

The Fall's New Games For Commodore, Apple, Atari, and IBM

COMPUTE!

\$2.95
October
1985
Issue 65
Vol. 7, No. 10
\$3.75 Canada
02193
ISSN 0194-357X

The Leading Magazine Of Home, Educational, And Recreational Computing

Atari 520 ST A Hands-On Report



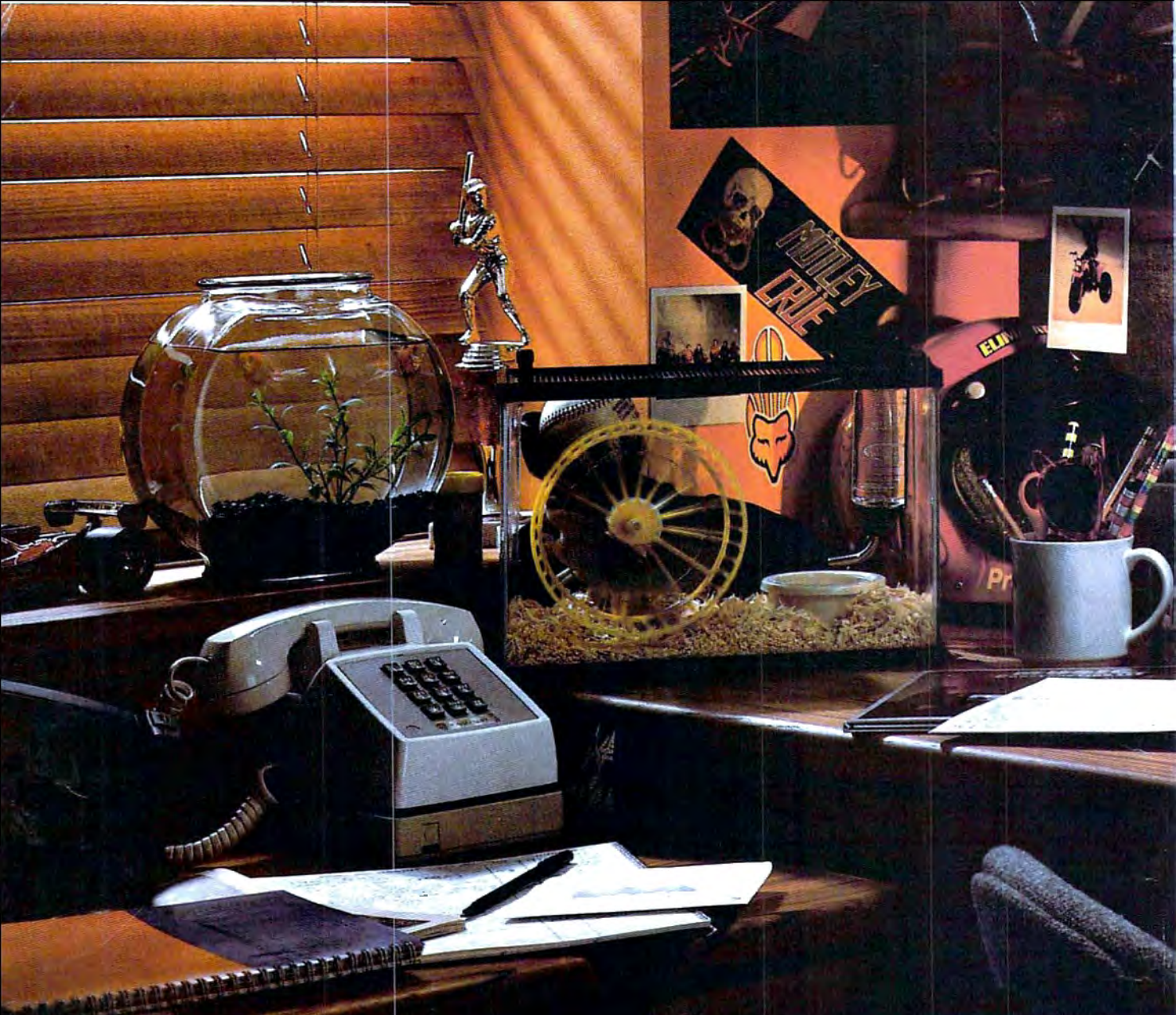
**The Commodore 1541
Save-With-Replace Bug:
Proof That It's Real
And How To Avoid It**

**The Witching Hour
Haunting Strategy Game
For Commodore 64, Atari,
Apple, IBM PC/PCjr,
TI-99/4A**

**Apple II
Pull-Down Menus
Add Mac-Style Features
To Your II+, IIe, IIc**

**Lightning Renumber
For Atari
Powerful Tool
For BASIC Programmers**





Why every kid should ha

Today, there are more Apples in schools than any other computer.

Unfortunately, there are still more kids in schools than Apples.

So innocent youngsters (like your own) may have to fend off packs of bully nerds to get some time on a computer.

Which is why it makes good sense to buy them an Apple® IIc Personal Computer of their very own.

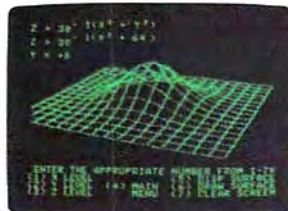
The IIc is just like the leading computer in education, the Apple IIe. Only smaller. About the size of a three-ring notebook, to be exact.

Of course, since the IIc is the

legitimate offspring of the IIe, it can access the world's largest library of educational software. Everything from Sticky-bear Shapes™ for preschoolers to SAT

preparation programs for college hopefuls,

which you might be interested in yourself. For example, 3-in-1 integrated business software. Home accounting and tax programs. Diet and fitness programs.



With a IIc, your kid can do something constructive after school. Like learn to write stories. Or learn to fly. Or even learn something slightly more advanced. Like multi-variable calculus.

preparation programs for college hopefuls.

In fact, the IIc can run over 10,000 programs in all. More than a few of

Not to mention fun programs for the whole family. Like "Genetic Mapping" and "Enzyme Kinetics."



ve an Apple after school.

And the Apple IIc comes complete with most everything you need to start computing in one box.

Including a free 4-diskette course to teach you how — when your kids get tired of your questions.

As well as a long list of built-in features that would add about \$800 to the cost of a smaller-minded computer. 128K of internal memory — twice the power of the average office computer. A built-in half-high 140K disk drive

that could drive up the price of a less-senior machine considerably.

And built-in electronics for adding accessories like a printer, a modem, an AppleMouse or an extra disk drive when the time comes.

So while your children's shoe sizes

and appetites continue to grow at an alarming rate, there's one thing you

know can keep up with them. Their Apple IIc.

To learn more about it, visit any authorized Apple dealer. Or talk to your own computer experts.

As soon as they get



In its optional carrying case, the IIc can even run away from home

home from school.

Earth will be destroyed in 12 minutes to make way for a hyperspace bypass. Should you hitchhike into the next galaxy? Or stay and drink beer?

Simply slip the disk in your computer and suddenly you are Arthur Dent, the dubious hero of *THE HITCHHIKER'S GUIDE TO THE GALAXY™* a side-splitting masterpiece of interactive fiction by novelist Douglas Adams and Infocom's Steve Meretzky. And every decision you make will shape the story's outcome. Suppose for instance you decide to linger in the pub. You simply type, in plain English:

>DRINK THE BEER

And the story responds:

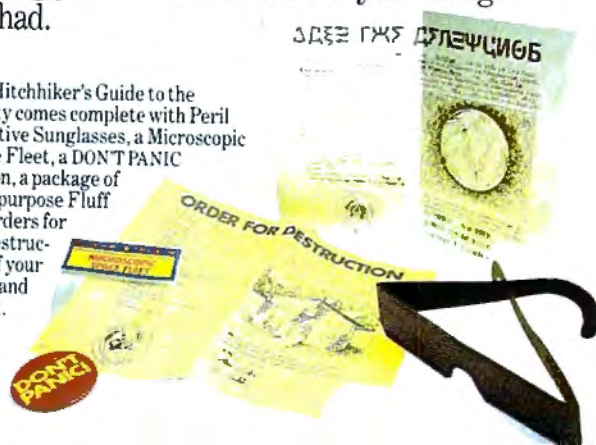
YOU GET DRUNK AND HAVE A TERRIFIC TIME FOR TWELVE MINUTES, ARE THE LIFE AND SOUL OF THE PUB, TELL SOME REALLY TERRIFIC STORIES, MAKE EVERYONE LAUGH A LOT, AND THEY ALL CLAP YOU ON THE BACK AND TELL YOU WHAT A GREAT CHAP YOU ARE AND THEN THE EARTH GETS UNEXPECTEDLY DEMOLISHED. YOU WAKE UP WITH A HANGOVER THAT LASTS FOR ALL ETERNITY. YOU HAVE DIED.

Suppose, on the other hand, you decide to:

>EXIT THE VILLAGE PUB THEN GO NORTH

In that case you'll be off on the most mind-bogglingly hilarious adventure any earthling ever had.

The Hitchhiker's Guide to the Galaxy comes complete with Peril Sensitive Sunglasses, a Microscopic Space Fleet, a DONT PANIC Button, a package of Multipurpose Fluff and orders for the destruction of your home and planet.



You communicate – and the story responds – in full sentences. Which means that at every turn, you have literally thousands of alternatives. So if you decide it might be wise, for instance, to wrap a towel around your head, you just say so:

>WRAP THE TOWEL AROUND MY HEAD

And the story responds:

THE RAVENOUS BUGBLATTER BEAST OF TRAAAL IS COMPLETELY BEWILDERED. IT IS SO DIM IT THINKS IF YOU CAN'T SEE IT, IT CAN'T SEE YOU.

But be careful about what you say. Or one moment you might be strapped down, forced to endure a reading of the third worst poetry in the galaxy; the next you could be hurtling through space with Marvin the Paranoid Android aboard a stolen spaceship.

And simply staying alive from one zany situation to the next will require every proton of puzzle solving prowess your mere mortal mind can muster. Even simple tasks can put you at wit's end:

>OPEN THE DOOR

And the story responds:

THE DOOR EXPLAINS, IN A HAUGHTY TONE, THAT THE ROOM IS OCCUPIED BY A SUPER-INTELLIGENT ROBOT AND THAT LESSER BEINGS (BY WHICH IT MEANS YOU) ARE NOT TO BE ADMITTED. "SHOW ME SOME TINY EXAMPLE OF YOUR INTELLIGENCE," IT SAYS, "AND MAYBE, JUST MAYBE I MIGHT RECONSIDER."



Other interactive science fiction stories from Infocom include PLANETFALL,™ in which you're stranded on a mysterious deserted world. STARCROSS,™ a puzzling challenge issued eons ago and light-years away. SUSPENDED,™ the race to stabilize an entire planet's life support systems. And A MIND FOREVER VOYAGING,™ a radically new work of serious science fiction in which you explore the future of mankind.



But don't panic. You'll be accompanied every light-year of the way by your trusty Hitchhiker's Guide, which you can always depend on for up-to-the-nanosecond information. Well, almost always:

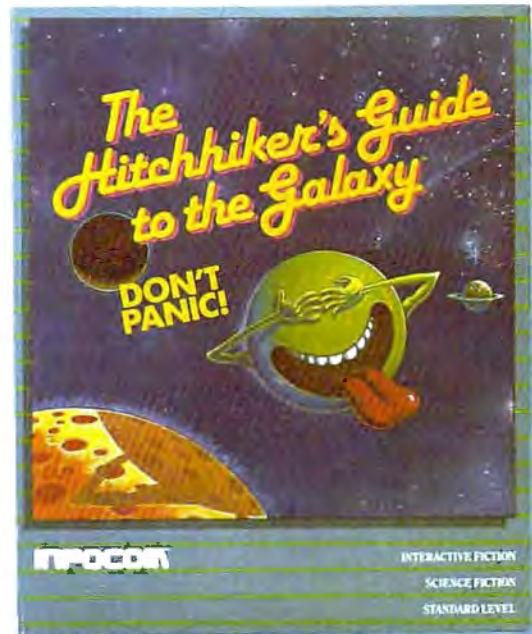
>CONSULT THE HITCHHIKER'S GUIDE ABOUT THE MOLECULAR HYPERWAVE PINCER

And the story responds:

SORRY, THAT PORTION OF OUR SUB-ETHA DATABASE WAS ACCIDENTALLY DELETED LAST NIGHT DURING A WILD OFFICE PARTY.

So put down that beer, take that towel off your head, open the door, hitchhike down to your local software store today and pick up THE HITCHHIKER'S GUIDE TO THE GALAXY. Before they put that bypass in.

Still not convinced? Try our Sampler Disk which includes portions of four different types of stories for a paltry \$7.95. If it doesn't get you hooked on the addictive pleasures of Infocom, return it for a full refund. If it does, you can apply the price toward any Infocom story. You can't lose!



INFOCOM

For more information call 1-800-262-6868.
Or write to us at 125 Cambridge Park Dr.,
Cambridge, MA 02140.

IF YOU CAN FIND A BETTER PROGRAM WE'LL BUY IT FOR YOU!*



WORD WRITER with Spell Checker

Now with 85,000 word Spelling Checker

- An efficient, 80-column professional word processing system which includes a spelling checker and built-in calculator.
- Contains all the features you'll need for everyday word processing, plus most of the sophisticated features found in more expensive programs: document chaining, form letter printout, page separations, horizontal and vertical scrolling, and more.

With Timeworks you get more power for your dollar

You can use each program alone. Or interface this trio – one at a time if you like – into a completely integrated productivity system that delivers all the power and features most of you will ever need . . . at a cost that lets you enjoy their use.

Look for these and other Timeworks programs at your favorite dealer. Or contact Timeworks, 444 Lake Cook Road, Deerfield, IL 60015. Phone: (312) 948-9200.

DATA MANAGER 2

Faster, more efficient, more versatile

- A complete general information storage and retrieval system with report-writing, graphics, statistics, and label-making capabilities.
- Exclusive X-SEARCH, X-SORT, and X-CHART features allow you to cross-search any category of information; sort items alphabetically, numerically, or by date; break down statistical information into categories; and graphically view your results.

With Timeworks you get more than software

You Get Our Customer Technical Support Team

At the other end of our toll-free hotline, you'll find our full-time Customer Technical Support Team. Free of charge to all registered users.

You Get Our Liberal Trade-Up Policy

You'll find the details inside each package.

SWIFTCALC with SIDEWAYS

New easy-to-use spreadsheet for home and small business use

- 250 rows and up to 250 columns (128K version) provide up to 62,500 cells (locations on the spreadsheet) in which to place information.
- Performs mathematical functions up to 17 digits. Allows the use of minimum and maximum values, averages, sums, integers, absolute values and exponential notation.

*With Timeworks you get our Money Back Guarantee

If you can find anything that works better for you, simply send us your Timeworks program, your paid receipt, and the name of the program you want, along with your check or credit card number for any retail price difference. If it's available, we'll buy it for you.**

Available for Apple, IBM, Commodore 64 and 128, and Atari Computers.***



More power for your dollar.

Other Timeworks Programs: ■ The Evelyn Wood Dynamic Reader ■ Sylvia Porter's Personal Finance Series ■ Swiftax ■ Cave of the Word Wizard ■ Business Systems ■ The Electronic Checkbook ■ The Money Manager ■ Wall Street

These programs interface with each other
Now available for Commodore 128

** Offer valid for 90 days from date of purchase.

*** Registered trademarks of Apple Computer, Inc., International Business Machines Corporation, and Commodore Computer Systems

© 1985 Timeworks, Inc. All rights reserved.

COMPUTE!

OCTOBER 1985
VOLUME 7
NUMBER 10
ISSUE 65

FEATURES

- 22 Atari 520ST: A Hands-On Report Tom R. Halfhill
28 Amiga Goes IBM-Compatible Tom R. Halfhill
32 The New Games Selby Bateman and Kathy Yakal
37 Expert Systems: Shortcut to Artificial Intelligence? Kathy Yakal
42 The Witching Hour Brian Flynn
59 Laser Beam for Atari and Commodore 64 Mike Greenfield

GUIDE TO ARTICLES AND PROGRAMS

•
•
•
•
AP/AT/V/64/
TI/PC/PCjr
AT/64

REVIEWS

- 69 *The Original Boston Computer Diet* Tony Roberts
74 *The Writer's Tool for Atari* Robert L. Riggs
76 *Karateka* James V. Trunzo
78 *1 Dir for IBM PC/PCjr* Arthur Leyenberger

AP/64/128/PC/PCjr
AT
AP/64/128
PC/PCjr

COLUMNS AND DEPARTMENTS

- 6 The Editor's Notes Tom R. Halfhill
10 Readers' Feedback The Editors and Readers of COMPUTE!
106 The World Inside the Computer:
More Adventures of Junior, the Robot Fred D'Ignazio
107 Computers and Society:
Of Babbages and Things David D. Thornburg
108 Telecomputing Today: The Latest Developments Arlan R. Levitan
109 IBM Personal Computing: Games People Play Donald B. Trivette
110 INSIGHT: Atari—Atari Disk Drive Compatibility Bill Wilkinson
112 The Beginner's Page: Clearing Up Variable Cloudiness Tom R. Halfhill
114 HOTWARE: Software Best Sellers
117 Programming the TI: Sprites in TI Extended BASIC C. Regena

•
•
•
•
•
PC/PCjr
AT
•
•
TI

THE JOURNAL

- 79 Save-with-Replace: Debugged at Last P. A. Slaymaker
84 Dynamic Keyboard for Commodore Machines, Part 1 Jim Butterfield
86 All About IBM Batch Files, Part 2 G. Russ Davies
90 64 Multicolor Graphics Made Easy James P. Hassett
95 Apple II Pull-Down Menus Lee Swoboda
98 Using the Atari 130XE and DOS 2.5 Tom R. Halfhill
100 Atari Animation with P/M Graphics, Part 2 Robert J. Powell
103 Lightning Renumber for Atari Raymond Citak

V/64/+4/16/128/P
V/64/+4/16/128/P
PC/PCjr
64
AP
AT
AT
AT

- 114 **CAPUTE! Modifications or Corrections to Previous Articles**
115 **MLX Machine Language Entry Program for Commodore 64**
128 **Classified**
128 **Advertisers Index**

AP Apple, Mac Macintosh,
AT Atari, V VIC-20, 64 Com-
modore 64, +4 Commodore
Plus/4, 16 Commodore 16,
128 Commodore 128, P
PET/CBM, TI Texas Instru-
ments, PC IBM PC, PCjr IBM
PCjr.
*General Interest.

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

COMPUTE! Publications, Inc.

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

Address all inquiries to:
P.O. Box 5406, Greensboro, NC 27403

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. POSTMASTER: Send address changes to: COMPUTE! Magazine, P.O. Box 10955, Des Moines, IA 50315. Second class postage paid at Greensboro, NC 27403 and additional mailing offices. Entire contents copyright ©1985 by COMPUTE! Publications, Inc. All rights reserved, ISSN 0194-357X.

Editor's Notes

This month's Editor's Notes are written by Tom R. Halfhill, Editor of COMPUTE!

—Robert C. Lock, Editor-In-Chief.

We received some interesting letters in response to our September 1985 Editor's Notes. As you may recall, it was argued that machine language (ML) will remain the dominant language for commercial software, even though many of the first programs appearing for the newest generation of personal computers—such as the Atari 520ST and Commodore Amiga—are written with compilers such as C. The argument was that ML is and always will be the computer's native language, and since higher-level languages run slower and consume more memory, they will always be superseded by ML for commercial software.

Here's a dissenting letter from reader Jeff O'Neil in Plano, Texas:

I feel there will continue to be a migration away from assembly language with more use of higher-level languages, such as C, for application programs. The driving force is programmer productivity—being able to quickly bring good products to the market and also being able to quickly port the same program from one machine to another. Languages such as C can be effectively used on the newer micros because of better compilers and because of the larger memories available. No longer do you have to spend an inordinate amount of time trying to squeeze the code into 64K. Assembly language will continue to be used for operating systems and compilers, but less and less for application programs.

While last month's Editor's Notes presented one side of the higher-level language discussion, Mr. O'Neil presents a point of view also shared by some editors.

One of the lessons of industrialization is that a machine will always take over a task from a person if it can do the work faster, better, or less expensively. A compiler, in effect, is a device that generates object code from the programmer's high-level source code. Because high-level code is easier to write, compilers make it possible for programmers to finish a program faster than if

they were writing in low-level ML to begin with. Certainly, none of the high-level compilers currently available can generate object code as good as that written by an experienced ML programmer using an assembler. But they don't have to. They need only be *good enough*.

For example, the vast majority of application programs announced to date for the 520ST and Amiga are written in compiled C. Potentially, they could be even better programs if written directly in ML. But it would take longer to write and debug the programs in ML, increasing development costs accordingly. To recover this larger investment in programmers' time, the software companies would be forced to charge a higher price or accept less profit. By transferring a task to a machine—in this case, using a compiler to generate the object code—they finished the job faster and still created good programs. That's the classic equation for greater productivity.

This principle has been demonstrated time and again for hundreds of years. In all probability, the clothes you wear, the car you drive, the furniture you own, the books you read, the TV set you watch, and so on were not painstakingly handmade by skilled craftsmen. Most of these things are manufactured largely by machines. Handmade versions are available, but top quality is not always the ultimate consideration. If it were, people would hire freelance programmers to write custom programs entirely in ML, no matter what the cost.

Furthermore, compilers are constantly being improved. Someday—especially if there are breakthroughs in the field of artificial intelligence—we may have compilers which generate object code that matches or even surpasses the code written by good ML programmers. At the very least, compiled languages will continue getting better, and the most time-critical routines can be rewritten in ML—just as many other products today are made partly by machine and partly by hand.

And don't forget another factor that affects programmer productivity—training time. The rapid pace of computer technology means that ML pro-

grammers have to master the instruction set of an entirely new chip every few years. But high-level languages can be implemented on any chip, so programmers only have to learn the language once.

The programmer productivity factor also is closely tied to marketability. If software companies invest the programmer time in writing all-ML programs, they risk missing a window of opportunity. And in the fast-moving world of personal computing, a few months can make or break a commercial program.

Portability, too, is related to productivity. If programmers can write a major program in a high-level language and translate it for noncompatible computers with a minimum of fuss, they can double or triple the potential market and reap a higher return on their time.

For a preview of what's to come, look at the world of minicomputers and mainframes. Application programming is increasingly done in high-level languages. As personal computers keep growing more powerful, we too will see more and more application software written in high-level languages instead of ML. The extra horsepower built into the machines will make it less necessary for people to spend tedious hours building extra horsepower into the programs.

Computers are boosting productivity and reducing sweatwork in hundreds of occupations; why should computer programming be any different?

COMPUTE! is looking for utilities, games, applications, and tutorial articles. If you've created a program that you think other readers might enjoy or find useful, send it on tape or disk to:

*Submissions Reviewer
COMPUTE!
P.O. Box 5406
Greensboro, NC 27403*

Please enclose an SASE if you wish to have the materials returned. Articles are reviewed within four weeks of submission.

SCENERY DISKS *for* FLIGHT SIMULATOR II



SubLOGIC Scenery Disks expand the potential flying environment of Flight Simulator II and Microsoft Flight Simulator.

Twelve separate Scenery Disks cover the entire continental United States. Each disk covers a geographical region of the country, and includes the major airports, radio-navaids, cities, highways, rivers, and lakes located in that region. Enough detail is available on each disk for either visual or instrument cross-country navigation.

A STAR Scenery Disk (available 4th quarter 1985) covers a smaller area with a relatively dense amount of scenery. STAR Scenery Disks are primarily intended for visual flight sight-seeing. They include buildings and landmarks, as well as detailed renditions of all major airports in the area.

Individual Scenery Disk price: \$19.95
Western U.S. (Disks 1-6): \$99.95
— Coming Soon —
Eastern U.S. (Disks 7-12): \$99.95

See Your Dealer . . .
or write or call for more information. For direct orders please specify which disk or disk-set you want. Enclose the correct amount plus \$2.00 for shipping (\$6.00 for the six-disk set) and specify UPS or first class mail delivery. Visa, MasterCard, American Express, and Diners Club cards accepted.

Commodore 64 is a trademark of Commodore Electronics Ltd.
IBM is a registered trademark of International Business Machines Corp.

For the Commodore 64™ and IBM PC®





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

Order Line: (800) 637-4983
(except in Illinois, Alaska, and Hawaii)

Publisher	James Casella
Editor in Chief	Robert C. Lock
Director of Administration	Alice S. Wolfe
Senior Editor	Richard Mansfield
Managing Editor	Kathleen Martinek
Editor	Tom R. Halthill
Assistant Editor	Phil Nelson
Production Director	Tony Roberts
Production Editor	Gail Cowper
Editor, COMPUTE!'s GAZETTE	Lance Eiko
Technical Editor	Ottis R. Cowper
Assistant Technical Editors	John Krause, George Miller
Program Editor	Charles Brannon
Features Editor	Selby Bateman
Assistant Editor, COMPUTE!'s GAZETTE	Todd Heimarck
Feature Writer	Kathy Yakal
Programming Supervisor	Patrick Parrish
Editorial Programmers	Tim Victor, Kevin Mykvtyn, Kevin Martin
Submissions Reviewer	Mark Tuttle
Programming Assistant	David Florance
Copy Editors	Joan Rouleau, Ann Davies
Executive Assistant	Susan Young
Administrative Assistants	Julia Fleming, Iris Brooks, Jan Kralow
Associate Editors	Jim Butterfield Toronto, Canada Harvey Herman Greensboro, NC Fred D'Ignazio Roanoke, VA David Thornburg Los Altos, CA Bill Wilkinson
Contributing Editor	Bill Wilkinson
COMPUTE!'s Book Division	
Editor	Stephen Levy
Assistant Editors	Gregg Keizer, J. Blake Lambert
Administrative Assistant	Laura MacFadden
Director, Book Sales & Marketing	
Assistant	Steve Vayatzis Carol Dickerson
Production Manager	Irma Swain
Art & Design Director	Janice R. Fary
Assistant Editor, Art & Design	Lee Noel
Mechanical Art Supervisor	De Potter
Artists	Debbie Bray, Dabney Ketrav
Typesetting	Terry Cosh, Carole Dunton
Illustrator	Harry Blair
Director of Advertising Sales	Ken Woodard
Production Coordinator	Patti Stokes
Administrative Assistant	Kathleen Hanlon
Promotion Assistant	Caroline Dark
Customer Service Manager	Philippa King
Dealer Sales Supervisor	Gail Jones
Assistants	Liz Krusenstjerna, Rhonda Savage
Individual Order Supervisor	Judy Taylor
Assistants	Betty Atkins, Gayle Benbow, Mary Hunt, Jenna Nash, Chris Patty
Warehouse Manager	Lannie Arden
Staff	Harold Ayers, Steve Bowman, Larry O'Connor, David Hensley
Data Processing Manager	Leon Stokes
Assistant	Chris Can
Vice President, Finance & Planning	Paul J. Megliola
Director, Finance & Planning	R. Steven Vetter
Accountant	Robert L. Bean
Financial Analyst	Karen K. Rogalski
Staff	Dale Branch, Jill Pope
Credit Manager	Barry L. Beck
Staff	Sybil Agee, Anne Ferguson, Pat Fuller, Doris Hall, Linda Miller, Mary Waddell, Jane Wigg
Purchasing Manager	Greg L. Smith

Robert G. Burton, President
 Paul J. Megliola, Vice President, Finance and Planning
 Debi Nash, Executive Assistant
 Anita Armfield, Assistant

Member

 Magazine Publishers Association

Member

 Audit Bureau of Circulations

Coming in Future Issues

**Skyscape
 Astronomy Program For
 Commodore 64, Atari, Apple,
 IBM PC/PCjr, TI**

**Amiga's Amazing Graphics
 Puzzler
 Challenging Game For
 Commodore 64, VIC-20,
 Plus/4, 16, Atari, Apple, IBM
 PC/PCjr, TI**

**Commodore 64 3-D
 Animated Graphics
 Adding TIME\$ To Atari BASIC**

**IBM Graphics On A
 Monochrome Monitor**

COMPUTE! Publications, Inc. publishes:

COMPUTE!
 GAZETTE

COMPUTE! Books
 COMPUTE!'s
 GAZETTE DISK

Corporate office:
 324 West Wendover Avenue
 Suite 200
 Greensboro, NC 27408 USA

Mailing address: COMPUTE!
 Post Office Box 5406
 Greensboro, NC 27403 USA
 Telephone: 919-275-9809

Subscription Orders

COMPUTE!
 P.O. Box 10955
 Des Moines, IA 50950

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

**COMPUTE! Subscription Rates
 (12 Issue Year):**

US (one yr.) \$24
 (two yrs.) \$45
 (three yrs.) \$65

Canada and Foreign
 Surface Mail \$30
 Foreign Air
 Delivery \$65

Advertising Sales



1. New England
 Jonathan M. Just
 Regional Manager
 212-315-1665

2. Mid Atlantic
 John Saval
 Eastern Advertising
 Manager
 212-315-1665
 Kathy Hicks
 Marsha A. Gittelman
 215-646-5700
 Brian S. Rogers
 212-674-0238

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

4. Midwest
 Gordon Benson
 312-362-1821
 Kathy Hicks
 Marsha A. Gittelman
 215-646-5700
 Brian S. Rogers
 212-674-0238

**5. Northwest/
 Mountain/Texas**
 Phoebe Thompson
 408-354-5553

6. Southwest
 Ed Winchell
 213-378-8361

Director of Advertising Sales
 Ken Woodard

COMPUTE! Home Office 919-275-9809.

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

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 send an exact copy of your subscription label to COMPUTE! P.O. Box 10955, Des Moines, IA 50950. Include a note indicating your preference to receive only your subscription.

Authors of manuscripts warrant that all materials submitted to COMPUTE! are original materials with full ownership rights resident in said authors. By submitting articles to COMPUTE!, authors acknowledge that such materials, upon acceptance for publication, become the exclusive property of COMPUTE! Publications, Inc. No portion of this magazine may be reproduced in any form without written permission from the publisher. Entire contents copyright © 1985, COMPUTE! Publications, Inc. Rights to programs developed and submitted by authors are explained in our author contract. Unsolicited materials not accepted for publication in COMPUTE! will be returned if author provides a self-addressed, stamped envelope. Programs (on tape or disk) must accompany each submission. Printed listings are optional, but helpful. Articles should be furnished as typed copy (upper- and lowercase, please) with double spacing. Each page of your article should bear the title of the article, date and name of the author. COMPUTE! assumes no liability for errors in articles or advertisements. Opinions expressed by authors are not necessarily those of COMPUTE!.

PET, CBM, VIC-20 and Commodore 64 are trademarks of Commodore Business Machines, Inc. and/or Commodore Electronics Limited
 Apple is a trademark of Apple Computer Company
 IBM PC and PCjr are trademarks of International Business Machines, Inc.
 ATARI is a trademark of Atari, Inc.
 TI-99/4A is a trademark of Texas Instruments, Inc.
 Radio Shack Color Computer is a trademark of Tandy, Inc.

NEW
FOR
YOUR

apple



personal computer

MacOffice: Using the Macintosh for Everything

Sharon Aker Paul Freiberger Arlan Levitan
Selby Bateman Vahé Guzelimian Dan McNeill
Charles Brannon

This newest release from COMPUTE! Books shows you how to get the most out of your Macintosh and software. Practical demonstrations teach you how to fully utilize several commercially available programs, such as Microsoft's *Word*, *Chart*, *File*, and *Multiplan*, Apple's *MacTerminal*, and others. You'll see how to:

- Create form letters with *Word*,
- Use *Multiplan* for your accounting,
- Share information between offices with *MacTerminal*.

Here are the ins and outs, hints and tips on how to use each program most efficiently, and previously undocumented techniques.

Extensively illustrated with actual Macintosh-created documents and graphics, *MacOffice* shows you how you can integrate programs, let them share information, making it even easier to manage your business with a computer. You'll also learn about networks—where computers, printers, and other devices are connected to create an office-wide working environment—with details on how to create a network, and what to look for in network software.

\$18.95 ISBN 0-87455-006-8

MacOffice

Using the Macintosh
for Everything



Inside information, practical applications, and hints and tips on the Macintosh show you how to use Microsoft's *Word*, *File*, *Chart*, *Multiplan*, and *MacTerminal* to turn your office into a more efficient workplace.

Edited by Gregg Kiefer

• COMPUTE! Books Publication

\$18.95



Look for these new titles at your local book or computer stores or order directly from COMPUTE! Books.

COMPUTE!'s
SECOND BOOK
OF

Apple

Ready-to-use home applications, powerful graphics programs, fast action games, quality educational tools, and a wide range of programming utilities for the Apple II+, IIe, and IIc computers.

A COMPUTE! Books Publication \$12.95

COMPUTE!'s Second Book of Apple

Edited

With over 30 programs, this collection for Apple II+, IIe, and IIc owners contains arcade-style games, games of logic and education, applications, graphics generators, and programming utilities. Compiled from the most recent issues of *COMPUTE!* magazine and *COMPUTE!'s Apple Applications Issue*, these programs include dazzling graphics, high-speed game play, and valuable programming techniques. All the programs are ready to type in.

Applications calculate your financial situation and turn your computer into a remote terminal for accessing sophisticated databases. Action games put you in a jet fighter and in a bowling alley. Educational games range from a five-level chess game to a program which lets you write quizzes on any subject. Graphics and programming utilities help you design custom graphics or put a RAM disk in your IIc.

\$12.95 ISBN 0-87455-008-4

There is also a disk available which includes the programs in the book. You can order this disk directly from COMPUTE! for only \$12.95 plus \$2.00 shipping charges.

COMPUTE! Books are available in the U.K., Europe, the Middle East, and Africa from Holt Saunders, Ltd., 1 St. Anne's Road, Eastbourne, East Sussex BN 21 3UN England.

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

To order, call toll-free 800-334-0868 (in NC 919-275-9809) or mail your payment (including \$2.00 shipping charges) to COMPUTE! Books, P.O. Box 5058, Greensboro, NC 27403.



Readers Feedback

The Editors and Readers of COMPUTE!

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

Files And Programs

What is a file, and what is the difference between a program and a file? When I try to erase a program on disk, my disk drive sometimes gives me a FILE NOT FOUND message.

Kevin Cullen

A file is any collection of data (information) stored permanently on disk or tape, or temporarily in the computer's memory. In many cases, a computer file is the electronic equivalent of a manila file folder: It stores data you create with a computer. Word processing programs store words in files, spreadsheets make files containing numbers, and so on. In that sense, a file may seem very different from a program, which is a set of instructions the computer can load into memory and run. But programs are just a special kind of data—letters, numbers, and other symbols arranged in a pattern the computer understands. Thus, a program stored on disk is a file containing computer instructions rather than some other kind of data. When the disk drive signals FILE NOT FOUND, file is used in a general sense that includes programs along with other kinds of data.

Although these broad definitions apply to all computers, be alert for additional, narrower meanings that apply only to your system or in specific situations. For instance, opening a file to a printer usually means you are opening a communications channel to that device. In Commodore disk parlance, a program file is any file with a certain format (different from sequential or relative format), and so on. When in doubt, consult the user's guide for your equipment and pay close attention to the context in which the word is used.

Apple ProDOS Conversions

I have an Apple IIe and would like to

use the "Renumber" program on the DOS 3.3 System Master disk. However, I like ProDOS better for programming, and most of my files are on ProDOS disks. I can copy the program to ProDOS, but it won't run properly. How can I make this program work in ProDOS?

Bruce Bohm

The general rule for transporting programs between DOS 3.3 and ProDOS is that BASIC programs usually work and machine language (ML) programs usually don't. Since the "Renumber" program you mention is stored as an Applesoft BASIC file, you would expect it to work with ProDOS. The reason it doesn't is that Renumber is a hybrid program: In addition to BASIC instructions, it contains a substantial machine language routine. When you run Renumber, the BASIC portion prints instructions for using the program, then calls the ML routine to do the real work. Though the BASIC part would probably work with ProDOS, the ML section is incompatible.

In short, there's no way to make Renumber work in ProDOS without rewriting its machine language section. But you do have an alternative. On the example disk included with "BASIC Programming with ProDOS" (available from Apple dealers) is a program called "Applesoft Programmer's Assistant." One of its features is a renumber command that's very similar to the DOS 3.3 Renumber program. The instruction manual for this package is very helpful by itself—especially if you learned Applesoft BASIC with DOS 3.3 and want to learn what's different about ProDOS—and the programs on the example disk are quite useful as well.

Datassette Adapter

I have found an adapter that lets me use my old Commodore Datassette with the newer Plus/4 or 16 computers. It is available from the following company for less than \$20:

Rabbitts Software Company
P.O. Box 1192
Cleveland, Ohio 44111
(216) 252-2214

Gary Sawitzke

We appreciate the information. Incidentally, the C2N Datassette designed for the

VIC-20 and 64 works just fine on the Commodore 128, in 128 mode as well as 64 mode.

Saving Atari Screens

I am currently working on an Atari program that lets me create high-resolution drawings in graphics mode 8. However, it lacks one important function. How do you save and reload a graphics screen? I have an 800XL and 1050 disk drive.

Albert Newball

The following program uses the computer's input/output routines to save a block of memory. To use it, put lines 1-2 at the start of your program. These lines create a short machine language routine in memory page 6. Line 10 shows how to save or load a screen. Set the variable NAME\$ equal to the name of the file you want to save or load (include D: for disk or C: for cassette). Set the variable AUX to 4 when you want to load a graphics screen, or set AUX to 8 to save a screen. Once NAME\$ and AUX are defined, GOSUB 1000 does the job.

```
EO 1 DIM NAME$(15):FOR A=153
  6 TO 1542:READ B:POKE A
  ,B:NEXT A
CC 2 DATA 104,104,104,170,76
  ,86,228
OL 10 NAME$="D:NAME":AUX=4:G
  OSUB 1000:END
CO 1000 OPEN #1,AUX,0,NAME$
KE 1010 POKE 852,PEEK(88):PO
  KE 853,PEEK(89):POKE
  856,220:POKE 857,30
  :POKE 850,AUX+3
PC 1015 A=USR(1536,16)
KH 1020 CLOSE #1:RETURN
```

You can use this routine in other graphics modes by changing the values POKED into locations 856 and 857 in line 1010. Determine the total number of bytes used for the screen in that graphics mode, then break the number down into low byte/high byte format. POKE 856 with the low byte value and POKE 857 with the high byte. The following line shows how to convert the value of the variable VA into low byte (LO) and high byte (HI) values:

```
HI=INT(VA/256):LO=VA-(HI*256)
```




THE BETTER LETTER BOX

Introducing EasyPlex™. The new, easy-to-use electronic mail system from CompuServe.

Finally! Electronic Mail that's so easy to use you can start composing and sending messages the first time you get online.

Designed for various experience levels, EasyPlex has a menu mode with simple, easy-to-follow directions for beginners, and it lets experienced users save time by working in the prompt or command modes. With EasyPlex, you can compose, edit, send, file, and take advantage of sophisticated

options previously available only with more expensive services.

CompuServe's EasyPlex lets friends and relatives, associations and club members communicate any time of the day or night. And small business owners, real estate professionals, insurance agents, lawyers, writers, etc. can communicate quickly and simply—either interoffice or interstate. "It's Easy." "Just Plex it!"

Best of all, EasyPlex is available to all CompuServe subscribers. And, along with EasyPlex, you get hundreds of valuable and entertaining computing options. Plus the assurance of belonging to the largest, fastest

growing computer information service in the world and the premier supplier of business information to FORTUNE 500 companies.

Start communicating! To buy a CompuServe Subscription Kit, see your nearest computer dealer. To receive our informative brochure or to order direct, call or write:

CompuServe®

Information Services, P.O. Box 20212
5000 Arlington Centre Blvd., Columbus, Ohio 43220

800-848-8199

In Ohio, call 614-457-0802

An H&R Block Company

ANNOUNCING THE FAMILY SOFTWARE SPECTACULAR.™

BUY 3, GET 1 FREE.

CHOOSE FROM OVER 50 LEADING TITLES.

What do you call an offer that brings together, for the first time ever, five leading brands of home software?

The Family Software Spectacular!

And it's your opportunity to choose a *free* software program from the best titles on the market today. All you have to do is buy any combination of three titles from any participating brands during this special offer period. And we'll send you another one of your choice – *free!*

It's a one-of-a-kind value your family shouldn't miss.

FISHER-PRICE.® A NAME YOU CAN TRUST.

For years Fisher-Price has been known for helping children develop skills as they play. With Fisher-Price™ Learning Software, your child can develop skills in five key areas: math, language, creativity, basic learning and computer literacy.

Your child will love developing and testing language skills with the help of PETER RABBIT READING, a program that uses voice to teach sound and letter recognition in words.

WINDHAM CLASSICS.™ CLASSIC NOVELS COME TO LIFE.

Pick up Windham Classics, graphic interactive fiction based on some of the greatest adventures of all time.

They're great for kids, yet fun for all ages.

Enjoy "THE WIZARD OF OZ.™" You are Dorothy, and each of your decisions determines your adventure.

There's more than one adventure to be had as you meet old friends and new in the land of Oz.

WORK BETTER WITH BETTER WORKING.™

Constantly erasing and retyping? Unsure of your spelling? WORD PROCESSOR WITH SPELLCHECKER is exactly what you need. This full featured word processor includes the 50,000 word AMERICAN HERITAGE DICTIONARY™ spellchecker which detects over 99% of misspelled words.

The full line also includes FILE & REPORT and SPREADSHEET – titles that represent the best values on the market today.



**SPINNAKER® THE LEADER IN
FAMILY LEARNING SOFTWARE.**

From pre-school counting to high-school compositions, Spinnaker offers the high quality educational programs you have come to expect. For example, there's the HOMEWORK HELPER™ series which provides step-by-step methods for improving writing and math skills and helps kids tackle otherwise troublesome school assignments.

**TELARIUM.™
INTERACTIVE FICTION AT ITS BEST.**

Here's graphic interactive fiction by famous writers of science fiction, fantasy, and mystery like Ray Bradbury, Arthur

C. Clarke and Erle Stanley Gardner. Each story unfolds with you in the center of the action – and completely in control. In PERRY MASON: THE CASE OF THE MANDARIN MURDER,™ you are the world famous criminal lawyer. Challenge the evidence. Cross-examine the witness. Only you can prove your client's innocence. And time is running out.

A SOFTWARE OFFER FOR ALL AGES.

Any software offer including something for everyone in the family is certainly fantastic. But combine that with a free product offer and what you have is something spectacular. Look for the specially marked boxes of The Family Software Spectacular at your retailer.

The Family Software Spectacular™



**TURN PAGE FOR MORE INFORMATION ON THE FAMILY
SOFTWARE SPECTACULAR. →**

© 1985 SSC, One Kendall Square, Cambridge, MA 02139. All rights reserved. Titles available on most popular home computers. Spelling Software developed by Houghton Mifflin Company, publishers of the *American Heritage Dictionary*.

THE FAMILY SOFTWARE SPECTACULAR is a trademark of Spinnaker Software Corp. SPINNAKER is a registered trademark of Spinnaker Software Corp. FISHER-PRICE is a trademark of The Quaker Oats Company and is used under license. WINDHAM CLASSICS is a trademark of Windham Classics Corp. TELARIUM is a trademark of Telarium Corp. BETTER WORKING is a trademark of Spinnaker Software Corp.

[SEE PREVIOUS PAGE]

HERE'S HOW YOUR FAMILY CAN PARTICIPATE IN

The Family Software Spectacular™

REMEMBER, TO RECEIVE A FREE PRODUCT YOU MUST PURCHASE ANY THREE TITLES FROM THE PARTICIPATING BRANDS (IN ANY COMBINATION) AND MAIL YOUR ENTRY NO LATER THAN JANUARY 31, 1987.

1. Start by saving the receipt(s) from your software program purchases. (It is not necessary for software purchases to appear on one receipt. Photocopies of the receipt(s) are accepted. Receipts must be dated BETWEEN JULY 1, 1985, AND JANUARY 31, 1987.)
2. Cut the proof-of-purchase tab from each of the three user manuals that come with the programs. (Photocopies not accepted.)
3. Attach the purchase receipt(s) and the three original proof-of-purchase tabs to one separate sheet of paper.
4. Fill in the form below and place the completed form in an envelope with:
 - a. A sheet of paper with three original proof-of-purchase tabs and your purchase receipt(s)
 - b. A check or money order for \$3.50 to cover postage and handling. (Canada residents please send \$5.00 for postage and handling.)

Make check payable to THE FAMILY SOFTWARE SPECTACULAR and mail envelope to:

THE FAMILY SOFTWARE SPECTACULAR
P.O. Box 1327, Cambridge, MA 02238

ORDER FORM

To receive your free program, this form must be filled out completely. Please print.

Free Product Chosen:

Title/Brand _____

Computer/Model _____

MAKE SURE THE PRODUCT YOU CHOOSE IS AVAILABLE ON THE COMPUTER SYSTEM YOU HAVE SELECTED.

Name _____

Phone (____) _____

Address _____

City _____ State _____ Zip _____

TITLES PURCHASED

1. _____

2. _____

3. _____

BRANDS DATE OF PURCHASE

1. _____ 1. _____

2. _____ 2. _____

3. _____ 3. _____

Allow 6-8 weeks for delivery of your free software program. Note: All receipts and envelope postmark must be dated prior to January 31, 1987. Offer good in the US and Canada only. Void where taxed, restricted or prohibited by law.

Too Many Caesars

I own two Commodore computers and a 1541 disk drive. I would like to connect both computers to the drive at once (of course, I would only send disk commands from one computer at a time). Everything works fine when only one computer is turned on, but when I turn on the second one, the first computer does a cold start. When I try to send disk commands from either computer, the entire system seems to lock up. Is there any way to accomplish what I'm trying to do?

Charles Mitchell

Since you can connect more than one peripheral to a single computer, you might expect the reverse to be true. Why can't two computers share the same drive? The answer reveals a fundamental difference between a computer and peripheral devices such as disk drives and printers. The computer is designed to act as "absolute ruler" of the system. It not only sends and receives information (as peripherals can do), but also sends commands that control the whole system. Plugging two computers into the same disk drive is like creating a Rome with two Caesars: Each computer acts like the only commander in existence, and the system becomes confused.

In the first case you describe, turning on the second computer sends a normal reset command to every device in the system—including the second computer, which responds as if it had reset itself. Sending a disk command (which goes to the other computer as well as the drive) makes things even worse. Serial communications require a complex exchange of "handshaking" signals between computer and peripheral to make sure one doesn't send data until the other is ready, and vice versa. Since the second computer isn't designed to respond as a peripheral, it can't complete the handshake and crashes the entire system.

One makeshift way to do what you want is to unplug the serial cable from one computer whenever you want to use the other. However, we definitely don't recommend this as a regular practice. The serial port connectors aren't designed for such heavy use, and you run the risk of sending garbage signals along the line. For long-term use you may want to buy a switching box which cleanly disconnects one computer from the serial bus before connecting the other.

ACCEPT On TI

I have a problem using ACCEPT on my TI-99/4A with Extended BASIC. When I try to enter numeric input with ACCEPT and accidentally press ENTER before any input, the screen scrolls

and I get an error message. Is there any way I can avoid this without using the CALL KEY statement?

Jory Rannow

The following program illustrates one solution to your problem:

```
100 CALL CLEAR
110 DISPLAY AT(1,1): "ROW
#1"
120 ACCEPT AT(2,1) VALIDAT
E (NUMERIC): X$
130 IF X$="" THEN 120
140 X=VAL(X$)
150 PRINT X
```

After this program clears the screen, line 110 prints a message on line 1 so you can tell whether scrolling occurs. Line 120 takes in numeric input (numerals 0-9, period symbol, plus symbol, minus symbol, or E) and accepts the input as X\$. If at this point you hit ENTER by mistake, line 130 sends you back for another try without scrolling the screen. Once you've entered a value, line 140 converts it from a string into the numeric variable X.

Unwanted Commodore Messages

I have written a machine language routine that loads several program modules into the Commodore 64 from disk. However, the computer prints the usual SEARCHING FOR and LOADING messages during every load. How can I prevent these messages from appearing on the screen?

Allen Kotomski

These messages are generated by the 64's operating system, which controls input/output functions. Since Commodore calls the operating system the Kernal, they're known as Kernal control messages. One easy way to mask them is to change the character color to the same color as the screen background. The messages then print invisibly on the screen. However, since they may overprint an existing display or cause the screen to scroll, it's usually better to suppress them altogether.

Location \$9D (157 decimal) holds a flag that tells the 64 what type of messages to display. When the flag contains 128 (bit 7 is set to 1), the computer prints Kernal control messages to tell you when it's searching, loading, saving, or verifying. When bit 7 is set to 0, control messages are not displayed. Though you rarely see them when using BASIC, the Kernal also has its own set of error messages. For instance, the Kernal equivalent of BASIC's FILE NOT FOUND message is I/O ERROR #4. Location \$9D controls Kernal error messages as well: They're displayed when the flag contains 64 (bit 6 is set to 1), and suppressed when bit 6 is clear.

Imagine...

**A WORD PROCESSING PROGRAM!
AN INFORMATION MANAGEMENT PROGRAM!
A TELECOMMUNICATIONS PROGRAM!**

ALL THREE PROGRAMS, ON ONE DISKETTE!, FOR ONLY \$49.95*!

"Quite simply the best! The highest rating possible... the package should be part of every (computer) library." — ANALOG COMPUTING

"Russ Wetmore has done an EXCELLENT job! The program is flexible, powerful and very easy to use. \$49.95 buys a heck of a lot of program." — REVIEW BY ARTHUR LEYENBERGER

"Performance: ★ ★ ★ ★ (Excellent) Value: ★ ★ ★ ★ (Excellent)

This three-in-one package is a bargain... one of the finest values on the market."

FAMILY COMPUTING

HOMETEXT WORD PROCESSOR.
HOMEFIND INFORMATION MANAGER.
HOMETERM TELECOMMUNICATIONS

Together they are **HomePak**: the three most important and most useful home computer applications in one integrated system — on one diskette!

The reviewers are unanimous: any one of these programs **alone** is well worth the price. So you're getting **three times the computing power**, with this exceptionally easy to use package:

- all commands in simple English; no complex computer jargon, no obscure instructions
- all key commands are immediately available on the screen menu; additional commands can be called up for the more experienced user
- to help you, system status is displayed right on the screen

And it's easy to use the three programs together. For example, in the "Merge" mode, you can take data stored in **HOMEFIND** and print letters and labels using **HOMETEXT**. Or, use **HOMETEXT** to write reports based on information you've called up via **HOMETERM**.



BATTERIES INCLUDED



"The Energized Software Company!"

WRITE TO US FOR FULL COLOUR CATALOGUE of our products for COMMODORE, ATARI, APPLE and IBM SYSTEMS

FOR TECHNICAL SUPPORT OR PRODUCT INFORMATION PLEASE PHONE (416) 881-9816

MANUFACTURERS SUGGESTED U.S. LIST PRICE

EACH COMPUTER SYSTEM MAY REQUIRE ACCESSORY DEVICES SUCH AS MODEMS, PRINTERS OR CARDS TO UTILIZE SPECIFIC FEATURES OF HOMEPAK. SEE YOUR DEALER FOR DETAILS.

© 1985 BATTERIES INCLUDED. APPLE, ATARI, COMMODORE AND IBM ARE REGISTERED TRADEMARKS RESPECTIVELY OF APPLE COMPUTERS INC., ATARI INC., COMMODORE BUSINESS MACHINES INC., AND IBM BUSINESS MACHINES INC.

For
COMMODORE 64
ATARI
APPLE IIe/c AND IBM PC

30 Mural Street
Richmond Hill, Ontario
L4B 1B5 CANADA
(416) 881-9941
Telex: 06-21-8290

17875 Sky Park North, Suite P
Irvine, California
USA 92714
(416) 881-9816
Telex: 509-139

HOW NOT AN ENDANG



The Creation of a Transistor

The dra...



Computer Basics

TO BECOME ERED SPECIES.

As more and more of our daily activities become "computerized," survival of the fittest will come down to this: Those who become successful will share a common understanding—a knowledge of computers.

That's why TIME-LIFE BOOKS brings you this brand new series. UNDERSTANDING COMPUTERS does what was once thought impossible. Help us understand how computers do the impossible.

Through straightforward language (no "computerese") and easy-to-follow illustrations, UNDERSTANDING COMPUTERS tells you what computers really are.

How to think about them. And how they can make your life easier—from where you work to where you work out.

Starting with *Computer Basics*, you'll get a thrilling "inside view" of what happens inside that incredible black box.

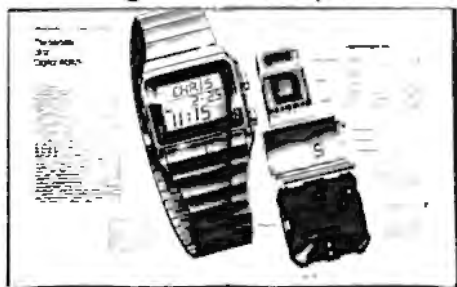
You'll discover how everything a computer does can be reduced to a simple 'ON' or 'OFF,' like a switch. And you'll learn how computers can be taught everything from predicting the weather to teaching a foreign language to reducing your heating bills.

Step by step, your understanding will grow, until

you find yourself confident and at home in the Computer Age.

So end all your wondering and enjoy the wonder of it all. Examine *Computer Basics* FREE for 10 days. If you aren't satisfied, send it back and owe nothing. Otherwise keep it and pay just \$12.95 (\$15.95 in Canada) plus shipping and handling. Future volumes will come one about every other month. Same free trial. Keep only the books you want. Cancel anytime.

Mail the coupon today. And see how easy understanding computers can be.



EXAMINE COMPUTER BASICS FOR 10 DAYS FREE.

If card is missing, mail to Time-Life Books, Time & Life Bldg., Chicago, IL 60611
Yes! Please send me *Computer Basics* for 10 days' free examination. Also send me future UNDERSTANDING COMPUTERS volumes under the terms described in this ad
D1AJ32

name _____

address _____ apt. _____

city _____

state or province _____ zip or postal code _____

All orders subject to approval. Price subject to change.

TIME
LIFE
BOOKS

UNDERSTANDING COMPUTERS

Thus, the machine language statement LDA #00:STA \$9D suppresses all Kernal messages. This is the normal condition when a BASIC program is running. LDA #80:STA \$9D displays only the control messages (the normal condition when you're in BASIC direct mode), and LDA #40:STA \$9D displays only the special Kernal error messages. Note that Commodore computers also have a built-in routine (SETMSG, accessed at \$FF90) to set the Kernal message control flag. To use it, load the accumulator with the value you want to put in location \$9D, then JSR \$FF90.

Atari Disk RAM?

I have an Atari 600XL and 1050 disk drive. My 600XL has 16K RAM. Does my disk drive add any RAM to the computer? If so, how much does it add?
Doug Howard

Strictly speaking, you lose some usable computer memory when operating an Atari (or most other computers) with a disk drive. To use the drive, you must load DOS (the Disk Operating System) into memory. DOS is a machine language program that on the Atari is roughly 6K long. Therefore, when DOS is present, you lose memory that's otherwise available.

However, in a broader sense the disk drive expands system memory tremendously. A disk drive lets you run much larger programs (and process much more data) than the computer could otherwise handle. For example, a program that's too big to fit into memory can be broken into two separate parts or modules. When the first program module is finished, it loads and runs the second module. The second module could in turn load a third, and so on. Since the program modules link themselves together as they go, this technique is often called chaining.

Though many BASIC programs store data within the program itself (usually in DATA statements), you can also store data outside the computer in a disk file. An Atari 1050 drive with DOS 2.5 or 3.0 stores about 126K of data on each disk. An 810 drive (or 1050 drive with DOS 2.0 or 2.5 formatted for single density) stores about 88K on a disk. Of course, the computer's memory can't hold that much data all at once. But it can access parts of it whenever it wants. When one disk fills up with data, you start filling another, and so on. In this sense, a disk drive extends system memory to infinity.

Multicolor Player/Missiles

I have written many simple games on my Atari 800XL using player/missile graphics and would like to start using different colors. How do I make multicolor P/M graphics?

Bob Rudis

Unfortunately, players can be only one color. However, you can simulate a multicolor player by overlapping two or more players. Define the players' shapes so that solid areas of underlying (lower priority) players show through holes (blank areas) in overlapping (higher priority) players. One player can be used for each color you need to define. Of course, to maintain the effect, you'll need to move the overlapped players in unison.

You can obtain additional colors by setting bit 5 of the player priority register (location 623 decimal). If you add 32 to the number in the priority register, then any area where two players overlap becomes a third color. The following program displays a red player and a blue player. The region where they overlap becomes green. You can find more information on multicolor players in COMPUTE!'s First Book of Atari Graphics.

```

00 10 POKE 106,INT(PEEK(106)
      /8)*8-8:GRAPHICS 0:8=P
      EEK(106):REM PROTECT M
      EMORY ON A 2 K BOUNDAR
      Y
00 20 POKE 559,62:POKE 704,5
      5:POKE 705,135:POKE 53
      256,1:POKE 53257,1:POK
      E 53277,3:SETCOLOR 2,0
      ,0
00 30 POKE 623,33:POKE 54279
      ,8:PMBASE=256*8+1024:F
      OR A=PMBASE TO PMBASE+
      511:POKE A,0:NEXT A
00 40 FOR A=0 TO 7:POKE PMBA
      SE+100+A,255:POKE PMBA
      SE+356+A,255:NEXT A
00 50 FOR A=0 TO 245:POKE 5
      3248,A:POKE 53249,A+10
      :NEXT A:GOTO 50
  
```

Immortal PC Programs?

I have an IBM PC. Sometimes when I save a program and later try to erase it from my disk, the computer says "File not found." Yet when I load the program it is still there. How can I get rid of these unwanted programs?

Richard Bookal

You are evidently enclosing the filename in quotation marks when using the ERASE command from DOS. Although BASIC requires that you enclose or at least precede filenames with quotes, DOS does not—in fact it won't find an existing file when quotes are used. To delete a file from disk, use ERASE filename.ext from DOS or KILL "filename.ext" from BASIC. When you're KILLing a program, the second pair of quotes is optional.

Trackball Tricks

I purchased a trackball for my Atari 800 computer system and would like to use the device in my programs. I have looked in the hardware manual and

elsewhere, but can't find any information about how this is done.

Wesley Wortman

Atari and Commodore computers (which can use the same trackball) read the device like a joystick. If you have an Atari computer, plug the trackball into joystick port 1, then type in and run the one-line program below. By moving the ball in various directions, you can see what numbers it generates.

10 PRINT STICK(0):GOTO 10

A trackball that fits an Atari joystick port will also work on a Commodore VIC-20 or 64, again returning the same values a joystick would. If you have a Commodore 64, run the following program after plugging the trackball into joystick port 2.

10 PRINT CHR\$(19);PEEK(56320)AND15;
CHR\$(20);CHR\$(32):GOTO10

After running either program with the trackball, you may find it interesting to rerun it with a joystick for comparison. As you'll see, the ball is very sensitive and tends to return rapidly changing values, whereas a joystick returns the same value as long as you push it in a particular direction. Of course, in either case the device just generates numbers. It's your job to write a program that uses those numbers in some meaningful way—to animate a figure, draw a picture, or whatever. You can learn more about using joysticks in COMPUTE!'s Second Book of Atari and COMPUTE!'s First Book of Commodore 64.

ML Disk Routine

I need a machine language routine that opens, writes, and properly closes a disk file on a Commodore disk drive.

Rick Elwell

Since we're asked this type of question often, here's a short example that writes a 20-character sequential file to disk, and works with any Commodore computer and disk drive except the 128 in CP/M mode. You'll need a machine language assembler to enter this program. The explanatory comments after the semicolons are, of course, optional:

```

LDA #3 ;Set file number,
TAY ;secondary address
LDX #8 ;and device
      number,
JSR $FFBA ;call SETLFS
      routine.
LDA #10 ;Set filename
      length,
LDX #<NAME ;low byte of
      filename
LDY #>NAME ;and its high byte,
JSR $FFBD ;call SETNAM
      routine.
JSR $FFC0 ;Call OPEN
      routine.
LDX #3 ;Set file number,
JSR $FFC9 ;call CHKOUT
      routine.
  
```


NEW FALL RELEASES

Entertainment and information from COMPUTE! Books this fall!

These brand-new, top-of-the-line books offer you the latest home and business applications for your Apple, Commodore, and IBM personal computers.

100 Personal Computer Programs for Business and Professional Use

Paul Garrison

\$19.95 ISBN 0-87455-017-3

Each of these 100 short programs fulfills one specific need and runs on the IBM PC, PC XT, PCjr, and all Apple II computers. Covering such topics as inventory, loan analysis, accounts payable, name and address lists, advertising cost analysis, invoice printing, and many other business and personal applications, these programs have dozens of uses in the home and at work.

A disk is available which includes the programs in the book.

Using Your Macintosh: Beginning Microsoft BASIC and Applications

Richard K. Swadley and Joseph B. Wikert

\$16.95 ISBN 0-87455-021-1

Learn BASIC gently. This comprehensive book explores the Macintosh and teaches Microsoft BASIC in such a way that even the most reluctant beginner feels at ease. Information about the revolutionary Macintosh, from its desktop environment to the mouse, will get you started. Later chapters clearly explain BASIC, from the first statement to a finished program. Examples, including several complete programs, offer study tools and practical applications which demonstrate what you can do with BASIC on the Macintosh.

COMPUTE!'s First Book of IBM

\$14.95 ISBN 0-87455-010-6

Edited

The editors of COMPUTE! Books have collected all the best programs from COMPUTE!'s PC & PCjr and COMPUTE! magazines to bring outstanding games, utilities, graphics, and applications to your IBM PC or PCjr computer. Ready to type in and use, with easy-to-follow documentation, these 30 programs offer something for every IBM user. From telecommunications tutorials to a terminal program for the PCjr, you can use your computer to access hundreds of electronic bulletin boards and commercial databases. Applications for the home help calculate IRAs, energy needs, and financial plans. Games, in both machine language and BASIC, let you hop spiders, play computerized chess, and bowl a 300 game. Programming utilities examine disks, sort through hundreds of items in seconds, and assist in creating super disk directories.

Tutorials demonstrate everything from 3-D graphics creation to relational operations. Graphics, an impressive feature of both the PC and PCjr, can be fully utilized with a drawing program and a shape editor. You can even make minimovies on your computer through animation of shapes. Typing these programs in is easy, since a proofreader program is included which makes it almost impossible to enter errors.

A disk is available which includes the programs in the book.

Pick out the books you need
and call us today!

COMPUTE!'s Personal Accounting Manager for the Commodore 64

Roland Frechette

\$12.95 ISBN 0-87455-014-9

Easy to use, the Personal Accounting Manager (PAM) is a complete small-business/home accounting system that satisfies every accounting need. Thirteen support routines, from income and expenses to property and investments, are managed by the menu-driven PAM. Personalizing PAM is simple. PAM calculates, projects, plans, and prints reports on financial status based on the data entered. It's the perfect financial assistant for anyone who wants to take the drudgery out of keeping track of his or her money. Ready-to-type listings for PAM are included.

A disk is available which includes the programs in the book.

MacIdeas

J. Richard McLaughlin

\$14.95 ISBN 0-87455-015-7

This idea-packed guide includes more than 100 specific ways to apply the Macintosh's powerful graphics capabilities. Readers will learn how to use MacWrite and MacPaint to create certificates, maps, newsletters, charts, flyers, and much more. MacIdeas shows how to enhance personal gifts and correspondence including personalized postcards, holiday greetings, and letterhead creation. Information and examples on using the newest Macintosh technology—digitizers—demonstrate how dazzling graphics can be created from photographs, portraits, even videotape. Dozens of illustrations take the reader from an idea to the finished product.

Apple II Applications: 40 Programs for Your Apple

Brian and Christopher Flynn

\$14.95 ISBN 0-87455-016-5

Forty educational and strategy games, business and science applications, and home and personal organizational tools—all ready to type in and use on any Apple II-series computer. And since all programs are written entirely in BASIC, Apple II Applications also serves as an excellent example of good programming techniques which can be studied. All programs run under both ProDOS and DOS 3.3.

A disk is available which includes the programs in the book.

For more information on these or any best-selling titles from COMPUTE! Books,
call toll-free 800-334-0868 (in NC 919-275-9809).

COMPUTE! Publications, Inc. 

One of the ABC Publishing Companies
324 W. Wendover Avenue, Suite 200, Greensboro, NC 27408, 919-275-9809.
Publishers of COMPUTE!, COMPUTE!'s Gazette, COMPUTE!'s Gazette Disk, COMPUTE! Books, and COMPUTE!'s Apple Applications.

COMPUTE! books are available in the U.K., Europe, the Middle East, and Africa from Holt Saunders, Ltd., 1 St. Anne's Road, Eastbourne, East Sussex BN21 3UN, England.


```

LDX #0 ;X is a counter.
WRITE LDA CHARS,X ;Get a byte,
CMP #255 ;look for end
marker,
BEQ EXIT ;quit when found.
JSR $FFD2 ;Call CHROUT
routine,
INX ;bump counter,
JMP WRITE ;write entire text.
EXIT LDA #3 ;Set file number,
JSR $FFC3 ;call CLOSE
routine.
JSR $FFCC ;Call CLRCHN
routine.

RTS
NAME .ASC "0:FILE,S,W"
CHARS .ASC "THIS IS A TEST FILE."
.BYT 255

```

Though there are other ways to get the job done, it's usually simplest and most reliable to use the computer's built-in routines. The *SETLFS* routine (\$FFBA) sets the logical file number, device number, and secondary address, and *SETNAM* (\$FFBD) sets the filename. The filename prefix 0: designates drive 0 and the suffix ,S,W designates a sequential file opened for writing. Different suffixes are used for other operations—for instance, the suffix ,S,R would prepare the program to read this file.

After *OPEN* (\$FFC0) opens the file, *CHKOUT* (\$FFC9) sets it for output (writing). *CHKIN* (\$FFC6) would be used here if you wanted to set the file for input (reading). The file is written one byte at a time with *CHROUT* (\$FFD2). Use *CHRIN* (\$FFCF) or *GETIN* (\$FFE4) to input bytes when reading a file. After the write is complete, *CLOSE* (\$FFC3) closes the file and *CLRCHN* (\$FFCC) restores the system to normal, reenabling keyboard input and screen output. You should always *CLOSE* every disk file individually. Don't try to use *CLALL* (\$FFE7) as a shortcut: It may create a poison (unclosed) file on the disk.

©

To receive additional information from advertisers in this issue, use the handy reader service cards in the back of the magazine.

FOR THE ATARI®

CENTER NEAREST YOU PLEASE CALL OUR SALES OFFICE IN YOUR AREA

New England
Bellavance, Fassler, Iarrobino, Inc.
Needham, Maine
617-449-3910

Upstate New York
Seeber Sales Corp.
Latham, New York
518-785-6423

Metro New York, North New Jersey
The Spieler-Weiss Group, Ltd.
Spring Valley, New York
914-352-2502

**South New Jersey,
East Pennsylvania, Delaware**
R. K. Marketing
Havertown, Pennsylvania
215-446-6400

Maryland, Washington, Virginia
Alexander & Samet
Rockville, Maryland
301-251-9300

**South Nevada, Arizona,
New Mexico, El Paso**
Mountain Micro Markets
Scottsdale, Arizona
602-998-4357

Washington, Oregon
Barnsley-Weis Associates
Yakima, Washington
509-248-7250

No. California, No. Nevada
New-West Companies
Mountain View, California
415-940-6033

Southern California
Tri West Marketing, Inc.
Culver City, California
213-390-8591

**Tennessee, Georgia, Alabama,
Mississippi, No. & So. Carolina**
John Lee Company, Inc.
Nashville, Tennessee
615-321-5012

Florida
Intratec Technology Rep.'s Inc.
Boca Raton, Florida
305-393-1925

**W. Pennsylvania, W. Virginia,
Ohio, Kentucky**
Incom Marketing, Inc.
Columbus, Ohio
614-451-5146

**Minnesota, North Wisconsin,
North Dakota, South Dakota**
Continental Merchandisers, Inc.
St. Paul, Minnesota
612-645-6441

**South Wisconsin, North Illinois,
Michigan, Indiana**
Hawthorn Marketing, Inc.
Buffalo Grove, Illinois
312-541-8846

**Missouri, Kansas, S. Illinois,
Nebraska, Iowa**
Sound Marketing Associates
St. Louis, Missouri
314-644-2400

**Texas, Oklahoma, Arkansas,
Louisiana, Mississippi**
Miller & Associates
Richardson, Texas
214-437-5733

**Utah, Idaho, Colorado
Wyoming, Montana, Alaska**
Schreyer Associates, Inc.
Salt Lake City, Utah
801-483-1331

Hawaii
SCS Co., Inc.
Honolulu, Hawaii
808-845-9937

ATARI®

Power Without the Price

AMERICA WE BUILT IT FOR YOU THE ATARI 520ST

"We promised.
We delivered.
With pride,
determination,
and good old
ATARI know how."
Sam Tramiel,
President,
ATARI CORP.

No other computer we know of has been awaited with such anticipation, has received so much national and trade press, and has been so unanimously acclaimed — as the remarkable 520ST.

And for good reason. Its development represents a bold, new standard in personal computing power.

The 520ST simply obsoletes all current personal systems — even those costing thousands of dollars more.



Beneath its full stroke 94-key keyboard is an operating environment so intelligent that it puts you in command almost at once. It's that easy.

Graphic symbols quickly identify available functions. Menus appear just by aiming

the mouse. Point to a specific operation, click the mouse and instantly you are able to develop full color charts, recall files from within folders, and so much more.

And when you combine 524,288 bytes of RAM with ATARI's custom circuits and the horsepower of a 68000 microprocessor, you own a powerful computer that delivers crisp, high resolution images with incredible speed.

With a monochrome monitor your 520ST displays 640 x 400 pixels of extremely high resolution clarity. Select a color monitor and you are able to create beautiful graphs and diagrams from a palette of 512 vivid colors.



Power to grow. An array of expansion ports allow you to easily customize your 520ST. There are standard serial and parallel interface

ports for connecting printers and telecommunications equipment, MIDI connectors to interface with music synthesizers and keyboards, and 3.5 inch floppy disk, cartridge and joystick ports. There is also a hard disk port with the lightning communications speed of 1.33



Megabytes per second. ATARI 520ST systems are available now.

When it comes to state-of-the-art technology ...don't settle for less. And when it comes to price ...don't pay a penny more.

For the dealer nearest you call 408/745-2367.

Or write to:
ATARI Corp.
Customer Service
1196 Borregas Ave.
Sunnyvale, CA 94086



The New
ATARI®
Power Without the Price

\$799⁹⁵

*plus state and local taxes where applicable.

SYSTEM INCLUDES: 520ST Personal Computer, Monochrome Monitor, Mouse Controller, 3.5 inch Disk Drive, TOS™ - The Operating System Disk, ATARI Logo™ Language Disk
With full color monitor: \$999.95*

A · T · A · R · I

520 ST



A Hands-On Report

Tom R. Halfhill, Editor

"We aren't selling home computers. We aren't selling business computers. We're selling personal computers. People can use them for whatever they want." With those words, Jack Tramiel launched the ST series and a new beginning for Atari. Here's a close look at the first computer in the ST series and the most powerful Atari ever.

The old stereotypes about home computers are being challenged. There's a new generation of personal computers emerging that combines massive memory, high-speed processing, fast floppy disk drives, hard disk interfaces, considerable expansion potential, stunning graphics, and sophisticated sound. These computers are powerful enough to run state-of-the-art business software and versatile enough to excel at running entertainment and educational programs.

The Atari 520ST was the first of this new breed. Announced at the Winter Consumer Electronics Show last January, it is now becoming widely available. Here are the standard features:

- 512K of Random Access Memory (RAM), half a megabyte.
- Motorola 68000 microprocessor. This 16/32-bit chip is clocked at 8 megahertz and can directly address up to 16 megabytes of memory without bank-switching. It's the

same central processing unit found in the Apple Macintosh and Amiga from Commodore.

- One of the fastest floppy disk drive interfaces in personal computing. Although the interface bus is serial, not parallel, it transfers data at a megabit per second, faster than some hard disks. The basic 520ST system comes with one external drive that stores 400K (unformatted) on a single side of a 3½-inch microfloppy disk. Double-sided drives which store 800K per disk have also been announced.

- One of the fastest hard disk interfaces in personal computing. It transfers data at 1.33 megabytes per second, more than eight times faster than the floppy interface. Although hard disks aren't yet available for the ST, Atari plans to introduce a 10- to 15-megabyte

drive by early 1986, possibly for as low as \$399. This price is feasible because the hard disk controller is already built into the computer. The hard disk interface can also be used for memory expansion or a CD-ROM (Compact Disc-Read Only Memory). Atari has shown a prototype CD-ROM that stores up to 550 megabytes of data on a single compact disc. (See "Monster Memory," August 1985.)

- Built-in Centronics-standard parallel port and RS-232 serial port for printers, modems, and other peripherals. These ports are compatible with IBM cables for printers and modems.

- Built-in Musical Instrument Digital Interface (MIDI) for attaching keyboard synthesizers, sequencers, drum boxes, and other electronic musical devices. Because the MIDI ports transfer data at a very high speed (31.25 kilobaud), they've also been considered for such future applications as extremely inexpensive local area networks (LANs).

- A slot for cartridges containing up to 128K of Read Only Memory (ROM).

- Intelligent video output port that recognizes whether a color or monochrome monitor is plugged into the computer and allows the operating system to adjust itself accordingly. This port also has pins for audio input/output.

- High-resolution monochrome monitor. With a screen refresh rate of 70 hertz—about 16 percent faster than normal monitors and TVs—this monitor is capable of unusually sharp displays. An analog RGB (red-green-blue) color monitor also is available.

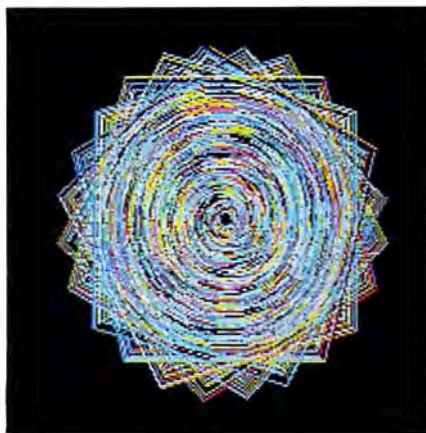
- Screen modes with high resolution (640 × 400 pixels, monochrome), medium resolution (640 × 200, four onscreen colors), and low resolution (320 × 200, 16 onscreen colors).

- Palette of 512 possible colors. Any of the four colors in medium resolution or 16 colors in high resolution can be selected from this palette.

- Three-channel General Instruments sound chip, the same as found in the Texas Instruments TI-99/4A, IBM PCjr, and MSX-standard computers. Envelope

registers allow the chip to simulate various types of waveforms.

- A disk-based operating system called TOS (Tramiel Operating System) which combines Digital Research's CP/M-68K and GEM (Graphics Environment Manager). CP/M-68K is the 68000 version of the popular Z80-based operating system, CP/M (Control Program/Microcomputers), similar to the MS-DOS used on the IBM PC and compatibles. CP/M-68K is vastly expanded, however, with provisions to support up to 16 disk drives with 512 megabytes per drive and 32 megabytes per file. To make this operating system easier to use, it is linked on the 520ST with GEM, a Macintosh-like user interface with icons, windows, and drop-down menus. GEM can be manipulated from the keyboard or with a mouse controller that comes with the 520ST. The two-button mouse plugs into one of the two controller ports built into the computer.



Turtle graphics in Logo: This geometric figure was created in the Atari 520ST's low-resolution mode (320 × 200 pixels, 16 colors).

- Digital Research Logo and Atari BASIC programming languages on disk. (At this writing, BASIC wasn't finished, and the 520ST was being shipped with Logo only. Atari has said that BASIC will be added to the package when it's done and offered as an upgrade to early ST buyers as well.)

- An 84-key keyboard with cursor keypad, numeric keypad, plus ten special function keys.

The price for the complete system (520ST, disk drive, monochrome monitor, mouse, and system software) is \$799. A 520ST

system with RGB monitor costs \$999.

If you've never used a Macintosh, working with the Atari 520ST for the first time will be an unfamiliar experience. When you switch on most personal computers, you find yourself either in BASIC or some type of disk operating system (DOS). But the 520ST doesn't wake up with a READY prompt, command line, or DOS menu. Instead, the first thing you see is the GEM desktop.

Icons along the edges of the desktop screen show a trash can and file drawers. The drawers represent floppy disk drives and hard disks, depending on your system configuration. Menu titles appear across the top of the screen. Floating above the desktop is an arrow that you can move by rolling the mouse or by pressing certain keys. It represents an extension of your hand on the screen.

To view a menu, you move the pointer to the desired title. Instantly, the menu drops down over the screen. (The 520ST's drop-down menus are summoned slightly differently than the Macintosh's pull-down menus: You don't have to click and hold the mouse button.) As you move the pointer up and down the menu, it highlights various options. Some options may be invalid for a particular operation, so they appear in dim print and cannot be highlighted. To select an option, you simply highlight it and click the left button on the mouse.

To call a disk directory, you move the pointer atop the appropriate file drawer icon and do what's called a double-click—pressing the mouse button twice in rapid succession. The disk drive hums, and a window appears on the desktop. Various types of icons inside the window denote data files, executable program files, and subdirectories on the disk. If you prefer a more conventional disk directory, you can drop down the View menu and select View As Text. The file icons change into a list of filenames which includes such information as file lengths in bytes and the dates on which the files were last updated. Other options on the View menu let you sort the directory by filename (alphabetically), file type,



This low-res picture was created with Dr Doodle, a simple drawing program written by Digital Research and included on an ST demo disk.



In high resolution (640 × 400 pixels, monochrome), GEM closely resembles the Macintosh desktop.



Error messages on the 520ST are usually more helpful than the cryptic error codes of days past.

size, or date.

If you're working with a two-drive system, you can call the directory for drive B by double-clicking on its icon. When this window appears, it overlaps the window for drive A. But the drive A window isn't erased; by pointing to it and clicking the mouse button once, it moves atop the drive B window. A similar click on the drive B window brings it to the fore. You can flip back and forth between several windows in this manner, like shuffling papers on a real desktop. Options selected from menus, such as View As Text, affect the window which is currently on top of the pile.

All other functions in the GEM desktop work in similar ways: You point to a menu option or icon, then click the mouse button once or twice.

For instance, to run a program, you point to its icon or filename in the disk directory window and double-click. The desktop disappears and the program runs. When you exit the program, the desktop reappears.

Some operations, such as deleting a file, require a mouse maneuver known as *dragging*. First you select the icon—in this case, the file you want to delete—by pointing to it with the mouse and then clicking the mouse button. While still holding down the button, you can roll the mouse to drag an outline of the file icon along with the pointer. To delete the file, you would drag it to the trash can icon and release the mouse button. A window appears and asks "Are you sure?", warning that the file will be erased if you click on a marker labeled "OK." If you don't want to delete the file, you can click on a marker labeled "Cancel." The first choice irretrievably erases the selected file off the disk; the second choice restores everything to normal. (Unlike the Macintosh, you can't retrieve files from the trash can. As the 520ST manual points out, the 520ST trash can is more like an incinerator.)

This dragging technique is used for other operations as well. You can copy a file from one disk to another by dragging the file icon from the source disk's directory window to the destination disk's window; you can copy the contents of an entire disk by dragging its file cabinet icon atop another disk's icon; and you can organize files into subdirectories by dragging their icons into a folder icon.

You can also manipulate windows as easily as icons. The "active" window—that is, the one on top of the pile if several are displayed—has various control bars and squares along its edges. Pointing to the square in the upper-right corner and clicking the mouse button expands the active window to full-screen size. Clicking this corner again restores it as a window. Dragging the lower-right corner lets you

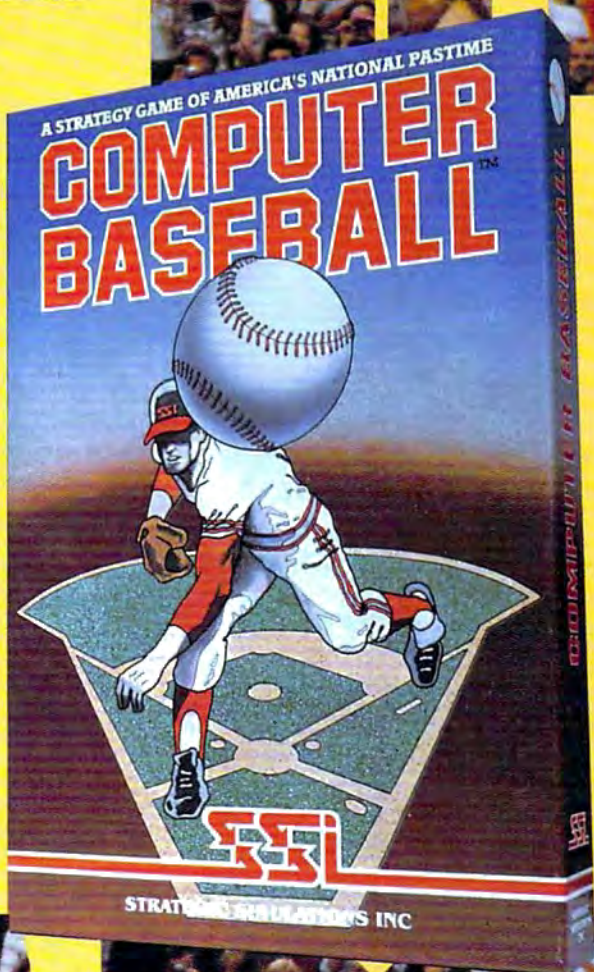
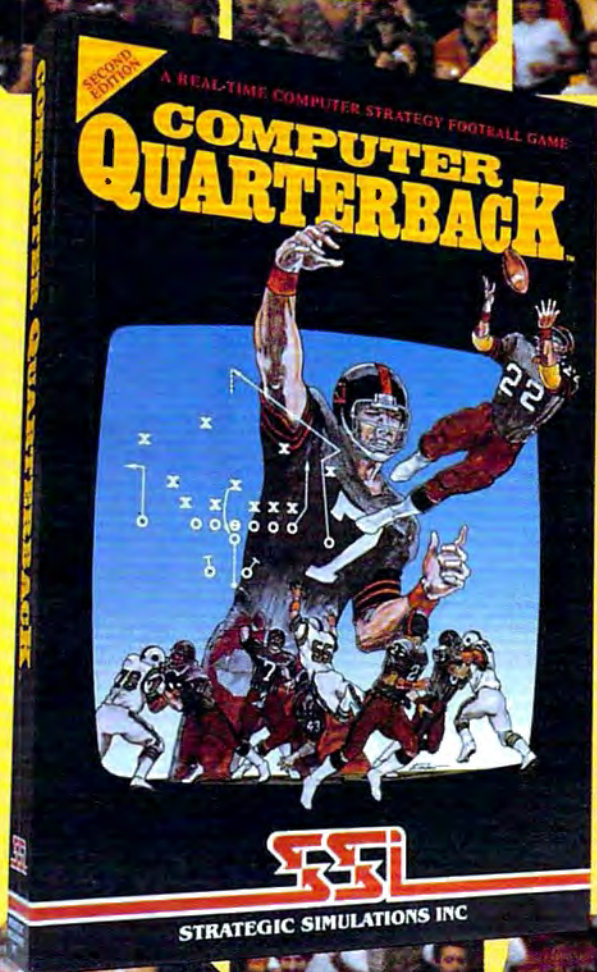
adjust a window's size, making it larger or smaller. Dragging the top bar lets you move a window anywhere on the screen. Clicking on the small arrows displayed along the bottom and right bars will scroll the material displayed in the window, assuming some of it is hidden due to the window's size. And clicking on the upper-left corner removes the active window from the screen ("closes" the window).

One unusual feature of the 520ST is its intelligent monitor interface. When you boot up, the operating system checks whether a monochrome or color monitor is attached to the computer and adjusts itself for one of three possible screen resolutions.

With the monochrome monitor, the operating system automatically configures the GEM desktop for high resolution—640 × 400 pixels, black and white. The display is extremely sharp and stable because of the monitor's 70 hertz refresh rate, which means it redraws the screen image 70 times per second rather than 60 times as on standard monitors and TVs. (This is possible because the monitor uses its own 70 hertz oscillator instead of synchronizing with the 60 hertz power line.) Furthermore, the display is paper-white, not blue-white, easier on the eyes. When the monochrome monitor is hooked up, the operating system won't let you enter the medium- or low-resolution modes, which have color.

If the 520ST is booted up when plugged into its RGB monitor, it defaults to medium resolution—640 × 200 with four simultaneous colors. Because this screen has the same horizontal resolution as the monochrome mode but only half the vertical resolution, the aspect ratio is slightly distorted. Icons appear tall and skinny, and characters are narrower.

The low-resolution mode—320 × 200 with 16 simultaneous colors—also requires the RGB monitor. (The RF modulator included in preproduction 520STs has been eliminated from production models, so it can't be attached to ordinary TVs. There's also no direct output for standard composite monitors, although one could probably be rigged from the RGB pins.)



Superstars aren't just the best in their fields. They're the best, year after year. In the wide world of sports simulations, SSI's **COMPUTER QUARTERBACK™** and **COMPUTER BASEBALL™** stand out as true superstars. To date, tens of thousands of enthusiastic fans and dozens of magazine reviewers alike have cheered their superb display of realism and excitement. By consistently outplaying the competition, our games stand head and shoulders above the crowd.

If you're scouting for the best football and baseball strategy games around, take

a good look at ours — the ones with the proven performance. You'll know these are the superstars you want to play on your computer. Sign them up at your local computer/software or game store today!

If there are no convenient stores near you, VISA & M/C holders can order these \$39.95 games direct by calling **800-227-1617, x335 (toll free)**. In California, **800-772-3545, x335**.

Please specify computer format and add \$2.00 for shipping and handling. To order by mail, send your check to:

Strategic Simulations, Inc., 883 Stierlin Road, A-200, Mountain View, CA 94043. (California residents, add 7% sales tax.) All our games carry a "14-day satisfaction or your money back" guarantee.

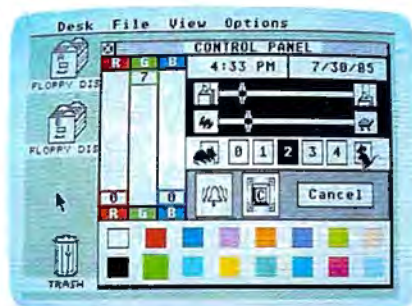
WRITE FOR A FREE COLOR CATALOG OF ALL OUR GAMES TODAY.

Computer Quarterback is on diskette for 48K APPLE II® series, ATARI® home computers, and the COMMODORE 64™. **Computer Baseball** is on diskette for APPLE, ATARI, C-64 and IBM PC® and PCjr®.

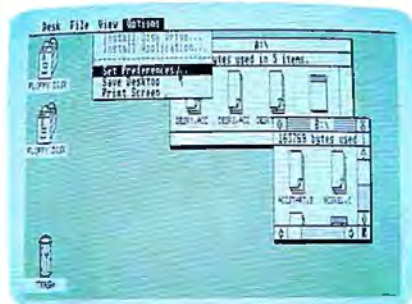
APPLE, ATARI, COMMODORE 64 and IBM PC/PCjr are trademarks of Apple Computer, Inc., Atari, Inc., Commodore Electronics, Ltd., and International Business Machines Corp., respectively.



STRATEGIC SIMULATIONS, INC.



In low res, the GEM desktop has a 40-column screen. The Control Panel is a pop-up menu that lets you adjust various system functions.



In medium resolution (640 x 200 pixels, four colors), the GEM desktop has an 80-column screen. Note the two disk directory windows.



The 520ST is capable of displaying numerous type styles, as seen on this hi-res Logo screen.

To enter the low-res mode, you boot up in medium-res, then drop down the Options menu and select Set Preferences. A small window appears with markers for low-res, medium-res, and hi-res (the hi-res marker is dimmed to indicate it's not available with this configuration). To change modes, you click the mouse button while pointing to the appropriate marker.

If you want your 520ST to "wake up" in low-res instead of medium-res, you can drop down the Options menu and select Save Desktop. This selection saves all adjustments you've made to GEM

onto the operating system boot disk. Other preferences can be saved this way, too. By dropping down various menus, you can specify whether warning windows should appear when copying or deleting files; turn the keyboard click and error beeps on or off; adjust the keyboard's auto-repeat delay and repeat rate; set the mouse button's response speed for double-clicking; choose the desktop's foreground and background screen colors from the 512 available hues; set the real-time clock's time and date, which is automatically stamped on disk directories whenever you save a file; and configure the RS-232 and parallel ports for certain peripherals.

The 520ST doesn't have sprites or player/missile graphics, but animation is possible in any of its screen modes by a technique called *bit-block transfer*. Like sprite graphics, it allows you to move objects around the screen without erasing the background. The mouse pointer and the bumblebee icon that appears when the disk drive is busy are examples of bit-block animation. Unfortunately, these capabilities are not supported in Logo, the only language shipped with the 520ST at launch. The Logo is actually a translation of Digital Research's Logo for the IBM PC, and it has no commands for animation or sound. Reportedly, the BASIC being prepared for the 520ST is a translation of Digital Research's BASIC for the PC.

When the 520ST made its first appearance at the Winter CES, it was hard to believe that anyone could design a system like the 520ST and throw together a prototype in only about six months—the time that had elapsed since ex-Commodore President Jack Tramiel had acquired Atari from its parent company, Warner Communications.

Forced to trim down from several thousand employees to several hundred, Atari accelerated development on the 520ST by taking advantage of some ready-made parts. The 520ST came along just in time for Digital Research's CP/M-68K and GEM. This is important in understanding the underlying structure of the 520ST, which has been nicknamed the "Jackintosh."

Although the Atari's desktop screens can easily be mistaken for the Macintosh's, the 520ST is actually quite different from the Mac. True, GEM has all the icons, windows, menus, and other Macintosh screen graphics. But GEM is really just a shell—a layer between the user and the real operating system, CP/M-68K. In fact, it's possible to leave GEM and enter this lower level. All the fancy graphics can be made to disappear and you see a screen prompt, A>. This prompt is familiar to users of CP/M and MS-DOS/PC-DOS (a descendant of CP/M). You can enter commands such as DIR to call a disk directory or TYPE to display a file. Like CP/M and PC-DOS, CP/M-68K allows programmers to perform various system functions by calling routines in the Basic Input/Output System, or BIOS. Digital Research even says that CP/M file structures are upwardly compatible with CP/M-68K.

GEM, too, is a module that has something in common with other systems. Digital Research sells a version of GEM for the IBM PC and compatibles, and publishes guidelines for writing application programs to work with GEM.

All this doesn't mean that the 520ST can run CP/M or PC-DOS programs, of course—the machine languages are completely incompatible. But it does mean that programs written in compiled languages such as C can be adapted for these various systems without complete rewriting. If software companies take advantage of this, it could significantly boost the amount of software available for the 520ST.

Another consequence of the 520ST's shell-like operating system structure is that the machine has not been designed around its user interface. The computer is functional without the mouse, and the keyboard includes such traditional features as cursor keys.

Combining ease of use with real power, speed, and the potential for future expansion, the Atari 520ST is an important addition to personal computing. It lends itself to users who prefer to buy their software off the shelf as well as to programmers—a versatile representative of the new generation. ©

COMPUTE! Books Announces

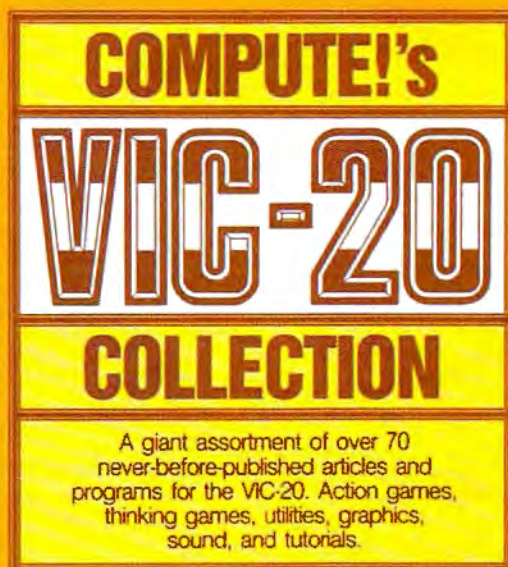
COMPUTE!'s VIC-20 Collection

with more than 70 never-before-published articles and programs for the Commodore VIC-20.

Included in this giant collection are over 30 games, plus utilities, applications, tutorials, and much more, most of which will run on an unexpanded VIC. *COMPUTE!'s VIC-20 Collection* contains something for every VIC-20 user. Even if you use just a fraction of the programs inside, this book will prove extremely valuable. Typing in the programs is made easy with "The Automatic Proofreader," an error-checking program that tells you right away if you've made an error.

Edited, \$12.95, ISBN 0-87455-007-6

There's also a disk available which includes all the exciting, challenging programs from the book ready to run on your VIC-20. *COMPUTE!'s VIC-20 Collection Disk* saves you typing time and prevents many typing errors. It's fast, convenient, and inexpensive. You can order the *Disk* from COMPUTE! Books for only \$12.95.



A COMPUTE! Books Publication

\$12.95

Please send me _____ copies of *COMPUTE!'s VIC-20 Collection, (007)* at \$12.95 each. *(Add \$2.00 per book in U.S. and surface mail; \$5.00 per book airmail for shipping charges.) \$ _____

Please send me _____ copies of *COMPUTE!'s VIC-20 Collection Disk* at \$12.95 each. *(Add \$2.00 per disk shipping charges.) \$ _____

NC residents add 4.5% tax _____

*Shipping charges _____

All orders must be prepaid.

Total payment enclosed \$ _____

Payment enclosed (check or money order)

Charge Visa MasterCard American Express

Account No. _____ Exp. Date _____ (Required)

Signature _____

Name _____


Address _____

City _____ State _____ Zip _____

All payments must be in U.S. funds drawn on a U.S. bank.
Please allow 4-6 weeks for delivery.

75A0071

Look for COMPUTE!
books at your local
book or computer re-
tailer, or mail the order
form to COMPUTE!
Books, P.O. Box 5058,
Greensboro, NC 27403.
For fastest service, call
toll free 800-334-0868.

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

Amiga Goes IBM-Compatible

Tom R. Halfhill, Editor

Commodore sprang a few surprises when it officially announced the Amiga in late July. For one thing, there's an option to make the Amiga compatible with most programs written for the IBM PC—an option that requires no additional hardware.

Commodore has revealed the missing link.

Its new Amiga personal computer already is reaping praise from industry analysts and journalists as the most innovative machine introduced in years (see "The Amiga: An In-Depth Review," *COMPUTE!*, September 1985). However, as with all new computers that break with existing technology, it could take a year or more before the Amiga accumulates an extensive software library.

But Commodore appears to have solved that problem with a single stroke. On July 23, when it formally unveiled the Amiga to a crowd of several hundred people at a gala media event in New York's Lincoln Center, Commodore announced that an option will make the Amiga software-compatible with the popular IBM PC and its huge base of commercial programs. Although this had been rumored for months, the method of achieving this compatibility was the real

surprise—the Amiga will emulate the IBM PC entirely in software.

In other words, it won't be necessary to add an expansion board containing an 8088 and support chips to emulate the IBM PC. Instead, Amiga users will simply load an emulation program that replaces the Amiga's proprietary operating system with PC-DOS to make the Amiga act like an IBM. This was demonstrated in New York when an engineer loaded the PC emulator from a 3½-inch disk, then booted PC-DOS from a standard 5¼-inch IBM disk on an external drive (the 5¼-inch drive is optional). The Amiga's graphics-oriented operating system disappeared, and the screen displayed the usual PC-DOS startup message:

The IBM Personal Computer DOS
Version 2.10 (C)Copyright IBM Corp 1981,
1982, 1983
A>

After inserting another 5¼-inch disk and typing "lotus" at the DOS prompt, the engineer demonstrated a *Lotus 1-2-3* spreadsheet. The Amiga screen even looked like an IBM monochrome screen.

The technical feat of emulating the IBM PC entirely in software is best appreciated by advanced programmers and engineers, but can be likened to playing a record on a tape deck. It seems

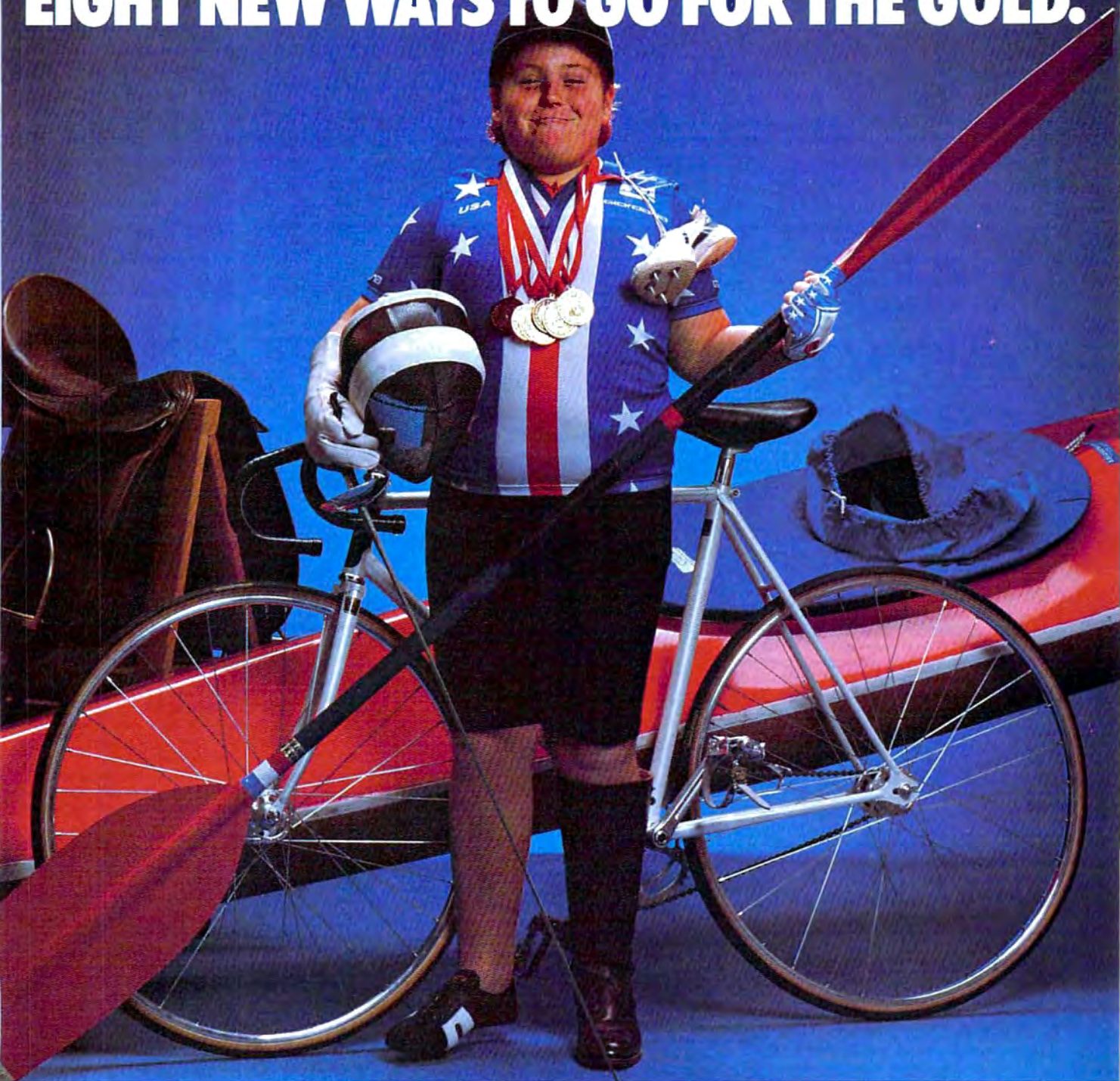
almost impossible, and even some people who witnessed the demonstration have doubts that the Amiga can emulate the PC at a speed comparable to a real PC.

Nevertheless, Commodore's engineers maintain it has been done, and that the PC emulator will be available within a month after the Amiga's launch in September. No price for the emulator was announced, but Commodore says it chose the software method to keep costs down. The only hardware involved is the 5¼-inch drive, and one engineer told *COMPUTE!* that even that accessory might be unnecessary since some PC programs can be loaded from 3½-inch disks sold for the Data General One, a PC-compatible portable computer.

According to Commodore, the emulator isn't memory-hungry, either. It consumes about 40K of RAM, not counting video memory. Still, to run large PC programs such as *Lotus 1-2-3*, Commodore will probably advise users to expand the Amiga's standard 256K RAM to 512K (a \$200 option).

Another surprise revealed July 23 was the Amiga's memory configuration. Commodore originally planned to locate the Amiga's large operating system, called Intuition, in 192K of ROM. Then, to make it easier to fix bugs and release the computer on time, Commodore said the first Amigas would load Intuition from disk, consuming

SUMMER GAMES II.TM EIGHT NEW WAYS TO GO FOR THE GOLD.



Sure Summer Games was great, but why stop there? Let Summer Games II take you even farther with eight new events including cycling, fencing, kayaking, triple jump, rowing, high jump, javelin and even equestrian. They can all be played by up to eight players and some, like cycling, rowing and fencing challenge you with realistic head-to-head competition.

First, you decide which of the 18 different countries you're going to represent. Then, in true Olympic fashion, you will need the proper strategy and mental toughness, not just speed and agility to excel in each

event. It's so realistic, there's even an opening and closing ceremony along with medal presentations after each event.

It's not too early to get ready for 1988. With the right diet, proper training and hours of practice you just might make it. In the meantime, put on your sweatsuit, grab that joystick and let Summer Games II give you eight new ways to Go For The Gold!



EPYXTM
COMPUTER SOFTWARE

Strategy Games for the Action-Game Player



about half of the 256K user RAM. Now Commodore has a better solution: The standard Amiga will have 512K of RAM, but half will be dedicated to storing Intuition. Called the *Writeable Control Store*, this extra bank of 256K RAM is write-protected immediately after the operating system is loaded. Commodore says even a system reset won't interfere with it. In effect, the Writeable Control Store acts like

256K of ROM, except that Intuition must be loaded from disk again after the computer is powered off. As a result, the entire 256K of user RAM is available for programs.

The Writeable Control Store won't be counted as system RAM; the standard \$1,295 Amiga will still be advertised as a 256K computer, even though it really contains 512K. Later, when Commodore is certain that Intuition is fully opti-

mized (critical parts are being rewritten from compiled C into machine language), the Writeable Control Store will be eliminated and replaced with ROM. This will allow nearly instant startups, because Intuition won't have to be loaded from disk. Commodore hasn't yet said whether early Amiga owners will be able to upgrade to a ROM-based operating system later. ©

Amiga Software

Kathy Yakal, Feature Writer

Here is a list of software announced so far for the Amiga. Prices are included where available:

Entertainment

Archon: Unique chess game, using wizards and dragons instead of traditional pieces. Unusual game play is enhanced by 3-D effects. (Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403.)

Dèjà Vu: A Nightmare Come True: A graphics/text adventure in the genre of a 1940s movie mystery. The Amiga's windowing ability lets the player see several parts of the story simultaneously. (\$54.95; Mindscape, Inc., 3444 Dundee Road, Northbrook, IL 60062.)

Dr. J & Larry Bird Go One-on-One: Realistic graphics and sound highlight simulated basketball action between the two athletes. (Electronic Arts.)

Marble Madness: Translation of the arcade game. (Electronic Arts.)

Radar Raiders: A graphics- and sound-rich flight simulator that lets the player control a high-performance jet aircraft, both in test pilot and combat game modes. (Developed by Sublogic Communications Corporation and marketed by Amiga.)

Return to Atlantis: 3-D undersea adventure. (Electronic Arts.)

Sargon III: Chess game with nine levels of play and a library of 68,000 moves. (Hayden Software Company, 600 Suffolk Street, Lowell, MA 01854.)

Skyfox: Light combat simulation. (Electronic Arts.)

Zork I: The Underground Empire; Zork II: The Wizard of Frobozz; Zork III: The Dungeon Masters; Enchanter; Sorcerer; Suspect; The Witness; Cutthroats; Deadline; Seastalker; Infidel; Planetfall; Suspended; Starcross; The Hitchhiker's Guide to the Galaxy. The well-known series of all-text interactive fiction adventures. (\$39.95-\$49.95. Infocom, Inc., 125 Cambridge Park Drive, Cambridge, MA 02140.)

Languages And Utilities

ABasic: A powerful BASIC interpreter designed to take full advantage of the Amiga's capabilities. (Developed by Metacomco, the British company that wrote AmigaDOS. Marketed by Amiga.)

Amiga Assembler/Linker: A Motorola-standard 68000 macroassembler with linker. (Developed by Metacomco and marketed by Amiga.)

Amiga Tutor: A step-by-step look at the Amiga's graphics capabilities and other major features. (Mindscape.)

Cambridge LISP 68000: Programming language

designed for work in artificial intelligence. (Developed by Metacomco and marketed by Amiga.)

Lattice C Compiler: Allows software developed for other PC operating systems to run on the Amiga. (Lattice, Inc., P.O. Box 3072, Glen Ellyn, IL 60138.)

Lattice C Cross Compiler/IBM MS-DOS: Allows software developed for Amiga to run on IBM personal computers. (Lattice, Inc.)

Lattice C Cross Compiler/Unix: Allows software designed for the Amiga to run on Unix-type machines. (Lattice, Inc.)

Lattice C Cross Compiler/VAX: Allows software developed for the Amiga to run on VAX minicomputers. (Lattice, Inc.)

LMK: Software development tool similar to Unix-Make. (Lattice, Inc.)

LSE: Screen editor; allows user to enter commands in several languages. (Lattice, Inc.)

MCC Pascal 68000: Single-pass compiler for software systems and utilities development. (Developed by Metacomco and marketed by Amiga.)

TMN: Software development tool for text management utilities. (Lattice, Inc.)

TLC-LOGO for the Amiga: A high-level programming language incorporating a LISP dialect. (Developed by The LISP Company and marketed by Amiga.)

Turbo PASCAL: High-speed compiler. (Borland International, 4585 Scotts Valley Drive, Scotts Valley, CA 95066.)

Business/Productivity

CalCraft: A spreadsheet for the Amiga, featuring pull-down menus and flexible formatting options. (Developed by Synapse Software and marketed by Amiga.)

Deluxe Video Construction Set: Creates animated video with sound effects; accepts data from other Electronic Arts software. (Electronic Arts.)

Enable/Calc: Spreadsheet program with over 50 math functions and up to eight simultaneously active spreadsheet files in RAM. (The Software Group/Amiga, Northway Ten Executive Park, Ballston Lake, NY 12019.)

Enable/File: Database manager capable of handling up to 256 fields per record. (The Software Group/Amiga.)

Enable/The Office Manager: Integrated business package, including word processor, database manager, telecommunications, and graphics modules. (The Software Group/Amiga.)

Enable/Write: Word processor. (The Software Group/Amiga.)

Graphicraft: Graphics/paint package using 32 medium-resolution colors. (Developed by Island Graphics Corporation and marketed by Amiga.)

Harmony: Creates musical accompaniment, either through Amiga's internal sound or MIDI (Musical Instrument Digital Interface) instruments. (Developed by Cherry Lane Technologies and marketed by Amiga.)

Moviecraft: Animation package; uses "tweening" technique to animate without reading from disk. (Developed by Island Graphics and marketed by Amiga.)

Musicraft: Turns the Amiga into a four-voice synthesizer and sequencer; teaches music composition. (Developed by Everywhere, Inc. and marketed by Amiga.)

Presentationcraft: Business graphics package for creating 3-D objects, exploded and expanded bar and pie graphs. (Developed by Island Graphics Corporation and marketed by Amiga.)

RAGS to RICHES Ledger: Double-entry general ledger software for small businesses. (Developed by Chang Laboratories and marketed by Amiga.)

RAGS to RICHES Payables: Accounts payable software for small businesses. (Developed by Chang Laboratories and marketed by Amiga.)

RAGS to RICHES Receivables: Accounts receivable software for small businesses. (Developed by Chang Laboratories and marketed by Amiga.)

RAGS to RICHES Sales: A sales register program for point-of-sale income accounting; makes the Amiga function as a cash register. (Developed by Chang Laboratories and marketed by Amiga.)

Scorewriter: Enables user to score and print music. (Developed by Cherry Lane Technologies and marketed by Amiga.)

The Print Shop: Specialized graphics software, allowing user to design and print personalized greeting cards, invitations, letterheads, stationery, signs, and banners. (Braderbund Software, Inc., 17 Paul Drive, San Rafael, CA 94903.)

Telecraft: Telecommunications software for Amiga. (Developed by Software 66.)

Textcraft: A word-processing program incorporating online tutorials and screen help for ease of use. (Developed by Arktronics and marketed by Amiga.)

Education

The Halley Project: A realtime simulation of the solar system. Teaches about concepts like gravity, orbital motion, and navigation by the stars as players "travel" around the universe. (\$49.95; Mindscape.)

Keyboard Cadet: Teaches touch typing. (\$39.95; Mindscape.)

Seven Cities of Gold: An adventure game that helps teach geography and cartography; players are sixteenth-century conquistadors exploring the new world. (Electronic Arts.)

Peripherals

Penmouse Input Device: A cordless light pen with built-in power supply that functions as both a mouse and graphics tablet. (Kurta Corporation, 4610 S. 35th Street, Phoenix, AZ 85040.)

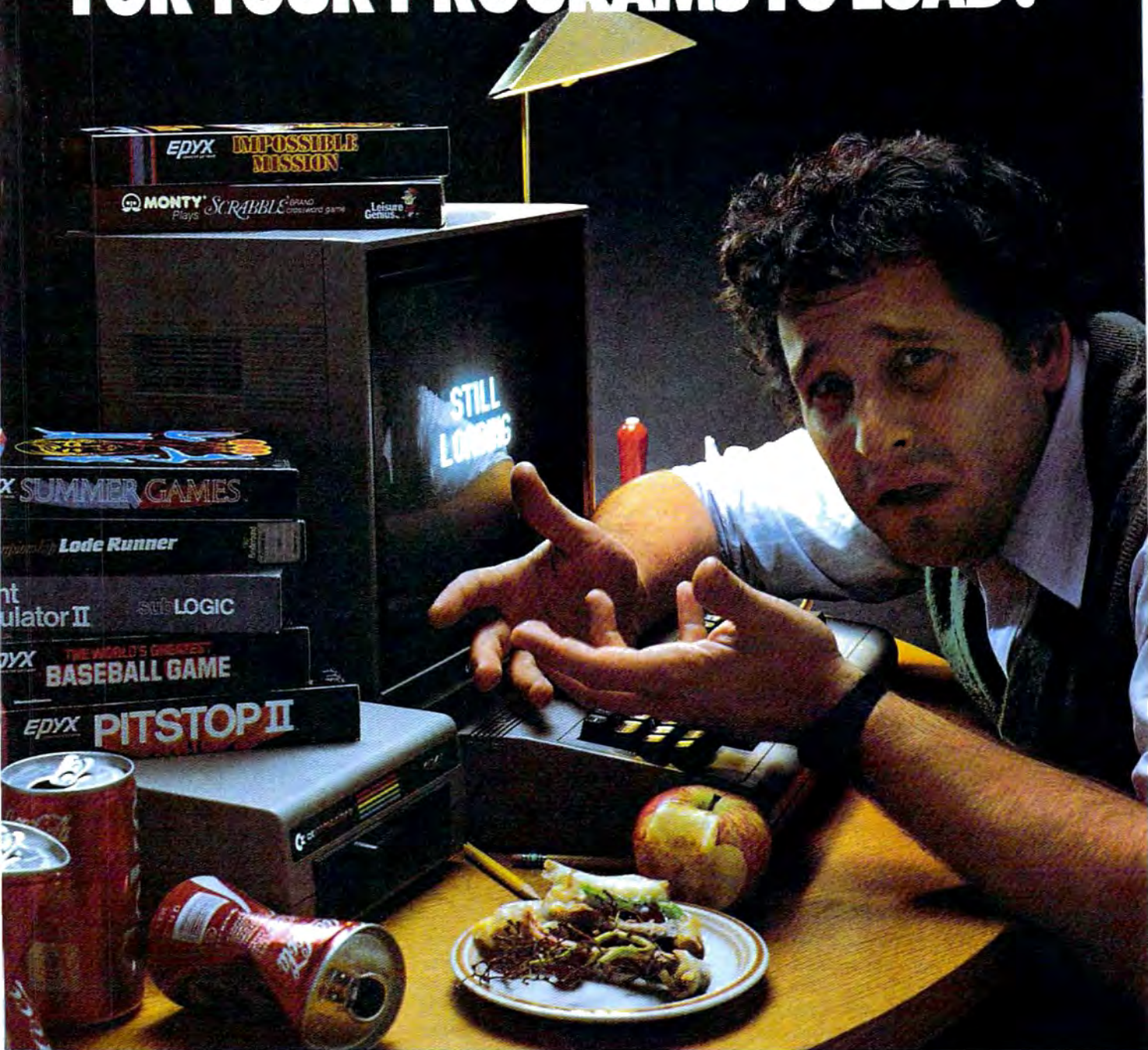
T-Card: Multifunction expansion card with up to one megabyte of memory; includes serial port, parallel printer port, and hard disk interface. (Tecmar, 6225 Cochran Road, Solon, OH 44139.)

T-Disk: 20-megabyte 3½-inch hard disk drive. (Tecmar.)

T-Tape: 20-megabyte tape backup for hard disk; can be linked to Amiga through floppy interface port. (Tecmar.)

T-Modem: Hayes-compatible modem, switchable 300, 1200, and 2400 bits per second. (Tecmar.)

TIRED OF WAITING FOREVER FOR YOUR PROGRAMS TO LOAD?



INTRODUCING THE FAST LOAD CARTRIDGE FROM EPYX.

You're tired of waiting forever for your Commodore 64 programs to load. But it's no use glaring at your disk drive. Calling it names won't help, either. It was born slow — a lumbering hippo. You need the FAST LOAD CARTRIDGE from EPYX. FAST LOAD transforms your Commodore 64 disk drive from a lumbering hippo into a leaping gazelle. With FAST LOAD, programs that once took minutes to load are booted up in a matter of seconds.

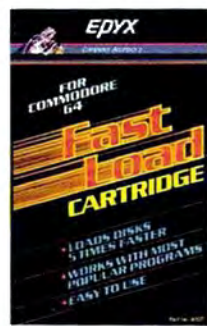
FAST LOAD can load, save and copy your disks five times faster than normal. It plugs into the cartridge port

of your Commodore 64 and goes to work automatically, loading your disks with ease. And that's only the beginning. You can copy a single file, copy the whole disk, send disk commands, and even list directories without erasing programs stored in memory.

And unlike other products, the FAST LOAD CARTRIDGE works with most programs, even copy protected ones, including the most popular computer games.

The FAST LOAD CARTRIDGE from Epyx. Easy to insert, easy to use and five times faster. So why waste time waiting for your disks to load?

Speed them up with FAST LOAD!



EPYX

The NEW Games

Selby Bateman,
Features Editor
Kathy Yakal
Feature Writer

A game with no instructions. A program that seems to think for itself. Aircraft simulations edging closer to the real thing. And an "alternate reality" that's expandable. All this—plus the Goonies—are among the new computer game releases you'll be seeing this fall and during the holiday season.

Jim Levy stepped back from the computer screen, a look of embarrassment crossing his face. As the president of Activision, Levy was supposed to be showing a roomful of reporters his company's newest computer game. But something had apparently gone wrong, and now he apologized and explained that he was trying to get online with a computer at company headquarters to demonstrate the program.

"Logon please..." appeared on the screen. After a few unsuccessful tries, suddenly Levy's computer was online—not with Activision, but with some unknown computer system. But whose?

"That, ladies and gentlemen, is the game," said Levy, flashing a sly smile at the crowd.

It's called *Hacker*, and it's a game with no instructions, no rules, no clues—just your simulated on-line connection with a mysterious

computer system. Whose system have you stumbled into? What's going on? What does it take to win? What pitfalls make you lose? As the computer hacker, you must discover all these answers on your own as you play this intriguing adventure game, which will be available initially for the Commodore 64 and 128 (Apple and Atari soon after; price to be announced).

In addition to the engaging approach Activision has taken with *Hacker*, a number of companies are showing that there are plenty of fresh ideas for computer games. And these games reveal that experienced programmers are getting far more from today's computers than ever before. Several of the newest entries are sequels which equal or surpass the original hits. Here are some highlights:



A view through the periscope in Silent Service.

AcroJet, *Gunship*, and *Silent Service* (MicroProse Software)—Fans of MicroProse Software's earlier hits, *Solo Flight* and *F-15 Strike Eagle*, can look forward to more excitement from this trio of new simulations. *AcroJet* is an advanced flight simulator which starts where the earlier *Solo Flight* left off, allowing you to pilot a BD5-J jet. *Gunship* is a simulation of the AH-64 Apache attack helicopter, complete with electronic multiple weapons systems and realistic helicopter maneuverability. *Silent Service* is a World War II submarine combat simulation which lets you slowly increase the level of complexity as your skills develop. The emphasis in all three packages is on realistic simulations coupled with intriguing game scenarios. (*AcroJet*—Apple II, Atari, Commodore, IBM; *Gunship*—Apple II, Commodore, IBM; *Silent Service*—Apple II, Commodore; \$34.95 each.)

Alternate Reality (Datasoft, Inc.)—This is the first game in a projected series of eight fantasy role-playing programs being released by Datasoft. Called *The City*, the original episode of *Alternate Reality* finds your character abducted by aliens to another time and place. As you move around the strange city, you learn basic survival skills. But this is an adventure game with a difference. Traits like patience, compassion, and honesty are valued every bit as much as the usual strength and proficiency with weapons. Day turns to night as you learn how to earn money, obtain food, avoid dangers, and explore the city. Later programs will tie in with this first game, letting you gain access to parts of the city which are not open to you in the original program. Following *The City*, Datasoft plans to produce *The Dungeon*, *The Arena*, *The Palace*, *The Wilderness*, *Revelation*, and *Destiny*. (Atari and Commodore versions, \$39.95; Apple II family, \$49.95.)

Beach-Head II (Access Software)—Two earlier fast-action games from Access, *Beach-Head* and *Raid Over Moscow*, have been among the most popular computer programs on the market. *Beach-Head II* may well join them. The theme is unabashedly arcade-style battle, with soldiers charging a machine gun bunker, rescuing prisoners, flying a helicopter through antiaircraft fire, and throwing knives in a one-on-one finale. Superb color graphics and eerily authentic speech synthesis add realism to the game's constant action. There are two options of game play: two players or one player versus the computer. (Commodore 64/128, Atari, Apple II, IBM PC/PCjr, \$39.95.)

APBA Major League Players Baseball (Random House)—It's your strategic skills, not athletic abilities, which count in *APBA Major League Players Baseball*. Adapted from the popular board game invented 30 years ago, it's a simulation that lets you make the decisions of a major league manager, putting a baseball team together and then pitting it against other teams. The 1985 Master Edition contains actual records and ratings for 676 players from the 1984 professional baseball season. Updated records will be available



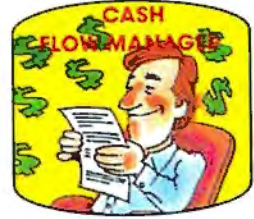
Get the jump on the weatherman by accurately forecasting the local weather yourself!



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.



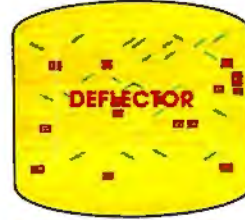
Create multi-colored bar graphs with a surprisingly small amount of memory.



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!, 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.

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?

Order now! Mail the postpaid card attached to this ad and start receiving every issue of COMPUTE!.



COMPUTE! P.O. Box 10954, Des Moines, IA 50340

every year. You deal with everything a real manager would—should a batter bunt, should your pitcher throw an intentional walk, does the infield move in for the next batter? You even face injuries, ejections, and rainouts. Create your own leagues, divisions, teams, and farm clubs. Statistics for up to 100 teams can be stored on a disk. (IBM PC/PCjr/XT/AT with color/graphics or monochrome adapter, \$89.95.)



King Graham meets King Neptune in King's Quest II: Romancing the Throne.

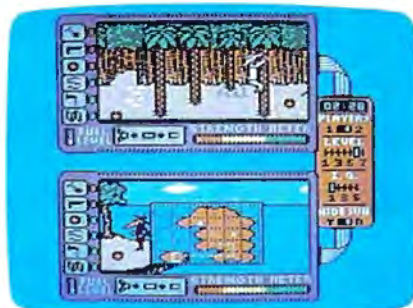
King's Quest II: Romancing the Throne (Sierra)—The three-dimensional, double high-resolution graphics in the original *King's Quest* are back in this second all-graphics adventure featuring Sir Graham (now King Graham). King Graham's quest is a colorful, smoothly scrolling adventure which can be played by youngsters as well as adults. Sierra has again paid attention to all the details, making this a worthy successor to the original. (IBM PC and PC compatibles, \$49.95.)

The Fourth Protocol (Bantam Electronic Publishing)—Frederick Forsyth's bestselling novel has been turned into a graphics and text adventure which is being released simultaneously with the paperback version of the book. You play the part of a British intelligence agent racing to uncover a plot to smuggle and detonate a nuclear device in England. The game employs easy-to-use Macintosh-style icons and windows to help you get around. And there are plenty of plot twists, even for those who may have read the book. (Commodore 64, \$34.95; Apple version soon.)

The Goonies (Datasoft, Inc.)—A colorful series of eight mazes, filled

with a collection of Rube Goldberg-style devices to trip you up, comprises this action-strategy game based on Steven Spielberg's movie. Coordinating your multiple characters and learning the intricacies of the mazes make this a demanding and absorbing game. You won't find the treasure easily, but you can have fun trying. (Apple II family, \$39.95; Atari and Commodore, \$29.95.)

Jet (SubLogic)—The company that brought out the very popular *Flight Simulator II* has gone one better with its newest release, *Jet*, for IBM computers. This newest game is a very realistic simulation of two supersonic jet fighters, a land-based F-16 Fighting Falcon and a carrier-based F-18 Hornet. There is a free-flight mode, or you can try your hand at a variety of land or sea attacks or dogfight options to test your skill. (IBM PC or PC-compatible with minimum 128K memory, \$49.95.)



Simultaneous play with split screens in *Spy vs. Spy: The Island Caper*.

Spy vs. Spy: The Island Caper (First Star Software)—First Star scored a big success with the original *Spy vs. Spy* game, and now the sequel is available. The same split-screen Simulvision/Simulplay techniques used in the original are employed here, allowing two players to see what's happening with each onscreen character and to act independently. Both games are based on *Mad Magazine's* long-running comic strip. In the latest edition, the spies are after a nuclear warhead on a tropical volcanic island. (Commodore 64/128, \$29.95; Apple II, \$34.95.)

Racter (Mindscape)—One of the most novel approaches to computer gaming this year may be *Racter*, a program with a mind of its own.

Racter (short for *raconteur*) exists to converse with you. Type in a question, and the program not only responds from its 2,800-word vocabulary and knowledge of English grammar, but may also launch into a lengthy tale from the past, present, or future. The sentences are sophisticated—perhaps a bit schizophrenic—and all in fun. *Racter* is already the "author" of its own book (the first ever written by a computer), *The Policeman's Beard Is Half Constructed* (Warner Books), a collection of short poems, dialogues, limericks, and stories. (IBM PC, Apple IIe and IIc, Macintosh, \$44.95. The book is available separately.)



The bobsled run in *Winter Games*.

Winter Games (Epyx, Inc.)—Last year, Epyx brought out a popular computer re-creation of the Summer Olympics called *Summer Games*. The package reportedly sold more than 200,000 copies thanks to its smooth, colorful graphics and solid game play. Now the company has produced two sequels, *Summer Games II*, and most recently, *Winter Games*, in anticipation of the 1988 Winter Olympics. Ski jumping, speed and freestyle events, a ski biathlon, and even a bobsled run are part of this latest Olympic exercise. (Apple II, Commodore 64, Macintosh, from \$29–\$35.)

Wishbringer (Infocom, Inc.)—This introductory level all-text fantasy is another of Infocom's computerized text adventures. *Wishbringer* is suitable for the beginning adventurer, yet offers the experienced player plenty of challenges. The game can be played on two levels—with the help of magic (for beginners) and through logic and puzzle-solving without magic (for experienced players). (Apple II family, IBM PC/AT, Macintosh, others, \$39.95; Atari, Commodore, \$34.95.) ©

THE #1 BACKUP COPY SYSTEM
IS NOW BETTER THAN EVER!

DiskMaker

Version 3.3

with
MasterKey
Modules

NEW!
MODULAR
SYSTEM

THE AUTOMATIC DISK BACKUP SYSTEM FOR COMMODORE 64 SOFTWARE

- The LATEST breakthrough in copy technology!
- Copies NEW custom G.C.R. code protection
- Accesses & copies NEW no-sync data blocks!
- Now includes NEW long data-block logic
- Copies normal & PROTECTED data up to track 40
- 3 New IMPROVED copiers! Includes FAST Copier, VARI-SECTOR Copier, and AUTO-LOGIC Nibbler
- Actually copies a FULL disk in only 2.75 minutes!

- Includes one FREE Masterkey Module!
- Inexpensive MODULE releases keep you up-to-date
- MODULES available individually or by subscription
- Works with DiskMaker TOOLKIT and FAT-TRACK Kit
- Requires standard 1541 disk drive or SX-64
- Special version available for INDUS GT drive!
- PRODUCT SUPPORT tel. # & future module updates
- You've tried the rest, now get the BEST!!

THE FASTEST NIBBLE COPIER YOU CAN BUY!

ONLY

\$49.95

for copier system

To order CALL **805-687-1541 ext. 94**

Technical line 805-682-4000 ext. 55



Order by phone 24 hrs./7 days or send cashier's check/money order payable to BASIX. Visa, MasterCard & American Express include card # and exp. date. CA residents add 6% tax. Allow 2 weeks for clearance of personal and co. checks. Add \$3.50 shipping/handling for continental U.S., \$5.50 for UPS air. COD's shipped to 48 states only; add \$4.00. AK, HI, APO, FPO, add \$7.50. CANADA add \$10.00. Other Foreign orders add \$15.00, and remit certified U.S. funds only. No credit card orders from outside North America. Dealers & Distributors invited & supported.

DISKMAKER...THE ONLY COPY SYSTEM YOU'LL EVER NEED!





1/2/1909

Expert Systems: Shortcut To Artificial Intelligence?

Kathy Yakol, Feature Writer

If an "expert" is defined as someone who knows more than most people about a given subject, then you probably seek advice from several experts every week. If you or someone in your family is ill, you probably go to a physician. After asking several questions and running some tests, the doctor arrives at a diagnosis and recommends treatment. If your car keeps stalling at intersections, you probably take it to a mechanic, who checks the car and recommends a repair. If you find yourself owing too much federal income tax on April 15, a tax consultant can offer ways to help. And if you think you've been wronged by someone, a lawyer can usually decide if it's worthwhile to bring a lawsuit.

All of these people you consult—these experts—are trusted to have a sufficient *database* of knowledge in certain areas so that their advice is worth following (and worth paying for).

You can also buy programs for your personal computer that have been designed to act as consultants in such areas as personal finance and health care. Are they replacements for real experts? Not according to their publishers, who stress that the programs are consultants *only*, and that you should almost always seek additional help from professionals.

But the day may not be too distant when a new type of computer program will replace experts—or at least, take over part of what experts do. These sophisticated programs, called *expert systems*, contain a database of knowledge that human experts can spend years

The term expert system is rapidly becoming a new catch-phrase, like user-friendly. Some people point to "smart" computers now being used for diagnosis and trouble-shooting in medicine and industry as proof that expert systems are possible and practical. Even some personal computer software publishers claim that their products possess artificial intelligence or expert system capabilities. But others maintain that few, if any, true expert systems really exist. Here's a look at what's happening.

acquiring. More significantly, the most advanced expert systems now under development also incorporate some of the rules of logic and analysis that experts combine with their storehouse of facts to solve real-life problems. Already, there are programs in everyday use that analyze geological data to find likely spots for new reservoirs of oil—a job which was formerly the exclusive domain of geologists and engineers.

Some people even believe that expert systems will become commonplace on the next generation of home computers, bringing the advice of family doctors and other professionals into the home at the touch of a key. But others warn that the premature application of expert systems could result in serious trouble, especially if they're based on an incomplete understanding of the decision-making process.

Though still in their infancy, expert systems are opening another chapter in the debate over artificial intelligence.

Several years ago, Joseph Weizenbaum, professor of computer science at the Massachusetts Institute of Technology (MIT), wrote a computer program called *Eliza*. His intention was to show how a computer could act like a psychologist. *Eliza* would ask the user questions about how he or she was feeling, then pick up on key words or phrases in the answer to guide its "therapy."

Some people are now calling *Eliza* an early expert system.

"I hadn't even heard that phrase used when I wrote it," says Weizenbaum today.

Part of the challenge of designing an expert system is deciding on the definition of what it's supposed to be and how it's supposed to work: Even the experts can't agree. For example, Weizenbaum thinks *Eliza* is being characterized as an early expert system because he consulted experts before writing it. Although *Eliza* may seem like it's really listening to you and responding, the program just follows a set of rules given it by Weizenbaum. If you say you're having a bad day, the program may ask you to talk about it. Then it may ask how certain events made you feel, or what you think you should do about it. *Eliza* is really more of an interactive diary than an expert.

Now the term expert system appears to be changing to apply to systems that perform expertly.

That's still too vague, says Weizenbaum. "If one were to characterize systems that perform expertly as expert systems, then huge libraries of scientific and business programs that have accumulated

over the years—many of which are doing a perfectly expert job at whatever they do—would all be expert systems. So it's not a very precise term.

"Here is an example of something that nobody considers to be an expert system: Today, almost all landings of wide-bodied airplanes are done automatically by onboard computers. I often wonder what the world would be like if that particular work had been done at the AI (artificial intelligence) lab at MIT or Stanford. I don't think we'd ever hear the end of it. But as a matter of fact, it was done, one might say, anonymously. I have no idea who did it, and certainly it does a job that it takes a lot of years to train a human being to do, but it's not considered an expert system. That's odd."

Yet, defining an expert system isn't as simple as pointing to a computer which replaces the performance of a human. Computers have been doing that for years. For instance, though they may not be labeled by some academics as expert systems, *process control* computers perform functions previously carried out by people with extensive training. "Today, for example, one can see a very large—I mean acres and acres—petroleum processing factory, and if you look very, very hard, you might find two people in these hundreds of acres," says Weizenbaum. "The whole thing is done under computer control."

"So there's this whole world of computerized process control which has been doing this for a long, long time, and it doesn't think of itself, or hasn't, as expert control."

Instead, true expert systems seem to be defined according to their evolution and architecture—such as a database of rules and inference mechanisms. Process control computers were developed by other means. "There are lots of process control applications that have been done very well that today might have been tackled differently in the light of expert systems," says Weizenbaum.

The point at which expert systems cross the border of artificial intelligence is hazier still. To some,

there is a definite difference; to others, a perfectly functioning expert system *implies* artificial intelligence.

Part of the problem is that AI researchers diverge over how to approach the development of expert systems and artificial intelligence. A long time ago, says Weizenbaum, those in the field recognized two fundamentally different ways of doing business.

The first is to look at AI basically as a branch of psychology; that is, to use a computer to understand the operations of the human mind by programming it to do high-level tasks as we think a human mind might do them. The other approach is to program a computer to do very clever things that ordinarily would require human intelligence, but to perform the tasks in ways that might not be considered by (or even possible for) a human being.

These two schools of thought are referred to as *theory mode* and *performance mode*. Weizenbaum gives an example of theory mode:

"Very early on, people got interested in the idea of computers playing chess. It was thought that if we could find out somehow what goes on in a chess player's mind and somehow program that into the computer, not only would we have a good chess-playing machine, but we'd also learn a lot about psychology, about human thought processes. People started trying to do that, but if nothing else, people got tempted to take shortcuts, to take advantage of some features that were built into the computer that no one thought were built into the human mind."

"So from the very beginning, the temptation couldn't be resisted, and people started designing chess-playing programs which took enormous advantage of all the peculiarities of computers but left behind any consideration of how the mind does it. And today we have powerful chess-playing computers, without the slightest claim that they teach us anything at all about human thinking."

"We've sort of drifted from theory into performance mode."

And due to a number of circumstances, including the military's

interest in and funding of performance mode AI research, says Weizenbaum, there's very little theory work going on today.

One place where theory work is being pursued is at the University of California at San Diego, in a research center called the Institute for Cognitive Science. Paul Smolensky, one of the researchers there, has been primarily involved in research on neurally inspired mathematical models of learning, memory processes, and problem solving. Using what are currently believed to be some very general characterizations of the brain, Smolensky's work is focused on one primary area: to understand people, and how to educate them and advance knowledge in scientific fields.

An outgrowth of this research is that it suggests various kinds of novel computers that could be built—such as connecting lots of processors together and letting them work in parallel the same way neurons work in the brain. Only a few prototypes of such machines exist today.

"There's the platonic idea of what an expert system is, and then there's a whole bunch of actual systems that people have developed that they use the label for," says Smolensky. "I'm not aware of any that are actually in practice except the one that everyone in computer science is aware of, and that's the DEC [Digital Equipment Corporation] expert system for designing installations of their VAX computer systems."

This expert system, called R1/XCON, was developed by Dr. John McDermott, principal scientist and associate head of the computer science department at Carnegie-Mellon University. It configures a VAX minicomputer system to the customer's specifications, saving DEC more than \$2.5 million annually in field costs. R1/XCON takes roughly a minute to execute the work it took its human predecessors an hour to complete.

McDermott and a number of other scientists, engineers, and programmers at Carnegie-Mellon have formed a corporation called the Carnegie Group to design and market AI-based systems for commercial applications. The Carnegie

ONLINE IN THE U.S.A.



Be anything you want on American PEOPLE/LINK, where people from across the country get together every night.

They are people with interests in sports, movies, music, games, and just meeting other people . . . people like you. Whatever your interests or fantasies, you'll find someone to share them with on PEOPLE/LINK.

See for yourself why so many men and women are getting together and partying online with us. Not screen after screen of boring data . . . just lots of fun and friendly people.

And our low, low rates won't turn your online dreams into nightmarish monthly charges. To

discover our affordable videotex entertainment, call or write us today.

PEOPLE/LINK . . . the network that says "Thank You."



American PEOPLE/LINK
Arlington Ridge Office Center
3215 N. Frontage Road - Suite 1505
Arlington Heights, IL 60004

1-800-524-0100 (Toll Free) 1-312-870-5200 (Illinois)

Group is looking into many areas that could benefit from expert systems, including engineering design, project management, production management, and sensor-based machine diagnosis and control.

One of the first steps in creating an expert system is to interview the experts the program is supposed to emulate. By asking a series of highly detailed questions, the designers try to figure out the decision-making process they'll attempt to reconstruct in the program. When this thinking process is coupled with a database of facts, the ideal expert system should have a similar capacity for analyzing information and arriving at the right decision.

A potential flaw has been cited in this approach, however: the difficulty of taking into account the role of human intuition, and even emotion, in decision-making.

This is a vital point for some critics of expert systems and artificial intelligence. For instance, if you ask someone what the movie *War Games* was about, they'll probably say something like, "Oh, this kid

broke into the national defense system with his home computer and almost started a nuclear war." But the defense system wasn't exposed to this vulnerability until after the government decided that human beings could not be trusted to enter the codes and push the buttons that would launch our nuclear weapons. So the weapons were placed under computer control, because computers would not falter for emotional reasons at the crucial moment.

"There's a tremendous amount of human judgment that has to go into a decision about whether to give a computer a certain role in a decision-making system," says Smolensky.

Computers may be able to take over jobs previously done by human beings, but that does not make them intelligent, let alone experts, he says. "Expertise derives in a very significant way from intuition and intuitive processes. Experts do not have any access to that when they introspect about how they do what they do, and no amount of asking an expert questions is going to get at the information and the knowledge that allows the expert to do

what he or she does. And if we're going to understand expertise, we have to understand intuition."

Smolensky warns of the dangers of employing too much technology too fast, especially in areas that have a direct effect on human life. He points out that even when a relatively simple computer system is first installed in a business, there are inevitable last-minute bugs and problems that must be solved before it functions smoothly. "And it's only because these systems can make a lot of bad mistakes and people can go in and fix them afterward—basically putting Band-Aids on top of Band-Aids on top of Band-Aids—that we don't have a lot of permanent disaster stories.

"If you look at the problem of making decisions intelligently as something that we can only understand when we understand intuition, and if you realize that intuition is something that we're not going to understand for a long time, then you realize that we shouldn't be giving computers the power to make decisions that are important." ©

THE ULTIMATE DISK UTILITIES FOR YOUR 64 & 1541 DRIVE!

DiskMaker™

TOOLKIT™

WORLD'S FASTEST & LATEST CODECRUNCHERS!
with FAT-Track™

WORLD'S FASTEST DATA COPIER actually backs-up unprotected disks in just ONE MINUTE!!! Removes errors while copying to recover lost data! SUPER-FAST (8 second) format to track 40. SUPER-QUICK Scan for errors & Half-Tracks! FAT-TRACK™ CONSTRUCTIONKIT with State-of-the Art FAT-TRACK™ EMULATOR allows most 1541's to put on new "wide-track" protection & speeds loading of NEW "wide-track" protected products. In a GCR editor for analysis from track 1-40 WITH Clock-Rate & Half-Track control! Display & edit headers, sync & data blocks of any length in HEX, ASCII, & GCR bytes! Use with DiskMaker™ to duplicate extra-tough protection. Package also includes 6502/6501 MSD Drive Disassembler, MSD Speedloader, complete Drive Alignment package, and more!!

ONLY
\$39.95

To Order CALL **805-687-1541 ext. 94**
Technical line 805-682-4000 ext. 55

base

3463 State Street, Suite 111F • Santa Barbara • CA 93105

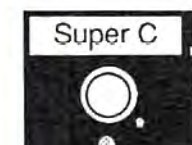
Order by phone 24 hrs/7 days or send cashier's check/money order payable to BASIX. Visa, MasterCard & American Express. Add card # and exp. date. CA residents add 6% tax. Allow 2 weeks for clearance of personal and co. checks. Add \$3.50 shipping/handling. International U.S. \$5.50 for UPS air COD's shipped to 48 states only; add \$4.00. AK, HI, APD, FPO, add \$7.50. CANADA add \$10.00. Other Foreign add \$15.00. and remit certified U.S. funds only. No credit card orders from outside North America. Dealers & Distributors invited & supported.

*For a limited time, you can

SAVE A BUNDLE

on any of these Super bundles

Bundle #1 - Language Software



Super C - Complete K&R C compiler and development system. With editor, compiler, linker, I/O library and extensive handbook. Creates 6510 machine code. Regularly \$79.95



Super Pascal - Complete J&W Pascal development system. Editor, compiler, assembler, toolkit and handbook, graphics, fast DOS (3X faster than 1541). Regularly \$59.95



Basic Compiler - Full compiler turns BASIC into lightning fast 6510 machine code or compact speedcode. Overlays, variable passing integer arithmetic, more. Regularly \$39.95

For a limited time, all 3 for only \$95

Bundle #2 - Productivity Software



PowerPlan - Wonderfully complete spreadsheet. Draws 2D and 3D graphs from your worksheet data. Comprehensive handbook and built-in help screens. Regularly \$49.95



Xper - The first expert system available for Commodore. Ordinary data bases can play back facts, but a *knowledge base* can help you make decisions. Regularly \$59.95



Cadpak Revised - Complete graphics design and drawing package. Use w/ or w/o lightpen. Create very detailed designs with dimensioning, scaling, text, more. Regularly \$39.95

For a limited time, all 3 for only \$95

Bundle #3 - Reference Books

Anatomy of C-64 - longtime bestseller \$19.95
Anatomy of 1541 - Revised 2nd edition \$19.95
Printer Book - very complete information \$19.95

For a limited time, all 3 for only \$35

Bundle #4 - Application Books

Graphics Book - best reference available \$19.95
Science & Engineering - excellent intro \$19.95
Computer Aided Design - and programs \$19.95

For a limited time, all 3 for only \$35

Bundle #5 Machine Lang. Books

Machine Language - learn fundamentals \$14.95
Advanced Mach. Lang. - in depth \$14.95
Compiler Design - write your own \$19.95

For a limited time, all 3 for only \$30

Bundle #6 - Helpful Books

Tricks & Tips - more than 70,000+ sold \$19.95
Peeks & Pokes - programming quickies \$14.95
Ideas to Use on your C-64 - new ideas \$12.95

For a limited time, all 3 for only \$30

Call now, for the name of your nearest participating dealer. To order by credit card call 616/241-5510. Add \$4.00 for postage and handling per bundle in U.S. Foreign orders add \$12.00 per bundle. Other software and books are also available. Call or write for free catalog. Expires October 31st. Sorry, but substitutions are not permitted on these specially priced bundles.

Dealer Inquiries Welcome

Abacus Software

P.O. Box 7211 Grand Rapids, MI 49510 616/241-5510

Other software also available!
Call now for free catalog and the name of your nearest dealer. Phone: 616/241-5510.



The Witching Hour

Brian Flynn

This game of skill and foresight is ideal for a bleak, stormy October night. Originally programmed for the IBM PC with color/graphics adapter and PCjr, versions have been added for the Commodore 64, expanded VIC-20, Atari 400/800, XL, and XE, TI-99/4A, and Apple II-series computers. The Commodore 64 and Atari versions require a joystick.

When autumn winds send a shiver down your spine and the witching hour draws near, there's no better entertainment than a good computer game. "The Witching Hour" is an absorbing contest of strategy based on Alquerque, a board game played in ancient Egypt and still popular in Spain today. Type in and save *The Witching Hour*, referring to the listing for your computer. Since every version is similar, read the general game rules below, then check the specific notes for your computer before running

the program.

The Witching Hour pits broomstick-straddling witches against ethereal ghosts and is played on a board of 25 squares with 12 pieces to a side. After choosing sides, you attempt to take your opponent's players by jumping over them. You can move vertically, horizontally, or diagonally. However, certain diagonal moves are illegal (the lines between squares show where you can go) and only one square is vacant when the game begins.

Jumping an opposing player's

GAMES GAMES GAMES

THREE BOOKS OF GAMES
FOR ONLY \$29.00

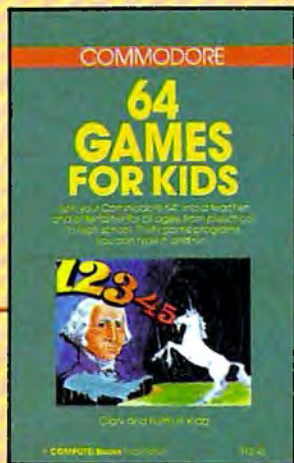


COMPUTE!'s First Book of Commodore 64 Games

Edited, \$12.95, ISBN 0-942386-34-5
Packed with games for the 64 plus ideas and techniques for writing your own games.

Commodore 64 Games for Kids

Clark and Kathy H. Kidd,
\$12.95, ISBN 0-942386-37-X
Games that teach as they entertain. For kids from preschool to high school.



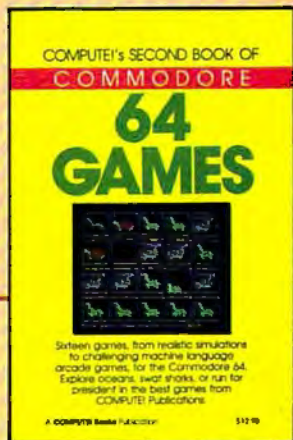
COMPUTE!'s Second Book of Commodore 64 Games

Edited, \$12.95, ISBN 0-942386-64-7
Outstanding games plus articles showing how to design videogames and write text adventures.

For a limited time only, you can order all three of these fantastic game-filled books for your Commodore 64 for only \$29.00.

You get 65 fully tested, ready-to-enter educational and recreational games for the whole family to enjoy—and you save 25 percent off the regular retail price!

To order your COMPUTE! Books, mail this form with your payment to COMPUTE! Books, P.O. Box 5058, Greensboro, NC 27403. For fastest service, call toll free 800-334-0868 (in NC 919-275-9809).



Please send me the following books. I've included \$2.00 shipping and handling charges for each book. (\$5.00 per book for airmail outside the U.S.)

- _____ COMPUTE!'s First Book of Commodore 64 Games (34-5) \$12.95 each _____
- _____ COMPUTE!'s Second Book of Commodore 64 Games (64-7) \$12.95 each _____
- _____ Commodore 64 Games for Kids (37-X) \$12.95 each _____
- _____ SPECIAL SAVINGS—All three books for \$29.00 _____

ALL ORDERS
MUST BE
PREPAID IN
U.S. FUNDS

Subtotal _____
NC residents add 4.5% tax _____
Shipping charges _____
(\$2.00 per book) _____
Total paid _____

Payment enclosed (check or money order) _____
 Charge MasterCard Visa American Express _____

Account No. _____ Exp. Date _____
(Required)

Signature _____
Name _____
Address _____
City _____ State _____ Zip _____

Please allow 4-6 weeks for delivery

75A1161

Order all three books today. This offer expires November 10, 1985.

COMPUTE! Books are available in the U.K., Europe, the Middle East, and Africa from Holt Saunders, Ltd., 1 St. Anne's Road, Eastbourne, East Sussex BN21 3UN, England.

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

CALL TOLL FREE 1-800-631-1003



COMPUTER

Centers of America, Mail Order LTD.

BACK TO



INTERFACES

Telesys Turboprint GT
• Prints Enhanced Graphics 4 Different Type Faces & Reverse Characters

\$5995

Cardo G+
Microworld
PPI

Call
Call
4495



DISKETTES

Nashua 109⁹⁵
Scotch 139⁹⁵
Maxell 139⁹⁵
Memorex 119⁹⁵
*After \$3 Mtl's Rebate



INDUS GT
DISC DRIVE
\$249⁹⁵

LOOK! CCA NOW HAS AN EXCLUSIVE LINE OF COMPACT DISC PLAYERS!
Emerson • ADC • Sherwood • Magnavox
• Triple Beam Pick-up
• Analog Filtering
• 16 Track Programmability
• Front-Loading Disc Tray

PRICED FROM \$15995

NEW FROM
commodore

ENHANCER 2000 DISC DRIVE

- Faster than Commodore 1541
- Half-Height Drive
- External Power Supply
- No Overheating
- 100% Commodore Compatible
- Direct Drive Mechanism
- 2 Yr. Extended Warranty
- Free Software Included



CCA EXCLUSIVE
\$16495

NEW FROM
commodore

COMMODORE 128 PERSONAL COMPUTER SYSTEM

CALL FOR PRICE



NEW
MSD SUPER DISC II

\$399⁹⁵

Single Drive **\$179⁹⁵**

commodore
THE NAME YOU CAN TRUST

commodore
Letter 1101
Quality Printer



\$274⁹⁵

commodore
1702
Monitor



\$174⁹⁵

commodore
64



\$144⁹⁵

commodore
1541
Disc Drive



\$169⁹⁵

SOFTWARE SPECIALS



MONITORS

BMC Color 149⁹⁵
Pan 1300 RGB & Comp 289⁹⁵
Sharp Green 64⁹⁵
Sharp Amber 69⁹⁵

EPYX
JUMP MAN 288

Penguin Software	
Quest	19.99
Transylvania	19.99
Sword of Kadash	19.99
Xyphus	19.99
Graphics Magician Picture Painter	21.99

Professional Software	
Fleet System 2—Word Processor with built-in 70,000 word spell check	59.95

Epyx	
Barbie	19.99
Hot Wheels	19.99
Baseball	19.99
Pitstop	24.99
Pitstop II	24.99
9 to 5 Typing	24.99
Moreta	24.99

CBS Software	
Dr. Seuss Fix up The Mix-up	19.99
Puzzler	19.99
Sesame Street Letter-Go-Round	19.99
Big Bird's Fun House	19.99
The Sea Voyager	24.99
Weather Tamers	12.99
Movie Musical Madness	9.99
Success w/Decimals (Add/Sub) D-T	14.99
Success w/Decimals (Mult/Div) D-T	14.99
Success w/Fractions (Add/Sub) D-T	14.99
Success w/Fractions (Mult/Div) D-T	14.99
Duck's Annoy	23.99
Ernie's Magic Shapes	23.99
Mastering The SAT	104.99
Murder by the Dozen	23.99
Peanut Butter Panic	24.99

Access	
Neutral Zone-D/T	20.95
Sprlemaster-D/T	20.95
Beachhead-D/T	20.95
Master Composer-D	23.95

Commodore	
Assembler-D	17.95
Easy Finance I, II, III, IV, D	19.95
Easy Calc-D	64.95
Easy Script-D	39.95
Easy Spell-D	19.95
Logo-D	49.95
The Manager-D	37.95
General Ledger-D	37.95
Accts Rec-D	37.95
Accts Pay-D	37.95
Magic Desk-D	52.95
Zork I, II or III-D	29.95
Suspended-D	29.95
Starcross-D	29.95
Sivert Butler	24.95
Deadline-D	29.95
Sky Travel	27.90

IN NEW YORK STATE CALL TOLL FREE **1-800-631-1003** OR **1-800-221-2760** or **516-349-1020**
OR WRITE: COMPUTER CENTERS OF AMERICA, 81 TERMINAL DRIVE, PLAINVIEW, NY 11803

WE HAVE A FULL LINE OF COMPACT DISC PLAYERS

SCHOOL SPECIALS

FREE
CARDCO MAIL NOW,
SPELL NOW, WRITE NOW
INCLUDED



**Cardco LQ/3
DAISY WHEEL
PRINTER**
Letter Quality Printer
with Built-in
Commodore Interface
\$199.95



PRINTERS

- | | |
|--|-------------------|
| Gemini SG10 | 209 ⁹⁵ |
| Gemini SG15 | 359 ⁹⁵ |
| Gemini SG10C w/Built-in
Commodore Interface | Call |
| Gemini SR 10/15 NEW! | Call |
| Gemini SB10 NEW! | Call |
| Silver Reed 400 | 249 ⁹⁵ |
| Panasonic 1091 | Call |
| HUSH 80CD Smaller, Quieter | 89 ⁹⁵ |

FREE
50 PIECE
STORAGE CASE



**20 MEMOREX
SS/DD DISCS**
\$24.95

*After \$5 Mfr's Rebate



**WICO
JOYSTICKS**
THE BOSS **\$12.88**
The Bat 14⁹⁸
3-Way 19⁹⁸



MODEMS
Mighty Mo 64⁹⁵
Cumm 1660 79⁹⁵
Total
Telecommunications Call

FALL SOFTWARE SPECIALS!



- Fast Load
 - Breakdance
 - Jet Combat Simulator
 - G.I. Joe
 - Summer Games
- YOUR CHOICE**
\$19.99



Simons Basic
or
Commodore Programmers'
Reference Guide
\$8.88



- Ghostbusters
 - Pitfall
 - Pitfall II
 - Space Shuttle
- \$13.88**

**SHARP
13" COLOR
COMPOSITE
MONITOR 13M31U**
\$144.95



**UNLEASH THE
POWER OF YOUR
COMPUTER
DIRECTLY INTO THE TOMY ROBOTS.**

•Includes Computer, Interface and Disk
•Create, Edit, Save, Retrieve and Mix Your Programs
•Robot*Link is Also a Powerful Educational Tool
•For Tomy Omnibot,
•Omnibot 2000 and
•Verbot All on the
Same Disk

**CALL FOR
PRICE**



WE NOW HAVE A LARGE SELECTION OF COMPACT DISCS

CBS

- NEW!**
BILLY JOEL'S GREATEST HITS
Michael Jackson - ThrillerEK 38112
Wham! - Make It BigCK 39595
Barbra Streisand - EmotionCK 39480
Johnny Mathis - Right from
the HeartCK 39601
Billy Joel - An Innocent ManCK 38837
Julio Iglesias - 1100 Bel Air
PlaceCK 39157
Bruce Springsteen - Born
in the USACK 38653

Warner/Elektra Atlantic

- Phil Collins - Hello I Must
Be Going80035
John Fogery - Centerfield
Eagles - Greatest Hits
1971-75105
Al Jarreau - Breaking Away3576
Carly Simon - The Best of
Prince & The Revolution -
Purple Rain25110
Madonna - Madonna23867

**CALL FOR
OUR PRICES**

DELOS

- Joe Williams - Nothin' But
the Blues4001
Bobby Shriver/Chuck Findley -
Trumpets No End4003
Mavis Rivers - It's A Good Day4002
Maria Callas - Cherubini -
MedeaACDOCL 201
Jerry Lee Lewis, Little Richard,
Bill Haley - Kings of Rock
'n Roll290-13-007
Survivor - Eye of the Tiger290-14-021

TELARC

- Tchaikovsky, Cinunutti
Orch. - 1812 OvertureCD80041
Stravinsky, Atlanta
Symph. - The FirebirdCD80039
Beethoven, The Cleveland
Orch., Symph. #3 "Eroica"CD80090

DENON

- J.S. Bach - Trio in D MinorC37-7093
Nancy Wilson - I'll Be a SongC38-7061
Art Farmer with The Great
Jazz Trio - AmbrosiaC38-7091

WE'RE PROUD OF OUR PRICES — SATISFACTION GUARANTEED

Check, Money Order, MC or VISA accepted / No additional charge for MasterCard and Visa / Call for shipping and handling information / NYS residents add applicable sales tax / Prices and availability are subject to change without notice / All factory fresh merchandise with manufacturer's warranty. Dealers Welcome. Call for recent price reductions and new rebate information. Plus shipping and handling. No returns without return authorization number



Centers
of America
Mail Order LTD.

piece removes that piece from the board. If no capture is possible, you may move any piece to an adjacent empty square. You may not pass up a capture—if it's possible to jump an opponent, you must always do so—and if the first capture puts you in position to make another, you must jump again (except in the Apple version). The computer won't let you make illegal moves.

Play ends when all the pieces from one side have been removed from the board. You can play against a friend or measure your skills against the computer (the IBM and TI versions also let you watch the computer play itself). Like other contests of strategy, *The Witching Hour* is simple to learn, but a challenge to master, and can be played at many different levels. Hint: It's sometimes smart to sacrifice a player to draw the opponent into a dangerous position.

IBM PC/PCjr Version

Each game square on the screen is marked with one of the letters of the alphabet. To move a piece, first type the letter for the square of the piece you want to move. Then type the letter of the square where you want to go. For instance, to move a witch from square L to square M, type L when the computer prompts you with FROM and type M when it prompts you with TO. If you press Enter without typing a letter, the computer takes that turn. Thus, to play alone against the computer, just press Enter every other turn. Press Enter on every turn to watch the computer play against itself.

Commodore 64 And VIC-20

Both Commodore versions of *The Witching Hour* offer a one- or two-player option when the game begins. The 64 version is played with a joystick. Plug the joystick into port 1 if you are playing alone (of course, two joysticks are needed for the two-player version). The colored box indicates which square you are on. Use the joystick to position the box on the piece you wish to move, then press the fire button: The box will change color. Now move the box to the square where you want the piece to go, and press the button again. If the move is legal, the piece appears in the new

square (if not, you get to try again).

The VIC-20 game requires at least 8K memory expansion and uses keyboard controls exactly like the IBM version. Each square is marked with a letter. When the computer prompts you with FROM and TO, make your move by entering the appropriate letters. Before loading the VIC version, you must enter the following two lines in direct mode (don't add a line number, and hit RETURN after each line):

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

Atari Version

The Atari game requires a joystick (a pair for the two-player game) and is played like the Commodore 64 version. The joystick controls a colored box. Move the box over the piece you want to move, then press the fire button. After the box changes color, move it to the square where you want to put the piece, then press the button again. Player/missile graphics are used to form the witch and ghost figures, and a short machine language routine moves them quickly around the screen.

Apple Version

The Witching Hour runs on any Apple II-series computer with DOS 3.3 or ProDOS. When the program starts, you must choose between a one- or two-player game. Then the game board is drawn and play begins. The flashing box shows which square you are on, and is moved with keyboard controls. Press the I key to go up, J to go left, K for down, and L for right. Press RETURN when the box is on the piece you want to move, then move the box to the desired square and press RETURN again.

TI-99/4A Version

This program runs on any TI-99/4A computer with either console BASIC or TI Extended BASIC. Every game square is labeled with a letter, and the pieces are moved on the board with keyboard controls. The first letter you enter (when the computer prompts FROM:) designates the piece you wish to move. The second letter (entered when the computer prints TO:) designates the square you will move to.

The computer signals with a beep when you try an illegal move. The game may be played by one or two players, or the computer can play both sides. Whenever you press ENTER without typing a letter, the computer takes that move.



"The Witching Hour" for IBM PC/PCjr forms ghost and witch shapes with PUT statements.

Program 1: The Witching Hour, PC/PCjr Version

For instructions on entering this listing, please refer to "COMPUTE's Guide to Typing In Programs" published bimonthly in COMPUTE!

```

NK 10 GOSUB 530:GOTO 280
OB 20 H=0:K=0:FOR A=7 TO 35:GOSU
B 60:NEXT
BF 30 GOSUB 170:IF H<1 THEN 250
GE 40 H=0:K=0:A=T:GOSUB 60:IF H<
1 THEN 250
HI 50 GOTO 30
DK 60 IF B(A)=0 OR B(A)=-S OR B(
A)=2 THEN RETURN
BP 70 FOR B=0 TO D(A-7):C=A+M(B)
:IF B(C)=S OR B(C)=2 THEN
160
OC 80 IF B(C) THEN 120
ND 90 SC=RND(1)*.9:IF H<SC THEN
H=SC:F=A:T=C
AE 100 IF CK=1 AND T1=C THEN L=1
:B=7
EA 110 GOTO 160
NN 120 IF B(C+M(B)) THEN 160
JN 130 SC=1+RND(1)*.9:IF H<SC TH
EN H=SC:F=A:T=C+M(B):K=C
NK 140 IF CK=0 THEN 160
GP 150 IF T1=C+M(B) THEN L=1:K1=
C:B=7
GN 160 NEXT:RETURN
ND 170 B(T)=B(F):B(F)=0:A=F:GOSU
B 760
IF 180 IF K THEN B(K)=0:A=K:GOSU
B 760
DD 190 A=T:GOTO 760
HB 200 GOSUB 520:IF S=1 THEN PRI
NT"The witches win!":GOTO
220
BA 210 PRINT"The ghosts win!"
OF 220 LOCATE 23,10:PRINT"Hit a
key to play again"
OE 230 K$=INKEY$:IF K$="" THEN 2
30
BE 240 RUN
NI 250 S=-S:H=0:A=7
LF 260 IF A=36 THEN 200
ML 270 GOSUB 60:IF H=0 THEN A=A+
1:GOTO 260

```


The complete 1541 enhancement system...

STAR[★]DOS

**MAKES
GREAT COFFEE!!**

The 1541 is the slowest disk drive on planet earth. Even simple operations seem to take forever. Quickloaders and Fastloaders that software-patch the operating system are vulnerable to being knocked out of memory, rendering them totally useless. Even Flashier products that require permanent modifications to the 64 and 1541 can't compete with the blinding speed of STARDOS.

STARDOS accelerates every (yes, we said every) function of the 1541 disk drive. Other fast loaders only load PRG files faster. STARDOS also speeds up SEQ, REL,USR and DIRECT ACCESS files. Everything including FORMAT, VERIFY, SCRATCH, VALIDATE, INITIALIZE and COPY are much faster. In addition STARDOS adds a vast array of easy to use commands all at the touch of a key.

A sampling of STARDOS features:

- Accesses ALL types of files up to 1,000% faster!
- Saves up to 300% faster than normal (with extended verify)
- DOES NOT CHANGE THE SPEED AT WHICH THE DRIVE MOTOR SPINS
- Makes your 1541 MORE RELIABLE and LESS PRONE TO BREAK DOWN or OVERHEAT!
- STARDOS is fully expandable for multiple fast disk drives
- Easy (5 minute) plug in installation. User friendly manual
- 100% compatible with software and serial bus peripherals
- Adds years of life to your disks and drive in reduced wear
- Cures a number of bugs in the Commodore 64 and 1541 disk drive including:
 - The damaging 'Head Knock' that can mis-align your 1541
 - The @: Save with replace bug!!
 - The Editor lock-up bug
- Harness the full power of your disk drive with the built in DOS wedge
- Lock/unlock files and protect/unprotect disks from the keyboard
- Powerful sector editor allows direct viewing of diskette
- Upgrades computer and drive to the latest Commodore specifications
- Instant access to the built in mini-wordprocessor for short notes and memos
- Built in copier copies all file types (even relative) easily and effectively
- Built in disk duplicator copies an entire diskette in less than 3 minutes
- Fully expanded machine language monitor, always on line
- Quality hardware. Full 120 day repair or replace warranty
- Satisfaction guaranteed or money back—no questions asked
- (Oh, by the way, we lied, STARDOS makes LOUSY COFFEE)

Simply the best. \$74.95

[Take advantage of our introduction special at \$64.95]

Personalize your C64! for a \$10 (non-refundable) charge we will include a 21 character power-on message with your favorite screen, border and text colors. Example

MIKE'S COMMODORE-64

Background Black Border Red Text Green

Write of phone for additional information.

*Trademark of Commodore Business Machines

... WRITE OR PHONE ...

STAR[★]POINT SOFTWARE

Star Route 10 Gazelle, CA 96034 [916] 435-2371

When ordering by mail:

- \$64.95 + 3.00 shipping
- \$64.95 + 4.00 COD orders
- Shipping out of USA \$6.00
- Calif. residents add 6% sales tax
- VISA or Mastercard accepted
- Please allow 4-6 weeks for delivery.


```

66 280 D=0:GOSUB 520:IF S=1 THEN
PRINT"Ghost's turn":GOTO
300
OF 290 PRINT"Witch's turn"
BH 300 PRINT TAB(16)"From:";
NJ 310 E=E+1:K$=INKEY$:IF K$=""
THEN 310
OC 320 IF ASC(K$)=13 THEN GOSUB
520:RANDOMIZE E:GOTO 20
GD 330 IF ASC(K$)<97 OR ASC(K$)>
121 THEN 310
DM 340 PRINT K$:A=N(ASC(K$)-97):
Z=A
DB 350 LOCATE 23,18:PRINT"to:";
GC 360 K$=INKEY$:IF K$="" THEN 3
60
DD 370 IF ASC(K$)<97 OR ASC(K$)>
121 THEN 360
JM 380 PRINT K$:T1=N(ASC(K$)-97)
GC 390 CK=1:L=0:K1=0:GOSUB 60:CK
=0
KC 400 H=0:A=7
BH 410 IF A=36 THEN 440
MB 420 GOSUB 60:IF H>=1 THEN 440
FH 430 A=A+1:IF A<36 THEN 420
OL 440 IF D THEN 470
DM 450 IF L THEN 480
GF 460 SOUND 99,5:GOTO 280
PO 470 IF L=0 OR K1=0 THEN SOUND
99,5:GOTO 510
DO 480 IF K1=0 AND H>=1 THEN 460
CD 490 F=Z:T=T1:K=K1:GOSUB 170:IF
F K1=0 THEN 250
AG 500 A=T:Z=A:H=0:GOSUB 60:IF H
<1 THEN 250
JD 510 GOSUB 520:D=1:GOTO 350
MO 520 LOCATE 20,1:FOR B=1 TO 3:
PRINT:PRINT"
";NEXT:
LOCATE 21,14:RETURN
AE 530 KEY OFF:SCREEN 1:COLOR 0,
1:CLS:DEFINT C,W
LI 540 DIM C1(98),W1(98),SQ(98),
B(42),D(28),X(35),Y(35),L(
35),XL(35),YL(35),N(28)
LP 550 LINE (50,80)-(81,103),1,B
IH 560 LOCATE 12,12:PRINT "The
Witching Hour
DA 570 LINE (230,80)-(261,103),1
,B
NN 580 GET (50,80)-(81,103),SQ
II 590 FOR A=0 TO 52:READ C1(A):
NEXT
QM 600 PUT (56,82),C1
MA 610 GET (50,80)-(81,103),C1
MC 620 FOR A=0 TO 69:READ W1(A):
NEXT
OC 630 PUT (232,82),W1
NN 640 GET (230,80)-(261,103),W1
II 650 S=-1:FOR A=0 TO 7:READ M(
A):NEXT
PM 660 FOR A=0 TO 28:READ D(A):N
EXT
LD 670 B=48:C=32:D=59:E=12
QL 680 FOR A=0 TO 4:FOR F=0 TO 4
:H=6*A+F+7:X(H)=B*F+D-15:
Y(H)=C*A+E-11
BO 690 L(H)=G+97:N(G)=H:G=G+1:XL
(H)=6*F+10:YL(H)=4*A+1:NE
XT:NEXT
AF 700 CLS:FOR A=0 TO 4:LINE (D,
C*A+E)-(B*A+D,C*A+E),2:NE
XT
BH 710 FOR A=0 TO 4:LINE (B*A+D,
E)-(B*A+D,C*A+E),2:NEXT
QE 720 A=0:F=0:GOSUB 740:A=B+B:G
OSUB 740:F=C+C:GOSUB 740:
A=0:GOSUB 740
EF 730 FOR A=0 TO 42:READ B(A):G
OSUB 760:NEXT:RETURN
BP 740 LINE (D+A,E+F)-(2*B+D+A,2
*C+E+F),2
FJ 750 LINE (D+A,2*C+E+F)-(2*B+D

```

```

+A,E+F),2:RETURN
KG 760 IF B(A)=2 THEN RETURN
FP 770 IF B(A)<0 THEN PUT (X(A),
Y(A)),W1,PSET
NM 780 IF B(A)=0 THEN PUT (X(A),
Y(A)),SQ,PSET
KL 790 IF B(A)>0 THEN PUT (X(A),
Y(A)),C1,PSET
JM 800 LOCATE YL(A),XL(A):PRINT
CHR$(L(A)):RETURN
IJ 810 DATA 36,20,-256,192,0,-96
1,0,16128,255,0,-1,192,-3
328,-16177,0,-1,192
LN 820 DATA 16128,255,0,-1009,-1
6381,1020,16368,-16,-1,-3
841,-1,-769,-16336,-193
FC 830 DATA 192,16128,-3841,0,-2
41,252,768,-769,0,16128,2
52,0,-4033,0,16128,192,0
DJ 840 DATA -4081,0,0,255,0
QI 850 DATA 52,20,48,0,3,15360,2
40,768,0,-241,252,-16381,
768,-1,960,192,-256
CP 860 DATA -769,-4081,0,-241,16
383,255,3840,4095,12543,0
,-1009,-1,192,768,-61
DG 870 DATA 207,0,3840,-16129,0,
0,-12289,192,0,-253,-1636
9,0,768,-15361,240
JP 880 DATA -32768,-253,15600,0,
168,-193,-16369,-22016,-8
1,-21761,-24406,16296
IL 890 DATA -1,0,-32768,-241,252
,0,3840,-3841,0,0,-16372
IL 900 DATA -6,1,6,-1,-5,7,5,-7
NM 910 DATA 7,3,7,3,7,0,3,7,3,7,
3,0
DM 920 DATA 7,3,7,3,7,0,3,7,3,7,
3,0,7,3,7,3,7
II 930 DATA 2,2,2,2,2,-1,-1,
-1,-1,-1,2
CI 940 DATA -1,-1,-1,-1,-1,2,-1,
-1,0,1,1,2
BJ 950 DATA 1,1,1,1,1,2,1,1,1,1,
1,2,2,2,2,2,2,2

```

Program 2: The Witching Hour, Commodore 64 Version

Version by Kevin Mykytyn, Editorial Programmer

For instructions on entering this listing, please refer to "COMPUTE!'S Guide to Typing In Programs" published bimonthly in COMPUTE!.

```

10 POKE 56,56:CLR:Z=1:U=53287
:rem 132
20 POKE53281,0:POKE53280,0:PRI
NT"[CLR]{2 DOWN}"TAB(11)
{YEL}THE WITCHING HOUR
{2 DOWN}{WHT}" :rem 134
25 PRINTTAB(11)"JOYSTICK IN PO
RT 1{2 DOWN}":PRINTTAB(6)"T
WO JOY&TICKS FOR TWO PLAYER
S :rem 102
30 PRINTTAB(8)"{3 DOWN}{CYN}PR
ESS DOWN FOR ONE PLAYER":PR
INTTAB(11)"{2 DOWN}UP FOR T
WO PLAYERS :rem 252
50 NP=PEEK(56321)AND3:IFNP=3TH
EN50 :rem 40
60 IFNP=2THEN110 :rem 195
70 PRINTTAB(9)"{3 DOWN}{GRN}PR
ESS LEFT TO GO FIRST:PRINT
TAB(11)"{2 DOWN}RIGHT TO GO
SECOND" :rem 141
80 IF(PEEK(56321)AND4)<>4THENF
1=1:GOTO110 :rem 141

```

```

90 IF(PEEK(56321)AND8)<>8THENF
1=-1:GOTO110 :rem 195
100 GOTO80 :rem 50
110 PRINT"[CLR]":GOSUB650:S$="
{OFF}{HOME}{YEL}{13 RIGHT}
":GOTO350 :rem 68
120 H=0:K=0:FORA=7 TO 35:GOSUB
160:NEXT :rem 229
130 GOSUB270:IF H<1 THEN340
:rem 241
140 H=0:K=0:A=T:GOSUB160:IF H<
1 THEN340 :rem 221
150 GOTO130 :rem 99
160 IF B(A)=0 OR B(A)=-S OR B(
A)=2 THEN RETURN :rem 140
170 FOR B=0 TO D(A-7):C=A+M(B)
:IF B(C)=S OR B(C)=2 THEN2
60 :rem 237
180 IF B(C) THEN220 :rem 193
190 SC=RND(1)*.9:IF H<SC THEN
{SPACE}H=SC:F=A:T=C
:rem 157
200 IF CK=1 AND T1=C THEN L=1:
B=8 :rem 207
210 GOTO260 :rem 100
220 IF B(C+M(B)) THEN260
:rem 203
230 SC=1+RND(1)*.9:IF H<SC THE
N 'I=SC:F=A:T=C+M(B):K=C
:rem 4
240 IF CK=0 THEN260 :rem 231
250 IF T1=C+M(B) THEN L=1:K1=C
:B=8 :rem 70
260 NEXT:RETURN :rem 241
270 A=F:B(T)=B(F):B(F)=0:GOSUB
1130 :rem 147
280 IFK THEN B(K)=0:A=K:GOSUB1
130 :rem 112
290 A=T:GOTO1130 :rem 165
300 GOSUB610:IF S=1 THEN PRINT
LEFT$(S$,14)*{YEL}THE WIT
CHES WIN!":GOTO320:rem 137
310 PRINT LEFT$(S$,15)*{YEL}TH
E GHOSTS WIN!":rem 116
320 PRINT"[HOME]{DOWN}"SPC(12)
"HIT FIREBUTTON" :rem 79
330 WAIT56321,16,16:POKE53269,
0:POKE53248,0:RUN :rem 186
340 S=-S:Z=-Z:Z=0:H=0:A=7
:rem 155
345 IF A=36 THEN 300 :rem 212
347 GOSUB160:IFH=0THEN A=A+1:G
OTO345 :rem 140
350 D=0:GOSUB610:IF NP=1 AND S
=-1 THEN Z=1 :rem 39
360 IF F1=-1 THEN Z=1 :rem 49
370 IF NP=1 AND S=F1 THEN120
:rem 209
380 IF S=1 THEN PRINT SS"GHOST
'S TURN":GOTO400 :rem 177
390 PRINT SS"WITCH'S TURN"
:rem 38
400 Q=3:R=3:FL=0:GOTO480
:rem 153
410 IF(PEEK(56320+Z)AND16)<>16
ANDFL=0THENFL=1:GOSUB490:A
=X:ZZ=A:POKEU,5:GOTO430
:rem 136
420 IF(PEEK(56320+Z)AND16)<>16
ANDFL=1THENGOSUB490:T1=X:P
OKEU,7:GOTO500 :rem 40
430 JX=15-(PEEK(56320+Z)AND15)
:ONJXGOTO440,450,410,460,4
10,410,410,470:GOTO410
:rem 54
440 Q=Q-1*-(Q>1):GOTO480
:rem 76
450 Q=Q+1*-(Q<5):GOTO480
:rem 77
460 R=R-1*-(R>1):GOTO480
:rem 81
470 R=R+1*-(R<5) :rem 67

```


A SPECIAL APPLE-SPECIFIC PUBLICATION FROM THE PUBLISHERS
OF *COMPUTE!*, *COMPUTE!'s Gazette*, AND
BEST-SELLING *COMPUTE!* BOOKS.



The second semiannual
edition of *COMPUTE!'s
Apple Applications Special*
goes on sale
October 1, 1985.

Price: \$3.95
(in Canada \$4.75)

Editorial

COMPUTE!'s Apple Applications Special second issue features applications, purchasing decisions, tutorials, and in-depth feature articles for owners and users of Apple personal computers. There are exciting applications for business, school, and home. From software to hardware to the state of the industry, this special issue serves as a useful tool and a handy reference. The special issue includes:

Features

Apple at Ten, and What's Coming in the Next Decade: This in-depth look describes Apple's place in the industry and predicts what it will do in the future. Can the Macintosh Office concept succeed against IBM? How will Apple retain its position in the market when the newest round of computers—such as the Commodore Amiga and Atari ST—reaches homes and schools? This intriguing survey includes comments by computer industry analysts and software manufacturers.

Cruising MAUG: The Micronet Apple Users Group is probably the best connection any Apple owner can make. Available through CompuServe, MAUG lets Apple users communicate and exchange information and programs. This guide to MAUG describes just some of its features, and highlights

programs from Macintosh desktop utilities to complete terminal software, all of which can be retrieved with a modem.

The Big Picture: Innovative hardware and software can transform the Apple II computer into a powerful graphics machine and enhance the Macintosh's already considerable abilities. Drawing programs, digitizers, and graphics tablets are featured and evaluated in this buyer's guide and tutorial.

Applications

Dr. Disk: Allows you to read from, edit, and write to any block on any disk. An excellent utility which lets you examine disk contents, manipulate catalogs, and even change machine language programs.

Enhanced Applesoft INPUT: A short machine language utility which turns Applesoft INPUT into a more flexible and powerful statement. Allows entry of any valid numeric expression, as well as commas, quotes, or colons as responses to the INPUT prompt.

The Office for Everyone: A major applications feature on using *Word*, *Chart*, *File*, *Multiplan*, and *MacTerminal* on the Macintosh. This tutorial shows how to turn the Macintosh into a powerful business computer.

The ApWriter: This simple BASIC program turns any Apple II-series computer into an electronic-style typewriter. Set margins and tabs, underline, and print out letters, memos, and notes.

Quality editorial in the style and tradition of *COMPUTE!*, the leading magazine of home, educational, and recreational computing.

There's also a disk available which includes all the programs from the magazine. The 5¼-inch floppy disk for the Apple II+, IIe, or IIc costs \$16.95 and is available only from *COMPUTE!* Publications. Send in the attached card with your payment today to order the *Disk*.

Look for the October issue of *COMPUTE!'s Apple Applications Special* on sale where you buy other *COMPUTE!* publications, or at Apple computer retailers. You can also order directly from *COMPUTE!* Publications.

To order, send in the attached card with your payment or call toll-free 800-334-0868 (in NC 919-275-9809.)

COMPUTER MAIL ORDER

THE CMO ADVANTAGE

- ✓ THE BEST PRICES!
- ✓ Next day shipping on all in stock items.
- ✓ Free easy access order inquiry.
- ✓ Orders from outside Pennsylvania and Nevada save state sales tax.
- ✓ Free technical support with our factory trained technical staff
- ✓ There is no limit and no deposit on C.O.D. orders.
- ✓ There's no extra charge for using your credit card. Your card is not charged until we ship.
- ✓ No waiting period for cashiers checks.
- ✓ We accept purchase orders from qualified corporations. Subject to approval.
- ✓ Educational discounts available to qualified institutions.
- ✓ FREE CATALOG MEMBERSHIP

ORDER LINE

1-800-233-8950
In PA 1-800-242-4215

CUSTOMER SERVICE & TECH SUPPORT
1-717-327-1450
Dept. A210

MAILING ADDRESS

Computer Mail Order
Dept. A210
477 East Third Street
Williamsport, PA 17701



MEMBER DIRECT MARKETING ASSOCIATION

CREDIT CARDS



SHIPPING

Add 3%, minimum \$5.00 shipping and handling on all orders. Larger shipments may require additional charges.

All items subject to availability and price change.

Returned shipments may be subject to a restocking fee.

CANADIAN ORDERS

1-800-268-3974
Ontario/Quebec

1-800-268-4559
Other Provinces

1-416-828-0866
In Toronto

TELEX: 06-218960

2505 Dunwin Drive,
Mississauga, Ontario
Canada L5L1T1

All prices shown are for U.S.A. orders.
Call The Canadian Office for Canadian prices.

HOME COMPUTERS

ATARI

130XE (128K).....CALL
520ST (512K).....CALL



800XL 64K CALL
850 Interface \$119.00
1010 Recorder \$49.99
1050 Disk Drive \$169.00
1025 Dot Matrix Printer \$199.99
1027 Letter Quality Printer \$269.99
1030 Direct Connect Modem \$59.99

APPLE

APPLE IIe CALL
APPLE IIc CALL
MacINTOSH CALL
IIC LCD Display CALL



commodore

C128 Computer.....\$NEW
C1571 (Disk Drive for C128).....\$NEW
C1902 (RGB 13" Monitor for C128).....\$NEW
C1670 (Modem for C128).....\$NEW

Commodore Plus 4 \$199.00
CBM 64..... \$149.00
C1541 Disk Drive \$199.00
C1530 Datasette \$39.99
M-801 Dot Matrix Printer \$169.00
MCS 803 Dot Matrix \$179.00
C1702 Color Monitor \$199.00
C1660 Auto Modem \$59.99
DPS 1101 Daisy Printer \$339.00

PORTABLE COMPUTERS



41CV \$189.99
41CX \$249.99
HP 71B \$419.99
HP 11C \$62.99
HP 12C/15C/16C \$89.99
HP 75D \$94.00
HPIL Module \$98.99
HPIL Cassette or Printer \$359.99
Card Reader \$143.99
Extended Function Module \$63.99
Time Module \$63.99

We stock the full line of
HP calculator products

NEC

PC-8401 CALL
PC-8201 Portable Computer \$289.00
PC-8231 Disk Drive \$599.00
PC-8221A Thermal Printers \$149.00
PC-8281A Data Recorder \$99.99
PC-8201-06 BK RAM Chips \$105.00

SHARP

PC-1350 \$159.99
PC-1261 \$159.99
PC-1260 \$109.99
PC-1500A \$165.99
PC-1250A \$88.99
CE-125 Printer/Cassette \$128.99
CE-150 Color Printer Cassette \$171.99
CE-161 16K RAM \$134.99

8036 Atari Writer \$59.99
Star Raiders \$5.99
Missile Command \$5.99
Defender \$5.99
Galaxian \$5.99
Space Invaders \$5.99
Computer Chess \$5.99
Robotron \$5.99
Eastern Front \$5.99

BOARDS FOR ATARI

Axlon 32K \$39.99
Axlon 48K (400) \$69.99
Axlon 128K \$269.99
Microbits 64K (600) \$109.00
Bit 3 Full View 80 \$229.00

Macintosh Software

Lotus Jazz CALL
Microsoft Excel CALL
Microsoft Business Pak \$375.00
Living Videotext
ThinkTank 512 \$159.00
Manhattan Ready, Set, Go \$79.99
Creighton Development
Mac Spell \$69.99
Monogram Dollars & Sense \$99.99
Peachtree Back to Basics - GLS \$109.00
PFS File & Report (New Version) \$129.00
Silicon Beach Airborn \$25.99

Professional Software

Fleet System II w/Spell \$49.99
Trivia Fever \$29.99
Word Pro 4 Plus/5 Plus each \$239.00
Info Pro \$179.00
Administrator \$399.00
Power \$69.99

File (64) \$59.99
Report (64) \$49.99

PRECISION SOFTWARE

Superbase 64 \$54.99
PaperClip w/Spell Pack \$79.99
The Consultant DBMS \$69.99
Bus Card II \$139.00
80 Col Display \$139.00

DISKETTES

maxell.
3 1/2" SS/DD \$39.99
3 1/2" DS/DD \$54.99
5 1/4" MD-1 w/Hardcase \$17.99
5 1/4" MD-2 w/Hardcase \$23.99
5 1/4" MD-2-HD for AT \$44.99

Verbatim.

5 1/4" SS/DD \$21.99
5 1/4" DS/DD \$29.99
Disk Analyzer \$24.99

Dennison

Elephant 5 1/4" SS/SD \$13.99
Elephant 5 1/4" SS/DD \$15.99
Elephant 5 1/4" DS/DD \$16.99
Elephant Premium DS/DD \$23.99

IBM

5 1/4" DS/DD Floppy Disks
(Box of 10) \$25.99

DISK HOLDERS

INNOVATIVE CONCEPTS

Flip-in-File 10 \$3.99
Flip-in-File 50 \$17.99
Flip-in-File 50 w/lock \$24.99
Flip-in-File (400/800 ROM) \$11.99

AMARAY

50 Disk Tub 5 1/4" \$9.99
30 Disk Tub 3 1/2" \$8.99

MODEMS

ANCHOR

Volksmodem \$59.99
Volksmodem 300/1200 \$189.99
Mark XII (1200 Baud) \$259.00
Signalman Express \$299.00
Lightning 2400 Baud \$399.00

Hayes

Smartmodem 300 \$139.00
Smartmodem 1200 \$389.00
Smartmodem 1200CB \$359.00
Smartmodem 2400 \$629.00
Micromodem IIe \$149.00
Smart Com II \$89.99
Chronograph \$199.00
Transet 1000 \$309.00

AST

Reach 1200 Baud Half Card \$399.00

mic MICROBITS

MPP-1000E AD/AA (Atari) \$79.99
MPP-1064 AD/AA (C-64) \$69.99

Novation

Smart Cat Plus \$319.00
J-Cat \$99.99
Novation 2400 CALL
Apple Cat II \$229.00
212 Apple Cat II \$379.00
Apple Cat 212 Upgrade \$229.00
Macmodem \$319.00

QUADRAM

Quadmodem II \$339.00
300/1200 \$499.00
300/1200/2400 \$499.00

TELELEARNING

C64 300 Baud.....(Closeout)..... \$39.99

GRAPHICS

Koala

IBM \$89.99
Apple/Franklin \$79.99

Polaroid

Palette \$1299.00

DRIVES

HARD ALLOY

PC Stor CALL

IDEA Associates

5 meg Removable/Internal \$1399.00
10 meg Fixed/Internal \$1249.00
15 meg 5 Removable/10 Fixed \$2149.00
25 meg 5 Removable/20 Fixed \$2499.00

MEGA

10 Meg Bernoulli Box \$2099.00
20 Meg Bernoulli Box \$2599.00
5 meg MacNoulli \$1599.00

TALLGRASS TECHNOLOGIES

12 25 35 50 80 meg (PC) \$1499.00

FLOPPY

INDUS

Apple GT \$209.00
Atari GT \$239.00
C-64 GT \$259.00

U-SCI

A1 5 Apple \$199.00
A2 Apple \$199.00

ISD

SD1 C-64 Single \$219.00
SD2 C-64 Dual \$469.00

Tandon

320K 5 1/4" (PC) \$119.00

TEAC

320K 5 1/4" \$109.00

CALL TOLL-FREE

MONITORS

AMDEK	
300 Green.....	\$129.00
300 Amber.....	\$139.00
310 Amber IBM-Plug.....	\$169.00
Color 300 Composite.....	\$199.00
Color 500 Composite/RGB.....	\$389.00
Color 600 Hi-Res (640x240).....	\$399.00
Color 700 Hi-Res (720x240).....	\$499.00
Color 710 Long Phosphor.....	\$579.00



12" Amber/Green Composite.....	\$99.99
12" Amber/Green TTL.....(ea.)	\$119.00

NEC

JB 1260 Green.....	\$59.99
JB 1201/1205 (ea.).....	\$99.99
JB 1270 Green.....	\$139.00
JB 1275 Amber.....	\$149.00
JB 1290 G TTL/1285 A TTL.....	\$149.00
JC 1410 RGB.....	\$669.00

PRINCETON

MAX-12E Amber.....	\$189.00
HX-9 9" RGB.....	\$469.00
HX-9E Enhanced.....	\$519.00
HX-12 12" RGB.....	\$469.00
HX-12E Enhanced.....	\$559.00
SR-12 Hi-Res.....	\$599.00
SR-12 P Enhanced.....	\$649.00

TAXAN

115 12" Green Mono.....	\$119.00
116 12" Amber Mono.....	\$119.00
121 Green TTL.....	\$139.00
122 Amber TTL.....	\$149.00
420 Hi-Res RGB (IBM).....	\$429.00
440 Ultra Hi-Res RGB.....	\$559.00



8400 Quadchrome I.....	\$479.00
8410 Quadchrome II.....	\$429.00
8420 Amberchrome.....	\$179.00
8500 Quad Screen.....	\$1499.00



ZVM 1220/1230.....	\$99.99
ZVM 1240 (IBM) Amber.....	\$149.00
ZVM 130 Color.....	\$269.00
ZVM 131 Color.....	\$249.00
ZVM 133 RGB.....	\$429.00
ZVM 135 RGB/Color.....	\$459.00
ZVM 136 RGB/Color.....	\$599.00
1220, 1230, 1240.....	CALL

INTERFACES



Multi I/O (Apple II).....	\$189.00
---------------------------	----------



Graphcard.....	\$79.99
Serial Card.....	\$99.99
Microbuffer II +.....	\$169.00
Microbuffer 32K.....	\$189.00



Microfazer.....	from \$139.00
Etazer (Epson).....	from \$79.99

Orange Mikro

Grappier CD (C64).....	\$99.99
Grappier + (Apple).....	\$89.99
Grappier 16K+ (Apple).....	\$159.00

DIGITAL DEVICES

Ape Face (Atari).....	\$49.99
U-Print A (Atari).....	\$54.99
U-A16/Buffer (Atari).....	\$74.99
U-Call Interface (Atari).....	\$39.99
U-Print C (C64).....	\$49.99
P-16 Print Buffer.....	\$74.99
U-Print II Apple IIC.....	\$89.99

mip MICROBITS

MPP-1150 Parallel (Atari).....	\$69.99
MP-1150XL (Atari 1200XL).....	\$69.99
MicroStuffer 64K Print Buffer.....	\$109.00

PRINTERS

Canon

A40.....	CALL
LBP-8A1 Laser.....	CALL



MSP-10 (80 col.).....	\$349.00
MSP-15 (132 col.).....	\$499.00
MSP-20 (80 col.).....	\$569.00
MSP-25 (132 col.).....	\$679.00

C. ITOH

Prowriter 7500.....	\$219.00
Prowriter 8510P.....	\$299.00
Prowriter 8510 NLO.....	\$329.00
Prowriter 1550P.....	\$469.00

corona

Lazer LP-300.....	\$2799.00
-------------------	-----------

DIABLO

D25 Daisywheel.....	\$599.00
630-109 Daisywheel.....	\$1749.00
D801F Daisywheel.....	CALL



2000.....	\$749.00
-----------	----------

EPSON

LX-80, LX-90, FX-85, FX-185	
JX-80, DX-10, DX-20, SQ 2000	
HS-80, Homewriter 10.....	CALL

JUKEI

6000 Letter Quality.....	CALL
6100 Letter Quality.....	CALL
6300 Letter Quality.....	CALL

NEC

8027 Transportable.....	\$299.00
2000 Series.....	\$699.00
3000 Series.....	\$1099.00
8000 Series.....	\$1449.00
ELF 360.....	\$449.00

OKIDATA

84, 182, 192, 193, 2410.....	CALL
Okimate 10 (Specify C64/Atari).....	\$189.00
Okimate 20 (IBM).....	CALL

OLYMPIA

Needlepoint Dot Matrix.....	\$299.00
Compact RO.....	\$339.00
Compact 2.....	\$369.00

Panasonic

KX1091.....	\$259.00
KX1092.....	\$389.00
KX1093.....	\$479.00



Quadjet.....	\$399.00
Quad Laser.....	CALL

SILVER-REED

500 Letter Quality.....	\$279.00
550 Letter Quality.....	\$419.00
770 Letter Quality.....	\$759.00



SG-10C (C64 Interface) SNEW	
SB/SD/SG/SR Series.....	CALL
Powertype Letter Quality.....	CALL

Texas Instruments

T1865.....	\$1049.00
------------	-----------

TOSHIBA

1340 (80 column).....	\$589.00
P351 (132 column).....	\$1169.00

PC COMPATIBLES

IBM PC SYSTEMS

Configured to your specification.
Call for Best Price!

IBM-PC, IBM-PC II, IBM-XT, IBM-AT

SOFTWARE FOR IBM



Electric Desk IBM-PC.....	\$199.00
ASHTON-TATE Framework.....	\$369.00
dBase III.....	\$369.00



Turbo Pascal 3.0.....	\$49.99
Sidekick.....	\$39.99

CENTRAL POINT

Copy II PC-Backup.....	\$29.99
------------------------	---------

DECISION RESOURCES

Chartmaster.....	\$259.00
Signmaster.....	\$179.00

FOX & GELLER

Quickcode III.....	\$169.00
--------------------	----------

FUNK SOFTWARE

Sideways.....	\$39.99
---------------	---------

Harvard Software Inc. Harvard Project Manager.....	\$209.00
Total Project Manager.....	\$269.00

Human Edge™

Communication Edge.....	\$99.99
Management Edge.....	\$119.00
Negotiation Edge.....	\$139.00
Sales Edge.....	\$119.00

LIFETREE

Volksriver Deluxe.....	\$159.00
------------------------	----------

LIVING VIDEOTEK

Think Tank.....	\$109.00
-----------------	----------



Symphony.....	\$439.00
1-2-3.....	\$309.00

MECA SOFTWARE

Managing Your Money.....	\$109.00
--------------------------	----------

MICROSTUF

Crosstalk XVI.....	\$89.99
Microstuf Remote.....	\$89.99



R:Base 4000.....	\$259.00
R:Base 5000.....	\$399.00
Clout 2.0.....	\$129.00



WordStar 2000.....	\$249.00
WordStar 2000+.....	\$309.00
WordStar Professional.....	\$299.00

MICROSOFT

Word.....	\$239.00
Mouse.....	\$139.00
Flight Simulator.....	\$39.99
MultiPlan.....	\$129.00

MultiMate

Multi Mate Word Proc.....	\$249.00
---------------------------	----------

NOUMENON

Intuit.....	\$69.99
-------------	---------

NORTON

Norton Utilities 3.0.....	\$59.99
---------------------------	---------



Peachtext 5000.....	\$169.00
PeachPack (GLU/AP/AR).....	\$219.00



Access.....	\$54.99
Write/Graph/File/Plan.....(ea.)	\$79.99
Report.....	\$74.99
Proof.....	\$59.99

Professional Software

Wordplus-PC w/Boss.....	\$249.00
-------------------------	----------

ROESOFT

Prokey.....	\$89.99
-------------	---------

THE SOFTWARE GROUP

Enable.....	\$339.00
-------------	----------

SATELLITE SYSTEMS

Word Perfect 4.0.....	\$219.00
-----------------------	----------

SORCIM/IUS

Accounting.....	
AP/AR/GL/INV/OE.....(ea.)	\$295.00
SuperCalc III.....	\$195.00
EasyWriter II System.....	\$195.00
Super Project.....	\$195.00

SPI

Open Access.....	\$379.00
------------------	----------

THOUGHTWARE

Trigger.....	\$289.00
Sell, Sell, Sell Training.....	\$299.00
Application.....	\$179.00



Safari (7300).....	CALL
6300.....	CALL

corona

PPC400 Dual Portable.....	\$1799.00
PPCXT 10 meg Portable.....	\$2399.00
PC40022 10 meg Desktop.....	\$1999.00

ITT

ITT X-TRA 256K, 2 Drive System.....	CALL
256K, 10 meg Hard Drive System.....	CALL



MBC 550-2 Single Drive.....	\$699.00
MBC 555-2 Dual Drive.....	\$969.00
MBC 775 Portable.....	\$1599.00
MBC 511 10 meg.....	CALL
MBC 675 Portable.....	CALL
MBC 880 Desktop.....	CALL



PC-158-21 Single Desktop.....	CALL
PC-158-52 Dual Desktop.....	CALL
PC-158-53 10 meg Desktop.....	CALL
PC-161-21 Single Portable.....	CALL
PC-161-52 Dual Portable.....	CALL
Z-200 (AT).....	CALL
171 (Portable).....	CALL
138 (Transportable).....	CALL
148 (DeskTop).....	CALL

MULTIFUNCTION CARDS



Six Pack Plus.....	\$239.00
Mega Plus II.....	\$269.00
I/O Plus II.....	\$139.00
Advantage-AT.....	\$399.00
Graph Pak.....	\$599.00
Monograph Plus.....	\$399.00
Preview Mono.....	\$299.00
PC Net Cards.....	\$379.00
5251/11 On-line.....	\$799.00
5251/12 Remote.....	\$579.00
3780 Emulation Card.....	\$639.00
BSC Biscync.....	\$489.00



IRMA 3270.....	\$879.00
IRMA Print.....	\$999.00



Color Card (Graphics Edge).....	\$299.00
Magic Card.....	\$199.00

HERCULES

Graphics.....	\$299.00
Color.....	\$159.00



IDEAmax - ZPR, 64K, C, S, P.....	\$229.00
IDEAmini - YPR, C, S, P.....	\$189.00
IDEAminimax - MPR 128K.....	\$229.00
IDEAshare Software.....	\$219.00
IDEA 5251.....	\$699.00

MYLEX

The Chairman.....	\$489.00
-------------------	----------

PARADISE

Modular Graphics Card.....	\$274.00
Multi Display Card.....	\$289.00
Five Pack C, S.....	\$159.00

PERSYST

Bob Board.....	\$389.00
----------------	----------

PLANTRONICS

Color Plus.....	\$369.00
-----------------	----------



Captain - 64.....	\$239.00
Captain Jr. 128K.....	\$339.00
Graphics Master.....	\$469.00




```

480 POKE 53248,R*40+47:POKE 53
249,Q*40+26:FORTD=1TO100:N
EXT:GOTO410 :rem 93
490 X=(Q-1)*6+(R-1)+7:WAIT5632
0+Z,16,0:RETURN :rem 29
500 CK=L:L=0:K1=0:GOSUB160:CK=
0 :rem 45
501 H=0:A=7 :rem 58
502 IFA=36THEN510 :rem 210
503 GOSUB160:IFH>=1THEN510
:rem 49
504 A=A+1:IFA<36THEN503:rem 42
510 IF D THEN540 :rem 49
520 IF L THEN545 :rem 63
530 GOSUB620:GOTO350 :rem 187
540 IF L=0 OR K1=0 THEN GOSUB6
20:GOTO600 :rem 187
545 IFK1=0ANDH>=1THEN530
:rem 164
550 F=ZZ:T=T1:K=K1:GOSUB270:IF
K1=0 THEN340 :rem 42
560 A=T:ZZ=A:H=0:GOSUB160:IFH<
1 THEN340 :rem 93
600 D=L:Q=3:R=3:POKEU,5:GOTO48
0 :rem 109
610 PRINT"[HOME][BLK]";:FORAL=
1TO2:FORA2=1TO40:PRINT" ";
:NEXTA2,A1:RETURN :rem 15
620 POKE 54276,33:FOR TD=1 TO
[SPACE]600:NEXT:POKE 54276
,32:RETURN :rem 86
630 PRINT"[HOME]";:FORA=0TO23:
PRINT"[7][40 SPACES]";:NEX
T :rem 232
640 RETURN :rem 122
650 W$="[7][RVS]@AB[DOWN]
[3 LEFT]FGH[DOWN][3 LEFT]L
MN[2 UP]":G$="[7][RVS]CDE
[DOWN][3 LEFT]IJK[DOWN]
[3 LEFT]OPQ[2 UP]":rem 18
660 BL$="[7][OFF]O[Y]P[DOWN]
[3 LEFT][H] [N][DOWN]
[3 LEFT]L[P]@[2 UP]"
:rem 214
670 DIMD(28),B(42),X(35),Y(35)
:rem 22
680 S=-1:FORA=0TO7:READM(A):NE
XT:FORA=0TO28:READD(A):NEX
T :rem 100
690 FORA=0TO4:FORF=0TO4:H=6*A+
P+7:X(H)=5*F+8:Y(H)=5*A+2:
NEXTF,A:FORA=0TO42:rem 195
700 READB(A):NEXT:GOSUB770:GOS
UB1190:FORA=0TO42:GOSUB113
0:NEXT:RETURN :rem 199
710 DATA -6,1,6,-1,-5,7,5,-7
:rem 64
720 DATA 7,3,7,3,7,0,3,7,3,7,3
,0 :rem 9
730 DATA 7,3,7,3,7,0,3,7,3,7,3
,0,7,3,7,3,7 :rem 241
740 DATA 2,2,2,2,2,2,2,-1,-1,-
1,-1,-1,2 :rem 43
750 DATA -1,-1,-1,-1,-1,-1,-1,-
1,0,1,1,2 :rem 34
760 DATA 1,1,1,1,1,2,1,1,1,1,1
,2,2,2,2,2,2 :rem 29
770 POKE56334,0:IFPEEK(15361)=
192THEN830 :rem 16
780 PRINT"[CLR][10 DOWN]"SPC(1
5)"[YEL]PLEASE WAIT"
:rem 27
790 FOR A=15360 TO 15503:READ
[SPACE]B:POKE A,B:NEXT
:rem 206
800 POKE 1,51:FORA=0TO1023:POK
E14336+A,PEEK(A+53248):NEX
T:POKE 1,55 :rem 85
810 FOR A=14952 TO 14967:READB
:POKE A,B:NEXT :rem 218
820 FOR A=832 TO 895:READB:POK
EA,B:NEXT :rem 14

```

```

830 POKE 53272,30:POKE 56334,1
:POKE 53270,216 :rem 86
840 POKE2040,13:POKE53269,1:PO
KE53275,0:POKE53271,1:POKE
53287,7 :rem 88
850 FOR A=54272 TO 54295:POKE
[SPACE]A,0:NEXT:POKE 54296
,15:POKE 54273,10 :rem 49
860 POKE 54277,21:RETURN
:rem 127
870 DATA255,192,192,192,192,19
2,208,212 :rem 196
880 DATA255,0,0,8,8,10,42,5
:rem 86
890 DATA255,3,3,3,3,3,131,3
:rem 82
900 DATA255,192,192,193,192,19
3,193,193 :rem 203
910 DATA255,0,0,80,84,85,153,8
5 :rem 43
920 DATA255,3,3,3,3,3,3
:rem 234
930 DATA213,197,197,192,193,22
5,233,234 :rem 197
940 DATA69,84,20,84,81,80,80,8
6 :rem 59
950 DATA3,3,3,3,3,67,19,171
:rem 91
960 DATA192,192,212,213,213,20
8,192,192 :rem 184
970 DATA85,20,20,85,85,85,85,2
1 :rem 54
980 DATA3,23,87,87,71,3,3,67
:rem 160
990 DATA232,224,193,192,192,19
2,192,255 :rem 200
1000 DATA21,84,80,0,0,0,0,255
:rem 162
1010 DATA3,3,3,3,3,3,255
:rem 17
1020 DATA192,192,192,192,192,1
92,192,255 :rem 241
1030 DATA21,5,5,5,1,0,0,255
:rem 65
1040 DATA67,67,3,67,83,23,3,25
5,128,64,32,16,8,4,2,1,1,
2,4,8,16,32,64,128:rem 44
1050 DATA255,255,255,192,0,3,1
92,0 :rem 179
1060 DATA3,192,0,3,192,0,3,192
:rem 226
1070 DATA0,3,192,0,3,192,0,3
:rem 119
1080 DATA192,0,3,192,0,3,192,0
:rem 225
1090 DATA3,255,255,255,0,0,0,0
:rem 223
1100 DATA0,0,0,0,0,0,0,0
:rem 144
1110 DATA0,0,0,0,0,0,0,0
:rem 145
1120 DATA0,0,0,0,0,0,0,0
:rem 146
1130 IFB(A)=2THENRETURN
:rem 166
1140 POKE781,Y(A):POKE782,X(A)
:POKE783,0:SYS65520
:rem 110
1150 IFB(A)=0THENPRINTBLS;
:rem 64
1160 IFB(A)>0THENPRINTGS;
:rem 251
1170 IFB(A)<0THENPRINTW$;
:rem 10
1180 RETURN :rem 170
1190 GOSUB630:PRINT"[HOME]
[PUR]";:R$=CHR$(13):A$="
[8 SPACES][3 RIGHT]CC
[3 RIGHT]CC[3 RIGHT]CC
[3 RIGHT]CC"+R$+R$:rem 82
1200 B$="[8 SPACES][RIGHT]_
[RIGHT]M[2 RIGHT]_

```

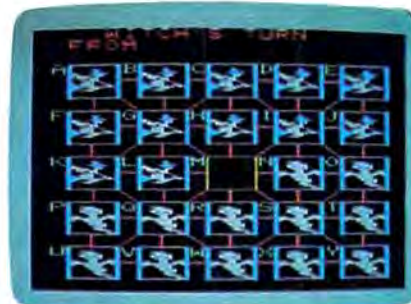
```

[2 RIGHT]N[RIGHT]B[RIGHT]
M[2 RIGHT]B[2 RIGHT]N
[RIGHT]B" :rem 89
1210 B$=B$+R$+"[8 SPACES]
[RIGHT]B[2 RIGHT]M[RIGHT]
B[RIGHT]N[2 RIGHT]B
[2 RIGHT]M[RIGHT]B[RIGHT]
N[2 RIGHT]B"+R$+R$
:rem 152
1220 C$="[8 SPACES][RIGHT]B
[2 RIGHT]N[RIGHT]B[RIGHT]
M[2 RIGHT]B[2 RIGHT]N
[RIGHT]B[RIGHT]M[2 RIGHT]
B"+R$ :rem 199
1230 C$=C$+"[8 SPACES][RIGHT]B
[RIGHT]N[2 RIGHT]B
[2 RIGHT]M[RIGHT]B[RIGHT]
N[2 RIGHT]B[2 RIGHT]M
[RIGHT]B"+R$+R$ :rem 251
1240 PRINT"[CLR][3 DOWN]"A$B$A
C$A$B$A$C$LEFT$(A$,28):R
ETURN :rem 65

```



The Commodore 64 version of "The Witching Hour" features sprite graphics.



Use keyboard controls to play "The Witching Hour" on the VIC-20.

Program 3: The Witching Hour, VIC-20 Version

Version by Kevin Martin, Editorial Programmer

For instructions on entering this listing, please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!.

```

10 Z=1:POKE36879,9:POKE36878,2
39 :rem 75
20 PRINT "[CLR][YEL][8 DOWN]
[2 SPACES]THE WITCHING HOUR
":rem 104
30 PRINT "[2 DOWN]CHOOSE: '1'

```



```

[SPACE]PLAYER" :rem 157
40 PRINT SPC(8)"[2 DOWN]'2' PL
AYERS" :rem 102
50 GETA$:IFA$="THEN50:rem 237
55 NP=ASC(A$)-48:IFNP<LORNP>2T
HENS0 :rem 130
60 IFNP=2THEN10 :rem 195
70 PRINT"[DOWN]PRESS:":PRINT"
[2 SPACES]'1' TO GO FIRST":
PRINT"[2 SPACES]'2' TO GO S
ECOND" :rem 219
75 GETA$:A=ASC(A$+CHR$(0))-48:
IFA<LORA>2THEN75 :rem 160
80 IFA=1THENF1=1 :rem 186
90 IFA=2THENF1=-1 :rem 233
110 PRINT"[CLR]":GOSUB650:S$="
[OFF][HOME][4 RIGHT]":GOTO
350 :rem 161
120 H=0:K=0:FORA=7 TO 35:GOSUB
160:NEXT :rem 229
130 GOSUB270:IF H<1 THEN340
:rem 241
140 H=0:K=0:A=T:GOSUB160:IF H<
1 THEN340 :rem 221
150 GOTO130 :rem 99
160 IF B(A)=0 OR B(A)=-S OR B(
A)=2 THEN RETURN :rem 140
170 FOR B=0 TO D(A-7):C=A+M(B)
:IF B(C)=S OR B(C)=2 THEN2
60 :rem 237
180 IF B(C) THEN220 :rem 193
190 SC=RND(1)*.9:IF H<SC THEN
[SPACE]H=SC:F=A:T=C
:rem 157
200 IF CK=1 AND T1=C THEN L=1:
B=8 :rem 207
210 GOTO260 :rem 100
220 IF B(C+M(B)) THEN260
:rem 203
230 SC=1+RND(1)*.9:IF H<SC THE
N H=SC:F=A:T=C+M(B):K=C
:rem 4
240 IF CK=0 THEN260 :rem 231
250 IF T1=C+M(B) THEN L=1:K1=C
:B=8 :rem 70
260 NEXT:RETURN :rem 241
270 A=F:B(T)=B(F):B(F)=0:GOSUB
1130 :rem 147
280 IFK THEN B(K)=0:A=K:GOSUB1
130 :rem 112
290 A=T:GOTO1130 :rem 165
300 GOSUB610:IF S=1 THEN PRINT
"[HOME][3 SPACES]THE WITCH
ES WIN!":GOTO320 :rem 86
310 PRINT"[HOME][3 SPACES]THE
[SPACE]GHOSTS WIN!":rem 64
320 PRINT"[HOME][DOWN]
[5 SPACES]HIT SPACEBAR"
:rem 176
330 GETA$:IFA$<>" THEN330
:rem 140
331 RUN :rem 140
340 S=-S:Z=-(Z=0):H=0:A=7
:rem 155
345 IF A=36 THEN 300 :rem 212
347 GOSUB 160:IF H=0 THEN A=A+
1:GOTO 345 :rem 140
350 D=0:GOSUB610:IF NP=1 AND S
=-1 THEN Z=1 :rem 39
360 IF F1=-1 THEN Z=1 :rem 49
370 IF NP=1 AND S=F1 THEN120
:rem 209
380 IF S=1 THEN PRINT S$"GHOST
'S TURN":GOTO400 :rem 177
390 PRINT S$"WITCH'S TURN"
:rem 38
400 PRINTS$"[DOWN][2 LEFT]FROM
:[LEFT]": :rem 109
410 GETA$:A=ASC(A$+CHR$(0)):IF
A<65ORA>89THEN410 :rem 210
420 PRINTA$:A=N(A-65):Z=A
:rem 5
430 PRINT SPC(5)"TO: {LEFT}";
:rem 137
440 GETA$:T1=ASC(A$+CHR$(0)):I
FT1<65ORT1>89THEN440
:rem 164
450 PRINTA$:T1=N(T1-65):rem 67
500 CK=1:L=0:K1=0:GOSUB160:CK=
0 :rem 45
501 H=0:A=7 :rem 58
502 IF A=36 THEN 510 :rem 210
503 GOSUB 160:IF H>=1 THEN 510
:rem 49
504 A=A+1:IF A<36 THEN 503
:rem 42
510 IF D THEN540 :rem 49
520 IF L THEN545 :rem 63
530 GOSUB620:GOTO350 :rem 187
540 IF L=0 OR K1=0 THEN GOSUB6
20:GOTO570 :rem 193
545 IF K1=0 AND H>=1 THEN 530
:rem 164
550 F=Z:T=T1:K=K1:GOSUB270:IF
[SPACE]K1=0 THEN340
:rem 208
560 A=T:Z=A:H=0:GOSUB160:IFH<1
THEN340 :rem 3
570 GOSUB610:PRINT"[HOME]
[2 SPACES]JUMP AGAIN (Y/N)
?" :rem 211
580 GETA$:IFA$<>"Y"ANDA$<>"N"
T HEN580 :rem 55
590 GOSUB610:IFA$="N"THEN S=-S
:GOTO350 :rem 252
600 D=1:PRINT"[HOME]":;GOTO430
:rem 171
610 PRINT"[HOME][RED][OFF]":;F
ORAL=1TO3:FORA=1TO22:PRIN
T " ";:NEXTA2,A1:RETURN
:rem 46
620 POKE 36874,240:FOR TD=1 TO
80:NEXT:POKE 36874,0:RETI
RN :rem 43
630 PRINT"[HOME]":;FORA=0TO21:
PRINT"[22 SPACES]":;NEXT
:rem 76
640 RETURN :rem 122
650 W$="{BLK}[RVS]@AB[DOWN]
[3 LEFT]FGH[DOWN][3 LEFT]L
MN[2 UP]":G$="{BLK}[RVS]CD
E[DOWN][3 LEFT]IJK[DOWN]
[3 LEFT]OPQ[2 UP]":rem 254
660 BL$="{YEL}[OFF]O[GT]P[DOWN]
[3 LEFT]EG[GM]DOWN
[3 LEFT]LE@#@[2 UP]"
:rem 169
670 DIMD(28),B(42),X(35),Y(35)
,N(28) :rem 75
680 S=-1:FORA=0TO7:READM(A):NE
XT:FORA=0TO28:READD(A):NEX
T :rem 100
690 FORA=0TO4:FORF=0TO4:H=6*A+
F+7:X(H)=4*F+2:Y(H)=4*A+3:
N(G)=H:G=G+1 :rem 190
695 NEXTF:A:FORA=0TO42:rem 110
700 READB(A):NEXT:GOSUB770:GOS
UB1190:FORA=0TO42:GOSUB113
0:NEXT:RETURN :rem 199
710 DATA -6,1,6,-1,-5,7,5,-7
:rem 64
720 DATA 7,3,7,3,7,0,3,7,3,7,3
,0 :rem 9
730 DATA 7,3,7,3,7,0,3,7,3,7,3
,0,7,3,7,3,7 :rem 241
740 DATA 2,2,2,2,2,2,2,-1,-1,-
1,-1,-1,2 :rem 43
750 DATA -1,-1,-1,-1,-1,2,-1,-
1,0,1,1,2 :rem 34
760 DATA 1,1,1,1,1,2,1,1,1,1,1
,2,2,2,2,2,2 :rem 29
770 IFPEEK(7169)=192THEN830
:rem 29
780 PRINT"[CLR][10 DOWN]"SPC(5
)"[YEL]PLEASE WAIT"
:rem 234
790 FOR A=7168 TO 7311:READ B:
POKE A,B:NEXT :rem 115
800 FORA=0TO1023:POKE6144+A,PE
EK(A+32768):NEXT :rem 203
830 POKE 36869,254 :rem 161
860 RETURN :rem 126
870 DATA255,192,192,192,192,19
2,208,212 :rem 196
880 DATA255,0,0,8,8,10,42,5
:rem 86
890 DATA255,3,3,3,3,3,131,3
:rem 82
900 DATA255,192,192,193,192,19
3,193,193 :rem 203
910 DATA255,0,0,80,84,85,153,8
5 :rem 43
920 DATA255,3,3,3,3,3,3,3
:rem 234
930 DATA213,197,197,192,193,22
5,233,234 :rem 197
940 DATA69,84,20,84,81,80,80,8
6 :rem 59
950 DATA3,3,3,3,3,67,19,171
:rem 91
960 DATA192,192,212,213,213,20
8,192,192 :rem 184
970 DATA85,20,20,85,85,85,85,2
1 :rem 54
980 DATA3,23,87,87,71,3,3,67
:rem 160
990 DATA232,224,193,192,192,19
2,192,255 :rem 200
1000 DATA21,84,80,0,0,0,255
:rem 162
1010 DATA3,3,3,3,3,3,255
:rem 17
1020 DATA192,192,192,192,192,1
92,192,255 :rem 241
1030 DATA21,5,5,5,1,0,0,255
:rem 65
1040 DATA67,67,3,67,83,23,3,25
5 :rem 44
1130 IFB(A)=2THENRETURN
:rem 166
1140 POKE781,Y(A):POKE782,X(A)
:POKE783,0:SYS65520
:rem 110
1150 IFB(A)=0THENPRINTBL$:RET
URN :rem 90
1160 IFB(A)>0THENPRINTG$:
:rem 251
1170 IFB(A)<0THENPRINTW$:
:rem 10
1175 QS=X(A)+Y(A)*22+38400
:rem 103
1176 FORC1=0TO2:FORC2=0TO2:POK
EQS+C1*22+C2,14:NEXTC2,C1
:rem 61
1180 RETURN :rem 170
1190 GOSUB630:R$=CHR$(13):A$="
[2 SPACES][3 RIGHT]C
[3 RIGHT]C[3 RIGHT]C
[3 RIGHT]C"+R$+R$ :rem 81
1200 B$="[2 SPACES][RIGHT]-
[RIGHT]M[RIGHT]-[RIGHT]N
[RIGHT]B[RIGHT]M[RIGHT]B
[RIGHT]N[RIGHT]B"+R$+R$
:rem 39
1220 C$="[2 SPACES][RIGHT]B
[RIGHT]N[RIGHT]B[RIGHT]M
[RIGHT]B[RIGHT]N[RIGHT]B
[RIGHT]M[RIGHT]B"+R$+R$
:rem 244
1240 PRINT"[CLR][PUR][4 DOWN]"
ASB$ASC$ASB$ASC$LEFT$(A$,
18) :rem 211
1245 PRINT"[HOME][GRN][3 DOWN]
":;G=1:FORA=0TO4:IFA>0TH

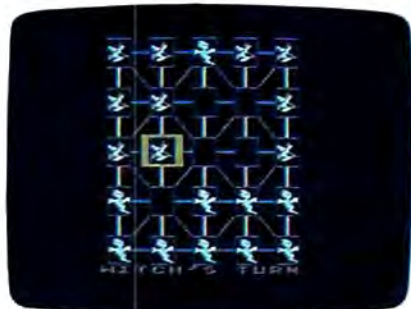
```



```

ENPRINT "{3 DOWN}":PRINT "
[SPACE]"; :rem 194
1250 FORF=0TO4:PRINTCHR$(G+64)
"(3 RIGHT)":;G=G+1
:rem 101
1260 NEXTF,A:RETURN :rem 213

```



The Atari version of "The Witching Hour" uses player/missile graphics and is played with a joystick.

Program 4: The Witching Hour, Atari Version

Version by Kevin Mykytyn, Editorial Programmer

For instructions on entering this listing, please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!.

```

BN 0 A=PEEK(106)-16:TOP=A-16
:CHBAS=TOP+12:DL=256*TO
P:POKE 106, TOP:CH=CHBAS
*256:POKE 756, CHBAS:SPR
BAS=TOP+4
EF 1 FOR A=1536 TO 1567:READ
B:POKE A,B:NEXT A
FL 2 DATA 160,127,169,0,145,
206
IL 3 DATA 136,16,251,164,203
,162
IN 4 DATA 10,169,248,145,206
,200
LN 5 DATA 169,136,145,206,20
0,202
NB 6 DATA 16,248,169,248,145
,206
IB 7 DATA 104,96
NP 10 FL=0:Z=0:U=704:POKE 82
,0:P1=2:P2=23
LG 20 GRAPHICS 17:POSITION 1
,5:PRINT #6;"THE WITCH
ING HOUR":POSITION 7,1
0:PRINT #6;"press"
ID 25 POSITION 0,13:PRINT #6
;"Down for one player"
:PRINT #6:PRINT #6;"U
P for two players"
OC 30 NP=STICK(0)-12:IF NP<1
OR NP>2 THEN 30
ND 60 IF NP=2 THEN 110
NF 70 POSITION 7,17:PRINT #6
;"PRESS":POSITION 2,19
:PRINT #6;"LEFT TO GO
FIRST"
EE 75 PRINT #6;" RIGHT TO GO
SECOND"
XD 80 IF STICK(0)=11 THEN F1
=1:GOTO 110
LB 90 IF STICK(0)=7 THEN F1=
-1:GOTO 110
DC 100 GOTO 80
BO 110 GRAPHICS 0:POKE 752,1
:IF RT=0 THEN POSITIO
N 3,10:PRINT "PLEASE
WAIT, THE SCREEN WILL
BLANK"
BN 111 FOR A=1 TO 700:NEXT A
NJ 112 GRAPHICS 0:SL=PEEK(88
):SH=PEEK(89):FOR I=0
TO 2:POKE DL+I,112:N
EXT I:POKE DL+3,68:PO
KE DL+4,SL:POKE DL+5,
SH
FB 113 FOR I=DL+6 TO DL+27:P
OKE I,4:NEXT I:POKE I
,6:I=I+1:POKE I,65:PO
KE I+1,0:POKE I+2,DL/
256
KJ 114 POKE 560,0:POKE 561,D
L/256:GOSUB 650:GOTO
350
DC 120 H=0:K=0:A=T:FOR A=7 T
O 35:GOSUB 160:NEXT A
PB 130 GOSUB 270:IF H<1 THEN
340
NN 140 H=0:K=0:A=T:GOSUB 160
:IF H<1 THEN 340
SD 150 GOTO 130
IM 160 IF B(A)=0 OR B(A)=-5
OR B(A)=2 THEN RETURN
ON 170 FOR B=0 TO D(A-7):C=A
+M(B):IF B(C)=S OR B(
C)=2 THEN 260
NB 180 IF B(C) THEN 220
MN 190 SC=RND(1)*0.9:IF H<SC
THEN H=SC:F=A:T=C
MP 200 IF CK=1 AND T1=C THEN
L=1:B=8
GE 210 GOTO 260
ML 220 IF B(C+M(B)) THEN 260
DE 230 SC=1+RND(1)*0.9:IF H<
SC THEN H=SC:F=A:T=C+
M(B):K=C
OH 240 IF CK=0 THEN 260
EG 250 IF T1=C+M(B) THEN L=1
:K1=C:B=8
DO 260 NEXT B:RETURN
JD 270 A=F:B(T)=B(F):B(F)=0:
GOSUB 1130
HA 280 IF K THEN B(K)=0:A=K:
GOSUB 1130
KF 290 A=T:GOTO 1130
JL 300 GOSUB 610:IF S=1 THEN
POSITION P1,P2:PRINT
" The Witches win";;
GOTO 320
OF 310 POSITION P1,P2:PRINT
" The hosts win";;
MH 320 FOR TD=1 TO 1500:NEXT
TD:POSITION P1,P2:PR
INT " hit firebutton
";
JD 330 IF STRIG(0)<>0 THEN 3
30
EQ 335 POKE 53248,0:RT=1:GOT
O 10
SO 340 S=-S:Z=(Z=0):H=0:A=7
NE 345 IF A=36 THEN 300
IA 347 GOSUB 160:IF H=0 THEN
A=A+1:GOTO 345
IG 350 D=0:GOSUB 610:IF NP=1
AND S=-1 THEN Z=0
DA 360 IF F1=-1 THEN Z=0
NE 370 IF NP=1 AND S=F1 THEN
120
AH 380 IF S=1 THEN POSITION
P1,P2:PRINT " Hosts
(#) win";:GOTO 400
HM 390 POSITION P1,P2:PRINT
" Witches
(#) win";;
JI 400 Q=3:R=3:FL=0:GOTO 480
GC 410 IF STRIG(Z)=0 AND FL=
0 THEN FL=1:GOSUB 490
:A=X:ZZ=A:POKE U,198:
POKE 77,0:GOTO 430
IF 420 IF STRIG(Z)=0 AND FL=
1 THEN GOSUB 490:T1=X
:POKE U,40:GOTO 500
LJ 430 ON STICK(Z)-5 GOTO 43
0,440,430,430,430,450
,430,460,470:GOTO 410
BF 440 O=0+1*(O<5):GOTO 480
CF 450 O=0-1*(O>1):GOTO 480
CE 460 R=R+1*(R<5):GOTO 480
BG 470 R=R-1*(R>1)
AC 480 POKE 203,R*20-5:POKE
53248,0*20+60:V=USR(1
536):FOR TD=1 TO 30:N
EXT TD:GOTO 410
AR 490 X=(R-1)*6+(O-1)+7:IF
STICK(Z)<>15 OR STRIG
(Z)=0 THEN 490
IC 495 RETURN
CN 500 CK=1:L=0:K1=0:GOSUB 1
60:CK=0
DF 501 H=0:A=7
NC 502 IF A=36 THEN 510
DB 503 GOSUB 160:IF H>=1 THE
N 510
DI 504 A=A+1:IF A<36 THEN 50
3
DB 510 IF D THEN 540
DF 520 IF L THEN 545
LL 530 GOSUB 620:GOTO 350
JY 540 IF L=0 OR K=0 THEN GO
SUB 620:GOTO 600
KE 545 IF K1=0 AND H>=1 THEN
530
DI 550 F=ZZ:T=T1:K=K1:GOSUB
270:IF K1=0 THEN 340
FN 560 A=T:ZZ=A:H=0:GOSUB 16
0:IF H<1 THEN 340
ML 600 D=1:O=3:R=3:POKE U,20
0:GOTO 480
JD 610 POSITION P1,P2:FOR A1
=1 TO 18:PRINT " ";N
EXT A1:RETURN
JF 620 SOUND 1,200,12,15:FOR
TD=1 TO 70:NEXT TD:S
OUND 1,0,0,0:RETURN
HJ 630 RETURN
FC 650 IF RT=0 THEN DIM W$(3
0),G$(30),BL$(30)
AB 655 W$="!":W$(2,2)=CHR$(3
4):W$(3,17)="#(DOWN)
(3 LEFT)'(DOWN)
(3 LEFT)-./":G$="%&
(DOWN)(3 LEFT)*+,
(DOWN)(3 LEFT)012":BL
$="596(DOWN)(3 LEFT)
(V)(B)(DOWN)(3 LEFT)
B:7"
BC 670 IF RT=0 THEN DIM D:(28
),B(42),M(10),X(35),Y
(35)
BF 680 RESTORE 710:S=-1:FOR
A=0 TO 7:READ T:M(A)=
T:NEXT A:FOR A=0 TO 2
B:READ T:D(A)=T:NEXT
A
LE 690 FOR A=0 TO 4:FOR F=0
TO 4:H=6*A+F+7:X(H)=5
*F+9:Y(H)=5*A:NEXT F:
NEXT A:FOR A=0 TO 42
GI 700 READ T:B(A)=T:NEXT A:
GOSUB 770:GOSUB 1190:
FOR A=0 TO 42:GOSUB 1
130:NEXT A:RETURN
EA 710 DATA -6,1,6,-1,-5,7,5
,-7
AJ 720 DATA 7,3,7,3,7,0,3,7,
3,7,3,0
PB 730 DATA 7,3,7,3,7,0,3,7,
3,7,3,0,7,3,7,3,7
EL 740 DATA 2,2,2,2,2,2,-1
,-1,-1,-1,-1,2
DE 750 DATA -1,-1,-1,-1,-1,2
,-1,-1,0,1,1,2
BN 760 DATA 1,1,1,1,1,2,1,1,
1,1,1,2,2,2,2,2,2,2

```



```

AO 770 POKE 756,CHBAS:POKE 5
4279,SPRBAS:IF RT=1 T
HEN B30
AM 780 FOR A=0 TO 1023:POKE
CH+A,PEEK(57344+A):NE
XT A
AE 790 RESTORE 870:FOR A=CH+
8 TO CH+215:READ B:PO
KE A,B:NEXT A:FOR A=C
H+472 TO CH+479:READ
B:POKE A,B:NEXT A
AI 800 FOR A=CH TO CH+7:POKE
A,0:NEXT A
AJ 810 A=SPRBAS*256+512:POKE
207,A/256:POKE 206,A
-256*PEEK(207)
AK 830 POKE 559,46:POKE 623,
1:POKE 704,40:POKE 53
256,3:POKE 53277,3:PO
KE 708,15:POKE 709,40
:RETURN
AL 870 DATA 255,192,192,192,
192,192,208,212
AM 880 DATA 255,0,0,8,8,10,4
2,5
AN 890 DATA 255,3,3,3,3,3,13
1,3
AO 900 DATA 255,192,192,193,
192,193,193,193
AP 910 DATA 255,0,0,80,84,85
,153,85
AQ 920 DATA 255,3,3,3,3,3,3,
3
AR 930 DATA 213,197,197,192,
193,225,233,234
AS 940 DATA 69,84,20,84,81,8
0,80,84
AT 950 DATA 3,3,3,3,3,67,19,
171
AU 960 DATA 192,192,212,213,
213,208,192,192
AV 970 DATA 85,20,20,85,85,8
5,85,21
AW 980 DATA 3,23,87,87,71,3,
3,67
AX 990 DATA 232,224,193,192,
192,192,192,255
AY 1000 DATA 21,84,80,0,0,0,
0,255
AZ 1010 DATA 3,3,3,3,3,3,2
55
BA 1020 DATA 192,192,192,192
,192,192,192,255
BB 1030 DATA 21,5,5,5,1,0,0,
255
BC 1040 DATA 67,67,3,67,83,2
3,3,255,128,128,32,3
2,8,8,2,2,2,2,8,8,32
,32,128,128
BD 1041 DATA 255,192,192,192
,192,192,192,192,255
,3,3,3,3,3,3,3,3,3
,3,3,3,3,255,192,192
,192,192,192,192,192
,255
BE 1042 DATA 255,0,0,0,0,0,0
,0,0,0,0,0,0,0,255
,12,12,24,48,0,0,0,0
BF 1130 IF B(A)=2 THEN RETUR
N
BG 1140 POSITION X(A),Y(A)
BH 1150 IF B(A)=0 THEN PRINT
BL$:
BI 1160 IF B(A)>0 THEN PRINT
BM$:
BJ 1170 IF B(A)<0 THEN PRINT
BN$:
BK 1180 RETURN
BL 1190 IF RT=0 THEN DIM R$(
1)
BM 1200 R$=CHR$(155):POSITIO
N 0,1:GOSUB 1300:GOS
UB 1310:GOSUB 1300:G

```

```

OSUB 1320:GOSUB 1300
:GOSUB 1310:GOSUB 13
00
ND 1210 GOSUB 1320:R$="":GOS
UB 1300:RETURN
NE 1300 PRINT "(9 SPACES)
(3 RIGHT)(2 R)
(3 RIGHT)(2 R)
(3 RIGHT)(2 R)
(3 RIGHT)(2 R)":R$:R
ETURN
NF 1310 PRINT "(9 SPACES)
(RIGHT)(=)(RIGHT)3
(2 RIGHT)(=)(2 RIGHT)
4(RIGHT)(=)(RIGHT)3
(2 RIGHT)(=)(2 RIGHT)
4(RIGHT)(=)":R$:
(9 SPACES)(RIGHT)
(=)(2 RIGHT)3(RIGHT)
(=)(RIGHT)4(2 RIGHT)
(=)(2 RIGHT)3(RIGHT)
(=)(RIGHT)4(2 RIGHT)
(=)":R$:RETURN
NG 1320 PRINT "(9 SPACES)
(RIGHT)(=)(2 RIGHT)4
(RIGHT)(=)(RIGHT)3
(2 RIGHT)(=)(2 RIGHT)
4(RIGHT)(=)(RIGHT)3
(2 RIGHT)(=)":R$:
(9 SPACES)(RIGHT)
(=)(RIGHT)4(2 RIGHT)
(=)(2 RIGHT)3(RIGHT)
(=)(RIGHT)4(2 RIGHT)
(=)(2 RIGHT)3(RIGHT)
(=)":R$:RETURN

```

Program 5: The Witching Hour, Apple II Version
Version by Kevin Martin, Editorial Programmer

For instructions on entering this listing, please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!

```

9F 10 Z = 1: HOME : TEXT
9G 11 POKE 232,96: POKE 233,3: S
CALE= 27: ROT= 0: HCOLOR=
3
9H 20 VTAB 8: HTAB 11: PRINT "TH
E WITCHING HOUR"
9I 30 VTAB 12: HTAB 6: PRINT "PR
ESS '1' FOR ONE PLAYER"
9J 40 HTAB 12: PRINT "'2' FOR TW
O PLAYERS"
9K 50 GET A$:NP = ASC (A$) - 48:
IF NP < 1 OR NP > 2 THEN
50
9L 60 IF NP = 2 THEN 110
9M 70 HTAB 5: PRINT "DO YOU WANT
TO GO FIRST (Y/N)?":
20 80 GET A$:F1 = 1: IF A$ < > "
Y" AND A$ < > "N" THEN 80
9N 90 IF A$ = "N" THEN F1 = - 1
9O 110 HOME : HGR : GOSUB 650: G
OTO 350
9P 120 H = 0:K = 0: FOR A = 7 TO
35: GOSUB 160: NEXT
9Q 130 GOSUB 270: IF H < 1 THEN
340
9R 140 H = 0:K = 0:A = T: GOSUB
160: IF H < 1 THEN 340
9S 150 GOTO 130
9T 160 IF B(A) = 0 OR B(A) = - S
OR B(A) = 2 THEN RETURN
9U 170 FOR B = 0 TO D(A - 7):C =
A + M(B): IF B(C) = S OR
B(C) = 2 THEN 260
9V 180 IF B(C) THEN 220
9W 190 SC = RND (0) * .9: IF H <

```

```

SC THEN H = SC:F = A:T =
C
9X 200 IF CK = 1 AND T1 = C THEN
L = 1:B = 7
9Y 210 GOTO 260
9Z 220 IF B(C + M(B)) THEN 260
9AA 230 SC = 1 + RND (0) * .9: IF
H < SC THEN H = SC:F = A
:T = C + M(B):K = C
9AB 240 IF CK = 0 THEN 260
9AC 250 IF T1 = C + M(B) THEN L =
1:K1 = C:B = 7
9AD 260 NEXT : RETURN
9AE 270 A = F:B(T) = B(F):B(F) =
0: GOSUB 1130
9AF 280 IF K THEN B(K) = 0:A = K:
GOSUB 1130
9AG 290 A = T: GOTO 1130
9AH 300 GOSUB 610: IF S = 1 THEN
VTAB 21: HTAB 12: PRINT "
THE WITCHES WIN!": GOTO 3
20
9AI 310 VTAB 21: HTAB 12: PRINT "
THE GHOSTS WIN!"
9AJ 320 HTAB 10: PRINT "PRESS THE
<SPACEBAR>"
9AK 330 GET A$: IF A$ < > " " THE
N 330
9AL 331 RUN
9AM 340 S = - S:Z = - (Z = 0):H =
0: FOR A = 7 TO 35: GOSU
B 160: NEXT : IF H = 0 TH
EN 300
9AN 350 D = 0: GOSUB 610: IF NP =
1 AND S = - 1 THEN Z = 1
9AO 360 IF F1 = - 1 THEN Z = 1
9AP 370 IF NP = 1 AND S = F1 THEN
120
9AQ 380 IF S = 1 THEN VTAB 21: HT
AB 12: PRINT "THE GHOST'S
TURN": GOTO 400
9AR 390 VTAB 21: HTAB 12: PRINT "
THE WITCH'S TURN"
9AS 400 VTAB 22: HTAB 12: PRINT "
FROM: "; CHR$ (8);
9AT 410 GOSUB 1250
9AU 420 PRINT A$:A = N( ASC (A$)
- 65):Z = A
9AV 430 HTAB 25: PRINT "TO: "; CH
R$ (8);
9AW 440 GOSUB 1250
9AX 450 PRINT A$:T1 = N( ASC (A$)
- 65):CK = 1:L = 0:K1 =
0: GOSUB 160:CK = 0
9AY 451 H = 0:A = 7
9AZ 452 IF A = 36 THEN 460
9BA 453 GOSUB 160: IF H > = 1 THE
N 460
9BB 454 A = A + 1: IF A < 36 THEN
453
9BC 460 IF D THEN 540
9BD 470 IF L THEN 545
9BE 530 GOSUB 620: GOTO 350
9BF 540 IF L = 0 OR K1 = 0 THEN G
OSUB 620: GOTO 570
9BG 545 IF K1 = 0 AND H > = 1 THE
N 530
9BH 550 F = Z:T = T1:K = K1: GOSU
B 270: IF K1 = 0 THEN 340
9BI 560 A = T1:Z = A:H = 0: GOSUB
160: IF H < 1 THEN 340
9BJ 570 GOSUB 610: VTAB 21: HTAB
11: PRINT "JUMP AGAIN (Y/
N)?":
9BK 580 GET A$: IF A$ < > "Y" AND
A$ < > "N" THEN 580
9BL 590 GOSUB 610: IF A$ = "N" TH
EN B = - B: GOTO 350
9BM 600 D = 1: VTAB 22: GOTO 430
9BN 610 PRINT : VTAB 21: FOR J =
1 TO 2: FOR I = 1 TO 40:
PRINT " ";: NEXT I,J
9BO 611 RETURN
9BP 620 PRINT CHR$ (7);: RETURN
9BQ 630 HOME : RETURN

```



```

E7 650 DIM D(28),B(42),X(35),Y(3
5),N(28)
DE 660 S = - 1: FOR A = 0 TO 7:
READ M(A): NEXT : FOR A =
0 TO 28: READ D(A): NEXT
53 670 FOR A = 0 TO 4: FOR F = 0
TO 4: H = 6 * A + F + 7: X
(H) = 4 * F + 11: Y(H) = 4
* A: N(G) = H: G = G + 1:
NEXT F, A
58 680 FOR A = 0 TO 42: READ B(A
): NEXT : FOR A = 0 TO 6:
READ F: POKE 864 + A, F:
NEXT : GOSUB 760: GOSUB 1
190: FOR A = 0 TO 42: GOS
UB 1130: NEXT : RETURN
C8 690 DATA -6,1,6,-1,-5,7,5,-7
44 700 DATA 7,3,7,3,7,0,3,7,3,7,
3,0
1A 710 DATA 7,3,7,3,7,0,3,7,3,7,
3,0,7,3,7,3,7
A9 720 DATA 2,2,2,2,2,2,-1,-1,
-1,-1,-1,2
44 730 DATA -1,-1,-1,-1,-1,2,-1,
-1,0,1,1,2
BE 740 DATA 1,1,1,1,1,2,1,1,1,1,
1,2,2,2,2,2,2
38 750 DATA 1,0,4,0,44,62,0
A2 760 FOR A = 768 TO 855: READ
F: POKE A, F: NEXT
7F 770 POKE 6,0: POKE 7,141: IF
PEEK (191 * 256) = 76 THE
N PRINT CHR$(4): "PR#A$30
0": GOTO 790
C8 780 POKE 54,0: POKE 55,3: CAL
L 1002
E3 790 FOR A = 36352 TO 36567: R
EAD F: POKE A, F: NEXT
18 800 RETURN
2C 1130 IF B(A) = 2 THEN RETURN
22 1140 VTAB Y(A) + 1: HTAB X(A)
45 1150 IF B(A) < 0 THEN PRINT "
@AB": HTAB X(A): PRINT "
FGH": HTAB X(A): PRINT "
LMN"
38 1160 IF B(A) > 0 THEN PRINT "
CDE": HTAB X(A): PRINT "
IJK": HTAB X(A): PRINT "
OPQ"
A8 1170 IF B(A) = 0 THEN PRINT "
RST": HTAB X(A): PRINT "
UVW": HTAB X(A): PRINT "
XYZ"
F3 1180 RETURN
EA 1190 HCOLOR= 3
71 1200 FOR A = 11 TO 139 STEP 3
2: HPLLOT 78,A TO 190,A:
NEXT
6A 1210 FOR A = 78 TO 190 STEP 2
8: HPLLOT A,11 TO A,139:
NEXT
FB 1220 HPLLOT 78,11 TO 194,140:
HPLLOT 194,11 TO 78,140
39 1230 HPLLOT 78,76 TO 136,11 TO
194,76 TO 136,140 TO 78
,76
2E 1249 RETURN
D2 1250 F = 2: T1 = 2: QS = 2
28 1260 SCALE= QS
83 1270 XDRAW 1 AT (T1 * 4 + 10)
* 7 - 3, (F * 4) * 8 + 25
3E 1275 PRINT CHR$(F * 5 + T1 +
65); CHR$(8);
49 1280 A$ = "": IF PEEK (- 163
84) > 128 THEN GET A$
AF 1285 XDRAW 1 AT (T1 * 4 + 10)
* 7 - 3, (F * 4) * 8 + 25
F8 1287 QS = QS + 5: IF QS > 27
THEN QS = 2
EE 1290 IF A$ = "I" AND F > 0 TH
EN F = F - 1
#1 1291 IF A$ = "K" AND F < 4 TH
EN F = F + 1

```

```

88 1292 IF A$ = "J" AND T1 > 0 T
HEN T1 = T1 - 1
87 1293 IF A$ = "L" AND T1 < 4 T
HEN T1 = T1 + 1
A2 1300 IF A$ < > CHR$(13) THEN
1260
48 1400 A$ = CHR$(F * 5 + T1 +
65): RETURN
D6 1500 DATA 216,120,133,69,134,
70
2E 1510 DATA 132,71,166,7,10,10
44 1520 DATA 176,4,16,62,48,4
88 1530 DATA 16,1,232,232,10,134
68 1540 DATA 27,24,101,6,133,26
A3 1550 DATA 144,2,230,27,165,40
95 1560 DATA 133,8,165,41,41,3
81 1570 DATA 5,230,133,9,162,8
3E 1580 DATA 160,0,177,26,36,50
89 1590 DATA 48,2,73,127,164,36
47 1600 DATA 145,8,230,26,208,2
9F 1610 DATA 230,27,165,9,24,105
8F 1620 DATA 4,133,9,202,208,226
87 1630 DATA 165,69,166,70,164,7
1
72 1640 DATA 88,76,240,253
71 1700 DATA 255,129,129,129,129
,129
F8 1710 DATA 139,171,255,128,128
,192
C8 1720 DATA 192,208,212,224,255
,192
4F 1730 DATA 192,192,194,202,234
,199
9F 1740 DATA 255,129,129,225,129
,225
68 1750 DATA 225,225,255,128,128
,135
8C 1760 DATA 159,255,238,255,255
,192
C9 1770 DATA 192,192,192,192,192
,192
8D 1780 DATA 171,171,171,169,129
,129
A8 1790 DATA 193,199,229,181,181
,165
98 1800 DATA 168,170,170,170,199
,193
48 1810 DATA 193,193,193,195,199
,204
D1 1820 DATA 129,129,159,255,255
,199
89 1830 DATA 193,193,159,142,142
,255
C1 1840 DATA 255,191,191,255,192
,240
8C 1850 DATA 255,255,241,192,192
,192
53 1860 DATA 223,223,255,159,135
,129
72 1870 DATA 129,255,170,170,170
,168
8F 1880 DATA 170,139,128,255,216
,240
69 1890 DATA 255,193,192,192,192
,255
7E 1900 DATA 129,129,129,129,129
,129
13 1910 DATA 129,255,255,254,252
,248
17 1920 DATA 248,224,128,255,193
,193
47 1930 DATA 193,192,193,207,254
,255
39 1940 DATA 127,1,1,1,1,1
46 1950 DATA 1,1,127,0,0,0
D2 1960 DATA 0,0,0,0,127,64
25 1970 DATA 64,64,64,64,64,64
A4 1980 DATA 1,1,1,1,1,1
53 1990 DATA 1,1,0,0,0,0
28 2000 DATA 0,0,0,0,64,64
FB 2010 DATA 64,64,64,64,64,64
78 2020 DATA 1,1,1,1,1,1
38 2030 DATA 1,127,0,0,0,0
FF 2040 DATA 0,0,0,127,64,64
F6 2050 DATA 64,64,64,64,64,127

```



A ghost is about to be jumped in this game of "The Witching Hour" for Apple II computers.



"The Witching Hour" for the TI-99/4A works with console BASIC as well as TI Extended BASIC.

Program 6: The Witching Hour, TI-99/4A Version

Version by Patrick Parrish,
Programming Supervisor

```

100 GOTO 150
110 FOR I=1 TO LEN(H$)
120 CALL HCHAR(R,C+I,ASC(
SEG$(H$,I,1)))
130 NEXT I
140 RETURN
150 DIM B(42),D(28),N(28)
, X(35),Y(35)
160 GOSUB 1650
170 GOTO 930
180 H=0
190 K=0
200 FOR A=7 TO 35
210 GOSUB 310
220 NEXT A
230 GOSUB 600
240 IF H<1 THEN 860
250 H=0
260 K=0
270 A=T
280 GOSUB 310
290 IF H<1 THEN 860
300 GOTO 230
310 IF (B(A)<>0)*(B(A)<>-
S)*(B(A)<>2) THEN 330
320 RETURN
330 FOR B5=0 TO D(A-7)
340 C=A+M(B5)
350 IF (B(C)=S)+(B(C)=2) T
HEN 580

```



```

360 IF B(C) THEN 450
370 SC=RND*.9
380 IF H>=8C THEN 420
390 H=8C
400 F=A
410 T=C
420 IF (CK<>1)+(T1<>C) THEN
  N 580
430 LL=1
440 GOTO 570
450 IF B(C+M(B5)) THEN 580
460 SC=1+RND*.9
470 IF H>=8C THEN 520
480 H=8C
490 F=A
500 T=C+M(B5)
510 K=C
520 IF CK=0 THEN 580
530 K=0
540 IF T1<>C+M(B5) THEN 580
550 LL=1
560 K1=C
570 B5=7
580 NEXT B5
590 RETURN
600 A=F
610 B(T)=B(F)
620 B(F)=0
630 GOSUB 2790
640 IF K=0 THEN 680
650 B(K)=0
660 A=K
670 GOSUB 2790
680 A=T
690 GOTO 2790
700 GOSUB 1630
710 IF B<>1 THEN 740
720 H$="THE WITCHES WIN!"
730 GOTO 750
740 H$="THE GHOSTS WIN!"
750 R=23
760 C=9
770 GOSUB 110
780 R=24
790 C=5
800 H$="HIT A KEY TO PLAY
  AGAIN"
810 GOSUB 110
820 CALL KEY(0, KK, SB)
830 IF SB=0 THEN 820
840 GOSUB 2190
850 GOTO 930
860 S=-8
870 H=0
880 A=7
890 IF A=36 THEN 700
900 GOSUB 310
910 A=A+1
920 IF H=0 THEN 890
930 DD=0
940 GOSUB 1630
950 IF B<>1 THEN 980
960 H$="GHOST'S TURN"
970 GOTO 990
980 H$="WITCH'S TURN"
990 R=22
1000 C=10
1010 GOSUB 110
1020 R=23
1030 C=9
1040 H$="FROM:"
1050 GOSUB 110
1060 RANDOMIZE
1070 CALL KEY(0, KK, SB)
1080 IF SB=0 THEN 1060
1090 IF KK<>13 THEN 1120
1100 GOSUB 1630
1110 GOTO 180
1120 IF (KK<65)+(KK>89) THEN
  EN 1060
1130 H$=CHR$(KK)

```

```

1140 C=15
1150 GOSUB 110
1160 A=N(KK-65)
1170 Z=A
1180 H$="T0:"
1190 IF DD<>1 THEN 1210
1200 CALL HCHAR(23, 10, 32,
  7)
1210 R=23
1220 C=17
1230 GOSUB 110
1240 CALL KEY(0, KK, SB)
1250 IF SB=0 THEN 1240
1260 H$=CHR$(KK)
1270 C=21
1280 GOSUB 110
1290 T1=N(KK-65)
1300 CK=1
1310 LL=0
1320 K1=0
1330 GOSUB 310
1340 CK=0
1350 H=0
1360 A=7
1370 IF A=36 THEN 1420
1380 GOSUB 310
1390 IF H>=1 THEN 1420
1400 A=A+1
1410 IF A<36 THEN 1380
1420 IF DD THEN 1460
1430 IF LL THEN 1490
1440 CALL SOUND(50, 220, 5)
1450 GOTO 930
1460 IF (LL<>0)*(K1<>0) THEN
  EN 1490
1470 CALL SOUND(50, 220, 5)
1480 GOTO 1600
1490 IF (K1=0)*(H>=1) THEN
  1440
1500 F=Z
1510 K=K1
1520 T=T1
1530 GOSUB 600
1540 IF K1=0 THEN 860
1550 A=T
1560 Z=A
1570 H=0
1580 GOSUB 310
1590 IF H<1 THEN 860
1600 DD=1
1610 CALL HCHAR(23, 22, 32)
1620 GOTO 1180
1630 CALL HCHAR(22, 1, 32, 9
  6)
1640 RETURN
1650 FOR I=96 TO 104
1660 READ A$
1670 CALL CHAR(I, A$)
1680 NEXT I
1690 DATA 0000000000000000F
  F,0101010101010101,F
  F0000000000000000
1700 DATA FF01010101010101
  1,0000000000000000,0
  0402010000040201
1710 DATA 010204081020408
  0,01010101010101FF,F
  F0000000000000000
1720 FOR I=112 TO 115
1730 READ A$
1740 CALL CHAR(I, A$)
1750 NEXT I
1760 DATA 0000A0FCFE7E3F1
  E,0000000C1C3E1C00,1
  C090101E1FFE302,F0EB
  C0C4E2FFE000
1770 FOR I=120 TO 123
1780 READ A$
1790 CALL CHAR(I, A$)
1800 NEXT I
1810 DATA 00011131131F030
  7,40F050F4F6F4FCE0,0

```

```

70F0F1F3F3F1C00,00C0
000000000000
1820 CALL CLEAR
1830 CALL COLOR(11, 4, 1)
1840 CALL COLOR(12, 15, 1)
1850 FOR I=1 TO 8
1860 CALL COLOR(I, 16, 1)
1870 NEXT I
1880 CALL SCREEN(2)
1890 PRINT TAB(6); "THE WI
  TCHING HOUR" ; " : : : : : :
  : : : : :
1900 CALL HCHAR(14, 8, 112)
1910 CALL HCHAR(14, 9, 113)
1920 CALL HCHAR(15, 8, 114)
1930 CALL HCHAR(15, 9, 115)
1940 CALL HCHAR(14, 23, 120)
1950 CALL HCHAR(14, 24, 121)
1960 CALL HCHAR(15, 23, 122)
1970 CALL HCHAR(15, 24, 123)
1980 FOR A=0 TO 7
1990 READ M(A)
2000 NEXT A
2010 FOR A=0 TO 28
2020 READ D(A)
2030 NEXT A
2040 FOR A=0 TO 4
2050 FOR F=0 TO 4
2060 H=6*A+F+7
2070 X(H)=4*F+8
2080 Y(H)=4*A+2
2090 N(0)=H
2100 B=0+1
2110 NEXT F
2120 NEXT A
2130 DATA -6, 1, 6, -1, -5, 7,
  5, -7
2140 DATA 7, 3, 7, 3, 7, 0, 3, 7
  , 3, 7, 3, 0
2150 DATA 7, 3, 7, 3, 7, 0, 3, 7
  , 3, 7, 3, 0, 7, 3, 7, 3, 7
2160 DATA 2, 2, 2, 2, 2, 2, 2, -
  1, -1, -1, -1, -1, 2
2170 DATA -1, -1, -1, -1, -1,
  2, -1, -1, 0, 1, 1, 2
2180 DATA 1, 1, 1, 1, 1, 2, 1, 1
  , 1, 1, 1, 2, 2, 2, 2, 2, 2
2190 CALL COLOR(11, 1, 1)
2200 B=-1
2210 CALL COLOR(12, 1, 1)
2220 CALL COLOR(9, 1, 1)
2230 CALL COLOR(10, 1, 1)
2240 CALL CLEAR
2250 H$="...SETTING UP GA
  ME BOARD"
2260 R=23
2270 C=3
2280 GOSUB 110
2290 FOR ROW=5 TO 17 STEP
  4
2300 FOR COL=8 TO 24 STEP
  4
2310 CALL HCHAR(ROW, COL, 1
  03)
2320 NEXT COL
2330 NEXT ROW
2340 FOR ROW=2 TO 18 STEP
  4
2350 FOR COL=7 TO 23 STEP
  4
2360 CALL HCHAR(ROW, COL+3
  , 100)
2370 CALL HCHAR(ROW+1, COL
  +4, 99)
2380 CALL HCHAR(ROW, COL, 9
  7)
2390 CALL HCHAR(ROW-1, COL
  +2, 96)
2400 CALL HCHAR(ROW+1, COL
  +3, 98)
2410 CALL HCHAR(ROW+2, COL
  +1, 99)

```



```

2420 CALL HCHAR(ROW+2, COL
+2, 104)
2430 NEXT COL
2440 NEXT ROW
2450 FOR ROW=3 TO 19 STEP
4
2460 CALL HCHAR(ROW, 7, 97)
2470 CALL HCHAR(ROW, 26, 10
0)
2480 CALL HCHAR(ROW, 27, 32
)
2490 NEXT ROW
2500 FOR COL=8 TO 24 STEP
4
2510 CALL HCHAR(1, COL, 96,
2)
2520 CALL HCHAR(20, COL, 10
4)
2530 NEXT COL
2540 FOR ROW=4 TO 12 STEP
8
2550 FOR COL=10 TO 18 STE
P 8
2560 CALL HCHAR(ROW, COL, 1
01)
2570 CALL HCHAR(ROW, COL+5
, 102)

```

```

2580 CALL HCHAR(ROW+1, COL
+4, 102)
2590 CALL HCHAR(ROW+4, COL
+1, 102)
2600 CALL HCHAR(ROW+5, COL
, 102)
2610 CALL HCHAR(ROW+4, COL
+4, 101)
2620 NEXT COL
2630 NEXT ROW
2640 RESTORE 2160
2650 CALL HCHAR(23, 3, 32, 2
5)
2660 Q=0
2670 FOR A=0 TO 42
2680 READ B(A)
2690 GOSUB 2790
2700 IF B(A)=2 THEN 2730
2710 CALL HCHAR(Y(A)-1, X(
A)-1, Q+65)
2720 Q=Q+1
2730 NEXT A
2740 CALL COLOR(9, 14, 1)
2750 CALL COLOR(10, 14, 1)
2760 CALL COLOR(11, 4, 1)
2770 CALL COLOR(12, 15, 1)
2780 RETURN

```

```

2790 IF B(A)<>2 THEN 2810
2800 RETURN
2810 IF B(A)<>0 THEN 2850
2820 CALL HCHAR(Y(A), X(A)
, 32, 2)
2830 CALL HCHAR(Y(A)+1, X(
A), 32, 2)
2840 GOTO 2950
2850 IF B(A)=0 THEN 2910
2860 CALL HCHAR(Y(A), X(A)
, 112)
2870 CALL HCHAR(Y(A), X(A)
+1, 113)
2880 CALL HCHAR(Y(A)+1, X(
A), 114)
2890 CALL HCHAR(Y(A)+1, X(
A)+1, 115)
2900 GOTO 2950
2910 CALL HCHAR(Y(A), X(A)
, 120)
2920 CALL HCHAR(Y(A), X(A)
+1, 121)
2930 CALL HCHAR(Y(A)+1, X(
A), 122)
2940 CALL HCHAR(Y(A)+1, X(
A)+1, 123)
2950 RETURN

```

©

HELP YOUR KIDS MAKE THE GRADE



Now there's a way parents can help their children climb to the heights of success.

It begins with an Apple®, IBM®, Commodore™ or Atari® computer. It takes off with CBS Software.

Our *Success with Math™* series has met with sales success second to none in its field. Along with our new *Success with Algebra™* series, your home computer will become a patient, private tutor—using serious drill and practice to help your children over the obstacles in their way.

Mastering the SAT has also become a best seller. With its counterpart, *Mastering the ACT*, it's the comprehensive test preparation program that's proven to be the first choice for thousands of students who want acceptance from their first choice college. They are the only programs of their kind created with the National Association of Secondary School Principals. And they're designed to provide the competitive edge that can help put your kids over the top.



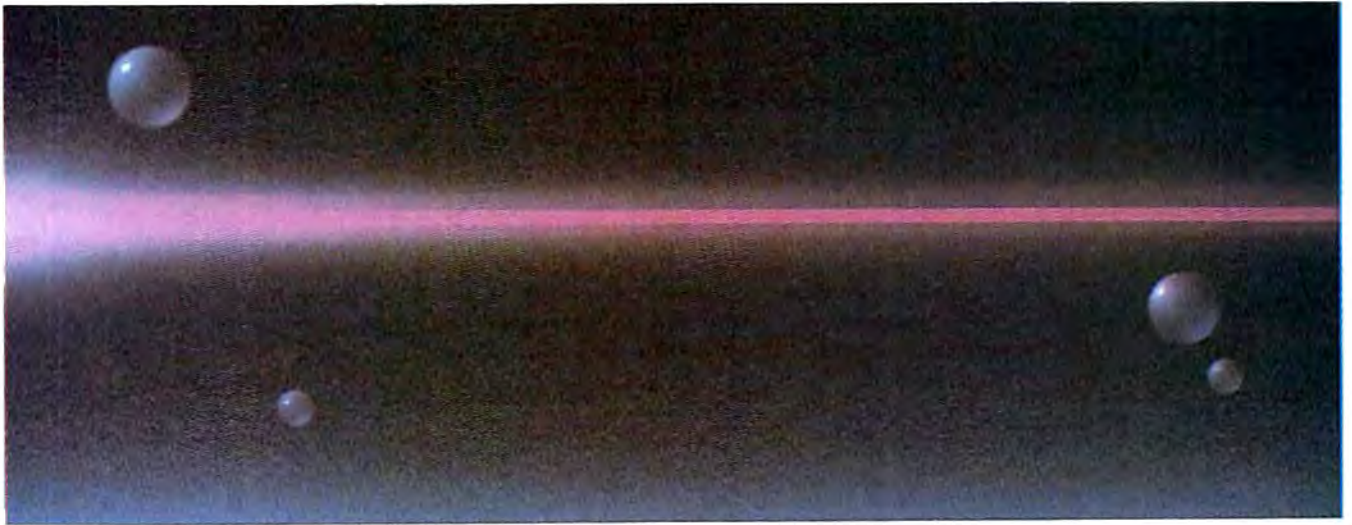
**CBS
SOFTWARE**

Making you the best.

IBM, Apple and Atari are registered trademarks of International Business Machines Corp., Apple Computer Inc., and Atari Corp., respectively. Commodore is a trademark of Commodore Electronics Ltd.
© 1985 CBS Inc. All rights reserved. CBS Software, A Unit of CBS Educational and Professional Publishing Division.
CBS Inc. One Fawcett Place, Greenwich, CT 06836 (203) 622-2525

IF YOU'RE INTERESTED IN GIVING YOUR CHILDREN THE BEST, CALL 1-800-CBS-ASK4 FOR THE DEALER NEAREST YOU.

Look for details at your nearest CBS Software dealer.
WIN THE "HONORROLL"
\$20,000 SWEEPSTAKES.



LASER BEAM

For Atari And Commodore 64

Mike Greenfield

This fast-paced arcade game is written entirely in machine language and challenges the quickest reflexes. Originally written for the Atari, the program has been adapted and enhanced for the Commodore 64. The Atari version runs on any 400, 800, XL, or XE with at least 16K RAM. Both versions require a joystick.

The Atari version of "Laser Beam" is a fast-action arcade-style game with a simple premise—you score by moving. The more you move, the more you score. You start off in an arena along with a bouncing ball. If you happen to run into the ball or the arena walls, the game ends.

But watch out! If you haven't collided with anything after half a minute or so, you advance to level 2 and a second bouncing ball appears. If you last a while longer, you reach level 3 and a *third* ball appears, and so on. Up to five balls can be bounc-

ing around the arena simultaneously. Your score for each move depends on which level you're on. When there's one ball on the screen, you score one point per move; when there's five balls, you score five points.

In early stages of the game, you may not feel motivated to move unless you absolutely have to. So there's one additional challenge—the laser beams. Each side of the arena is guarded by a roving laser. You'll see a red indicator when the laser beam fire sequence has been activated, but the indicator tells you only where the beam will fire, not when. As the game progresses, it becomes more difficult to dodge the laser because the countdown before firing decreases.

Before starting the game, you can select one of ten difficulty options. The program automatically selects option 5. To change this, press the OPTION button. Option 9 is the slowest, and therefore the

easiest; option 0 is the fastest.

To freeze the action, press the SELECT button. To continue, press SELECT and START together. After each round, press the START button to start another game. To return to the title screen, press START, SELECT, and OPTION simultaneously.

Entering The Atari Version

Programs 1 and 2 work together to load Laser Beam from BASIC. To fit the game into 16K of RAM, a single BASIC program can't hold all the DATA statements necessary for the machine language and also POKE them into memory.

Therefore, the DATA statements in Program 1 create a machine language file on disk or tape called LASERBEM.OBJ. (If LASERBEM.OBJ already exists on a disk, Program 1 recognizes this and won't create a new file.) After Program 1 runs, it automatically loads and runs Program 2, assuming you



ATARI	
800XL	CALL
130XE (NEW)	CALL
520ST (NEW)	CALL
1050 Drive	165
1010 Recorder	42
1020 Printer	55
1025 Printer	159
1027 Printer	179
850 Interface	1 9

ATARI SOFTWARE (NEW)	
Codewriter	35 75
Filewriter	20 75
Reportwriter	20 75
Menuwriter	20 75
Home Integrator	19 75
Small Bus Inventory	11 75
Salesman Expenses	11 75
Accs Rec/Pay	11 75
Retail Invoice	11 75
Final Legacy	15 75
Adventure Writer	18 75
Star Voyager	11 75

SSI (Atari)	
Colonial Conquest	24 75
Field of Fire	24 75
Kampfgruppe	36 75
Objective Kursk	24 75
Market Garden	29 75
Six Gun Shootout	24 75
War in Russia	49 75
Computer Baseball	24 75
Computer Quarterback	24 75
Gemstone Warrior	22 75
50 Mission Crush	24 75
Questron	29 75

SPINNAKER	
Delta Drawing Room	19 95
Cosmic Life Room	19 95
Up for Grabs Room	19 95

PERSONAL PERIPHERALS	
Super Sketch C-64	29 95
Printer Utility C-64	14 99
Super Sketch Atari	25 95
Super Sketch Apple/IBM	55 00

SUB LOGIC (Atari)	
Flight Simulator II	32 75
Night Mission Pinball	20 75

ATARI	
850 Interface	109

CONTINENTAL	
Home Accountant	44 75
'85 Book of Atari Software	16 95

TRONIX	
S A M Atari	38 50
S A M C-64	38 50

ADVENTURE INT'L (Atari)	
Diskey	32 75
Ultradisambler	32 75
Max Golf	18 75
Rolley Speedway	26 75
Whomper Stomper	18 75
Adventures 1-12 each	14 50
Adv Hint Book	5 50

MICROPROSE (Atari)	
Kennedy Approach	21 75
Crusade in Europe	24 75
Decision in Desert	24 75
Solo Flight	20 75
Nato Commander	20 75
Splitre Ace	18 75
F-15 Strike Eagle	20 75
Helicat Ace	18 75

SYNAPSE (Atari)	
SynFile	33 75
SynCalc (AT/C-64)	33 75
SynComm	26 75
SynTrend	26 75
SynChron	26 75
SynStock	26 75

BRODERBUND (Atari)	
The Print Shop	28 95
Graphics Library	18 95
Graphics Library II	19 50
Bank St. Writer	42 75
Whittier's Brother	18 95
Spetfunker	18 95
Sleath	18 95
Serpent's Star	24 95
Mask of the Sun	24 95

SCARBOROUGH (Atari)	
NET WORTH (AT/C-64)	48 75
Mastertype	22 75
Improved Mastertype	23 75
Mastertype Filer	22 75

US ROBOTICS	
Password 1200M	229
Password 1200	229
Password 300M	139
Password 300F	139
Autodial 212A	359
PCME	319
PCME4	519
PCM256	769
S-100	079
Co-ur	469
Whittier's Brother	469
MicroLink	469
Telpac Ms-DOS	79

RACAL-VADIC	
2400PC	549
2400PA	799
2400V	559
1200PC	329
300V	205
300PC	199
George Software	69

SCARBOROUGH (Apple)	
NET WORTH	48 75
Improved Mastertype	22 75
Mastertype Filer	22 75

BRODERBUND (Apple)	
The Print Shop	31 50
Graphics Library	18 50
Graphics Library II	18 95
Paper Refill	11 95
Bank St. Writer 64K	41 50
Bank St. Writer 128K	42 75
Bank St. Filer	42 75
Bank St. Mailer	46 75
Bank St. Speller	42 75
Carmen Sandiego	22 75
Karateka	22 75
Captain Goodnight	22 75
Muppey Cruise	22 75

SUB LOGIC (Apple)	
Flight Simulator II	32 75
Night Mission Pinball	20 75

MICROPROSE (Apple)	
Crusade in Europe	25 75
Decision in Desert	25 75
F-15 Strike Eagle	21 75
Nato Commander	21 75

SSI (Apple)	
Mech Brigade	36 75
Norway 1985	22 75
Market Garden	29 75
Six Gun Shootout	24 75
50 Mission Crush	24 75
Phantasia	24 75

Spinnaker	
Alphabet	\$18 75
Story Machine	\$19 75
Kids on Keys	\$18 75
Grandma	\$19 75
Snooper Troop	\$22 75

COMMODORE	
C-128 NEW	CALL
1571 Drive	CALL
1572 Drive	CALL
1902 Monitor	CALL
1670 Modem	CALL
C-64 Computer	CALL
1541 Drive	189
MPS801 Printer	LOW
1702 Monitor	199
Simon's Basic	24 75
Assembler 64	34 75
Super Expander	22 75
Logo 64	49 75
Pilot 64	38 75
Easy Calc	34 75
Easy Script	38 75

SSI (C-64)	
Colonial Conquest	24 75
Wings of War	24 75
Computer Ambush	34 75
Field of Fire	24 75
Fighter Command	36 75
Kampfgruppe	36 75
Mech Brigade	36 75
Market Garden	29 75
Six Gun Shootout	24 75
Computer Baseball	24 75
Computer Quarterback	24 75
Imperium Galactica	24 75
Phantasia	24 75
Cartels & Cutthroats	24 75
50 Mission Crush	24 75
Questron	24 75

SCARBOROUGH (C-64)	
Build A Book	24 75
Improved Mastertype	23 75
NET WORTH	48 75
Mastertype Filer	22 75

SUB LOGIC (C-64)	
Flight Simulator II	32 75
Night Mission Pinball	20 75

ANCHOR	
Volkmodem	55
Volkmodem i2	186
Mark 12	229

NOVATION	
BM 300 200 MS-DOS ex	319
BM 300 200 CPM 86 ex	319
BM 300 1200 2400 ex	529
BM 300 1200 2400 MS-DOS	579
BM MS-DOS int	325
BM CPM 86 int	325
Macmodem 300-1200	315
Macmodem 300-1200/2400	585
Apple Cal II	519
Upgrade Apple Cal II	275
Cal 300 Acoustic	139
Cal RS232	89
WESTRIDGE MODEM (C-64)	59
WTE MO MODEM (C-64)	69
Compuserve	19 85

CARDCO	
Digital Camera	189 95
32K Printer Buffer	59 95
Numeric Keypad	34 95
CB/5 5-slot Board(64)	54 00
CB/2 2-slot Board(64)	25 00
S More Basic Rom	45 95
Write Now-64	35 00
Mail Now-64	29 00
Spell Now-64	29 00
File Now-64	29 00
Paint Now-64	29 00
Calc Now-64	29 00
Tax Survival	29 00
Super Printer Utility	27 95
Write Now-Vic-20	29 95

HES	
HES Games 84	22 95
Omn Writer/Spell	34 95
HES Mon 64	23 95
Microsoft Multiplan	55 00
Type N Write	19 95
Turtle Graphics II	23 95
Cell Defense	22 95
Paint Brush	12 95
Tri Math	22 95
Graphics Basic	27 95
HES Kit	29 95
Millionaire	23 95
64 Fortn	24 95
HES Writer 64	24 95

BATTERIES INCLUDED	
Paper Clip	59 95
Spell Pak	34 95
Consultant	59 95
Paper Clip	75 95
Spell Pak	34 95
Home Pak	129 95
Bus Card	109 95
60 Column Board	109 95

BRODERBUND (C-64)	
The Print Shop	28 75
Graphics Library	18 75
Graphics Library II	19 75
Karateka	18 75
Castles Dr Creep	19 75
Bank St. Writer	32 75
Loderunner	20 75
Mask of the Sun	24 75
Spelunker	19 75
Serpent's Star	24 75
Whittier's Brother	18 75
Raid Bungeing Bay	18 75

MICROPROSE (C-64)	
Kennedy Approach	21 75
Crusade in Europe	24 75
Decision in Desert	24 75
Solo Flight	20 75
Nato Commander	20 75
Splitre Ace	18 75
F-15 Strike Eagle	20 75
Helicat Ace	18 75

★ SUPER SPECIAL! ★ LOWEST PRICES! ★

MONITORS

AMDEK	
300 Green	125
300 Amber	139
310 Amber IBM	155
Color 300 Audio	245
Color 500 Composite	369
Color 600	429
Color 700	499
Color 710	569

NEC	
JB-1250 Green	95
JB-1201 Green	135
JC 1215 Color	235
JC 1216 RGB	375
JC-1460 Color	265
JB-1205 Amber	139

PRINCETON GRAPHICS	
MAX-12 Amber	189
HX-12 RGB	475
SR-12 RGB	599

SAKATA	
SG1000 12 Green	99
SGA1000 12 Amber	109
SG1500 12 Green TTL	119
SGA1500 12 Amber TTL	129
SC100 13 Color Comp	209
SC200 13 RGB	389
STS1 Tilt Stand	29

PANASONIC	
DT 1300 RG1 composite	299

ZENITH	
ZVM 122A Amber	84
ZVM 123G Green	75
ZVM 124 Amber IBM	129
ZVM 131 Color	275
ZVM 133 RGB	389
ZVM 135 Composite	449
ZVM 136 Hi-Res Color	589

X-TRON	
Comcolor I Composite Green	185

TAXAN	
115 12 Green Composite	CALL
116 12 Amber Composite	CALL
121 12 Green TTL	135
122 12 Amber TTL	145
225 12 Color Composite	259
410 12 RGB H-Res IBM	329
420 12 RGB Super H-IBM	409
440 12 RGB Ultra H-Res	569
Tilt Stand	35

AMERICA'S MAIL ORDER HEADQUARTERS
LYCO COMPUTER
 WORLD'S LEADER IN SALES & SERVICE

TO ORDER
 CALL TOLL FREE
 800-233-8760
 In PA 1 717-327-1824
 Lyco Computer
 P.O. Box 5088
 Jersey Shore, PA 17740



Four bouncing balls fly wildly about the screen as the player runs for his life in the Atari version of "Laser Beam."

have saved Program 2 with the filename shown in line 220. Program 2 reads the file LASERBEM.OBJ, POKEs the machine language into memory, and then jumps to the starting address to automatically run the game.

Tape users need to make a few modifications to the programs. In Program 1, delete lines 10-90, replace the statements in line 220 with END, and change D: to C: in line 100. In Program 2, change D: to C: in line 100.

After these changes, Program 1 creates a file on tape which Program 2 can load. That means the file created by Program 1 should immediately follow Program 2 on the tape. As Program 2 reads this file, it is normal for the cassette recorder to stop and start and it reads each block.

Commodore 64 Version

Laser Beam on the Commodore 64 is considerably different from the original Atari version. The object is not just to avoid the bouncing balls, but also to grab them at certain times and stuff them into a basket.

Written entirely in machine language, Program 3 must be entered with COMPUTE!'s "MLX" utility found elsewhere in this issue. Here is the information you'll need:

Starting address: 49152
Ending address: 52699

After you've saved Laser Beam on disk or tape according to the MLX instructions, plug a joystick into port 2 and type LOAD "LASER BEAM",8,1 for disk or LOAD "LASER BEAM",1,1 for tape (assuming you saved the program with the filename LASER BEAM, of

course). Then type SYS 49152 and press RETURN.

The Highlight Zone

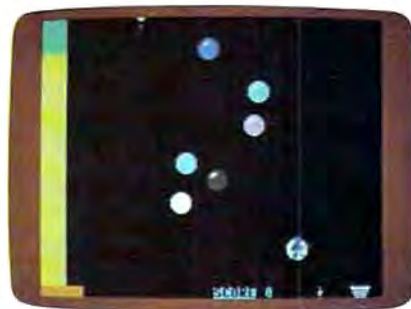
Move the joystick up or down to select the difficulty level from 0 to 9. Unlike the Atari version, 0 is the slowest and 9 is the fastest (in fact, 9 is so fast that it's almost unplayable!). The game starts when you press the fire button.

Immediately you'll see seven colored balls bouncing around the screen. At the left is a highlighted "safe zone" occupied by a small stick figure—that's you. By moving the joystick, you can maneuver your figure around the screen. But if you venture out of the safe zone and bump into a bouncing ball, you're zapped. (You get three lives per game, as indicated by the figures at the bottom of the screen.)

Your goal is to render the balls harmless, grab them one by one, and drop them into the basket in the lower-right corner. To make a ball safe to touch, you have to shoot it with the laser gun. The laser is visible along the edge of the screen. To control it, first you must move your figure into the uppermost corner of the safe zone. *The laser gun is under your control only when your figure is at this spot.* Pushing the joystick to the right moves the laser clockwise around the edge of the screen, and pushing the joystick to the left moves the laser counterclockwise around the screen. Press the fire button to activate the beam. If you push the joystick in any other direction, you'll move your figure away from the top of the safe zone, and the laser gun will no longer be under your control.

Now, you can't shoot just *any* bouncing ball with the laser to make it safe to grab. You have to shoot the ball which matches the border color of the screen. As soon as you hit the ball, it turns white. Then you can maneuver your figure out of the safe zone, grab the white ball by touching it, carry it to the basket, and drop it in by pressing the fire button. Afterward you must scurry back to the safe zone before a collision with another ball.

For example, let's say the border color is red. First you move your figure to the top of the safe zone to take control of the laser gun. Next you push the joystick right or left to



In this Commodore 64 version of "Laser Beam," the player has rendered a bouncing ball harmless by shooting it with the laser. Now he's carrying it to the basket.

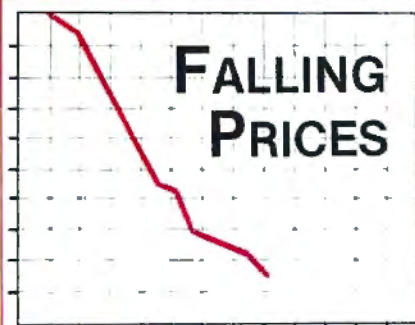
aim the laser at the red ball. When you have a clear shot, press the fire button to shoot the beam. If you score a hit, the red ball turns white. Then you can push the joystick in another direction to move your figure out of the safe zone. Grab the ball, stuff it into the basket by pressing the fire button, and make your escape—all while avoiding the other bouncing balls, of course. If you succeed, the border color changes to correspond to one of the remaining balls.

You continue with the process until all the balls are safely dropped into the basket. Then another round begins.

Bouncing Chaos

Sounds simple, right? Well, it's not. There are a few complications. Suppose you fire the laser and hit a bouncing ball that *doesn't* match the border color. It turns white, too. But it *isn't* safe to grab. If you touch it, you're zapped. This becomes a real problem when you accidentally shoot several of the balls and turn them white. Only one of them is safe, and you have to remember which one. It's not easy when three or more white balls are bopping all over the place.

There is an incentive for creating this chaos, however. The number of points you get for dropping a ball in the basket doubles for each white ball on the screen. If the only white ball is the one you're grabbing, you get only 5 points. If a second ball is white, you get 10 points; if a third ball is white, you get 20 points; and so on. If all seven balls are white when you drop the first one into the basket, you score 320 points.



VERIFLEX

Free plastic library case.
Lifetime warranty.



	Price Each		
	50 +	100 +	500 +
5 1/4" Single Sided/ Double Density	.93	.91	.87
5 1/4" Double Sided/ Double Density	.98	.96	.92

From the inventors of the 3 1/2" Micro Disk . . .

SONY

Ten-pack, boxed diskettes.



	Price Each		
	30 +	50 +	100 +
3 1/2" Single Sided/ Double Density	2.28	2.25	2.19
3 1/2" Double Sided/ Double Density	3.45	3.39	3.35

APPLE IMAGEWRITER RIBBONS



\$3.69 each



Many other models available.
Boxed in dozens.

DISK FILES

The deluxe files for 3 1/2" or 5 1/4" floppies. Buff plastic body with natural oak roll-top. Each comes with dividers and color coded labels.



for 3 1/2" holds 55 **\$17.49**



for 5 1/4" holds 140 **\$24.99**

Other colors and locking models available.

CALL TOLL FREE **1-800-USA-FLEX**

7 to 7 Central Time

IN ILLINOIS 1-312-351-9700

Please mention this ad when calling in your order. MasterCard, Visa, C.O.D. or Net 30 days with approved credit on purchases over \$200.00. Shipping/Handling additional. Prices subject to change without notice.

COMARK

COMARK, INC. 135 N. Brandon
Glendale Heights, Illinois 60139

STARPOINT SOFTWARE proudly presents

ISEPIC

8 + 8 + 8 + 8 + 8 + 8 + 8 + 8 = 8

DB CHIP GRACEY

[say Icepick], a revolutionary new concept in software back up for the Commodore 64. ISEPIC is not a disk duplication system, but an extraordinary hardware/software combination that actually bypasses any disk protection scheme. ISEPIC captures and saves the protected program as it runs in the 64's memory, this "snapshot" becomes accessible to the user for complete inspection and alteration. From this image, ISEPIC can automatically create a compact, auto-booting, fast-loading file which is completely un-protected and self contained.

- ☆ Backs up almost ALL memory-resident software
- ☆ ISEPIC'd programs load many times faster than originals
- ☆ ISEPIC is invisible to software—cannot be defeated
- ☆ Eliminates drive "knock" due to antique protection schemes
- ☆ Automatically backs up protected programs into single, auto-booting, super-fast loading files
- ☆ Place multiple programs on a single diskette
- ☆ Create auto-booting, fast-loading versions of your own programs
- ☆ Back up programs are completely self-contained and run independently of the ISEPIC adapter
- ☆ Backs up software with a flick of a switch
- ☆ ISEPIC comes complete and ready-to-run, just plug into expansion port
- ☆ Programs backed up by ISEPIC may be used on MSD or 4040 drives as well as hard disks regardless of original protection schemes

• FOR ARCHIVAL PURPOSES ONLY •

When ordering by mail:

- \$64.95 + 3.00 shipping
- \$64.95 + 4.00 COD orders
- Calif. residents add 6% sales tax
- VISA or Mastercard accepted
- Shipping out of USA \$6.00

Please allow 4-6 weeks for delivery.

... WRITE OR PHONE ...

STARPOINT SOFTWARE

Star Route 10

Gazelle, CA 96034

(916) 435-2371

Another complication is that your safe zone doesn't always stay safe for very long. After you shoot the ball that matches the border color, it begins shrinking from the bottom up. If you don't hurry out, you'll get zapped.

And there's yet another reason to move quickly: If you finish a round by dropping every ball into the basket before the horizontal bar at the bottom of the screen disappears, you get a 50-point bonus.

If all this action causes your brain to momentarily suffer a system crash, you can freeze everything by pressing and holding the SHIFT key. Press SHIFT LOCK to freeze the game for extended periods. Release SHIFT to resume play.

For instructions on entering these listings, please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!.

Program 1: Atari Laser Beam, Main Program

```

AB 10 TRAP 90
DB 20 OPEN #1,4,0,"D:LASERBE
M.OBJ"
CN 30 CLOSE #1
DB 40 GOTO 220
DD 90 CLOSE #1
BJ 100 OPEN #1,8,0,"D:LASERB
EM.OBJ"
JD 110 READ NUMBEROFBYTES
ME 115 READ SUMOFBYTES
EL 120 N=0:S=0:TRAP 200
PB 130 READ A
EP 140 PUT #1,A
FE 150 N=N+1:S=S+A
GE 160 GOTO 130
FH 200 CLOSE #1
FF 210 IF N<>NUMBEROFBYTES T
HEN PRINT "ERROR IN N
UMBER OF BYTES ":STOP

LH 215 IF S<>SUMOFBYTES THEN
PRINT "ERROR IN SUM
OF BYTES ":STOP
GA 220 RUN "D:LOADLSR.BAS"
EC 10005 DATA 2440,265870
NI 10010 DATA 255,255,0,40,1
19,45,255,255,255,2
55
AB 10020 DATA 255,255,255,25
5,0,0,0,255,255,0
CK 10030 DATA 0,0,24,24,24,2
4,24,24,24,24
NH 10040 DATA 16,124,84,84,4
0,40,40,100,0,24
GF 10050 DATA 60,126,126,60,
24,0,83,46,0,0
HN 10060 DATA 0,0,0,0,0,0,0,
0,0,0
DG 10070 DATA 5,15,13,169,0,
133,203,169,51,133
DJ 10080 DATA 204,165,190,13
3,195,165,195,201,0
,200
WJ 10090 DATA 1,96,162,0,160
,0,177,203,149,214
FF 10100 DATA 232,200,224,6,
200,246,160,0,162,0

```

```

II 10110 DATA 134,240,134,24
1,165,214,133,220,1
65,215
IH 10120 DATA 133,221,165,21
6,133,222,165,217,1
41,116
DC 10130 DATA 40,32,0,50,169
,129,193,220,240,6
KF 10140 DATA 169,133,193,22
0,200,9,32,71,41,22
8
CG 10150 DATA 216,240,2,133,
241,165,214,133,220
,165
JE 10160 DATA 215,133,221,16
5,218,133,222,165,2
19,141
JN 10170 DATA 157,40,32,0,50
,169,129,193,220,24
0
EI 10180 DATA 6,169,133,193,
220,200,9,32,85,41
CH 10190 DATA 228,218,240,2,
133,241,165,214,133
,220
JB 10200 DATA 165,215,133,22
1,165,216,133,222,1
65,217
JE 10210 DATA 141,198,40,32,
0,50,165,218,133,22
2
JB 10220 DATA 165,219,141,21
0,40,32,0,50,169,12
9
AF 10230 DATA 193,220,240,6,
169,133,193,220,200
,19
AF 10240 DATA 32,71,41,32,85
,41,133,241,169,1
NO 10250 DATA 197,240,240,40
,133,240,76,98,40,1
69
CL 10260 DATA 133,145,220,16
9,0,145,214,165,241
,201
CL 10270 DATA 0,240,3,32,37,
41,165,220,133,214
IK 10280 DATA 165,221,133,21
5,181,214,145,203,2
32,200
BH 10290 DATA 224,6,200,246,
32,56,41,24,169,6
AO 10300 DATA 101,203,133,20
3,198,195,76,69,40,
169
IL 10310 DATA 0,141,31,200,1
62,51,160,51,136,14
1
NH 10320 DATA 31,200,200,250
,202,200,245,96,162
,0
LP 10330 DATA 160,0,200,192,
40,200,251,232,224,
80
BD 10340 DATA 200,244,96,169
,160,197,217,240,3,
133
FO 10350 DATA 217,96,169,176
,133,217,96,169,160
,197
BI 10360 DATA 219,240,3,133,
219,96,169,176,133,
219
CF 10370 DATA 96,72,162,96,1
69,12,157,66,3,32
BD 10380 DATA 86,228,162,96,
169,3,157,66,3,169
BH 10390 DATA 40,157,60,3,16
9,40,157,69,3,104
NH 10400 DATA 157,75,3,41,24
0,73,16,9,12,157

```

```

BJ 10410 DATA 74,3,32,86,220
,96,162,0,169,224
KN 10420 DATA 141,158,41,169
,40,141,161,41,189,
0
GJ 10430 DATA 224,157,0,48,2
32,224,0,200,245,24
MK 10440 DATA 173,161,41,105
,1,141,161,41,173,1
58
ME 10450 DATA 41,105,1,141,1
58,41,201,226,200,2
24
EF 10460 DATA 169,48,141,244
,2,162,8,160,0,105
DF 10470 DATA 0,40,157,0,48,
232,200,224,47,200
NH 10480 DATA 244,96,169,0,1
33,203,169,52,133,2
04
NH 10490 DATA 216,162,0,160,
0,177,203,149,214,2
32
CO 10500 DATA 200,224,6,200,
246,165,214,201,255
,200
JB 10510 DATA 6,165,215,201,
255,240,64,162,0,16
0
BC 10520 DATA 0,196,217,240,
5,177,216,76,4,42
DE 10530 DATA 165,216,145,21
4,232,228,218,240,3
2,24
CJ 10540 DATA 165,219,101,21
4,133,214,169,0,101
,215
DB 10550 DATA 133,215,196,21
7,240,221,169,1,101
,216
AL 10560 DATA 133,216,169,0,
101,217,133,217,76,
249
KA 10570 DATA 41,24,169,6,10
1,203,133,203,76,21
9
BH 10580 DATA 41,96,162,0,16
0,0,165,206,133,220
PE 10590 DATA 165,207,133,22
1,173,120,2,201,14,
240
IA 10600 DATA 21,201,13,240,
29,201,11,240,37,20
1
NH 10610 DATA 7,240,45,169,0
,133,222,169,176,76
HD 10620 DATA 142,42,169,20,
133,222,32,9,44,169
BD 10630 DATA 160,76,142,42,
169,20,133,222,32,9
KP 10640 DATA 44,169,176,76,
142,42,169,1,133,22
2
BK 10650 DATA 32,9,44,169,16
0,76,142,42,169,1
HO 10660 DATA 133,222,32,9,4
4,169,176,76,142,42
WF 10670 DATA 141,146,42,32,
0,50,162,0,160,0
HJ 10680 DATA 169,129,193,22
0,240,27,169,133,19
3,220
KO 10690 DATA 240,21,169,0,1
45,206,169,4,145,22
0
CO 10700 DATA 165,220,133,20
6,165,221,133,207,1
69,0
OD 10710 DATA 133,240,96,169
,255,133,240,96,169
,0

```


MP 10720	DATA 133,240,197,181,240,5,198,181,76,12	MP 11010	DATA 224,12,208,246,96,165,197,201,0,240		141,196,2,169,15,141
JD 10730	DATA 43,173,10,210,141,45,40,24,101,188	BO 11020	DATA 13,201,1,240,14,201,2,240,15,169	LF 11350	DATA 197,2,169,114,141,198,2,169,48,141
AL 10740	DATA 144,3,76,143,43,173,45,40,41,31	IH 11030	DATA 33,76,6,44,169,0,76,6,44,169	MP 11360	DATA 199,2,96,165,89,41,240,141,111,45
GM 10750	DATA 201,17,16,233,173,45,40,41,31,168	BH 11040	DATA 11,76,6,44,169,22,133,176,96,24	DI 11370	DATA 162,0,160,0,169,0,133,203,169,55
HE 10760	DATA 165,177,133,220,165,178,133,221,169,20	GG 11050	DATA 248,173,43,40,109,51,40,141,43,40	GB 11380	DATA 133,204,177,203,201,255,240,27,141,108
JH 10770	DATA 192,0,240,10,133,222,32,176,50,136	CP 11060	DATA 173,44,40,105,0,141,44,40,173,43	AA 11390	DATA 45,141,113,45,200,177,203,141,109,45
ED 10780	DATA 192,0,208,248,165,220,133,179,165,221	KD 11070	DATA 40,141,45,40,169,84,141,152,44,173	JP 11400	DATA 141,114,45,173,255,255,9,0,141,255
EK 10790	DATA 133,180,165,189,133,181,169,193,160,0	DM 11080	DATA 55,40,141,153,44,32,70,44,173,44	NL 11410	DATA 255,200,76,86,45,96,160,50,174,50
EF 10800	DATA 145,179,165,181,201,0,208,119,165,179	KD 11090	DATA 40,141,45,40,169,82,141,152,44,173	GB 11420	DATA 216,56,165,220,229,222,133,220,165,221
CL 10810	DATA 133,220,165,180,133,221,169,2,133,222	DK 11100	DATA 55,40,141,153,44,32,70,44,216,96	AJ 11430	DATA 229,223,133,221,96,176,50,190,50,216
NM 10820	DATA 32,0,50,169,1,133,222,160,0,76	DE 11110	DATA 160,0,248,169,0,141,46,40,141,47	EN 11440	DATA 24,165,220,101,222,133,220,165,221,101
AC 10830	DATA 51,43,32,0,50,169,4,209,220,240	MC 11120	DATA 40,14,45,40,121,46,40,10,14,45,40,121,46	FJ 11450	DATA 223,133,221,96,0,51,101,51,220,13
ED 10840	DATA 22,169,129,209,220,240,27,169,133,209	PD 11130	DATA 40,121,46,40,10,14,45,40,121,46	OL 11460	DATA 1,160,0,160,221,13,1,160,20,160
PM 10850	DATA 220,240,21,165,183,145,220,32,216,44	PJ 11140	DATA 40,10,14,45,40,121,46,40,153,46	AI 11470	DATA 198,14,0,160,20,160,89,14,1,160
LF 10860	DATA 76,48,43,169,255,133,240,169,0,133	LB 11150	DATA 40,78,45,40,78,45,40,78,45,40	PJ 11480	DATA 20,160,16,14,0,160,20,160,28,15
LF 10870	DATA 181,76,143,43,32,56,41,165,179,133	DM 11160	DATA 78,45,40,200,173,45,40,153,46,40	NI 11490	DATA 1,160,0,160,95,14,1,160,20,160
AA 10880	DATA 220,165,180,133,221,169,2,133,222,32	BD 11170	DATA 173,46,40,9,16,141,46,40,173,47	OH 11500	DATA 243,13,1,160,20,160,22,15,1,160
AC 10890	DATA 0,50,169,1,133,222,160,0,76,120	NJ 11180	DATA 40,9,16,141,47,40,160,0,185,46	CH 11510	DATA 20,160,194,14,1,160,0,160,195,13
GG 10900	DATA 43,32,0,50,169,129,209,220,240,13	AD 11190	DATA 40,153,0,0,200,192,2,208,245,96	NC 11520	DATA 1,160,0,160,69,14,0,160,20,160
NC 10910	DATA 169,133,209,220,240,7,169,0,145,220	NM 11200	DATA 169,160,141,1,210,166,194,32,207,44	PE 11530	DATA 39,14,1,160,20,160,140,14,1,160
DA 10920	DATA 76,117,43,169,129,145,179,96,169,128	NM 11210	DATA 24,105,1,201,176,208,241,169,14,166	FH 11540	DATA 20,160,203,14,1,160,20,160,247,14
AF 10930	DATA 133,203,169,51,133,204,164,176,162,1	KL 11220	DATA 195,32,207,44,56,233,1,208,246,169	AL 11550	DATA 1,160,20,160,255,255,255,255,255
BO 10940	DATA 177,203,149,176,232,200,224,12,208,246	KC 11230	DATA 175,141,1,210,166,196,32,207,44,56	KC 11560	DATA 128,51,182,51,188,13,0,0,0,17
EG 10950	DATA 96,165,182,141,223,42,165,186,141,241	NE 11240	DATA 233,1,201,159,208,241,96,160,19,136	PN 11570	DATA 66,1,2,20,176,150,13,0,0,0
NJ 10960	DATA 42,165,184,141,40,43,141,109,43,165	BE 11250	DATA 208,253,202,208,248,96,169,1,133,194	OK 11580	DATA 15,67,20,40,1,176,207,13,0,0
AK 10970	DATA 185,141,33,43,141,102,43,165,187,141	KC 11260	DATA 141,163,44,141,192,44,169,64,141,0	AJ 11590	DATA 0,17,66,1,2,20,160,58,15,0
KH 10980	DATA 37,43,141,106,43,141,49,43,141,118	NL 11270	DATA 210,169,4,133,195,169,1,133,196,140	FK 11600	DATA 0,0,15,67,20,40,1,160,213,14
NJ 10990	DATA 43,96,169,128,133,203,169,51,133,204	EP 11280	DATA 48,40,32,160,44,172,48,40,96,169	BE 11610	DATA 0,0,0,6,66,1,220,176,0
CL 11000	DATA 164,176,162,1,181,176,145,203,232,200	OA 11290	DATA 2,133,194,133,195,133,196,169,3,141	NK 11620	DATA 52,89,52,128,13,129,0,20,1,148
		DK 11300	DATA 163,44,141,192,44,165,192,141,2,210	JF 11630	DATA 13,129,0,20,1,168,13,129,0,20
		DO 11310	DATA 140,48,40,32,160,44,172,48,40,96	OB 11640	DATA 1,188,13,129,0,18,20,189,13,129
		KO 11320	DATA 173,54,40,141,45,40,169,94,141,152	NK 11650	DATA 0,18,20,206,13,129,0,18,20,207
		DK 11330	DATA 44,173,55,40,141,153,44,32,70,44	JH 11660	DATA 13,129,0,18,20,36,15,129,0,20
		LD 11340	DATA 216,96,169,24,	HF 11670	DATA 1,56,15,129,0,20,1,76,15,129
				ND 11680	DATA 0,20,1,128,13,0,53,5,1,76
				AO 11690	DATA 15,5,53,5,1,136,13,10,53,7
				LC 11700	DATA 1,88,15,27,53,6,1,255,255,255


```

BE 11710 DATA 255,255,255,0,
53,32,53,44,37,54
KK 11720 DATA 37,44,51,35,47
,50,37,40,41,51
HH 11730 DATA 35,47,50,37,44
,33,51,37,50,0
LL 11740 DATA 34,37,33,45,47
,48,52,41,47,46
GP 11750 DATA 0,54,41,54,157
,14,17,53,10,1
HH 11760 DATA 213,14,129,0,6
,20,214,14,129,0
KF 11770 DATA 6,20,228,14,12
9,0,6,20,229,14
HH 11780 DATA 129,0,6,20,250
,14,4,0,1,1
HF 11790 DATA 255,255,255,25
5,255,255,0,55,89,5
5
DL 11800 DATA 1,51,7,51,13,5
1,19,51,25,51
KL 11810 DATA 31,51,37,51,43
,51,49,51,55,51
LL 11820 DATA 61,51,67,51,73
,51,79,51,85,51
BH 11830 DATA 91,51,129,51,1
40,51,151,51,162,51
HH 11840 DATA 173,51,1,52,7,
52,13,52,19,52
LB 11850 DATA 25,52,31,52,37
,52,43,52,49,52
ND 11860 DATA 55,52,61,52,67
,52,73,52,79,52
FB 11870 DATA 1,54,7,54,13,5
4,19,54,25,54
BN 11880 DATA 31,54,37,54,55
,40,56,40,255,255
PH 11890 DATA 0,56,167,57,16
9,17,32,99,41,32
PP 11900 DATA 144,41,32,46,4
5,32,210,41,32,24
DL 11910 DATA 45,56,173,44,4
0,237,53,40,48,28
NK 11920 DATA 201,0,240,3,76
,42,56,56,173,52
DF 11930 DATA 40,237,43,40,1
6,12,173,43,40,141
DL 11940 DATA 52,40,173,44,4
0,141,53,40,173,52
NJ 11950 DATA 40,141,45,40,1
69,146,141,152,44,1
73
EE 11960 DATA 56,40,141,153,
44,32,70,44,173,53
NJ 11970 DATA 40,141,45,40,1
69,144,141,152,44,1
73
HH 11980 DATA 56,40,141,153,
44,32,70,44,216,169
HK 11990 DATA 0,133,197,165,
197,201,4,240,18,32
BB 12000 DATA 231,43,32,144,
43,169,0,133,181,32
OI 12010 DATA 208,43,230,197
,76,99,56,169,240,1
33
EB 12020 DATA 206,173,56,40,
133,207,169,255,133
,188
NI 12030 DATA 169,32,133,189
,169,1,133,190,141,
51
AG 12040 DATA 40,169,0,133,1
97,133,192,133,193,
141
AE 12050 DATA 43,40,141,44,4
0,32,28,44,24,165
AG 12060 DATA 197,105,1,201,
4,208,7,169,0,133
LD 12070 DATA 197,76,182,56,
133,197,32,231,43,3
2

```

```

KN 12080 DATA 144,43,32,167,
43,32,190,42,169,25
5
ML 12090 DATA 197,240,240,12
5,169,0,133,77,32,2
08
WJ 12100 DATA 43,32,57,40,16
9,255,197,240,240,1
09
MO 12110 DATA 32,54,42,169,2
55,197,240,240,100,
32
HO 12120 DATA 249,44,169,5,2
05,31,208,208,7,169
AC 12130 DATA 4,205,31,208,2
08,249,165,192,133,
220
AE 12140 DATA 165,193,133,22
1,169,1,133,222,32,
176
BI 12150 DATA 50,165,220,133
,192,165,221,133,19
3,165
HH 12160 DATA 192,201,0,208,
39,230,190,24,165,1
88
BL 12170 DATA 233,10,133,188
,198,189,24,240,173
,51
DA 12180 DATA 40,105,1,141,5
1,40,141,45,40,169
ND 12190 DATA 133,141,152,44
,173,56,40,141,153,
44
DB 12200 DATA 32,70,44,216,1
65,192,201,0,208,6
KL 12210 DATA 165,193,201,16
9,240,3,76,164,56,16
9
DB 12220 DATA 6,205,31,208,2
40,3,76,82,57,76
NI 12230 DATA 0,56,169,0,205
,31,208,208,3,76
EB 12240 DATA 3,58,169,3,205
,31,208,208,226,24
GI 12250 DATA 248,173,54,40,
105,1,216,141,54,40
DI 12260 DATA 201,16,208,5,1
69,0,141,54,40,173
AK 12270 DATA 54,40,141,45,4
0,32,24,45,173,54
HM 12280 DATA 40,201,0,208,5
,169,1,76,144,57
CL 12290 DATA 10,10,10,10,14
1,67,41,24,162,255
HA 12300 DATA 160,255,192,0,
240,4,136,76,152,57
AP 12310 DATA 202,224,0,208,
241,76,69,57,0,58
EL 12320 DATA 126,58,32,67,4
5,32,144,41,169,18
BG 12330 DATA 32,99,41,32,14
4,41,32,46,45,169
JH 12340 DATA 0,133,203,169,
54,133,204,32,218,4
1
FH 12350 DATA 169,246,133,18
8,169,60,133,189,16
9,44
BP 12360 DATA 133,176,169,0,
162,0,160,0,192,255
HE 12370 DATA 240,4,200,76,4
6,58,224,255,240,34
BH 12380 DATA 232,141,50,40,
142,49,40,140,48,40
DO 12390 DATA 32,144,43,32,1
67,43,32,190,42,32
HF 12400 DATA 208,43,173,50,
40,174,49,40,172,48
JO 12410 DATA 40,76,44,58,20
1,5,240,5,105,1

```

```

CI 12420 DATA 76,42,58,169,1
7,32,99,41,32,144
AC 12430 DATA 41,32,46,45,32
,210,41,173,54,40
LA 12440 DATA 141,45,40,32,2
4,45,76,69,57,0

```

Program 2: Atari Laser Beam, Loader Program

```

BF 100 OPEN #1,4,0,"D:\LASERB
EM.OBJ"
DH 110 GET #1,X:GET #1,X
FN 120 TRAP 210
JO 130 GET #1,STARTLO:GET #1
,STARTRI:GET #1,LASTL
O:GET #1,LASTHI
JK 140 START=STARTLO+256*STA
RTHI
JN 150 LAST=LASTLO+256*LASTH
I
GJ 160 FOR I=START TO LAST
FA 170 GET #1,X
JF 180 POKE I,X
CC 190 NEXT I
FP 200 GOTO 130
IA 210 CLOSE #1:X=USR(14840)
GL 220 END

```

Program 3: Commodore 64 Laser Beam

Version by Kevin Mykytyn, Editorial Programmer

Please refer to the "MLX" article in this issue before entering the following listing.

```

49152 :169,004,141,181,002,032,017
49158 :058,197,032,204,196,169,094
49164 :000,141,021,208,169,147,186
49170 :032,210,255,169,000,141,057
49176 :033,208,141,032,208,169,047
49182 :046,141,160,206,133,010,214
49188 :032,202,204,162,009,160,037
49194 :017,024,032,240,255,169,011
49200 :221,160,204,032,030,171,098
49206 :169,109,141,160,206,133,204
49212 :010,032,202,204,162,012,170
49218 :160,018,024,032,240,255,027
49224 :169,233,160,204,032,030,132
49230 :171,162,011,165,162,197,178
49236 :162,240,252,202,208,247,115
49242 :173,181,002,009,048,141,132
49248 :112,006,173,000,220,074,169
49254 :176,010,174,181,002,224,101
49260 :009,240,003,238,181,002,013
49266 :074,176,008,174,181,002,217
49272 :240,248,206,181,002,074,047
49278 :074,074,176,205,173,181,241
49284 :002,041,015,141,181,002,002
49290 :169,003,141,179,002,169,033
49296 :000,141,185,002,141,186,031
49302 :002,169,010,056,237,181,037
49308 :002,010,133,079,133,078,079
49314 :169,007,141,178,002,032,179
49320 :226,202,032,025,199,032,116
49326 :204,196,032,070,195,169,016
49332 :020,141,183,002,032,123,169
49338 :199,172,179,002,200,169,083
49344 :032,153,223,007,136,169,144
49350 :040,153,223,007,169,007,029
49356 :153,223,219,136,208,243,106
49362 :032,169,197,165,162,197,108
49368 :162,240,252,173,030,208,001
49374 :173,031,208,032,169,197,008
49380 :198,065,208,021,165,066,183
49386 :133,065,032,231,197,032,156
49392 :133,204,032,069,205,169,028
49398 :000,141,180,002,032,072,161
49404 :193,198,078,208,007,165,077
49410 :079,133,078,032,194,195,201
49416 :234,032,031,193,032,095,113
49422 :203,032,055,204,173,141,054
49428 :002,240,202,173,141,002,012

```


49434	:208,251,076,225,192,162,116	49980	:012,141,012,212,169,021,115	50526	:002,165,003,105,000,133,246
49440	:002,173,031,208,074,074,082	49986	:141,011,212,096,238,160,156	50532	:003,165,002,201,231,208,142
49446	:144,026,072,189,038,208,203	49992	:206,173,160,206,201,122,116	50538	:232,169,191,133,002,169,234
49452	:041,015,201,001,240,015,045	49998	:208,017,169,000,141,160,005	50544	:036,032,154,197,198,002,219
49458	:169,001,157,038,208,202,057	50004	:206,240,010,206,160,206,088	50550	:165,002,201,154,208,243,067
49464	:228,167,208,004,169,024,088	50010	:016,005,169,121,141,160,190	50556	:230,002,169,033,032,154,232
49470	:133,169,232,104,232,224,133	50016	:206,173,160,206,168,032,017	50562	:197,165,002,056,233,040,055
49476	:009,208,222,096,165,010,010	50022	:111,195,185,000,206,032,063	50568	:133,002,165,003,233,000,160
49482	:208,003,076,022,194,173,238	50028	:156,195,096,173,155,195,054	50574	:133,003,201,003,208,234,156
49488	:180,002,208,008,032,236,234	50034	:201,025,176,005,238,155,146	50580	:169,020,141,160,206,096,172
49494	:198,144,003,076,026,194,215	50040	:195,208,005,169,005,141,075	50586	:232,157,000,206,165,002,148
49500	:165,083,208,045,174,160,159	50046	:155,195,169,020,141,011,049	50592	:157,000,207,165,003,157,081
49506	:206,189,000,207,133,170,235	50052	:212,169,007,141,001,212,106	50598	:128,207,096,169,000,133,131
49512	:133,251,189,128,207,133,121	50058	:173,155,195,141,008,212,254	50604	:016,162,007,160,014,189,208
49518	:171,133,252,189,000,206,037	50064	:169,038,141,012,212,169,117	50610	:150,003,201,002,208,018,248
49524	:133,084,074,144,008,169,216	50070	:021,141,011,212,096,005,124	50616	:173,060,003,157,060,003,128
49530	:064,133,149,169,036,208,113	50076	:072,173,160,206,168,185,096	50622	:173,070,003,157,070,003,154
49536	:006,169,066,133,149,169,052	50082	:000,207,133,004,185,128,051	50628	:173,080,003,157,080,003,180
49542	:022,133,147,133,148,133,082	50088	:207,133,005,104,160,000,009	50634	:189,080,003,074,038,016,090
49548	:083,165,084,201,035,176,116	50094	:145,004,165,004,024,105,109	50640	:189,060,003,153,000,208,053
49554	:023,201,033,208,004,169,016	50100	:000,133,004,165,005,105,080	50646	:189,070,003,153,001,208,070
49560	:001,208,002,169,040,024,084	50106	:212,133,005,169,007,145,089	50652	:136,136,202,016,208,165,059
49566	:101,170,133,170,165,171,044	50112	:004,096,162,007,189,150,032	50658	:016,141,016,208,096,169,104
49572	:105,000,133,171,208,025,038	50118	:003,240,003,076,131,196,079	50664	:000,133,006,160,000,165,184
49578	:201,036,240,004,169,001,053	50124	:189,070,003,201,055,208,162	50670	:083,240,001,096,173,000,063
49584	:208,002,169,040,133,016,232	50130	:005,254,070,003,208,007,245	50676	:220,074,176,015,174,070,205
49590	:165,170,056,229,016,133,183	50136	:201,215,208,017,222,070,125	50682	:003,224,055,240,008,206,218
49596	:170,165,171,233,000,133,036	50142	:003,189,100,003,173,001,079	50688	:070,003,162,001,134,006,120
49602	:171,165,149,160,000,145,216	50148	:157,100,003,032,138,196,086	50694	:200,074,176,015,174,070,203
49608	:170,165,170,024,105,000,066	50154	:032,183,196,189,060,003,129	50700	:003,224,215,240,000,238,172
49614	:133,253,165,171,105,212,221	50160	:201,055,208,010,189,080,215	50706	:070,003,162,002,134,006,139
49620	:133,254,169,010,160,000,170	50166	:003,208,005,254,060,003,011	50712	:200,074,176,059,032,236,033
49626	:145,253,169,128,141,011,041	50172	:208,015,189,060,003,201,160	50718	:198,176,015,208,052,072,239
49632	:212,169,008,141,012,212,210	50178	:055,208,022,189,080,003,047	50724	:169,032,032,156,195,032,140
49638	:165,147,024,105,010,010,179	50184	:240,017,222,060,003,189,227	50730	:087,195,104,076,087,198,021
49644	:141,008,212,169,129,141,012	50190	:090,003,073,001,157,090,172	50736	:174,080,003,208,007,174,182
49650	:011,212,198,147,208,030,024	50196	:003,032,138,196,032,183,092	50742	:060,003,224,025,240,027,121
49656	:165,149,201,032,248,018,029	50202	:196,189,090,003,208,029,229	50748	:072,173,060,003,056,233,145
49662	:169,032,133,149,165,251,129	50208	:189,130,003,024,125,110,101	50754	:001,141,060,003,173,000,012
49668	:133,170,165,252,133,171,004	50214	:003,157,130,003,189,060,068	50760	:003,233,000,141,080,003,020
49674	:165,148,133,147,208,006,049	50220	:003,185,000,157,060,003,116	50766	:192,000,208,004,169,003,142
49680	:169,000,133,010,133,083,032	50226	:189,080,003,105,000,157,072	50772	:133,006,104,074,176,059,124
49686	:096,076,212,194,169,000,001	50232	:080,003,076,087,196,189,175	50778	:032,236,198,176,015,208,187
49692	:133,010,166,166,189,150,074	50238	:130,003,056,253,110,003,105	50784	:052,072,169,032,032,156,097
49698	:003,201,002,144,240,173,029	50244	:157,130,003,189,060,003,098	50790	:195,032,070,195,104,076,006
49704	:080,003,240,235,173,060,063	50250	:233,000,157,060,003,189,204	50796	:149,198,174,080,003,240,184
49710	:003,201,055,208,228,173,146	50256	:080,003,233,000,157,080,121	50802	:007,174,060,003,224,055,125
49716	:070,003,201,214,144,221,137	50262	:003,189,100,003,208,021,098	50808	:240,027,072,173,060,003,183
49722	:138,072,032,023,195,104,110	50268	:189,140,003,024,125,120,181	50814	:024,105,001,141,060,003,204
49728	:170,169,026,133,169,134,097	50274	:003,157,140,003,189,070,148	50820	:173,080,003,105,000,141,122
49734	:016,162,000,160,006,185,087	50280	:003,105,000,157,070,003,186	50826	:080,003,192,000,208,004,113
49740	:040,208,041,015,201,001,070	50286	:076,131,196,189,140,003,077	50832	:169,004,133,006,104,074,122
49746	:208,001,232,136,016,243,150	50292	:056,253,120,003,157,140,077	50838	:176,004,169,001,133,010,131
49752	:189,050,197,024,199,185,074	50298	:003,189,070,003,233,000,108	50844	:165,006,208,010,166,063,006
49758	:002,141,185,002,173,186,015	50304	:157,070,003,202,240,003,035	50850	:189,016,199,141,248,007,194
49764	:002,105,000,141,186,002,024	50310	:076,196,195,096,032,167,128	50856	:208,063,198,064,208,048,189
49770	:032,120,205,166,016,169,046	50316	:196,024,125,110,003,201,031	50862	:169,009,133,064,165,012,214
49776	:255,157,070,003,206,178,213	50322	:100,144,003,157,110,003,151	50868	:073,001,133,012,169,064,120
49782	:002,208,080,169,000,141,206	50328	:032,167,196,024,125,120,048	50874	:141,004,212,165,006,205,151
49788	:021,208,169,147,032,210,143	50334	:003,201,150,144,003,157,048	50880	:131,204,240,008,141,131,023
49794	:255,162,010,160,015,024,244	50340	:120,003,056,173,027,212,027	50886	:204,169,000,141,132,204,024
49800	:032,240,255,032,213,194,078	50346	:041,031,172,027,212,016,157	50892	:238,132,204,173,132,204,007
49806	:169,032,160,205,033,030,002	50352	:005,073,255,024,105,001,127	50898	:024,105,005,010,141,001,240
49812	:171,173,183,002,010,133,052	50358	:096,169,128,141,004,212,164	50904	:212,169,065,141,004,212,251
49818	:016,010,010,024,101,016,075	50364	:169,064,141,005,212,169,180	50910	:165,012,166,006,024,125,208
49824	:170,072,169,000,032,205,040	50370	:020,141,001,212,169,129,098	50916	:020,199,141,248,007,134,209
49830	:189,104,024,109,185,002,011	50376	:141,004,212,096,032,084,001	50922	:063,096,174,060,003,224,086
49836	:141,185,002,173,186,002,093	50382	:204,169,000,133,012,133,089	50928	:025,208,028,174,070,003,236
49842	:105,000,141,186,002,169,013	50388	:010,133,083,169,009,133,237	50934	:224,055,208,021,174,080,240
49848	:000,133,162,165,162,201,239	50394	:064,141,170,002,169,128,124	50940	:003,208,016,206,167,002,086
49854	:120,208,250,104,104,238,190	50400	:141,015,212,141,018,212,195	50946	:208,008,174,168,002,142,192
49860	:181,002,076,151,192,032,062	50406	:169,008,133,065,133,066,036	50952	:167,002,162,000,024,144,251
49866	:035,195,169,001,157,150,141	50412	:169,003,141,184,002,169,136	50958	:001,056,096,204,207,211,021
49872	:003,032,255,194,096,169,189	50418	:007,141,167,002,141,168,100	50964	:213,205,208,210,212,169,213
49878	:020,141,004,212,141,011,231	50424	:002,160,007,032,042,197,176	50970	:147,032,210,255,169,000,071
49884	:212,169,010,141,005,212,207	50430	:153,110,003,032,042,197,023	50976	:141,033,208,169,011,141,223
49890	:141,012,212,173,181,002,179	50436	:153,120,003,173,027,212,180	50982	:032,208,169,024,133,016,108
49896	:010,024,105,005,141,001,006	50442	:041,001,153,090,003,173,215	50988	:169,105,160,099,032,030,227
49902	:212,169,035,141,008,212,247	50448	:027,212,041,001,153,100,038	50994	:171,198,016,208,245,160,024
49908	:169,017,141,004,212,169,188	50454	:003,136,208,225,169,009,008	51000	:037,152,153,191,007,169,253
49914	:021,141,011,212,096,230,193	50460	:133,164,169,000,133,168,027	51006	:001,153,191,219,200,192,250
49920	:168,166,168,189,249,199,115	50466	:032,255,194,169,001,133,050	51012	:040,208,242,162,019,169,140
49926	:134,167,141,032,208,160,080	50472	:063,096,173,027,212,201,044	51018	:160,157,192,007,169,010,001
49932	:007,185,249,199,153,039,076	50478	:150,144,249,096,000,005,178	51024	:157,192,219,202,016,243,085
49938	:208,136,016,247,096,162,115	50484	:010,020,040,080,120,160,226	51030	:162,024,160,020,024,032,252
49944	:024,160,005,138,032,165,036	50490	:162,255,169,003,133,002,014	51036	:240,255,169,112,160,199,203
49950	:204,202,208,247,096,169,132	50496	:169,004,133,003,169,034,064	51042	:032,030,171,032,120,205,176
49956	:020,141,011,212,173,178,003	50502	:032,154,197,230,002,165,080	51048	:096,030,018,032,032,032,088
49962	:002,024,105,004,141,001,063	50508	:002,201,040,208,243,198,200	51054	:013,000,159,018,083,067,194
49968	:212,173,179,002,010,010,122	50514	:002,169,035,032,154,197,159	51060	:079,082,069,146,032,048,060
49974	:010,010,141,008,212,169,092	50520	:165,002,024,105,040,133,045	51066	:000,160,000,185,034,200,189

51072 :153,000,051,185,034,201,240
51078 :153,000,052,185,034,202,248
51084 :153,000,053,136,208,235,157
51090 :169,255,141,021,208,169,085
51096 :007,168,056,237,178,002,032
51102 :133,016,185,249,199,153,069
51108 :039,208,185,001,200,153,182
51114 :248,007,173,001,200,141,172
51120 :248,007,185,009,200,153,210
51126 :060,003,173,009,200,141,000
51132 :060,003,185,017,200,153,038
51138 :070,003,173,017,200,141,030
51144 :070,003,185,025,200,153,068
51150 :080,003,169,000,141,080,167
51156 :003,169,000,153,150,003,178
51162 :141,150,003,136,196,016,092
51168 :208,190,169,255,141,028,191
51174 :208,169,007,141,037,208,232
51180 :169,006,141,038,208,169,199
51186 :026,133,169,032,023,195,052
51192 :096,002,002,003,004,013,112
51198 :006,007,011,204,214,214,142
51204 :214,214,214,214,214,025,075
51210 :100,100,100,100,100,100,098
51216 :100,100,100,100,100,100,104
51222 :100,100,100,000,000,000,066
51228 :000,000,000,000,000,096,124
51234 :000,000,000,000,000,000,034
51240 :000,060,000,000,255,000,099
51246 :000,255,000,000,255,000,044
51252 :000,060,000,002,255,128,241
51258 :002,255,128,002,255,128,060
51264 :000,255,128,000,085,128,148
51270 :000,255,000,000,255,000,068
51276 :000,255,000,000,255,000,074
51282 :000,255,000,000,100,000,181
51288 :000,170,000,000,170,000,172
51294 :000,170,000,000,000,000,008
51300 :000,000,000,000,000,060,160
51306 :000,000,255,000,000,255,104
51312 :000,000,255,000,000,060,171
51318 :000,002,255,128,002,255,248
51324 :128,002,255,128,000,255,124
51330 :128,000,085,128,000,255,214
51336 :000,000,255,000,000,255,134
51342 :000,000,175,000,000,175,236
51348 :000,000,010,000,000,010,168
51354 :000,000,010,000,000,010,174
51360 :000,000,000,000,000,000,160
51366 :000,000,000,060,000,000,226
51372 :255,000,000,255,000,000,170
51378 :255,000,000,060,000,002,239
51384 :255,128,002,255,128,002,186
51390 :255,128,002,255,000,002,064
51396 :085,000,000,255,000,000,024
51402 :255,000,000,255,000,000,200
51408 :250,000,000,250,000,000,196
51414 :160,000,000,160,000,000,022
51420 :160,000,000,160,000,000,028
51426 :000,000,000,000,000,000,226
51432 :000,060,000,000,255,000,035
51438 :000,235,000,000,255,000,216
51444 :000,060,000,002,255,128,177
51450 :002,255,128,001,255,128,251
51456 :001,255,128,000,085,128,085
51462 :000,255,128,000,255,000,132
51468 :000,255,000,000,255,000,010
51474 :000,255,000,000,170,000,187
51480 :000,170,000,000,170,000,108
51486 :000,170,000,000,000,000,200
51492 :000,000,000,000,000,060,096
51498 :000,000,255,000,000,235,020
51504 :000,000,255,000,000,060,107
51510 :000,002,255,128,002,255,184
51516 :128,001,255,128,001,255,060
51522 :128,000,085,128,000,255,150
51528 :000,000,255,000,000,255,070
51534 :000,000,255,000,000,175,252
51540 :000,000,010,000,000,010,104
51546 :000,000,010,000,000,010,110
51552 :000,000,000,000,000,000,096
51558 :000,000,000,060,000,000,162
51564 :255,000,000,235,000,000,086
51570 :255,000,000,060,000,002,175
51576 :255,128,002,255,128,002,122
51582 :255,128,002,255,128,001,127
51588 :085,000,001,255,000,000,217
51594 :255,000,000,255,000,000,136
51600 :255,000,000,250,000,000,137
51606 :160,000,000,160,000,000,214
51612 :160,000,000,160,000,000,220

51618 :000,000,000,000,000,000,162
51624 :000,240,000,000,252,000,148
51630 :000,188,000,000,252,000,102
51636 :000,060,000,000,251,000,235
51642 :020,250,000,006,254,128,076
51648 :000,255,128,000,086,000,149
51654 :000,248,000,000,255,000,189
51660 :003,207,000,015,015,000,188
51666 :012,015,000,008,003,168,160
51672 :008,000,008,008,000,008,248
51678 :040,000,000,255,000,000,005
51684 :000,000,000,000,000,240,212
51690 :000,000,252,000,000,188,162
51696 :000,000,252,000,000,060,040
51702 :000,000,251,000,000,251,236
51708 :000,002,171,000,000,255,168
51714 :000,000,084,000,000,252,082
51720 :000,000,252,000,000,060,064
51726 :000,000,060,000,000,060,134
51732 :000,000,040,000,000,040,100
51738 :000,000,040,000,000,168,234
51744 :000,255,000,000,000,000,031
51750 :000,000,000,015,000,000,053
51756 :063,000,000,062,000,000,169
51762 :063,000,000,060,000,000,173
51768 :239,000,000,175,032,002,248
51774 :191,128,002,255,000,000,126
51780 :149,000,000,039,000,000,000
51786 :245,000,000,243,192,000,242
51792 :240,240,000,240,048,042,122
51798 :192,032,032,000,032,032,150
51804 :000,032,000,000,040,255,163
51810 :000,000,000,000,000,000,098
51816 :000,015,000,000,063,000,182
51822 :000,062,000,000,063,000,235
51828 :000,060,000,000,239,000,159
51834 :000,239,020,000,234,144,247
51840 :000,255,000,000,021,000,148
51846 :000,063,000,000,063,000,004
51852 :000,060,000,000,060,000,004
51858 :000,060,000,000,040,000,246
51864 :000,040,000,000,040,000,232
51870 :000,042,000,255,000,000,199
51876 :000,000,000,000,000,000,164
51882 :000,000,170,000,002,170,000
51888 :128,010,090,160,009,090,151
51894 :160,041,106,168,041,170,100
51900 :168,042,170,168,042,170,180
51906 :168,042,170,168,042,170,186
51912 :168,042,170,168,010,170,160
51918 :160,010,170,160,002,170,110
51924 :128,000,170,000,000,000,254
51930 :000,000,000,000,000,000,218
51936 :000,000,120,169,051,133,185
51942 :001,169,000,133,002,169,192
51948 :056,133,003,169,000,133,215
51954 :004,169,208,133,005,162,158
51960 :008,160,000,177,004,145,230
51966 :002,136,208,249,230,005,060
51972 :230,003,202,208,242,169,034
51978 :055,133,001,169,030,141,027
51984 :024,208,160,063,185,031,175
51990 :203,153,080,057,136,016,083
51996 :247,088,096,128,192,216,227
52002 :231,231,216,192,128,255,007
52008 :126,024,036,036,024,024,054
52014 :024,001,003,027,231,231,051
52020 :027,003,001,024,024,024,155
52026 :036,036,024,126,255,127,150
52032 :063,042,031,021,015,010,246
52038 :007,255,255,165,255,082,065
52044 :255,165,255,248,240,080,039
52050 :224,160,192,064,128,028,110
52056 :020,029,063,092,060,020,116
52062 :054,173,030,208,041,001,089
52068 :240,101,162,007,169,255,010
52074 :133,016,169,009,133,164,218
52080 :189,150,003,203,208,057,173,124
52086 :080,003,221,080,003,208,201
52092 :049,173,060,003,056,253,206
52098 :060,003,016,005,073,255,030
52104 :024,105,001,201,015,176,146
52110 :031,133,165,173,070,003,205
52116 :056,253,070,003,016,005,039
52122 :073,255,024,105,001,201,045
52128 :015,176,011,024,101,165,140
52134 :197,016,176,004,133,016,196
52140 :134,164,202,208,191,166,213
52146 :164,224,009,240,020,169,236
52152 :002,157,150,003,134,166,028
52158 :228,167,208,010,189,039,007

52164 :208,041,015,201,001,208,102
52170 :001,096,169,005,133,016,110
52176 :169,020,141,011,212,169,162
52182 :000,141,008,212,169,010,242
52188 :141,012,212,169,021,141,148
52194 :011,212,162,000,172,027,042
52200 :212,169,000,153,000,051,049
52206 :153,000,052,142,000,212,037
52212 :153,128,052,032,049,204,094
52218 :202,208,233,198,016,208,035
52224 :229,104,104,032,202,204,107
52230 :206,179,002,240,003,076,200
52236 :184,192,169,000,141,021,207
52242 :208,162,011,160,015,024,086
52248 :032,240,255,169,032,141,125
52254 :224,007,169,015,160,205,042
52260 :032,030,171,173,000,220,150
52266 :041,016,208,249,076,005,125
52272 :192,160,100,136,208,253,073
52278 :096,165,169,010,010,010,002
52284 :024,105,023,205,070,003,234
52290 :176,015,173,080,003,208,209
52296 :010,173,060,003,201,042,049
52302 :176,003,076,204,203,096,068
52308 :162,000,138,157,000,212,241
52314 :232,224,026,208,248,169,173
52320 :020,141,001,212,169,066,193
52326 :141,005,212,169,008,141,010
52332 :003,212,169,005,141,012,138
52338 :212,169,005,141,010,212,095
52344 :169,255,141,015,212,169,057
52350 :015,141,024,212,096,000,102
52356 :000,206,170,002,208,026,232
52362 :169,050,141,170,002,165,067
52368 :169,201,026,240,015,198,225
52374 :169,016,006,169,000,133,131
52380 :169,240,005,160,007,032,001
52386 :165,204,096,132,016,168,175
52392 :169,216,133,002,169,215,048
52398 :133,003,165,002,024,105,094
52404 :040,133,002,165,003,105,116
52410 :000,133,003,136,208,240,138
52416 :165,016,160,002,145,002,170
52422 :136,016,251,096,169,001,099
52428 :141,180,002,032,072,193,056
52434 :165,162,197,162,240,252,108
52440 :165,010,208,238,096,158,067
52446 :146,076,032,065,032,083,144
52452 :032,069,032,082,000,066,253
52458 :032,069,032,065,032,077,029
52464 :150,017,017,157,157,157,243
52470 :157,157,157,157,157,076,083
52476 :069,086,069,076,032,032,104
52482 :017,017,017,157,157,157,012
52488 :157,157,157,157,157,157,182
52494 :157,018,159,072,073,084,065
52500 :032,070,073,082,069,066,156
52506 :085,084,084,079,078,000,180
52512 :158,076,069,086,069,076,054
52518 :032,067,079,077,080,076,193
52524 :069,084,069,068,017,017,112
52530 :157,157,157,157,157,157,224
52536 :157,157,157,157,157,157,230
52542 :066,079,078,085,083,032,229
52548 :000,173,183,002,240,045,199
52554 :206,182,002,208,040,206,150
52560 :184,002,208,035,162,003,162
52566 :142,184,002,206,183,002,037
52572 :173,183,002,208,016,169,075
52578 :024,133,169,169,001,162,244
52584 :006,157,040,208,202,016,221
52590 :250,169,000,170,169,032,132
52596 :157,192,007,096,162,024,242
52602 :160,026,024,032,240,255,091
52608 :173,186,002,201,255,240,161
52614 :007,174,185,002,032,205,227
52620 :189,096,169,152,160,205,087
52626 :032,030,171,104,104,096,171
52632 :147,017,017,017,032,067,193
52638 :079,078,071,082,065,084,105
52644 :085,076,065,084,073,079,114
52650 :078,083,044,032,089,079,063
52656 :085,032,065,082,069,032,029
52662 :079,078,069,032,079,070,077
52668 :032,084,072,069,032,070,035
52674 :069,087,032,084,079,032,065
52680 :087,073,078,032,065,084,107
52686 :032,076,065,083,069,082,101
52692 :032,066,069,065,077,046,055
52698 :000,013,013,013,013,013,027

The Original Boston Computer Diet

Tony Roberts, Production Director

Requirements: IBM PC, PCjr, or XT with at least 128K RAM; Apple II-series computer with at least 64K RAM; or a Commodore 64/128. All versions also require a disk drive.

Discipline is a key ingredient in any weight-loss program, and that remains true with *The Original Boston Computer Diet*, a software package from Scarborough Systems.

While the program takes a conservative, balanced-diet approach to weight loss, its strengths are in the ways it helps dieters gather information about their eating habits and how it takes the drudgery out of counting calories. Before embarking on the diet, you choose one of three "counselors" who engages you in a question-and-answer session. Based on this information, the counselor sets up goals and procedures for the diet and assigns readings on nutrition and health.

The program requires about an hour a day for the first week or so, after which the daily meal planning and reporting routine takes only about 15 minutes. The program maintains seven days' worth of data for meals, and a series of charts are available to help you amass and assess information about your eating habits. The information includes statistics on the intake of various vitamins and minerals, as well as data about how your mood—from depression to elation—affects the number of calories consumed.

The heart of the program is the food planning and reporting section. Counting calories is practically effortless. As you plan future meals, the screen shows how each selection affects the number of calories in the scheduled meal as well as the balance of the weekly diet. With the touch of a key, you can tell the computer how much you ate during your last meal, and it adjusts the calorie count accordingly.

As the program builds its database of information about how you eat, it watches for and warns you of possible problems. Should your diet fall out of balance, the program might warn that your intake of calcium has been low recently, bolstering its comment with a graph or two. Another possible problem is undereating, which is as unacceptable to your counselor as pigging out.

The program can't guarantee you'll lose all the weight you hope to, but its

evaluation of your eating habits, its insistence on planning and setting goals, and its readings on health and nutrition in the manual do give you the tools to help you maintain interest in your diet and develop the willpower to carry it off.

It's worth noting that the program is set up to handle the data for only one dieter at a time. A second family member who plans to take the treatment would have to obtain another copy of the program or wait until dieter No. 1 has had his fill.

The Original Boston Computer Diet
Scarborough Systems, Inc.
25 N. Broadway
Tarrytown, NY 10591
Apple & IBM \$79.95
Commodore \$49.95

Free Catalog!

Your 80-page guide to computer supplies and accessories—including complete new product descriptions.



- Packed with over 1600 products for microcomputers, minicomputers, and word processors — many available nowhere else.
- Big special section devoted to new supplies and accessories.
- Comprehensive product descriptions — including more than 475 full-color photos — clearly explain features and benefits.
- Easy-to-use cross reference guides to magnetic media, ribbons, and more—along with the industry's most complete cable guide.
- Helpful suggestions and tips, ranging from flexible disk care to proper ribbon selection to useful application ideas.

Phone toll-free 1-800-547-5444

inmac[™]

Inmac Catalog Dept.
2465 Augustine Drive
Santa Clara, CA 95054

Please rush my free copy of the Inmac Catalog. I understand there is no obligation whatsoever.

Phone toll-free 1-800-547-5444 or send coupon today.

NAME _____
COMPANY _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____ PHONE _____

311108

COMMODORE 64

\$ 139⁹⁵

- 170K Disk Drive \$149.95
- Tractor Friction Printer \$159.95
- 13" Hi-Res Color Monitor \$169.95

COMPUTER AND SOFTWARE SALE

CALL BEFORE YOU ORDER

PRICES MAY BE LOWER

C128 COMMODORE COMPUTER

(Order Now)

\$ 289⁹⁵

- 340K 1571 Disk Drive \$259.00
- Voice Synthesizer \$39.95
- 12" Green or Amber Monitor \$69.95
- Printer/Typewriter Combination \$249.95

SPECIAL SOFTWARE COUPON

We pack a SPECIAL SOFTWARE DISCOUNT COUPON with every COMMODORE 64 COMPUTER, DISK DRIVE, PRINTER, or MONITOR we sell! This coupon allows you to SAVE OVER \$300 OFF SALE PRICES!!

(Examples)

PROFESSIONAL SOFTWARE COMMODORE 64

Name	List	Sale	Coupon
Paperback Writer 64	\$99.00	\$39.95	\$29.95
Paperback Data Base	\$69.00	\$34.95	\$24.95
Paperback Dictionary	\$24.95	\$14.95	\$10.00
Practical II	\$69.95	\$49.95	\$44.95
Print Shop (Disk)	\$44.95	\$32.95	\$26.95
Practical	\$59.95	\$24.95	\$19.95
Programmers Reference Guide	\$20.95	\$16.95	\$12.50
Programmers Helper (Disk)	\$59.95	\$29.95	\$19.95
80 Column Screen (Disk)	\$59.95	\$29.95	\$19.95
Disk Filer (by Flip-N-File)	\$39.95	\$14.95	\$12.95
Deluxe Tape Cassette	\$89.00	\$44.95	\$34.95
Pro Joy Stick	\$19.95	\$12.95	\$10.00
Light Pen	\$39.95	\$14.95	\$ 9.95
Dust Cover	\$ 8.95	\$ 6.95	\$ 4.60
Simon's Basic	\$29.95	\$22.95	\$19.95
Pitstop II Epyx	\$39.95	\$22.95	\$19.95
Super Graphics Expander	\$29.95	\$22.95	\$19.95
Music Calc I	\$59.95	\$29.95	\$12.95
Filewriter	\$59.95	\$29.95	\$24.95

(See over 100 coupon items in our catalog)

Write or call for Sample SPECIAL SOFTWARE COUPON!

COMMODORE 64 COMPUTER \$139.95

You pay only \$139.95 when you order the powerful 84K COMMODORE 64 COMPUTER! LESS the value of the SPECIAL SOFTWARE DISCOUNT COUPON we pack with your computer that allows you to SAVE OVER \$500 off software sale prices!! With only \$100 of savings applied, your net computer cost is \$39.95!!

170K DISK DRIVE \$149.95

You pay only \$149.95 when you order the 170K Disk Drive! LESS the value of the SPECIAL SOFTWARE DISCOUNT COUPON we pack with your disk drive that allows you to SAVE OVER \$500 off software sale prices!! With only \$100 of savings applied, your net disk drive cost is \$49.95.

13" HI-RES COLOR MONITOR \$169.95

You pay only \$169.95 when you order this 13" COLOR MONITOR with sharper and clearer resolution than any other color monitors we have tested! LESS value of the SPECIAL SOFTWARE DISCOUNT COUPON we pack with your monitor that allows you to save over \$500 off software sale prices!! With only \$100 of savings applied, your net color monitor cost is only \$69.95. (16 Colors).

80 COLUMN 80 CPS

TRACTION/FRICTION PRINTER \$159.95

You pay only \$159.95 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. Impact dot matrix, bidirectional. LESS the value of the SPECIAL SOFTWARE DISCOUNT COUPON we pack with your printer that allows you to SAVE OVER \$500 off software sale prices!! With only \$100 of savings applied your net printer cost is only \$59.95.

80 COLUMN BOARD \$59.95

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!! PLUS 4 slot expander!

80 COLUMNS IN COLOR

PAPERBACK WRITER 64 WORD PROCESSOR \$39.95

This PAPERBACK WRITER 64 WORD PROCESSOR is the finest available for the COMMODORE 64 computer! The ULTIMATE FOR PROFESSIONAL Word Processing. DISPLAYS 40 or 80 COLUMNS IN COLOR or black and white! Simple to operate, powerful text editing, complete cursor and insert delete key controls line and paragraph insertion, automatic deletion, centering, margin settings and output to all printers! List \$99.00. SALE \$39.95. Coupon \$29.95.

ATTENTION Computer Clubs

We Offer Big Volume Discounts

CALL TODAY!

PROTECTO WARRANTY

All Protecto's products carry a minimum 90 day warranty. If anything fails within 90 days from the date of purchase, simply send your product to us via United Parcel Service prepaid. We will IMMEDIATELY send you a replacement at no charge via United Parcel Service prepaid. This warranty proves once again that **We Love Our Customers.**

C128 COMMODORE COMPUTER \$289.95

We expect a limited supply the 1st week in July. We will ship on a first order basis. This all-new revolutionary 128K computer uses all Commodore 64 software and accessories plus all CPM programs formatted for the disk drive. List \$349.00. SALE \$289.95.

340K 1571 COMMODORE DISK DRIVE \$259.00

Double Sided, Single Disk Drive for C-128 allows you to use C-128 mode plus CPM mode. 17 times faster than 1541, plus runs all 1541 formats. List \$349.00. Sale \$259.00.

SUPER AUTO DIAL MODEM \$39.95

Easy to use. Just plug into your Commodore 64 computer and you're ready to transmit and receive messages. Easier to use than dialing your telephone, just push one key on your computer! Includes exclusive easy to use program for up and down loading to printer and disk drives. **Best In U.S.A.** List \$129.00. SALE \$39.95.

VOICE SYNTHESIZER \$39.95

For Commodore-64 computers. Just plug it in and you can program words and sentences, adjust volume and pitch, make talking adventure games, sound action games and customized talkies!! FOR ONLY \$19.95 you can add TEXT TO SPEECH, just type a word and hear your computer talk — ADD SOUND TO "ZORK", SCOTT ADAMS AND OTHER ADVENTURE GAMES!! (Disk or tape.) List \$89.00. SALE \$39.95

12" GREEN OR AMBER MONITOR \$69.95

Your choice of green or amber screen monitor, top quality, 80 columns x 24 lines, easy to read, anti-glare! PLUS \$9.95 for connecting cable. Com-64 or VIC-20. List \$159.00. SALE \$69.95.

PRINTER/TYPEWRITER COMBINATION \$249.95

"JUKI" Superb letter quality, daisy wheel printer/typewriter combination. Two machines in one — just a flick of the switch. 12" extra large carriage, typewriter keyboard, automatic margin control and relocate key, drop in cassette ribbon! (90 day warranty) centronics parallel or RS232 serial port built in (Specify). List \$349.00. SALE \$249.95. (Ltd. Qty.)

13" RGB & COMPOSITE MONITOR \$279.00

Must be used to get 80 columns in color with 80 column computers (C128 & Atari ST). (Add \$14.50 shipping) List \$399.00. SALE \$279.00.

- LOWEST PRICES • 15 DAY FREE TRIAL
- BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL

PHONE ORDERS

8 a.m. - 8 p.m. Weekdays
9 a.m. - 12 noon Saturdays

- 90 DAY FREE REPLACEMENT WARRANTY
- 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, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. 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!

VISA — MASTER CARD — C.O.D.

No C.O.D. to Canada, APO-FPO.

PROTECTO

We Love Our Customers

22292 N. Pepper Rd., Barrington, Illinois 60010

312/382-5244 to order

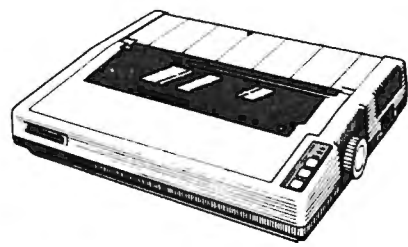
GIANT PRINTER SALE!!

List \$399.00
10" Printer
SALE \$179⁰⁰

1 Year Warranty
120-140 CPS
Premium Quality

List \$599.00
15½" Printer
SALE \$249⁰⁰

10" Comstar 10X — This Bi-directional Tractor/Friction Printer prints standard sheet 8½"x11" paper and continuous forms or labels. High resolution bit image graphics, underlining, horizontal tab setting, true lower descenders, with super scripts and subscripts, prints standard pica, compressed, expanded, block graphics, etc. Fantastic value. (Centronics parallel interface.)
 List \$399.00. Sale \$179.00.



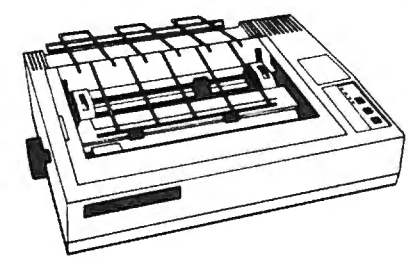
15½" Comstar 15X — Has all the features of the 10" Comstar 10X plus a wider 15½" carriage and more powerful electronics to handle large ledger business forms! (Better than FX-100). The 15½" Comstar 15X also prints on standard size paper and continuous forms and labels. Fantastic value. (Centronics parallel interface.)
 List \$599.00. Sale \$249.00.

List \$499.00
10" Printer
SALE \$229⁰⁰

1 Year Warranty
150-170 CPS
High Speed

List \$699.00
15½" Printer
SALE \$299⁰⁰

10" Comstar 160+ High Speed — This Bi-directional Tractor/Friction Printer combines the above features of the 10" Comstar 10X with speed (150-170 cps) and durability. Plus you get a 2K buffer, 96 user definable characters, super density bit image graphics, and square print pins for clearer, more legible print (near letter quality). This is the best value for a rugged dependable printer. (Centronics parallel interface.)
 List \$499.00. Sale \$229.00.



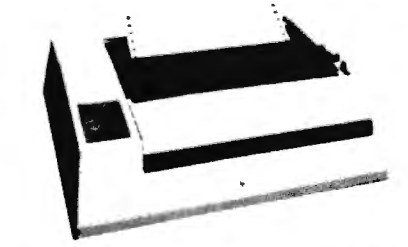
15½" Comstar 160+ High Speed — This Bi-directional Tractor/Friction Printer has all the features of the 10" Comstar 160+ High Speed plus a wider 15½" carriage and the heavy duty electronics required for today's business loads. You can use large ledger business forms as well as standard sheets and continuous forms and labels. This is the best wide carriage printer in the U.S.A. (Centronics parallel interface.)
 List \$699.00. Sale \$299.00.

List \$599.00
10" Printer
SALE \$259⁰⁰

Lifetime warranty*
165-185 CPS
High Speed & Letter Quality

List \$599.00
10" Printer
SALE \$259⁰⁰

10" Comstar 2000 — The ultimate printer has arrived! This Bi-directional Tractor/Friction Printer gives you all the features of the Comstar 160 plus higher speed (165-185 cps), 256 downloadable characters, proportional setting, external dark printing mode and a *lifetime printhead warranty. PLUS ...



With the flip of a switch you can go into the letter quality mode which makes all your printing look like it came off a typewriter. Turn in term papers, do articles or just print programs. Have the best of letter quality and speed in one package. Fantastic printer (Centronics parallel interface.)
 List \$599.00. Sale \$259.00.

• 15 Day Free Trial — 1 Year Immediate Replacement Warranty
Parallel Interfaces

Commodore-64, VIC 20 — \$39.00

Atari — \$59.00

Apple II, II+, IIe — \$59.00

Add \$10.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add \$20.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. 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!
 VISA — MASTER CARD — C.O.D.
 No C.O.D. to Canada, APO-FPO.

PROTECTO

We Love Our Customers
 22292 N. Pepper Rd., Barrington, Illinois 60010
312/382-5244 to order

COLOR MONITOR

Sale

SALE!!!

16
COLORS

(Premium Quality)

- Built in Speaker and Audio
- Front Panel Controls
- For Video Recorders
- For Small Business Computers
- Apple - Commodore - Atari - Franklin - etc.



(Premium Quality)

- Beautiful Color Contrast
- High Resolution
- Separated Video
- Sharp Clear Text
- Anti-Glare Screen
- 40 Columns x 24 Lines
- Supports 80 Columns

List \$329⁰⁰

13" Color Computer Monitor

Sale \$169⁹⁵*

*Connecting cable \$9.95

Add \$14.50 shipping, handling and insurance. Illinois residents please add 6% tax. We do not ship to foreign countries (including Canada), Alaska, Puerto Rico, APO-FPO. Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail!

13" RGB & COMPOSITE MONITOR List \$399.00

Must be used to get 80 columns in color with 80 column computers (C128 & Atari ST). (add \$14.50 shipping)

Sale \$279⁰⁰*

14" COMMODORE 1702 COLOR MONITOR List \$299.00

(add \$14.50 shipping)

Sale \$179⁰⁰*

15 Day Free Trial - 90 Day Immediate Replacement Warranty

12" XTRON SUPER HI-RESOLUTION MONITOR

80 Columns x 24 Lines, Super Hi-Resolution 1000 lines Green or Amber Super-Clear "Easy to Read" text with special anti-glare screen! (Ltd. Qty.) List \$249.00

Sale \$109⁹⁵*

12" ZENITH HI-RESOLUTION GREEN OR AMBER TEXT DISPLAY MONITOR

80 Columns x 24 Lines, Hi-Resolution, crisp clear easy to read text with anti-glare screen! A MUST for word processing. (Ltd. Qty.) List \$199.00

Sale \$89⁹⁵*

12" MONITOR GREEN OR AMBER TEXT List \$159.00

80 Columns x 24 Lines, easy to read up front controls (Ltd. Qty.)

Sale \$69⁹⁵*

* Connecting cable \$9.95

• **LOWEST PRICES** • **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, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. 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!
VISA — MASTER CARD — C.O.D.
No C.O.D. to Canada, APO-FPO.

PROTECTO

We Love Our Customers

22292 N. Pepper Rd., Barrington, Illinois 60010

312/382-5244 to order



88K *Lowest Price In The USA!* 152K

Computer System Sale

• Students • Word Processing • Home • Business

88K System \$449
152K System \$499*

EDUCATE WITH ATARI



¹ **Rated "Best Buy" by Consumers Digest Buyers Guide, January 1985**

LOOK AT ALL YOU GET FOR ONLY	\$449	INDIVIDUAL	SAVE \$100
	SYSTEM PRICE	LIST PRICE	ALL 5 ONLY
Atari 800XL 88K Computer		\$179.00	\$449⁰⁰
Atari 1050 127K Disk Drive		299.00	
Atari 1027 Letter Quality 20 CPS Printer		299.00	
Atari Writer Word Processor		59.95	
Atari BASIC Tutorial Manual		16.95	
			SYSTEM SALE PRICE
			152K SYSTEM \$499 ⁰⁰
	TOTALS	\$852.90	\$559.90

All connecting cables & T.V. interface included. Monitors sold separately.

Other Accessories	List	Sale	Add \$9.95 for Connection Cables (Monitors Only) (Ltd. Qty) Add \$10 for UPS
12" Hi Resolution Green or Amber Screen Monitor	\$199.00	69.95	
13" Hi Resolution Color Monitor	\$399.00	169.95	
* ATARI 130XE 152K Computer	\$249.00	159.00	

15 DAY FREE TRIAL. We give you 15 days to try out this ATARI COMPUTER SYSTEM!! If it doesn't meet your expectations, just send it back to us prepaid and we will refund your purchase price!! **90 DAY IMMEDIATE REPLACEMENT WARRANTY.** If any of the ATARI COMPUTER SYSTEM equipment or programs fail due to faulty workmanship or material within 90 days of purchase we will replace it IMMEDIATELY with no service charge!!

Best Prices • Over 1000 Programs and 500 Accessories Available • Best Service
• One Day Express Mail • Programming Knowledge • Technical Support

Add \$25.00 for shipping and handling!!
 Enclose Cashiers Check Money Order or Personal Check. Allow 14 days for delivery. 2 to 7 days for phone orders. 1 day express mail!
 We accept Visa and MasterCard. We ship C.O.D. to continental U.S. addresses only. Add \$10 more if C.O.D.

COMPUTER DIRECT
We Love Our Customers
 22292 N. Pepper Rd., Barrington, Ill. 60010
312/382-5050 to order

The Writer's Tool For Atari

Robert L. Riggs

Requirements: Atari 400/800, XL, or XE computer with at least 48K RAM, a disk drive, and a printer.

Those of us who can't afford the super-expensive computers—and still need to do extensive computing—try to get multiple duty from our inexpensive machines. Games are nice. But we also want programming languages, spreadsheets, database managers, and quality

word processors. As a high school teacher, I use my Atari 800XL for all kinds of time- and labor-saving jobs. Still, word processing is my primary concern and, until now, I've not found a program that was sophisticated enough for all my needs.

But *The Writer's Tool* is an extrapolation of all the other Atari word processors I've tried. Anything they can do, *The Writer's Tool* does better. Even the documentation is superior. The

166-page manual is clear and concise, and it includes an 89-page tutorial especially designed for those who are completely new to word processing, plus a 56-page reference section.

If you've tried other word processors for Atari computers, you'll find the transition to *The Writer's Tool* quite painless—and exciting. A quick once-over to note the new capabilities gets you started. Just pull out the quick reference card from the front of the manual and start typing. Then, after getting comfortable with *The Writer's Tool*, read the entire manual and try out each new feature. The tutorial section leads you, step by step, through each function. The reference section provides detail. Optimized Systems Software makes this word processor very easy to learn and use.

This doesn't mean that *The Writer's Tool* is a simplistic, third grade level word processor—not by a long shot. It starts right out with a customizer program that lets you personalize *The Writer's Tool* to suit your own purposes and tastes. You can preset the printing format, screen display, and sound options so your preferences load automatically each time you boot the program. It's great to be able to change the luminance of the characters and background colors for clearer visibility. Or you can vary the blinking speed of the cursor—which, by the way, can be either a block or an underline. You can even adjust the screen width to display more or fewer characters per line.

Printing Versatility

By presetting the printer format, you can select new default values for page length, line spacing, beginning footer line, font, single sheet option, line length, left margin, justification, and all tab stops. The selectable fonts are interesting, too. I have two Centronics printers, a 737 (equivalent to the Atari 825) and a 739 (a 737 with graphics). According to their manuals, each has only three fonts plus elongated versions. But *The Writer's Tool* can print four fonts. Somehow it comes up with a second proportionally spaced font that Centronics doesn't even document!

The Writer's Tool, of course, supports all the major printers: Atari, the Epsoms, Gemini 10X, Prowriter/NEC 8023, Okidata 82A and 92, Comriter CR-II, Mannesman Tally Spirit 80, and so on. There's also a generic printer option, or you can insert printer control codes directly into the text. Printer problems should be practically nonexistent with *The Writer's Tool*.

Among the special printing features is something called the automatic header block. SHIFT-CTRL-H puts a

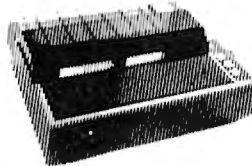
Here are 87 reasons to buy at Elek-Tek, not to mention the fastest delivery anywhere.

MEGA BERNOULLI BOX

- 5 meg Drive for Macintosh \$ 1375
- Cartridges for above 43
- 10 meg Drive for IBM PC/XT, AT & compatibles 1790
- 20 meg Drive for IBM PC/XT, AT & compatibles 2490
- 10 meg Drive w/ Auto Boot for IBM PC/XT & compatibles ... 1890
- 20 meg Drive w/ Auto Boot for IBM PC XT & compatibles ... 2590
- 10 meg cartridges for above (3 pak special) 125

Save 30% to 43% off Manufacturer Suggested Ret. prices on
EPSON • Okidata • Star • DIABLO
• TOSHIBA • COMPEX •

EPSON®	
8. LX 80	\$ 230
9. RX 100+	350
10. FX 85	350
11. FX 185	490
12. LO 1500 parallel	CALL
13. DX10 Daisy Wheel 10CPS	230
14. DX20 Daisy Wheel 20CPS	CALL
15. Comrex II Comriter	269
STAR	
16. SG 10	235
17. SD 10/15	CALL
18. SR 10/15	CALL
OKI	
19. Ok 182	CALL
20. Ok 192/193	CALL
21. Ok 84	CALL



EPSON FX 85

OTHER PRINTERS

22. Olympia Compact 2	\$ 350
23. Olympia Compact RO	CALL
24. Toshiba P351	1080
25. Tosh ba P1340	560

PRODUCTS FOR IBM-PC

26. Amdek 310A Amber Monitor	\$ 150	33. Generic Multi Multifunction Board 64K	150	40. Hayes 1200B Internal modem w/software	379
Other Amdek Monitors	CALL	34. Orchid Tech. PC Turbo 186	CALL	41. AT&T 4000 300/1200 Ext 1 Modem	335
27. Zenith Monitors	CALL	35. Paradise Modular Graphics Card	275	42. Hayes 1200 External modem	399
28. AST Six Pak + Multifunction Board 64K	229	36. Hercules Monochrome Card	329	43. Hayes 2400 External modem	599
29. AST Six Pak + (loaded) Multifunction Board 384K	289	37. Hercules Color Color Graph c Card	170	44. US Robotics Courier 2400 Ext 2400B Smart Modem	460
30. AST Megapius II Multifunction Board 64K	270	38. Novation 4905911 Modem w/software	CALL	45. US Robotics Telpac Telecomm Software	74
31. Quadram Quadboard Multifunction Board OK	195	39. Novation 4905921 Internal Modem w/software	CALL	46. TEAC FD55B 1/2 HI DSDD Disk Drive	95
32. Quadram Quadboard Multi Board 64K/384K	210/267			47. Presh Keyboard 13 prog keys heavy duty	175

DISKETTES

	Dyan	maxell	3M	SONY	wabash	MEMOREX
3 1/2" SSDD	28.00	25.00	25.00	25.00	—	—
DSDD	—	37.00	37.00	37.00	—	—
5 1/4" SSDD	17.00	14.00	14.50	13.00	11.50	11.50
DSDD	21.00	18.00	18.00	16.00	12.50	14.00
SSDD96TPI	28.00	24.00	24.00	—	—	—
DSDD96TPI	37.00	29.00	29.00	—	—	—
5 1/4" DSDDHD (For IBM AT)	45.00	39.00	40.00	—	—	—
8" SSDD**	25.00	29.00	25.00	—	—	—
8" DSDD**	29.00	32.00	29.00	—	—	—

Call for Quantity pricing for 10 boxes or more.

3M DATA CARTRIDGES

82. DC100A	\$ 14.00	84. DC300XL	\$ 21.00	86. DC600A	\$ 23.50
83. DC300A	18.00	85. DC300XLP	22.00	87. DC1000	15.00

Call for Quantity pricing for 10 cartridges or more.

CALL TOLL FREE 800-621-1269 EXCEPT Illinois, Alaska

Corp. Accts. Invited Min. Ord. \$15.00 Visa or MasterCard by Mail or Phone. Mail Cashier's Check, Mon. Ord. Personal Check (2 wks. to clear) Add \$4.00 Int. Item. (AK, HI, PR, Canada add \$10.00 Int. Item) \$1.00 ea. add'l ship. & hand. Shipments to IL address add 7% tax. Prices subject to change. WRITE FOR FREE CATALOG. RETURN POLICY: Defective Only. Most products replaced within 30 days of purchase with identical merchandise only. Computer and large peripherals replaced only when defective on arrival (within 3 work days of delivery). Other problems covered by mfr. warranty. ALL ELEK-TEK MERCHANDISE IS BRAND NEW, FIRST QUALITY AND COMPLETE. Delivery subject to availability. DATES 808-716-0617

ELEK-TEK, inc.

6557 N. Lincoln Ave., Chicago, IL 60645
(312) 631 7800 (312) 677 7660

block of easily modifiable printer commands on the screen for creating standard page formats. The block has a reverse slash that enables what OSS calls split justification. Everything to the left of the diagonal is justified to the left margin, while everything to the right is printed at the right margin. Now, printing tables of contents is a breeze.

In fact, *The Writer's Tool* offers four kinds of justification: (1) justification off, but word-wrap retained; (2) right justification; (3) word-wrap off; and (4) microspaced justification (for printers that offer this feature). You can insert "soft hyphens" in long words, but hyphenation occurs only if the word can be split between two print lines. Or you can insert "hard spaces" to prevent phrases like "Figure 5" from being split between lines.

Another special printing feature is a graphics driver that, with certain printers, lets you include pictures and graphs in your documents. The images can be created with a Koalapad, Atari Touch Tablet, Atari light pen, or virtually any other drawing program that uses graphics mode 7.5 or 8.

Like Atari's popular *AtariWriter* word processor, *The Writer's Tool* has a print-preview feature. But unlike *AtariWriter*, it lets you edit the previewed text as well. There's also a Print System screen that tells you, among other things, the number of words in the document. You can use the Disk I/O System screen to determine the number of characters in the document, the location of the cursor, the amount of available memory, and how much memory remains.

Typeover And Insert Modes

For entering text, *The Writer's Tool* offers both typeover and insert modes. Other word processors sometimes offer only one or the other (for example, *AtariWriter* is locked in insert mode). Even in typeover mode, you can insert characters or lines with *The Writer's Tool* by pressing CTRL-INSERT or SHIFT-INSERT. Pressing CTRL-I toggles the insert mode, denoted by a flashing vertical bar. If you don't like to watch the text ahead of the cursor repositioning itself as you insert, you can press SHIFT-CTRL-INSERT to open up a large block of empty space. After inserting your text, you can remove the unused space by pressing CTRL-J.

If you prefer one-handed cursor movement, CTRL-CAPS turns on a mode that lets you manipulate the cursor keys without simultaneously pressing CTRL. A reminder at the bottom of the screen indicates when this mode is switched on, along with the CAPS LOCK and inverse video modes.

A big kudo is deserved for the Merge command. Pressing M from the Print System menu activates the Merge System. This is a subprogram which handles the creation of database files and the merged printing of these files with template documents. That means that you can use the built-in database (or another, like *SynFile*) to automatically insert names and addresses, for example, into form letters. Don't worry. The tutorial section takes you through it step by step.

The Writer's Tool lets you move swiftly through your documents. You can quickly scroll forward or backward with CTRL-F (forward) or CTRL-R (reverse), though the text scrolls only 20 lines, so you have to glance up or down three lines to find where you left off. But it's fast—unlike *AtariWriter*.

A Few Criticisms

There are a few things about *The Writer's Tool* that could stand improvement. CTRL-W moves the cursor by word, which is nice, but if you move to the

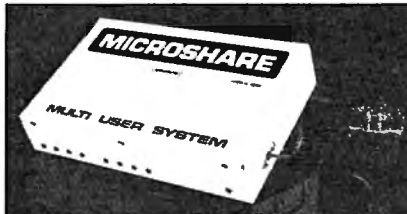
end of the document with CTRL-W, the cursor ends up on the last letter of the last word—so if you start typing immediately, you make a typo.

Another drawback is that *The Writer's Tool* uses OSS's DOS XL instead of Atari DOS. DOS XL supports single and double density but not the Atari 1050's one-and-a-half density. This isn't a severe handicap—since the disk isn't copy-protected, you can transfer the program to another disk that contains any DOS you like, including the latest DOS 2.5.

The provisions for tabs could be improved. A special feature of the old *Atari Word Processor* that came in handy was decimal and right-justified tabs. *The Writer's Tool* offers neither.

Still, I can live with a few relatively minor shortfalls. *The Writer's Tool* remains a superbly designed and executed word processor for serious use on Atari computers. OSS recently cut the price by \$30 and now includes a 20,000-word spelling checker as well. And, for

MICROSHARE



PET/CBM MULTI USER DISK SYSTEM

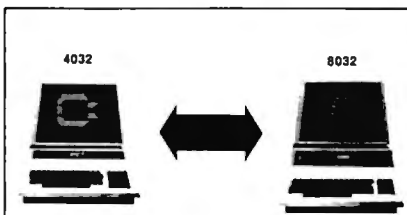
- ALLOWS UP TO SIXTEEN USERS TO SHARE DISK DRIVES AND/OR PRINTERS
- WORKS WITH ALL PET/CBM EQUIPMENT
- 100% HARDWARE INTERFACED
- NO ALTERATIONS TO SOFTWARE OR SPECIAL SOFTWARE REQUIRED
- SOFTWARE TRANSPARENT — WORKS WITH ALL PET/CBM SOFTWARE
- LANGUAGE TRANSPARENT — WORKS IN ANY LANGUAGE
- NO SPECIAL COMMANDS USED
- PROTECTS AGAINST SYSTEM LOCKUP



COMMODORE 64 MULTI USER DISK SYSTEM

- ALLOWS UP TO EIGHT USERS TO SHARE DISK DRIVES AND/OR PRINTERS
- WORKS WITH ALL 64/VIC EQUIPMENT
- BUILT IN IEEE AND 64/VIC SERIAL PORTS (WORKS WITH ALL IEEE DEVICES)
- 100% HARDWARE INTERFACED
- NO ALTERATIONS TO SOFTWARE OR SPECIAL SOFTWARE REQUIRED — SOFTWARE TRANSPARENT
- NO SPECIAL COMMANDS USED
- BUILT IN 16K PRINT BUFFER
- DISK DRIVE PRIORITY

GREATER PRODUCTIVITY & LOWER COST FOR BUSINESS AND EDUCATIONAL USE



40 TO 80 COLUMN CONVERSION

- EXTERNALLY SWITCHABLE FROM 40 TO 80 COLUMNS
- EXTERNALLY SWITCHABLE FROM 80 TO 40 COLUMNS
- CONVERSIONS FOR BOTH 4032's AND 8032's
- 100% SOFTWARE COMPATIBILITY IN EITHER MODE
- HARDWARE (NOT SOFTWARE) MODIFICATION
- ALL KEYS FROM 8032 EMULATED ON 4032
- SPECIAL FUNCTION KEYS



MICROSHARE 64K PRINT BUFFER

- LOW COST
- REDUCES LONG WAITS — SAVES TIME
- ALLOWS YOU TO PRINT AND PROCESS SIMULTANEOUSLY
- IEEE INPUT — IEEE OR CENTRONICS PARALLEL OUTPUT
- WORKS WITH ALL PET/CBM SOFTWARE
- NO INSTALLATION REQUIRED
- ELIMINATES THE FRUSTRATION OF WAITING FOR YOUR PRINTER

COMMODORE 64 PET AND CBM ARE ALL TRADEMARKS OF COMMODORE BUSINESS MACHINES, INC.

DEALER INQUIRIES INVITED.

MANUFACTURED BY:
COMSPEC COMMUNICATIONS INC.
153 BRIDGELAND AVE., UNIT 5,
TORONTO, ONTARIO M6A 2Y6
(416) 787-0617

once, "user-friendly" doesn't mean "reduced to second grade simplicity." If you've been waiting for a word processor that makes serious writing a pleasure, or if you intend to use your Atari for more than occasional writing, wait no longer. *The Writer's Tool* can take care of your word processing needs for

a long time to come.

The Writer's Tool
Optimized Systems Software
1221-B Kentwood Avenue
San Jose, CA 95129
\$69

Karateka

James V. Trunzo

Requirements: Apple II-series computer with at least 48K RAM and a disk drive; or a Commodore 64/128 with a disk drive. Joystick optional.

This superb action game is a nominee for the Most Underrated Program of the Year. It's a program that must be seen to be fully appreciated.

The theme of the game is simple. You, the hero, have been away from your village, studying karate under a master. Upon returning home, you find that the Japanese warlord Akuma has burned your village to the ground and kidnapped your betrothed, the lovely Mariko. Akuma has imprisoned Mariko in his mountain fortress, where she is guarded by Akuma's fierce warriors—the least of whom is a first-degree black belt. You must fight your way into Akuma's stronghold and defeat opponent after opponent until, at last, you come face to face with the powerful Akuma himself.

The Apple version of *Karateka* has by far the best animation I've seen in an Apple arcade game. The smoothness of the animation, complete with scrolling background and beautiful, full-colored details, makes the game almost as enjoyable to watch as it is to play.

Using either the keyboard or a joystick, you maneuver your persona about the screen, kicking and punching as if he were Bruce Lee. Each opponent that Akuma sends against you has a unique style. Some are better with their feet, others are better with their hands, some are balanced fighters. As the opponents become tougher (corresponding to your success), they are better able to coordinate several kicks and punches in a row. Victory comes only after you learn the best way to fight the various warriors, each easily identified by his headgear.

Warriors aren't the only obstacle between you and your beloved Mariko, however. Akuma's pet eagle attacks

from time to time, and the fortress conceals deadly traps. Furthermore, even if you vanquish an opponent, you sustain injuries that accumulate as the game progresses. Of course, your opponents are always fresh!

Karateka has more to offer, too. There are delightful animated sequences showing, among other things, Mariko despairing in her call for help and Akuma sending forth his warriors. There are the sound effects that accompany a victory. There are...well, to tell you more would ruin the surprise.

Is *Karateka* the perfect game? No. When you're defeated, you must start the game from the very beginning. You don't have multiple "lives," each one picking up where the previous one left off. Considering the effort it takes to progress through Akuma's stronghold, this can get a bit frustrating. Also, there are times when you try to throw a kick but your character just stands there. It's not a bug in the program, but I'm not sure if it's poor joystick response, confused commands from trying to throw two punches and two kicks at once, or what. Still, these problems are relatively minor compared to the action and enjoyment that *Karateka* brings to the screen.

Karateka
Brøderbund Software
17 Paul Drive
San Rafael, CA 94903
\$34.95

Copies of articles from this publication are now available from the UMI Article Clearinghouse.

For more information
about the Clearinghouse,
please fill out and mail back
the coupon below.

UMI Article Clearinghouse

Yes! I would like to know more about UMI Article Clearinghouse. I am interested in electronic ordering through the following system(s):

- DIALOG/Dialorder ITT Dialcom
 OnTyme OCLC ILL
Subsystem

- Other (please specify) _____
 I am interested in sending my order by mail.
 Please send me your current catalog and user instructions for the system(s) I checked above.

Name _____

Title _____

Institution/Company _____

Department _____

Address _____

City _____ State _____ Zip _____

Phone (_____) _____

Mail to: University Microfilms International
300 North Zeeb Road, Box 91 Ann Arbor, MI 48106

GET THE KNOW-HOW TO REPAIR EVERY COMPUTER ON THIS PAGE.

Learn the Basics the NRI Way—and Earn Good Money Troubleshooting Any Brand of Computer

The biggest growth in jobs between now and 1995, according to Department of Labor estimates, will occur in the computer service and repair business, where demand for trained technicians will actually *double*.

You can cash in on this opportunity—either as a fulltime corporate technician or an independent service-person—once you've learned all the basics of computers the NRI way. NRI's practical combination of "reason-why" theory and "hands-on" building skills starts you with the fundamentals of electronics, then guides you through advanced electronic circuitry and on into computer electronics. You also learn to program in BASIC and machine language, the essential languages for troubleshooting and repair.

You Build—and Keep—a 16-bit Sanyo personal computer

The vital core of your training is the step-by-step building of the 16-bit Sanyo MBC-550 series computer. Once you've mastered the details of this state-of-the-art machine, you'll be qualified to service and repair virtually every major brand of computer, plus many popular peripheral and accessory devices.

With NRI training, you learn at your own convenience, in your own home. You set the pace—without classroom pressures, rigid night-school schedules, or wasted time. You build the Sanyo IBM compatible computer from the keyboard up, with your own personal NRI instructor and the complete NRI technical staff ready to answer your questions or give you guidance and special help whenever you need it.

Praised by critics as the "most intriguing" of all the IBM-PC compatible computers, the new Sanyo uses the same 8088 microprocessor as the IBM-PC and



IBM is a Registered Trademark of International Business Machine Corporation.
Epson is a Registered Trademark of Epson America, Inc.
Apple and the Apple logo are Registered Trademarks of Apple Computer, Inc.
Compaq is a Registered Trademark of COMPAQ Computer Corporation.
© 1984 AT&T Technologies, Inc.

the 8088 microprocessor functions, using machine language. You'll also prepare the interfaces for future peripherals such as printers and joysticks.

100-Page Free Catalog Tells More

Send the coupon today for NRI's big 100-page color catalog on NRI's electronics training, which gives you all the facts about NRI courses in Micro-computers, Robotics, Data Communications, TV/Video/Audio Servicing, and other growing high-tech career fields. If the coupon is missing, write to NRI Schools, 3939 Wisconsin Avenue, NW, Washington, DC 20016.

AND MORE.

features the MS/DOS operating system. As a result, you'll have a choice of thousands of off-the-shelf software programs to run on your completed Sanyo.

Your NRI course includes installation and troubleshooting of the "intelligent" keyboard, power supply, and disk drive, plus you'll check out

Your NRI course includes the Sanyo 16-bit IBM compatible computer with 128K RAM, monitor, double density/double sided disk drive, and "intelligent" keyboard; the NRI Discovery Lab[®], teaching circuit design and operations; a Digital Multimeter; Bundled Spread Sheet and Word Processing Software worth over \$1000 at retail—and more.



NRI SCHOOLS
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue, Washington, DC 20016



We'll give you tomorrow.

CHECK ONE FREE CATALOG ONLY

- Computer Electronics with Microcomputers
- Data Communications
- Robotics & Industrial Controls
- Video Electronics Servicing
- Electronic Design Technology
- Digital Electronics

- Satellite Communications
- Communications Electronics
- Industrial Electronics
- Basic Electronics
- Telephone Servicing
- Small Engine Servicing
- Appliance Servicing

- Automotive Servicing
- Air Conditioning, Heating, Refrigeration, & Solar Technology
- Building Construction
- Locksmithing & Electronic Security

For Career courses approved under GI bill.

check for details.

Name (Please Print) _____

Age _____

Street _____

City/State/Zip _____

Accredited by the National Home Study Council

198-105

1 Dir For IBM PC/PCjr

Arthur Leyenberger

Requirements: IBM PC/PCjr or compatible with at least 128K RAM (192K recommended), at least one disk drive, and DOS 2.0 or higher.

Whether you are a casual user or a "power user," getting the most from your IBM PC or compatible requires a thorough understanding of how to use MS-DOS. But the difference between merely understanding how to use MS-DOS and really using it effectively may be like the difference between walking around the block and competing in a marathon. With *1 Dir* from Bourbaki, Inc., you can easily run circles around MS-DOS.

1 Dir (pronounced "wonder") stands for *one directory*. Its purpose is to simplify the use of MS-DOS for anyone, regardless of their level of expertise. It is called a shell for DOS because it sits between you and the operating system, simplifying command execution.

1 Dir eliminates the DOS A> prompt and the need to type filenames and commands on the command line. Instead, it presents a menu screen from which all operations take place (see photo). At the top left of the screen is an indicator showing which directory is being displayed; the indicator is blank for your root directory.

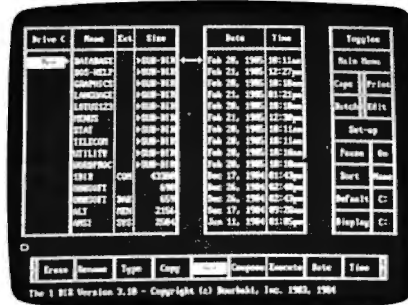
The rest of the screen is divided into seven columns grouped into three blocks. The first column displays the currently selected disk drive and a "file cursor"—a reverse video cursor used to select files from a directory. The next three columns list your filenames, extension names, and file sizes. The following two columns, grouped into another block, display the date and time that your files were last accessed. (If you like, *1 Dir* can also display system and disk statistics in this area rather than file information.) The last column, separated from the others in its own block, contains the toggle and setup information.

Sorted Directories

Toggles such as Caps, Print, Batch, and Edit are highlighted in reverse video when turned on. You can also switch the Pause option on or off, select which drive directory is displayed by default, and choose from four ways to sort file directories (by name, extension, date, and size). Each time you specify a different sort, the filenames instantly rear-

range themselves on the screen.

A horizontal block at the bottom of the screen contains a "command cursor" and nine commands: Erase, Rename, Type, Copy, Run, Compose, Execute, Date, and Time. By moving the command cursor with the left and right arrow keys to the command you want, and then moving the file cursor with the up and down arrow keys to the filename you want, you can execute DOS commands without having to remember the proper syntax. Just above the horizontal command block is a one-line area for typing commands and responding to prompts.



1 Dir makes it easier to use MS-DOS by organizing commands and file directories into menus.

Let's say you want to erase three files on a disk whose filenames are too different to permit use of a wildcard (which is a risky way to delete files, anyhow). Rather than erasing each file separately by typing ERASE A:FILE1.EXT, with *1 Dir* you start by positioning the command cursor on the Erase command and then moving the file cursor to the first filename you want to delete. Press the + key to tag that file. Then move the file cursor to the second and third filenames and tag those files by pressing + each time. Although you've tagged the files, nothing yet has happened. When you press ENTER, the screen displays all three filenames and shows how many bytes will become available by erasing them. If you answer Y to the "Are you sure?" prompt, the files are deleted.

The Copy command works in much the same way. You point to either an individual file to be copied or tag several files. Then tell *1 Dir* where the file(s) should be copied to and press ENTER. If you want to copy an entire

disk, you can tag the whole directory with one keystroke rather than tagging each file separately. You can also run programs simply by pointing to them with the file cursor, positioning the command cursor on Run, and pressing ENTER.

Batch Files, Too

One of the most powerful features of MS-DOS is its ability to execute a group of commands with a batch file. Unfortunately, creating batch files with Edlin (the MS-DOS line editor) can be difficult, especially for novices and casual users.

With *1 Dir*, creating batch files is easy. The Batch Builder feature automatically compiles a batch file as you issue the commands. In the Batch Builder mode, you can use *1 Dir* to change directories, run programs, copy and erase files, or do whatever you want. When you're done, just turn off the mode and *1 Dir* constructs the batch file.

1 Dir also lets you customize the command menu at the bottom of the screen. If you use the Batch Builder first to create your commands, it's easy to make menus corresponding to the batch files. You can put together customized shells in very little time.

I've been running *1 Dir* for several months on a two-drive AT&T 6300 computer and have found it invaluable and easy to use. Although it's very useful on a floppy disk computer, it's even better if your computer has a hard disk. I set it up on a hard disk system accessed mostly by casual users, and there's no question that this particular computer gets more use because of *1 Dir*.

A new version of *1 Dir*, promised to be available by the time you read this, is supposed to be even more powerful. It will have expanded color options, password protection, a rewritten manual, the ability to rename subdirectories, and custom commands that allow abbreviations or descriptions to be displayed rather than actual command syntax.

Whether you're a beginner or an experienced user, *1 Dir* can simplify your introduction to MS-DOS and make your time on the computer more productive.

1 Dir
Bourbaki, Inc.
431 Main Street
Boise, ID 83702
\$95

©

Save With Replace: Debugged At Last

Part 1

P. A. Slaymaker

Since the early days of the Commodore PET in the late 1970s, a controversy has raged over one particular disk command—Save-with-Replace. This convenient command automatically replaces an existing disk file with a new file of the same name, combining SCRATCH and SAVE in one operation. But for years, many Commodore users have shunned Save-with-Replace like poison, swearing that it contains a mysterious bug which unpredictably scrambles disks. And just as many other users contend the bug doesn't exist at all. Now, finally, there's proof: The bug does exist in the 1541 drive, it can be demonstrated, and most importantly, it can be avoided. This two-part article is the first full explanation of why the bug happens and how you can circumvent it. The author is the president of Quantum Software, which produces the Peek a Byte disk utility for the Commodore 64.

It's time to settle something once and for all: There is a Save-with-Replace bug! It afflicts the Disk Operating System (DOS) built into every 1541 disk drive, potentially threatening every disk on which you use the Save-with-Replace command. In this two-part series, we'll review what the Save-with-Replace bug typically does; list a program which demonstrates the bug beyond doubt; explain why it happens; and finally, recommend a procedure for avoiding the bug.

The Save-with-Replace command (typed as SAVE@) has been

accused of scrambling, swapping, duplicating, or overwriting disk files and of messing up Block Allocation Maps (a BAM is a map on a disk which keeps track of which blocks are storing files and which are free). Many computer magazines and other authorities in the Commodore community have warned against using SAVE@. Yet other Commodore experts have never experienced problems with SAVE@ and swear the bug is an old hacker's tale. There are many anecdotes about when the bug strikes, which files are affected, and when the files or BAM will be garbled. The mystery has persisted for so long because usually the bug is not repeatable. But this article shows how to replicate the bug and explains why it is related primarily to the file length and the distribution of free blocks on the disk as determined by the BAM.

Recently some new evidence surfaced about SAVE@. In an article published in the July 1985 issue of *The Transactor*, "SAVE with Replace Exposed!!," author Charles H. Whittern showed that the bug exists under some conditions. This article made some observations on files likely to be affected and listed a program which repeatedly loaded and saved files using SAVE@. Afterward, an examination of the disk showed some files to be scrambled. Unfortunately, no details of the file configurations were given, and the editors admitted the bug had them baffled—but at least the problem was recognized, a first step.

Our investigation shows that the bug usually occurs when the drive number has not been specified on previous drive operations, such as loading a file or listing a directory. In other words, typing LOAD"filename",8 or LOAD"\$",8 instead of LOAD"0:filename",8 or LOAD"0:\$",8 sets up conditions for the bug. The drive number 0 should be specified in disk commands because, as we'll explain later, the SAVE@ bug is related to the phantom software drive 1 in the 1541. In addition, the bug tends to bite disks on which many files have been scratched and rewritten. This leaves gaps on the disk so that a file is scattered over many tracks. These gaps do not normally cause a problem if you specify the drive number in disk commands.

Therefore, the key to avoiding the SAVE@ bug is to always specify drive 0 when performing any disk drive function, or to always reset the drive before any SAVE@ operation. Resetting the drive requires either turning the drive off and then on, or sending a reset command (OPEN15,8,15,"UJ").

Demonstrating The Bug

At this point, some of you might be skeptical that the SAVE@ bug really exists. To prove that it does, the accompanying program formats a new disk with the single file "SAVE@ DEMO" and alters the BAM to simulate a partially used disk with a gap due to scratched files. Follow these instructions carefully:

COMPUTE! Back Issues

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

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

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

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

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

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

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

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

May 1982: VIC Meteor Maze Game, Atari Disk Drive Speed Check, Modifying Apple's Floating Point BASIC, Fast Sort For PET/CBM, Extra Atari Colors Through Artifacts, Life Insurance Estimator (multiple computers), PET Screen Input, Getting The Most Out Of VIC's 5000 Bytes.

August 1982: The New Wave Of Personal Computers, Household Budget Manager (multiple computers), Word Games (multiple computers), Color Computer Home Energy Monitor, A VIC Light Pen For Under \$10, Guess That Animal (multiple computers), PET/CBM

Inner BASIC, VIC Communications, Keyprint Compendium, Animation With Atari, VIC Curiosities, Atari Substring Search, PET and VIC Electric Eraser.

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

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

May 1983: The New Low-Cost Printer/Plotters, Jumping Jack (multiple computers), Deflector (multiple computers), VIC Kaleidoscope, Graphics on the Sinclair/Timex, Bootmaker For VIC, PET and 64, VICSTATION: A "Paperless Office," The Atari Musician, Puzzle Generator (multiple computers), Instant 64 Art, 64 Odds And Ends, Versatile VIC Data Acquisition, POP For Commodore.

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

COMPUTE! Back Issues

VIC Contractor, Commodore Supermon Q & A.

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

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

September 1983: Games That Teach, Caves Of Ice, Diamond Drop, Mystery Spell, and Dots (multiple computers), VIC Pilot, Ultrasort (VIC, 64, PET), Easy Atari Page Flipping, Computer Aided Design On The TI, Relative Files On the VIC/64, Atari Fontbyter, TI Sprite Editor, All About Interrupts (multiple computers), Cracking The 64 Kernal, Making Change On The Timex/Sinclair, Build Your Own Random File Manager (multiple computers).

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

February 1984: What Makes A

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

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

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

May 1984: The Digital Palette: Fundamentals Of Computer Graphics, The Inside Story: How Graphics Tablets And Light Pens Work, Picture Perfect For Atari And Commodore 64, 64 Hi-Res Graphics Editor, Snertle (multiple computers), Pentominos: A Puzzle-Solving Program (multiple computers), A BASIC Cross-Reference (PET, 64).

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

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

September 1984: New Trends In Educational Computing, Choosing The Best Educational Software, Missile Math (multiple computers), Lightsaver (multiple computers), Multiple Choice Quiz Generator (multiple computers), Lightning Sort (multiple computers), Commodore Autoboot, Apple Editing Hints, Atari Paddle Fixer, Musical TI Keyboard.

January 1985: VIC/64 TurboTape: tape at disk speeds, Music In The Computer Age, Inside MSX, Paratrooper (multiple computers), Rescue Of Blondell (Commodore/Atari), Guitar Tuner (multiple computers), Which Computer Language Is Best?, Machine Language Multiplication, Part 1, Enhanced Applesoft Input, Atari Terminal Program, IBM Pie Chart Maker.

February 1985: Special Games Issue, The New Atari, Fame Games, Birth Of A Computer Game, Acrobat (multiple computers), Terminal Program For VIC & 64, Programming The TI Without A Math Background, Adding Sound Effects To Atari, Rebound: Machine Language IBM Game, Apple Bowling Champ, 64 Sound Effects.

Back issues are \$6 each. Price includes freight in the US. Outside the US add \$1 per magazine ordered for surface postage, \$4 per magazine for air mail postage. All back issues subject to availability.

In the Continental US call
TOLL FREE 800-334-0868
(919-275-9809 in NC)

Or write to:
COMPUTE! Back Issues
P.O. Box 5058
Greensboro, NC 27403 USA

Prepayment required in US funds.
MasterCard, Visa, and American Express accepted.
NC residents add 4.5% sales tax.

1. The program is for the Commodore 64. For the VIC-20, change these lines:

```
10 POKE 36879,8          :rem 5
100 IF K<>39 THEN 90: REM WAIT
    FOR F1                :rem 154
150 IF K=11 THEN 170: REM CONT
    INUE IF <Y>          :rem 187
```

For the Plus/4 and 16, change these lines:

```
10 COLOR 0,1:COLOR 4,1:rem 133
340 POKE 239,0: REM CLEAR KEYB
    OARD BUFFER           :rem 80
5000 POKE239,0:POKE198,64: REM
    CLEAR KEYBOARD BUFFER
                        :rem 31
5010 K=PEEK(198)        :rem 102
```

Type the program *exactly* as listed—including all uppercase REM statements (the lowercase rem statements are checksums for COMPUTE!'s "Automatic Proofreader"; do not type them in). It's important to type the program as listed because it must be at least nine blocks long on the test disk to insure proper results.

2. Save the program on another disk before running it.
3. Put a blank test disk in the drive and run the program. It will format the disk and save a file called SAVE@ DEMO on the disk. Type LOAD"\$",8 to list the directory and notice that 254 blocks are free.
4. Reset the drive by turning it off, then on. Load the file by typing LOAD"SAVE@ DEMO",8.
5. Save the file three times using the SAVE@ command (SAVE"@0: SAVE@ DEMO",8). Do not list the directory or perform any other operation between SAVE@ commands.
6. List the directory by typing LOAD"\$",8. What's this? There were 254 blocks free before, but now there are 258—a discrepancy of four blocks. (If you don't get this result, it probably means that you haven't followed the directions exactly. Start again at step 3.) If you examine the BAM with a disk utility, you'll see that the first four sectors of the file are marked as free! (Specifically, the file starts on track 17, block 0; blocks 0 through 3 are marked

as unallocated.) If you executed a fourth SAVE@ command, it would overwrite the beginning of the file, and the disk would be corrupted even worse!

7. Now rerun the program to make a new test disk. Reset the drive and run the above test again, but specify the drive number for the load (LOAD"0:SAVE@ DEMO",8). The SAVE@ bug does *not* occur!

Always Specify Drive 0

This demonstration provides a powerful lesson: All DOS commands should include the drive number 0:

```
LOAD"0:filename",8 (Load file)
SAVE"0:filename",8 (Save file)
SAVE"@0:filename",8 (Save with Replace)
LOAD"$0",8 (Load directory)
LOAD"$0:filename",8 (Load directory
    entry with filename)
OPEN15,8,15,"0":CLOSE15 (Initialize
    drive 0)
OPEN15,8,15,"V0":CLOSE15 (Validate
    BAM)
```

Similarly, all disk file commands should specify the drive number.

Most Commodore users do not specify the drive number when loading the directory or files. The 1541 *User's Manual* examples for the LOAD command don't specify the drive, and neither do most magazine articles. If the drive number is not specified, the 1541 is supposed to default to drive 0. What actually happens very often causes an error message such as 74,DRIVE NOT READY,00,00. For a simple example, use the DOS 5.1 Wedge that comes with the 1541. List the directory for the file "TEST" on the 1541 *Test/Demo* disk by using the Wedge command:

```
>$TEST (list directory for files "TEST")
```

Since this file doesn't exist on the *Test/Demo* disk, the red error light begins blinking. This command should include the drive number, but is accepted without it. Now repeat the command and read the error channel with this Wedge command:

```
> (read error channel)
```

The error will be 74,DRIVE NOT READY,00,00. Repeat this test, but specify the drive number:

```
>$0:TEST (List directory with drive
    specified)
```

No matter how many times this command is repeated, no error will occur.

The Missing Drive

Part 2 in next month's COMPUTE! will present a full technical explanation of the SAVE@ bug. For those who aren't so technically inclined, here's a brief summary.

The early Commodore PETs were available with dual disk drives—two drives in one unit. The drives were addressed as 0: and 1: when using disk commands. But on later Commodore computers designed to use the 1540/1541, multiple drives are addressed by changing the *device number*, not the *drive number*. The device number for a single drive is 8. That's why you type a command like LOAD "filename",8. On two-drive systems, the second drive is usually addressed as device 9, as in LOAD "filename",9. Therefore, most people stopped (or never started) specifying the drive number, which is 0: for all 1541 disk drives. Drive 1: simply doesn't exist with the 1541.

What happens when the drive number is not specified for a LOAD or SAVE? DOS first checks for a drive number. If none is specified, it assumes drive 0. Okay so far. Then DOS attempts to read the disk. If no disk is found, DOS automatically switches to the nonexistent drive 1. A DRIVE NOT READY error then results whether or not a drive number was specified. If a disk is found, DOS searches its internal directory for the specified file. If the default drive was used, DOS switches to drive 1 to continue searching. This also causes the DRIVE NOT READY error, since there is no drive 1. Furthermore, drive 1 remains the default drive as long as there are directory searches to be done. The internal drive pointers must be reset to recover from this error condition.

SAVE@ always works properly in our tests if the drive number is specified on all operations and no direct access buffers are allocated. We are not aware of anyone who has documented a failure under these conditions (assuming a closed file was specified, sufficient room was present on the disk, and no read or write errors occurred). Thus,

Commodore experts who claim there is no bug are partially correct. We have also found that if the drive number is not always specified during loads and directory listings, as is common practice, the SAVE@ bug can occur even though the drive number is specified in the SAVE@ command.

Files stored on just one or two tracks—such as short files on a fresh disk—are not prone to the SAVE@ bug. Files stored over many tracks on disks on which many files have been saved and scratched are the most susceptible, as are files saved with some utilities intended to speed up the 1541 disk drive.

Next month: Part 2 examines the technical reasons for the Save-with-Replace bug in more detail. Our special thanks to Jim Gracely of Commodore and Associate Editor Jim Butterfield for very helpful discussions.

SAVE@ Bug Demonstration

For instructions on entering this listing, please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!.

```

10 POKE 53281,0:POKE 53280,11
      :rem 232
20 PRINT"{CLR}";CHR$(14)CHR$(8
  )
      :rem 66
30 PRINT"{YEL}{RIGHT}{RVS} SAV
  E@ BUG EXAMPLE "
      :rem 90
40 PRINT"{CYN}{DOWN} THIS PROG
  RAM FORMATS":PRINT"A BLANK
  {SPACE}DISK, ALTERS"
      :rem 167
50 PRINT"THE BAM, SAVES ITSELF
  ":PRINT"AND THEN ALTERS THE
  "
      :rem 149
60 PRINT"BAM AGAIN.":PRINT"
  {DOWN}SAVE@ WILL FAIL THE"
      :rem 213
70 PRINT"THIRD TIME IT IS USED
  ":PRINT"ON THIS DISK."
      :rem 133
80 PRINT"{DOWN}{RIGHT}{GRN}INS
  ERT DISK TO FORMAT - PRESS
  {SPACE}{RVS} F1 {OFF}."
      :rem 116
90 GOSUB 5000: REM GET KEYPRES
  S
      :rem 34
100 IF K<4 THEN 90: REM WAIT
  {SPACE}FOR F1
      :rem 98
110 PRINT"{DOWN}{RED}WARNING!
  {SPACE}THE DISK WILL BE ER
  ASED."
      :rem 116
120 PRINT"{DOWN}{RIGHT}{YEL}AR
  E YOU SURE?":PRINT"(PRESS
  {SPACE}{RVS}Y{OFF} TO CONT
  INUE.)"
      :rem 31
130 FOR T=0 TO 100:NEXT: REM T
  IME DELAY
      :rem 165
140 GOSUB 5000: REM GET KEYPRE
  SS
      :rem 78
150 IF K=25 THEN 170: REM CONT
  INUE IF <Y>
      :rem 192

```

```

160 PRINT"[DOWN]{RIGHT}{YEL}PR
  OGRAM ABORTED.":GOTO 330
      :rem 4
170 CLOSE2:CLOSE15: REM
  {2 SPACES}CLOSE CHANNELS
      :rem 54
180 OPEN15,8,15: REM OPEN COMM
  AND CHANNEL
      :rem 111
190 PRINT"[DOWN]{RIGHT}{CYN}NO
  W FORMATTING DISK - PLEASE
  WAIT."
      :rem 28
200 PRINT#15,"N0:SAVE@ TEST"CH
  R$(44)"PS": REM FORMAT DIS
  K
      :rem 50
210 GOSUB 3000: REM CHECK ERRO
  R CHANNEL
      :rem 213
220 PRINT"{UP}{RIGHT}{PUR}FORM
  ATTING COMPLETED.
  {2 SPACES}{3 SHIFT-SPACE}
  {8 SPACES}"
      :rem 213
230 PRINT"{DOWN}{RIGHT}ALTERIN
  G BAM."
      :rem 232
240 GOSUB 4010: REM OPEN DIREC
  T CHANNEL AND CHECK ERROR
  {SPACE}CHANNEL
      :rem 147
250 GOSUB 1010: REM ALTER BAM
      :rem 63
260 CLOSE2:CLOSE15: REM CLOSE
  {SPACE}CHANNELS
      :rem 54
270 PRINT"[DOWN]{RIGHT}{RED}SA
  VING SAVE@ DEMO."
      :rem 190
280 SAVE"0:SAVE@ DEMO",8
      :rem 111
290 PRINT"[DOWN]{RIGHT}{YEL}AL
  TERING BAM."
      :rem 140
300 GOSUB 4000: REM OPEN DIREC
  T CHANNEL AND CHECK ERROR
  {SPACE}CHANNEL
      :rem 143
310 GOSUB 2010: REM ALTER BAM
      :rem 61
320 PRINT"[DOWN]{RIGHT}{CYN}
  {TAB}DISK IS FINISHED! NOW
  REFER TO TEXT."
      :rem 236
330 CLOSE2:CLOSE15: REM CLOSE
  {SPACE}CHANNELS
      :rem 52
340 POKE 198,0: REM CLEAR KEYB
  OARD BUFFER
      :rem 84
350 END
      :rem 111
1000 REM * MODIFY BAM SECTOR F
  OR SAVE
      :rem 77
1010 PRINT#15,"U1:2 0 18 0":GO
  SUB 3000: REM READ BAM SE
  CTOR
      :rem 90
1020 PRINT#15,"B-P:2 52":GOSUB
  3000: REM POSITION BUFFE
  R POINTER TRACK 13
      :rem 159
1030 FOR I=1 TO 20:PRINT#2,CHR
  $(0);NEXT: REM FILL BAM
  {SPACE}WITH ZEROS:rem 201
1040 PRINT#15,"B-P:2 76":GOSUB
  3000: REM POSITION BUFFE
  R POINTER TRACK 19
      :rem 173
1050 FOR I=25 TO 92:PRINT#2,CH
  R$(0);NEXT: REM FILL BAM
  WITH ZEROS
      :rem 10
1060 PRINT#15,"U2:2 0 18 0":GO
  SUB 3000: REM WRITE TO BA
  M SECTOR
      :rem 114
1070 PRINT#15,"I0":GOSUB 3000:
  REM INITIALIZE BAM
      :rem 36
1080 RETURN
      :rem 169
2000 REM * MODIFY BAM SECTOR A
  FTER SAVE
      :rem 217
2010 PRINT#15,"U1:2 0 18 0":GO
  SUB 3000: REM READ BAM SE
  CTOR
      :rem 91
2020 PRINT#15,"B-P:2 60":GOSUB
  3000: REM POSITION BUFFE

```

```

R POINTER TRACK 15
      :rem 161
2030 REM FREE UP 12 SECTORS ON
  TRACKS 15 TO 17
      :rem 204
2040 PRINT#2,CHR$(4)CHR$(15)CH
  R$(0)CHR$(0);
      :rem 81
2050 PRINT#2,CHR$(4)CHR$(15)CH
  R$(0)CHR$(0);
      :rem 82
2060 PRINT#2,CHR$(4)CHR$(15)CH
  R$(0)CHR$(0);
      :rem 83
2070 PRINT#15,"U2:2 0 18 0":GO
  SUB 3000: REM WRITE TO BA
  M SECTOR
      :rem 116
2080 PRINT#15,"I0":GOSUB 3000:
  REM INITIALIZE BAM
      :rem 38
2090 RETURN
      :rem 171
3000 INPUT#15,EN,E$,ET,ES
      :rem 185
3010 IF EN=0 OR EN=73 THEN RET
  URN
      :rem 61
3020 PRINT"{2 DOWN}{RIGHT}"EN;
  E$;ET;ES
      :rem 179
3030 CLOSE2:CLOSE15:END
      :rem 149
4000 OPEN15,8,15:GOSUB3000: RE
  M OPEN COMMAND CHANNEL AN
  D CHECK ERROR
      :rem 210
4010 OPEN2,8,2,"#":GOSUB3000:
  {SPACE}REM OPEN DIREC CH
  ANNEL AND CHECK ERROR CHA
  NNEL
      :rem 179
4020 RETURN
      :rem 166
5000 POKE198,0:POKE203,64: REM
  CLEAR KEYBOARD BUFFER
      :rem 22
5010 K=PEEK(203)
      :rem 89
5020 IF K=64 THEN 5010
      :rem 61
5030 RETURN
      :rem 168

```

**IT MUST BE
MAGIC!**

**AFFORDABLE COMPUTER ACCESSORIES
by MAGITRONIC®**

IBM PC/XT COMPATIBLE MOTHERBOARD with BIOS & 128K Memory installed Assembled & tested #92250	\$219.00	512K RAM CARD #92300	\$85.00
DISC NOTCHER #90090	\$4.95	SMARTTEAM MODEM - 1200/300 BAUD #91990	\$179.00
COPY HOLDER SET #90030	\$11.95	KEYBOARD COVER FOR IBM #90110	\$4.90
HEAD CLEANER KIT #90040	\$4.95	DISC DRIVE COVER #90120	\$3.95
COLOR GRAPHIC CARD FOR IBM #92280	\$80.00	KEYBOARD IBM COMPATIBLE #90130	\$69.00
Holes 100 pcs		MULTIPLE OUTLET #90140	\$13.00
DISKETTE FILE #90060	\$11.95	150 W. POWER SUPPLY #90150	\$95.00
Holes 100 pcs		SERIAL INTERFACE SWITCH #90160	\$36.00
GENDER CHANGERS Male to Male - #90080 Female to Female - #90070		PARALLEL CONNECTOR SWITCH #90170	\$42.00

* MANY OTHER CABLES & ACCESSORIES AVAILABLE *

LET YOUR COMPUTER DO THE TALKING

MURA MODEM — FSK telephone interface allows computers to talk to each other over telephone lines. Compatible with all major personal & home computers & most time sharing systems. Sugg. Retail \$79.95

#10005
NOW JUST **\$20.00**



THE WHOLESALE OUTLET
DEPT. C
1-Interstate Ave.
Albany, NY 12205
1-800-344-4387 (orders only)
In NY (518) 459-7883
Customer pays freight & handling FOB Albany, NY
VISA & MASTERCARD accepted. Personal & Company checks on
mail-in orders only. \$25.00 MINIMUM ORDER.

Dynamic Keyboard For Commodore Machines

Part 1

Jim Butterfield, Associate Editor

Dynamic keyboard techniques let you perform tasks that would otherwise be difficult or impossible in BASIC. The first article in this two-part series covers the fundamentals. In Part 2, we'll look at more advanced uses of the dynamic keyboard.

Many BASIC commands can be used in either *direct mode* (typed directly on the keyboard without a line number) or *program mode* (as part of a program). Certain commands, however, work only in direct mode. Using them in a program requires the *dynamic keyboard* technique, which lets a program act like it's you—typing commands on the keyboard. This method is especially effective on Commodore machines because of their full-screen editing. The term *dynamic keyboard* was first used by Mike Louder in 1978, though the technique had been used previously by Larry Tessler to merge programs.

Direct Versus Programmed

A direct-mode command doesn't have a line number and is executed as soon as you press RETURN. An example is PRINT "HELLO". In program mode, the command does have a line number and is executed only when you type RUN and then press RETURN. An example is 10 PRINT "HELLO". Most BASIC

commands work in both direct and program mode.

A few BASIC commands cannot be used in direct mode, however; they may appear only in a program. GET, INPUT, GET#, and INPUT# are the best-known of these. Usually these commands use a segment of memory called the *input buffer* to store data as it arrives, and they won't work in direct mode because the same input buffer is used to hold the command itself. Thus, the incoming data might overwrite the command you typed in. An easy way to see this conflict is to use GOSUB as a direct command, calling a routine that does input. Try the following simple program:

```
300 INPUT "YOUR NAME";N$
330 RETURN
```

Execute this routine by typing GOSUB 300 and pressing RETURN. The subroutine will ask YOUR NAME?. If you reply with a one-character name, such as X, everything works fine. The RETURN takes you back to the keyboard, and the computer reports READY. But if you reply with a longer name such as CHARLOTTE, you may get a strange error message. Why? Your original command GOSUB 300 is still sitting in the input buffer. When the subroutine ends, the system looks beyond the

GOSUB command to see what comes next. We expect it to find an end-of-command marker and quit. But the GOSUB command has been destroyed. It was overwritten by the name you typed in, which went to the same input buffer. The result is confusion.

On the other hand, some BASIC commands can be used only in direct mode—not in a program. CONT, for example, causes an indefinite pause when used in a program. LIST works in program mode, but on most Commodore computers the program ends after executing LIST. In direct mode, you can enter a program line to add to the program or change it. You can't do this while running a program. Again, there's a difference between programs and direct commands—they have different powers.

A very important difference is found in the LOAD command. If typed as a direct command, LOAD fills memory with a new program from tape or disk. If there was already a program in memory, it vanishes and its variables are thrown away. But a LOAD command executed within a program is quite different. The new program comes in, but existing variables are not scrapped—they are preserved so that the new program can use them. This is a powerful programming technique called *chaining*, which

lets one program continue processing data that was generated by a previous program.

Invisible Fingers

Direct keyboard statements can perform certain tasks that programs can't (at least, not in the usual way). For example, if we want a program to invite a student to type in a formula, BASIC doesn't allow the formula to be evaluated (an INPUT statement won't evaluate the formula $2 + 2$ as 4).

Similarly, suppose we want one program—perhaps a main menu program—to load and run another program. That's hard to do because BASIC wants to chain the new program to the old one. Instead of starting the next program fresh, it tries to make it a continuation of the previous program. On rare occasions, there may be a real need to allow a program to change itself, although this is tricky because every time you change a program (by editing a line, etc.), its variables go away. It's hard for any program to continue running after its variable values disappear.

We can accomplish these things, however, by using a startling technique: making the computer *type on its own keyboard*. How can a computer do this? It doesn't even have any fingers.

Here's how it works. When you strike a key, the information always goes first to a memory area called the *keyboard buffer*. After it gets there, it is picked up and used by the computer. If we can put a character in the keyboard buffer without actually pressing any keys, it will appear to have been typed, and the computer responds exactly as if the corresponding key was pressed.

Self-Keying

Let's try a quick example to see how it works. The keyboard buffer is located in different places on different computers, so the commands must be tailored to the machine involved. We'll ask the machine to self-type the letter X:

For VIC-20 or Commodore 64:
POKE 198,1:POKE631,88

For Plus/4 or 16:
POKE 239,1:POKE 1319,88

For PET/CBM (3.0 and 4.0 BASIC):
POKE 158,1:POKE 623,88

For Original ROM PETs:
POKE 525,1:POKE 527,88

For Commodore B-128 (Model 700)
BANK 15:POKE 209,1:POKE 939,88

The first POKE in each line tells the computer how many characters are waiting in the keyboard buffer. The second puts the character X in the first slot of the buffer. After you type the line and press RETURN, the computer reports READY and acts as if you pressed the X key. The letter X appears on the screen and the cursor flashes to its right. It would be easier just to type the X, of course, but we've established a new capability. A program can now, in effect, type on the keyboard.

Using The Screen

With this technique alone, you're limited to pretty short commands. The keyboard buffer usually has a size limit of about nine characters. Also, it's cumbersome for a program to put characters into the buffer one at a time. But on Commodore machines we can take advantage of *screen editing* to process longer direct commands.

Whenever you press the RETURN key, the computer reads the screen. Whatever it finds there, it does—perform a command, enter a line, or whatever. To make a program execute a long direct-mode command, follow these steps:

1. PRINT the command on the screen in a known place.
2. Position the cursor a couple of lines above the command.
3. Put a carriage return in the keyboard buffer.
4. Terminate execution with an END command.

When the program reaches END, here's what happens. The desired command is on the screen and the RETURN is in the keyboard buffer. The program terminates, and the computer prints READY. Although the program has ended, the computer receives the RETURN as if you had just pressed that key,

so it executes the line on the screen. Among other things, that line might contain a GOTO or CONT that would continue the program.

A Simple Example

Here's a simple program that uses the dynamic keyboard method to do something normally forbidden by BASIC: a computed GOTO. In most cases, a straightforward ON-GOTO command does the same job better, but let's use this example for the sake of simplicity. Type in line 100 as shown for your machine:

For VIC-20 or Commodore 64:

```
100 DATA 198,631
```

For Plus/4 or 16:

```
100 DATA 239,1319
```

For most PET/CBM:

```
100 DATA 158,623
```

Now enter the following lines:

```
110 READ A,B
120 PRINT "PICK A NUMBER 3 TO
{SPACE}5"
130 INPUT "NUMBER";L
140 IF L<3 OR L>5 THEN 130
150 PRINT CHR$(147)
160 PRINT
170 PRINT
180 PRINT "GOTO";L*100
190 PRINT CHR$(19)
```

The program isn't finished, but you might like to see what we have so far. If you run it and enter 3 in response to the prompt, you'll find the program stopped with the cursor blinking over a line that says GOTO 300. To execute that direct command, all you'd need to do is press RETURN. When we complete the program, it will press RETURN by itself. Finish the program by entering these lines:

```
200 POKE A,1
210 POKE B,13
220 END
300 PRINT "THIS IS LINE 300"
310 GOTO 120
400 PRINT "HERE'S 400"
410 GOTO 120
500 PRINT "LINE 500 IS THE END"
"
```

It's as easy as that. Once you grasp the basic method, all sorts of interesting applications come to mind. Next time, we'll look at more advanced, useful applications of the dynamic keyboard technique.

©

All About IBM Batch Files

Part 2

G. Russ Davies

Part 1 of this article (COMPUTE!, September 1985) covered the fundamentals of batch programming on the IBM PC/PCjr. This month we'll look at some advanced techniques and a utility that makes batch programs interactive and easier to use.

As we saw last month, IBM batch programs can be very powerful. The batch commands FOR, IF, and GOTO permit program loops, conditional tests, and program branching. You can also chain two or more batch programs together and pass information from one to another.

But batch programs have limitations, too. Visual displays are often unexciting, consisting of single-color alphanumerics (no graphics characters, etc.), and user input is even more restricted. The PAUSE command allows only two options: continuing after the pause or ending the program. This virtually rules out complex, interactive programs that let you select from several different options to perform various tasks.

Adding Choices

The "CHOOSE.COM" program below provides the equivalent of a new batch command. As the name suggests, CHOOSE lets you make a choice. It can be used by itself to request a yes/no response, or with additional information to offer sev-

eral different options. Since CHOOSE.COM is a machine language program, we've included a BASIC filemaker program that creates it for you. Type in and save Program 1 as listed below, then run it. Once that's done, you can try out the simpler "yes/no" form of CHOOSE.

Remember from Part 1 that any batch program named AUTOEXEC.BAT loads and runs automatically when you boot the system. An AUTOEXEC.BAT program that doesn't include the DOS commands DATE and TIME won't prompt you to enter the date and time (as normally happens when you boot up). Though it's often valuable to have correct date and time information on new files, there are also many times when you don't need it.

The short batch program that follows lets you choose whether to add date and time settings. Enter it as listed, using the EDLIN program (on the *DOS Supplemental Programs* disk) or any word processor or text editor that produces standard ASCII output. Since this and the following examples are *not* BASIC programs, don't try to enter them with COMPUTE!'s "IBM Automatic Proofreader." Once you have entered this program, save it with the filename AUTOEXEC.BAT. Because the program calls CHOOSE.COM, you *must* save it on a disk that contains CHOOSE.COM.

```
echo off
MODE CO80
echo Do you wish to set the
date/time?
rem press Y,y,N, or n to
answer
CHOOSE
IF ERRORLEVEL 1 GOTO :setdt
goto :next
:setdt
date
time
:next
CHKDSK
BASICA MENU
```

After saving this program, run it by rebooting the system (press Ctrl-Alt-Del or enter AUTOEXEC). When used without parameters, CHOOSE checks for a yes/no response, permitting uppercase as well as lowercase Y and N (it's not necessary to press the Enter key after typing Y or N). Other responses (except Ctrl-Break) cause the prompt message to be displayed until a valid choice is made.

ERRORLEVEL Is A Variable

After you respond with yes or no, CHOOSE passes this information to the batch program via ERRORLEVEL. As explained in Part 1, ERRORLEVEL is a special variable you can test with IF. In this example, CHOOSE sets ERRORLEVEL to 1 when the response is yes, and 0 when the response is no. The GOTO command then branches appropriately. Note that GOTO branches to a destination label, which is a colon followed by a string. This program uses the labels :setdt and :next. Don't confuse

the label :next with BASIC's NEXT statement (which doesn't exist in batch programming).

In this case, ERRORLEVEL can have only one of two possible values, but it can take higher values as well (see below). When testing ERRORLEVEL with IF, keep in mind that the IF ERRORLEVEL statement is true when ERRORLEVEL is *greater or equal* to the number being tested. If you tested for 0 first in this program, ERRORLEVEL would always be 0 (1 and 0 are both greater than or equal to 0). When testing ERRORLEVEL, you must always test for higher values before testing for lower ones.

Multiple Options

Most utility programs offer a variety of options. Typically, they display a menu with a list of options, and you choose the option you want by pressing a certain key. CHOOSE makes it easy to present such menus within a batch program. First display the options on the screen, then use CHOOSE followed by a list of the keys you wish to test. For instance, the statement CHOOSE ABC checks the A, B, and C keys and returns appropriate values in ERRORLEVEL. The ERRORLEVEL value corresponds to the position of the key in the list after the CHOOSE command. Thus, after the program performs CHOOSE ABC, ERRORLEVEL equals 1 if A was pressed, 2 if B was pressed, and so on.

When using CHOOSE with several option keys, it's critical to list the keys in the right order. Since you must always test for higher ERRORLEVEL values before testing for lower ones, you'll want to put the most likely (or most speed-critical) options at the *end* of the option key list. This assigns higher ERRORLEVEL values to the more important options.

Entering FILES.BAT

The "FILES.BAT" program below demonstrates multiple-option selection as well as a colorful, attractively formatted menu and help panel. It sorts any disk directory by file size, date, filename extension, or alphabetical order, and can also create separate batch files for mass DOS operations. Entering the pro-

gram requires several steps:

1. Make sure your disk contains the system file called ANSI.SYS. If necessary, copy ANSI.SYS from the DOS disk with the COPY command. This file contains the screen/keyboard driver used for graphics displays and temporary key assignments.
2. Make sure your disk contains a file named CONFIG.SYS that includes the statement DEVICE=ANSI.SYS. If your disk already has a CONFIG.SYS file, add that statement to the file with EDLIN or another text editor. If your disk doesn't have a CONFIG.SYS file, create one by entering these lines:

```
COPY CON:CONFIG.SYS  
DEVICE=ANSI.SYS
```

Next press the F6 key to end the file, then press Enter. Your disk now contains the necessary CONFIG.SYS file.
3. Using EDLIN or some other text editor, enter Program 2 as listed below and save it on disk with the name FILES.BAT. (Since this is *not* a BASIC program, don't try to enter it with the IBM Automatic Proofreader.) Several lines in the listing contain the characters {CTRL-P}. The braces indicate that this is a special control character which you must enter by pressing a combination of keys. Do *not* type the braces. Instead, wherever you see {CTRL-P} in the listing, hold down the Ctrl key and press the P key. On the screen, you'll see the wedge-shaped control character that precedes special ANSI.SYS screen or keyboard instructions. Type everything else in Program 2 exactly as it appears.
4. In the same manner, enter Program 3 as listed and save it on disk with the name FILES.MNU (do not use any other filename). This file is graphics data for the menu. Whenever you see {CTRL-P} in the listing, enter CTRL-P as described in step 3. A number enclosed in braces indicates a graphics character (the number is an ASCII code) which you must enter with the Alt-keypad technique on the PC and by another method on the PCjr.

For instance, where the listing contains {218}, hold down the Alt key, then type the characters 2, 1, and 8 on the numeric keypad. When you release the Alt key, character 218 appears on the screen. On the PCjr, hold down Alt, press Function-N, then enter the numbers as on the PC. After all three numbers are entered, release the Alt key; the character will appear on the screen. When the braces enclose two numbers, several characters are needed; the first value shows how many characters to enter, and the second is the ASCII code. For instance, where you see {5 196}, use the above procedure to enter character 196 five times. Where you see the letters SP followed by a number and enclosed in braces, you should type the space bar the indicated number of times. For example, {SP 16} means to type 16 spaces.

5. Enter Program 4 as listed, using the technique described for step 4, and save it on disk with the filename FILES.HLP (don't use any other filename). This file contains graphics data for the Help screen.
6. Enter a batch program that contains nothing but a REM statement and save it on disk with the filename QUIT.BAT. This can be done with a text editor or by entering these statements from DOS:

```
COPY CON: QUIT.BAT  
REM ANYTHING
```

Now press the F6 key followed by Enter.
7. Activate BASIC and type in Program 5. Since this program is listed in BASIC, enter and save it using the IBM Automatic Proofreader published bimonthly in COMPUTE!. You must save this program with the filename FILEGRP .BAS.
8. Finally, before using FILES.BAT, check your disk to make sure all the necessary files are present. It must contain CHOOSE.COM, ANSI.SYS, CONFIG.SYS, FILES.BAT, FILES.HLP, FILES.MNU, FILEGRP.BAS, and QUIT.BAT. The program will not work correctly unless all

these files are on one disk and named as shown here. Note that the FILEGRP option (see below) also requires BASIC.

Using FILES.BAT

Before you run this program, reboot the system by turning the computer off and on or by pressing Ctrl-Alt-Del. This guarantees that the ANSI.SYS driver is present. To run FILES.BAT, enter FILES after the DOS prompt and press Enter. Most of the program is self-explanatory—after all, that's what menus and help screens are for—so we won't describe every option.

The FILEGRP option lets you create a separate batch file (named FILEGRP.BAT) for performing operations on a group of files. Every line in FILEGRP.BAT consists of a filename from the subject disk and four dummy parameters in this order:

```
%1 filename.extension %2 %3 %4
```

Dummy parameters are replaced by actual parameters you supply when running FILEGRP.BAT. This makes it easy to perform the same operation (copy, print, delete, etc.) on a large group of files. After using the FILEGRP option, exit to DOS and use a word processor or text editor to edit FILEGRP.BAT as needed, deleting the names of any files you don't want to include in the operation. Then run FILEGRP.BAT by entering its name followed by the needed parameters. The first parameter can be any DOS command; the rest will be parameters that are relevant to that command. For instance, you might enter FILEGRP COPY B: /V to copy the files listed in FILEGRP.BAT onto drive B. Incidentally, BASIC does not provide any way to set ERRORLEVEL.

Advanced Batch Programming

FILES.BAT employs several techniques you may find useful. The DOS command BREAK ON makes the system respond to Ctrl-Break in more instances than normal. The TYPE command is used to display graphics like the menu and help screen. TYPE creates such displays much faster than the DOS ECHO command (you could also use COPY).

The ANSI.SYS driver assigns the lowercase keys a, s, d, e, b, and i to their uppercase equivalents to reduce the amount of testing required. The F1 and F10 keys are assigned to keys H and X, respectively, so those function keys perform their usual HELP and EXIT roles. After CHOOSE accepts a response, the modified keys are restored to their original definitions. Pressing Ctrl-Break while CHOOSE is active (or pressing Y in response to "Terminate batch file?") leaves these keys reassigned. To avoid this effect, you should normally exit by pressing F10.

The F10 (EXIT) function uses a trick to perform a quick exit. It simply runs QUIT.BAT, a batch program that consists of a do-nothing REM statement. When any batch program ends, it ends all preceding batch programs as well. Note that since ECHO OFF is in effect when QUIT.BAT is called, the REM is not displayed.

Batch commands are not particularly fast. To optimize speed, structure the program so that the most-often used (or speed-critical) routines are closest to the place you're branching from. The fewer program lines that a GOTO has to skip over, the quicker it executes. You can also speed up batch programs by using extra disk buffers as explained in the *DOS Manual*. REM statements slow batch programs drastically; if you want to document the program, store your comments in a separate file.

In some cases it's useful to test for the absence of a parameter. For instance, you might want to re-prompt the user with a message like "You must enter more information." This can be done with a statement such as IF .--%1. GOTO .NOPARM. This line means "if a dot equals the parameter plus a dot then go to the no-parameter routine." The IF test is true only when no parameters have been entered.

Program 1: CHOOSE.COM Filemaker

For instructions on entering this listing, please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!

```
Q 100 OPEN "CHOOSE.COM" FOR OUT
```

```
PUT AB #1
LA 110 READ X$:IF X$="/\" GOTO 1
30
CA 120 PRINT #1,CHR$(VAL("&H"+X$
)):GOTO 110
ID 130 CLOSE #1:END
KB 140 DATA A0,80,0,3C,0,75,2D,
90,8A,60,1,B4,9,CD,21,B4
PC 150 DATA C,B0,7,CD,21,3C,59,
74,F,3C,4E,74,10,3C,79,74
FB 160 DATA 7,3C,6E,74,8,EB,E1,
90,80,1,EB,3,90,80,0,B4
EL 170 DATA 4C,CD,21,90,8A,80,1,
84,9,CD,21,B4,C,B0,8,CD
GN 180 DATA 21,88,C4,90,BD,0,0,
45,8A,86,80,0,3C,D,74,E4
KC 190 DATA 38,E0,75,F3,89,EB,9
0,48,B4,4C,CD,21,90,90,90
,90
NJ 200 DATA 43,68,6F,6F,73,65,2
0,59,20,20,79,65,73,29,20
,6F
FR 210 DATA 72,20,4E,20,20,6E,6
F,29,20,2E,2E,2E,D,A,24,2
0
WJ 220 DATA 43,68,6F,6F,73,65,2
0,64,65,73,69,72,65,64,20
,6F
OK 230 DATA 70,74,69,6F,6E,20,2
E,2E,2E,D,A,24,0,0,0,0
KR 240 DATA /&
```

Program 2: FILES.BAT

```
echo off
rem Name: FILES.BAT
[filename.ext] See help
panel for usage
break on
dir %1 >temp.dir
:menu
cls
type files.mnu
echo(CTRL-P)[ "a"; "A"p(CTRL-P)[
"s"; "S"p(CTRL-P)[ "d"; "D"p(CT
RL-P)[ "e"; "E"p(CTRL-P)[ "b"; "
B"p
(CTRL-P)[ "i"; "I"p
echo(CTRL-P)[0;59;"H"p(CTRL-P)
[0;68;"X"p(CTRL-P)[2A
choose EIBSDHAX
echo(CTRL-P)[ "a"; "a"p(CTRL-P)[
"s"; "s"p(CTRL-P)[ "d"; "d"p(CT
RL-P)[ "e"; "e"p(CTRL-P)[ "b"; "
b"p(CTRL-P)[ "i"; "i"p
echo(CTRL-P)[0;59;0;59p(CTRL-P
)[0;68;0;68p(CTRL-P)[0m
if errorlevel 8 QUIT
if errorlevel 7 goto :a
if errorlevel 6 goto :h
if errorlevel 5 goto :d
if errorlevel 4 goto :s
if errorlevel 3 goto :b
if errorlevel 2 goto :i
goto :e
:a
cls
sort /+1 <temp.dir >con
pause
goto :menu
:h
copy files.hlp con
pause
goto :menu
:d
cls
sort /+24 <temp.dir >con
pause
goto :menu
:s
cls
sort /+14 /R <temp.dir >con
```



```

pause
goto :menu
ib
basic filegrp
echo ----- FILEGRP.BAT
Created -----
pause
goto :menu
ii
cls
dir X1 /p
pause
goto :menu
ie
cls
sort /+10 <temp.dir >con
pause
goto :menu

```

Program 3: FILES.MNU

```

(CTRL-P){2J (CTRL-P){32m
(SP 16){218}{5 196}
(CTRL-P){33m DIRECTORY
DISPLAYS MENU (CTRL-P){32m{5
196}{191}
(SP 16){179}{SP 35}{179}
(SP 16){179}{CTRL-P){35m A
(CTRL-P){32m- Alphabetical
order by filename (179)
(SP 16){179}{SP 35}{179}
(SP 16){179}{CTRL-P){35m E
(CTRL-P){32m- Ext name
order (SP 17){179}
(SP 16){179}{SP 35}{179}
(SP 16){179}{CTRL-P){35m D
(CTRL-P){32m- Date order, Yr
not significant (179)
(SP 16){179}{SP 35}{179}
(SP 16){179}{CTRL-P){35m S
(CTRL-P){32m- Size order (SP
21){179}
(SP 16){179}{SP 35}{179}
(SP 16){179}{CTRL-P){35m B
(CTRL-P){32m- Bat file
creation: FILEGRP.bat (179)
(SP 16){179}{SP 35}{179}
(SP 16){179}{CTRL-P){35m I
(CTRL-P){32m- Intrinsic
order of dir entries (179)
(SP 16){179}{SP 35}{179}
(SP 16){179}{CTRL-P){35m F1
(CTRL-P){32m- HELP (SP
27){179}
(SP 16){179}{SP 35}{179}
(SP 16){179}{CTRL-P){35m F10 (CTRL
-P){32m- EXIT (SP 27){179}
(SP 16){179}{SP 35}{179}
(SP 16){192}{36 196}{217}
(CTRL-P){31m

```

Program 4: FILES.HLP

```

(CTRL-P){44}{33m (CTRL-P){2J (CTR
L-P){1m
(SP 7){201}{15 205}
(CTRL-P){35m DIRECTORY
DISPLAY HELP (CTRL-P){33m{16
205}{187}
(SP 7){186}{SP 2}{PURPOSE:
Produces a directory
listing (SP 17){186}
(SP 7){186}{SP 12}{sorted in
the desired order. (SP
16){186}
(SP 7){186}{SP 2}{SYNTAX: (SP
2){FILES
[di ][filename][.ext]{SP
20}{186}
(SP 7){186}{SP 9}{if
parameters are omitted, &. &
used} (SP 10){186}

```

```

(SP 7){186}{SP 56}{186}
(SP 7){186}{SP 2}{MENU
OPTIONS: (SP 41){186}
(SP 7){186}{SP 4}{A: Directory
sorted ascending by
filename (SP 11){186}
(SP 7){186}{SP 4}{E: Directory
sorted ascending by file
extension (SP 5){186}
(SP 7){186}{SP 4}{D: Directory
sorted ascending by file
date (mm-dd) (SP 2){186}
(SP 7){186}{SP 7}{giving
calendar order, year least
significant (SP 4){186}
(SP 7){186}{SP 4}{S: Directory
sorted DESCENDING by file
size (SP 9){186}
(SP 7){186}{SP 7}{allowing
quick determination of
largest files (SP 4){186}
(SP 7){186}{SP 4}{B:
FILEGRP.BAT created as : X1
filename.ext X2 X3 X4{186}
(SP 7){186}{SP 7}{for editing
and mass file copy, erase,
type, etc. (186)
(SP 7){186}{SP 4}{I: Directory
in the order of the
directory entries (SP 2){186}
(SP 7){186}{SP 56}{186}
(SP 7){186}{SP 4}{H or F1:
Displays this help panel (SP
19){186}
(SP 7){186}{SP 4}{X or F10:
Fast exit to DOS (SP 26){186}
(SP 7){200}{56
205}{188}{CTRL-P){0m

```

Program 5: FILEGRP.BAS

For instructions on entering this listing, please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!.

```

N1 10 'This program creates a ba
tch file named FILEGRP.BAT
, using the
LD 20 'TEMP.DIR file created by
FILES.BAT. FILEGRP.BAT is
useful for
JF 30 'group file operations suc
h as copying, deleting, pr
inting, etc.
EK 40 'Each line in FILEGRP.BAT
has the format: X1 filenam
e.ext X2 X3 X4
GK 50 'Use a word processor or t
ext editor to delete non-p
articipating
LD 60 'files from FILEGRP.BAT.
PE 70 OPEN "temp.dir" FOR INPUT
AS #1'input file
MN 80 OPEN "filegrp.bat" FOR OUT
PUT AS #2'output file
EC 90 FOR X= 1 TO 4:IF EOF(1) TH
EN SYSTEM'skip 4-line head
er
KD 100 LINE INPUT#1,X$:NEXT
GN 110 IF EOF(1) THEN SYSTEM'che
ck for end-of-file
LA 120 LINE INPUT #1,X$:get inpu
t line
DI 130 IF LEFT$(X$,1)="" GOTO 1
10'skip lines beginning w
ith space
BE 140 Z=INSTR(X$, " "):Z=Z-1'fin
d length of filename
EB 150 PRINT #2,"X1 ";MID$(X$,1,
Z);". ";MID$(X$,10,3);" X2
X3 X4"'form output
HL 160 GOTO 110'continue till en
d-of-file

```

Davidson is #1, #1, #1, & #1 in Education

For math, speed reading, spelling and vocabulary, Davidson's award winning software outsells all others. Why? Because enough people choose to buy the educational software that works.

MATH BLASTER makes it more fun to add, subtract, multiply, divide, and learn fractions, decimals and percents. First through sixth graders master 600 math facts with exciting graphics, animation, sound effects...even an arcade game. Apple™, Macintosh™, IBM™, Commodore 64/128™, Atari™. 49.95.



SPEED READER II can quadruple your reading speed and improve your comprehension. Develop good reading habits, chart your progress, and have fun! For high school age through adult. Apple II™, Macintosh™, IBM™, Commodore 64/128™. 69.95



WORD ATTACK lets students ten through adult discover the meanings and usages of 675 new words. Includes a fun, fast-action arcade game and add-your-own-words editor. Apple™, IBM™, Commodore 64/128™, Atari™. 49.95



SPELL IT teaches ten year olds and older how to spell a thousand and one of our most commonly misspelled words. Vivid graphics, animation, sound effects, a lively arcade game and add-your-own-words editor, too! Apple™, IBM™, Commodore 64/128™, Atari™. 49.95



Davidson & Associates, Inc.
800-556-6141
(In Calif., 213-534-4070)

D Davidson.

Davidson & Associates, Inc.
3135 Kashiwa St. / Torrance, CA 90505

Please send me a FREE COLOR BROCHURE and the name of my nearest Davidson Dealer.

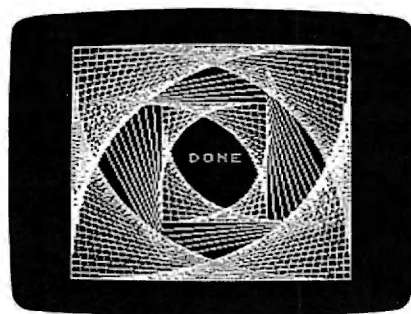
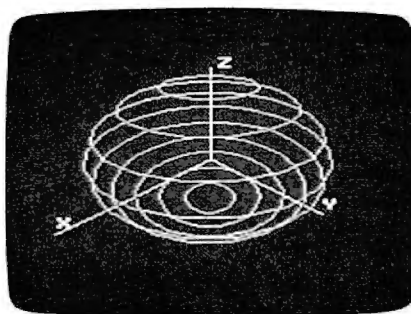
Name _____
Address _____
City _____ State _____ Zip _____

Educational Software that Works

64

Multicolor Graphics Made Easy

James P. Hassett



"Color Plotter 64" gives your Commodore 64 a set of 14 powerful new commands for plotting multicolor high-resolution graphics. You can even mix text and graphics on the same screen. The photos on these pages were generated by the demo program following this article.

Have you ever admired a multicolor high-resolution graphics display on the Commodore 64? Usually you have to learn machine language to create such displays yourself—but not now.

With "Color Plotter 64" those screens become easy because you'll have 14 special graphics commands added to your Commodore 64

BASIC. And because the commands are written in machine language, they work fast and efficiently. Here is a summary of the new commands:

IN, Turns on hi-res multicolor mode.

OFF, Turns off hi-res multicolor mode.

CL, Clears hi-res screen.

PC, Pen Clear. Clears everything on high-res screen drawn with current pen number.

P0,*n* Sets color of PEN 0, which is also the background color, where *n* is one of the 16 standard colors (0-15).

P1,*n* Sets color of PEN 1 (*n* = 0-15).

P2,*n* Sets color of PEN 2 (*n* = 0-15).

P3,*n* Sets color of PEN 3 (*n* = 0-15).

PEN,*n* Defines active pen number (*n* = 0-3).

PL,*x,y* Plots point on hi-res screen at coordinates *x,y* using active pen.

DR,*x,y* Draws best straight line from last point plotted to coordinates *x,y* using active pen.

CR,*x,y* Sets hi-res screen cursor to coordinates *x,y*.

PR,*A\$* Prints contents of *A\$* on high-res screen using active pen.

PR,"text" Prints text between quotes on hi-res screen using active pen.

Some of these commands may look familiar to those who have plotted graphics on other computers with other languages. You might be able to jump right in and

start plotting. Do note that all commands, even those without parameters (such as the IN, command), must be accompanied by the comma. There are also some special typing and loading instructions to follow with Color Plotter 64. For more details, see the sections below.

Entering The Program

Since Color Plotter is written entirely in machine language, it must be entered with the "MLX" machine language editor program, found elsewhere in this issue. To enter the Color Plotter program, load and run MLX. When MLX asks for the starting and ending addresses for the machine language data to be entered, respond with 49152 and 51353, respectively. MLX will then prompt you with the line number of the first line of data, 49152. Begin typing the data shown in Program 1 and continue until all the data is entered. If you do not type in all the data in one sitting, follow the directions in the MLX article for saving your incomplete work. When all the data is entered, you're ready to start using the Color Plotter commands.

Special Loading Instructions

You must issue a certain sequence of commands to load and activate Color Plotter 64. After turning on the power, enter these lines for disk, pressing RETURN each time:

```
LOAD "COLOR PLOTTER",8,1
POKE 44,64:POKE 16384,0:NEW
SYS 51260
```

For tape, change the first line above to:

```
LOAD "COLOR PLOTTER",1,1
```

Of course, you can save Color Plotter 64 on disk or tape with any filename you like. To load a program that contains Color Plotter commands, use the normal LOAD command.

Color Plotter Pen

As described above, the first three Color Plotter 64 commands (IN, OFF, and CL,) turn the hi-res multi-color mode on or off and clear the screen. (For those interested, the hi-res screen is located at memory addresses 8192 to 16191—hex

\$2000-\$3F3F.)

PC, (Pen Clear) makes it possible to erase certain things off the screen while leaving all else intact. This is particularly useful for removing text, prompts, or messages while preserving the drawing in the background. To erase everything drawn with PEN 1, for example, execute:

```
PEN,1:PC,
```

The next five commands are very similar to each other; they all select drawing colors for the various pens. The parameter n should be a number, variable, or numeric expression in the range of 0 to 15 corresponding to standard Commodore 64 color numbers. (If you specify a number larger than 15, Color Plotter 64 does not report an error, however.) All the following statements are legal:

```
P0,0:REM Sets PEN 0 and background color to black.
```

```
P1,J:REM Sets color of PEN 1 to previously defined value of variable J.
```

```
P2,J/2+1:REM Sets color of PEN 2 to value of expression J/2+1.
```

The command PEN,n defines the active pen number—in other words, which pen will be used with the drawing, printing, and pen-clearing commands that follow. Since there are only four pens, the parameter n should be a number, variable, or expression in the range of 0 to 3. PEN 0 is the background color, which makes it handy for erasing lines drawn with another color (simply draw over the lines with PEN 0).

As a technical aside, the pens draw in different colors by switching on different bit pairs on the hi-res screen. PEN 0 plots a 00 bit pair. PEN 1 plots the 01 pair, PEN 2 plots the 10 pair, and PEN 3 plots the 11 pair. PC, (Pen Clear) works by searching the screen and removing all occurrences of the bit pair that matches that of the active pen.

Drawing And Printing

The next five commands all perform the actual drawing, plotting, and printing in the colors specified by the pen commands. They use a coordinate system so you can place the pens anywhere on the screen.

PL,x,y is the plot command. Screen coordinates in the multi-

color hi-res mode range from 0 to 159 horizontally (x) and 0 to 199 vertically (y). Important: The origin is the lower-left corner of the screen. That means the coordinates of the lower-left corner of the screen display are 0,0, the upper-left coordinates are 0,199, the upper-right coordinates are 159,199, and the lower-right coordinates are 159,0.

Again, the parameters x and y can be numbers, variables, or numeric expressions. Trying to plot a location out of range causes an ILLEGAL QUANTITY ERROR.

DR,x,y is the draw command. It works with the same coordinates as the plot command. Since the x,y parameters are the coordinates it draws to, at least one plot command should be executed to define the starting point before the first draw command.

CR,x,y positions the invisible hi-res cursor at the coordinates specified. This defines where a following print command will begin printing the text. Since a character is 8 bits high and 16 bits wide, the allowable range for coordinates with this command is 1 to 144 for x and 1 to 192 for y. Specifying a location out of range causes an ILLEGAL QUANTITY ERROR.

PR,A\$ and PR,""" are the hi-res printing commands. To print a message, simply put the text between the quotes with PR,""" or define it as a string variable with PR,A\$. String expressions such as PR,A\$+B\$ or PR,A\$+"ABC" are not allowed.

Nondestructive Printing

The printing commands are specially written so they never write over a bit that is already on. This means they print nondestructively; they won't interfere with your graphics. This is handy in many instances. For example, if you create a drawing or a graph, you can label it without erasing any lines. Then you can erase the text with the PC, command without disturbing the graphics, assuming the text is printed in a different color.

The printing commands also update the invisible hi-res cursor automatically. They provide for line advances and wraparound from the bottom to the top of the screen.

There is one limitation with the

printing commands. They can print only those characters with ASCII codes 33 to 95 (this includes most punctuation symbols, numbers, and letters, but no keyboard graphics). Trying to print characters out of this range will cause an error.

You can do lots of exciting things with these 14 commands. By executing P1,1 everything drawn on the screen with PEN 1 will change to white in a flash. With a simple loop (FOR X=0 TO 15:P1, X:NEXT X) everything drawn with PEN 1 will flash through all 16 colors in an instant. Drawings or objects can be made to disappear by executing a command to match the pen color to the background color. Then they can be made to instantly reappear by executing another pen color command using a contrasting color.

Additional Notes

You should be aware that Color Plotter 64 affects a few normal BASIC commands. None of the new commands works with IF-THEN. For example, the following statement will cause a syntax error:

```
10 X=5:IF X=5 THEN CL,
```

Otherwise, IF-THEN works normally.

BASIC's pi function (π) also is affected. It still operates and is evaluated as 3.1415... but appears as a graphic symbol when listed. If a line containing a pi symbol is edited, the pi symbol will have to be re-typed at the edited line. I have found it convenient to define the variable PI=3.14159 and use PI instead of the pi symbol.

The IN, command should never be executed when already in the hi-res mode. Otherwise, a system crash and lockup may result. This is because the IN, command saves the normal error vector (ERRVEC) and replaces it with a new vector. If it is executed again before an OFF, command, the ERRVEC will point to the address of the replacement vector—in effect, it will point to itself.

Anytime there's a syntax error, the normal text screen with the default colors is restored. When a program is running in the hi-res mode, you can stop it as usual by pressing the RUN/STOP key. To return to the normal text screen, deliberately

cause a syntax error by typing a key in direct mode and pressing RETURN.

If you press RUN/STOP-RESTORE, the Color Plotter 64 commands will no longer work. That's because BASIC ROM is switched back in. (Color Plotter 64 works by copying BASIC ROM into RAM and then modifying it to patch in the new routines.) In fact, the program won't even LIST properly. The first thing to do after pressing RUN/STOP-RESTORE is to enter SYS 51343 or POKE-1,PEEK(1) AND254. Either statement will switch out BASIC ROM and resurrect Color Plotter 64.

Program 1: Color Plotter 64

Please refer to the "MLX" article before entering this listing.

```
49152 :076,039,192,076,092,192,155
49158 :076,134,192,076,165,192,073
49164 :076,182,192,076,254,192,216
49170 :076,068,193,076,162,198,023
49176 :076,045,194,076,059,194,156
49182 :076,150,196,076,211,196,167
49188 :076,102,197,032,253,174,102
49194 :173,017,208,009,032,141,110
49200 :017,208,173,022,208,009,173
49206 :016,141,022,208,173,024,126
49212 :208,009,008,141,024,208,146
49218 :173,000,003,141,238,207,060
49224 :173,001,003,141,239,207,060
49230 :169,168,141,000,003,169,216
49236 :196,141,001,003,076,006,251
49242 :197,096,032,253,174,173,247
49248 :017,208,041,223,141,017,231
49254 :208,173,022,208,041,239,225
49260 :141,022,208,173,024,208,116
49266 :041,240,009,004,141,024,061
49272 :208,173,238,207,141,000,063
49278 :003,173,239,207,141,001,122
49284 :003,096,032,253,174,169,091
49290 :063,133,252,169,000,133,120
49296 :251,168,133,251,145,251,063
49302 :160,063,162,032,145,251,195
49308 :136,208,251,198,252,202,123
49314 :208,246,096,032,253,174,147
49320 :032,158,173,032,170,177,142
49326 :152,141,033,208,141,032,113
49332 :208,096,032,253,174,032,207
49338 :158,173,032,170,177,152,024
49344 :010,010,010,010,141,251,112
49350 :207,162,000,189,000,004,248
49356 :041,015,013,251,207,157,120
49362 :000,004,189,000,005,041,193
49368 :015,013,251,207,157,000,091
49374 :005,189,000,006,041,015,222
49380 :013,251,207,157,000,006,094
49386 :232,208,220,162,024,189,245
49392 :232,006,041,015,013,251,030
49398 :207,157,232,006,232,208,008
49404 :242,096,032,253,174,032,057
49410 :158,173,032,170,177,152,096
49416 :041,015,141,251,207,162,057
49422 :000,189,000,004,041,240,232
49428 :013,251,207,157,000,004,140
49434 :189,000,005,041,240,013,002
49440 :251,207,157,000,005,189,073
49446 :000,006,041,240,013,251,077
49452 :207,157,000,006,232,208,086
49458 :220,162,024,189,232,006,115
49464 :041,240,013,251,207,157,197
49470 :232,006,232,208,242,096,054
49476 :032,253,174,032,158,173,122
49482 :032,170,177,152,041,015,149
```

```
49488 :162,000,157,000,216,157,004
49494 :000,217,157,000,218,232,142
49500 :208,244,162,024,157,232,095
49506 :218,232,208,250,096,032,110
49512 :253,174,032,158,173,032,158
49518 :170,177,170,240,003,076,178
49524 :166,196,140,253,207,140,194
49530 :247,207,192,160,144,004,052
49536 :234,076,166,196,032,253,061
49542 :174,032,158,173,032,170,105
49548 :177,170,240,003,076,166,204
49554 :196,140,254,207,140,248,051
49560 :207,192,200,144,004,234,109
49566 :076,166,196,169,000,133,130
49572 :254,056,169,199,237,254,053
49578 :207,072,041,248,010,038,018
49584 :254,010,038,254,010,038,012
49590 :254,170,141,251,207,165,090
49596 :254,141,252,207,138,010,166
49602 :038,254,010,038,254,109,129
49608 :251,207,133,253,165,254,183
49614 :109,252,207,133,254,173,054
49620 :253,207,041,252,010,144,095
49626 :002,230,254,024,101,253,058
49632 :133,253,169,000,101,254,110
49638 :133,254,104,041,007,101,102
49644 :253,133,253,169,032,101,153
49650 :254,133,254,173,253,207,236
49656 :041,003,141,249,207,169,034
49662 :003,056,237,249,207,141,123
49668 :249,207,170,173,250,207,236
49674 :141,251,207,169,003,141,154
49680 :252,207,138,240,015,014,114
49686 :251,207,014,251,207,014,198
49692 :252,207,014,252,207,202,138
49698 :208,241,173,252,207,073,164
49704 :255,141,252,207,096,032,255
49710 :103,193,032,077,196,160,039
49716 :000,173,255,207,145,253,061
49722 :096,032,253,174,032,158,035
49728 :173,032,170,177,072,104,024
49734 :240,003,076,166,196,140,123
49740 :247,207,192,160,144,003,005
49746 :076,166,196,032,253,174,211
49752 :032,158,173,032,170,177,062
49758 :072,104,240,003,076,166,243
49764 :196,140,248,207,192,200,003
49770 :144,003,076,166,196,173,096
49776 :247,207,205,253,207,144,095
49782 :009,237,253,207,141,246,187
49788 :207,024,144,010,173,253,167
49794 :207,056,237,247,207,141,201
49800 :246,207,173,248,207,205,142
49806 :254,207,144,009,237,254,223
49812 :207,141,245,207,024,144,092
49818 :010,173,254,207,056,237,067
49824 :248,207,141,245,207,173,101
49830 :247,207,205,253,207,144,149
49836 :056,173,248,207,205,254,035
49842 :207,144,024,173,246,207,155
49848 :205,245,207,144,008,169,138
49854 :000,141,244,207,076,026,116
49860 :195,169,001,141,244,207,129
49866 :076,026,195,173,246,207,101
49872 :205,245,207,144,008,169,162
49878 :007,141,244,207,076,026,147
49884 :195,169,006,141,244,207,158
49890 :076,026,195,173,248,207,127
49896 :205,254,207,144,024,173,215
49902 :246,207,205,245,207,144,212
49908 :008,169,003,141,244,207,248
49914 :076,026,195,169,002,141,091
49920 :244,207,076,026,195,173,153
49926 :246,207,205,245,207,144,236
49932 :008,169,004,141,244,207,017
49938 :076,026,195,169,005,141,118
49944 :244,207,173,247,207,141,219
49950 :253,207,173,248,207,141,235
49956 :254,207,173,246,207,141,240
49962 :241,207,141,240,207,205,003
49968 :245,207,144,008,173,245,046
49974 :207,141,240,207,176,006,007
49980 :173,245,207,141,241,207,250
49986 :173,241,207,208,001,096,224
49992 :173,244,207,010,010,168,116
49998 :185,105,195,141,102,196,234
50004 :185,106,195,141,103,196,242
50010 :185,107,195,141,131,196,021
50016 :185,108,195,141,132,196,029
```



```

50022 :076,091,196,009,196,167,069
50028 :195,167,195,009,196,167,013
50034 :195,197,195,197,195,167,236
50040 :195,197,195,137,195,137,152
50046 :195,197,195,137,195,009,030
50052 :196,009,196,137,195,165,006
50058 :253,041,007,073,007,240,247
50064 :008,230,253,208,017,230,066
50070 :254,208,013,024,165,253,043
50076 :105,057,133,253,165,254,099
50082 :105,001,133,254,096,165,148
50088 :253,041,007,208,015,056,236
50094 :165,253,233,057,133,253,244
50100 :165,254,233,001,133,254,196
50106 :208,008,165,253,208,002,006
50112 :198,254,198,253,096,238,149
50118 :249,207,173,249,207,201,204
50124 :004,208,166,169,000,141,230
50130 :249,207,056,165,253,233,093
50136 :008,133,253,176,002,198,218
50142 :254,173,249,207,170,173,168
50148 :250,207,141,251,207,169,173
50154 :003,141,252,207,138,240,191
50160 :015,014,251,207,014,251,224
50166 :207,014,252,207,014,252,168
50172 :207,202,208,241,173,252,255
50178 :207,073,255,141,252,207,113
50184 :096,173,249,207,208,018,191
50190 :024,165,253,105,008,133,190
50196 :253,165,254,105,000,133,162
50202 :254,169,004,141,249,207,026
50208 :206,249,207,173,249,207,043
50214 :170,173,250,207,141,251,206
50220 :207,169,003,141,252,207,255
50226 :138,240,015,014,251,207,147
50232 :014,251,207,014,252,207,233
50238 :014,252,207,202,208,241,162
50244 :173,252,207,073,255,141,145
50250 :252,207,096,160,000,177,198
50256 :253,045,252,207,013,251,077
50262 :207,141,255,207,096,173,141
50268 :241,207,141,242,207,074,180
50274 :141,243,207,032,234,234,165
50280 :032,077,196,173,243,207,008
50286 :024,109,208,207,141,243,050
50292 :207,176,005,205,241,207,133
50298 :144,009,237,241,207,141,077
50304 :243,207,032,234,234,032,086
50310 :077,196,160,000,173,255,227
50316 :207,145,253,206,242,207,120
50322 :208,209,234,096,032,253,154
50328 :174,032,158,173,032,170,123
50334 :177,152,041,003,141,250,154
50340 :207,096,162,014,072,138,085
50346 :072,152,072,032,095,192,017
50352 :169,006,141,033,238,169,134
50358 :014,141,032,208,169,147,125
50364 :032,210,255,173,238,207,023
50370 :141,000,003,173,239,207,189
50376 :141,001,003,104,168,104,209
50382 :170,104,108,000,003,032,111
50388 :253,174,032,158,173,032,010
50394 :170,177,170,240,003,076,030
50400 :166,196,192,153,144,003,054
50406 :076,166,196,140,236,207,227
50412 :032,253,174,032,158,173,034
50418 :032,170,177,170,240,003,010
50424 :076,166,196,192,193,144,191
50430 :003,076,166,196,140,237,048
50436 :207,096,120,165,253,072,149
50442 :165,254,072,169,225,141,012
50448 :040,003,169,142,032,210,100
50454 :255,173,014,220,041,254,211
50460 :141,014,220,165,001,041,098
50466 :251,133,001,169,000,133,209
50472 :251,169,209,133,252,169,199
50478 :000,133,253,169,008,133,230
50484 :254,160,000,177,251,145,015
50490 :253,200,208,249,169,208,065
50496 :133,252,230,254,177,251,081
50502 :145,253,200,208,249,165,010
50508 :001,009,004,133,001,173,141
50514 :014,220,009,001,141,014,225
50520 :220,169,237,141,040,003,130
50526 :088,104,133,254,104,133,142
50532 :253,096,032,253,174,032,172
50538 :158,173,032,163,182,032,078
50544 :166,182,208,003,076,138,117
50550 :198,141,242,207,165,034,081

```

```

50556 :133,251,141,245,207,165,242
50562 :035,133,252,141,246,207,120
50568 :165,253,072,165,254,072,093
50574 :160,000,177,251,201,032,195
50580 :208,003,076,097,198,141,103
50586 :243,207,173,236,207,201,141
50592 :153,144,023,169,000,141,022
50598 :236,207,173,237,207,201,147
50604 :008,176,006,169,200,141,104
50610 :237,207,056,233,000,141,036
50616 :237,207,173,237,207,201,166
50622 :192,144,006,169,192,141,010
50628 :237,207,024,105,007,141,149
50634 :015,208,173,253,207,072,106
50640 :173,254,207,072,173,236,043
50646 :207,141,253,207,173,015,186
50652 :208,141,254,207,032,161,199
50658 :193,104,141,254,207,104,205
50664 :141,253,207,169,000,133,111
50670 :252,173,243,207,201,032,066
50676 :176,003,076,166,196,201,038
50682 :096,144,003,076,166,196,163
50688 :056,233,032,010,038,252,109
50694 :010,038,252,010,038,252,094
50700 :133,251,024,165,232,105,174
50706 :008,133,252,160,000,169,228
50712 :008,133,002,177,251,141,224
50718 :240,207,152,072,173,240,090
50724 :207,234,234,010,141,240,078
50730 :207,144,024,160,000,173,238
50736 :252,207,073,255,049,253,113
50742 :234,234,234,234,234,234,178
50748 :208,007,177,253,013,251,201
50754 :207,145,253,032,009,196,140
50760 :198,002,208,214,032,137,095
50766 :195,169,008,133,002,032,105
50772 :197,195,198,002,208,249,109
50778 :104,168,200,192,008,144,138
50784 :182,173,236,207,024,105,255
50790 :008,141,236,207,206,242,118
50796 :207,240,021,238,245,207,242
50802 :208,003,238,246,207,173,165
50808 :245,207,133,251,173,246,095
50814 :207,133,252,076,142,197,109
50820 :104,133,254,104,133,253,089
50826 :169,000,141,236,207,173,040
50832 :237,207,201,008,176,005,210
50838 :169,200,141,237,207,056,136
50844 :233,008,141,237,207,096,054
50850 :032,253,174,165,251,072,085
50856 :165,252,072,169,032,133,223
50862 :252,169,000,133,251,168,123
50868 :162,031,173,250,207,141,120
50874 :243,207,010,010,141,244,017
50880 :207,010,010,141,245,207,244
50886 :010,010,141,246,207,177,221
50892 :251,240,064,041,192,205,173
50898 :246,207,208,006,177,251,025
50904 :041,063,145,251,177,251,120
50910 :240,047,041,048,205,245,024
50916 :207,208,006,177,251,041,094
50922 :207,145,251,177,251,240,225
50928 :030,041,012,205,244,207,211
50934 :208,006,177,251,041,243,148
50940 :145,251,177,251,240,013,049
50946 :041,003,205,243,207,208,141
50952 :006,177,251,041,252,145,112
50958 :251,200,208,185,230,252,060
50964 :202,208,180,198,252,165,201
50970 :251,201,064,240,012,169,195
50976 :064,133,251,160,192,162,226
50982 :001,024,144,161,234,104,194
50988 :133,252,104,133,251,096,245
50994 :073,206,079,070,198,067,231
51000 :204,080,195,080,176,080,103
51006 :177,080,178,080,179,080,068
51012 :069,206,080,204,068,210,137
51018 :067,210,080,210,000,000,129
51024 :234,234,234,234,234,234,204
51030 :234,234,234,234,234,038,014
51036 :192,091,192,133,192,161,029
51042 :198,164,192,181,192,253,254
51048 :192,067,193,149,196,044,177
51054 :194,058,194,210,196,101,039
51060 :197,234,234,032,115,000,160
51066 :032,128,199,076,174,167,130
51072 :240,027,233,128,144,024,156
51078 :201,076,144,023,201,089,100
51084 :176,019,243,075,010,168,053

```

```

51090 :185,092,199,072,185,091,202
51096 :199,072,076,115,000,096,198
51102 :076,165,169,076,243,167,030
51108 :032,008,200,201,204,144,185
51114 :015,173,055,200,233,076,154
51120 :141,055,200,169,199,162,078
51126 :050,076,190,199,169,160,002
51132 :162,158,141,050,167,142,240
51138 :049,167,141,058,167,142,150
51144 :057,167,032,249,199,076,212
51150 :026,167,032,008,200,173,044
51156 :252,165,201,160,208,015,189
51162 :169,199,162,050,032,026,088
51168 :200,032,249,199,160,000,040
51174 :076,184,165,169,160,162,122
51180 :158,032,026,200,032,249,165
51186 :199,189,000,002,076,007,203
51192 :166,173,054,200,072,173,062
51198 :055,200,174,056,200,172,087
51204 :057,200,040,096,008,141,034
51210 :055,200,142,056,200,140,035
51216 :057,200,104,141,054,200,004
51222 :173,055,200,096,141,190,109
51228 :165,216,142,189,165,141,022
51234 :001,166,142,000,166,202,199
51240 :224,255,208,003,056,233,251
51246 :001,141,252,165,142,251,230
51252 :165,096,255,255,255,255,053
51258 :255,255,162,032,160,000,154
51264 :169,160,133,252,169,000,179
51270 :133,251,177,251,145,251,254
51276 :200,208,249,230,252,202,137
51282 :208,244,234,169,076,141,130
51288 :225,167,141,004,166,169,192
51294 :119,141,226,167,169,199,091
51300 :141,227,167,169,208,141,129
51306 :005,166,169,199,141,006,024
51312 :166,169,164,141,006,003,249
51318 :169,199,141,007,003,169,038
51324 :000,141,254,207,141,253,096
51330 :207,141,252,207,141,251,049
51336 :207,141,236,207,141,237,025
51342 :207,165,001,041,254,133,175
51348 :001,096,255,013,013,013,027

```

Program 2: Color Plotter Demo

For instructions on entering this listing, please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!.

```

14 REM COLOR PLOTTER 64:rem 92
18 REM *** INITIALIZE FOR DEM
O1***** :rem 32
20 PEN,1:REM START USING PEN1
:rem 232
25 P0,0:REM SET BKGRND COLOR=B
LACK :rem 30
30 P1,12:REM SET PEN1=GRAY
:rem 1
35 P2,14:REM SET PEN2=LT BLUE
:rem 159
40 P3,5:REM SET PEN3=GREEN
:rem 22
45 IN,:REM TURN ON HI-RES SCRE
EN :rem 152
47 CL,:REM CLEAR HI-RES SCREEN
:rem 19
50 REM*** DEMO1, RANDOM SYMMET
RY***** :rem 186
52 CR,0,192:PR,"DESIGNS IN":P
R,0":PR,"RANDOM SYMMETRY"
:rem 243
53 X1=79:Y1=100:X2=79:Y2=100:X
4=79:Y4=100 :rem 60
54 CR,0,0:PR,"PRESS A KEY TO C
ONT":PEN,2:PL,X1,Y1
:rem 134
55 DX=INT(RND(0)*50)-25:DY=INT
(RND(0)*80)-40:PEN,2:rem 90
60 X1=X1+DX:IFX1>159THENX1=159
:rem 63
62 IFX1<0THENX1=0 :rem 17

```



```

64 Y1=Y1+DY:IFY1>170THENY1=170      :rem 58
66 IFY1<9THENY1=9                    :rem 41
68 X2=X2-DX:IFX2>159THENX2=159      :rem 77
69 IFX2<0THENX2=0                    :rem 26
70 Y2=Y2+DY:IFY2>170THENY2=170      :rem 59
72 IFY2<9THENY2=9                    :rem 40
74 DR,X1,Y1:X3=X1:Y3=Y1:PEN,3:      :rem 119
  PL,X4,Y4:DR,X2,Y2:X4=X2:Y4=Y2
75 PL,X3,Y3                          :rem 119
76 K=K+1:IFK>15THENK=0:FORJ=0T      :rem 224
  O500:NEXTJ:PC,:PEN,2:PC,:GO
  TO55                                :rem 88
78 GETA$:IFA$=""THEN55:rem 252
79 POKE198,0:CL,                    :rem 146
210 REM***DEMO2 GEOMETRIC PAT      :rem 5
  TERN***                               :rem 5
220 CL,:REM CLEAR SCREEN
      :rem 148
225 PEN,3:CR,40,100:PR,"NOW LE      :rem 27
  T'S SEE":CR,40,90:PR,"A PA
  TERN"                                :rem 18
230 X1=0:Y1=0:X2=159:Y2=0:X3=1     :rem 175
  59:Y3=199:X4=0:Y4=199
240 PEN,1:PL,X1,Y1:DR,X2,Y2
      :rem 84
245 PEN,2:DR,X3,Y3                  :rem 27
250 PEN,1:DR,X4,Y4                  :rem 24
255 PEN,2:DR,X1,Y1                  :rem 24
260 X1=X1+5:Y2=Y2+6.25:X3=X3-5     :rem 66
  :Y4=Y4-6.25
265 IFX1<160THEN240                :rem 77
268 PEN,3                            :rem 226
269 IFY1=50THEN280                 :rem 37
270 X1=50:Y1=50:X2=110:Y2=50:X     :rem 92
  3=110:Y3=150:X4=50:Y4=150:
  GOTO240
280 PEN,3:PC,:K=0                  :rem 199
290 FORI=1TO15:P1,I:P2,16-I:FO      :rem 9
  RJ=0TO400:NEXTJ
295 GETA$:IFA$=""THENNEXTI:K=K     :rem 0
  +1:IFK<2THEN290
300 P1,15:P2,3:P3,14:CR,65,100     :rem 32
  :PEN,3:PR,"DONE"
310 FORI=0TO500:NEXT:PEN,1:PC,      :rem 81
  :FORI=0TO500:NEXT:PEN,2:PC
315 FORI=0TO200:NEXT:CL,
      :rem 217
320 CR,0,160:PR,"MORE RANDOM D      :rem 150
  ESIGNS"
330 FORI=0TO800:NEXT:CL,
      :rem 220
350 POKE198,0:PEN,1                :rem 63
400 REM***DEMO3, RANDOM DESIG      :rem 152
  NS*****
402 P0,0:REM SET PEN 0(BKGRND)     :rem 174
  =BLK
403 P1,1:REM SET PEN 1=COLOR 1     :rem 62
  =WHITE
404 P2,2:REM SET PEN 2=COLOR 2     :rem 157
  =RED
405 P3,3:REM SET PEN,3=COLOR 3     :rem 30
  =CYAN
406 PEN,1:REM DEFINE ACTIVE PE      :rem 147
  N =PEN1
415 CL,:REM CLEAR HI-RES SCREE      :rem 66
  N
418 N=3:REM SET NUMBER OF RAND      :rem 123
  OM PTS
420 N1=20:REM SET INTERVAL DIV      :rem 42
  IDER
423 REM NEXT LINE GENERATES RA      :rem 32
  NDOM X,Y
430 FORI=0TON:X(I)=INT(RND(0)*      :rem 11
  120)+20:Y(I)=INT(RND(1)*19
  0):NEXTI

```

```

438 REM NEXT LINE COMPUTES DEL      :rem 220
  TX,DELTY$
440 FORI=0TON-1:DX(I)=(X(I+1)-      :rem 123
  X(I))/N1:DY(I)=(Y(I+1)-Y(I
  ))/N1:NEXTI
450 DX(N)=(X(0)-X(N))/N1:DY(N)     :rem 190
  =(Y(0)-Y(N))/N1
465 REM DRAW LINES BETWEEN POI      :rem 19
  NTS
470 PL,X(0),Y(0):FORI=0TON:PEN      :rem 61
  ,I:DR,X(I),Y(I):NEXTI:PEN,
  2:DR,X(0),Y(0):PEN,3
476 REM COMPUTE NEW X AND Y VA      :rem 224
  LUES
477 REM BASED ON NEWX=OLDX+DX      :rem 255
  :rem 255
478 REM AND NEWY=OLDY+DY
      :rem 218
480 FORI=0TON:X(I)=X(I)+DX(I):      :rem 103
  Y(I)=Y(I)+DY(I):NEXTI
485 REM CHECK IF DONE              :rem 152
486 REM IF NOT, DRAW LINES
      :rem 219
487 REM BETWEEN NEW X AND Y'S
      :rem 121
488 K=K+1:IFK<N1 THEN 470
      :rem 108
491 REM KEY PRESSED?              :rem 192
492 REM IF TRUE THEN END
      :rem 88
493 REM IF NOT THEN CONTINUE
      :rem 152
500 GETA$:IFA$<>"THEN700
      :rem 140
515 REM DELAY TO VIEW GRAPHICS
      :rem 29
520 FOR I=0 TO 500:NEXTI
      :rem 46
526 REM LOOP THROUGH GENERATIO      :rem 200
  N
527 REM OF RANDOM COLORS
      :rem 170
528 REM FOR PENS 2 AND 3
      :rem 216
530 FOR I=0 TO 5:C1=INT(RND(1)*      :rem 119
  15)+1:C2=INT(RND(1)*15)+1
  :C3=INT(RND(1)*15)+1
      :rem 123
532 P1,C1:P2,C2:P3,C3
      :rem 30
534 REM TIME DELAY
      :rem 53
536 FORJ=0TO300:NEXTJ
      :rem 39
537 NEXTI
538 CR,8,188:PR,"PRESS KEY TO      :rem 214
  {SPACE}EXIT":FORI=0TO500:N
  EXTI
540 REM CLEAR SCREEN ONE PEN
      :rem 105
541 REM AT A TIME WITH DELAY
      :rem 46
545 PEN,1:PC,:FORI=0TO300:NEXT      :rem 166
  I
550 PEN,2:PC,:FORI=0TO300:NEXT      :rem 163
  I
560 PEN,3:PC,:FORI=0TO300:NEXT      :rem 165
  I
580 REM CHECK FOR KEYPRESS
      :rem 60
590 REM IF TRUE THEN EXIT
      :rem 186
600 REM ELSE CONTINUE
      :rem 8
610 GETA$:IFA$<>"THEN700
      :rem 142
640 K=0:GOTO415
      :rem 95
700 REM ***DEMO4 GLOBAL GRAPH      :rem 80
  ICS*****
710 CL,:P0,0:P1,1:P2,6:P3,2:PE      :rem 52
  N,1
730 R=60:PI=3.14159
      :rem 4
731 X=0:Y=0:Z=0:GOSUB900:PL,SX

```

```

  ,SY:X=0:Y=0:Z=65:GOSUB900:
  DR,SX,SY :rem 70
732 SX=SX+3:CR,SX,SY:PR,"Z"
      :rem 177
733 X=0:Y=0:Z=0:GOSUB900:PL,SX
  ,SY:Y=65:GOSUB900:DR,SX,SY
  :SY=SY+3:CR,SX,SY :rem 243
734 PR,"Y":X=0:Y=0:Z=0:GOSUB90
  0:PL,SX,SY:X=80:Y=0:Z=0:GO
  SUB900:DR,SX,SY :rem 235
735 SY=SY+4:CR,SX,SY:PR,"X":PE
  N,2 :rem 48
740 FORTH=0TOPISTEP PI/10
      :rem 44
750 Z=R*COS(TH):R1=R*SIN(TH)
      :rem 206
760 X=R1*COS(1.9*PI):Y=R1*SIN(
  1.9*PI) :rem 131
770 GOSUB900:PL,SX,SY :rem 60
775 IFTH=0THENNEXTTH :rem 69
780 FOR BETA=0TO 2*PISTEP PI/1
  0: :rem 70
790 X=R1*COS(BETA):Y=R1*SIN(BE
  TA): :rem 66
800 GOSUB900:DR,SX,SY :rem 48
810 NEXT BETA :rem 244
820 NEXT TH :rem 117
830 PEN,3 :rem 221
835 X=0:Y=0:Z=R:GOSUB900:PL,SX
  ,SY :rem 96
840 FORTH=0 TO 2*PI STEP PI/10
      :rem 137
841 X=0:Y=0:Z=R:GOSUB900:PL,SX
  ,SY :rem 93
845 FOR BETA=0 TO PI STEP PI/1
  0 :rem 178
850 Z=R*COS(BETA):X=R*SIN(BETA
  )*COS(TH):Y=R*SIN(BETA)*SI
  N(TH) :rem 68
855 GOSUB900:DR,SX,SY:NEXT BET
  A:X=0:Y=0:Z=-R:GOSUB900:DR
  ,SX,SY :rem 240
860 NEXT TH :rem 121
865 PEN,1:PC,:FORI=0TO1000:NEX
  T :rem 144
866 FORI=0TO10:C2=INT(RND(0)*1
  6):C3=INT(RND(0)*16):P2,C2
  :FORJ=0TO150:NEXTJ:rem 179
867 P3,C3:FORJ=0TO150:NEXTJ:NE
  XTI :rem 96
870 PEN,1:CR,4,4:PR,"THAT'S AL
  L FOLKS" :rem 189
875 FORI=0 TO 32:P1,I:FORJ=0TO
  50:NEXTJ,I :rem 145
879 REM ***CLOSING CEREMONIES
  ***** :rem 41
880 CL,:P0,14:P1,6:CR,15,95
      :rem 190
885 PR,"COLOR PLOTTER 64"
      :rem 202
888 PR," :P2,1:PEN,1 :rem 77
895 FORI=0 TO 1000:NEXTI
      :rem 105
897 P3,6:FORI=0TO101:PL,0,I:DR
  ,159,I:PL,0,199-I:DR,159,1
  99-I:NEXTI :rem 105
898 OFF,:POKE53281,6:POKE53280
  ,14:PRINT"[CLR]" :rem 24
899 END :rem 129
900 S1=SIN(PI/4):C1=COS(PI/4):
  S2=SIN(PI/4):C2=COS(PI/4):
  D=100:PH=120 :rem 237
905 XE=-X*S1+Y*C1 :rem 205
910 YE=-X*C1+Y*S1 :rem 62
      :rem 25
915 ZE=-X*S2+Y*S2 :rem 239
  :Z=C2+P
  H
920 SX=D*XE/ZE+80 :rem 31
925 SY=D*YE/ZE+100 :rem 31
930 RETURN :rem 124
1000 END :rem 152 ©

```


Apple II

Pull-Down Menus

Lee Swoboda

With this program, you can add attractive, Macintosh-like pull-down menus and instruction screens to any BASIC program. For all Apple II-series computers with DOS 3.3 or ProDOS.

Apple's Macintosh has forced programmers to reevaluate software for the venerable Apple II. Recent Apple II programs go to some lengths to emulate the Mac's pull-down menus and icons to make the software less intimidating. No amount of programming magic will turn an Apple II into a Mac, but the following programs let you add pull-down menus and instruction screens to any Applesoft BASIC program.

Two programs are needed to make this happen: a BASIC subroutine you can easily add to the end of any BASIC program, and a machine language (ML) routine that temporarily saves and later restores the text behind the pull-down menu. Although BASIC takes several seconds to move an entire text screen, machine language performs the same task in an instant. Don't worry if you're unfamiliar with machine language. We've listed a BASIC filemaker program that automatically creates the ML routine for you.

Starting Out

To get "Pull-Down Menus" running, you need to type in and save

both programs listed below. Program 1 is the filemaker program that automatically saves the ML routine to disk as a binary file named MOVE. Type it in and save a copy, then run it. Program 2 is an example BASIC program that demonstrates pull-down menus. It is designed to run with either DOS 3.3 or ProDOS. If you're using DOS 3.3, type the program exactly as shown. For ProDOS, change line 150 as shown here:

```
75 150 HIMEM:35840
```

Since this program loads the MOVE file from disk, be sure to put the right disk in the drive before you run it. Once you have it running, the program simulates a crude word processor with a screenful of text. You can type on the screen and move the cursor with the arrow keys (use CTRL-J and CTRL-K for the up and down cursor keys if you don't have a IIe or IIc). When you press the ESC key, the pull-down menu appears. Then you can move the selection cursor inside the menu with the cursor keys, and choose a selection by pressing RETURN. Note that the text behind the menu is always restored correctly when you leave the menu.

Create Your Own Menus

The important part of the demonstration program is the subroutine beginning at line 63000. This routine allows you to add pull-down menus to your own programs with

a minimum of work: It generates the window shape and calls MOVE at the appropriate time. All you need to do is add lines 63000-63500 to the end of any BASIC program, and follow the steps listed below:

1. Your program must BLOAD MOVE as shown in lines 180-190 before calling the ML routine.
2. Set HIMEM *immediately* (line 150) before you declare any strings or open any files. Use a value of 36914 for DOS 3.3 or 35840 for ProDOS.
3. Set the variable NN to equal the maximum number of items you will have in the largest menu (line 160). The menu subroutine automatically determines how many items are in each menu and adjusts the size of the menu window accordingly.
4. DIMension the string array MM\$ for the number of menu selection labels you need (line 170). Then fill each array element with a label string, either by READING string DATA as in lines 200-220 or by defining each string expressly (with statements like MM\$(1)="Leave menu").
5. Define the string variable TITLE\$ as your menu title (line 470). The menu subroutine automatically centers the title for you.

6. Provide some means of branching to the rest of your program based on the value of the variable SELECT (line 480). This may be done with ON SELECT GOTO as in this program, or with ON SELECT GOSUB or a series of IF-THEN statements.

Lines 690-850 of the program show how to use MOVE to add instructions to your programs without losing the original screen. In this case, CTRL-I is used to request instructions.

Using A Mouse

If you have an Apple mouse, you can use it to call the menu and make selections. This requires several changes in the demonstration program. First, delete lines 320, 330, and 63360-63460. Then change lines 310, 450, and 63350 as follows:

```

E9 310 PRINT "PRESS ESC KEY OR M
      OUSE BUTTON FOR MENU";
98 450 GOTO 311
66 63350 HTAB 3: VTAB SELECT + 2
      : INVERSE : PRINT ">" C
      HR$ (8); : NORMAL
  
```

Now add these lines:

```

D2 235 PRINT : HOME : PRINT D$ "P
      R#2": PRINT CHR$ (1): PRI
      NT D$ "PR#0"
#A 311 VTAB 15: HTAB 1: PRINT CH
      R$ (13) D$ "IN#2"
55 312 VTAB 23: HTAB 40: INPUT "
      "; X, Y, B0
#F 313 IF B0 = 1 OR B0 < 0 THEN
      316
80 314 VTAB CV: HTAB CH: FLASH :
      PRINT " "; : NORMAL
#B 315 GOTO 312
C2 316 PRINT D$ "IN#0"
57 317 IF B0 = 1 THEN IN$ = CHR$
      (27): GOTO 319
#F 318 IN$ = CHR$ ( PEEK ( - 163
      84) - 128)
34 319 POKE - 16368, 0
#D 320 VTAB CV: HTAB CH: PRINT "
      ";
F7 395 IF CH > 0 THEN HTAB CH
79 396 IF CV > 0 THEN VTAB CV
F8 63360 VTAB 1: HTAB LMAX + 5:
      PRINT : HTAB LMAX + 5:
      PRINT D$ "IN#2": VTAB 1:
      HTAB LMAX + 5: INPUT "
      "; X0, Y0, B0
61 63370 IF B0 = 1 THEN 63430
#B 63380 Y0 = INT ( Y0 / 10)
#D 63390 VTAB SELECT + 2: HTAB 3
      : PRINT " ";
C9 63400 SELECT = Y0: IF SELECT
      > NITEMS THEN SELECT =
      NITEMS
3D 63410 IF SELECT < 1 THEN SELE
      CT = 1
#4 63420 GOTO 63350
#C 63430 PRINT D$ "IN#0"
  
```

If you're using ProDOS, change line 311 to the following:

```

#I 311 VTAB 15: HTAB 1: PRINT D$
      "IN#2"
  
```

The PR#2 and IN#2 in lines 235, 311, and 63360 assume the mouse interface is in slot 2. If your interface is in another slot, substitute the appropriate slot number in those lines. If you have an Apple IIc, substitute PR#4 and IN#4 for PR#2 and IN#2 in those lines. (Although the IIc doesn't have *physical* slots, the mouse is in *logical* slot 4.) Once you've made all the changes, install the mouse and rerun the program. It works much as described above, using the mouse button instead of RETURN for menu selections.

For instructions on entering these listings, please refer to "COMPUTE's Guide to Typing In Programs" published bimonthly in COMPUTE.

Program 1: MOVE Filemaker

```

#7 100 REM BASIC PROGRAM FOR
#B 110 REM GENERATING THE
44 120 REM BINARY FILE
28 130 REM 'MOVE'
4C 140 HOME
1C 150 VTAB 12: PRINT "WORKING .
      .."
92 160 FOR I = 0 TO 459
21 170 READ A
CC 180 POKE 36915 + I, A
#I 190 VTAB 12: HTAB 13: PRINT I
      + 1
#E 200 NEXT I
FF 210 PRINT CHR$ (4) "BSAVE MOVE
      ,A36915, L460"
2A 220 PRINT : PRINT "DONE!"
#B 230 DATA 173, 89, 170, 72, 165, 21
      7, 72, 165, 118, 72, 169
3F 240 DATA 2, 133, 118, 169, 255, 13
      3, 217, 169, 191, 133, 51
50 250 DATA 169, 0, 133, 243, 76, 86,
      144, 76, 86, 76, 86
#B 260 DATA 76, 86, 169, 80, 133, 133
      , 169, 144, 160, 0, 162
33 270 DATA 5, 32, 254, 144, 76, 104,
      144, 76, 104, 169, 102
35 280 DATA 133, 133, 169, 144, 160,
      0, 162, 1, 32, 254, 144
97 290 DATA 169, 0, 141, 80, 144, 169
      , 4, 141, 81, 144, 173
F5 300 DATA 81, 144, 201, 8, 48, 14, 2
      08, 9, 173, 80, 144
#B 310 DATA 201, 0, 144, 5, 240, 3, 76
      , 234, 144, 173, 80
7D 320 DATA 144, 141, 161, 144, 173,
      81, 144, 141, 162, 144, 173
99 330 DATA 0, 16, 141, 82, 144, 169,
      0, 141, 83, 144, 24
#I 340 DATA 169, 255, 109, 102, 144,
      141, 84, 144, 169, 145, 109
#D 350 DATA 103, 144, 141, 85, 144, 1
      73, 84, 144, 141, 204, 144
#D 360 DATA 173, 85, 144, 141, 205, 1
      44, 173, 82, 144, 141, 0
#D 370 DATA 16, 24, 173, 102, 144, 10
      5, 1, 141, 102, 144, 173
#E 380 DATA 103, 144, 105, 0, 141, 10
      3, 144, 238, 80, 144, 208
#3 390 DATA 3, 238, 81, 144, 76, 127,
      144, 104, 133, 118, 104
35 400 DATA 133, 217, 104, 141, 89, 1
      70, 169, 141, 141, 1, 2
  
```

```

C2 410 DATA 169, 1, 133, 52, 96, 133,
      134, 132, 135, 160, 0
#B 420 DATA 169, 0, 145, 133, 200, 20
      8, 2, 230, 134, 138, 208
F3 430 DATA 4, 198, 135, 48, 4, 202, 7
      6, 4, 145, 96, 173
#B 440 DATA 89, 170, 72, 165, 217, 72
      , 165, 118, 72, 169, 2
#A 450 DATA 133, 118, 169, 255, 133,
      217, 169, 191, 133, 51, 169
44 460 DATA 0, 133, 243, 76, 60, 145,
      76, 60, 76, 60, 76
#E 470 DATA 60, 169, 54, 133, 133, 16
      9, 145, 160, 0, 162, 5
#4 480 DATA 32, 228, 145, 76, 78, 145
      , 76, 78, 169, 76, 133
7A 490 DATA 133, 169, 145, 160, 0, 16
      2, 1, 32, 228, 145, 169
#7 500 DATA 255, 141, 54, 145, 169, 1
      45, 141, 55, 145, 173, 55
5A 510 DATA 145, 201, 149, 48, 14, 20
      8, 9, 173, 54, 145, 201
#5 520 DATA 255, 144, 5, 240, 3, 76, 2
      08, 145, 173, 54, 145
#7 530 DATA 141, 135, 145, 173, 55, 1
      45, 141, 136, 145, 173, 0
1E 540 DATA 16, 141, 56, 145, 169, 0,
      141, 57, 145, 24, 169
#B 550 DATA 0, 109, 76, 145, 141, 58,
      145, 169, 4, 109, 77
7A 560 DATA 145, 141, 59, 145, 173, 5
      8, 145, 141, 178, 145, 173
4D 570 DATA 59, 145, 141, 179, 145, 1
      73, 56, 145, 141, 0, 16
#E 580 DATA 24, 173, 76, 145, 105, 1,
      141, 76, 145, 173, 77
#4 590 DATA 145, 105, 0, 141, 77, 145
      , 238, 54, 145, 208, 3
#7 600 DATA 238, 55, 145, 76, 101, 14
      5, 104, 133, 118, 104, 133
22 610 DATA 217, 104, 141, 89, 170, 1
      69, 141, 141, 1, 2, 169
33 620 DATA 1, 133, 52, 96, 133, 134,
      132, 135, 160, 0, 169
41 630 DATA 0, 145, 133, 200, 208, 2,
      230, 134, 138, 208, 4
C9 640 DATA 198, 135, 48, 4, 202, 76,
      234, 145, 96
  
```

Program 2: Apple II Pull-Down Menus

```

1C 100 REM LINES 150-850 ARE
#B 110 REM A SAMPLE PROGRAM
#A 120 REM DEMONSTRATING
#D 130 REM PULL-DOWN MENUS
#A 140 REM
5B 150 HIMEM: 36914: REM FOR DOS
      3.3 ONLY. FOR PRODOS USE
      35840
14 160 NN = 20: REM MAXIMUM NU
      MBER OF ITEMS IN ANY MENU
C6 170 DIM MM$(NN): REM MM$=MENU
      SELECTIONS
62 180 D$ = CHR$ (4)
5C 190 PRINT D$ "BLOAD MOVE"
#D 200 FOR I = 1 TO 5
#E 210 READ MM$(I)
#2 220 NEXT I
4B 230 HOME
41 240 FOR I = 1 TO 15
57 250 PRINT "THIS IS A SAMPLE P
      ULL-DOWN MENU. ";
#A 260 NEXT I
#3 270 CV = 13: CH = 16
12 280 VTAB 21: HTAB 1: PRINT "--
      -----": REM 39 DA
      SHEB
#E 290 PRINT TAB (5) "USE ARROW K
      EYS TO MOVE CURSOR"
35 300 PRINT TAB (5) "PRESS CTRL-
      I FOR INSTRUCTIONS"
  
```



```

34 310 PRINT TAB( 8) "PRESS ESC K
    EY FOR MENU ";
8A 320 VTAB CV: HTAB CH
91 330 GET IN$
62 340 IF IN$ = CHR$ (9) THEN GO
    SUB 690
31 350 IF IN$ = CHR$ (27) THEN 4
    70
CA 360 IF IN$ = CHR$ (8) THEN CH
    = CH - 1
71 370 IF IN$ = CHR$ (21) THEN C
    H = CH + 1
09 380 IF IN$ = CHR$ (11) THEN C
    V = CV - 1
53 390 IF IN$ = CHR$ (10) THEN C
    V = CV + 1
8A 400 IF IN$ > CHR$ (31) THEN P
    RINT IN$; CH = CH + 1: IF
    CH > 40 THEN CH = 1: CV =
    CV + 1
73 410 IF CH < 1 THEN CH = 1
C6 420 IF CH > 40 THEN CH = 40
7E 430 IF CV < 1 THEN CV = 1
4F 440 IF CV > 20 THEN CV = 20
9A 450 GOTO 320
36 460 REM THE FOLLOWING LINE AC
    TIVATES THE MENU
33 470 TITLE$ = "MENU": GOSUB 63
    040
59 480 ON SELECT GOTO 280,490,50
    0,510,590
59 490 HOME : PRINT "THE FIRST F
    UNCTION OF YOUR PROGRAM G
    OES HERE": GOTO 520
74 500 HOME : PRINT "THE SECOND
    FUNCTION OF YOUR PROGRAM
    GOESHERE": GOTO 520
08 510 HOME : PRINT "THE THIRD F
    UNCTION OF YOUR PROGRAM G
    OES HERE": GOTO 520
3F 520 VTAB 24: PRINT "PRESS ANY
    KEY TO CONTINUE ... ";
07 530 GET A$
35 540 FOR I = 1 TO NITEMS
97 550 MM$(I) = ""
E0 560 NEXT I
08 570 RESTORE
1F 580 GOTO 200
25 590 HOME : PRINT "GOOD-BYE!":
    END
99 600 DATA "LEAVE MENU"
C0 610 DATA "FIRST SELECTION"
71 620 DATA "SECOND SELECTION"
80 630 DATA "THIRD SELECTION"
AE 640 DATA "QUIT PROGRAM"
98 650 END
93 660 REM
8E 670 REM INSTRUCTIONS
97 680 REM
6C 690 CALL 36915
05 700 HOME : INVERSE : PRINT BL
    ANK$
0C 710 VTAB 1: HTAB 14: PRINT "I
    NSTRUCTIONS": NORMAL : VT
    AB 3
68 750 PRINT "FOR THIS SAMPLE PR
    OGRAM, YOU CAN MOVE"
12 760 PRINT "THE CURSOR WITH TH
    E ARROW KEYS AND TYPE"
39 770 PRINT "ON THE SCREEN. WH
    EN YOU PRESS ESC, THE"
64 780 PRINT "COMPUTER WILL DISP
    LAY A PULL DOWN MENU."
38 790 PRINT "USE THE ARROW KEYS
    TO MOVE THE SELEC-"
47 800 PRINT "TION CURSOR TO THE
    DESIRED OPTION, THEN"
9A 810 PRINT "PRESS RETURN TO SE
    LECT IT."
42 820 VTAB 24: PRINT "PRESS ANY
    KEY TO CONTINUE ... ";
0A 830 GET A$
61 840 CALL 37145

```

```

22 850 RETURN
A5 62999 REM #63000
24 63000 REM
EA 63010 REM PULL-DOWN MENU
81 63020 REM SUBROUTINE
3C 63030 REM
90 63040 BLANK$ = "
    ": REM 39 SPACES
A4 63050 LMAX = 0: NITEMS = 0
53 63060 REM DETERMINE MENU SIZE
24 63070 FOR II = 1 TO NN
59 63080 IF MM$(II) = "" THEN 63
    120
A3 63090 LL = LEN (MM$(II))
62 63100 IF LL > LMAX THEN LMAX
    = LL
C2 63110 NITEMS = NITEMS + 1
CC 63120 NEXT II
65 63130 IF LMAX > 20 THEN PRINT
    "NAME IS TOO LONG": EN
    D
83 63140 REM SAVE SCREEN TEXT
98 63150 CALL 36915
A3 63160 REM DISPLAY MENU
8A 63170 POKE 32,5: POKE 33,LMAX
    + 5: POKE 34,0: POKE 3
    5,NITEMS + 4: REM SET T
    EXT WINDOW FOR MENU SIZ
    E
6F 63180 HOME
32 63190 INVERSE : PRINT LEFT$ (
    BL$,LMAX + 5)
04 63200 VTAB 1: HTAB 3 + ((LMAX
    - LEN (TITLE$)) / 2):
    PRINT TITLE$
C0 63210 FOR II = 1 TO NITEMS +
    2
0C 63220 VTAB II + 1: HTAB 1: PR
    INT " ";
6C 63230 HTAB LMAX + 5: PRINT "
    ";
E0 63240 NEXT II
C0 63250 POKE 35,24
0F 63260 PRINT LEFT$ (BL$,LMAX +
    5);
17 63270 POKE 35,NITEMS + 4
00 63280 VTAB 1
70 63290 NORMAL
AB 63300 FOR II = 1 TO NITEMS
78 63310 HTAB 4: VTAB II + 2: PR
    INT MM$(II)
04 63320 NEXT II
03 63330 REM MAKE SELECTION
99 63340 SELECT = 1
88 63350 HTAB 3: VTAB SELECT + 2
    : PRINT ">" CHR$ (8);
43 63360 GET SELECT$
90 63370 HTAB 3: VTAB SELECT + 2
    : PRINT " "
A4 63380 IF SELECT$ = CHR$ (13)
    THEN 63480
0F 63390 IF SELECT$ < > CHR$ (10
    ) AND SELECT$ < > CHR$
    (21) THEN 63430
18 63400 SELECT = SELECT + 1
06 63410 IF SELECT > NITEMS THEN
    SELECT = 1
04 63420 GOTO 63350
56 63430 IF SELECT$ < > CHR$ (11
    ) AND SELECT$ < > CHR$
    (8) GOTO 63350
40 63440 SELECT = SELECT - 1
83 63450 IF SELECT < 1 THEN SELE
    CT = NITEMS
24 63460 GOTO 63350
5C 63470 REM RESTORE SCREEN TEXT
83 63480 CALL 37145
94 63490 POKE 32,0: POKE 33,40:
    POKE 34,0: POKE 35,24:
    REM RETURN THE TEXT WI
    NDOW TO NORMAL
72 63500 RETURN

```

Save Your Copies of COMPUTE!

Protect your back issues of *COMPUTE!* in durable binders or library cases. Each binder or case is custom-made in flag-blue binding with embossed white lettering. Each holds a year of *COMPUTE!*. Order several and keep your issues of *COMPUTE!* neatly organized for quick reference. (These binders make great gifts, too!)



Binders

\$8.50 each;
3 for \$24.75;

Cases:

\$6.95 each;
3 for \$20.00;
6 for \$48.00 6 for \$36.00

(Please add \$2.50 per unit for orders outside the U.S.)

Send in your prepaid order with the attached coupon

Mail to: Jesse Jones Industries
P.O. Box 5120
Dept. Code COTE
Philadelphia, PA 19141

Please send me _____ COM-
PUTE! cases binders.
Enclosed is my check or money
order for \$ _____. (U.S. funds
only.)

Name _____
Address _____
City _____
State _____ Zip _____

Satisfaction guaranteed or money
refunded.
Please allow 4-6 weeks for delivery.

Using The Atari 130XE And DOS 2.5

Tom R. Halfhill, Editor

The Atari 130XE is the first computer in Atari's XE line and by far the least expensive 128K RAM computer on the market. Here's a guide to using the new features of the 130XE and the latest version of Atari DOS.

Making good on its promise to continue supporting the 8-bit line of computers first introduced in 1979, Atari recently brought out the 130XE, its most powerful 8-bit machine yet. Atari also started distributing free copies of its new disk operating system, DOS 2.5, to solve some compatibility problems between the single-density DOS 2.0 and the enhanced-density DOS 3.

Both products are evolutionary rather than revolutionary. DOS 2.5 bears a strong resemblance to DOS 2.0 and is designed to smoothly handle both Atari disk formats. Likewise, the 130XE has much in common with the XL series and original 400/800. Because the 130XE's internal operating system is virtually identical to the 800XL's, the 130XE works with all existing Atari peripherals and nearly all the software. Nevertheless, the 130XE does incorporate some features not found on earlier Ataris:

- 128K of Random Access Memory (RAM), with the extra 64K accessible by bank-switching in 16K banks. Without bank-switching, the amount of free memory for BASIC programs remains the same as on 48K and 64K Ataris—about

32K or 37K, depending on whether DOS is booted.

- A high-speed RAM disk option for the extra 64K when DOS 2.5 is booted with a special startup file. (A RAM disk is a disk drive simulated in memory; you can save and load files much faster with a RAM disk than with a conventional disk drive, although the contents of the RAM disk are erased when power is shut off.) The RAM disk can be disabled if you want to use the extra 64K for other purposes.

- Revision C Atari BASIC. The 130XE's BASIC has been cured of the infamous lockup bug that plagued the revision A BASIC cartridge sold for the 400, 800, and 1200XL, and the even-worse bugs that infested revision B BASIC in the 600XL and 800XL when Atari tried to fix revision A.

- Enhanced Cartridge Interface (ECI) for future expansion. The expansion connector found on the rear of the 600XL and 800XL has been slightly redesigned for the 130XE. The new ECI is supposed to be more versatile than the rarely used XL connector, allowing you to add faster disk drives, hard disks, and other devices—none of which have been announced, however. (Don't confuse the ECI with the ROM cartridge slot, which is fully compatible with cartridges made for older Atari computers.)

- Chroma and luma video outputs for sharper screen displays. This allows you to hook up the 130XE to video monitors with sepa-

rate chroma and luma inputs for a much sharper image than with normal composite video. The old Atari 800 had this feature, but it was eliminated on later models.

Dual-Personality DOS

Before examining the 130XE's new features in greater detail, let's cover the new functions of DOS 2.5, since they affect all users of 8-bit Atari computers as well as 130XE owners.

First of all, if you don't have a copy of DOS 2.5, get one soon. Atari is shipping DOS 2.5 with 1050 disk drives and distributing it free through user groups, electronic bulletin boards, and the Atari forum on CompuServe. It is quickly replacing DOS 3 because it integrates the best features of existing DOS versions, is compatible with all Atari computers, and works interchangeably with both single-density (810 format) and enhanced-density (1050 format) disk drives. (Of course, enhanced density disks are still unreadable on 810 drives.)

The new DOS menu is identical to the DOS 2.0 menu except for one extra feature: option P, Format Single. Since DOS 2.5 is a dual-density DOS, it must be capable of formatting disks for both single density and enhanced density. Option P formats a disk in single density, leaving 707 sectors free (about 88K of storage). Option I, Format Disk, now defaults to enhanced density, leaving 1010 sectors free (about 126K). Also, one

existing option has been slightly changed: Option J, Duplicate Disk, now formats the target disk before copying.

Three new utility files are included with DOS 2.5. The first, SETUP.COM, lets you customize DOS in various ways without the POKEs that used to be necessary. For instance, you can significantly speed up disk accesses by turning off the write-with-verify mode. You can also set up one of three AUTORUN.SYS files: the usual RS-232 handler for the 850 Interface Module; a file which automatically boots a BASIC program; or a file which boots both the RS-232 handler and a BASIC program.

The second utility, DISKFIX.COM, can help clean up garbled disks by closing open files and verifying that allocated sectors correspond to information in the disk directory. It can even recover deleted files, as long as new data hasn't been saved over the deleted data. The third utility, COPY-32.COM, converts DOS 3 files to 2.0/2.5 format. All three utilities guide you with screen prompts and are nearly foolproof.

New Disk Commands

DOS 2.5 also makes a few additional disk commands available in BASIC. There are now two methods of reading a disk directory:

```
OPEN #1,6,0,"D:*.":FOR X=1 TO
1E9:GET #1,A:CHR$(A):NEXT X
OPEN #1,7,0,"D:*.":FOR X=1 TO
1E9:GET #1,A:CHR$(A):NEXT X
```

The first method is the same as before. But the second method identifies files in the directory which cannot be accessed from DOS 2.0 because they occupy extra sectors on an enhanced-density disk. These files are flagged by a pair of less-than/greater-than symbols, such as <FILENAME.BAS>.

Also, there are now three ways to format a disk from BASIC:

```
XIO 253,#1,0,0,"D1:"
XIO 253,#1,34,0,"D1:"
XIO 254,#1,0,0,"D1:"
```

The first XIO statement formats a disk in single density. The second formats in enhanced density (generating an error 139 if attempted on an 810 drive). The third XIO statement attempts to format in enhanced density, then switches to

single density if the drive isn't 1050-compatible.

Incidentally, if you select option J (Duplicate Disk) with DOS 2.5 when using a 1050 drive, the disk is automatically formatted in

the DOS command in BASIC. Usually this takes 10 to 20 seconds or more. But with DUP.SYS stored in the RAM disk, the DOS 2.5 menu comes up almost instantly when you type DOS.

Memory Location 54017 (130XE Only)

Bit Position Function

Bit Position	Function
0	If 1, enable OS ROM, disable RAM from \$C000-\$FFFF (default) If 0, disable OS ROM, enable RAM from \$C000-\$FFFF
1	If 0, enable BASIC ROM at \$A000-\$BFFF (default)* If 1, disable BASIC ROM, enable RAM at \$A000-\$BFFF
2-3	If 00 (decimal 0), switch first 16K bank of extra 64K into \$4000-\$7FFF If 01 (decimal 4), switch second 16K bank of extra 64K into \$4000-\$7FFF If 10 (decimal 8), switch third 16K bank of extra 64K into \$4000-\$7FFF If 11 (decimal 12), switch fourth 16K bank of extra 64K into \$4000-\$7FFF
4	If 1, deny 6502 access to extra bank (default) If 0, allow 6502 access to extra bank
5	If 1, deny ANTIC access to extra bank (default) If 0, allow ANTIC access to extra bank
6	Not presently used. Default = 1
7	If 1, disable self-test ROM, enable RAM at \$5000-\$57FF (default after powerup) If 0, enable self-test ROM, disable RAM at \$5000-\$57FF

*Note: A similar chart on page 122 of the 130XE Owner's Manual indicates that bit 1 should always be set. However, bit 1 should not be set unless you want to disable BASIC.

enhanced density before copying starts. Keep this in mind if you're duplicating a disk for someone who doesn't have an enhanced-density drive. Instead, you'll have to format the destination disk for single density (option P) and then copy the source disk one file at a time.

Instant DOS

The 130XE's extra 64K RAM can be used as either a superfast RAM disk with DOS 2.5 or as additional memory for programming. Of these two options, the RAM disk is by far the easiest to use, especially for those who aren't too familiar with bank-switching or bit manipulations.

The only accessory you need to set up a RAM disk with the 130XE is a free DOS 2.5 file called RAM-DISK.COM. When you boot DOS 2.5 on a 130XE, RAMDISK.COM automatically initializes the RAM disk and loads two DOS files: DUP.SYS and MEM.SAV. DUP.SYS is the DOS utility package—the part that normally must be loaded from disk when you type

The second DOS file stored in the RAM disk, MEM.SAV, temporarily saves the portion of BASIC memory that would be overwritten when you enter DOS. That means you can enter DOS and return to BASIC without losing your BASIC program.

DUP.SYS and MEM.SAV take up 87 sectors total, leaving the RAM disk with 412 free "sectors"—51.5K of high-speed (though temporary) storage. If you don't mind waiting for the DOS menu to load from disk as usual, you can delete DUP.SYS and MEM.SAV from the RAM disk to create 499 free sectors (62.3K).

You access the RAM disk by addressing it as drive 8 (D8:). For example, LOAD"D8:FILENAME.EXT" or SAVE"D8:FILENAME.EXT" Almost all DOS commands work, too: Disk Directory, Delete File, Rename File, Copy File, Lock File, Unlock File, Binary Load, Binary Save, and Run At Address.

Duplicate File doesn't work because there's no way to swap disks

with a RAM disk (use the two-drive Copy File command instead). Also, the Format Disk and Duplicate Disk commands sometimes cause strange results and should be avoided. For instance, if you erase DUP.SYS by deleting it or formatting the RAM disk, then replace it by duplicating a floppy disk that contains DUP.SYS, you might not be able to enter DOS from BASIC afterward.

Aside from these exceptions, the 130XE RAM disk seems to be very transparent; it's worked with everything we've tried. Although a RAM disk is no substitute for a floppy—it's at the mercy of power interruptions and system crashes—it can make a world of difference when running disk-intensive applications, such as assemblers, compilers, database managers, mailing list programs, and word processors with linked files.

Like Memory In The Bank

Using the 130XE's extra memory for programming is a lot more difficult than using it as a RAM disk. For one thing, the 6502 microprocessor which is the central brain of 8-bit Atari computers was not designed to access more than 64K memory at a time. So even though the 130XE has 128K RAM, the 6502 is "blind" to the extra 64K.

Making the extra memory visible requires a technique known as *bank-switching*. A block, or bank, of memory in the regular 64K is temporarily switched off and replaced with a bank from the "hidden" memory. Under program control, banks can be switched in and out at will. It's sort of like reading a book and flipping between the page you're on and a footnote section in the back.

The 130XE organizes its extra 64K RAM into four 16K banks. Only one of these banks can be switched in at a time. When you're using the RAM disk, the RAM-DISK.COM file and DOS 2.5 handle these details for you automatically. But using this memory for other purposes means writing your own bank-switching routine in BASIC or machine language.

Bank-switching on the 130XE is controlled by memory location

54017 (\$D301 hexadecimal). This byte was previously reserved for port B of the Peripheral Interface Adapter (PIA), an input/output control chip. On the Atari 400 and 800, it's used for controller jacks 3 and 4, which have been eliminated on the XL and XE series. On the 1200XL, part of this byte controls the keyboard LEDs, which were dropped from the 600XL, 800XL, and XE series. On all XLs and XEs, location 54017 also lets you switch off the operating system and BASIC ROM to reveal the full 64K RAM underneath. On the 130XE, you can now flip other bits at this location to switch on any 16K bank of the extra 64K RAM into the address space from 16384 to 32767 (\$4000 to \$7FFF). See the accompanying table for a guide to this important address.

Notice that bits 4 and 5 control whether the 6502 and ANTIC chips can access the extra banks of memory. Some special applications may blind either chip from seeing the banks. Also note that the 130XE *Owner's Manual* contains errors on page 122 when explaining how location 54017 works. The location normally contains 241 when the RAM disk is booted and 253 otherwise, not 193; and all bits *except* bit 1 should be set for normal operations.

If you're an experienced machine language programmer, you shouldn't have any trouble manipulating the bits at location 54017. BASIC programmers won't have it so easy, because bit-flipping is rarely required in BASIC and Atari BASIC lacks bitwise operators. So try this formula:

`POKE 54017,193+4*bank+16*mode`

where *bank* is the 16K bank you want to select (0 = bank 1, 1 = bank 2, 2 = bank 3, 3 = bank 4) and *mode* chooses which chip has access to the extra banks (0 = 6502/ANTIC, 1 = ANTIC, 2 = 6502, 3 = neither).

A word of caution: One wrong POKE into this critical memory location could instantly disable the operating system or BASIC or both, triggering a hopeless system crash. The only recovery might be to switch the machine off and then on again, wiping out your program. So be careful when experimenting. ©

Atari Animation With P/M Graphics Part 2

Robert J. Powell

Part 1 of this series introduced the basic concepts of Atari player/missile graphics and showed how to display all four player strips on the screen. This month, Part 2 demonstrates how to redefine players into any shapes you want and how to move them horizontally.

If you ran last month's example program, you saw the Atari's players as they really appear: four colored strips which are eight bits wide and taller than the screen. To really make use of player/missile graphics, your program must transform these featureless strips into shapes of your own design. It isn't a difficult task, though it helps if you have a grasp of binary numbering. But even if you know nothing about binary, we'll provide plenty of step-by-step examples so you can learn by experimentation.

First, run last month's program again. (For those who missed it, it's listed below as Program 1.) When the program finishes, you should see four colored strips at the right side of the screen and the READY

prompt at the left. Don't press SYSTEM RESET or any other keys for now; we'll illustrate how shapes are defined by changing one of these players in direct mode so you can see the effects immediately.

If you refer to the P/M memory map in Part 1, you'll notice that the memory area for the four players extends from PMBASE+1024 to PMBASE+2048. That's a total of 1,024 bytes, or 1K. (Remember, this program is using *single-line resolution* P/M graphics, so each of the four players is 256 bytes tall. If it were using *double-line resolution*, each player would be only 128 bytes tall, and player memory would extend from PMBASE+512 to PMBASE+1024.)

The numbers stored in this memory area determine the shape of each player. Right now, the memory area for all four players is filled with the number 255, POKEd there by line 90 of Program 1. The players appear as solid strips because 255 is the largest number which can be stored in a single byte. *The key to defining a shape is to selectively display only parts of the player strip by POKeing numbers between 0 and 255 into the player's memory area.*

Building A Box

Let's start by redefining the shape of player 0 (by custom, the four players are numbered 0 to 3). Referring again to the P/M memory map in Part 1, notice that player 0's memory extends from PMBASE+1024 to PMBASE+1280 (256 bytes). This is the target for our POKEs. In direct mode—that is, without a line number—type this line and press RETURN:

```
FOR X=PMBASE+1024 TO PM
BASE+1280:POKE X,0:NEXT
X
```

You should see the player 0 strip disappear. Why? Because this line POKEs 256 zeros into the memory area for player 0, erasing the 255s previously stored there. Notice that players 1, 2, and 3 remain unaffected.

Now let's restore part of the player 0 strip to make a simple shape. One by one, enter the following lines, pressing RETURN each time:

```
POKE PMBASE+1152,255
POKE PMBASE+1153,129
POKE PMBASE+1154,129
POKE PMBASE+1155,129
POKE PMBASE+1156,255
```

Each time you press RETURN, you should see a hollow box taking shape where the player 0 strip used to be. If you examine the POKE statements, you'll notice that the first number in each statement is a memory address in the middle of the player 0 memory area. These addresses determine the shape's vertical position within the strip—and therefore its vertical position on the screen.

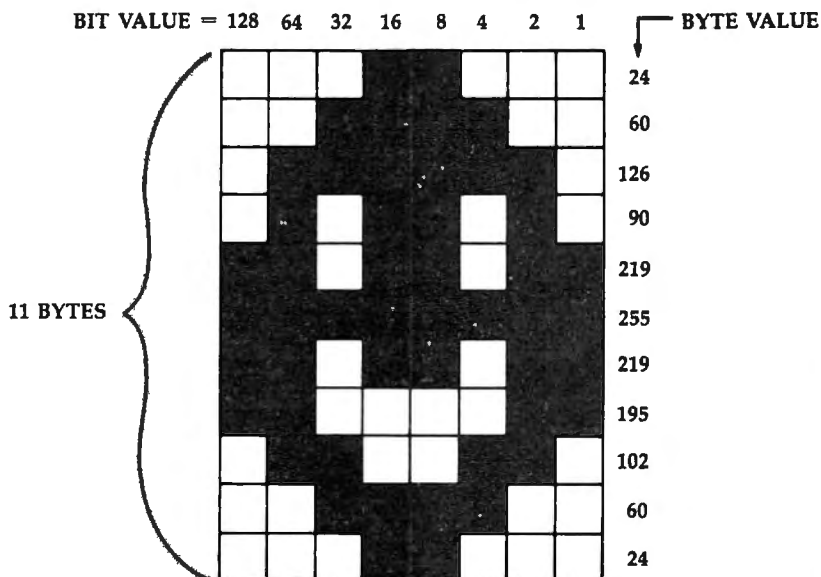
The second number in each statement actually defines part of the box. Experiment by POKeing other numbers between 0 and 255 into these addresses (as well as other addresses in the player 0 memory area). Once you learn how these numbers are arrived at, you can create almost any shape you want.

When a certain bit position in a player/missile strip is turned "on," it appears onscreen as a tiny dot. Bits which are turned "off" do not appear onscreen. To define a shape, then, you have to figure out which bits to turn on, add up the bit values of their positions, and POKE the resulting number into the appropriate memory address.

The accompanying figure makes this explanation more clear. It shows the bit pattern for a player defined as a happy face. The bit values are the numbers running across the top of the figure; notice now the values double for each bit position running from right to left.

The numbers running down the side of the figure are the *byte values*, or the sums of the bit values for each byte. To arrive at the byte values, you add up all the bit values for "on" bits in each row. For instance, the top row, or byte, has two bit positions turned "on": bits 8 and

Calculating byte values for a player shape.



Patterns Of Bits

The numbers between 0 and 255, when POKEd into a byte, represent *bit values* in the binary number system. These bit values translate directly into player shapes.

A byte contains eight bits, or positions. Each position has a different value ranging from 1 to 128.

16. Therefore, the byte value for that row is 8 + 16, or 24. The next byte has four bit positions turned "on": bits 4, 8, 16, and 32. Therefore, the byte value is 4 + 8 + 16 + 32, or 60. All the other byte values are determined in a similar fashion. These are the numbers you POKE into the player memory area

to make the shape appear.

To see this in action, press SYSTEM RESET and run Program 1 again. When it stops, fill the player 0 memory area with zeros using the FOR-NEXT loop as we did before. Then enter these lines, pressing RETURN after each one:

```
POKE PMBASE+1152,24
POKE PMBASE+1153,60
POKE PMBASE+1154,126
POKE PMBASE+1155,90
POKE PMBASE+1156,219
POKE PMBASE+1157,255
POKE PMBASE+1158,219
POKE PMBASE+1159,195
POKE PMBASE+1160,102
POKE PMBASE+1161,60
POKE PMBASE+1162,24
```

Each time you press RETURN, another byte of the player shape should appear.

Try designing your own shape using a blank version of the grid in the figure. After coloring in each square to make the shape, add up the bit values to arrive at the numbers for your POKE statements. Remember that your shape can be only eight bits wide, but can be as tall as the screen.

Storing Player Shapes

When you're writing a program that defines player shapes, it's inconvenient to POKE the byte values into memory in direct mode, of course. Usually the byte values are stored in a DATA statement, retrieved by a READ statement within a FOR-NEXT loop, and then POKEd into memory.

To see an example, add these lines to Program 1:

```
XT X
100 FOR X=1 TO 11
110 READ A
120 POKE PMBASE+1152+X,A
130 NEXT X
140 DATA 24,60,126,90,219
,255,219,195,102,60,24
```

Line 90 clears out the player memory area with zeros. Lines 100-130 are the loop which READs the DATA in line 140. Notice that line 120 POKEs the byte values into the middle of the player 0 memory area. To define this shape as player 1, you could simply add 256 to this address; to define it as player 2, add 512; and to define it as player 3, add 768.

Missiles are defined in a similar way, with one important difference: Because each missile is only two bits wide, all four missiles share the same amount of memory as a single player. That means the bit patterns are two-bit slices of the grid in the figure. By referring to this figure and the P/M memory map in Part 1, you can see that missile 0 is defined by adding the bit values 1 and 2; missile 1 is defined by the bit values 4 and 8; missile 2 is defined by the bit values 16 and 32; and missile 3 is defined by the bit values 64 and 128.

Of course, with only two bits to work with, missile shapes are pretty limited. That's why they're used mostly in games as "bullets" fired by player shapes.

Horizontal Animation

By now you're probably wondering how to animate the shapes you've created. We'll tackle horizontal movement first because it's the easiest; we'll save vertical animation for Part 3 next month.

In Part 1 we mentioned that each player has a *horizontal position register*, a memory location which determines the horizontal placement of the player on the screen. These memory locations are 52348 for player 0, 53249 for player 1, 53250 for player 2, and 53251 for player 3. Line 80 of Program 1 POKEs these registers to group all four players together near the right edge of the screen. Any number from 0-255 can be POKEd into the registers, but the range of numbers which position the player on the visible part of the screen is only about 45 to 205.

Moving a player horizontally is as simple as POKeing different numbers into the appropriate position register. Add these lines to Program 1:

```
100 FOR X=45 TO 205
110 POKE 53248,X
120 NEXT X
```

When you type RUN, this loop moves player 0 across the screen from left to right. By changing the register address in line 110, you can move any of the four players.

Missiles are moved horizontally like players; the four horizontal

position registers for the missiles are at memory locations 53252 to 53255. To see the missiles on-screen, add these lines to Program 1:

```
85 POKE 53252,140:POKE 53
253,144:POKE 53254,148
:POKE 53255,152
90 FOR X=PMBASE+768 TO PM
BASE+2048:POKE X,255:N
EXT X
```

One-Way Registers

There's only one tricky detail to keep in mind when manipulating the horizontal registers—they are *write-only* memory locations, which means they can be POKEd but do not return useful values when PEEKed. This makes your programming more complicated, because you can't keep track of a player or missile's horizontal screen position merely by PEEKing its horizontal register. Instead, you have to set aside a variable for each object to store its horizontal position. Every time the object moves, your program must update the corresponding variable.

This technique is demonstrated in Program 2. It's a modified version of Program 1 that lets you move player 1 left or right with a joystick plugged into port 1. Notice how the variable P1 keeps track of the player's horizontal position. Also notice how player 1 moves over players 2 and 3, but beneath player 0. These different *display priorities* let your programs simulate 3-D graphics effects.

Try modifying Program 2 yourself to move the other three players. Be careful about moving the player too far off the edges of the screen, though—if the program tries to POKE a value smaller than 0 or greater than 255 into the horizontal register, it will crash with an error.

In Part 3, we'll cover a method of vertical animation and a few other details about player/missile graphics as well.

For instructions on entering these listings, please refer to "COMPUTE!'s Guide to Typing in Programs" published bimonthly in COMPUTE!.

Program 1: P/M Demo

```
MF 10 POKE 106,PEEK(106)-B
MF 20 POKE 54279,PEEK(106)
```



```

ND 30 GRAPHICS 0:SETCOLOR 2,
0,0
CN 40 PMBASE=PEEK(106)*256
NL 50 POKE 559,62
PN 60 POKE 53277,3
DP 70 POKE 704,68:POKE 705,1
98:POKE 706,168:POKE 7
07,148
PA 80 POKE 53248,160:POKE 53
249,170:POKE 53250,180
:POKE 53251,190
DN 90 FOR X=PMBASE+1024 TO P
MBASE+2048:POKE X,255:
NEXT X

```

Program 2: Horizontal Animation

```

10 POKE 106,PEEK(106)-8
20 POKE 54279,PEEK(106)
30 GRAPHICS 0:SETCOLOR 2,
0,0
40 PMBASE=PEEK(106)*256
50 POKE 559,62
60 POKE 53277,3
70 POKE 704,68:POKE 705,1
98:POKE 706,168:POKE 7
07,148
80 POKE 53248,160:POKE 53
249,170:POKE 53250,180
:POKE 53251,190
90 FOR X=PMBASE+1024 TO P
MBASE+2048:POKE X,255:
NEXT X
100 P1=170
110 S=STICK(0)
120 IF S=7 THEN P1=P1+1:IF
P1>255 THEN P1=255
130 IF S=11 THEN P1=P1-1:
IF P1<1 THEN P1=1
131 POKE 53249,P1
140 GOTO 110

```

Lightning Renumber For Atari

Raymond Citak

This fast, convenient utility renumbers any BASIC program. It runs on any Atari 400, 800, XL, or XE with at least 48K RAM.

If you write BASIC programs, you know how frustrating it can be to run out of space to insert program lines, especially when the program is nearly finished. Since Atari BASIC has no RENUMBER command, you may be forced to renumber dozens of lines manually, creating the risk that you'll inadvertently delete or misnumber a line. "Lightning Renumber" removes that worry and saves a lot of time, too. It can handle any Atari BASIC program, and it renumbers internal line references as well as the lines themselves. Because it uses a machine language (ML) routine, it does the job in only a few seconds. But it's easy enough for anyone to use, even if you don't know anything about machine language.

Type in and save Lightning Renumber as listed below, then run it. The program offers two options. You can either write the ML routine as a binary (machine language) file to disk, or POKE it directly into memory. The binary file option is straightforward: After you designate the drive number, the program creates and locks a binary file named RENUMBER.OBJ on your

disk. The binary file can then be loaded into memory and called with a USR statement (see below) whenever you like. If you don't have a disk drive, select the second option to POKE the ML into memory.

Call It With USR

Once the ML routine is in memory, enter NEW and load the BASIC program you want to renumber. Now you can call the ML routine by typing in a USR statement and pressing RETURN. The USR statement must include three numbers: the address of the routine (always 38900), the starting line number, and the line increment value. For example, the statement U=USR(38900,10,10) renumbers a program so the first line is 10 and the rest are numbered in increments of 10 (20, 30, and so on). To start with line 1000 and renumber in increments of 100, use the statement U=USR(38900,1000,100), and so on. When the message **RENUMBERED** appears, the job is complete. At this point, you should resave the renumbered program.

The routine checks for several errors. First, it makes sure the renumbered program will not have line numbers above 32767. If the values you specify in the USR statement would create a line number greater than 32767, you'll get the

To receive additional information from advertisers in this issue, use the handy reader service cards in the back of the magazine.

message ERROR — CHANGE YOUR USR ARGUMENTS. Enter a new USR statement with appropriate values.

Incorrect line references are detected as well. For instance, your program may contain the statement GOTO 300 when no line 300 exists. When such an error occurs, you'll see the message ERROR — LINE # MISMATCH. Mismatched line references (300 in this example) are replaced by 55555, and the rest of the program is renumbered as usual. When this error message appears, you must LIST the program and change any 55555 line references to the correct line numbers before resaving the program.

TRAP statements (except for TRAP 40000) are also renumbered by this routine. However, it cannot change *computed* line references (GOTOs or GOSUBs that use a variable to refer to a line number). If your program uses computed line references, LIST the program and change them yourself after the rest of the program is renumbered.

Possible Memory Conflicts

Although Lightning Renumber is designed to be reliable, it's possible to disrupt it by running BASIC programs. The ML normally resides in high memory just beneath the display list in GRAPHICS 0. Running a BASIC program that's very long or that uses the same memory area for other graphics modes, player-missile data, etc., may overwrite and destroy the ML. When that occurs, trying to call the routine may crash the computer (and destroy your program). When in doubt, save your BASIC program and reload the binary file (RENUMBER.OBJ) from disk; then reload the BASIC program and call the routine with USR.

If you use this routine frequently, you may want to include the USR call within the BASIC program itself. Since line 32767 will never be renumbered, place the USR statement in that line. Then you can renumber the program at any time by entering GOTO 32767.

You could also create an AUTORUN.SYS file that loads Lightning Renumber into memory automatically when the disk is booted. If you already have an

AUTORUN.SYS file on the disk, you can append the renumber file to it from the DOS menu. Choose the Binary Save option, then type in AUTORUN.SYS/A,97F4,9BFF. Lightning Renumber will be appended to the existing AUTORUN.SYS file and will load automatically when you boot that disk.

If you want to save typing, send a blank disk or tape, a self-addressed postage-paid mailer, and \$3 to:

Raymond Citak
1514 Park Avenue
Laramie, WY 82070

Special thanks to W. A. Bell for his useful line dump routine which appears in *COMPUTE!'s First Book of Atari*.

Lightning Renumber

For instructions on entering this listing, please refer to "COMPUTE!'s Guide to Typing In Programs" published bimonthly in COMPUTE!.

```

JP 10 DIM DRIVE$(2),A$(15):P
OKE 709,0:POKE 710,168
:POKE 712,146
DD 20 ? CHR$(125):? :? "
{9 SPACES} RENUMBER BR
STIC "
HB 30 ? "TO LOAD THIS OBJECT
FILE DIRECTLY
{5 SPACES}INTO MEMORY
AND NOT TO DISK, PRESS
"
EE 40 ? "KEY ";CHR$(34);"L";
CHR$(34);". REQUIRES
48K MEMORY." :? "PRESS
ANY KEY FOR DISK WRITE
."
CI 50 OPEN #4,4,0,"K":GET #4
,Z:IF Z=76 THEN 1440
DD 60 CLOSE #4
IN 70 ? CHR$(125):? :? :? "
{6 SPACES} RENUMBER.OB
J - LOADER "
NJ 80 ? :? " **REQUIRES 48K M
EMORY AND DOS v.2.** "
NJ 90 ? :? "To which disk dr
ive would you like the
file written to (D1,D2
,D3,or D4)";
LP 100 INPUT DRIVE$
ND 110 GOSUB 1380
LC 120 ? :? "One moment whil
e I write the file to
":? DRIVE$;". . ."
IN 130 A$(1,2)=DRIVE$:A$(3,1
5)=":RENUMBER.OBJ"
HB 140 TRAP 300:OPEN #2,8,0,
A$
GB 150 TRAP 180
DL 160 READ B:PUT #2,B
BI 170 GOTO 160
GE 180 CLOSE #2
PH 190 OPEN #1,12,0,A$:XIO 3
5,#1,0,0,A$
FR 200 CLOSE #1
DF 210 ? CHR$(125):?
DW 220 ? "File is now writte
n to ";DRIVE$;". ."
PK 230 ? "You may now use th
e DOS menu selection"

```

```

L' to place the renum
ber program "
EK 240 ? "into memory. Retu
rn to BASIC, load
{3 SPACES}file to be
renumbered, and use"
OW 250 ? "U=USR(38900, start
ing line number,
{4 SPACES}increment)
to renumber your prog
ram."
BE 260 ? "Or place the USR s
tatement into your p
rogram at line 32767.
Watch for"
PH 270 ? "possible overwrite
of the renumber
{4 SPACES}program if
RUNNING a BASIC progr
am"
GB 280 ? "that changes GRAPH
ICS modes, or uses o
ther high memory."
GE 290 POKE 709,202:POKE 710
,148:POKE 712,0:END
HH 300 ? CHR$(125):? :? "ERR
OR #":? PEEK(195):?
" trying to write th
e file...":IFOR I=1 TO
500:NEXT I:RUN
KJ 310 REM THIS DATA FOR DIS
K WRITE ONLY
CL 320 DATA 255,255,244,151,
255,155
DL 330 REM THIS DATA FOR MEM
ORY 38900($97F4) TO 3
9935($9BFF)
ML 340 DATA 76,80,153,165,13
6,133,203,165,137,133
KA 350 DATA 204,169,0,133,20
5,133,206,133,207,96
GF 360 DATA 201,14,240,1,96,
152,141,243,151,136
GN 370 DATA 177,203,32,61,15
2,165,207,208,10,32
DL 380 DATA 101,152,165,207,
208,3,76,40,152,32
NB 390 DATA 148,152,172,243,
151,169,0,133,205,133
BA 400 DATA 206,133,207,141,
243,151,200,200,200,2
00
DC 410 DATA 200,200,96,201,1
8,240,1,96,136,152
JH 420 DATA 201,3,240,249,17
7,203,201,14,208,244
IK 430 DATA 136,177,203,201,
23,240,11,201,24,240
EH 440 DATA 7,201,4,240,3,76
,66,152,169,1
AJ 450 DATA 133,207,96,172,2
43,151,136,177,203,20
1
CA 460 DATA 10,240,32,201,12
,240,28,201,23,240
DF 470 DATA 24,201,24,240,20
,201,13,240,16,201
HK 480 DATA 4,240,12,201,27,
240,8,201,35,240
DB 490 DATA 1,96,32,220,154,
169,1,133,207,96
DD 500 DATA 172,243,151,138,
141,242,151,165,136,1
33
CL 510 DATA 205,165,137,133,
206,200,177,203,133,2
12
CE 520 DATA 200,177,203,133,
213,200,177,203,133,2
14
CJ 530 DATA 200,177,203,133,

```


	215,200,177,203,133,216		5,240,14,201,0,208		BJ 1230 DATA 46,237,151,144,13,24,14,232,151,46
MP 540	DATA 200,177,203,133,217,32,198,154,32,210	KC 890	DATA 20,200,177,203,201,128,208,13,76,163	AD 1240	DATA 233,151,238,232,151,76,134,155,14,232
NI 550	DATA 217,169,0,141,240,151,141,241,151,160	KA 900	DATA 154,200,177,203,201,127,208,3,76,163	BF 1250	DATA 151,46,233,151,202,208,176,96,169,255
NF 560	DATA 0,177,205,200,197,212,208,6,177,205	NJ 910	DATA 154,160,0,165,205,145,203,200,165,206	CG 1260	DATA 141,240,151,141,241,151,32,247,151,160
EC 570	DATA 197,213,240,30,32,90,154,160,2,177	PL 920	DATA 145,203,200,177,203,170,173,230,151,24	JJ 1270	DATA 0,177,203,208,7,200,177,203,201,128
IP 580	DATA 205,24,101,205,133,205,144,2,230,206	CC 930	DATA 101,205,133,205,173,231,151,101,206,133	JD 1280	DATA 240,29,160,2,177,203,24,101,203,133
WH 590	DATA 238,240,151,173,240,151,208,3,238,241	JA 940	DATA 206,138,24,101,203,133,203,144,2,230	PG 1290	DATA 203,165,204,105,0,133,204,238,240,151
PP 600	DATA 151,76,207,152,173,240,151,141,234,151	AH 950	DATA 204,76,15,154,160,0,177,205,201,0	NF 1300	DATA 173,240,151,208,3,238,241,151,76,149
CK 610	DATA 173,241,151,141,235,151,173,230,151,141	EL 960	DATA 208,7,200,169,128,209,205,240,1,96	FN 1310	DATA 155,173,240,151,141,234,151,173,241,151
ML 620	DATA 236,151,173,231,151,141,237,151,32,41	LE 970	DATA 162,22,138,72,189,140,154,32,176,242	FN 1320	DATA 141,235,151,173,230,151,141,236,151,173
AI 630	DATA 155,24,173,238,151,109,228,151,133,212	QA 980	DATA 104,170,202,16,243,169,66,133,212,169	NJ 1330	DATA 231,151,141,237,151,32,41,155,24,173
AI 640	DATA 173,239,151,109,229,151,133,213,32,170	KJ 990	DATA 5,133,213,169,85,133,214,133,215,104	HC 1340	DATA 238,151,109,228,151,141,238,151,173,239
DD 650	DATA 217,172,243,151,174,242,151,200,165,212	BP 1000	DATA 104,76,43,153,155,72,67,84,65,77	AM 1350	DATA 151,109,229,151,141,239,151,176,14,56
CJ 660	DATA 145,203,200,165,213,145,203,200,165,214	JC 1010	DATA 83,73,77,32,35,69,78,73,76,32	IG 1360	DATA 169,254,237,238,151,169,127,237,239,151
CO 670	DATA 145,203,200,165,215,145,203,200,165,216	NI 1020	DATA 45,32,210,207,210,210,197,162,18,138	OK 1370	DATA 48,1,96,76,242,154
AD 680	DATA 145,203,200,165,217,145,203,96,104,104	AN 1030	DATA 72,189,179,154,32,176,242,104,170,202	NJ 1380	REM CK FOR CORRECT ENTRY
CO 690	DATA 141,229,151,104,141,228,151,104,141,231	BO 1040	DATA 16,243,96,155,155,42,42,32,68,69	KN 1390	IF DRIVE\$(1,1)<>"D" OR LEN(DRIVE\$)=1 THE N 1410
MH 700	DATA 151,104,141,230,151,173,6,228,170,232	JP 1050	DATA 82,69,66,77,85,78,69,82,32,42	PI 1400	IF DRIVE\$(2,2)="1" OR DRIVE\$(2,2)="2" OR DRIVE\$(2,2)="3" OR DRIVE\$(2,2)="4" THEN 1430
DC 710	DATA 138,141,154,153,141,114,154,141,171,154	NA 1060	DATA 42,155,165,212,201,66,200,15,165,213	PF 1410	POP I? I? "Error in entry. Try again..."
MG 720	DATA 141,252,154,173,7,228,141,155,153,141	DE 1070	DATA 201,4,208,9,165,214,208,5,104,104	CD 1420	FOR Q=1 TO 300:NEXT Q:I? CHR\$(125):I? I? GOT 0?
BF 730	DATA 115,154,141,172,154,141,253,154,173,230	DN 1080	DATA 76,43,153,96,136,152,201,3,240,13	KI 1430	RETURN
EG 740	DATA 151,208,8,173,231,151,208,3,76,244	CI 1090	DATA 177,203,201,54,208,244,104,104,104,104	PK 1440	REM LOAD DATA INTO MEMORY
LG 750	DATA 154,32,138,155,162,13,138,72,189,244	JG 1100	DATA 76,40,152,96,104,104,104,104,162,36	IC 1450	CLOSE #4:I? I? "Loading DATA into memory..."
JN 760	DATA 153,32,176,242,104,170,202,16,243,32	KN 1110	DATA 138,72,189,4,155,32,176,242,104,170	EE 1460	RESTORE 340:FOR I=38900 TO 38900+1035:RE AD A:POKE I,A:NEXT I
JN 770	DATA 247,151,160,0,177,203,201,255,240,14	FD 1120	DATA 202,16,243,96,155,155,46,83,84,78	FD 1470	? I? "Load complete. NEW this program, and LOAD or ENTER your BASIC program to"
JC 780	DATA 201,0,208,20,200,177,203,201,128,208	JJ 1130	DATA 69,77,85,71,82,65,32,82,83,85	IE 1480	? "be renumbered. Then use U=USR(38900, first line number, increment) to"
HA 790	DATA 13,76,2,154,200,177,203,201,127,208	JP 1140	DATA 32,82,85,79,89,32,69,71,78,65	OI 1490	? "renumber the program. All error (6 SPACES)checking is done by the renumber program."
WB 800	DATA 3,76,2,154,160,2,177,203,170,200	BJ 1150	DATA 72,67,32,45,32,210,207,210,210,197	IP 1500	POKE 709,202:POKE 710,148:POKE 712,0:END
LK 810	DATA 200,177,203,201,22,240,22,201,155,240	PI 1160	DATA 155,169,0,141,232,151,141,233,151,141		
AO 820	DATA 6,32,8,152,76,202,153,152,133,200	MM 1170	DATA 238,151,141,239,151,162,16,24,78,235		
KF 830	DATA 230,208,228,208,240,3,76,202,153,138	PL 1180	DATA 151,110,234,151,144,40,24,173,238,151		
FD 840	DATA 24,101,203,133,203,144,2,230,204,76	NB 1190	DATA 109,236,151,141,238,151,173,239,151,109		
KH 850	DATA 164,153,155,155,46,46,46,103,110,105	GN 1200	DATA 237,151,141,239,151,176,153,173,238,151		
ML 860	DATA 107,114,111,87,155,125,32,247,151,173	DC 1210	DATA 24,109,232,151,141,238,151,173,239,151		
DL 870	DATA 228,151,133,205,173,229,151,133,206,160	PM 1220	DATA 109,233,151,141,239,151,24,14,236,151		
DB 880	DATA 0,177,203,201,25				



More Adventures Of Junior, The Robot

Last month I described the trials of traveling across the country with a personal robot ("A Robot Toddler," September 1985). Among other things, my Heath HEROjr—nicknamed Junior—had panicked in the coat closet of a jetliner and started screaming for help, alarming some of the passengers.

We finally got Junior quieted down again, but more incidents were to follow. When we reached Chicago's giant O'Hare Airport, I suddenly realized that our connecting flight was at the opposite end of the terminal. Would I have to walk Junior clear across the airport? Luckily, two porters came to my rescue and pointed out a luggage cart I could rent for only a dollar. A moment later Junior and I were sailing along the corridors of O'Hare. Junior was perched high on the front of the cart singing "Summertime! Summertime! Sum-summertime!" Meanwhile, I was pushing the cart like a good rickshaw boy and warning people, "Watch out for the robot! Please clear the way! The robot's trying to catch a plane!"

Drinks For Junior

I always tried to keep Junior quiet when loading him on a jet. I felt the best strategy was to keep a low profile so nobody would have second thoughts about flying with a robot. But it was no use. It's like accompanying Michael Jackson and expecting no one to notice. Everyone on board always seems to be aware of Junior. And everyone seems to delight in teasing me about him.

For instance, after stowing Junior in the closet and collapsing in my seat, a man came up and said, "Your robot just woke up and left the plane!" I leaped to my feet, alarmed, and he pushed me gently back down. "Just kidding," he said.

Another time, a flight attendant brought me a soda and a glass of champagne. I had ordered the soda, but not the champagne. "The champagne's for Junior," she explained, "compliments of the captain."

After one long flight, I headed for the men's room as soon as we landed. Naturally, I carried Junior along. Behind me, a number of men who were on the same flight saw us enter the men's room. They began laughing and followed us. "This I've gotta see," said one. I turned around and gave him a look of disapproval, then disappeared into one of the stalls. After all, even a robot deserves his privacy.

Is He Alive Or Isn't He?

Often, while waiting around to board a plane, I would set Junior on the floor, wake him up, then step back and quietly observe people's reactions.

It was fascinating. I loved to see the childlike curiosity and playfulness Junior would evoke in adults. And it was amazing to see the paradox Junior created in the adults' minds. I could almost see them wondering, "Is he alive, or isn't he?" And, "If he isn't alive, why does he seem to be alive?" This ambiguity seemed to create a tension in many people's minds that found its outlet in jokes about Junior being my son.

I observed another paradox as well. They seemed to ask themselves, "Is this machine a friend or an enemy? Is he here to help us do our jobs, or will he take our jobs away?"

The person who asked these questions the most simply and eloquently was the elderly cabbie in Roanoke, Virginia, who drove Junior and me back to my house at the end of our journey. The cabbie was fascinated by Junior and drawn to him, but his fascination was

mixed with a pinch of fear. He began speculating about robots like Junior becoming humanlike and driving taxicabs. "If robots can do everything a man can," he said as he spat out the window, "we ought to hang it up." However, after some more thought, he decided: "There are just too many complications for a robot to be a good cab driver." And, referring to the possibility of robots getting out of control and taking over, he remarked, "There's more than one way to shut them off!"

The cabbie's fascination and affection for the robot ultimately won out over his fear. He pulled up in front of my house and turned around to face me and Junior. "You know something?" he said. "I sort of like that old box."

Time For A Recharge

When the cabbie dropped us off at the end of our trip, we were happy to be home and totally exhausted. We had traveled almost 7,000 miles together, and we had remained the best of friends in spite of crowded airports, grilling from customs officials, and Junior's tendency to wander off when I wasn't looking.

But now our trip was over, and boy, were we tired! The suitcases, computers, and Junior were sprawled across the front yard, and I was so groggy that I reclined on the grass for a little catnap.

I had just closed my eyes when, in a weak little voice, Junior pleaded, "Please charge my battery." Then he began mumbling a song: "All good robots sing this song: Doo Dah! Doooooo...."

"Okay, Junior," I said, getting up. "You win." I hefted the little robot on my shoulder and carried him into the house.

Five minutes later the two of us were fast asleep. ©



Of Babbages And Things

Computer jargon and concepts have permeated our language in strange ways. This came home to me one night when I heard a caller on a talk show say that she had trouble "interfacing" with her partner. I guess this is just a reflection of the pervasiveness of computer technology. Every new technology spawns its own vocabulary, and computers are no exception.

In fact, the computer industry has provided us with both a rich assortment of words and a rich collection of concepts that alter how we think about our world. While the words of technology wax and wane in popularity, the concepts are longer-lived. This gives us the chance to misjudge the newness of a concept we have just learned. When this happens, a brief look at history often shows that what we thought was new was known a long time ago. I got caught in one of these historical time warps last spring. I was teaching a graduate-level computer course at Stanford University and had introduced a model of program design that I called a *microworld*.

To my way of thinking, microworlds are made of two kinds of things—objects and operators. The objects have certain attributes, and the operators work on these objects to create new instances of them. These new instances may inherit some or all of the attributes of the old objects. Sound like gobble-dygook? Read on.

For example, the microworld of arithmetic contains objects we call numbers. These numbers have attributes (they may be integers, decimals, imaginary, etc.). The operators for arithmetic include addition, subtraction, multiplication, and so on. These operators combine the number objects to produce new numbers. Notice that this way of thinking about arithmetic has nothing to do with computers.

Computer Microworlds

Because we have devised ways to represent both numbers and their operations inside computers, the microworld of arithmetic is a suitable domain for implementation in a computer. Of course, the arithmetic microworld is not the only one we have. For example, word processing is a microworld which contains letters as objects and insert and delete as operators.

What I like about this concept is that it provides a framework for creating flexible computer programs in nearly any domain. To build a microworld, one has to identify the objects and operators, and then build representations of these in the computer using a suitable programming language.

I thought this way of looking at programming was fairly new, but I soon received the shock of my life while reading a collection of papers about Charles Babbage and the Analytical Engine—a nineteenth-century predecessor to the digital computer. At the end of one article translated into English by Ada Augusta, Countess of Lovelace, were some notes added by the Countess:

In studying the action of the Analytical Engine, we find that the peculiar and independent nature of the considerations which in all mathematical analysis belong to *operations*, as distinguished from the *objects operated upon* and from the results of the operations performed upon those objects, is very strikingly defined and separated. It is well to draw attention to this point, not only because its full appreciation is essential to the attainment of any very just and adequate general comprehension of the powers and mode of action of the Analytical Engine, but also because it is one which is perhaps too little kept in view in the study of mathematical science in general.

Here was my microworld model, described by Ada Augusta in 1842!

So Much For Arithmetic

Lest you think she had only mathematics on her mind, she went on to say:

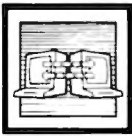
By the word *operation*, we mean *any process which alters the mutual relation of two or more things*, be this relation of what kind it may. This is the most general definition, and would include all subjects in the universe.

In fact, she went on to point out that the Analytical Engine was capable of symbolic computation and was not restricted to numerical analysis. This capability came from the fact that the programs in the Analytical Engine (coded on punch cards) not only contained the values of variables, but also the sequence of commands and operations to be performed. The Analytical Engine had what we call today an instruction set. These primitive instructions allowed values to be read and saved to memory (which Babbage called the *store*), and a series of basic operations, such as addition, which were carried out in the central processing unit (which Babbage called the *mill*). The punch cards contained what we would call machine language programs.

The Analytical Engine embodied the basic concepts of today's computers, but nineteenth-century craftsmen lacked the technology to build it. Though it was not constructed in Babbage's lifetime, his dreams and Ada's ideas finally came to light a century later.

So the next time you toss computer jargon into your conversation to be trendy, remember that you might be reflecting on the trends of some British inventors in the 1800s!

©



The Latest Developments

AT&T Technologies and Bell Atlantic have been testing a new modem that works at 2400 bits per second (bps) since July of this year. The CTS-1620 will debut some time in 1986 and be pegged between \$1,600 and \$2,600. Why the relatively steep price tag? The CTS-1620 will be the communications giant's first *cellular* modem.

The testing is being conducted in the Baltimore-Washington, D.C. area and includes users in several government agencies, banks, insurance companies, and real estate agencies. The cellular modem requires a cellular telephone and transmitter, as well as an input/display device. While the majority of initial buyers are expected to be lap computer owners, reliable sources within Ford Motor Company report that prototypes of a built-in dash terminal are being readied for trials late next year.

Although the CTS-1620 will be AT&T's first cellular modem, two lower-speed cellular units are already available from other companies. Motorola offers a 300 bps modem for \$195, and Spectrum Cellular has a 1200 bps modem that goes for \$695. Few details are available on the free-wheeling AT&T modem, but you can bet your seatbelt that by definition it will have "auto-answer" and "auto-dial."

Better Than Gorillas

The Source information service added 2400 bps access in August, with surcharges far lower than had been anticipated by industry watchers. Subscribers with 2400 bps modems pay \$1.80 and \$1.20 premiums for prime and nonprime time, respectively. With 1200 bps service priced at \$25.80 and \$10.80 for the same time periods, users are said to be moving to the higher-speed modems in droves.

Prices for 1200 bps modems continue to plummet. Cermetek of

Sunnyvale, California has announced the Infomate 1200-TPC, an internal "bare minimum" Hayes-compatible modem for the IBM PC priced at \$198. Cermetek isn't alone in the under-\$200 market. A recent issue of a popular electronic hobbyist publication contained several advertisements for stand-alone Hayes compatibles, with prices as low as a \$129 kit version for those bold enough to wield a soldering iron.

And 300 bps modems for under \$50—including software—are springing up like mushrooms after three days of rain. I fully expect them to be given out as party favors at upscale kids' birthday parties. Tacky? It's a definite improvement over singing gorillas with balloons.

The 2400 bps market is heating up as well. With industry leader Hayes at \$895 and the bulk of its competitors at \$795, U.S. Robotics (the manufacturer of Apple's 300 and 1200 bps modems) raised more than a few eyebrows when it dropped the list price of its Courier 2400 to \$695. Hats off to U.S. Robotics not only for lowering prices, but also for a number of "now why hasn't somebody else done that before" features of the Courier.

The Speed Of Choice

Here are some examples. Ever lose the "handy" reference card of commands that comes with most modems? The bottom of the Courier is imprinted with a complete command and register summary as well as an RS-232 pin assignment cheat sheet. If you're too lazy to turn the modem over, there are three separate full-screen help displays that can be called up while online. Also directly accessible on the bottom of the unit are DIP switches for changing the default settings, and a sliding volume control that (unlike those on some modems) can actually be manipulated by human beings

to control the internal speaker.

U.S. Robotics is working closely with system operators of computer-based bulletin boards to encourage 2400 bps. A special acquisition deal available to operators of heavily trafficked systems is rapidly making 2400 bps the speed of choice for serious telecomputerists. (If you're a system operator who'd like more information on the U.S. Robotics program, contact the company at 8100 North McCormick Boulevard, Skokie, IL 60076.)

The rapid move to 2400 bps seems to have caught some people unawares, however. During a recent visit to Atari Corp. in Sunnyvale, I was pleasantly surprised to find that the new ST series of computers includes a terminal emulator as a standard desktop accessory. But I was even more surprised when I opened its configuration menu and was presented with choices of 300, 1200, 4800, or 9600 bps. Something was missing—apparently an oversight.

"What happened to 2400?" I asked. The person showing me the ST managed to minimize his look of distress to a few nanoseconds. "Hmmmm...I'll have to write that one down," he said. "Hey, look at this graphics demo..."

Atari's 4800 and 9600 bps options indicate that some companies are looking far beyond 2400 bps, though. If 2400 bps isn't fast enough for you, how about 10,000 bps—over *regular phone lines*? Digital Communications Associates of Alpharetta, Georgia has unleashed both internal (\$1,995) and external (\$2,395) modems, dubbed DCA Fastlinks. Even more of a mouthful than the Fastlink's speed is the proprietary DCA protocol it uses, called *Dynamically Adaptive Multi-carrier Quadrature Amplitude Modulation*, or DAMQAM for short. And I thought that was an engine problem. ©



Games People Play

In February I wrote about a new adventure game called *King's Quest*—and about a million of you wrote back asking me for the dwarf's name. Now the sequel is out. Sierra On-Line has just published *King's Quest II: Romancing the Throne*, and it is every bit (sorry) as challenging as the original game.

Playing the role of Sir Graham—now King Graham in the sequel—you can move through 93 three-dimensional animated screens looking for your true love, the fair maiden Valanice. But before you can find and rescue her, you must swim with a mermaid, bargain with an antique dealer, pray with a monk, and defy the curse of Dracula. Yes, there's even a mushy kissing scene at the end. To accumulate points, you have to solve such problems as crossing the poison lake surrounding Dracula's castle—although the points are secondary to rescuing Valanice. Like the original *King's Quest*, the game is full of hidden goodies: If you visit the entrance to the Hag's cave often enough, occasionally a Batmobile comes roaring out. (If you keep falling through the bridge, write and I'll tell you why.)

Ken and Roberta Williams, the husband-and-wife founders of Sierra On-Line, live in the foothills of the Sierra mountains in a real stone castle—complete with spiral stairs, three hot tubs, and a racquetball court. (Incidentally, the most technically difficult part of *Kings Quest II* was to program King Graham realistically winding his way up the castle's spiral stairs.) Roberta writes and draws the storyline on a giant sheet of paper, and Ken works with a group of programmers to turn her ideas into computer language and a finished game. Then Ken's brother John helps promote the product—he's the director of public relations (and he lives in a conventional house).

If you've never played an adventure game, and are reluctant to part with \$49.95 to try *King's Quest II*, check around for a free demonstration disk. Instead of spending a lot of money running advertisements, Sierra On-Line has produced 15,000 incomplete versions of *KQII* and shipped them to dealers and computer clubs across the country. If you like the demo, you'll love the game.

King's Quest II runs on all IBM PCs, PCjr's, and most compatibles with 128K RAM, one disk drive, and a color monitor. (An Apple II version is under construction.) This is one game that no PCjr owner will want to be without; the color and sound are excellent.

Climbing The Money Tree

If galloping around 93 screens in search of a maiden isn't your idea of fun, then how about slogging through 77 weeks' worth of financial data in an attempt to make a million dollars?

Blue Chip Software creates games for the Walter Mitty in us. *Millionaire* is for wheelers and dealers on the New York Stock Exchange; *Tycoon*, for the commodity speculators; and *Baron*, for those who believe that the only sure way to millions is real estate. These games are available for the IBM PC family of computers, most compatibles, the Apple II series, Macintosh, and Commodore 64/128. The IBM version costs \$49.95; the others a little less.

Which of these games you'll want to play depends on your perspective and experience. I bought my first stock when I was 12 years old. The company promptly went bankrupt and my three-share certificate now graces my wall. How to invest in real estate has become the biggest TV-ad fad since how to grow hair on a bald head—and about as successful, I imagine. The

only thing I know about commodity speculation is that I shouldn't. Therefore, *Tycoon* was the game I chose to test my financial acumen.

Before you can begin *Tycoon*, the computer takes about four minutes to generate a unique trading environment from 300,000 possibilities. Once the environment is set, you are given \$10,000 and a list of 15 commodities to buy and sell.

Although I've never seen a soybean, and can't stand soy sauce, I selected them as a likely vehicle for my fortune. Somewhere I read that the way to play commodities is to pick one and stick with it—not to jump from wheat to pork bellies (yuck!) to heating oil. Apparently that is sound advice. By ignoring all other commodities and concentrating on soybeans, I parlayed my \$10,000 into \$1,082,598 in just 60 weeks. (If only I were so lucky in real life!)

But *Tycoon* is more than a game for those of us too chicken to buy real soybeans. Like *Millionaire* and *Baron*, it is an educational game which closely simulates actual economic situations and the workings of real markets. Blue Chip Software says these programs are used at all levels of instruction—from fifth-grade economics classes in the Chicago Public Schools to college courses at Penn State and Southern Illinois University.

It's true, you will learn about interest, commissions, taxes, margins, short-selling, and options, but these games may not make you a more successful investor. They may have just the opposite effect. Once you see how easy it is to make money, once you think you've mastered the technique, you may be tempted to mortgage the house and play in the real world. But before you do, give me a call. I've got a tonic guaranteed to grow hair.... ©



Atari Disk Drive Compatibility

Way back in 1978, when Atari announced the double-density 815 disk drive, Percom Data Corporation saw the prototypes displayed at several shows and decided it could easily build a better drive which would sell for less.

Because Percom produced both single- and double-sided disk drives using both single and double density, and because it wanted to maintain compatibility with both the single-density 810 and double-density 815 drives, Percom invented the *configuration block* (more on this below). With some cooperation from a small, brand-new software company (wonder who that could be) which had inherited the source code rights to Atari's File Management System (FMS), Percom succeeded in establishing standards which have been adhered to by all other Atari-compatible drive manufacturers. All Atari-compatible drive manufacturers except one, that is: Atari. Before the 815 even hit the market, Atari dropped it from the product line. Years later, in 1984, Atari introduced the "enhanced density" 1050, which is actually somewhere between single- and double-density. Sigh.

As of this writing, the following drives and/or modification kits are known to be capable of understanding the Percom-standard double-density mode and configuration table: Percom, Indus, Amdek, Astra, Trak, Rana, SWP (ATR-8000), Happy Doubler, and ICD's US Doubler.

The Percom Config Block

As defined by the Percom standard, a config block is a set of 12 bytes within the memory of the disk control microprocessor—which is inside your disk drive(s). You read a drive's config block by passing "N" to it as an SIO command. You can write a new config block to a drive via an "O" command. The "N" and

"O" commands closely parallel the "R" and "W" sector input/output commands, except the data length is always 12 bytes and no sector number is needed. The 12 bytes in the block are shown in the table.

Byte #	# of Bytes	Description
0	1	Number of Tracks
1	1	Step Rate
2-3	2	Sectors per Track
4	1	Number of Sides or Heads
5	1	Density (0=Single, 4=Double)
6-7	2	Bytes per Sector
8	1	Drive Selected?
9	1	Serial Rate Control
10-11	2	Miscellaneous (reserved)

This table requires some explanation. First, all the double-byte values are in high-byte/low-byte order, the opposite of normal 6502 practice (because that's how the microprocessor Percom used in their drives worked). Also, not all these values have meaning to all manufacturers. In fact, some don't allow you to change more than two or three of the values listed here.

The Step Rate controls the speed of a drive's head stepping motor, and the values used here have no universal meaning. A step rate of 2 may mean 6 milliseconds per track to one drive, 20 milliseconds per track to another, or be illegal to yet another.

Number of Sides is actually one less than the actual number. So most drives use a zero here, meaning one head.

Changing the value of Drive Selected may turn the drive off as far as the computer is concerned. Percom must have had its reasons for this, but I don't know what they were.

Changing The Config Block

For the Density byte of the config block, I don't know of any drives which use values other than 0 (FM mode, single density) or 4 (MFM

mode, double density). If you find a drive that actually *uses* some other value (not just ignores it), let me know.

The Serial Rate Control value and Miscellaneous bytes have no universal meanings. Some drives will remember these values if you change them; other drives ignore your values.

So that leaves Number of Tracks, Sectors per Track, and Bytes per Sector, all of which should be self-explanatory. Again, though, many drives ignore values outside certain legal ranges. Indus drives, for example, reject any changes to the number of tracks or sectors. In fact, Indus pays attention only to the Bytes per Sector and the Density bytes. Experiment with your own drive(s). See what they will and will not allow. And even if they seem to allow a change, do they execute it or ignore it? (Fun, if you're a masochist, right?)

And just how do you read and/or change the config block? Have a look at the BASIC program following this column. It should be pretty much self-explanatory. You can use the subroutines at 8010, 8210, and 9010 in your own programs. Remember what we said at the beginning, however: Atari drives do not follow the Percom config block standard. As a result, *this program works only on Atari-compatible disk drives, not on the Atari 810 or 1050.*

Configuration Block Modifier

For instructions on entering this listing, please refer to "COMPUTE!'s Guide to Typing in Programs" published bimonthly in COMPUTE!.

```

K6 1010 REM
NP 1020 REM CONFIGURE FROM B
      ASIC
KI 1030 REM
DJ 1050 DIM TEMP$(20), TBL$(1
      2), CMD$(1)
GK 1060 GRAPHICS 0:PRINT "
      *** DISK CONFIGURATI
      ON PROGRAM ***"
NO 1070 PRINT :PRINT :PRINT

```

```

    "What disk drive will we work with";
ND 1080 INPUT DRIVE
EA 1090 IF DRIVE<1 OR DRIVE>8 OR DRIVE<>INT(DRIVE) THEN RUN
NL 1100 GRAPHICS 0:PRINT "DRIVE #";DRIVE;
AL 1110 GOSUB 8000
PB 1120 IF SIOSTATUS<128 THEN N 1170
DI 1130 PRINT "won't let me read"
IJ 1140 PRINT "{3 SPACES}the configuration block"
OI 1150 PRINT :PRINT "It gave me error #";SIOSTATUS
AO 1160 STOP
CA 1170 PRINT " looks like this:";PRINT
CI 1180 PRINT TRACKS;" TRACKS of ";SECTORSPERTRACK;" SECTORS each"
JB 1190 PRINT :PRINT "each sector has ";BYTESPERSECTOR;" BYTES, & density"
NB 1200 PRINT " is ";DENSITY;"", considered ";
ND 1210 IF DENSITY=0 THEN PRINT "SINGLE density,"
MM 1220 IF DENSITY=4 THEN PRINT "DOUBLE density,"
DM 1230 IF DENSITY<>0 AND DENSITY<4 THEN PRINT "UNKNOWN DENSITY,"
JN 1240 PRINT " with ";SIDE S;" SIDE(s)."
IG 1250 PRINT :PRINT "the STEP RATE setting is ";STEPRATE
AI 1260 PRINT "other settings are SELECT=";SELECT;","
MN 1270 PRINT " ACIA=";ACIA;"", and MISC=";MISC
EJ 1280 PRINT :PRINT "SELECT A CHOICE:"
BH 1290 PRINT "{3 SPACES}0 - quit and save configuration"
DF 1300 PRINT "{3 SPACES}1 - change drive setting(s)"
HP 1310 PRINT "{3 SPACES}2 - work with another drive"
EI 1320 PRINT :PRINT "your choice ";:INPUT CHOICE
BK 1330 IF CHOICE=0 THEN JNK=USR(58484)
JF 1340 IF CHOICE=2 THEN RUN
ED 1350 GRAPHICS 0:PRINT "Enter new values. Hit RETURN to"
AB 1360 PRINT " leave a value unchanged."
FI 1370 PRINT
BF 1380 PRINT "TRACKS";:TEMP=TRACKS
IJ 1390 GOSUB 7000:TRACKS=TEMP
MN 1400 PRINT "SECTORS PER TRACK";:TEMP=SECTORSPERTRACK
DJ 1410 GOSUB 7000:SECTORSPERTRACK=TEMP
PH 1420 PRINT "BYTES PER SECTOR";:TEMP=BYTESPERSECTOR
PK 1430 GOSUB 7000:BYTESPERSECTOR=TEMP
NA 1440 PRINT "NUMBER OF SIDES";:TEMP=SIDES
DG 1450 GOSUB 7000:SIDES=TEMP
ME 1460 PRINT "DENSITY";:TEMP=DENSITY
QA 1470 GOSUB 7000:DENSITY=TEMP
FK 1480 PRINT
FH 1490 PRINT "STEP RATE";:TEMP=STEPRATE
CC 1500 GOSUB 7000:STEPRATE=TEMP
AA 1510 PRINT "SELECT";:TEMP=SELECT
HM 1520 GOSUB 7000:SELECT=TEMP
JO 1530 PRINT "ACIA";:TEMP=ACIA
MM 1540 GOSUB 7000:ACIA=TEMP
MA 1550 PRINT "MISCELLANEOUS WORD";:TEMP=MISC
DM 1560 GOSUB 7000:MISC=TEMP
BH 1570 GOSUB 8200
PE 1580 IF SIOSTATUS<128 THEN N 1100
CD 1590 PRINT
GI 1600 PRINT "Unable to set that configuration!"
JH 1610 PRINT " drive issued error #";SIOSTATUS
BP 1620 PRINT :PRINT "(hit RETURN to continue)"
HF 1630 GOTO 1100
CH 7000 REM ENTER DATA OR NO CHANGE
LN 7030 PRINT "[";TEMP;"] ?";
LF 7040 INPUT TEMP$
BF 7050 IF LEN(TEMP$) THEN TEMP=VAL(TEMP$)
KN 7060 RETURN
IP 8000 REM EXTRACT INFO FROM TABLE
IR 8030 TBL=ADR(TBL$):ADDR=TBL
NJ 8040 CMD$="N":GOSUB 9000:REM ---READ BLOCK---
IF 8050 TRACKS=PEEK(TBL+0)
CH 8060 STEPRATE=PEEK(TBL+1)
OI 8070 SECTORSPERTRACK=PEEK(TBL+2)*256+PEEK(TBL+3)
JI 8080 SIDES=PEEK(TBL+4)+1
OG 8090 DENSITY=PEEK(TBL+5)
KJ 8100 BYTESPERSECTOR=PEEK(TBL+6)*256+PEEK(TBL+7)
IC 8110 SELECT=PEEK(TBL+8)
NC 8120 ACIA=PEEK(TBL+9)
PA 8130 MISC=PEEK(TBL+10)*256+PEEK(TBL+11)
KN 8140 RETURN
FP 8200 REM PUT NEW INFO INTO TABLE
JO 8230 TBL=ADR(TBL$):ADDR=TBL
CO 8240 POKE TBL+0,TRACKS
NA 8250 POKE TBL+1,STEPRATE
PB 8260 POKE TBL+2,INT(SECTORSPERTRACK/256)
JE 8270 POKE TBL+3,SECTORSPERTRACK-PEEK(TBL+2)*256
EE 8280 POKE TBL+4,SIDES-1
JA 8290 POKE TBL+5,DENSITY
KP 8300 POKE TBL+6,INT(BYTESPERSECTOR/256)
FG 8310 POKE TBL+7,BYTESPERSECTOR-PEEK(TBL+6)*256
CN 8320 POKE TBL+8,SELECT
MN 8330 POKE TBL+9,ACIA
MM 8340 POKE TBL+10,INT(MISC/256)
JO 8350 POKE TBL+11,MISC-PEEK(TBL+10)*256
DO 8360 CMD$="0":GOSUB 9000:REM ---WRITE BLOCK---
LC 8370 RETURN
ME 9000 REM DISK DENSITY CHANGE ROUTINE
LA 9030 REM
LN 9040 REM ENTER: DRIVE NUMBER IN DRIVE
DC 9050 REM .(5 SPACES)buffer address in ADDR
IP 9060 REM .(12 SPACES)command in CMD$
LE 9070 REM
GH 9080 REM (ONLY "N" AND "0" ARE VALID FOR CMD$)
LG 9090 REM
GH 9100 REM EXIT: status in SIOSTATUS
KP 9110 REM
OL 9130 TRAP 9190:REM activated if SIOCALL$ already DIM'd
IL 9140 DIM SIOCALL$(16)
MF 9150 RESTORE 9180
JM 9160 FOR CNT=1 TO 14:READ BYTE
FD 9170 SIOCALL$(CNT)=CHR$(BYTE):NEXT CNT
NI 9180 DATA 104,32,89,228,173,3,3,133,212,169,0,133,213,96
FH 9190 TRAP 40000:REM turn off TRAP
NL 9200 POKE 768,ASC("1"):REM don't ask me why
FP 9210 POKE 769,DRIVE:REM must be 1 through 8
OG 9220 POKE 770,ASC(CMD$)
NA 9230 POKE 771,128:REM assume output
LI 9240 IF CMD$="N" THEN POKE 771,64
GN 9250 POKE 773,INT(ADDR/256):REM buffer address
PC 9260 POKE 772,ADDR-256*PEEK(773)
FH 9270 POKE 774,3:REM short timeout
KA 9280 POKE 775,0:REM (high byte of timeout)
BI 9290 POKE 776,12:POKE 777,0:REM assume std config block
HG 9300 SIOSTATUS=USR(ADR(SIOCALL$))
KN 9310 RETURN

```

©



The Beginners Page

Tom R. Halfhill Editor

Clearing Up Variable Cloudiness

If you're just learning to program, variables can be confusing at first—especially because there are so many varieties of variables. Last month's column introduced the concept of numeric variables. But, depending on your computer's BASIC, there are also integer variables, double-precision variables, string variables, numeric array variables, and string array variables. This month we'll cover integer variables and tackle the rest later.

Numeric variables, you'll recall, represent ordinary numbers. For instance, you can store the number 10 in the variable X with the BASIC statement `X = 10`. Numeric variables can represent fractions just as easily, as in `X = 98.6`. An *integer variable* is similar, but with one important difference. As the term implies, integer variables can only represent *integers*—whole numbers. Fractions like 98.6 aren't allowed. There's one other limitation, too. In most BASICs which allow integer variables, the value cannot range beyond a maximum of 32,767 or a minimum of -32,768.

At first, these restrictions may seem odd. What's the advantage of limiting a variable to a whole number, and especially a whole number within a relatively narrow range?

The answer has to do with the way computers manipulate numbers. Internally, they use the binary numbering system instead of our everyday decimal system. Translating decimal numbers into binary gets tricky when the decimal number is a fraction, or *floating point* number (so-called because the decimal point can "float" to the left or right, as in 98.6 or 9.86). The conversion process requires a few valuable microseconds, and it takes several bytes of memory just to store a single floating point number.

Are Integers Faster?

Integer variables can greatly simpli-

fy matters for a computer. Because fractions aren't allowed, the operating system doesn't have to spin its wheels performing lengthy floating point conversions. And when the integers are limited to a range of -32,768 to 32,767, each number can be stored in only two bytes of memory.

Saving a few bytes of memory isn't a terribly important consideration anymore, now that nearly all personal computers come with at least 64K of RAM. But on certain computers, integer variables *can* help your programs run faster—often significantly faster.

In Commodore BASIC, AppleSoft, and IBM BASIC, you declare an integer variable by appending a percent symbol (%) to the variable name, as in `X% = 10`. (Integer variables are not available in TI BASIC or Atari BASIC, but are supported in Atari Microsoft BASIC.) A common mistake is to accidentally omit the % symbol in a statement somewhere, often leading to a mysterious error or unexpected result. Keep in mind that two variable names such as X and X% are treated by the computer as completely separate variables—they can store independent values and are as different as A and Z.

To test the performance of integer variables versus regular variables on your computer, enter this simple program:

```
10 FOR X=1 TO 32000
20 Y=Y+1
30 NEXT X
40 PRINT Y
```

Use a watch to measure how long this program takes to execute. Jot down the result, then change all three occurrences of Y to integer variables by adding the % symbol. Now run the program and time it again.

Surprising Results

What happened? If you have an

IBM PC or PCjr, the program should run measurably faster. But if you have a Commodore or Apple, the program actually runs *slower*. What's going on?

Integer variables are indeed faster and more memory-efficient on IBM computers. But on Commodore and Apple computers, integer variables actually execute slower and consume just as much memory as regular variables. This is true even though all three computers have versions of Microsoft BASIC. The reason is that the math routines in the Commodore and Apple are designed to handle floating-point numbers only. Therefore, the computer must convert integer variables into floating-point values, perform the math requested by the program, and then convert the results back into integers. All this conversion takes so long (in computer terms) that integer variables really aren't any faster than regular variables on Commodore or Apple computers.

It would seem, then, that integer variables are useless if you have a Commodore or Apple. But in fact, they can speed up your programs and save memory when used to construct *arrays*—a future column topic.

In the meantime, let's clear up another mystery raised by the above program. If you examine it closely, you might wonder why converting Y to Y% makes it run faster even on the IBM. Since the FOR-NEXT loop is incrementing Y by steps of one, Y is never a fraction, anyway—it's always a whole number. But computers handle all numeric variables as floating point numbers, *even when the value is a whole number and not a fraction*. Defining a variable as an integer variable forces the IBM to treat it as an integer. ©



The Computer Book Club®

Recognized as the authoritative source for micro users!

Superior Performance Practical Price!

More programs, projects, ways to use your micro for home, hobby, education, and business!

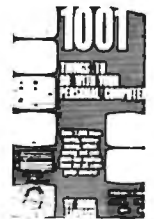
Select 5 Books for Only \$2⁹⁵



1884
List \$24.95



1588
List \$19.95



1160
List \$14.95



1750
List \$19.95



1540
List \$22.95

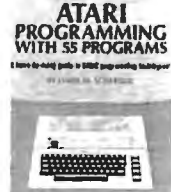


1000P
List \$8.25 (paper)

Making Money With Your Microcomputer FREE!



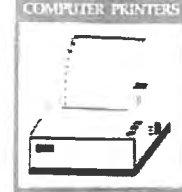
1906
List \$18.95



1485P
List \$14.50 (paper)



1533P
List \$11.95 (paper)



1872
List \$17.95



1849
List \$21.95



1811
List \$21.95



1640P
List \$15.50 (paper)



1748P
List \$10.95 (paper)



1169P
List \$14.50 (paper)



1822
List \$24.95



1702
List \$15.95



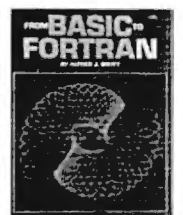
995P
List \$6.95 (paper)



1851
List \$22.95



1251
List \$16.95



1753
List \$17.95



1976
List \$26.95



1706
List \$14.95



1718
List \$21.95



1228P
List \$9.25 (paper)



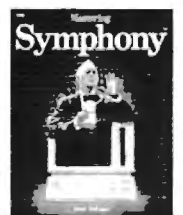
1745P
List \$11.50 (paper)



1882
List \$19.95



1521
List \$17.95



1948
List \$22.95

7 very good reasons to join The Computer Book Club®

- 1. Big Savings.** Save 20% to 75% on books sure to increase your computer know-how
- 2. No-Risk Guarantee.** All books returnable within 10 days without obligation
- 3. Club News Bulletins.** All about current selections—mains, alternates extras—plus bonus offers. Comes 13 times a year with hundreds of up-to-the-minute titles you can pick from
- 4. "Automatic Order."** Do nothing and the Main selection will be shipped automatically! But . . . if you want an Alternate selection—or no books at all—we'll follow the instructions you give on the reply form provided with every News Bulletin
- 5. Bonus Books.** Immediately get a Dividend Certificate with every book purchased and qualify for big discounts of 60% to 80%
- 6. Extra Bonuses.** Take advantage of added-value promotions, plus special discounts
- 7. Exceptional Quality.** All books are first-rate publisher's editions selected by our Editorial Board and filled with useful up-to-the-minute information



1295P
List \$10.25 (paper)



1831
List \$15.95



1874
List \$21.95



Making Money With Your Microcomputer FREE when you join!

Publisher's List \$8.25
(paper)—No. 1506P

If card is missing use this address to join: Computer Book Club, P.O. Box 80, Dept CMPT-1085, Blue Ridge Summit, PA 17214

HOTWARE: Software Best Sellers

This Month	Last Month	Title	Publisher	Remarks	Systems				
					Apple	Atari	Commodore	IBM	Macintosh
Entertainment									
1.	4.	<i>The Hitchhiker's Guide To The Galaxy</i>	Infocom	Comic adventure strategy game	•	•	•	•	•
2.	3.	<i>F-15 Strike Eagle</i>	MicroProse	Air combat simulation	•	•	•	•	
3.	1.	<i>Flight Simulator II</i>	SubLogic	Aircraft simulation	•	•	•		
4.	5.	<i>Flight Simulator</i>	Microsoft	Aircraft simulation				•	
5.	2.	<i>Karateka</i>	Brøderbund	Action karate game	•		•		
Education									
1.	3.	<i>New Improved MasterType</i>	Scarborough	Typing instruction program	•	•	•	•	•
2.	2.	<i>Typing Tutor III</i>	Simon & Schuster	Typing instruction program	•		•	•	•
3.	1.	<i>Math Blaster I</i>	Davidson	Introductory math program, ages 6-12	•	•	•	•	
4.	4.	<i>Early Games</i>	Springboard	Educational games, ages 2-6	•	•	•	•	
5.		<i>Music Construction Set</i>	Electronic Arts	Music composition program	•	•	•		
Home Management									
1.	1.	<i>Print Shop</i>	Brøderbund	Do-it-yourself print shop	•	•	•		
2.	2.	<i>Print Shop Graphics Library</i>	Brøderbund	100 additional graphics	•	•	•		
3.		<i>Print Shop Graphics Library II</i>	Brøderbund	More graphics	•	•	•		
4.	5.	<i>The Newsroom</i>	Springboard	Do-it-yourself newspaper	•		•	•	
5.	3.	<i>HomePak</i>	Batteries Included	Word processing, telecommunications, & data management	•	•	•	•	

Copyright 1985 by Billboard Publications, Inc. Compiled by the Billboard Research Department and reprinted by permission. Data as of 7/27/85.

CAPUTE!

Modifications or Corrections To Previous Articles

Commodore Disk 64 Commander

A character was smudged in the listing for this disk utility program from the September issue. Line 3315 (p. 82) should read as follows:

```
3315 :168,160,000,177,098,153,231
```

Also, the DOPEN command example for relative files (p. 81) is incorrect. The record length must be specified *outside* the quotes surrounding the filename, not within the quotes as shown. Thus, the example for opening a relative file named TEST with a record length of 20 characters should read:

```
DOPEN#1,"TEST",L20
```

Commodore 64 Headliner

The large characters displayed by this program from the August issue

(p. 72) do not have the desired color on newer 64s, and are invisible on older 64s which do not fill color memory. This is because the variable G, which is defined in line 100 as the address of the start of color memory and intended for use in line 530 to color the large characters, is redefined when it is used for another purpose in lines 200 and 220. There are several possible solutions to this problem, the simplest of which is to change the G in lines 200 and 220 to some other variable:

```
200 PRINTCHR$(147)TAB(125)"DOW
NLOADING THE CHARACTER SET
":C=53248:GN=12288:rem 114
220 POKE 56333,127:POKE1,51:FOR
Q=0TO1023:POKEGN+Q,PEEK(
C+Q):NEXT :rem 85
```

When adding the "Headliner" routine to your own programs, you

should make sure that your program does not use any of the variables in the main subroutine (lines 500-550) for any other purpose. The variables are P, L, X\$, G, CC, and SL.

©

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

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. At least 8K expansion memory is required.

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.

Using MLX

Type in and save the appropriate version of MLX (you'll want to use it in the future). When you're ready to type in an ML program, run MLX. MLX for the 64 asks you for two numbers: the starting address and the ending address. These numbers are given in the article accompanying the ML program.

When you run MLX, 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 space bar or RETURN key to advance to the next number. The checksum automatically appears in inverse video for emphasis.

To simplify your typing, MLX redefines part of the keyboard as a numeric keypad (lines 581-584):

```

U I O           7 8 9
H J K L become 0 4 5 6
M , .           1 2 3
    
```

64 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.

64 MLX: Machine Language Entry

```

10 REM LINES CHANGED FROM MLX
   {SPACE}VERSION 2.00 ARE 750
   ,765,770 AND 860      :rem 50
20 REM LINE CHANGED FROM MLX V
   ERSION 2.01 IS 300 :rem 147
100 PRINT "{CLR}[63]";CHR$(142);
   CHR$(8);:POKE53281,1:POKE5
   3280,1      :rem 67
    
```

```

101 POKE 788,52:REM DISABLE RU
   N/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}[G3]{RIGHT}
   {2 RIGHT}[OFF]£{RVS}£
   [*][OFF][*]{RVS}
   {14 SPACES}"; :rem 35
140 PRINT"{RVS}{41 SPACES}"
   :rem 120
200 PRINT"[2 DOWN]{PUR}[BLK] M
   ACHINE LANGUAGE EDITOR VER
   SION 2.02[5 DOWN]";:rem 238
210 PRINT"[5]{2 UP}STARTING AD
   DRESS?[8 SPACES]{9 LEFT}";
   :rem 143
215 INPUTS:F=1-F:C$=CHR$(31+11
   9*F) :rem 166
220 IFS<256OR(S>40960ANDS<4915
   2)ORS>53247THENGOSUB3000:G
   OTO210 :rem 235
225 PRINT:PRINT:PRINT :rem 180
230 PRINT"[5]{2 UP}ENDING ADDR
   ESS?[8 SPACES]{9 LEFT}";:I
   NPUTE:F=1-F:C$=CHR$(31+119
   *F) :rem 20
240 IFE<256OR(E>40960ANDE<4915
   2)ORE>53247THENGOSUB3000:G
   OTO230 :rem 183
250 IFE<STHENPRINTCS;"{RVS}END
   ING< START[2 SPACES]":GOS
   UB1000:GOTO 230 :rem 176
260 PRINT:PRINT:PRINT :rem 179
300 PRINT"{CLR}";CHR$(14):AD=S
   :rem 56
310 A=1:PRINTRIGHTS$("0000"+MID
   $(STR$(AD),2),5);":";
   :rem 33
315 FORJ=ATO6 :rem 33
320 GOSUB570:IFN=-1THENJ=N:G
   OTO320 :rem 228
390 IFN=-211THEN 710 :rem 62
400 IFN=-204THEN 790 :rem 64
410 IFN=-206THENPRINT:INPUT"
   {DOWN}ENTER NEW ADDRESS";Z
   Z :rem 44
415 IFN=-206THENIFZZ<SORZZ>ETH
   ENPRINT"{RVS}OUT OF RANGE"
   :GOSUB1000:GOTO410:rem 225
417 IFN=-206THENAD=ZZ:PRINT:GO
   TO310 :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>ETHENPR
   INT"AT LEAST";S;"{LEFT}, N
   OT MORE THAN";E:GOTO430
   :rem 159
450 FORI=FTOTSTEP6:PRINT:PRINT
   RIGHTS$("0000"+MID$(STR$(I
   ),2),5);":"; :rem 30
451 FORK=0TO5:N=PEEK(I+K):PRIN
   TRIGHTS$("00"+MID$(STR$(N),
   2),3);":"; :rem 66
    
```



```

460 GETAS:IFAS>" THENPRINT:PRI
NT:GOTO310 :rem 25
470 NEXTK:PRINTCHR$(20);:NEXTI
:PRINT:PRINT:GOTO310
:rem 50
480 IFN<0 THEN PRINT:GOTO310
:rem 168
490 A(J)=N:NEXTJ :rem 199
500 CKSUM=AD-INT(AD/256)*256:F
ORI=1TO6:CKSUM=(CKSUM+A(1
)AND255:NEXT :rem 200
510 PRINTCHR$(18);:GOSUB570:PR
INTCHR$(146); :rem 94
511 IFN=-1THENA=6:GOTO315
:rem 254
515 PRINTCHR$(20):IFN=CKSUMTHE
N530 :rem 122
520 PRINT:PRINT"LINE ENTERED W
RONG : RE-ENTER":PRINT:GO$
UB1000:GOTO310 :rem 176
530 GOSUB2000 :rem 218
540 FORI=1TO6:POKEAD+I-1,A(I):
NEXT:POKE54272,0: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"[$]"; :rem 81
581 GETAS:IFAS$=""THEN581
:rem 95
582 AV=- (AS$="M")-2*(AS$=",")-3*
(AS$=".")-4*(AS$="J")-5*(AS$=
"K")-6*(AS$="L") :rem 41
583 AV=AV-7*(AS$="U")-8*(AS$="I"
)-9*(AS$="O"):IFAS$="H"THENA
$="0" :rem 134
584 IFAV>0THENA$=CHR$(48+AV)
:rem 134
585 PRINTCHR$(20);:A=ASC(AS$):I
FA=13ORA=44ORA=32THEN670
:rem 229
590 IFA>128THENN=-A:RETURN
:rem 137
600 IFA<>20 THEN 630 :rem 10
610 GOSUB690:IFI=1ANDT=44THENN
=-1:PRINT" {OFF} {LEFT}
{LEFT}";:GOTO690 :rem 62
620 GOTO570 :rem 109
630 IFA<48ORA>57THEN580
:rem 105
640 PRINTAS$;:N=N*10+A-48
:rem 106
650 IFN>255 THEN A=20:GOSUB100
0: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 CANCE
L SAVE} {DOWN}" :rem 106
720 F$="" :INPUT" {DOWN} FILENAM
E";F$:IFF$="" THENPRINT:PRI
NT:GOTO310 :rem 71
730 PRINT:PRINT" {2 DOWN} {RVS}T
{OFF}APE OR {RVS}D{OFF}ISK
: (T/D)" :rem 228
740 GETAS:IFAS<>"T"ANDA$<>"D"
HEN740 :rem 36
750 DV=1-7*(AS$="D"):IFDV=8THEN

```

```


F$="0:"+F$:OPEN15,8,15,"S"
+F$:CLOSE15 :rem 212
760 T$=F$:ZK=PEEK(53)+256*PEEK
(54)-LEN(T$):POKE782,ZK/25
6 :rem 3
762 POKE781,ZK-PEEK(782)*256:P
OKE780,LEN(T$):SYS65469
:rem 109
763 POKE780,1:POKE781,DV:POKE7
82,1:SYS65466 :rem 69
765 K=S:POKE254,K/256:POKE253,
K-PEEK(254)*256:POKE780,25
3 :rem 17
766 K=E+1:POKE782,K/256:POKE78
1,K-PEEK(782)*256:SYS65496
:rem 235
770 IF(PEEK(783)AND1)OR(191AND
ST)THEN780 :rem 111
775 PRINT" {DOWN} DONE. {DOWN}":G
OTO310 :rem 113
780 PRINT" {DOWN} ERROR ON SAVE.
{2 SPACES} TRY AGAIN.":IFDV
=1THEN720 :rem 171
781 OPEN15,8,15:INPUT#15,E1$,E
2$:PRINTE1$;E2$:CLOSE15:GO
TO720 :rem 103
790 PRINT" {CLR} {RVS} *** LOAD *
** {2 DOWN}" :rem 212
795 PRINT" {2 DOWN} {PRESS {RVS}
RETURN {OFF} ALONE TO CANCE
L LOAD}" :rem 82
800 F$="" :INPUT" {2 DOWN} FILEN
AME";F$:IFF$="" THENPRINT:G
OTO310 :rem 144
810 PRINT:PRINT" {2 DOWN} {RVS}T
{OFF}APE OR {RVS}D{OFF}ISK
: (T/D)" :rem 227
820 GETAS:IFAS<>"T"ANDA$<>"D"
HEN820 :rem 34

```

```

830 DV=1-7*(AS$="D"):IFDV=8THEN
F$="0:"+F$ :rem 157
840 T$=F$:ZK=PEEK(53)+256*PEEK
(54)-LEN(T$):POKE782,ZK/25
6 :rem 2
841 POKE781,ZK-PEEK(782)*256:P
OKE780,LEN(T$):SYS65469
:rem 107
845 POKE780,1:POKE781,DV:POKE7
82,1:SYS65466 :rem 70
850 POKE780,0:SYS65493 :rem 11
860 IF(PEEK(783)AND1)OR(191AND
ST)THEN870 :rem 111
865 PRINT" {DOWN} DONE.":GOTO310
:rem 96
870 PRINT" {DOWN} ERROR ON LOAD.
{2 SPACES} TRY AGAIN. {DOWN}
":IFDV=1THEN800 :rem 172
880 OPEN15,8,15:INPUT#15,E1$,E
2$:PRINTE1$;E2$:CLOSE15:GO
TO800 :rem 102
1000 REM BUZZER :rem 135
1001 POKES4296,15:POKES4277,45
:POKES4278,165 :rem 207
1002 POKES4276,33:POKE 54273,6
:POKES4272,5 :rem 42
1003 FORT=1TO200:NEXT:POKES427
6,32:POKES4273,0:POKES427
2,0:RETURN :rem 202
2000 REM BELL SOUND :rem 78
2001 POKES4296,15:POKES4277,0:
POKES4278,247 :rem 152
2002 POKE 54276,17:POKES4273,4
0:POKES4272,0 :rem 86
2003 FORT=1TO100:NEXT:POKES427
6,16:RETURN :rem 57
3000 PRINTCS$;" {RVS} NOT ZERO PA
GE OR ROM":GOTO1000
:rem 89

```



\$50 for your old interface

NEW!
Universal Parallel Graphics Interface

- Built-in self-test with status report
- Optional RAM printer buffer
- Provides virtually total emulation of Commodore printers for compatibility with popular software
- ASCII conversion, total test, Emulate & transparent mode
- Fully intelligent interface that plugs into standard Commodore printer socket
- Exclusive graphic key-match function

Micrografx MW-350 \$129
..... \$79.00 with any trade in


Universal Input/Output Board for C-64 & C-128

- 16 Channel 8-bit A/D converter with 100 microsecond sampling time.
- 1 D/A output
- 16 high voltage/high current discrete output
- 1 EPROM socket
- Use multiple boards for additional channels up to 6 boards

CBM-64 used MW-611 \$225.00



Dealer Inquiries invited




Micro World Computers, Inc. (303) 987-9531
3333 W. Wadsworth Blvd. #C105
Lakewood, CO 80227



Sprites In TI Extended BASIC

Since this month's *COMPUTE!* is a game issue, let me remind you that *COMPUTE!'s First Book of TI Games* is still available. It offers a variety of games that do not require TI Extended BASIC.

Eventually, however, game programmers usually want the Extended BASIC command module because it adds several programming features, including up to 28 sprites (smoothly moving screen objects). With one statement you can define a sprite and set it in continuous motion. For example, try this short program:

```
100 REM TI EXTENDED BASIC
110 REM SPRITE DEMO
120 DEF R(X)=INT(X*RND)
130 CALL CLEAR
140 FOR S=1 TO 28 :: RAND
    OMIZE
150 CALL SPRITE( #S, 64+S, R
    (15)+2, 90, 128, R(255)-
    127, R(255)-127)
160 NEXT S
170 GOTO 170
180 END
```

This month's main program, "Sprite Tester," offers a way to test your sprites before putting them into a program of your own. After it displays a sprite on the screen, it lets you change various characteristics of the sprite by entering different numbers. You may experiment as much as you wish. When you have the sprite moving as you want, simply jot down the CALL SPRITE statement shown at the bottom of the screen.

Designing The Sprite

To get started, type in and run Sprite Tester. Choose a magnification factor from 1 to 4. (A regular-size character is magnification 1 and a four-times size is magnification 2. Magnification 3 is made up of four regular-size characters, and magnification 4 is four large characters.)

Next choose a character number from 33 to 95—one of the char-

acters from the regular ASCII character set. If you prefer to use your own graphic character, insert a CALL CHAR statement to redefine a character.

You may then choose a sprite color. Since 1 is transparent (the screen color), you must choose a color number from 2 to 16. If you choose color 8, the screen changes so you'll be able to see the sprite. All other colors use the cyan background screen.

Next choose a dot row and dot column position from which the sprite should start moving. Then, to move the sprite, select a row velocity and column velocity. Since these may be positive or negative numbers, first choose + or -, press ENTER, then pick the number and press ENTER again. If you want to experiment with the position of the sprite, keep the row velocity and column velocity at +0. Otherwise, the sprite will be in motion, and you may not be able to see the dot row and dot column changes.

As you enter parameters, the CALL MAGNIFY and CALL SPRITE statements at the lower part of the screen show the sprite's present conditions. The program continues until you press FCTN-CLEAR.

Extended BASIC Features

Extended BASIC contains a number of statements which make programs such as Sprite Tester easier to write. The DISPLAY AT statements, for instance, allow you to print at a specified row and column. USING helps to format output, right-justifying numbers in this case.

The ACCEPT statement is quite versatile for accepting input. BEEP sounds a tone when the computer is waiting for the input. AT() lets you receive the input starting at a certain row and column on the screen, and SIZE limits the input to

a specified number of characters. VALIDATE allows you to specify what characters are acceptable as input. To erase or change before you press ENTER, you can press FCTN-ERASE. Unfortunately, if you enter something wrong, an error message appears and the printing on the screen starts to scroll. Afterward, the cursor may not be lined up with the original question.

Unlike Console BASIC, Extended BASIC lets you follow THEN and ELSE in IF statements with either a line number or a command.

The CALL SPRITE statement specifies the sprite number, the character number for the sprite, the foreground color, the beginning dot row and dot column positions, and the row velocity and column velocity.

CALL MAGNIFY sets the magnification factor. You can change characteristics of the sprite either by using another CALL SPRITE statement or CALL PAT-TERN for the character number, CALL COLOR for color, and CALL MOTION for the velocities.

If you prefer to save typing effort, you can obtain a copy of this program by sending a blank cassette or disk, a stamped, self-addressed mailer, and \$3 to:

C. Regena
P.O. Box 1502
Cedar City, UT 84720

Please be sure to specify that you want Sprite Tester.

```
100 REM TI EXTENDED BASIC
110 REM SPRITE TESTER
120 CALL CLEAR
130 CALL SCREEN(8)
140 CALL CHAR(96, "080402F
    F020408")
150 CALL COLOR(9, 10, 1)
160 CALL CHAR(95, "10107C1
    010007C")
170 CH=42
180 COLOR=2
```



```

190 DROW=96
200 DCOL=128
210 VROW=0
220 VCOL=0
230 M=1
240 CALL MAGNIFY(M)
250 DISPLAY AT(20,1):"CAL
L MAGNIFY(1)"
260 DISPLAY AT(22,1):"CAL
L SPRITE(#1,42, 2, 96
,{3 SPACES}128,
,{3 SPACES}0,
,{3 SPACES}0)"
270 CALL SPRITE(#1,CH,COL
OR,DROW,DCOL,VROW,VCO
L)
280 CALL HCHAR(1,3,96)
290 DISPLAY AT(1,2):"MAGN
IFY 1-4:"
300 ACCEPT AT(1,16)VALIDA
TE("1234")BEEP SIZE(1
):M
310 CALL MAGNIFY(M)
320 CALL HCHAR(20,16,M+48
)
330 CALL HCHAR(1,3,32)
340 CALL HCHAR(3,3,96)
350 DISPLAY AT(3,2):"CHAR
ACTER 33-95:"
360 ACCEPT AT(3,20)VALIDA
TE(DIGIT)BEEP SIZE(2)
:CH
370 IF (CH<33)+(CH>95)THE
N 360
380 CALL PATTERN(#1,CH)
390 DISPLAY AT(22,16):USI
NG "##":CH;
400 CALL HCHAR(3,3,32)
410 CALL HCHAR(5,3,96)
420 DISPLAY AT(5,2):"COLO
R 2-16:"
430 ACCEPT AT(5,15)VALIDA
TE(DIGIT)BEEP SIZE(2)
:COLOR
440 IF (COLOR<2)+(COLOR>1
6)THEN 430
450 IF COLOR<>8 THEN 480
460 CALL SCREEN(16)
470 GOTO 490
480 CALL SCREEN(8)
490 CALL COLOR(#1,COLOR)
500 DISPLAY AT(22,19):USI
NG "##":COLOR;
510 CALL HCHAR(5,3,32)
520 CALL HCHAR(7,3,96)
530 DISPLAY AT(7,2):"DOT
ROW 1-196:"
540 ACCEPT AT(7,18)VALIDA
TE(DIGIT)BEEP SIZE(3)
:DROW
550 IF (DROW<1)+(DROW>196
)THEN 540
560 CALL SPRITE(#1,CH,COL
OR,DROW,DCOL,VROW,VCO
L)
570 DISPLAY AT(22,22):USI
NG "##":DROW;
580 CALL HCHAR(7,3,32)
590 CALL HCHAR(9,3,96)
600 DISPLAY AT(9,2):"DOT
COLUMN 1-256:"
610 ACCEPT AT(9,21)VALIDA
TE(DIGIT)BEEP SIZE(3)
:DCOL
620 IF (DCOL<1)+(DCOL>256
)THEN 610
630 CALL SPRITE(#1,CH,COL

```

```

OR,DROW,DCOL,VROW,VCO
L)
640 DISPLAY AT(23,1):USIN
G "##":DCOL;
650 CALL HCHAR(9,3,32)
660 CALL HCHAR(9,3,32)
670 CALL HCHAR(11,3,96)
680 DISPLAY AT(11,2):"ROW
VELOCITY _127: +"
690 ACCEPT AT(11,22)VALID
ATE("+")BEEP SIZE(1)
:S$
700 ACCEPT AT(11,23)VALID
ATE(DIGIT)SIZE(3):VRO
W
710 IF VROW>127 THEN 680
720 IF S$="-" THEN VROW--
VROW
730 CALL MOTION(#1,VROW,V
COL)
740 DISPLAY AT(23,5):USIN
G "##":VROW;
750 CALL HCHAR(11,3,32)
760 CALL HCHAR(13,3,96)
770 DISPLAY AT(13,2):"COL
UMN VELOCITY _127: +
"
780 ACCEPT AT(13,25)VALID
ATE("+")BEEP SIZE(1)
:S$
790 ACCEPT AT(13,26)VALID
ATE(DIGIT)SIZE(3):VCO
L
800 IF VCOL>127 THEN 770
810 IF S$="-" THEN VCOL--
VCOL

```

```

820 CALL MOTION(#1,VROW,V
COL)
830 DISPLAY AT(23,10):USI
NG "##":VCOL;
840 CALL HCHAR(13,3,32)
850 GOTO 280
860 END

```

To receive additional information from advertisers in this issue, use the handy reader service cards in the back of the magazine.

Save Your Copies of COMPUTE!



Protect your back issues of *COMPUTE!* in durable binders or library cases. Each binder or case is custom-made in flag-blue binding with embossed white lettering. Each holds a year of *COMPUTE!*. Order several and keep your issues of *COMPUTE!* neatly organized for quick reference. (These binders make great gifts, too!)

Cases:

\$6.95 each;
3 for \$20.00;
6 for \$36.00

Binders

\$8.50 each;
3 for \$24.75;
6 for \$48.00

(Please add \$2.50 per unit for orders outside the U.S.)

Send in your prepaid order with the attached coupon

Mail to: Jesse Jones Industries, P.O. Box 5120,
Dept. Code COTE, Philadelphia, PA 19141

Please send me _____ *COMPUTE!* cases binders.
Enclosed is my check or money order for \$ _____. (U.S. funds only.)

Name _____

Address _____

City _____

State _____ Zip _____

Satisfaction guaranteed or money refunded.
Please allow 4-6 weeks for delivery.

ATARI

ATARI is a trademark of ATARI INC.

Atari 520 ST- Monochrome System Call
Atari 520 ST-RGB System Call

Call for latest ST Software and Accessories

SUPERPRINTER PACKAGES

SG-10 Printer and U-Print A	289
Panasonic 1091 and U-Print A	318
Legend 880 & U-Print A	287
Citoh 8510AP+ & U-Print A	399
Powertype & U-Print A	379

Super Printer Packages have no extra charges when shipped in Continental USA.

ATARI INTERFACES

Aid Interfast I	99.95
U-Print A	59.95
U-Print A/16K Buffer	79.95
U-Print A/32K Buffer	99.95
U-Print A/64K Buffer	109.95
R-Verter Adaptor	39.95

INDUS GT

for Atari	219
---------------------	-----

MPP 1000E

Modern	89.95
------------------	-------

NEW

U-Call Modem Adapter	44.95
--------------------------------	-------

Epyx™

Rescue on Fractalus-D	24.95	Koronis Rift-D	24.95
World's Greatest Football-D	24.95	Ballblazer-D	24.95
The Eidolon-D	24.95	Pitstop II-D	24.95
Winter Games	24.95	Summer Games-D	24.95

Super Special Prices Effective Now Through October 31, 1985

ATARI SOFTWARE

BRODERBUND

Bank Street Writer-D	34.95
Loderunner-D	23.95
Spelunker-D	20.95
Stelth-D	20.95
Print Shop-D	34.95
Serpent's Star-D	27.95
Print Shop Paper	16.95
Print Shop Graphics-D	19.95

ELECTRONIC ARTS

Archon	19.95
Archon II	24.95
Mule	19.95
Realm-Impossibility	19.95
Murder/Zinderneuf	19.95
Music Construction	19.95
Pinball Construction	19.95
One on One	24.95
Seven Cities of Gold	24.95
Financial Cookbook	29.95

INFOCOM

Enchanter-D	24.95
Zork I-D	24.95
Hitchiker-D	24.95
Cuthroats-D	24.95
Wisbringer-D	29.95

MICROPROSE

F-15 Strike Eagle-D	23.95
Crusade in Europe-D	27.95
Decision in Desert-D	27.95
Kennedy Approach-D	23.95

MISCELLANEOUS

ATARI	
Fight Simulator II-D	34.95
Megaloft II --D	19.95
Monkey Wrench II-Cart	23.95
Beachhead-D	21.95
Net Worth-D	49.95
Omnitrend Universe-D	69.95
MMG Compiler-D	69.95
Summer Games-D	27.95
Ultima I-D	23.95
Ultima II-D	37.95
Ultima III-D	37.95
Ultima IV-D	41.95
Letter Perfect-D	39.95
Data Perfect-D	39.95
Micro-Leag. Baseball-D	29.95
Paper Clip-D	39.95

MISC. ATARI (cont'd.)

On-Track Racing-D	20.95
Bounty Bob-Cart	29.95
Ramrod XL	79.95
Alien Voice Box	99.95
B I 80 Column Card	49.95

OSS

BASIC XL-Cart	52.95
MAC 65XL-Cart	49.95
Action-Cart	49.95
Basic XL-Cart	39.95
DOS XL Bug 65	27.95
MAC 65 Tool Kit-D	20.95
Action Tool Kit-D	20.95
Basic XL Tool Kit-D	20.95

SSI

Carrier Force-D	37.95
Combat Leader-D	24.95
Cosmic Balance-D	24.95
Broadsides-D	24.95
50 Mission Crush-D	24.95
Rails West-D	24.95
Computer Ambush-D	37.95
Computer Baseball-D	24.95

Ardenes-D	37.95
Imperium Galatium-D	24.95
Oper Market Garden-D	32.95
Kampfgruppe-D	37.95
Computer Quarterback-D	24.95
Colonial Conquest-D	24.95
Gemstone Warrior-D	21.95
Six Gun Shootout-D	24.95

SYNAPSE

Syncaic-D	34.95
Synfile-D	34.95
Syntrend-D	27.95
Syncom-D	27.95
Synsrock-D	27.95
Syncaic Templates-D	16.95
Relax Stress Reduction-D	79.95
Blue Max-D	23.95
Blue Max 2001-D	20.95
Mindwheel-D	27.95
Loderunner's Rescue-D	20.95

GENERAL HARDWARE



SG-10	219
SG-15	369
SD-10	339
SD-15	449
SR-10	Call
SR-15	Call

PRINTER BUFFERS

Microfazer	Call
U-Print-16K	79.95
U-Print-32K	99.95
U-Print-64K	109.95

MODEMS

Volkmodem 300	59
Volkmodem 1200	189
Hayes 1200	Call
Hayes 300	169
Micromodem IIE	Call
Maxwel 300 1200	319

PRINTERS

Citoh 8510AP	329
Legend 1080	239
Citoh 7500AP	219
Epson	Call
Toshiba 1351	Call
Toshiba 1340	Call
Legend 880	219
Panasonic 1090	199
Panasonic 1091	245
Powertype	309

With The Purchase Of Any Printer

Buy

The Print Shop-Apple 31.95

The Print Shop-

Atari & C-64 27.95

Super Special Prices Effective Now Thru September 31, 1985

APPLE

BRODERBUND

Print Shop-D	33.95
Karateka-D	21.95
Champ Loderunner-D	21.95
Bank Street Writer-D	44.95
Print Shop Graphics-D	17.95
Dazzle Draw	39.95

SSI

Gemstone Warrior	21.95
Kampfgruppe	39.95
Phantasia	25.95
Questron	33.95

APPLE MISCELLANEOUS

Ghostbusters	25.95
Flight Simulator II	34.95
F-15 Strike Eagle	21.95
Summer Games	25.95
Micro League Baseball	29.95
Star League Baseball	23.95
Wizardry Proving	33.95
Ultima III	39.95
Bruce Lee	25.95
Millionaire	33.95
Legend Carnbean	21.95
Felony	21.95

INFOCOM

Hitchiker	29.95
Zork I II or III	29.95
Enchanter	29.95
Deadline	34.95
Wisbringer-D	29.95
Skyfax	29.95
One on One	29.95
Seven Cities Gold	29.95
Archon	24.95
Adv Construction Kit	37.95

ELECTRONIC ARTS

Conan	25.95
Sargon III	33.95
Dollars & Sense	64.95
PFS File	79.95
PFS Write	79.95
PFS Report	79.95
Multiplan	84.95
Supercalc III	124.95
Sideways	39.95
Grosstalk	129.95
Jane w/Mouse	129.95
BPI Software	Call

EST. 1982

ComputAbility.

PO Box 17882, Milwaukee, WI 53217

ORDER LINES OPEN

Mon-Fri 11 a.m. - 7 p.m. CST • Sat 12 p.m. - 5 p.m. CST

To Order Call Toll Free

800-558-0003

For Technical Info, Order Inquiries, or for Wisc. Orders

414-351-2007

ORDERING INFORMATION: Please specify system 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 4% shipping on all Hardware orders. minimum \$4.00. 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.

COMMODORE 64

SUPER PRINTER PACKAGES

SG-10 & G-WIZ	282
Panasonic 1091 & G-WIZ	308
Panasonic 1090 & G-WIZ	379
Legend 880 & G-WIZ	279
Legend 1080 & G-WIZ	291
Citoh 8510AP+ & G-WIZ	395

Super Printer Packages have no extra charges added when shipped in Continental USA

MODEMS

Westridge AA AD	69.95
Total Tele Modem	49.95
Mighty Mo	69.95
1660 Modem	49.95

Animation Station

for C-64	49.95
--------------------	-------

PRINTER

INTERFACES

Axiom	69.95
G-Wiz	59.95
Data Share PPI	49.95
Cardco G	Call

Epyx™

Fast Load-Cart	24.95	Temple of Apshai Trilogy-D	24.95
Rescue on Fractalus-D	24.95	Summer Games II-D	24.95
World's Greatest Football-D	24.95	Koronis Rift-D	24.95
The Eidolon-D	24.95	Ballblazer-D	24.95
Winter Games	24.95	Pitstop II-D	24.95

Super Special Prices Effective Now Through October 31, 1985

COMMODORE SOFTWARE

ACCESS

Beachhead-D	21.95
Beachhead II-D	24.95
Raid Moscow-D	24.95
Mach V-Cart	21.95
Consultant-D	52.95
Paperclip w/ Spellpak-D	79.95
Super Buscard II	129.95
Home Organizer Items-D	16.95
B.I. 80 Card	109.95
Cal-Kit	34.95
Home Pak-D	34.95

COMMODORE

Easy Calc-Cart	34.95
Easy Mail-D	19.95
Easy Script-D	44.95
Easy Spell-D	19.95
Logo-D	49.95
The Manager-D	34.95
Suspended-D	29.95
Starcross-D	29.95
Deadline-D	29.95
Cuthroats-D	29.95
The Suspect-D	29.95
Zork I, II or III-D	29.95

ELECTRONIC ARTS

Sky Fox-D	24.95
Mail Order Monster-D	24.95
Adv Construction-D	29.95
Racing Destruction-D	24.95

INSTA

Insta-Calc Graph Combo-D	24.95
Insta-Ledger-D	39.95
Insta-Writer-D	14.95
Management Combo-D	39.95
Insta-Speed-D	39.95

SSI

Questron-D	24.95
Phantasia-D	24.95
Germany 1985-D	37.95
Wings of War-D	24.95
Fighter Command-D	37.95
Mech Brigade-D	

What the world really needs is a 99 cent Double Sided, Double Density Diskette with a LIFETIME WARRANTY!

And DISK WORLD! has it.

Introducing Super Star Diskettes: the high quality diskette with the lowest price and the best LIFETIME WARRANTY!

In the course of selling more than a million diskettes every month, we've learned something: higher prices don't necessarily mean higher quality.

In fact, we've found that a good diskette manufacturer simply manufactures a good diskette...no matter what they charge for it. (By way of example, consider that none of the brands that we carry has a return rate of greater than 1/1,000th of 1 percent!)

In other words, when people buy a more expensive diskette, they aren't necessarily buying higher quality.

The extra money might be going toward flashier advertising, snazzier packaging or simply higher profits. But the extra money in a higher price isn't buying better quality.

All of the good manufacturers put out a good diskette. Period.

How to cut diskette prices ...without cutting quality.

Now this discovery posed a dilemma: how to cut the price of diskettes without lowering the quality.

There are about 85 companies claiming to be "diskette" manufacturers.

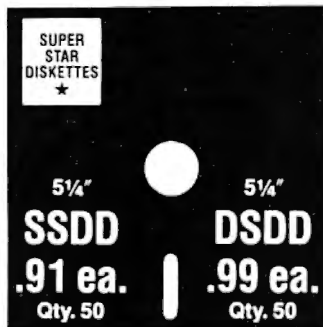
Trouble is, most of them aren't manufacturers. Rather they are fabricators or marketers, taking other company's components, possibly doing one or more steps of the processing themselves and pasting their labels on the finished product.

The new Eastman Kodak diskettes, for example, are one of these. So are IBM 5 1/4" diskettes. Same for DYSAN, Polaroid and many, many other familiar diskette brand names. Each of these diskettes is manufactured in whole or in part by another company!

So, we decided to act just like the big guys. That's how we would cut diskette prices...without lowering the quality.

We would go out and find smaller companies to manufacture a diskette to our specifications...specifications which are higher than most...and simply create our own "name brand" diskette.

Name brand diskettes that offered high quality at low prices.



Super Star diskettes are sold in multiples of 50 only. Diskettes are shipped with white Tyvec sleeves, reinforced hubs, user ID labels and write-protect tabs

Boy, did we get lucky. Our Super Star Diskettes are the same ones you've been using for years...without knowing it.

In our search for the low priced, high quality diskette of our dreams, we found something even more interesting.

We found that there are several manufacturers who don't give a hoot about the consumer market for their diskettes. They don't spend millions of dollars in advertising trying to get you, the computer user, to use their diskettes

Instead, they concentrate their efforts on turning out the highest quality diskettes they can...because they sell them to the software publishers, computer manufacturers and other folks who (in turn) put their name on them...and sell them for much higher prices to you!

After all, when a software publisher or computer manufacturer or diskette marketer puts their name on a diskette, they want it to work time after time, everytime. (Especially software publishers who have the nasty habit of copy-protecting their originals!)

Super Star Diskettes. You already know how good they are. Now you can buy them...cheap.

Well, that's the story. Super Star diskettes don't roll off the boat from Pago-Pago or emerge from a basement plant just east of Nowhere.

Super Star diskettes have been around for years...and you've used them for years as copy-protected software originals, unprotected originals. Sometimes, depending on which computer you own, the system master may have been on a Super Star diskette. And maybe more than once, you've bought a box or two or more of Super Star diskettes without knowing it. They just had some "big" company's name on them.

Super Star Diskettes are good. So good that a lot of major software publishers, computer manufacturers and other diskette marketers buy them in the tens or hundreds of thousands.

We buy them in the millions. And than we sell them to you. Cheap.

**When every little bit counts,
it's Super Star Diskettes.**

You've used them a hundred times...under different names.

Now, you can buy the real McCoy, the same diskette that major software publishers, computer manufacturers and diskette marketers buy...and call their own.

We simply charge less.

Super Special!

Order 50 Super Star Diskettes and we'll be happy to sell you an Amaray Media-Mate 50 for only \$8.75, shipping included...a lot less than the suggested retail price of \$15.95.



Regular DISK WORLD! price: \$9.69 ea.
+ \$2.00 Shpng.

DISKETTE STORAGE CASES

DISK CADDIES

The original flip-up holder for 10 5 1/4" diskettes. Beige or Grey only.

\$1.65 ea. + .20 Shpng.

DISKETTE 70 STORAGE

Dust-free storage for 70 5 1/4" diskettes. Six dividers included. An excellent value.

\$11.95 ea. + \$3.00 Shpng.



HOW TO ORDER:

ORDERS ONLY:

1-800-621-6827

(In Illinois: 1-312-256-7140)

INQUIRIES:

1-312-256-7140

FOR FASTEST SERVICE, USE NO-COST MCI MAIL: Our address is DISK WORLD!. It's a FREE MCI MAIL letter. No charge to you. (Situation permitting, we'll ship these orders in 24 hours or less.)

SHIPPING: 5 1/4" & 3 1/2" DISKETTES—Add \$3.00 per each 100 or fewer diskettes. **OTHER ITEMS:** Add shipping charges as shown in addition to other shipping charges. **PAYMENT:** VISA, MASTERCARD and Prepaid orders accepted. **COD ORDERS:** Add additional \$3.00 special handling charge. **APO, FPO, AK, HI & PR ORDERS:** Include shipping charges as shown and additional 5% of total order amount to cover PAL and insurance. We ship only to United States addresses, except for those listed above. **TAXES:** Illinois residents, add 8% sales tax.

MINIMUM ORDER: \$35.00 or 20 diskettes

The Super Star LIFETIME WARRANTY!

Super Star Diskettes are unconditionally warranted against defects in original material and workmanship so long as owned by the original purchaser. Returns are simple: just send the defective diskettes with proof of purchase, postage-paid by you with a short explanation of the problem, and we'll send you the replacements. (Incidentally, coffee stained diskettes and diskettes with staples driven through them don't qualify as "defective".)

WE WILL MEET OR BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES SUBJECT TO THE SAME TERMS AND CONDITIONS.

HOURS:

Human: 8AM-6PM Central Time, Monday through Friday
Answering Machine: 6PM-8AM, All Times
MCI MAIL: 24 hours a day.

DISK WORLD!, Inc.

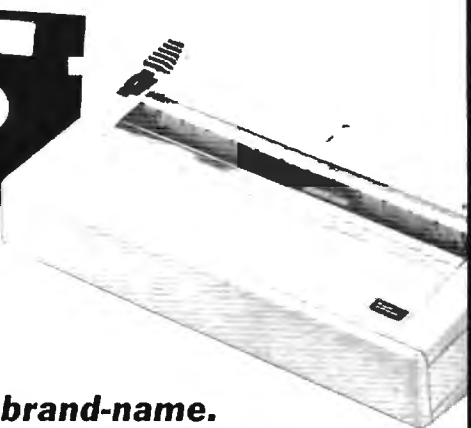
629 Green Bay Road
Wilmette, Illinois 60091

MUST LIQUIDATE At Far Below Dealer Cost! TOTAL Personal Computer System



**Factory Reconditioned with
Factory Warranty!**

**GREAT GIFT IDEA
FOR STUDENTS!**



Carries easily
as a suitcase!
Plugs into 115V outlet!

**Sorry, we're not permitted to PRINT the famous brand-name.
BUT, we CAN "tell all" if you call us TOLL FREE: 1-800-328-0609!**

THE COMPUTER

Snap-on computer keyboard! 64K RAM. 20K ROM. Full-size typewriter keyboard. Upper and lower case letters, numerals, symbols, reverse characters. 2 cursor control keys. 4 function keys, programmable to 8. Music synthesizer with 3 independent voices, each with 9 octave range. Input/output ports accommodate . . . user, serial, ROM cartridge, joysticks, external monitor, phone modem.

Built-in disk drive! Intelligent high speed unit with 5 1/4" floppy disk recorder. 170K formatted data storage; 35 tracks. 16K ROM. Uses single sided, single density disk. Serial interface. Second serial port to chain second drive or printer.

Built-in color monitor! Displays 40 columns x 25 lines of text on 5" screen. High resolution. 320 x 200 pixels. 16 background, character colors.

Built-in ROM cartridge port! Insert ROM program cartridge. Multitude of subjects available in stores across the nation!

Mfr. List Price **\$995.00**

Liquidation
Priced
At Only

\$388

Item H-621-63631-00 Ship, handling: \$20.00

THE PRINTER

Print method: Bi-directional impact dot matrix. Character matrix: 6 x 7 dot matrix. Characters: Upper and lower case letters, numerals and symbols. All PET graphic characters. Graphics: 7 vertical dots — maximum 480 columns. Dot addressable. Character codes: CBM ASCII code.

Print speed: 60 characters per second
Maximum columns: 80 columns.
Character spacing: 10 characters per inch.
Line feed spacing: 6 lines per inch in character mode or 8 lines per inch selectable. 9 lines per inch in graphics mode.

Line feed speed: 5 lines per second in character mode. 7.5 lines per second in graphics mode.

Paper feed: Friction feed
Paper width: 4.5" to 8.5" width.
Multiple copies: Original plus maximum of two copies.
Dimensions: 13"W x 8"D x 3 1/2"H. Wt.: 6 1/2 lbs. Power: 120V AC, 60 Hz.

Mfr. List: \$200.00

Liquidation
Priced At

\$118

Item H-621-63831-00 Ship, handling: \$7.00

THE SOFTWARE

"Easy Script" One of the most powerful word processors at any price! Cut re-typing, create documents from standard paragraphs, do personalized letters, see and change a document before it is printed. Instruction manual has extensive training section that simplifies use . . . even for someone who has never used a computer or word processor before!

"The Manager" A sophisticated database manager for business or home use. Business uses: accounts payable/receivable, inventory, appointments, task manager. Home uses: mailing lists, home inventory, recipes, collection organizer, investment tracking, checkbook balancing. School uses: research article index, gradebook.

Mfr. List: \$73.98

Liquidation Price

\$24

Item H-621-64011-03 Ship, handling: \$3.00

**BUY INDIVIDUAL UNITS OR
GET THIS ULTRA-FAMOUS
SYSTEM AT ONE LOW
PACKAGE PRICE!**

**TOTAL Personal Computer System
available at FAR BELOW dealer cost!**

Mfr. Sug. Retail . . . **\$1,268.98**

**TOTAL
PACKAGE
PRICE**

\$488

Item H-621-64011-02 Ship, handling: \$24.00

Compatible with above Computer System (Not included in package price.)

JOYSTICKS (Set of 2)

Mfr. List: \$59.90 pr.

\$18 pr.

Liquidation Price
Item H-621-63622-01 S/H: \$6.00 pr.

64 MODEM

Mfr. List: \$124.95

\$44

Liquidation Price
Item H-621-63646-00 S/H: \$4.00

SEND ME THE ITEMS I HAVE LISTED BELOW

Price subject to change after 60 days. Sales outside continental U.S. are subject to special conditions. Please call or write to inquire

Item No.	How Many	Item	Price	Ship/Handl.

C.O.M.B. CO.,[®] Item H-621
14605 28th Ave. N. Minneapolis, MN 55441-3397

Send the items indicated at left. (Minnesota residents add 6% sales tax. Please allow 3-4 weeks delivery. Sorry, no C.O.D.)

My check or money orders is enclosed. (No delays in processing orders paid by check, thanks to TeleCheck.)

Charge: MasterCard VISA Am. Ex. Diners Club

Acct. No. _____ Exp. _____

PLEASE PRINT CLEARLY

Name _____

Address _____

City _____

State _____ ZIP _____

Phone _____

Sign here _____



Credit card members can order by phone,
24 hours a day, 7 days a week.

Toll-Free: 1-800-328-0609

Your check is welcome!
No delays when you pay by check!

C.O.M.B. CO.[®]

Authorized Liquidator

14605 28TH AVENUE NORTH
MINNEAPOLIS, MINNESOTA 55441-3397

DISK WORLD! is proud to introduce the lowest-priced, LIFETIME-WARRANTY diskettes ever!

And they're BRAND NAME PRODUCT to boot!

5.25" SSDD → .79 ea. 5.25" DSDD → .89 ea.

5.25" DSDD-HD → \$2.35 ea.

3.50" SSDD → \$2.25 ea. 3.50" DSDD → \$2.65 ea.

Based on multiples of 100 each.
Boxed in 10's with heavy-duty cardboard sleeves, user ID labels,
reinforced hubs (where appropriate) and write-protect tabs.

Introducing Wabash Pinnacle Series Diskettes.

Two years ago, if you'd told me I'd be writing this ad, I would have laughed.

At that time, Wabash diskettes were synonymous with "s---t".

Just saying that quality control was poor would be charitable.

So much was wrong that DISK WORLD! wouldn't sell them.

That was yesterday.

Kearney-National Inc., a \$202-million division of a much larger company, came into Wabash.

Out went the old management, the old methods, the old production techniques... and in went a lot of new people, ideas, production lines and some really imaginative thinking.

The end result.

Today, I'm proud to offer you the Wabash Pinnacle Series of diskettes at the prices shown.

This isn't evolution in diskette manufacturing; it's revolution.

Here's what you get.

Wabash Pinnacle diskettes are

...certified 100% Error Free

...are covered by a LIFETIME WARRANTY

...meet or exceed all industry specifications (by quite some distance)

...and are simply the best value in diskettes available today.

The torture test.

Considering Wabash's earlier dubious reputation, I wasn't exactly a true believer when their Director of Marketing came into my office with samples.

So I took a box at random, selected a disk, bent the thing every which way and slipped it into my IBM-PC.

It formatted. It booted. It stored and retrieved data.

That wasn't enough.

I gave samples of the diskettes to Curt Rostenbach and, in turn, to Tom Streit, both hackers of long experience and members of the Waukegan (Illinois) Apple Users Group.

Tom really went at it.

He took a quartz-halogen lamp, aimed it at the diskette until it started to smoke (and melt)... and then formatted, booted the diskette and stored and retrieved data!

The same terribly (and intentionally) mutilated diskette ran on an ITT, Corona and IBM.

Curt was nicer.

He simply bent the diskette every which way... and it still formatted, booted and ran on his Apple.

The best buy I've ever seen.

DISK WORLD!, Inc. sells more flexible magnetic media by mail-order than anyone else in the world.

I, as President of the corporation, won't tolerate a product with a failure rate of more than 1/1000th of 1 percent.

I also don't like companies who try to milk a "quality" or "premium" image for a higher price like Dysan and Verbatim did... until they failed.

As President of DISK WORLD!, Inc., my motto is simple: "the best diskette for the least amount of money"

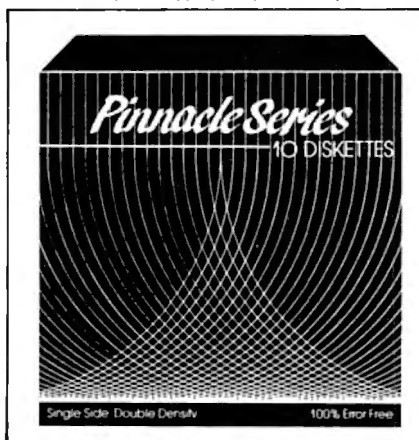
Wabash is it.

Right now, there is no better value than the Wabash Pinnacle Series of diskettes.

Granted, you have to buy a hundred at a time, but so what? Split the order with friends, relatives, co-workers or even your worst enemies.

The key thing is to get the most diskette for the money. And this is it.

(Incidentally, as a corporation, we put our money where our



mouth is. Our first order for Wabash Pinnacle Diskettes was 1.5-million units.)

That's an awful lot of faith and confidence.

But, then again, I have the diskette that Tom Streit literally melled... and kept on running.

The truth about \$1.00 or less diskettes.

More and more ads are popping up offering diskettes for \$1.00 or less.

By the same token, more and more people who were selling used cars a few months ago are now selling diskettes by mail.

We did a little survey of current ads for diskettes advertised for a dollar or less and did some analysis of the market and here's what we found as it applies to 5.25" DSDD diskettes "supposedly" selling for a dollar or less.

VENDOR:	ADVERTISED LOW PRICE:	ACTUAL PRICE PER 100:	ACTUAL MFGR.:
Unitech	89 ea.	92 ea.	Unspecified.
Datatech	99 ea.	99 ea.	Unspecified.
Computer Club	95 ea.	98 ea.	Unspecified.
		99 ea.	1.02 ea. Unspecified.
Communications & Electronics	49 ea.	80 ea.	Unspecified.
Precision Data	89 ea.	93 ea.	Unspecified.
Diskette Connec.	93 ea.	93 ea.	Unspecified.
Comp Soft Serv.	77 ea.	77 ea.	Unspecified.
		+ shpg.	
Computer/Computer	99 ea.	99 ea.	Unspecified.
DISK WORLD	89 ea.	92 ea.	Wabash DataTech

The real truth about \$1.00 or less diskettes.

It costs all diskette manufacturers about the same to produce a diskette. Some may charge more because they want to project a "premium quality" image, ala the late, lamented Dysan who bought their basic media from 3M.

Some charge less because they sell a sub-standard product... and we're not foolish enough to name names here. But here's the truth about the \$1.00 or less diskette market. It falls into four categories:

1. The DISK WORLD! 's of the universe who simply are so big that they can buy first quality product in massive quantities and choose to pass on the savings to you. (Precision Data and Diskette Connection on BRAND NAME products also fall into this category.)

2. The people who buy "cosmos"... stuff from major manufacturers that usually hits quality control standards, but is cosmetically blemished and thus can't be packaged and sold under the manufacturer's own name.

3. "Duplicator Quality". Uncertified media, usually below manufacturer's own standards and frequently below ANSI and IBM standards. Sold on an "as-is" basis with the understanding that the manufacturer's name will never be divulged. Usually about a 20% reject rate... as compared to DISK WORLD!'s standard of less than 1/1000th of 1% reject/return rate. Next to garbage, this is the source of most diskettes advertised at a dollar or less.

They may work... and then again they may not. (Frankly, the odds at the Blackjack table in Las Vegas are more in your favor.)

4. Garbage. Stuff that shouldn't be sold at all. But some manufacturers are hurting for cash, so they sell it anyway. (After all, they want to meet their payroll. Look what happens when you don't: you became a Dysan or Verbatim. Lots of history, but no money.) More and more garbage is being dumped into the market as manufacturers become pressed for cash and are motivated into selling anything and everything they can manufacture. (Read the article in FORBES about Verbatim and its "Bonus" brand.)

Finally, the Taiwanese counterfeiters are moving into the act. Perfect duplicates of the packaging of major manufacturers with one exception: the quality isn't there.

The Critical Factor.

Only DISK WORLD!, Inc. offers fully brand-identified, LIFETIME-WARRANTY product for less than a dollar.

Every one else offering 5.25" product for less than a buck doesn't tell you who makes it.

We do.

And that ought to tell you a lot right there.

Ordering & Shipping Instructions

SHIPPING: Wabash Pinnacle Diskettes are sold in multiples of 100 only. Shipping charges are \$3.00 per 100, regardless of type or size.

PAYMENT: VISA, MASTERCARD and PREPAID orders accepted. Corporations rated 3A2 or better and government and quasi-government open accounts are accepted on a NET 15 basis.

C O D orders are subject to a \$5.00 special handling charge. (Sorry for the increase, but too many people have been refusing C O D. orders or using bad checks. It's a classic example of a few "bad eggs" making life more expensive for everyone else.)

APD, FPO, AK, HI & PR ORDERS: Include shipping as shown and an additional 5% of the total amount of the order to cover PAL and insurance.

No other non-continental U.S. orders are accepted.

TAXES: Illinois residents only, add 7%.

All orders subject to acceptance.
Not responsible for typographical errors.

ORDERS ONLY:

1-800-621-6827

(In Illinois: 1-312-256-7140)

INQUIRIES & INFORMATION

1-312-256-7140

FOR FASTEST SERVICE,

USE MCI MAIL:

Just address "DISK WORLD!"
(24-hour shipping on any item in stock if you order via MCI MAIL.)

DISK WORLD!, Inc.

629 Green Bay Road
Wilmette, Illinois 60091

Incredible value!

Nashua™ Diskettes

LIFETIME WARRANTY!

97¢ ea. 5 1/4" SSDD Qty. 50 **\$107** ea. 5 1/4" DSDD Qty. 50

These are poly-bagged diskettes packaged with Tyvek sleeves, reinforced hubs, user identification labels and write-protect tabs. NASHUA Corporation is a half-billion dollar corporation and a recognized leader in magnetic media.

SOFT SECTOR ONLY! Sold in multiples of 50 only!

FOR ORDERS ONLY: INFORMATION & INQUIRIES:
1-800-621-6827 **1-312-256-7140**
(In Illinois: 1-312-256-7140)

HOURS: 8AM-5PM Central Time, Monday-Friday
WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.
629 Green Bay Road • Wilmette, Illinois 60091

DISK WORLD! **NASHUA**
Authorized Distributor **MAGNETIC**
Media **MEDIA**

FANTASTIC LOW PRICES ON

BASF QUALIMETRIC DISKETTES!

LIFETIME WARRANTY!

\$114 ea. 5 1/4" SSDD Qty. 20 **\$131** ea. 5 1/4" DSDD Qty. 20

5 1/4" SSDD-96TPI — \$1.46 ea 5 1/4" DSDD-96TPI — \$1.75 ea

PACKED IN CARDBOARD CASES!

BASF QUALIMETRIC DISKETTES have a LIFETIME WARRANTY with Tyvek sleeves, reinforced hubs, user identification labels and write-protect tabs.

SOFT SECTOR ONLY! MINIMUM ORDER: 20 DISKETTES

BASF 3 5/8" MICRO-FLOPPIES BASF 5 1/4" HIGH DENSITY FOR IBM PC-AT
5SSDD-135 TPI — \$2.34 ea DSDD-HD — \$3.14 ea

FOR ORDERS ONLY: INFORMATION & INQUIRIES:
1-800-621-6827 **1-312-256-7140**
(In Illinois: 1-312-256-7140)

HOURS: 8AM-5PM Central Time, Monday-Friday
WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD! **Authorized Reseller**
Information Processing **BASF**
Media

Now, the lowest prices ever on

3M Scotch® DISKETTES

LIFETIME WARRANTY!

The best deal on 3M diskettes you've ever seen!

FREE!

FLIP N' FILE 15 with every order for 5.25" SSDD and DSDD.



ATHANA DISKETTES

The great unknown!

97¢ ea. 5 1/4" SSDD Qty. 50 **\$101** ea. 5 1/4" DSDD Qty. 50

You've used these diskettes hundreds of times...as copy-protected originals on some of the most popular software packages. They're packed in poly-bags of 25 with Tyvek sleeves, reinforced hubs, user identification labels and write-protect tabs.

LIFETIME WARRANTY!

SOFT SECTOR ONLY! Sold in multiples of 50 only.

FOR ORDERS ONLY: INFORMATION & INQUIRIES:
1-800-621-6827 **1-312-256-7140**
(In Illinois: 1-312-256-7140)

HOURS: 8AM-5PM Central Time, Monday-Friday
WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.
629 Green Bay Road • Wilmette, Illinois 60091

DISK WORLD! **ATHANA**
Authorized Distributor **MAGNETIC**
Media **MEDIA**

DISK WORLD!

Ordering & Shipping Instructions

Shipping: 5 1/4" & 3 5/8" DISKETTES—Add \$3.00 per each 100 or fewer diskettes. Other Items: Add shipping charges as shown in addition to other shipping charges. Payment: VISA and MASTER-CARD accepted. COD Orders: Add additional \$3.00 Special Handling charge. APO, FPO, AK, HI & PR Orders: Include shipping charges as shown and additional 5% of total order amount to cover PAL and insurance. Taxes: Illinois residents only, add 7% sales tax.

Prices subject to change without notice.
This ad supercedes all other ads
Not responsible for typographical errors
MINIMUM TOTAL ORDER: \$35.00

FOR ORDERS ONLY: INFORMATION & INQUIRIES:
1-800-621-6827 **1-312-256-7140**
(In Illinois: 1-312-256-7140)

HOURS: 8AM-5PM Central Time, Monday-Friday
WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.
629 Green Bay Road • Wilmette, Illinois 60091

DISK WORLD!

\$1.42 ea. — 5.25" SSDD with FREE Flip n' File 15
\$1.74 ea. — 5.25" DSDD with FREE Flip n' File 15

100% LIFETIME WARRANTY

This is a Super Special promotion. It was supposed to end around the end of May.

But we decided to buy more than 1,000,000 3M diskettes packed in the FREE Flip n' File 15's...and give you the benefits of this terrific value.

One word of warning: this offer is limited only to supplies on hand. Once these supplies are used up, the prices stay the same...but there's no free Flip n' File.

The last time we ran an offer like this, everything was sold out in about six weeks.

So don't wait. Order now.

DISKETTE STORAGE CASES

AMARAY MEDIA-MATE 50: A REVOLUTION IN DISKETTE STORAGE

Every once in a while, someone takes the simple and makes it elegant! This unit holds 50 5 1/4" diskettes, has grooves for easy stacking, inside nipples to keep diskettes from slipping and several other features. We like it!

\$9.69 ea. Shpng. + \$2.00

DISKETTE 70 STORAGE: STILL A GREAT BUY.
Dust-free storage for 70 5 1/4" diskettes. Six dividers included. An excellent value.

\$11.68 ea. Shpng. + \$3.00

DISK CADDIES
The original flip-up holder for 10 5 1/4" diskettes. Beige or grey only.

\$1.65 ea. + 20¢ Shpng.

FOR ORDERS ONLY: INFORMATION & INQUIRIES:
1-800-621-6827 **1-312-256-7140**
(In Illinois: 1-312-256-7140)

HOURS: 8AM-5PM Central Time, Monday-Friday
WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.
629 Green Bay Road • Wilmette, Illinois 60091

DISK WORLD! **The value leader in**
Computer supplies **And accessories.**

PRINTER RIBBONS:

at extraordinary prices!

Brand new ribbons, manufactured to Original Equipment Manufacturer's specifications, in housings. (Not re-inked or spools only)

LIFETIME WARRANTY!

Epson MX-70/80 . . . \$3.58 ea. + 25¢ Shpng.
Epson MX-100 . . . \$4.95 ea. + 25¢ Shpng.
Okidata Micro83 . . . \$1.48 ea. + 25¢ Shpng.
Okidata Micro84 . . . \$3.66 ea. + 25¢ Shpng.

FOR ORDERS ONLY: INFORMATION & INQUIRIES:
1-800-621-6827 **1-312-256-7140**
(In Illinois: 1-312-256-7140)

HOURS: 8AM-5PM Central Time, Monday-Friday
WE WILL BEAT ANY NATIONALLY ADVERTISED PRICE ON THE SAME PRODUCTS AND QUANTITIES!

DISK WORLD!, Inc.
629 Green Bay Road • Wilmette, Illinois 60091

DISK WORLD!

Other 3M diskettes:

(Flip n' File offer does not apply.)

5.25" SSDD-96TPI \$2.06 ea.
5.25" DSDD-96TPI \$2.57 ea.
5.25" DSDD-HD for IBM PC/AT \$3.93 ea.
3.50" SSDD-135TPI for Apple Mac \$2.86 ea.

DATA CARTRIDGES

100% certified 3M data cartridges.

DC-1000 \$13.90 ea.
DC-300XLP \$19.83 ea.
DC-600A \$22.13 ea.

Sold in cases of 10 only.
Add \$5.00 shipping per 10.

DISK WORLD! **Authorized Distributor**
Information Processing **3M**
Products

WHITE HOUSE COMPUTER

P.O. Box 4025, Williamsport, PA 17701

"Where Prices Are Born, Not Raised"

TOLL FREE 1-800-351-3442

PA CALL 1-717-322-7700

— PA Residents FREE Shipping —

MONDAY - FRIDAY 9 AM - 6 PM

VISA & MC ACCEPTED 4%

POLICY: No deposit on COD orders. Free freight on all prepaid cash orders over \$300 in the continental USA. APO & FPO add \$5.00 per hundred. For priority mail add \$8.00 per hundred. PA residents add 6% sales tax. Defective products must have Prior RA number. Schools net 1%.

PRINTERS	
EPSON	
LX 80	239.00
FX 80	339.00
JX 80	479.00
RX 100	359.00
FX 100	489.00
LQ 1500	995.00
ATARI	
XTM 201 Non-Impact	
Dot Matrix	99.95
XTC 201 Color Non-Impact Matrix	109.95
XDM 121 Daisy Wheel	209.95
XMM 801 Dot Matrix Impact	169.95
STC 504 Color Non-Impact	139.95
STD 121 Daisy Wheel	219.95
SMM 801 Dot Matrix Impact	279.95
OKIDATA	
Okimate 10	179.95
182	219.95
84	640.95
192	349.95
193	525.95
COMMODORE	
MPS 801	165.95
802	199.95
803	165.95
DPS 1101	295.95
STAR MICRONICS	
SG 10	214.00
SG 15	379.00
SD 10	345.00
SD 15	450.00
SR 10	485.00
SR 15	585.00
PowerType	307.00
LEGEND	
1380	269.00
1385	305.00
1080	229.00
880	199.00
CITIZEN	
MSP 10	305.00
MSP 15	450.00
MSP 20	450.00
MSP 25	575.00
CARDCO	
LQ 1	365.00
LQ 3	209.00
PANASONIC	
1090	187.00
1091	237.00
1092	385.00
1093	425.00
3151	455.00

INTERFACES	
850 (Atari)	108.95
UPrint/port	49.95
UPrint/16k Buffer	69.95
UPrint/64k Buffer	89.95
Cardco G	39.95
G-Wiz	48.95
Apple Dumping GX	59.95

PRINTER PAPER	
2500 Sheets	
Lazor Edge	24.95
1000 Shts Lazor	14.95
500 Shts Lazor	9.95
Color Paper Assorted Pastels	
2500 Shts Lazor	42.95
1000 Shts Lazor	23.95
500 Shts Lazor	14.95

SOFTWARE	
Print Shop	28.95
Graphics Library I	17.50
Graphics Library II	17.50

VIDEO CASSETTE RECORDER
\$279.00

DISK DRIVES	
ATARI	
Indus GT	205.95
1050	164.95
Happy 1050	335.95
Happy Enhancer	160.95
MSD Dual	459.00

C-64	
Indus GT	229.00
1541	195.00
1571	249.95
1572	375.95

MODEMS	
C-1650	54.95
C-1670 300/1200	185.95
MPP 1064	54.95
Tele Learning	39.95
Hayes 300	149.95
Hayes 1200	385.95
Mitey Mo	59.95
Westridge	59.95
Compuserve	19.95
Micro Stuffer	95.95
MPP 1000E	69.95

DISKETTES	
SKC	
SS/DD	10.95
DS/DD	14.95
BONUS	
SS/DD	9.50
DS/DD	13.50
MAXELL	
MD 1	15.95
MD 2	20.95

MONITORS	
ZENITH	
122 A	82.95
123 G	75.95
AMDEK	
300 G	119.00
300 A	129.00
Color 300	229.00
Color 500	339.00
Color 600	399.00
Color 700	469.00
Color 710	539.00
310A	145.00
ATARI	
XC 141	199.95
SM 124	135.95
SC 1224	335.95
TEKNIKA	
MJ-10	185.95
MJ-22 RGB	269.95
SAKATA	
SC-100	179.00

COMMODORE	
C-1702	185.95
C-1902 RGB	259.95
C-1901	129.95

COMPUTERS	
COMMODORE	
C-64	139.95
C-128	275.95
ATARI	
800 XL	89.95
130 XE	139.95
520 ST Monochrome & More	749.00
520 ST Color RGB & More	870.00

PROFESSIONAL HANDICAPPING SYSTEMS

• PRESENTED BY PROFESSOR JONES •

GLD. Thoroughbred "Gold" Edition™
A Full featured thoroughbred analysis designed for the professional and the serious novice **\$159.95 complete**

EGLD. Enhanced "Gold" Edition™
"Gold" Edition with complete Master Better™ system integrated onto the same disk. This powerful program will transfer all horses and scores to the bet analysis with a "single keystroke" (Master Better™ included) **\$199.95 complete**

GLTD. Limited "Gold"™
Enables Professional Handicappers to assign specific values to the racing variables they feel are important. Create program weight based on a particular track and the time it for maximum win percentage. This program is designed for "ease of use" The user needs no programming experience. (contains Integrated Better™) **\$299.95 complete**

GD. Gold Dog Analysis™
The ONLY professional greyhound analysis available that evaluates ALL variables **\$149.95** w/Integrated Better **\$199.95** Limited Version **\$299.95**

MHH. Master Harness Handicapper™
Professional software designed to provide a thorough analysis of all trotter and pacer races in North America and Canada. **\$159.95 complete** **\$199.95** w/Integrated Better Limited **\$299.95**

Professor Pix Football™
Compete STATISTICAL ANALYSIS on Data Base allowing Designated previous games to be evaluated Statistical Series **\$99.95** w/Win-Loss Power Ratings **\$149.95**

NBA. Basketball™
NBA **\$99.95** w/college **\$129.95** w/power ratings **\$149.95**

LOT. Lottery Analysis™
Statistical comparison program designed to detect subtle patterns in winning numbers and digits Lottery (3-4 digit) **\$79.95** w/Lotto (Max. 99 Digit) **\$99.95**

PC-3 Portable Computer (4k) with choice of Thoroughbred, Greyhound or Trotter™ **\$249.95** (includes portable computer and program)

M-100 Portable (24k) w/choice of Thoroughbred, Greyhound, or Trotter. **\$649.95** (includes portable computer and program)

BROCHURE AVAILABLE

IBM™
APPLE™
TRS-80™
CPM™
COMMODORE™

Prof. Jones
1940 W. State St.
Boise, ID 83702



48 HR. FREE SHIPPING

CALL
208-342-6939

TERMS FREE SHIPPING ALL SOFTWARE Add \$6.00 hardware / \$6.00 C O D / UPS Blue \$6.00 / Out of Country \$9.00 / ID Residents 4% / 3 weeks personal checks / Cash price only, add 2% Visa MC / Prices subject to change

Program Your Own EPROMS

▶ **VIC 20**
▶ **C 64** **\$99.50**

PLUGS INTO USER PORT. NOTHING ELSE NEEDED. EASY TO USE. VERSATILE.

• Read or Program. One byte or 32K bytes!

OR Use like a disk drive. **LOAD, SAVE, GET, INPUT, PRINT, CMD, OPEN, CLOSE—EPROM FILES!**

Our software lets you use familiar BASIC commands to create, modify, scratch files on readily available EPROM chips. Adds a new dimension to your computing capability. Works with most ML Monitors too.

- Make Auto-Start Cartridges of your programs.
- The *promenade*™ C1 gives you 4 programming voltages, 2 EPROM supply voltages, 3 intelligent programming algorithms, 15 bit chip addressing, 3 LED's and NO switches. Your computer controls everything from software!
- Textool socket. Anti-static aluminum housing.
- EPROMS, cartridge PC boards, etc. at extra charge.
- Some EPROM types you can use with the *promenade*™

2758	2532	462732P	27128	5133	X2816A*
2516	2732	2584	27256	5143	52813*
2716	27C32	2764	68764	2815*	48016P*
27C16	2732A	27C64	68766	2816*	

▶ Commodore Business Machines

*Denotes electrically erasable types

Call Toll Free: 800-421-7731
In California: 800-421-7748

JASON-RANHEIM
580 Parrott St., San Jose, CA 95112



promenade™

presenting . . . **CAPTURE™**

A NEW WAY TO UNLOCK THE POWER OF YOUR C64 OR C128*

- **CAPTURE** IS A CARTRIDGE THAT PLUGS INTO YOUR COMPUTER'S EXPANSION PORT.
- **CAPTURE** DOES NOTHING — UNTIL YOU PRESS ITS **CAPTURE** BUTTON. UNTIL THEN, A RUNNING PROGRAM CANNOT DETECT ITS PRESENCE.
- **CAPTURE** THEN TAKES CONTROL — NO IFS, ANDS OR BUTS — AND PRESENTS A MENU.
- **CAPTURE** WILL NEATLY SAVE EVERYTHING IN YOUR COMPUTER TO YOUR 1541 OR COMPATIBLE DISK DRIVE — ALL 64K OF RAM, CPU, VIC AND SID CHIP REGISTERS — EVERYTHING. IN EASY TO VIEW CHUNKS.
- **CAPTURE** WILL, IF YOU WANT, PRE-CONFIGURE YOUR COMPUTER'S RAM SO THAT ONLY MEMORY ALTERED BY YOUR PROGRAM NEED BE SAVED.
- **CAPTURE** WILL WRITE A BOOT ON YOUR DISK SO YOU CAN RELOAD AND BEGIN EXECUTION RIGHT WHERE YOU LEFT OFF.
- **CAPTURE** DOES ALL THIS AT A COST OF JUST **\$39.95**

BUT HERE'S THE BEST PART

- **CAPTURE** WILL MAKE AN AUTO-START CARTRIDGE OF YOUR PROGRAM. IT'S EASY! JUST FOLLOW THE DIRECTIONS ON THE SCREEN. NOW PLUG IN YOUR CARTRIDGE AND TURN ON YOUR COMPUTER. IN LESS THAN TWO SECONDS YOUR PROGRAM BEGINS AGAIN AT PRECISELY THE POINT WHERE YOU **CAPTURE'D** IT. MAGIC!

BESIDES **CAPTURE**, YOU NEED A *promenade* C1 AND A SUPPLY OF CPR3 CARTRIDGE KITS.

ORDERING INFORMATION

- **CAPTURE** CARTRIDGE — COMPLETE WITH INSTRUCTIONS \$ 39.95.
- *promenade* C1 — EPROM PROGRAMMER WITH DISK SOFTWARE 99.50
- CPR3 CARTRIDGE KIT — PC BOARD, CASE AND 3 EPROMS 29.95
- DR—EPROM ERASER, TWO AT A TIME, 3 TO 10 MINUTES 34.95
- STARTER SET — **CAPTURE**, *promenade* C1 AND 1 CPR3 149.95
- DELUXE SET — **CAPTURE**, *promenade* C1, DR AND 2 CPR's 199.95

SHIPPING AND HANDLING — USA: UPS SURFACE \$3.00
BLUE LABEL \$5.00 NEXT DAY AIR \$13.00
CANADA: AIR MAIL \$7.00 OTHER FOREIGN AIR \$12.00

CALIFORNIA RESIDENTS ADD APPLICABLE SALES TAX
COD ORDERS, USA ONLY, ADD \$3.00

C64 AND C128 TM COMMODORE ELECTRONICS, LTD. *WHEN OPERATING IN 64 MODE

TO ORDER: TOLL FREE 800-421-7731
FROM CALIFORNIA 800-421-7748

TECHNICAL SUPPORT AND 408-287-0259
FROM OUTSIDE THE US: 408-287-0264



JASON-RANHEIM
580 PARROT STREET
SAN JOSE, CA USA 95112





23 PARK ROW, NEW YORK, N.Y. 10038

ORDER TOLL FREE 800-221-8180

Step at home and save 10% to 50% and more... on quality merchandise... fully guaranteed

maxell GOLD STANDARD FLOPPY DISKS

MAXELL MD10D 5 1/4" DISK DRIVE 10 GBITS \$19.95

MAXELL MD20D 5 1/4" DISK DRIVE 10 GBITS \$24.95

NEW Commodore 128 128K PERSONAL COMPUTER

Call For Price

TOP 10 COMPUTER HARDWARE

ATARI 130XE 128K COMPUTER \$1399.95

TOP 10 PERSONAL PRINTERS

STAR MICRONICS SC-10 DOT MATRIX COMPUTER PRINTER \$249.95

COMMODORE 64 COMPUTER

COMMODORE 1341 DISK DRIVE	\$179.95
ATARI 800XL COMPUTER	\$179.95
ATARI 1050 DISK DRIVE	\$169.95
IBM PC PERSONAL COMPUTER	\$1799.95
APPLE II HD SYSTEM	\$1369.95
COMMODORE 1702 COLOR MONITOR	\$189.95
ZENITH 2105 128K AMBER MONITOR	\$99.95
STYON IA-122 RGB MONITOR	\$109.95

TOP 10 APPLE SOFTWARE

GATO Spectrum Microtype	\$24.95
FLIGHT SIMULATOR II SUB LOGIC	\$29.95
PPSL FILE Software Plus	\$74.95
BASE STREET WRITER Broadband	\$39.95
COMPUTER BASEBALL Micro League	\$24.95
PRINTSHOP Broadband	\$34.95
MUSIC CONSTRUCTION SET EXACTLY	\$24.95
TYPING TUTOR II Simon & Schuster	\$29.95
BUS STRIKE Eagle Microtype	\$24.95
REARTRAK Broadband	\$24.95

TOP 10 ATARI SOFTWARE

ATARIWRITER Atari	\$34.95
SYNTHESIS PLUS Synthesis	\$29.95
BUS STRIKE Eagle Microtype	\$24.95
WESPAIR ON PRINTER Atari	\$24.95
SARGON II Chess Hayden	\$15.95
BALL BLAZER Atari	\$24.95
PAPERKUP Batteries Included	\$44.95
CHRISTMAS ACTIVATION	\$19.95
HOMEPARK Batteries Included	\$39.95
COMPUTER BASEBALL Micro League	\$24.95

TOP 10 IBM COMPATIBLE SOFTWARE

LOTUS 1-2-3 Lotus Development	\$279.95
FLIGHT SIMULATOR Microtype	\$29.95
TURBO PASCAL Borland	\$39.95
TYPING TUTOR II Simon & Schuster	\$29.95
MTCHESSES Clubs Program	\$24.95
GENUS QUEST Sierra	\$24.95
IBASIC II Ashton Tate	\$359.95
COMPUTER BASEBALL Micro League	\$24.95
MATH BLASTER Davidson Assoc	\$29.95

TOP 10 MACINTOSH SOFTWARE

JAZZ from Lotus Development

FACTFINDER Forthright \$119.95

ART CHAMBER BODY SHOP Hayden \$34.95

BUSINESS INVENTOR \$169.95

FLUVISION 1401 \$129.95

MTCHESSES CLUBS PROGRAM \$29.95

THINK TANK LINDSAY \$84.95

COMPUTER BASEBALL MICRO LEAGUE \$24.95

MAC VISION ROMAN TECHNOLOGIES \$199.95

TOP 10 COMPUTER ACCESSORIES

diskwasher SPINMASTER SURGE SUPPRESSOR \$49.95

SURGE SUPPRESSOR MICROGROSS \$24.95

DISK DRIVE CLEANING KIT HEAD \$14.95

COMPUTER PAPER \$14.95

PARALLEL PRINTER INTERFACES \$59.95

80-COLUMN PRINTER STAND \$14.95

80-COLUMN PRINTER \$29.95

SMART MODEM Hayden \$629.95

WREAD MODEM Commodore \$59.95

COMPUTER TABLE Bush \$79.95

NOTE: WE CARRY A FULL LINE OF AUDIO, VIDEO AND COMPUTERS IN EVERY MAJOR BRAND. THIS LISTING IS JUST A SMALL SAMPLE IN OUR 10 000 CD INVENTORY. PLEASE CALL US TOLL FREE OR WRITE TO US FOR PRICES ON ITEMS NOT LISTED IN THIS AD.

ALL PRODUCTS CARRY U.S. WARRANTIES

ALL DEFECTIVE PRODUCTS EXCHANGED WITHIN 30 DAYS

NOTE: WE CARRY A FULL LINE OF AUDIO, VIDEO AND COMPUTERS IN EVERY MAJOR BRAND. THIS LISTING IS JUST A SMALL SAMPLE IN OUR 10 000 CD INVENTORY. PLEASE CALL US TOLL FREE OR WRITE TO US FOR PRICES ON ITEMS NOT LISTED IN THIS AD.

ALL PRODUCTS CARRY U.S. WARRANTIES

ALL DEFECTIVE PRODUCTS EXCHANGED WITHIN 30 DAYS

ALL NEW FOR 1985

4 FREE CATALOGS

*AUDIO VIDEO ELECTRONIC CATALOG

*COMPUTER CATALOG

*RECORD, CASSETTE AND CD CATALOG

*VIDEO MOVIE CATALOG

PLEASE CHECK WHICH CATALOG YOU WANT

VIDEO COMPUTER RECORDS VIDEO

23 PARK ROW, DEPT. C10, NYC, NY 10038

NAME: _____

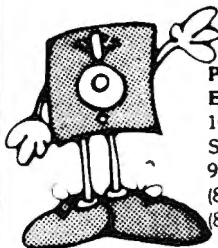
ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

PLEASE SEND \$1.00 FOR SHIPPING AND HANDLING.

MEMOREX FLEXIBLE DISCS

WE WILL NOT BE UNDER-SOLD! Call Free (800)235-4137 for prices and information. Dealer inquiries invited and C.O.D.'s accepted.



VISA
PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401 In Cal. call
(800)592-5935 or
(805)543-1037

DISKS 75c

SSDD

QUALITY MEDIA LIFETIME REPLACE GUARANTEE HUB RINGS, TVV, EPS. WRITE PROTECTS

Because we buy in huge volume to supply software manufacturers, our prices can't be beat.

5 25" SSDD	100	90	85	80	.75
5 25" DSDD	115	105	100	95	85
PC FORMATTED	1.45	1.35	1.25	1.15	1.10
3 5" 1D (For Mac)	2.70	2.60	2.45	CALL	CALL
3 5" 2D (For HP)	3.50	3.25	3.15	CALL	CALL

BLACKSHIP COMPUTER SUPPLY

P.O. Box 883362 • San Francisco, CA 94188
Inquiries + No. Cal. orders 415-550-0512
So. Cal. orders 800-235-6647 x31
USA orders 800-431-6249

Add \$3.00 shipping and handling (CA residents add 6.5% sales tax) VISA/MC/COD

3M Diskettes Lifetime Warranty

TIRED OF WAITING FOR SERVICE AND PRICE? 9 out of 10 SURVEYED DISK BUYERS PREFERRED

NORTH HILLS #1 IN SERVICE AND PRICE 1-800-328-3472

Formatted and hard sectored disks in stock-Dealer inquiries invited. COD, VISA, MASTERCARD All orders shipped within 24 hrs.

NORTH HILLS CORP. INTERNATIONAL
3564 Rolling View Dr.
White Bear Lake, MN. 55110
MN. call collect—612-770-0485

FREE CATALOG!

Features Precision Tools and Equipment for Computers



Jensen's new catalog features hard-to-find precision tools, tool kits, tool cases, test equipment and computer accessories used by sophisticated hobbyists, scientists, engineers, laboratories and government agencies. Call or write for your free copy today.

JENSEN TOOLS INC. 7815 S. 46th Street
Phoenix, AZ 85040
(602) 968-6231

maxell DISKS LIFETIME WARRANTY

TIRED OF WAITING FOR SERVICE AND PRICE? 9 out of 10 SURVEYED DISK BUYERS PREFERRED

NORTH HILLS #1 IN SERVICE AND PRICE 1-800-328-3472

Formatted and hard sectored disks in stock-Dealer inquiries invited. COD, VISA, MASTERCARD All orders shipped within 24 hrs.

NORTH HILLS CORP. INTERNATIONAL
3564 Rolling View Dr.
White Bear Lake, MN. 55110
MN. call collect—612-770-0485

Dysan CORPORATION

Solve your disc problems, buy 100% surface tested Dysan diskettes. All orders shipped from stock, within 24 hours. Call toll FREE (800) 235-4137 for prices and information. Visa and Master Card accepted. All orders sent postage paid.

PACIFIC EXCHANGES
100 Foothill Blvd
San Luis Obispo, CA
93401 (In Cal. call
(805) 543-1037.)

LEARN PROGRAMMING

MASTER COMPUTERS IN YOUR OWN HOME

Now you can write programs and get a computer to do just what you want. Get the most out of any computer, and avoid having to pay the high price of pre-packaged software.

LEARN AT YOUR OWN PACE IN YOUR SPARE TIME

Our independent study program allows you to learn about computers, operations, applications and programming in your spare time, at home. Our instructors provide you with one-on-one counseling.

LEARN EVEN BEFORE YOU DECIDE ON A COMPUTER
Everything is explained in simple language. You will enjoy learning to use a computer—EVEN IF YOU DON'T OWN ONE. Learn to program on any personal computer, IBM, APPLE, COMMODORE, TRS, and more.

BE YOUR OWN COMPUTER EXPERT

Programming is the best way to learn to use computers, and we can show you the best—and most economical—way to learn programming! Send today for your free information package. No obligation. No salesman will call.

halix CENTER FOR COMPUTER EDUCATION
INSTITUTE 1543 W Olympic # 226 Los Angeles CA 90015-3894

HALIX INSTITUTE CENTER FOR COMPUTER EDUCATION DEPT 61 A
1543 W OLYMPIC # 226 LOS ANGELES CA 90015-3894

YES! Send me information on how I can learn about computers and programming at home!

Name _____ Age _____

Address _____

City _____ State _____ Zip _____

COMPUTE! Subscriber Services

Please help us serve you better. If you need to contact us for any of the reasons listed below, write to us at:

COMPUTE! Magazine
P.O. Box 10955
Des Moines, IA 50950

or call the Toll Free number listed below.

Change Of Address. Please allow us 6-8 weeks to effect the change; send your current mailing label along with your new address.

Renewal. Should you wish to renew your **COMPUTE!** subscription before we remind you to, send your current mailing label with payment or charge number or call the Toll Free number listed below.

New Subscription. A one year (12 month) US subscription to **COMPUTE!** is \$24.00 (2 years, \$45.00; 3 years, \$65.00. For subscription rates outside the US, see staff page). Send us your name and address or call the Toll Free number listed below.

Delivery Problems. If you receive duplicate issues of **COMPUTE!**, if you experience late delivery or if you have problems with your subscription, please call the Toll Free number listed below.

COMPUTE!
800-334-0868
In NC 919-275-9809

MUST LIQUIDATE!

LIMITED INVENTORY OF ULTRA FAMOUS 64K COMPUTERS AT FAR BELOW DEALER COST!



Monitor is not available. See footnote.*

Factory Reconditioned with Warranty.

Millions sold at regular prices . . . and STILL being sold at regular prices!

Sorry, we're NOT permitted to print the brand name. But if you phone us, all details can be divulged.

Phone Toll-Free: 1-800-328-0609

PLENTY OF SOFTWARE AVAILABLE! Thousands upon thousands of programs are available for it from computer stores across the nation.

FOR BUSINESS! This is an ideal entry level business computer. Use the computer for word processing, data base, accounts payable/receivable, general ledger, payroll, inventory, tax accounting, spreadsheets, mailing lists . . . and much, MUCH more!

FOR EDUCATION! Perfect for everyone from Ph.D. candidates to pre-school youngsters. A vast number of programs are available to challenge and educate the mind.

FOR HOME! Use for analysis of personal investments, income tax planning, storage of recipes and household data. And of course, there are hundreds of exciting, fast-paced arcade games available!

Units sold **SINGLY** or in any combination you desire.

	Original List Price	YOUR COST
64K COMPUTER Item H-622-63553-00	\$200.00	\$99
DISK DRIVE Item H-622-63553-01	\$269.00	\$148
PRINTER Item H-622-63831-00	\$200.00	\$118
TOTAL	\$669.00	\$365

We reserve the right to limit quantity purchases.

Factory Reconditioned With Warranty.

*NOTE: If you do not have a monitor, you can use your TV as a display unit. The computer comes already to be hooked up to your TV.

Credit card customers can order by phone.
24 hours a day.
7 days a week



Toll-Free: 1-800-328-0609

Your check is welcome!
No delays in orders paid by check.

C.O.M.B. CO.®
Authorized Liquidator
14605 28TH AVENUE NORTH
MINNEAPOLIS, MINNESOTA 55441-3397

C.O.M.B. CO.® Item H-622
14605 28th Ave. N./Minneapolis, MN 55441-3397

Send the following items: (Indicate quantity of each):

- ___ 64K Computer(s) Item H-622-63553-00 at \$99 each plus \$8 each for shipping, handling.
- ___ Disk Drive(s) Item H-622-63553-01 at \$148 each plus \$8 each for shipping, handling.
- ___ Printer(s) Item H-622-63831-00 at \$118 each plus \$7 each for shipping, handling.

(Minnesota residents add 6% sales tax. Allow 3-4 weeks for delivery. Sorry, no C.O.D. orders.)

My check or money order is enclosed. (No delays in processing orders paid by check, thanks to TeleCheck.)

Charge: MasterCard VISA Am. Ex. Diners Club

Acct. No. _____ Exp. _____

PLEASE PRINT CLEARLY

Name _____

Address _____

City _____

State _____ ZIP _____

Phone _____

Sign here _____

Classified

COMPUTE! Classified is a low-cost way to tell over 350,000 microcomputer owners about your product or service.

Rates: \$25 per line, minimum of four lines. Any or all of the first line set in capital letters at no charge. Add \$15 per line for boldface words, or \$50 for the entire ad set in boldface (any number of lines.)

Terms: Prepayment is required. Check, money order, American Express, Visa, or MasterCard is accepted. Make checks payable to COMPUTE! Publications.

Form: Ads are subject to publisher's approval and must be either typed or legibly printed. One line equals 40 letters and spaces between words. Please underline words to be set in boldface.

General Information: Advertisers using post office box numbers in their ads must supply permanent address and telephone numbers. Orders will not be acknowledged. Ad will appear in next available issue after receipt.

Closing: 10th of the third month preceding cover date (e.g., June issue closes March 10th). Send order and remittance to: Harry Blair, Classified Manager, COMPUTE!, P.O. Box 5406, Greensboro, NC 27403. To place an ad by phone, call Harry Blair at (919) 275-9809.

Notice: COMPUTE! Publications cannot be responsible for offers or claims of advertisers, but will attempt to screen out misleading or questionable copy.

SOFTWARE

Mailing Label/Address File Program—for IBM PC and compatibles. Creates, updates, alphabetizes. Print options include by zip or city. Prints up to 4 across or continuous form index cards with phone #. \$19.95 plus \$2 s/h. TX residents add \$1.22 tax. **D & L Software**, 4636 Ringgold, Plano, TX 75075 (214) 867-5695

JDC Workstation—Word processor, typing service billing, & form letters all in one. Coded in **ACTION!** for easy customizing. Works with all 48K Ataris. Machine & **ACTION** listing & manuals on Disks \$100. **JDC Software**, P.O. Box 941, Bryte, CA 95605

COMMODORE OWNERS. Now create your own games, graphics and music in minutes instead of hours. Preprogrammed so everything is fast & easy. Create a game. Write a song. Sell it! Send \$29.95 to: **FreeSpirit**, 5836 S. Mozart, Chicago, IL 60629. (312) 476-3640

ATARI 800/XL/XE: Complete business program. All accounting, forms, mail, point of sale, word processing, etc. 8000+ records/disk. Demo disk \$3. **MICROMISER**, 1635-A Holden Ave., Orlando, FL 32809

TI-99/4A NEW STATES AND CAPITALS GAME Hi-Res map of USA. Send \$12 for cass. or \$1 for more info to: **TRINITY SYSTEMS**, 1022 Grandview, Pittsburgh, PA 15237

SPORTS POOL runs your football pool for the office or friends the fast & easy way. Handles all pool requirements for any sport and can be easily custom tailored. C64 disk \$29.95, IBM-PC \$39.95 plus \$2 s.h. **Bancrom Systems, Inc.**, P.O. Box 1783, Dept. A2, Kankakee, IL 60901

POSTMASTER! Finally, a simple, efficient mailing list program for C64 or C128. Print mailing labels. File up to 1600 on a single disk. Throw away your roladex! Sort, recall by name, zip, phone, etc. Send \$19.95 to: **FreeSpirit Software**, 5836 S. Mozart, Chicago, IL 60629

The "Eight Puzzle," an A.I. program that tests your skills against the computer or another player, \$10. E.C. 6287 Wall Triana Hwy., Madison, AL 35758, (205) 837-3158.

APPLE II SERIES, COMMODORE 64, TI-99/4A Discount Entertainment Software. Free Catalog. Newest Titles. **The Adventure Store**, P.O. Box 320, Roscoe, IL 61073-0320

HARDWARE

Trade in your used Commodore or Atari on a brand new C-128 or Atari ST. This offer may not be available through retail outlets. Brochure \$1.50 and **SASE**. **NEW WEST TECHNOLOGY**, 4B Monroe Pkwy., Box 200, Ste. 134, Lake Oswego, OR 97034

MISCELLANEOUS

DISK SALE! SS/DD 35-trk for Apple w/sleeve & label-10/\$7.20, bulk-100/\$64. Standard SS/DD w/sleeve, label-10/\$8.20, bulk-100/\$74. DS/DD w/sleeve & label-10/\$9.10, bulk-100/\$83. **PREMIUM QUALITY, LIFETIME WNTY!** Money-back satisfaction guarantee! Min. order \$15. Send check or MC/V/AE + \$3 p+h, \$2 if C.O.D. **UNITECH**, 20 Hurley St., Cambridge, MA 02141 (800) 343-0472, in Mass. (617) 864-8324

EARN MONEY, PART OR FULL TIME, AT HOME with your computer. 50 page manual with forms. Money back guarantee, \$9.95, **JV Tech**, P.O. Box 563, Ludington, MI 49431

Online Usage: Do you have a message to share with other computer users (50,000)? Weekly rate: \$4.50/line. State Category, Title (32 char.), message (38 char./line, max. 60 lines). Send check and copy to: **E. YEE**, FDR Sta., P.O. Box 7729, NY, NY 10150

TI-99/4A Software/Hardware bargain. Hard-to-find items. Huge selection. Fast service. Free catalog. **D.E.C.**, Box 690, Hicksville, NY 11801

FREE TO C64 AND 99/4A USERS! Brochure of new game and educational software. Send **SASE** to: **Exelon Software**, 20910 7th Pl. So., Seattle, WA 98148

IS YOUR ORIGINAL SOFTWARE GOOD enough to sell? We can find a publisher for you! **International Software Agents, Inc.**, 76 Millbank Ave., Greenwich, CT 06830

Maxell MD1, \$1.39 - MD2, \$1.99. **Dysan 104/1D**, \$1.79 - 104/2D, \$2.39. Shipping \$3.75. Also **Verbatim**, IBM, 3M, **BASF. TAPE WORLD**, 220 Spring St., Butler, PA 16001, 1-8009-245-6000, Visa, MC.

Advertisers Index

Reader Service Number/Advertiser	Page
102 Abacus Software	41
103 American PEOPLE/LINK	39
Apple Computer, Inc.	IFC, 1
Atari Corp.	20-21
104 Basix	35
105 Basix	40
Batteries Included	15
106 Blackship Computer Supply	126
107 Cardco, Inc.	IBC
CBS Software	58
108 Comark, Inc.	63
C.O.M.B. Co.	121
C.O.M.B. Co.	127
Commodore	BC
109 CompuServe	11
ComputAbility	119
110 Computer Book Club	113
Computer Centers of America	44-45
111 Computer Direct	73
112 Computer Mail Order	50-51
113 Cospec Communications, Inc.	75
114 Davidson & Associates, Inc.	89
Disk World, Inc.	120
Disk World, Inc.	122-123
115 Elek-Tek, Inc.	74
116 EPYX	29
117 EPYX	31
The Family Software Spectacular	14
Halix Institute	127
118 Infocom	2-3
Inmac	69
119 J & R Music World	126
120 Jason-Ranheim	124
121 Jason-Ranheim	125
122 Jensen Tools, Inc.	126
Lyco Computer	60-61
Micro World Computers, Inc.	116
North Hills Corp.	126
North Hills Corp.	126
NRI Schools	77
123 Pacific Exchanges	126
123 Pacific Exchanges	126
124 Professional Handicapping Systems	124
125 Protecto	70-72
Spinnaker Software Corp.	12-13
126 Starpoint Software	63
127 Starpoint Software	47
128 Strategic Simulations, Inc.	25
129 subLOGIC Corporation	7
Time-Life Books	16-17
130 Timeworks, Inc.	4
131 White House Computer	124
The Wholesale Outlet	33

COMPUTE! Books' New Fall Releases	19
COMPUTE!'s Apple Applications Special	49
COMPUTE!'s Commodore 64 Games Book	43
COMPUTE!'s Second book of Apple and MacOffice	9
COMPUTE!'s Subscription	33
COMPUTE!'s VIC-20 Collection	27

COMPUTE!

Holiday Savings...

32% off the cover price!

The magazine for Personal, Home,
Educational and Recreational Computing.

SPECIAL SAVINGS

- Send me 1 year (12 monthly issues) for just \$24—
32% off the cover price
- Bill me Payment enclosed

NAME _____

ADDRESS _____

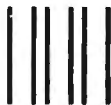
CITY/STATE/ZIP _____

Please indicate make and model of computer you use:

APPLE 01 ATARI 02 64 03 VIC 20 04 IBM 05

OTHER _____ 99





NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS

PERMIT NO. 7478

DES MOINES, IOWA

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE!

PO BOX 10954
DES MOINES, IOWA 50347



COMPUTE!'s APPLE APPLICATIONS SPECIAL

- COMPUTE!'s Apple Applications Special, Volume 2* **\$3.95**
(In U.S. add \$1.00 shipping and handling charges; outside U.S. add \$2.00)

- Companion Disk to *COMPUTE!'s Apple Applications Special, Volume 2* **\$16.95**
(Add \$2.00 shipping and handling charges)

To order, send in this card with your payment or call toll-free **800-334-0868**.
ALL ORDERS MUST BE PREPAID IN U.S. FUNDS.

- Payment enclosed (check or money order).
Charge: Visa MasterCard American Express

Account No. _____ Exp. Date _____
(Required)

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO 2312 GREENSBORO NC

POSTAGE WILL BE PAID BY ADDRESSEE



**COMPUTE!'s
APPLE APPLICATIONS SPECIAL**

Post Office Box 5058
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

Circle 101 for a one year new U.S. subscription to COMPUTE! you will be billed for \$24

Please let us know. Do you own: _____ plan to buy: _____

- Apple _____ 270
 Atari _____ 272
 Commodore _____ 274
 IBM _____ 276
 TI-99/4A _____ 278
 Other _____ 280
(specify model) 281

Please print or type name and address.
Limit one card per person.

Name _____
 Address _____
 City _____
 State/Province _____ Zip _____
 Country _____

Please include zip code. Expiration date 11/30/85

C01085

SUBSCRIBE TO COMPUTE!

My Computer Is:

- 01 Apple 02 Atari 03 Commodore 64
 04 VIC-20 05 IBM 06 TI-99/4A
 99 Other _____ Don't yet have one.

For Fastest Service,
Call Our **Toll-Free**
US Order Line
800-334-0868
In NC call 919-275-9809

- \$24.00 One Year US Subscription
 \$45.00 Two 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
 Charge my: 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

Place
Stamp
Here

COMPUTE! Reader Service
P.O. Box 2141
Radnor, PA 19089



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 7478 DES MOINES, IOWA

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE!

PO BOX 10954
DES MOINES, IOWA 50347



S'MORE

FOR YOUR 64

61,183 delicious bytes for your Commodore 64



S'MORE Memory, S'MORE Power, S'MORE Fun!

Now, 61K available memory
S'MORE frees up 61,183 bytes of C-64 RAM memory for un-restricted Basic programming (57% more than the standard C-64).

A bridge to C-128

The S'MORE command structure is similar to the C-128's new Basic 7.0, providing C-64 users advanced programming techniques.

S'MORE features for programming power

- Over 60 new and enhanced basic commands & functions
- No peeks or pokes (direct access to normally peeked/poked items)
- Full error trapping and automatic error helps
- Full up/down scrolling through program listings
- Structured programming
- Relative files
- Print using
- Formatted inputs
- Print at...and much, much more.



cardco, inc.

The Wizards from the Land of Oz Have done it Again!

CARDCO, Inc./300 S. Topeka/Wichita, KS 67202

"Thanks for the memory."



INTRODUCING THE COMMODORE 128.™

It's here. And it's going to make a lot of Commodore 64™ owners very happy. A personal computer with a 128K memory and 80-column capability that's still compatible with all the peripherals and over 3,000 programs designed for the Commodore 64.

In fact, the new 128 is almost like getting three computers in one. That's because it can run as a 64, a 128 and in a CP/M® mode. Or it can even be expanded to a full 512K memory. And that's about as "personalized" as a personal computer can get. It's intelligence that can match your

own versatility. And then, even take it to a higher level.

There's more than a bigger memory.

There are a lot of extra features we didn't forget. Like a handy numeric keypad for data-entry efficiency and accuracy.

An expanded keyboard that puts more commands at your fingertips for easier programming. So you can be a whiz at using more varied graphics and text. Or a musical genius playing full three-part melody in any tempo — you set. And there's even a "help" key

that comes to your rescue, listing programming errors on-screen with the error in reverse field.

There's also a new faster disk drive. With a separate "Burst" mode that can transfer up to 3,000 characters per second. Just in case you're a speed demon.

"Thanks for the memory!" You're welcome. And for the expandability. And compatibility. And versatility. And for making it all very affordable. After all, one of the other things that should go into a more intelligent computer is a price that makes sense.

COMMODORE 128 PERSONAL COMPUTER

A Higher Intelligence