

# COMPUTER'S GAZETTE

\$3.00  
November 1986 ©  
Issue 41, Vol. 4, No. 11  
02220 \$4.25 Canada

FOR **COMMODORE** PERSONAL COMPUTER USERS

## Power BASIC: 128 Instant Keywords

Save time and typing effort with this Commodore 128 program that lets you enter up to 52 keywords—each with an easy-to-remember, two-key combination.

## An Introduction To Compilers

Find out how these powerful utilities can make your BASIC programs run at nearly the speed of machine language. A beginner's guide to available compilers for the Commodore 128 and 64.



## Turbo Format

Your 1541 disk drive will welcome this powerful utility that formats a disk in less than ten seconds—and eliminates head knocking. For the 64.

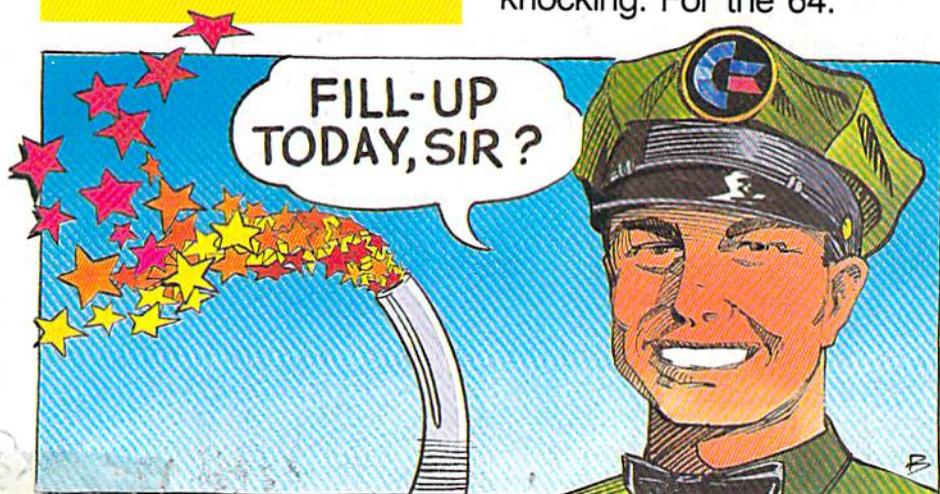
### Also In This Issue:

- 64 Multitasker
- 1526 Underliner
- Horizons: Elegant Programming
- And More



## Bump-N-Run

It's a head-to-head confrontation in this fast, two-player action game for the Commodore 64.



## Fill-64

Create fast, animated sequences on your 64's hi-res screen with this exciting package.



(No I.D. required for half-elves.)

# When the Going Gets Tough, the Bard Goes Drinking.

And the going is tough in Skara Brae town. The evil wizard Mangar has cast an eternal winter spell. Monsters control the streets and dungeons beneath. Good citizens fear for their lives. What's worse, there's only one tavern left that serves wine. But the Bard knows no fear. With his trusty harp and a few rowdy minstrel songs he claims



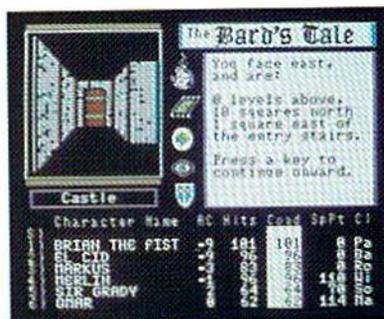
are magic, the Bard is ready to boogie. All he needs is a band of loyal followers: a light-fingered rogue to find secret doors, a couple of fighters to bash heads, a conjurer to create weird allies, a magician for magic armor. Then it's off to combat, as soon as the Bard finishes one more verse. Now what's a word that rhymes with "dead ogre?"



4 classes of magic user, including wizard and sorcerer. 85 new magic spells in all.



128 color monsters, many animated. All challenging.



Full-color scrolling dungeons. 16 levels, each better than the one before. 3-D city, too.

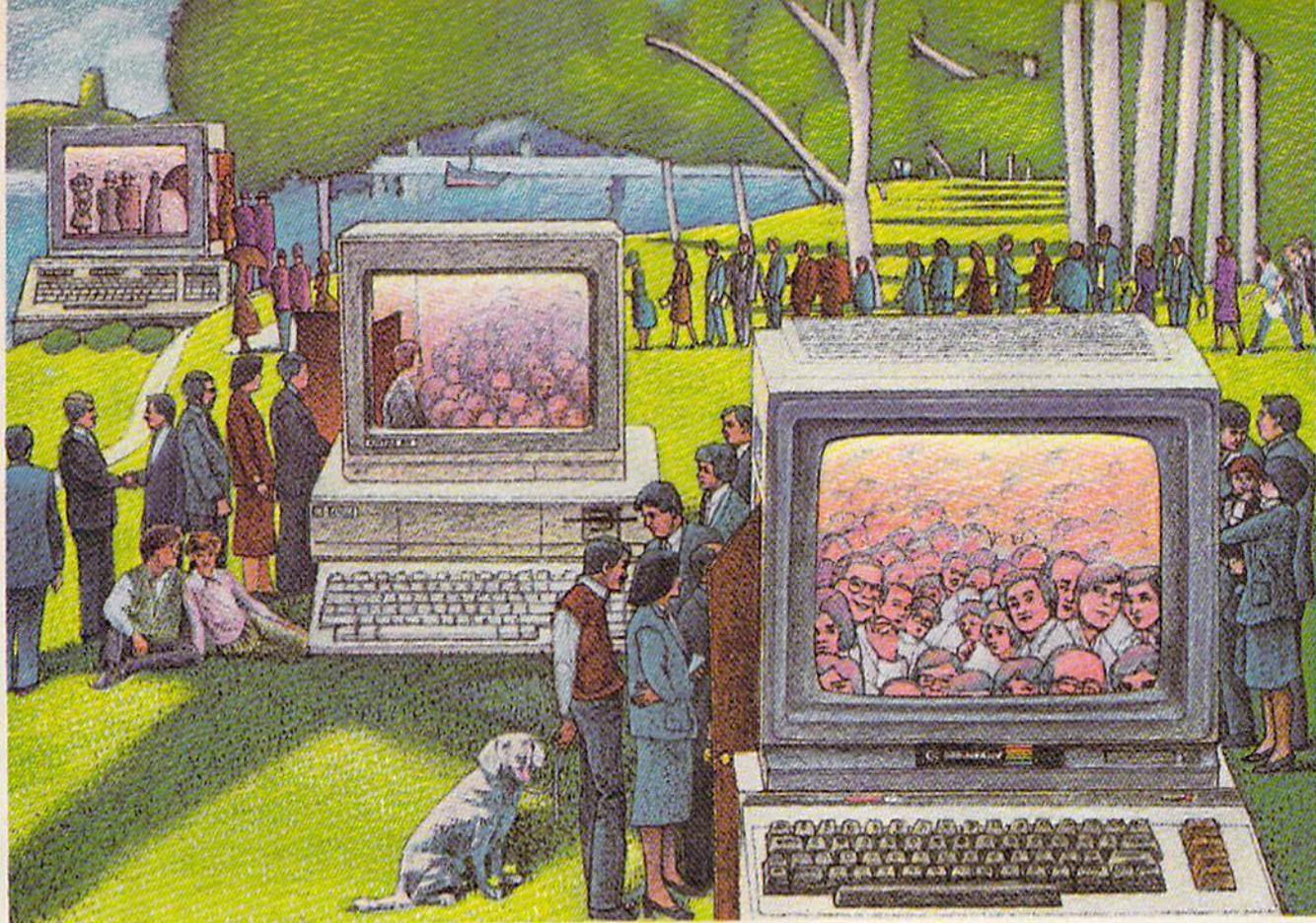
## The Bard's Tale™

from



ELECTRONIC ARTS™

Specs: 100% machine language, 400K worth on 2 disks. 64K RAM minimum; enhanced for 128K. Now available for Apple II family for \$44.95, C-64 & 128 for \$39.95. To order: Visit your retailer or call (800) 245-4525 (In Calif. call (800) 562-1112) for VISA or MasterCard orders. To purchase by mail, send check or money order to Electronic Arts, P.O. Box 306, Half Moon Bay, CA 94109. Add \$3 for insured shipping and handling. Allow 1-4 weeks for delivery. The Bard's Tale is worth the wait. Apple is a trademark of Apple Computer. Wizardry is a registered trademark of Sir-Tech Software, Inc. Ultima is a registered trademark of Richard Garriott. The Bard's Tale and Electronic Arts are trademarks of Electronic Arts. For a copy of our complete catalogue and direct order form, send \$5.00 and a stamped, self-addressed envelope to Electronic Arts, 2755 Campus Drive, San Mateo CA 94403.



# USE THE BRAINS YOUR COMMODORE WASN'T BORN WITH.

## Right at Your Fingertips in CompuServe's Commodore® Forums

Our Commodore Forums involve thousands of Commodore users worldwide. These forums show you just how easy and fun it is to get the most from your Commodore Computer.

The Commodore **Communications Forum** provides the latest news on communications software and advice on effective telecommunications.

The Commodore **Programming Forum** supports programmers and developers of Commodore 8-bit computers.

The Commodore **Arts and Games Forum** is for all Commodore 8-bit computers, concentrating on music, graphics and games.

The Commodore **Amiga® Forum** is the national resource for all business and entertainment applications in the Amiga community.

## Easy access to free software, including FREE uploads.

- Download first-rate, non-commercial user-supported software and utility programs.
- Upload your own programs free of connect time charges.
- Take advantage of CompuServe's inexpensive weeknight and weekend rates (when forums are most active, and standard online charges are just 10¢ a minute).
- Go online in most major metropolitan areas with a local phone call.
- Receive a **\$25.00 Introductory Usage Credit** when you purchase your CompuServe Subscription Kit.

## Information you simply can't find anywhere else.

Use the *Forum Message Board* to exchange mail with fellow members. Join ongoing, real-time discussions in a *Forum Conference*—with Commodore software publishers, developers and technical experts. Scan *Forum Data Libraries* for free software, documentation and contributions from Commodore enthusiasts.

Enjoy other useful services, too. Like electronic editions of your favorite magazines, newsletters and articles, including *Family Computing*, *OMNI Online* and the *Electronic Gamer*.™

## All you need is your Commodore computer and a modem...or almost any other personal computer.

To buy your Subscription Kit, see your nearest computer dealer. Suggested retail price is \$39.95. To receive our free brochure, or to order direct, call 800-848-8199 (in Ohio, call 614-457-0802). If you're already a CompuServe subscriber, type GO CBMNET (the Commodore Users Network) at any prompt to see what you've been missing.

# 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

# 21st CENTURY WARRIOR:



**"In a wide variety of locations around the world, the American soldier will now have a powerful new ally whose speed, maneuverability and firepower will serve as an added deterrent to opposing forces."**

**—Commander-In-Chief Ronald Reagan  
Speaking about the AH-64 APACHE,  
as quoted in the Journal  
Of Defense & Diplomacy**

The APACHE—as fierce and elusive as its warrior namesake. Equipped with an arsenal of today's most advanced weaponry, it can attack from nowhere against overwhelming odds, then slip away to strike again without warning. It is capable of defeating the enemy's armored columns, infantry and, if necessary, hostile aircraft on the modern electronic battlefield.

The attack helicopter—the gunship—came of age during the Vietnam War. Starting as a primitive patchwork of machine guns and rocket pods strapped to the side of a utility helicopter, it evolved into such sophisticated weapon systems as the armed Huey and AH-1G Cobra. However, the deadly armored arsenal of today's Warsaw Pact demands an even stronger front line.

The AH-64 Apache is here to give America all the muscle it needs

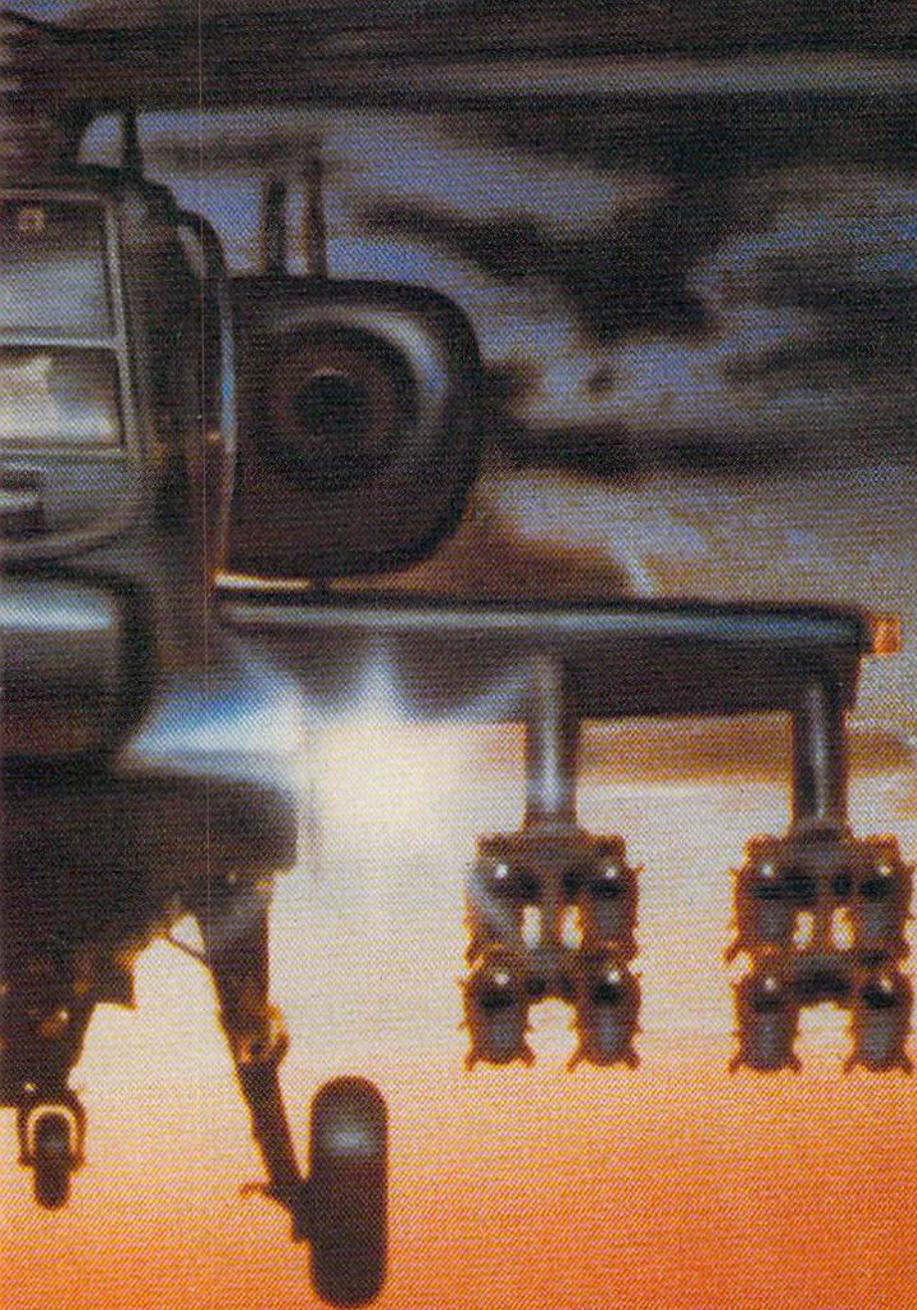
for the defense of freedom. This war machine is a fully integrated acquisition/firepower system designed to let the pilot find, lock onto and destroy the enemy with the greatest possible accuracy and effectiveness. Now actively in production at Hughes Helicopters, the first 675 choppers should be delivered to the U.S. Army by early 1990.

But you don't have to wait. As the latest addition to the ever growing line of MicroProse Simulation Software, GUNSHIP now brings all of the danger and excitement of attack helicopter action home to your computer in this true-to-life simulation.

With GUNSHIP, you, the pilot, will fly confidently into the world's hottest trouble spots... Central America, the Middle East, Southeast Asia and Central Europe. You'll use an unbelievable array of

# Apache GUNSHIP™

THE ATTACK  
HELICOPTER  
SIMULATION



high-tech information and weapons systems to get the job done including lasers, video cameras, night viewers, radar warnings, jammers, computers, missiles, rockets, flares and a 30mm cannon! Successful missions will be rewarded with medals and rank promotions; build your career as you go!

All of the GUNSHIP action is presented in revolutionary 3-D graphics. The cockpit instrumentation is elaborate; the maps, stores and damage displays are extensive; all flying maneuvers are fully accurate. A comprehensive Operations Manual and keyboard overlay complete the package.

See your software dealer today and become a part of the GUNSHIP adventure! Challenge the enemy, the sky, and YOURSELF with this extraordinary simulation.

GUNSHIP. For Commodore 64/128 and Atari XL/XE computers at a suggested retail of \$34.95; also for Apple II Family, IBM PC/PC Jr., Tandy 1000, Atari ST and Amiga at \$39.95. Call or write for specific machine availability, and for MC/VISA orders if product not found locally.

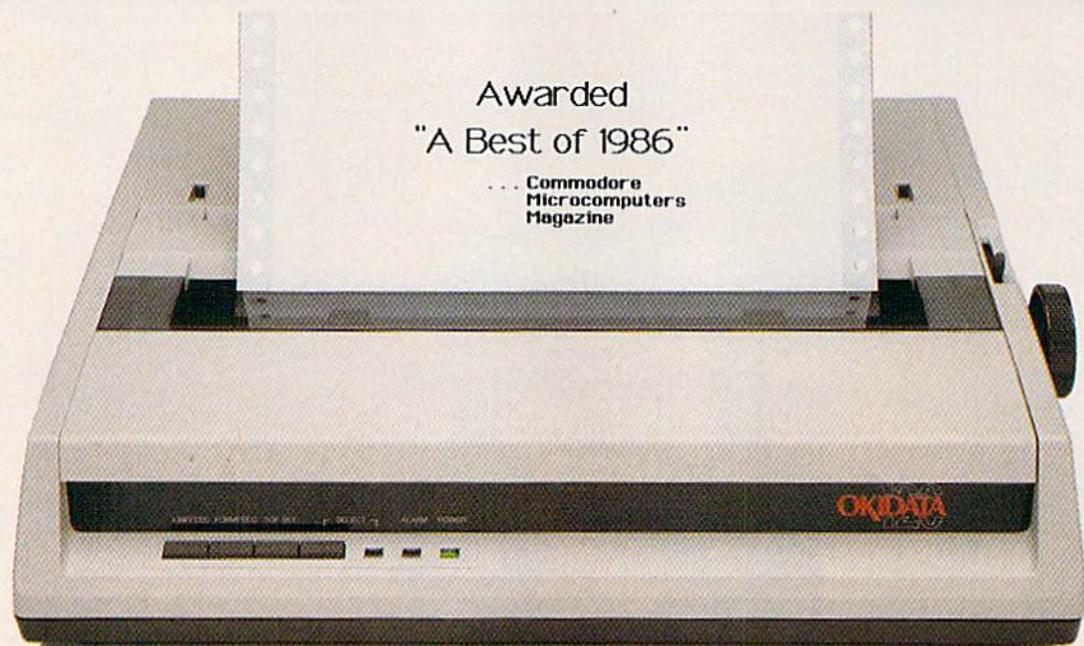
COMMODORE, ATARI, APPLE, IBM, TANDY AND AMIGA are registered trademarks of Commodore Electronics Ltd., Atari Inc., Apple Computer Inc., International Business Machines Corp., Tandy Corp., and Commodore-Amiga Inc., respectively.

**MICRO PROSE™**  
SIMULATION • SOFTWARE

120 Lakefront Drive • Hunt Valley, MD 21030 • (301) 771-1151



# Love at first write.



Awarded  
"A Best of 1986"

... Commodore  
Microcomputers  
Magazine

## New! Now with Near Letter Quality printing!

Commodore 64<sup>®</sup> and 128<sup>™</sup> owners, meet the personal printer of your dreams.

It's the Commodore-compatible OKIDATA 120. And it's got everything you've been looking for in a printer.

Like a Near Letter Quality speed of 30 characters per second. A Utility mode speed of 120 cps. And high-resolution graphics.

The OKIDATA 120 is built for long-term relationships. With a full one-year warranty, and a printhead life of 200 million characters.

You'll love the very affordable price, too.

The OKIDATA 120 comes complete with everything you need to start printing. Including its own interface cable, paper and self-inking "Clean

Hands" ribbon cartridge. Simply plug it in and you're ready to go.

Meet the printer of your dreams at your OKIDATA retailer now. For the name of the OKIDATA retailer nearest you, call 1-800-OKIDATA.

The OKIDATA 120. To you, it's a great printer. To your Commodore, it's Mr. Write.

**OKIDATA**<sup>®</sup>  
an OKI AMERICA company

We put business on paper.

### features

The Evolution of Program Design <i>Selby Bateman</i> .....	22	*
An Introduction to Compilers <i>Todd Heimarck</i> .....	30	*

### reviews

<i>Vizawrite Classic 128</i> <i>Scott Thomas</i> .....	58	128
<i>Nine Princes in Amber</i> <i>Neil Randall</i> .....	60	64
<i>The Music System and The Advanced Music System</i> <i>Art Hunkins</i> .....	62	64
<i>Superbase 128</i> <i>Ervin Bobo</i> .....	64	128

### games

Bump-N-Run <i>Tim J. Midkiff</i> .....	44	64
Obstacle 128 <i>Stephen Cheng</i> .....	46	128
Match Blox <i>Mark Tuttle</i> .....	50	64/+4/16

### programming

BASIC for Beginners: The PRINT Statement <i>Larry Cotton</i> .....	36	128/64/+4/16/V
Machine Language for Beginners: A Practical Program <i>Richard Mansfield</i> .....	72	128/64
Fill-64 <i>Hubert Cross</i> .....	76	64
Power BASIC: 128 Instant Keywords <i>Shawn K. Smith</i> .....	82	128
BASIC Examiner <i>Rick Kephart</i> .....	84	64
Mastering 128 Sound and Music, Part 2 <i>D. C. Holmes</i> .....	90	128
64 Multitasker <i>Richard F. and Sally J. Daley</i> .....	94	64
1526 Underliner <i>Georg Zimmer</i> .....	96	64
Polar Art <i>Jim and Deborah Chambers</i> .....	98	128/64/+4/16
Draw 128 <i>Mike Cortese</i> .....	99	128
Turbo Format <i>Ross Ouwinga</i> .....	100	64

### departments

The Editor's Notes <i>Robert C. Lock</i> .....	6	*
Gazette Feedback <i>Editors and Readers</i> .....	10	*
Simple Answers to Common Questions <i>Tom R. Halfhill</i> .....	102	*
Computing for Families: Something Fun for Teachers <i>Fred D'Ignazio</i> .....	103	*
Horizons: Elegant Programming <i>Todd Heimarck</i> .....	104	*
User Group Update .....	105	*
News & Products .....	106	*

### program listings

How to Type in COMPUTE!'s Gazette Programs .....	107	*
The Automatic Proofreader .....	108	128/64/+4/16/V
MLX .....	109	64
Advertiser's Index .....	144	*

\*=General, V=VIC-20, 64=Commodore 64, +4=Plus/4, 16=Commodore 16, 128=Commodore 128

COMPUTE!'s GAZETTE is published monthly by COMPUTE! Publications, Inc., 825 7th Avenue, New York, NY 10019 USA. Phone: (212) 265-8360. Editorial offices are located at 324 West Wendover Avenue, Greensboro, NC 27408. Domestic Subscriptions: 12 issues, \$24 POSTMASTER: Send address changes to COMPUTE!'s GAZETTE, P.O. Box 10957, Des Moines, IA 50340. Second class application pending at Greensboro, NC 27403 and additional mailing offices. Entire contents copyright ©1986 by COMPUTE! Publications, Inc. All rights reserved. ISSN 0737-3716.

COMPUTE! Publications, Inc. is part of ABC Consumer Magazines, Inc., One of the ABC Publishing Companies: ABC Publishing, President, Robert G. Burton; 1330 Avenue of the Americas; New York, New York 10019.

# editor's notes

Just in case you're not a regular reader of the financial news, we're happy to relate that Commodore International President Thomas Rattigan announced a net profit for Commodore in the fourth quarter ending in June 1986. Commodore net sales for the quarter were up 58 percent from the comparable quarter a year ago. Concurrently, Commodore Chairman Irving Gould pointed out that this net gain followed six consecutive quarters of losses. Rattigan also noted that the June quarter sales for the Amiga were the best since the computer's launch.

This is one set of quarterly reports that many have been anxiously awaiting. Commodore has been battered by the same weaknesses that have plagued the rest of the industry, as well as by Amiga sales that have been lower than anticipated. Conversely, Commodore 64 sales, and now 64C sales, have been consistently strong. Amiga sales, especially with the advent of international marketing, are showing continued improvement. Commodore has traditionally been quite strong in European markets, and has, in the past, been criticized for pushing products in Europe vigorously while soft selling their introduction in the U.S. With Amiga, Commodore apparently reversed the emphasis, and therefore only now is able to begin to draw on its reputation and sales in Europe after a slower than desired U.S. launch.

We continue to hope that Commodore will retarget the Amiga, or perhaps an Amiga-equivalent machine, at price points more system-competitive with the ST. Perhaps the newly introduced Apple IIGS will assist the Amiga, albeit in a convoluted way, by increasing interest in the market while helping highlight the significance of many of the Amiga features.

We digress. For now, a profitable quarter is significant. Let's go for back-to-back.

## Looking Ahead

We're looking forward to another good year for the GAZETTE. As reflected in responses from you, our readers, we think we're providing the best coverage available for Commodore computers in each issue; 1987 will be no exception.

We have already scheduled several outstanding programs—utilities, games, and educational programs. You'll also see some excellent articles in our features section—hands-on tutorials that meet the needs of both beginning and advanced users and programmers. In an upcoming issue, we'll also have an exciting report on new technologies, showing the slow, but increasing merger of audio and video technologies with personal computers, much of this currently or soon available for eight-bit Commodore machines.

In addition, you'll find first-hand reports on the winter and summer Consumer Electronics Shows (CES), which promise to bring forth a host of new software and hardware products for the Commodore machines. There will also be articles on the latest computer printers and how to use them, updates on new developments in telecommunications, more information on the graphics and sound capabilities of the 64 and 128, and much, much more.

With computers as versatile and popular as the 64 and the 128, there's certainly no shortage of first-rate information and programs to be shared with our readers.

## A Remarkable Success Story

The continuing popularity of the Commodore 64—as shown most recently in healthy sales of the 64C computer—is a remarkable success story that's now approaching its fifth anniversary. Introduced in January 1982, the Commodore 64 offered a combination of graphics, sound, and computing power that was remarkable when first an-

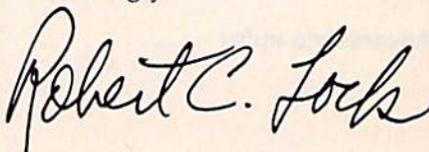
nounced. Almost five years later, thousands of Commodore 64 owners are still finding new ways to use this versatile machine.

What's more, software companies both big and small have made commitments to continue producing Commodore 64 software for at least the next couple of years. Not only are these companies finding that the installed base of 64 and 128 users is just too big and active to ignore, but their own programmers and software designers are now coming out with some of the best 64 software ever produced. After spending more than four years learning the ins and outs of the Commodore 64 system, these programmers are working wonders that couldn't have been imagined when the 64 was first introduced.

Couple that situation with the fact that the Commodore 128 has turned out to be even more successful than Commodore officials thought it would be, and you've got a terrific environment in which the GAZETTE and its readers can operate.

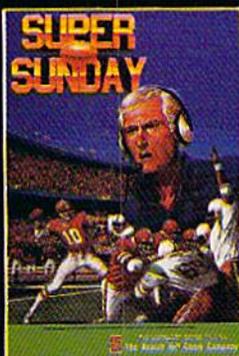
One of the pleasures of publishing the GAZETTE each month is that we're constantly hearing from both experienced 64 and 128 owners—some who've read the GAZETTE from its first issue—as well as brand-new 64, 64C, and 128 owners. As always, the GAZETTE and its variety of readers create a synergistic effect that helps to keep the Commodore enthusiasm alive and well.

Stay with us—1987 should be an exciting year.



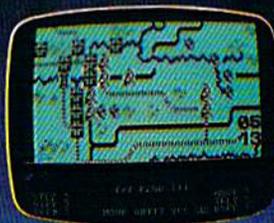
Robert C. Lock  
Editor in Chief

with Lance Elko  
and Selby Bateman



**SUPER SUNDAY**—PLAY THE GREATEST SUPER BOWL TEAMS OF ALL TIME. Expansion season disks available separately—Apple® II series, IBM® PC & compatibles (color graphics board required) and Commodore® 64/128. \$35

**GUDERIAN**—Simulation of the German campaign in Russia, re-creating the 1941 attack on Smolensk. For Apple II series, C64/128 and Atari 8-bit. \$30



**GULF STRIKE**—Intense award-winning wargame of modern warfare in the Middle East. Available for Atari® 8-bit, Apple II series, C64/128, IBM PC & compatibles (color graphics board required). \$30



**SPITFIRE '40**—WWII flight game and simulator. Available for Commodore 64/128. \$35



**MACBETH**—Text and graphics adventures, covering four different parts of Shakespeare's play. For Commodore 64/128. \$25



**Straighten Up  
and  
Fly Right!**



**MISSION ON THUNDERHEAD**—An intergalactic scavenger hunt—an arcade adventure. Available for Apple II series, Atari 8-bit and C64/128. \$25

Whether you're in the cockpit of our super realistic SPITFIRE '40, matching wits with three witches in MACBETH or going for the long bomb in SUPER SUNDAY, The Avalon Hill Game Company has the games to take you and your p.c. to new heights. Available at leading game and computer stores everywhere . . . or call for ordering information: TOLL FREE 1-800-638-9292. Ask for Operator CG.



microcomputer games DIVISION  
**The Avalon Hill Game Company**  
A MONARCH AVALON, INC. COMPANY  
4517 Harford Road, Baltimore, MD 21214

**Publisher** James A. Casella  
**Founder/Editor in Chief** Robert C. Lock  
**Senior Editor** Richard Mansfield  
**Managing Editor** Kathleen Martinek  
**Executive Editor** Selby Bateman  
**Editor** Lance Elko  
**Assistant Editor** Rhett Anderson  
**Production Director** Tony Roberts

**Editors**

Tom R. Halfhill, Editor, COMPUTE!'s Atari ST Disk & Magazine; Stephen Levy, Editor, COMPUTE! Books Division; Ottis R. Cowper, Technical Editor

**Assistant Editors**

Gregg Keizer, Ann Davies (Books); George Miller, Dale McBane, (Technical); Philip Nelson (COMPUTE! Magazine); Todd Heimark, (COMPUTE!'s Atari ST Disk & Magazine); Kathy Yakal, Assistant Features Editor; Tammie Taylor, Karen Uhlendorf, Copy Editors; Mark Tuttle, Submissions Reviewer

**Editorial Programmers**

Patrick Parrish (Supervisor), Tim Victor, Tim Midkiff

**Programming Assistants**

David Florance, David Hensley, Troy Tucker

**Administrative Staff**

Executive Assistant, Debi Nash; Julia Fleming, Iris Brooks, Mary Hunt, Sybil Agee

**Production**

Irma Swain, Production Manager; Janice Fary, Art & Design Director; Lee Noel, Assistant Editor, Art & Design; De Potter, Mechanical Art Supervisor; Terry Cash, Carole Dunton, Typesetting

**Artists**

Dabney Ketrow (Publications); Harry Blair, Illustrator

**Associate Editors**

Jim Butterfield (Toronto), Fred D'Ignazio (Alabama)

**Customer Service**

Diane Longo, Customer Service Manager; Orchid Tamayo, Dealer Sales Supervisor; Cassandra Greene, Customer Service Supervisor

Receptionist, Anita Armfield

Warehouse Manager, John Williams

**President** James A. Casella

**Vice President, Advertising** Richard J. Marino

**Director, Finance & Planning** Christopher M. Savine

**Promotion**

Caroline Dark, Promotion Assistant

**Advertising Sales**

Richard J. Marino, Vice President, Advertising Sales; Peter Johnmeyer, Director of Advertising Sales; Bernard J. Theobald, Jr., Associate Advertising Director; Kathleen Hanlon, Production Coordinator

**Sales Representatives**

Jerry Thompson 415-348-8222  
 Lucille Dennis 415-348-8222  
 Andrew Eisenberg 212-887-8474  
 Harry Blair 919-275-9809

Address all advertising materials to:

Kathleen Hanlon, COMPUTE!'s GAZETTE  
 324 West Wendover Ave., Suite 200, Greensboro, NC 27408

**Sales Offices**

Northeast 212-315-1665  
 Mid-Atlantic 212-315-1665  
 Southeast 212-275-9809

**Sales Offices, Jules E. Thompson, Inc.**

1290 Howard Avenue  
 Suite 303  
 Burlingame, CA 94010

Midwest 312-726-6047  
 Texas 713-731-2605  
 Pacific Northwest 415-348-8222  
 Northern CA 415-348-8222  
 Southern CA 213-378-8361  
 Arizona 213-378-8361  
 New Mexico 213-378-8361  
 Colorado 303-595-9299



Member



Audit Bureau of Circulations

COMPUTE! Publications, Inc., publishes

**COMPUTE!** **COMPUTE! Books** **COMPUTE!'s GAZETTE**  
**COMPUTE!'s GAZETTE Disk** **Apple Applications**  
**COMPUTE!'s Atari ST Disk & Magazine**

**Editorial Office:**

324 West Wendover Ave., Suite 200, Greensboro, NC 27408

**Corporate Offices:**

825 7th Avenue, New York, NY 10019

**Customer Service:**

P.O. Box 5038, F.D.R. Station, New York, NY 10150

Telephone: (In NY) 212-887-8525;

(In U.S.) Toll free 1-800-346-6767

Office Hours: 8:30 AM to 4:30 PM Monday-Friday

**Subscription Orders****COMPUTE!'s GAZETTE**

P.O. Box 10957, Des Moines, IA 50340

**TOLL FREE****Subscription Order Line**

**1-800-247-5470**

In IA 1-800-532-1272

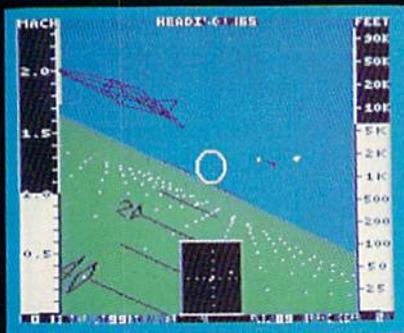
**COMPUTE!'s GAZETTE****Subscription Rates**

**(12 Issue Year):** US (one year) \$24. Canada, Mexico and Foreign Surface Mail \$30. Foreign Air Mail \$65.

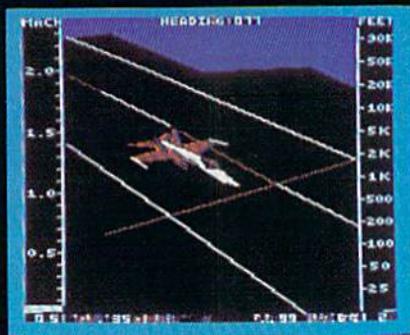
The COMPUTE!'s GAZETTE subscriber list is made available to carefully screened organizations with a product or service which may be of interest to our readers. If you prefer not to receive such mailings, please send an exact copy of your subscription label to: COMPUTE!'s GAZETTE, P.O. Box 10958, Des Moines, IA 50950. Include a note indicating your preference to receive only your subscription.

Authors of manuscripts warrant that all materials submitted to COMPUTE!'s GAZETTE are original materials with full ownership rights resident in said authors. By submitting articles to COMPUTE!'s GAZETTE, 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 © 1986 COMPUTE! Publications, Inc. Rights to programs developed and submitted by authors are explained in our author contract. Unsolicited materials not accepted for publication will be returned if author provides a self-addressed, stamped envelope. Where programs are included in an article submission, a tape or disk must accompany the submission. Printed listings are optional, but helpful. Articles should be furnished as typed copy (upper and lowercase, please) with double spacing. Each article page should bear the title of the article, date, and name of the author. COMPUTE! Publications, Inc., assumes no liability for errors in articles or advertisements. Opinions expressed by authors are not necessarily those of COMPUTE! Publications, Inc. COMPUTE! Publications assumes no responsibility for damages, delays, or failure of shipment in connection with authors' offer to make tape or disk copies of programs published herein.

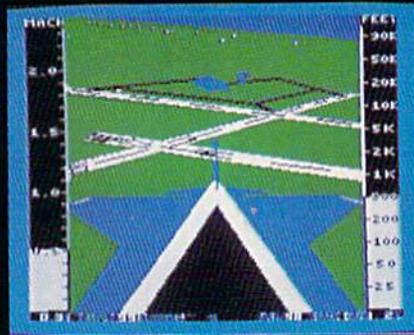
PET, CBM, VIC-20, Commodore 64, Plus/4, 16, and 128 are trademarks of Commodore Business Machines, Inc., and/or Commodore Electronics Limited. Other than as an independent supplier of quality information and services to owners and users of Commodore products, COMPUTE! Publications, Inc., is in no way associated with Commodore Business Machines, Inc., or any of its subsidiaries.



F-16 Dogfight with Enemy MiG-23 Fighters



F-18 on the Deck of a Nimitz-Class Aircraft Carrier (Control Tower View)



F-16 High-G Pullout over Detailed Wargame Scenery (Rear View)

*Jet*

From the author of Flight Simulator II comes a new dimension in realism. Jet simulates two fast and maneuverable supersonic jet fighters, a land-based F-16 or a carrier-based F-18. The simulator includes modern electronic flight instrumentation and the most advanced weaponry available. Jet's simulation sophistication, combined with excellent visual attitude references, makes it truly enjoyable to fly.

Easy aircraft control coupled with ballistic thrust gives you the kind of aerobatic maneuverability only a modern jet fighter can provide. Jet's attitude indicator is easy to read no matter what your orientation. A full-screen out-the-window view helps you get the most out of Jet's excellent flight controls. And that's a major consideration when flying at speeds in excess of 1300 MPH.

With Jet you can fly through either structured or non-structured environments. Engage in a deadly variety of combat missions. Explore the wargame territory, or relax by practicing precision aerobatic maneuvers. Load in scenery from optional United States Scenery Disks. You can even load in scenery off the Flight Simulator II disk.

New high-performance graphic drivers provide beautifully detailed scenery in either day or night-flight modes. You can look forward, left, right, rearward, or straight up out of the cockpit with a single keypress. The Jet simulator even includes a special view-magnification feature that lets you zoom-in to identify objects or details at a distance.

Jet will run on any Commodore 64 or Commodore 128 computer with one disk drive and either color or monochrome monitor.

#### See Your Dealer ...

or write or call for more information. For direct orders please enclose \$39.95 plus \$2.00 for shipping and specify UPS or first class mail delivery. Visa, MasterCard, American Express, and Diners Club cards accepted.

**SCENERY DISKS FOR JET AND FLIGHT SIMULATOR II ARE NOW AVAILABLE.**

Commodore 64 and Commodore 128 are trademarks of Commodore Electronics, Ltd.

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

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

*Do you have a question or a problem? Have you discovered something that could help other Commodore users? We want to hear from you. Write to Gazette Feedback, COMPUTE!'s GAZETTE, P.O. Box 5406, Greensboro, NC 27403. We regret that due to the volume of mail received, we cannot respond individually to programming questions.*

## A Good Idea For A Program

After many years of programming games on my Commodore 64, I've finally come up with a truly original idea for a game. My problem is I don't have the knowledge to write it. What I want to do is patent the idea, and then try and sell it to a software company. Have people done this before? Is there anything wrong with trying to do this? If not, how do I go about getting a patent for my idea?

Paul Rapnikas

*Many software companies buy programs from outside programmers or development teams, but most wouldn't be very receptive to buying an idea for a program. It would be like sending an inquiry to a book publishing company asking if they'd like an idea for a story which one of their authors could write. You could write to individual companies and ask them if they are interested, but most—if not all—only buy the rights to completed programs.*

*You could copyright the game, but only after writing the program. Only a creative original work (a story, a song, a computer program) can be copyrighted. An idea cannot.*

*One thing you might consider is teaming up with a friend who could make your idea a reality. Or you could continue to program and hope that eventually you'll have the skills to write the game yourself.*

## Listing A Program To The Printer

I wrote a short program and would like to print it out after I run it, but I don't know how. Could you tell me how to print my program?

Martha L. Cox

*While the program is in memory, type this line (make sure the printer is turned on*

*before you press RETURN):*

```
OPEN 3,4: CMD 3: LIST
```

*This opens a channel to the printer (the file number is 3; the printer's device number is 4). If you'd prefer to see upper-/lowercase characters, use a secondary address of 7 (OPEN 3,4,7). CMD transfers output to the previously opened channel, so the listing is sent to the printer instead of to the screen.*

*When the program is finished listing, type this line:*

```
PRINT#3: CLOSE 3
```

*The PRINT# flushes out any characters that might remain in the printer and CLOSE shuts down the channel to the printer.*

## Returning To The Menu

Can you use the printer to print out the menu from the GAZETTE Disk? I'd like to place a copy of the menu on the front of each month's disk envelope.

Also, can you return to the disk menu program from a program without reloading?

LN Lambprice

*A disk directory can be loaded and listed as if it were a program file. Type the following lines to list the disk directory of any disk to the printer (the diskname after CMD4 is optional):*

```
LOAD "$0",8
OPEN4,4: CMD4,"diskname": LIST
PRINT#4: CLOSE4
```

*If you load and list the directory from the GAZETTE Disk, you'll see the various programs for the 64 and 128, along with support programs and files such as the menu loader. If you'd prefer to see just the programs for the 64, type in the following short program, which reads the contents file on the disk and prints it to the screen. This is a generic file-reading program that will work on any files that contain ASCII characters:*

```
FS 10 OPEN1,8,2,"64 CONTENTS"
AE 20 GET#1,A$:S=ST
MX 30 PRINTA$:IFS=@THEN20
EK 40 CLOSE1
```

*To read the file and send the results to the printer, use this program:*

```
FS 10 OPEN1,8,2,"64 CONTENTS"
SM 15 OPEN4,4
AE 20 GET#1,A$:S=ST
```

```
QR 30 PRINT#4,A$:IFS=@THEN20
RR 35 PRINT#4:CLOSE4
EK 40 CLOSE1
```

*It would be possible to have most programs return to the menu after they're done, but there are several problems with this suggestion. First, the original idea for the Disk was to provide exact copies of programs as they're listed in the magazine. The magazine listings don't return to a menu, so we'd have to make changes to the programs on the Disk. In some cases this would be simple enough, but other programs (especially ML games and utilities) rely on special programming techniques that add wedges, introduce interrupts, or move memory around. Before returning to the menu, the program would have to undo the various changes that had been made to the computer.*

*Another factor is that many subscribers to the Disk make backup copies—games on one disk, utilities on another, and so on. A return-to-menu command would generate error messages if the program was run from a disk that didn't contain the menu program. In the case of ML programs, it would be difficult for some of our readers to remove or rewrite the portion of the program that reloaded the menu.*

*Adding the option of returning to the disk menu would please some subscribers, but it would displease many others.*

## The SpeedScript Buffer

I have a question about SpeedScript. Two of the commands deal with a buffer. The buffer isn't mentioned in the article, but the keyboard map shows the commands CTRL-R (retrieve buffer) and CTRL-K (kill buffer). Please explain how to insert text into the buffer and how to use these commands.

Chip Mattson

*SpeedScript's erase command automatically activates the buffer. After you press CTRL-E, a prompt appears on the top line to ask whether you want to erase a sentence, word, or paragraph (press S, W, or P). Whatever you erase is temporarily saved in the buffer. To retrieve the text, press CTRL-R.*

*The buffer can be used in two ways. If you accidentally erase more than you wanted to, you can immediately retrieve it. Also, if you wish to move a section of a*

# IF YOU CAN FIND A BETTER C64 PROGRAM WE'LL BUY IT FOR YOU!



## WORD WRITER with Spell Checker

- An efficient professional word processing system for home and business use.
- All the features you'll need for every day 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 much, much more. Plus, you get:
- An 85,000 word Spelling Checker
- A built-in, 5-function calculator.

### GEOS COMPATIBLE

Documents from these programs can be incorporated into the GEOS environment.

## DATA MANAGER 2 with Report Writer

- A general information storage and retrieval system with report writing, graphics, statistics, and label making capabilities. Plus, you get:
- Quick access to important information. Items can be easily retrieved and printed by name, index code, date range, amount range, or any category of information stored in the system.
- Exclusive X-SEARCH, X-SORT, and X-CHART features that 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 our Money Back Guarantee\*

If you can find anything that works better for you – and it's available – we'll buy it for you. Details inside every Timeworks package.\*\*

## SWIFTCALC with Sideways

- A powerful, easy-to-use electronic spreadsheet designed for home and business use. Plus, you get:
- Sideways – Prints all your columns on one, continuous sheet . . . sideways.
- 250 rows and 104 columns provide more than 25,000 cells (locations) in which to place information.
- Performs mathematical functions, up to 12 digits. Allows the use of minimum and maximum values, averages, sums, integers, absolute values, and exponential notation.
- Performs financial analysis functions calculates the present and future value of a dollar and the present and future value of a constant amount (annuity).

You Get Our Liberal Upgrade and Exchange Policy – Details are inside every Timeworks package.

### With Timeworks you get more than software. . .

You Get Our Customer Technical Support Team – free to all registered users.



More power for your dollar

Timeworks, Inc., 444 Lake Cook Road, Deerfield, Illinois 60015  
312-948-9200

Suggested Retail List Price

SWIFTCALC \$39.95  
DATA MANAGER 2 \$39.95  
WORD WRITER \$49.95

Available now at your favorite dealer, or call Timeworks.

TO ORDER CALL:  
1-800-535-9497

These programs include  
**SWIFTLINK™**  
Loads up to 5 times faster!  
These Programs  
**INTERFACE**  
with Each Other

\*\* Offer expires 90 days after date of original purchase.

\*\*\* COMMODORE 64 is a registered trademark of Commodore Electronics, Ltd.

†GEOS is a trademark of Berkeley Software, Inc.

© 1983 Timeworks, Inc. All Rights Reserved.

document, you can erase it, move the cursor to the new location, and press CTRL-R to insert it there. You can retrieve the contents of the buffer any number of times, which is handy for making repetitive forms (Name/Address/Phone, for example). Also, some (but not all) versions of SpeedScript allow you to erase part of a document, load a new file, and copy the buffered text from the first file into the second.

The text in the buffer will remain there until you use CTRL-E again, at which point the buffer is zeroed and the newly erased text begins to fill it. If you want to add to what's in the buffer, use SHIFT-CTRL-E instead.

When you're erasing large portions of a document, you may reach a point where there's no more room in the buffer. To clear out the buffer, press CTRL-K. You can then resume erasing.

### The Meaning Behind CMD

In the September issue of the GAZETTE, we said that the CMD statement doesn't seem to be an abbreviation and suggested that it doesn't have a long form. Readers R.S. Heyer and Jim Yost both sent letters with the same answer: CMD means Change Main (output) Device, which makes sense to us. Thanks for your letters.

### Moving Files Around

How can I reposition files on a disk directory so that an often-used program is the first on the disk? This would be useful in loading programs with just an asterisk (\*).

David Marz

First, the asterisk doesn't always load the first program on a disk. If you have just loaded or saved a program and then type LOAD"\*\*,8 you'll load the most recently accessed file—not the first on the disk. This is handy if you accidentally scratch a program. A scratched file is the most recently accessed, so you can LOAD"\*\*,8 to retrieve it and then save it back to disk.

To load the first file on a disk, enter LOAD"0:\*\*",8. Usually the shorter LOAD"::\*\*",8 will also work.

You can replace the first disk file with another file by using the DOS copy command in conjunction with the rename and scratch commands. Let's say you have a disk that contains ZEBRA as the first file and you'd prefer to have another program called AMBER at the beginning. First, you have to move ZEBRA out of the first position:

```
OPEN 15,8,15
PRINT#15, "C0:TEMP=0:ZEBRA"
PRINT#15, "S0:ZEBRA"
PRINT#15, "R0:ZEBRA=0:TEMP"
```

First, copy (C0:) the file named ZEBRA to a temporary file on the same disk

called TEMP. At this point, the same program is on the disk in two places, once as ZEBRA and once as TEMP. Next, scratch (S0:) ZEBRA, which frees up the first spot in the directory. Finally, rename (R0:) the file TEMP to its original name of ZEBRA. Now you have to copy AMBER to the newly opened first position in the directory:

```
PRINT#15, "C0:TEMP=0:AMBER"
PRINT#15, "S0:AMBER"
PRINT#15, "R0:AMBER=0:TEMP"
CLOSE15
```

This copies the file AMBER to the next available space in the directory (which happens to be the first filename, because ZEBRA was just moved). Then the original AMBER is scratched, and TEMP is renamed to be AMBER. Finally, channel 15 is closed. Now, when you enter LOAD"0:\*\*",8 you'll get the AMBER program because it's the first one in the directory.

### Arrays Are Lists

Could you write an article about the use of the DIM statement? The reference books I own have very sketchy information. I've enclosed a partial listing of a program I'm trying to write for our bowling team. I keep getting an error message in the line that contains DIM. Any help would be appreciated.

A.G. Trobaugh

The DIM statement sets up the size (Dimension) of an array of variables. An array is basically a numbered list of variables. The array has a single name, like a variable, but it is followed by an index number in parentheses. Arrays are useful in a wide variety of applications. You can create arrays to contain strings or numbers, and they may have one or more dimensions.

From the program listing you sent, it looks like you understand how to use ordinary variables. And there are sections of the program that would benefit from the use of arrays. For instance, there's one part of the program that looks like this:

```
310 INPUT NM
320 IF NM = 1 THEN NMS =
    "DOROTHY"
330 IF NM = 2 THEN NMS = "NESSY"
340 IF NM = 3 THEN NMS = "WALLY"
```

and so on, with a total of eight IF-THEN statements. This is a situation that could be handled very nicely with an array. There are eight names, so you need to DIM the array to a size of 8, and then assign the names to each position in the array:

```
10 DIM B$(8)
12 B$(1) = "DOROTHY": B$(2) =
    "NESSY": B$(3) = "WALLY"
```

The rest of the array is then filled with the appropriate names. A shorter

way to set up the array is to use a FOR-NEXT loop:

```
10 DIM B$(8)
12 FOR X = 1 TO 8: READ B$(X): NEXT
14 DATA DOROTHY, NESSY, WALLY
```

The DATA statement on line 14 must contain eight names for this to work properly. Note that line 12 uses a variable instead of a number in parentheses. You can put either a number or a numeric variable in parentheses. This means you could replace the INPUT and eight IF-THENS starting at line 310 with the following two lines:

```
310 INPUT NM
320 NMS = B$(NM)
```

A two-dimensional array needs two numbers (or variables) in parentheses. Let's say you want to keep weekly scores for each of the bowlers on the team. On paper, the grid would look like this:

NB ▼	NW ▶		
	WEEK 1	WEEK 2	WEEK 3
BOWLER 1	660	639	591
BOWLER 2	501	505	542
BOWLER 3	482	595	403
BOWLER 4	...	...	...

The number of bowlers (NB) runs down the left side, and the number of weeks (NW) runs across the top. To implement this in BASIC, you need a line like this:

```
10 NB = 8: NW = 33: DIM SC(NB,NW)
```

You also need a way to fill up the array with the appropriate numbers, whether you INPUT from the keyboard, READ from DATA statements, or OPEN and READ a disk file.

There are two problems in the line that's giving you the error message. The first is that DIM should be followed by the array name and parentheses containing the size of the array (see the examples above). Another, more serious, mistake is that there are several DIM statements sprinkled throughout the program. An array can be dimensioned only once. If you use DIM more than once on the same array, you'll get a REDIM'D ARRAY error. A common practice is to put all DIM statements at the beginning of a program or in a subroutine that's called only once.

### Exception To The Rule?

In one of your programs, you used negative numbers in DATA statements. I don't understand that. I thought all DATA statements were between 0-255. How does this work?

Glenn Peterson

Three of the most common uses for DATA statements are machine language programs, custom characters, and sprite

# COMMODORE CLASSICS!

## PAPERCLIP WITH SPELLPACK

for the Commodore 64

"The #1 Best Selling Word Processing Package."

— BILLBOARD'S COMPUTER SOFTWARE CHART

"Superb... the most sophisticated to date."

— COMPUTE MAGAZINE

"The best professional word processor available."

— RUN MAGAZINE

- Fast: Insert/Delete, Move or Copy words, phrases, sentences or entire blocks of text.
- Easy: save up to 52 repetitive words or phrases, then enter them with just two keystrokes.
- Sophisticated: Global Search and Replace changes every occurrence of a wrong word or phrase.
- Works with the Consultant Data Base Manager for the C64.
- Personalized form letter, mailing list and mailing label functions.
- Built-in Spellpack with Dictionary for fast error checking.

## THE CONSULTANT

for the Commodore 128/64

Database management made easy!

"Combines simplicity with speed and gigantic records."

— COMMODORE MAGAZINE

- Built-in templates for the most-needed database functions: Inventory, Budgets, Mailing Lists, Catalogs and many more.
- Extensive macro capability
- Keyed field access speed — 1/10 second; sorting speed — 4 seconds per 1000 records.
- Six search operators — Equal To, Greater Than, Less Than, Not Equal To, Match Anywhere, Wild Card.
- Totally flexible relational reporting — insert any Consultant datafile in a report.
- Works with PaperClip Word Processor.

## KEYS TO TYPING:

for the Commodore 64/128

40 words a minute in 32 easy lessons — or less!

Learn to type at your own pace!

- 32 step-by-step lessons to reach at least grade 10 proficiency!
- Lessons based on proven instructional techniques used by typing teachers.

BATTERIES INCLUDED, an IBM company, 30 Mural Street, Richmond Hill, Ontario, Canada, L4B 1B5 (416)881-9941. Customer Information (416)881-9816. If you can't find this product at your local retailer, you may order it direct from us at the full suggested list price plus \$5.00 for postage and handling. For product orders please call 1-800-387-5707 (U.S. only). For most Batteries Included products you can always have the latest version of your program by returning the original disk and \$10.00. Write to us for our full color catalog of products for the APPLE, APPLE MACINTOSH, ATARI, ATARI ST, COMMODORE, COMMODORE AMIGA, AND IBM SYSTEMS.

©1986 Batteries Included, APPLE, APPLE MACINTOSH, ATARI, ATARI ST, COMMODORE, COMMODORE AMIGA, AND IBM are registered trademarks respectively of APPLE CORPORATION, COMMODORE BUSINESS MACHINES INC., AND INTERNATIONAL BUSINESS MACHINES INC.



**BATTERIES  
INCLUDED**



## PAPERCLIP II: for the Commodore 128

"An exceptional value... one of the best software investments now available for the C128!"

— RUN MAGAZINE

The #1 best-selling word-processor, re-designed to take full advantage of the C128's increased memory, speed and power. Compatible with C-64 PaperClip text files.

- Integrated 38,000-word spelling checker to give you error-free documents.
- Built-in telecommunications module to access on-line services — one toggle moves you between word processor and terminal.
- Works with THE CONSULTANT for the C128.
- New editing features include multiple columns, reverse video scroll and chaptering, with maximum document size now expanded to 999 lines.

## CALKIT

for the Commodore 64/128

"... the very best program of its type... a powerful tool that's not overpowering... the perfect spreadsheet for the home user."

— COMPUTER ENTERTAINER NEWSLETTER

- Simplified, streamlined spreadsheet program with "What If?" capability for projections and estimates.
- Built-in application templates: Check Book, Budget, Installment Payment, Income Tax, Balance Sheet, Stock Portfolio, Materials Estimator, and many more.
- Formats are already set up, calculations are pre-programmed — all you need do is enter data.
- Design your own customized worksheets to solve specialized problems.

## HOMEPAK

for the Commodore 64/128

"... inexpensive, powerful, integrated software. As such, HomePak is the winner of InfoWorld's Best Buy Award."

— INFOWORLD MAGAZINE

... one of the finest values on the market.

Performance: excellent. Value: excellent."

— FAMILY COMPUTING MAGAZINE

Three easy-to-use programs on one disk:

### 1. HOMETERM TELECOMMUNICATIONS

- Powerful Macro facility — log on to your favorite bulletin board or database with one command.

■ Flexible data handling — save incoming text to disk, edit it, print it.

### 2. HOMETEXT WORD-PROCESSOR

- Over 20 full-screen editing and formatting features: move & copy, word-wrap, justification, automatic paging and many more.

### 3. HOMEFIND DATABASE MANAGER

- Natural English-language data entry/retrieval system, for simplified electronic filing.

All three HomePak programs work together so it's easy to transfer data and perform integrated tasks.

# BODYLINK™

CONVERTS YOUR COMMODORE 64/128  
INTO A HEALTH AND FITNESS SYSTEM.

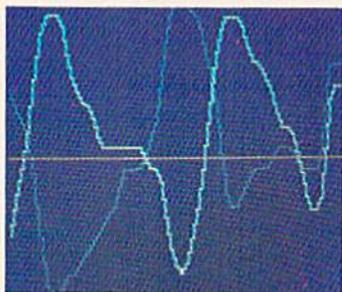


**Sports  
Training—  
A More  
Competitive  
You.**

No matter what the sport, we have become a nation conscious of performing to win. We spend hours training, practicing, competing. Bodylink gives you the individual attention of the best pro—anytime you desire for as long as you wish—and at no extra cost. The Bodylink System provides instantaneous feedback on the exact manner in which your muscles are performing, enabling you to correct your swing or refine your pitch while still in motion. Bodylink allows a true two-way conversation between you and your body, giving you the winning edge.

#### **MUSCLE COORDINATION PACKAGE—\$149.95**

This package includes Bodylink, Standard EMG Sensor and Lead Set, Head-Band, three electrodes and two software cartridges containing several programs.



**Reducing Stress.  
A Healthier and  
More Productive  
You.**

Medical authorities now consider stress a major health risk which may result in migraines, ulcers, back pain and heart attacks. With Bodylink you have within reach a powerful stress reduction system. Bodylink allows you to focus on physical signs of stress such as muscle tension and skin temperature. By using this feedback, Bodylink quickly and effectively teaches you to reduce stress for a healthier and happier life.

#### **STRESS REDUCTION PACKAGE—\$239.95**

This package includes Bodylink, Biofeedback EMG Sensor and Lead Set, Head-Band, three Electrodes, Biofeedback Temperature Sensor, and two software cartridges containing several programs.



**Getting in Shape...Easier...  
Safer...More Effectively**

Home exercise now becomes exciting and more effective. With Bodylink you can be sure you are exercising for maximum benefit. While using the cardio exercise package, Bodylink monitors your heart rate and helps you determine the ideal level you need for aerobic gain. With the muscle development package, Bodylink guides you to do muscle developing exercises correctly and effectively. Bodylink motivates you to work harder if you are not reaching your target level, or helps you slow down if you are working too hard.

#### **CARDIO EXERCISE PACKAGE—\$209.95**

This package includes Bodylink, Standard EMG Sensor and Lead Set, Leg-Band, Pulse Rate Sensor, and two software cartridge's containing several programs.

#### **MUSCLE DEVELOPMENT PACKAGE—\$169.95**

This package includes Bodylink, COMET, and two software cartridges containing several programs.

**BODYLINK is a peripheral that plugs into the cartridge slot of the Commodore 64/128 computer. Knowledge of computers or computer programming is NOT necessary to use BODYLINK. You don't even need a disk drive to save your data. Various sensors are used to record internal signals from your body and relay them to BODYLINK. You simply place the sensor against the part of your body to be monitored and watch the result on your TV screen.**

Commodore is a registered trademark of  
Commodore Electronics Limited.

**DEALERS, PROGRAMMERS AND USER GROUPS  
INQUIRIES WELCOME**



shapes. All three of these require numbers to be POKEd into memory. An individual byte of memory can hold a number in the range 0-255, so in a sense you're right. When DATA statements hold numbers that are going to be POKEd into memory, the DATA statements must be limited to the range 0-255.

But DATA statements can hold other sorts of information, too. If the data is names of people or bowling scores, the 0-255 rule doesn't apply. Negative numbers are acceptable in DATA, as long as the numbers aren't being POKEd to memory.

## How Much Room Remains On The Disk?

I have a program to control a loan business. Each account is kept as a sequential file. The individual file lengths vary from account to account, and it's sometimes necessary to ascertain how much space is available on the disk. It would not do to suddenly run out of space.

Could you provide a BASIC subroutine that would allow me to read at any time the number of blocks free on a disk?

Ralph Greenhalgh

The following program does what you're looking for:

```
EE 10 Z$=CHR$(0)
KC 20 DEFN(A(X))=ASC(A$+Z$)+256
      *(ASC(B$+Z$))
KC 25 PRINT "CHECKING DISK, PLEASE WAIT"
RC 30 OPEN 1,8,0,"$0"
BE 40 GET#1,A$,B$
HB 50 GET#1,A$,B$:IF FNA(X)=0
      {SPACE}THEN 90
BJ 60 GET#1,C$,D$
BE 70 GET#1,E$:IF ASC(E$+Z$) > T
      HEN 70
DG 80 GOTO 50
SJ 90 A$=C$:B$=D$:F = FNA(X):C
      LOSE 1
XS 100 PRINT F, "BLOCKS FREE ON
      THE DISK"
```

After the routine is finished, the number of blocks free will be in the variable F (see line 90).

## Sprite Collisions And Hi-Res Graphics

I have two computers, a VIC and a 64. I've been writing machine language programs for both of them for about a month now. How can I write a program that detects collision between a certain sprite and a certain background character in machine language? Say a program that checks for collision between sprite one and the letter R and a collision between sprite two and the letter A.

Another question. I have a game that displays 16 colors in bitmap (hi-res) mode. How is this done?

Sayam Tantasook

When a sprite-to-character collision occurs, you can PEEK location 53279 (\$D01F) to determine which sprite was involved in the collision, but there's no easy way to figure out which character it hit. All you really know is that a certain sprite happened to hit a character. You can't determine which character was hit unless you PEEK the horizontal and vertical locations (x and y coordinates) of the sprite, translate them into the equivalent row and column on the screen, and then PEEK screen memory in that vicinity.

To answer your second question, there are several ways to set up a hi-res screen. The first is true hi-res, where you can turn on or off 64,000 picture elements (pixels) arranged in a pattern of 320 pixels across  $\times$  200 pixels down. Since a byte of memory contains eight bits, it can hold enough information to control eight pixels on the hi-res screen. Thus, 8000 bytes are required to bitmap a standard hi-res screen.

Color memory is also important. When you set up a hi-res screen, 1000 bytes are set aside for color memory. Each memory location in hi-res color memory controls the foreground and background colors for an 8-pixel  $\times$  8-pixel section of the screen. Within each 8  $\times$  8 section, you're allowed only two colors (not counting sprites that might be moving around). But each section is independent of the other sections. So, for example, you could have an 8  $\times$  8 chunk of the screen with a blue background and white pixels next to a section that has a red background with gray pixels. Each 8  $\times$  8 area can contain only two colors, but the colors are independent of colors that might appear in other 8  $\times$  8 areas.

Another method to set up a bit-mapped screen is to use multicolor hi-res. If you choose to use multicolor mode (which could be called medium-res), you trade half the horizontal resolution in return for two additional colors. Instead of 320  $\times$  200, the screen has 160 double-width pixels  $\times$  200 lines. Each pixel requires two bits (binary 00, 01, 10, or 11) to define the color. Color memory still controls an 8  $\times$  8 section of the screen, but the pixels are twice as wide, so you really have only a 4  $\times$  8 area to work in. The 32 pixels can contain one of four different colors. Again, the separate sections of the screen are independent of each other, although one of the colors is universal.

Some screens that seem to be hi-res actually use custom characters. Each character can have an individual foreground color (based on the number in color memory) in addition to a background color shared among all characters. Multicolor characters can have an individual foreground color plus two other common colors in addition to the background.

Characters can also be displayed in extended background color mode, which

reduces by a factor of four the number of available characters (64 instead of 256), but multiplies by four the number of background colors. You can then choose one of the 16 available colors for the character in the foreground and one of four background colors for the rest of the 8  $\times$  8 character grid.

## Pictures On Disk

I recently purchased a Commodore 128. One of the main reasons I chose the 128 is because I heard of its easy-to-use graphics capabilities that are accessible from BASIC. I have written many hi-res programs and wish to save just the pictures to disk, preferably with the BSAVE command. Is this possible? How could I do it?

Brian Aljian

After you've designed the hi-res picture and displayed it on the screen, type the following line in immediate mode—or include it in your program:

```
BSAVE "picturename", B0, P7168 TO
P16383
```

To load it back into memory, BLOAD "picturename",B0. For multicolor hi-res pictures, you'll have to set colors 2 and 3 before BLOADing the picture.

BLOAD and BSAVE were intended primarily for machine language programs, but they can also be used to load and save hi-res pictures, sprite shapes, character sets, function key definitions, and so on. If you have a portion of memory you want to send to disk, BSAVE is a handy command.

## The Other Side Of The CP/M Disk

I'm a Commodore 128 owner, and I was unaware that the CP/M disk was two-sided until I read about it in your magazine.

After I booted it for the first time and before I copied it, I managed to "nuke" the disk. Now, the first side still boots up, but the second side gives me a disk error and prints a whole bunch of question marks.

What happened to my disk and how can I get it replaced?

Jim Traverse

The first side of the CP/M disk contains the boot sector for starting up CP/M and the second side does not. You must turn on the computer (or type BOOT) while side one is in the disk drive. After CP/M has booted, remove the disk and flip it over.

When the second side is in the drive, type DIR to see if you can get a directory. If you still get question marks, try pressing CTRL-C (hold down the CONTROL key and press C). This tells CP/M to log out the previous disk and prepare for a new one. Then type DIR again. Pressing CTRL-C may solve your problem.



Stuff their stockings  
with the perfect gift  
& save

33%



This year, give gift subscriptions to *Compute!'s Gazette*. You'll not only make their holidays happy, you'll spread cheer all year. Because they'll remember your thoughtfulness every time they receive another fresh and exciting issue.

Think of the people on your gift list (and, don't forget yourself!) who would enjoy receiving this definitive guide to their Commodore. *Compute!'s Gazette* will bring them up to 20 all-new, action-packed programs each month — plus reviews, updates, analysis and more.

It's so easy to give a gift of *Compute!'s Gazette*. A 1-year gift subscription (12 issues) is only \$24. You save a full 33% off the \$36 cover price and you won't be billed until after January 1st. At this Happy Holiday rate, you can afford to make a lot of people happy — and wrap up your holiday shopping fast! An attractive gift card comes with each gift subscription. Happy Holidays to you.

**Special Holiday Package**

Make that extra-special person extra happy. Give a 1-year gift subscription to *Compute!'s Gazette* PLUS a 1-year subscription to *Compute!'s Gazette Disk* for only \$75.

To Order Call Toll-Free 1-800-247-GIFT  
In Iowa 1-800-532-1272

**COMPUTE!'s  
GAZETTE**

If the disk is defective, it should be covered by the warranty. See the DRI licensing agreement that came with the disk. It says that defects in the media (meaning a disk that doesn't work) are covered and you can return the disk for a replacement.

### Addressing Envelopes

I have a Commodore 64 with a 1526 printer. I routinely use SpeedScript for letters with tractor-feed paper. I have trouble with regular single sheet paper and I have been unable to type envelopes. How do I do this?

George A. Clark

When you're using SpeedScript with single sheets of paper, you should put the page-wait command at the top of the document. Hold down CTRL and press the English pound key. You'll be prompted for a format key; type the letter w (for "wait between pages"). You may have to set the bottom margin a little higher as well. When a page has printed, SpeedScript will print a line that reminds you to insert the next sheet.

The Commodore 1526 printer has a paper sensor that causes the printer to stop when it thinks it has run out of paper. By using the page-wait command, you can avoid most problems caused by the sensor.

The printer won't print envelopes because of the paper sensor. When you've lined up the envelope, the printer thinks it's out of paper and refuses to continue.

Here's a way to use your printer to address envelopes: Place a piece of paper between the flap and the main envelope. Carefully pick up the paper and envelope together and insert them top first into the printer. Advance the paper until the top of the envelope shows. The piece of paper you've inserted fools the paper sensor into thinking there's more paper.

### A Fastload Warm Start

I am a happy owner of the Epyx Fastload cartridge, but when I use the 64's system reset command (SYS 64738), Fastload is disabled. Is there a reset command that will leave Fastload in place?

Brian Johnson

We don't usually respond to programming questions about specific commercial products (it's best to address inquiries to the software company that produces the program), but within a week after we received your letter, two answers appeared in the "Feedback" mailbox, so this must be a common problem. Here they are:

The Fastload manual states that the only way to use the cartridge after it has been deactivated is to turn the 64 off and on again. However, through disassembling

the program I have figured out how to do both a warm start and a cold start.

The warm start is easy; all it does is re-enable the Fastload commands without clearing the screen or erasing any program in memory. Just SYS 57194. The cold start is similar to SYS 64738 but also enables Fastload. Below is a program that does it. The variable S can be set to any value where there are 6 free bytes of memory.

```
10 S=820
20 FOR I = S TO S+5: READ A:
   POKE I,A: NEXT: SYS S
30 DATA 32,6,223,76,48,128
```

David MacKenzie

I'm sure Fastload users have found that SYS 64738 doesn't reset Fastload. This short routine can replace SYS 64738:

```
10 FOR I = 288 TO 293: READ A:
   POKE I,A: NEXT
20 DATA 32,21,223,76,61,128
```

After you run the program, you can reset the computer and re-enable Fastload with SYS 288.

Albert H. Cooper, III

Thanks to both of you for the answer to this question.

### 80-Column Cables For The 128

I would like to know where I may purchase the monochrome 80-column cable that you mentioned recently, and how much it is.

Ricky Seidenstein

The 128 has both monochrome and color 80-column outputs. These two signals are available on the port labeled RGBI. To see 80 columns in color, you need an RGB monitor and an IBM-compatible color cable (almost any merchant that sells RGB monitors will also stock cables for the IBM, so they're not difficult to find).

You can use either a monochrome monitor, also called a green-screen or an amber-screen, or a composite color monitor such as the 1701 or 1702 to obtain 80 columns in monochrome. For the 1701 or 1702, connect the monochrome input to the jack on the rear of the monitor labeled LUMA. Monochrome means one color, but you really have three colors: dark, light, and a gray shade that's between the two extremes.

To build your own cable, buy a length of coaxial cable, an RCA male plug, and a standard male nine-pin D connector (Radio Shack part #276-1537). The nine-pin connector is the complement of a joystick connector, which is to say that a joystick plug will fit into this connector. Pin 1 of the RGBI connector is ground and pin 7 is the monochrome output. See page 352 of the 128 System Guide for a diagram,

which is arranged as if you were inside the computer looking out. Connect pin 1 to the outside portion of the coaxial cable and pin 7 to the inner wire.

The Radio Shack parts cost about \$5, and the cable is easy to make if you're good with a soldering iron. If you're not, you can buy one for \$8-\$15. Batteries Included, Microvations, and Cardco have such cables for sale (ask your local Commodore dealer for details). Some Commodore dealers also make their own cables.

### XMODEM: A Standard Protocol

Where can I obtain the XMODEM protocol? I am interested in designing my own terminal programs and need information on this.

Tim Kollas

XMODEM (also known as Modem7) is an error-checking scheme used to transmit files from one computer to another, usually over the telephone lines. It is without a doubt the most popular microcomputer protocol for uploading and downloading.

The original XMODEM protocol was devised by Ward Christensen, who also set up the first computer bulletin board. Data is sent in blocks of 128 bytes, with a checksum and other extra information which insures that each block is received correctly.

XMODEM transfers always involve eight-bit bytes; if you are using a telecommunications program, make sure that you are communicating with a word length of eight bits and no parity. Four ASCII characters have a special meaning in this protocol:

1	SOH	start of header
4	EOT	end of text
6	ACK	acknowledge
21	NAK	negative acknowledge

The computers at both ends of the link use these characters as signals during the transfer. Respectively, they are used to mark the start of a data block (SOH), and to indicate when the transmission is complete (EOT), when a block has been received successfully (ACK), and when an error has occurred in receiving a block (NAK).

A complete XMODEM block always consists of 132 bytes of information. The first 3 bytes of the block are called the header. The next 128 bytes contain the actual data being transferred, and the last byte contains a checksum. The first byte is the start-of-header character (SOH, ASCII 1) which says to the receiving computer, "Here comes a block." The second byte is the block number, which begins at one and increases by one every time a block is successfully transmitted. When the block number exceeds 255, it flips over to zero (not one). The third byte is the block complement, a value equal to the ones complement of the block number (256 - the

# The Flying Simulations Chosen by Real Pilots



The toughest evaluators of flying simulations aren't computer buffs. They're actual pilots and flight professionals. And when these flyers talk authenticity and realism, one name comes up again and again: MicroProse Simulation Software. We're used to this kind of stringent comparison; our company president is a former fighter jock with 3,000 flying hours in his logbook.

Take the evaluation of Senior Editor David Martin, in *Private Pilot* magazine's August 1986 issue. Martin, a former Navy aviator who has flown almost everything with wings, reviewed five MicroProse programs, including the bestselling *SOLO FLIGHT* primary flight simulator. "I'd not have believed it possible..." he wrote. "Pilots of all sorts will be fascinated

by these aviation games."

Mr. Martin isn't the only pilot who's spent many of his recent leisure hours with MicroProse simulations. Comparing his experience in training real flyers with the instrument layout found in *SOLO FLIGHT*, Cessna Flight Instructor Mark Rice told us "the instrument flying segments are very similar to the real thing — you're up in the clouds and using your readings to guide the aircraft."

Concorde pilot and former RAF jet flyer John Hutchinson reviewed MicroProse' sport flight *ACROJET* for the British press. His conclusion: "This simulation is one that really does live up to its real-life counterpart... I find *ACROJET* completely absorbing and very exciting." High praise, from the man who flies the world's fastest airliner...

We regularly hear from military and commercial Air Traffic Controllers who rave about our *KENNEDY APPROACH* simulation, and though we can't mention names (they're Federal employees), we can say that many of these professionals tell us *KENNEDY APPROACH* is the most accurate depiction of airport conditions you can find short of a real control tower.

The MicroProse Civilian Aviation Series includes *SOLO FLIGHT*, which teaches the basic flying skills associated with a single-engine propeller aircraft. *ACROJET* recreates the sensitive control characteristics of the world's hottest sport jet — the Bede BD-5J — and includes a wide range of multiplayer competition events. *KENNEDY APPROACH* allows you to guide dozens of commercial aircraft into and out of the nation's busiest airports.

From MicroProse, the flying simulators chosen not only by computer enthusiasts, but also by real pilots...

*SOLO FLIGHT* is available for Commodore 64/128™, Apple II family, Atari XL/XE, IBM PC/PC Jr., and Tandy 1000. *KENNEDY APPROACH* is available for Commodore 64/128 and Atari XL/XE. *ACROJET* is available for Commodore 64/128. All products have a suggested retail price of \$24.95.

Available from your local retailer. If out of stock, contact MicroProse directly for further information on our full range of simulation software, and to place MasterCard/Visa orders.

Commodore, Apple, Atari, IBM, and Tandy are registered trademarks of Commodore Electronics, Ltd., Apple Computer, Inc., Atari, Inc., International Business Machines Corp., and Tandy Corp., respectively.

## MICRO PROSE™

SIMULATION • SOFTWARE

120 Lakefront Drive • Hunt Valley, MD 21030 • (301) 774-1151

block number). Together, the block number and complement allow both computers to make sure they are synchronized (dealing with the same block).

The 128 data bytes may contain any sort of eight-bit data (executable programs as well as ordinary ASCII text). The checksum is the eight-bit sum of all 128 data bytes. It's reset to zero at the beginning of each block, and flips over to zero whenever it exceeds 255. In BASIC, the checksum can be calculated with the statement  $CHECKSUM = (CHECKSUM + BYTE) AND 255$ , where CHECKSUM is the checksum value and BYTE is the ASCII value of the current character. Here is a nutshell description of a successful XMODEM transfer:

**Initiation.** Sender waits for an initial NAK from receiver. Receiver sends a NAK to initiate the transfer.

**Transfer of blocks.** Sender transmits a 132-byte block consisting of a one-byte SOH character, one-byte block number, one-byte block number complement, 128 bytes of data, and a one-byte checksum. If the receiver gets the block successfully, it sends an ACK to say, "I got that block okay; send the next one." If an error occurs, the receiver sends a NAK to say, "Send the last block again." This process continues until all blocks have been received successfully (or the transfer is aborted; see next section).

**Termination.** Sender transmits an EOT character to signal the end of the transmission. Receiver sends an ACK to say, "I see that you're done, so I'm quitting, too."

Timing and error-checking are critical parts of XMODEM. Since the transfer is largely automatic, each computer must have a means of aborting the process if too many errors occur. Here is a description of error-checking during an XMODEM transfer:

**Initiation.** Sender aborts the transfer if it doesn't receive an initiating NAK from the receiver after ten 10-second timeouts (100 seconds total). Receiver sends the first NAK, then waits to get the first SOH, sending another NAK every ten seconds if no SOH appears. Receiver aborts the transfer if ten 10-second timeouts occur without its receiving an SOH.

**Transfer of block.** Sender transmits a 132-byte block, then waits for a response from the receiver. Sender aborts transfer if ten 10-second timeouts occur for any block without its receiving an ACK or NAK from the receiver. Receiver waits for each block to arrive, sending a NAK every ten seconds if no SOH appears, and aborting transfer if ten such timeouts occur for any block. After receiving an SOH, the receiver reduces the timeout interval to one second for each of the 131 remaining bytes in the block, and sends a NAK to request retransmission if more than ten 1-second timeouts occur for any single byte (this

covers the case where a block contains too few bytes). If all 132 bytes arrive on time, the receiver sends a NAK if the first byte is not an SOH or if the block number, complement, or checksum does not match. If the receiver gets a duplicate block (caused when the sender fails to recognize an ACK), it throws away the duplicate and sends an ACK to say, "I got that block already; send the next one." In this case, and whenever it needs to send a NAK, the receiver first purges the line by getting the remainder of the block (getting characters until no more characters are incoming) and throwing it away.

**Termination.** If the sender's EOT is lost, or the sender simply stops sending, the receiver eventually aborts because it experiences ten 10-second timeouts without receiving anything. If the sender does not receive the receiver's final ACK, it aborts when ten 10-second timeouts occur. Note that if the very last block of data contains fewer than 128 bytes, the sender "pads" the block with extra characters, often nulls (ASCII 0).

Though it's not provided in the original protocol, many implementations of XMODEM use another special character (CAN, ASCII 26) to allow either computer to cancel the transfer immediately. Proponents of XMODEM claim an accuracy rate in excess of 99 percent (fewer than 1 percent undetected errors). XMODEM was devised in the early days of personal computing, when the eight-bit CP/M machine was king. Its major limitations arise because, understandably enough, it relies on eight-bit arithmetic. An improved version of XMODEM uses the CRC (cyclic redundancy checksum) method to reduce the likelihood of undetected errors. Programs designed for use with commercial information services often relax the timing requirements (increase the timeout periods) as well, to allow for the delays caused by telephone packet-switching networks.

XMODEM has also been criticized because it involves a high degree of overhead: For every 128 bytes of data, you must process a minimum of five non-data bytes (SOH, block number, complement, checksum, and ACK or NAK). More recent protocols such as Kermit transmit data in 1024-byte or even larger blocks.

### Video Banks

I am in the process of writing an arcade-style game for the 64 which uses both sprites and hi-res graphics. Unfortunately, I have more than 50 sprite shapes, so the shapes and the hi-res screen cannot be located in block zero. I haven't been able to find out how to move sprites and the hi-res screen to block one. The screen memory and character memory must be moved also. Do the sprite pointers change from

2040-2047 to 18424-18431? Since my game is in machine language, the placement of BASIC is not a problem. Can you help?

Dean Kreutzer

The VIC-II video chip handles all graphics, including sprites, hi-res screens, character shapes, and screen memory for ordinary characters. This chip can only "see" 16K at a time, so you can choose from four video banks:

bank 0: 0-16383  
bank 1: 16384-32767  
bank 2: 32768-49151  
bank 3: 49152-65535

When you switch to a new video bank, all video information moves there. If you have a character screen at locations 1024-2023, with sprite pointers at 2040-2047, and you move the video to bank 1, the new sprite pointers will be located at 18424-18431.

To switch to a new bank in BASIC, use the following lines (where BANK is the bank number):

POKE 56578, PEEK(56578) OR 3  
POKE 56576, (PEEK(56576) AND 252) OR  
(3-BANK)

The machine language equivalent, assuming you want to switch to bank 1, is:

LDA 56578  
ORA #3  
STA 56578  
LDA 56576  
AND #252  
ORA #2  
STA 56576

You won't be able to print to the standard text screen unless you also POKE 648, (PEEK(648) AND 63) OR (BANK \* 64).

All programs listed in this magazine are available on the GAZETTE Disk. See details elsewhere in this issue.

# FREE TRIP TO RUSSIA

## And you don't even have to leave your room.

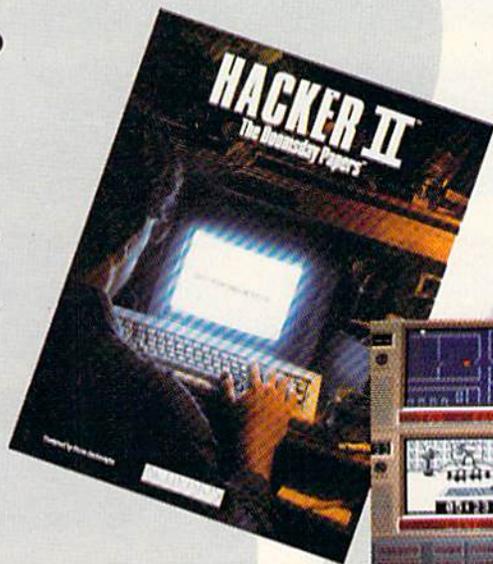
The Russians have *The Doomsday Papers*™ locked deep in a Siberian stronghold. With them, they can bring the world to its knees.

The U.S. government needs your help. Using their satellite you can get into the complex with your computer. All you have to do is locate the combinations to the safe, find and open it, and get the documents out.

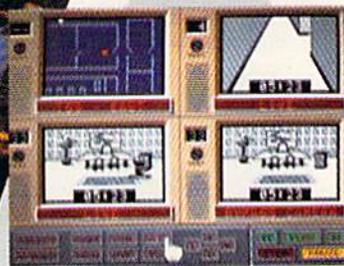
Sounds simple enough. Unfortunately, it's not that easy. There are video cameras and monitors to be avoided. Guard patrols. And something called...The Annihilator. Plus, your only map is the one you've got to make while not being discovered by all of the above.

Your reputation got you into this mess. Your hacking skill is the only thing that can get you out. Bon Voyage.

For more information and the dealer nearest you call 800/227-9759 (in California, call 415/960-0410) weekdays 10:00 a.m. to 4:00 p.m. Pacific time.



Hacker II: The Doomsday Papers designed by Steve Cartwright, who brought you the award winning challenge of Hacker.™



Hacker II for Commodore 64/128, Apple II, IBM PC/PCjr and Tandy 1000, Amiga, Atari ST and Macintosh computers.

**ACTIVISION**  
ENTERTAINMENT SOFTWARE

Commodore 64, 128 and Amiga are trademarks of Commodore Electronics Limited. IBM is a trademark of International Business Machines Corporation. Tandy is a trademark of Tandy Corporation. Atari and ST are trademarks of Atari Corp. Apple and Macintosh are trademarks of Apple Computer. Activision is the registered trademark of Activision, Inc. © 1986 Activision, Inc.



# The Evolution Of Program Design

Selby Bateman, Features Editor

*Will individual programmers be replaced by teams of program designers, each with his or her own specialty? It's been happening for years in the mainframe and minicomputer environment, and is fast becoming the norm in the microcomputer programming world. As computers grow more powerful, software becomes more complex—and programmers often find themselves with too much of a good thing.*

Veteran program designer Chris Crawford remembers leaning over his KIM-1 single-board microcomputer in 1977, trying to program a game that would run in the machine's 1K of Random Access Memory (RAM); that's 1,000 bytes of total memory—1/64 the RAM of your Commodore 64 and 1/128 that of the Commodore 128.

"I was sweating every bit, packing every bit; fitting it into RAM was the dominant consideration," says Crawford. "It's largely opaque to the user, but programmers have always sweated RAM."

He succeeded in finishing the game, and in the process learned a great many lessons about efficient program design and execution.

Less than ten years later, Crawford is now working on a computer with 512K of RAM, designing a game that will operate only on computers with a minimum of 256K of memory. That mushrooming growth in available memory is the trend that Crawford says has most dramatically affected his work and that of every other program designer today.

## Running Away From Us

At the same time that he and other programmers are enjoying this expanded memory, Crawford issues a warning: "Basically, the hardware is running away from us."

To understand that cautionary note, consider Crawford's own history in the programming business—a tenure that surpasses that of most other programmers in duration and success.

After working in the impossible space of 1K in 1977, Crawford moved up to 8K in 1978 with his first commercial game, *Tanktics*, then jumped to the then unheard-of 16K in 1981 with his popular game, *Eastern Front*. Another game, *Excalibur*, was created in 1983 to run on a machine with 48K. His recent highly acclaimed *Balance of Power* requires 128K of memory. And now he's in the midst of designing a game that requires 256K to operate.

In the days when he had little RAM to work with, Crawford discovered what many other programmers—professional and amateur hackers alike—have since learned.

When you want to squeeze a good program into a small space, you have to write your programs in machine (assembly) language.

So-called high-level languages like BASIC and Pascal are fairly large programs, which use up a lot of memory themselves. So, Crawford and many others studied machine language, and discovered the thrill of communicating one-to-one with the computer. While the task was not a simple one, the programs were small, fast, and elegant.

But when Crawford began to climb up to computers with larger memories, he quickly found a different problem.

"In small machines, you had to work in assembly language to accomplish much," says Crawford. "But when we got to 48K, it got a little rough to do everything in assembly language."

"For me, the big transition was going to 128K in *Balance of Power*. I worked in Pascal. It's difficult to imagine someone writing a 128K program in assembly language. Although people do it, it's very hard."

## The Real Problem

And something else began to happen. A few programmers noticed that the extra memory was making some programmers lazy—wasting all of that formerly precious memory by writing sloppy code. For example, a word processor that previously would have been

squeezed into 20K when written in machine language might now be written in a high-level language like C, taking up 100K or more of memory.

But, says Crawford, that's not the *real* problem. All of this extra memory is cheap. It's the quality of the program itself that's suffering today, he adds.

"Wasteful memory? That's not so much a problem. Do you waste paper clips in your office? Big deal," says Crawford with a laugh. "The more serious problem is that programmers have had problems adjusting to the new RAM sizes, and using them effectively."

When it comes to today's program design, Crawford is concerned with what he calls the difference between meat and meat extender. In earlier days, a 30K program might have had 12K of actual program (the meat) and 18K of data (the meat extender). Today, Crawford is seeing programs with 40K of real programming and 500K of meat extender.

"They spend a lot more time throwing little nothings at the user, but the programs aren't much different. Programmers are shoveling a lot of filler into their programs—meat extenders."

On the happier side of this equation, Crawford sees this as a temporary aberration. But, one that will change over time only slowly.

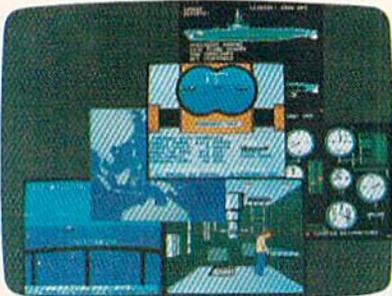
## Emerging Design Teams

How are commercial program designers coping with this problem? For several good reasons, the enormous changes in available memory and much more powerful and flexible computer systems have given rise to software design teams. Programmers, graphic artists, testers, project directors—all work together to create the best possible program. These teams also use a host of programming tools, usually built up through earlier projects, which become a virtual library of programming tricks and timesavers.

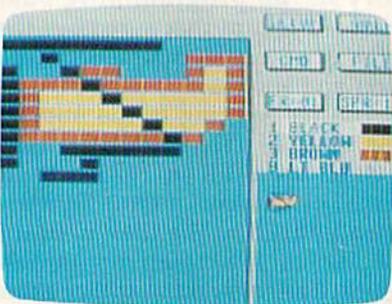
Sid Meier, who has designed or directed the design of virtually all of MicroProse Software's popular simulation and strategy games, says that MicroProse uses an interactive



The excellent visual effects in such Epyx computer games as *Summer Games II* are created by computer art director Michael Kosaka and his team of four artists.



Although Sid Meier's popular flight simulators and air combat software have been based on his own development libraries, he started from scratch when creating the screens for the MicroProse submarine simulation, *Silent Service*.



Garry Kitchen's GameMaker package includes a SpriteMaker among its arsenal of programming tools for nonprogrammers.

development language that includes many proven machine language routines and that was created internally for the company's own use. This library of development tools is composed of building blocks, everything from a static background to sound and sprite programming routines from earlier games the company has produced. "It lets you develop interactively without the hassles of machine language."

Meier is responsible for such hits as *Solo Flight*, *F-15 Strike Eagle*, and *Silent Service*, in addition to designing the company's Command Series of strategy games. He's been a part of many changes that have made his teams of designers more effective.

"For instance, the standards and levels of artwork required have improved dramatically," he says. "Generally today, you need an artist, or someone competent to do the graphic part of the program."

Another example of shared responsibilities is the MicroProse Command Series, including titles such as *Crusade in Europe*, *Conflict in Vietnam*, and *Decision in the Desert*. While Meier may do much of the actual program design, it's MicroProse resident historian Ed Bever who conducts the research to make sure that the final product design is as accurate as possible in a game. They work as a team, bringing together talents that would be difficult to find in just one designer.

## The Feel Of The Game

At Strategic Simulations (SSI), a leader in strategy and fantasy games, the development teams are a mixture of talents as well. For example, Paul Murray worked with co-designer Keith Brors to create the fantasy game *Wizard's Crown*. The approach they took with that game is similar to any program they might tackle, says Murray.

"The first thing we do is to come up with what we want the game to do, what the feel of the game is. And then we write the rules. The emphasis from the start in *Wizard's Crown* was on tactical combat.

"We came up with the basic algorithm, tested it to see if it worked,

"THE BEST ADVENTURE  
GAME 1985" COMMODORE  
COMPUTING INTERNATIONAL



TO HOLLYWOOD

GOES

# FRANKIE



Frankie have sent you over 60 tasks in your journey from Mundanesville through the Pleasure Dome. Tasks ranging from the trivial, to heroic feats of skill and intelligence. Whenever you complete these challenges a bar-chart will show your increase in the various elements of your personality and Pleasure points will be awarded.....

This combination awards you the minimum requirement (99% a *complete person*) to search for the Special Door - the Door to the Ultimate Experience - the heart of the Pleasure Dome. Your goal is to become a *complete person* and to achieve this you must reach the top

on the Bar Charts (when the word BANG will light up above the personality factors) and achieve a score of 87,000 Pleasure Points.

"Best adventure game 1985"  
Commodore Computing  
International

FIREBIRD LICENSEES INC. P.O. BOX 49, RAMSEY, N.J. 07446 FACTSHEET/ORDER HOTLINE: 201.934.7373

COMMODORE 64/128 ARE TRADE MARKS OF COMMODORE BUSINESS MACHINES.

**GOLD DISK**  
COMMODORE  
64/128K

**tcp**

# COMMODORE

ORDERS ONLY  
CALL TOLL FREE **1-800-468-9044**

**COMMODORE 128C**



**ON SALE NOW !!!**  
1670 ... \$129.95

C128  
1571, 1572 DRIVES  
1902A MONITOR  
1350 MOUSE  
1700, 1750 RAM  
EXPANSION

**CALL NOW FOR LOWEST PRICES**

**SAVE A BUNDLE ON A BUNDLE**  
PACKAGE DEALS AVAILABLE  
CALL FOR DETAILS

**NEW COMMODORE 64C**



Now bundled with GEOS and Quantum Link!!  
Still compatible with all C64 programs!!

**CALL FOR OUR LOW PRICE!!**

**NEW 1541C DISK DRIVE!!**  
OUR PRICE...\$CALL

**CMS**

We are a Commodore Authorized Service Center

**General Acct System**

for the C128 in 128 mode  
Includes  General Ledger   
Accts Receivable  Billing  
Statements  Accts Payable  
 Check Writing  Job  
Costing  Payroll

Out of warranty repair rates:  
C-64 ..... \$69.95  
1541 ..... \$79.95  
C-128, 1571 ..... \$CALL  
1541, 1571 align ..... \$29.95

prices include all parts  
and labor, 30 day  
warranty, and UPS  
return ground shipping

**TOTAL PRICE \$129.95**

**COMMODORE 128 SOFTWARE**  
For 128 in 128 or CPM modes

**WORD PROCESSORS**

JANE	\$32.95	PERFECT WRITER	\$CALL
VIZAWRITE 128	\$CALL	PAPERBACK WRITER 128	\$CALL
WORDPRO 128	\$59.95	FLEET SYSTEM II w/speller	\$47.95
PAPERCLIP	\$37.95	FLEET SYSTEM III w/speller	\$CALL
PAPERCLIP w/spellpack	\$49.95	and thesaurus	\$CALL
WORD WRITER 128 w/speller	\$49.95	SUPERSCRIP 128	\$59.95

**SPREADSHEETS**

EPYX MULTIPLAN	\$44.95	SWIFTCALC 128 w/sideways	\$49.95
PERFECT CALC.	\$CALL	PAPERBACK PLANNER 128	\$CALL

**DATABASES**

PROFILE 128	\$59.95	PAPERBACK FILER 128	\$CALL
PERFECT FILER	\$CALL	SUPERBASE 128	\$CALL
DATE MANAGER 128	\$CALL		

**MISC 128 SOFTWARE**

VIZASTAR 128	\$CALL	DESK MANAGER 128	\$34.95
MACH 128	\$39.95	C POWER 128 from Proline	\$59.95
MATRIX from Prog. Periph	\$47.95		

**GAME GALLERY**

Educational Software tool!  
All Games stocked for quick ship!!! Games work on 64 or 128 in 64 mode

**BEST SELLING GAMES**

Leaderboard	\$29.95	Sky Fox	\$24.95	Suspect	\$29.95	Hellcat Ace	\$21.95
Bard's Tale	\$32.95	Software Golden Oldies	\$16.95	Wishbringer	\$25.95	Kennedy Approach	\$24.95
Lord of Conquest	\$24.95	Touchdown Football	\$22.95	Witness	\$25.95	NATO Commander	\$24.95
Night Mission Pinball	\$CALL	Ultima IV	\$45.95	Zork I	\$22.95	Silent Service	\$24.95
Hitchhiker's guide	\$22.95	1 on 1/Dr. J-Bird	\$24.95	Zork II	\$26.95	Solo Flight	\$24.95
F-15 Strike Eagle	\$21.95			Zork III	\$26.95	Spitfire Ace	\$21.95
Karateka	\$19.95					Top Secret	\$24.95
Kung Fu (Spinnaker)	\$CALL						
Flight Simulator II	\$32.95						
JS II Scenery disks	\$15.95						
Fet	\$29.95						
Microleague Baseball	\$27.95						
Microleague general manager disk	\$27.95						
Microleague 1985 teams	\$15.95						
Hobbit	\$CALL						
Sargon III	\$37.95						
Fight Night	\$21.95						

**Carmen Sandiego** ..... \$CALL

**ACCESS**

Beach Head	\$24.95
Beach Head 2	\$29.95
Leader Board Tour	\$16.95

**ACCOLADE**

Dam Buster	\$22.95
Fight Night	\$22.95
Hard Ball	\$22.95
Law of the West	\$22.95
PSI 5 trading co	\$22.95

**ACTIVISION**

Alcazar	\$19.95
Borrowed Time	\$19.95
Computer Fireworks	
Celebration	\$19.95
Countdown to shutdown	\$19.95
Fast Tracks Slot Car Const.	\$19.95
Garry Kitchen's Gammaker	\$24.95
Ghostbusters	\$24.95
Great Amer RR	\$24.95
Hacker	\$19.95
Little Computer People	\$24.95
Master Of Lamps	\$19.95
Mindshadow	\$19.95
Pitfall II: Lost Caverns	\$19.95
Space Shuttle	\$19.95

**AVALON HILL**

Superbowl Sunday	\$26.95
Team Disk for SS	\$16.95

**BRODERBUND**

Championship Lode Runner	\$24.95
Lode Runner	\$24.95
Music Shop	\$29.95

**BLUE CHIP**

Baron	\$24.95
Millionaire	\$24.95
Tycoon	\$24.95

**COMMODORE**

Sky Travel	\$27.95
------------	---------

**ELECTRONIC ARTS**

Adventure Constr	\$27.95
Archon	\$18.95
Archon 2	\$27.95
Boulder Dash	\$18.95
Carriers at War	\$37.95
Europe Ablaze	\$37.95
Hard Hat Mack	\$13.95
Heart of Africa	\$24.95
Mail Order Monsters	\$24.95
Movie Maker	\$27.95
Music Const. Set	\$17.95
Pinball Contr. set	\$16.95
Racing Destr	\$24.95
Reach for the Stars	\$32.95
Realm of Possib	\$16.95
Seven Cities of Gold	\$24.95

**DATA EAST**

Karate Champ	\$26.95
Kung Fu master	\$26.95

**EPYX**

Summer Games	\$26.95
Summer Games II	\$26.95
Temple Trilogy	\$29.95
Winter Games	\$27.95
World's Greatest Baseball	\$24.95
World's Greatest Football	\$28.95
World Karate Cha	\$22.95

**CALL FOR PRICES ON OTHER EPYX PRODUCTS**

**INFOCOM**

Cut Throats	\$22.95
Deadline	\$25.95
Enchanter	\$25.95
Infidel	\$29.95
Planetfall	\$25.95
Sorcerer	\$29.95
Spellbreaker	\$29.95

**INVISICLUE BOOKS FOR ANY INFOCOM GAME** ..... \$6.95

**MINDSCAPE**

Bank Street Music Writer	\$27.95
Bank Street Storybook	\$27.95
Castle Clobber	\$18.95
Halley Project	\$27.95
Indiana Jones	\$22.95
Quake minus one	\$17.95
Shadowfire	\$17.95
The Perfect Score: Prep for Sat.	\$49.95
The Lords of Midnight	\$17.95

**CALL FOR PRICING ON OTHER MINDSCAPE PRODUCTS**

**MICROPROSE**

Acrojet	\$24.95
Crusade in Europe	\$27.95
Decision in the Desert	\$27.95
Gunship	\$24.95
Conflict in Vietnam	\$CALL

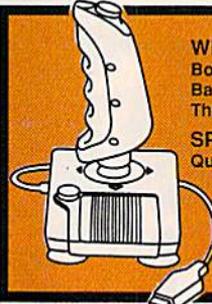
**WICO**

Boss	\$13.95
Bat Handle	\$18.95
Three Way	\$CALL

**SPECTRAVIDEO**

Quick Shot	\$6.95
------------	--------

**JOY STICKS**



**RADARSOFT**

Maps USA	\$34.95
Maps Europe	\$34.95
World Maps	\$34.95

**RANDOM HOUSE**

Garfield	\$17.95
Garfield Double Dares	\$17.95
Snoopy's reading machine	\$17.95
Snoopy's sky writer	\$17.95
Snoopy's scribe	\$17.95

**SIMON & SHUSTER**

G.I. Paper Airplane const.	\$CALL
JK Lasser's Income Tax guide	\$39.95
Kermit's Story Maker	\$19.95
NY Times Crossword Puzzle Vol. 1 or 2	\$14.95
Spy Hunter	\$31.95
Star Trek-Kobayashi alt.	\$29.95

**SPECTRUM HOLOBYTE**

Gato	\$CALL
------	--------

**SPINNAKER**

Adventure Creator	\$22.95
Alphabet Zoo	\$16.95
Cosmic Combat	\$CALL
Delta Drawing	\$19.95
Facemaker	\$19.95
Hey Diddle Diddle	\$16.95
Homework Helper	\$CALL
In search amazing thing	\$18.95
Snooper Troops I or II	\$18.95

**SPRINGBOARD**

Early Games	\$26.95
Easy As	\$29.95
Piece of Cake Math	\$26.95

**CALL FOR PRICING ON ALL STRATEGIC SIMULATION GAMES**

**C-64 BUSINESS AND PRODUCTIVITY**

**C-64 WORD PROCESSORS**

Paperback Writer	\$CALL
Paperback Writer Dictionary	\$19.95
Bank Street Writer	\$CALL
Bank Street Speller	\$34.95
Cut & Paste(EOA)	\$17.95
Font Master II	\$34.95
Wordpro 64	\$36.95
Spellpro 64	\$32.95
Wordpro 3 + /64	\$14.95
Fleet System II	\$CALL
Paperclip	\$37.95
Paperclip w/spellpack	\$49.95
Mirage Prof WP	\$36.95
Trio	\$CALL
Word Writer 64 w/speller	\$34.95
Kid Pro Quo	\$32.95

**C-64 DATABASES**

Bank Street Filer	\$34.95
Consultant	\$39.95
Mirage w/Report gen	\$36.95
Profile 64	\$36.95
Data Manager	\$19.95

**C-64 SPREADSHEETS**

Paperback Planner 64	\$CALL
Vizastar 64	\$79.95
Practical(d) or (t)	\$CALL
Calkit	\$39.95
Hes Multiplan	\$29.95
PS, The Programmable Spreadsheet	\$19.95
Swiftcalc 64 w/sideways	\$39.95

**UTILITIES**

Merlin 64	\$34.95
Fast Load	\$24.95
Vorpel fast loader	\$CALL
Quest Stat manager	\$34.95
Pal 64	\$32.95
Power 64	\$32.95
Toolbox 64	\$59.95
CSM 1541 align	\$34.95
Mach 5	\$24.95
Mach 128	\$CALL
C Power	\$69.95
Simon's Basic	\$39.95

**C-64 INTEGRATED PACKAGES**

Vizastar 8K	\$79.95
-------------	---------

**WORD PROCESSORS**

Sideways	\$19.95
Calc Result Advd (d.c)	\$67.00

**CARDCO**

Freeze Frame	\$39.95
Numeric keypad	\$34.95
5 slot cart. exp	\$54.95
S'more Basic	\$49.95

**PROLINE**

GT4	\$22.95
fast save. fast load cartridge	
C Power, C compiler	\$CALL
CADPIC	\$36.95
Cashbox	\$36.95
Wordpro 64	\$36.95
Spellpro 64	\$32.95
Profile 64	\$32.95
PAL 64	\$32.95
POWER 64	\$32.95

**TOOLBOX 64** ..... \$49.95

**MISC**

Trio	\$CALL
Homepack	\$39.95

**MISCELLANEOUS**

Estate power supply for C-64	\$54.95
Koaladap	\$59.95
Koala Gibson Light pen	\$49.95
Naverone 3 Slot expander	\$27.95

**GRAPHICS**

Print Shop	\$25.95
Print Shop Companion	\$24.95
Graphics Library I, II, III	\$16.95
Newroom	\$34.95
Clip Art I	\$19.95
Clip Art II	\$CALL
CADPIC	\$32.95
Screen Dumper 64	\$19.95
Newroom	\$34.95
Graphics Expansion	\$CALL
Clip Art I	\$19.95
Clip Art II	\$CALL
CADPIC	\$32.95
Screen Dumper 64	\$19.95

**Financial & Accounting**

Softsync Pars. Acct	\$32.95
Cont.Home Acct	\$46.95
Timewks General Ledger, A/R, A/P, Payroll, Invent.	\$40.95/EA
Cashbox	\$36.95
Timewks.Elect Chkbk	\$19.95
Timewks Money Mgr	\$19.95

**Typing Aids**

Typing Tutor III	\$29.95
Keys to Typing	\$19.95

# CLASSIFIEDS

INFORMATION AND  
PA ORDERS 814-234-2236

OPEN 9-8 Mon-Fri; 10-5 Sat EAST COAST TIME

**GEOS**  
C64 COLOR VERSION  
**\$CALL**

## PRINTERS



**Epson Printers** 1 yr warranty  
LX-80.....\$229  
Homewriter 10.....\$CALL  
FX-85.....\$359  
FX-286.....\$CALL  
RX-100.....\$299  
DX-10.....\$CALL  
HS-80 INKJET.....\$CALL

**UW** Unison World  
Printmaster.....\$29.95  
Art Gallery.....\$CALL

## SOLUTION UNLIMITED

Icon Factory.....\$29.95  
Billboard  
Maker.....\$29.95

**ENHANCER 2000**  
DISK DRIVE  
\$159  
1 YEAR WARRANTY

## DISKS

per box of 10  
**BONUS DISKS**  
SS/DD.....\$7.45  
DS/DD.....\$7.95  
**NASHUA DISKS**  
SS/DD.....\$8.95  
DS/DD.....\$9.45  
**TUSSEY DISKS**  
SS/DD.....\$8.45  
DS/DD.....\$8.95

Software orders over \$50.00 will be shipped **FEDERAL EXPRESS** (yes, even with these prices)

You only pay TCP's standard shipping charge of \$4.00 per order. This offer also valid on peripherals and accessories under 8 pounds. Orders arriving before 11:00 AM our time will be shipped out same day.



Computerized order entry, processing and status allow TCP to serve you faster and better!

## Print Shop

Broderbund Print Shop \$25.95  
Print Shop Companion \$22.95  
Graphics Library  
I, II or III.....\$16.95  
120 sheet color paper refill  
1/2 red, 1/2 blue, 1/2 gold.....\$8.95

80 Column Board for the C-64  
Only **\$39.95**

The Data 20 XL-80 is an 80 column card that plugs into the back of your C-64. Recommend use with monochrome monitor.



## SAT Preparation

With **NAVY**  
Prepared by Professionals  
**SAT Score Improvement System**.....\$59.95  
Includes Preparation for Math, Reading comp, Vocabulary, Quantitative Comparisons, and Word problems  
**SAT Practice Test**.....\$17.95

## INFO DESIGNS SALE!!!

General Ledger, Accounts Payable, Accounts Receivable, Payroll, Inventory, Communication Edge, Management Edge, Negotiation Edge, or Wendro 1-1/4  
**\$19.95/EA**

**PANASONIC**  
2 YR WARRANTY  
1091...\$229.00  
1080...\$199.00

1092.....\$CALL  
1592.....\$CALL  
3131 Daisywheel.....\$CALL  
3151 Daisywheel.....\$CALL

## JUKI



**PRINTER TYPEWRITER 2200**.....\$264  
Daisywheel Printer, Portable Typewriter, Built in Correction Tape  
**PRINTERS**  
6000P.....\$CALL  
6100P.....\$344

**NX-10**  
call for price and details  
**NL-10C**.....\$CALL  
**SL-10C** or **SG-10C**.....\$226  
Commodore ready  
**SG-15**.....\$364  
**SD-10**.....\$323  
**SD-15**.....\$449  
**POWERTYPE**.....\$229  
18cps daisywheel  
**SR-10, SR-15**.....\$CALL



## PRINTER PACKAGES

all packages work with C64 or C128  
**star** NX-10 & Xetec Supergraphix.....\$289.95  
NX-10 & Xetec Supergraphix jr.....\$269.95  
**PANASONIC**  
1091 & Xetec Supergraphix.....\$289.95  
1080 & Xetec Supergraphix jr.....\$239.95  
Packages Available! All printers/interfaces.....call for details!

## SEIKOSHA

2 YR WARRANTY  
**SP-1000VC**.....\$179.00  
**SP-1000A** or **SP-1000L**.....\$199.00

## Printer Closeouts!

**NEC 8027A**  
105 CPS, Friction and tractor feed Works with Print Shop!  
**\$139**

**COMREX**  
**COMREX 220**.....\$119.95  
Commodore Ready...3 month Warranty from Epson

## PRINTER INTERFACES

**G-WIZ**.....\$49.95  
**MW-350 w/4K Buffer**.....\$CALL  
**Cardco Super G**.....\$CALL  
**Xetec Supergraphix**.....\$CALL  
**Xetec Jr.**.....\$46.95  
**Grappler CD**.....\$87.95  
**Tymac Connection**.....\$67.95

**XETEC**  
**SUPER GRAPHIX** interface w/4K buffer down loadable fonts  
\$ lowest price  
**SUPERGRAPHIX jr** printer interface.....\$46.95  
**Font Master II**.....\$34.95

## MODEMS - MODEMS

**VOLKS 6480** 300/1200 BAUD \$124.95  
**WESTRIDGE 6420**.....\$59.95  
**6480** 300/1200 BAUD.....\$139.95  
**MESSENGER**.....\$42.95  
**1670**.....\$157.95  
**1660**.....\$CALL  
**MITEY MO**.....\$59.95  
**VIP TERMINAL**.....\$34.95  
**VIDTEX TERMINAL**.....\$23.95  
**Compuserve Starter Kit**.....\$19.95  
**Playnet Starter Kit**.....\$14.95  
**MASTER MODEM** \$39.95  
Includes Dow Jones, Compuserve Time

## MONITORS

### COMPOSITE COLOR

**COMREX 6550**.....\$149.00  
with 300K & 2 yr warranty  
**SAKATA SC-100**.....\$149.00  
**TAXAN 220**.....\$169.00  
14" Separated Video, mono mode

### MONOCHROME

**ZENITH 1220 12" flat amber**.....\$94.00  
**ZENITH 1230 GREEN**.....\$94.00  
**GOLDSTAR 12" medium res**  
amber or green.....\$79.95  
**PANASONIC 120 12" amber**.....\$79.95  
**NEC1205 amber w/sound**.....\$89.95  
**CARDCO 128/80 cable**.....\$ 9.95  
C128 to 80 composite monochrome adapter

### RGB/COMPOSITE for the 128

**MAGANVOX 8562**.....\$287.00  
2 yr warranty, monochrome mode  
**THOMPSON 36512VC**.....\$274.95  
monochrome mode, separated video  
**PANASONIC DT1300**.....\$259.95  
Great price & Panasonic reliability



■ If through some oversight we don't have the the lowest price, we would appreciate the opportunity to beat it. If we can, you will get the benefit of our Federal Express shipping on software orders over \$100.00.

■ We accept Mastercard, Visa, COD and mail orders.

■ Purchase orders are accepted from qualified corporations and institutions. Minimum order of \$500.00 required.

■ No sales tax on orders outside of PA.

■ Buy with confidence. We honor manufacturers warranty.



To order by mail: We accept money order, certified check, personal check. Allow 2 weeks for personal check to clear.  
**Shipping:** \$4.00 for software and accessories/\$10.00 for printers and color monitors/\$8.00 for disk drives and other monitors/Add \$3.00 per box shipped COD. Call for other shipping charges. Additional shipping required on APO, FPO, AK, HI, and foreign orders.

**Terms:** ALL PRICES REFLECT CASH DISCOUNT, ADD 1.9% FOR MASTERCARD OR VISA. Manufacturer's warranty honored with copy of our invoice. ALL SALES ARE FINAL. Defective items replaced or repaired at our discretion. Pennsylvania residents add 6% sales tax. Prices and terms subject to change without notice.

ORDERS ONLY...CALL TOLL FREE **1-800-468-9044**

**tcp**



then started doing the general stuff," he says.

While Brors worked on the characters and the data surrounding them, Murray concentrated on working out the combat situations. Later, the two put together what they'd worked out individually, but the entire process was one of constant interaction. Even SSI President Joel Billings, who has extensive experience as a war gamer and a game designer, gets involved as a tester and fine-tuner in the SSI development process.

Computer game enthusiasts today usually demand exceptionally well developed color graphics. To answer that need, one of the changes in program design is the emergence of the art director, whose job it is to make sure that the computer graphics are as effective as possible. At Epyx, a company known for its graphically excellent action games, Michael Kosaka serves as art director for computer graphics.

Managing a staff of four other artists, Kosaka works with individual project managers and programmers, trying to get the right mix of graphics and game play. Like a number of other companies, Epyx' designers build many products with in-house development tools. Kosaka even has a set of graphics tools that let him create any images he wants without having to be an expert in machine language.

### Thrashing Things Out

"I think my goal is to try to get the absolutely best images I can," he says. And he admits that part of what he likes most about his work is "thrashing things out with the programmers, working with them, pushing and learning from them.

"It's very interesting. We've found a nice blend of give and take, and it works out real well."

Kosaka also works with programmers who may be hundreds of miles away. As a game designer and an artist himself, he sends samples of sprites and storyboards to the programmers for their development. Then, once the programming itself has started, Kosaka and the programmers go back and forth decid-

ing what's possible to accomplish.

He's seen the way that today's computers, especially the Commodore 64, can produce results far beyond what programmers just two years ago felt were possible. "It's fascinating. It's the same basic machine, but a lot of new things are going on with it. And a lot of that is experience, hacking away at it."

Garry Kitchen is another successful program designer who's made a transition from working alone to working with a co-designer. After creating Activision's *The Designer's Pencil* by himself, Kitchen began work on what was to become the popular *GameMaker* program.

*GameMaker* is a package that lets the nonprogrammer create workable, stand-alone action games, including sprites, sound effects, music, and background scenes. Just as commercial program designers now use their own development libraries and refined tools, *GameMaker* lets the nonprogrammer have much the same thing—only less powerful.

"The *GameMaker* code is probably 150K; it takes up almost all of one side of a disk," notes Kitchen. Since *GameMaker* is essentially composed of five separate sound and graphics modules, Kitchen brought in programmer and musician Alex DeMeo to create the *SoundMaker* and *MusicMaker* sections of the program. All five modules must work together, so Kitchen and DeMeo had to carefully design and program each section.

"It's increasingly difficult to work alone with that much memory," says Kitchen. "You have to generate vast amounts of assembly language code."

Nevertheless, Kitchen has not made the jump to a high-level programming language such as Pascal or C. He prefers to stay with machine language despite the rigors such a course involves with large programs. "I'm always dedicated to maxing out the hardware. If I write a program in assembly language and someone else writes in C, my program will be better."

What's more, Kitchen's current project, a new game, is so far a solo effort. He admits, however, that he

may bring in some help on the graphics work.

### A Monk In A Monastery

Chris Crawford maintains that there's still plenty of room for the program designer who's willing to invest thought and energy. In fact, he's convinced that it's this type of programmer who will, in the long run, prevail. And that includes programmers working alone as well as design teams. Crawford, who is continually studying the evolution of computer programming, is the author of the book, *The Art of Computer Game Design: Reflections of a Master Game Designer* (Osborne/McGraw-Hill).

"The fundamental question here is, What is programming? We're in the middle of a transition from one regime to another. The first regime is the monk in the monastery copying a manuscript—the programmer does what the computer does well," says Crawford.

"The new regime is programming as an act of communication: The emphasis is on what we should say. People will become bored with communication that says nothing. That's rather like opening a book that has an illuminated manuscript, but is nothing more than 'Mary had a little lamb'—not saying anything.

"I take a generally optimistic view over the long term, but less in the short term," he adds. "When I take the long view, I can certainly say that the top ten products of 1986 are better than those of 1983. There are a lot of weeds in the garden, but they're not choking out the roses."

Whatever the course of program design, it's obvious that computers will always attract individual programmers like Crawford and Kitchen. Even with microcomputer memories quickly approaching one, two, and four megabytes, there will be designers who prefer a solo approach to programming tasks. But, just as clearly, commercial software for microcomputers is now reaching a point where the combined talents of a group of programmers can be a potent force in bringing new products to the software marketplace. ©

Better Than RISK™

# Power—you know you love it.

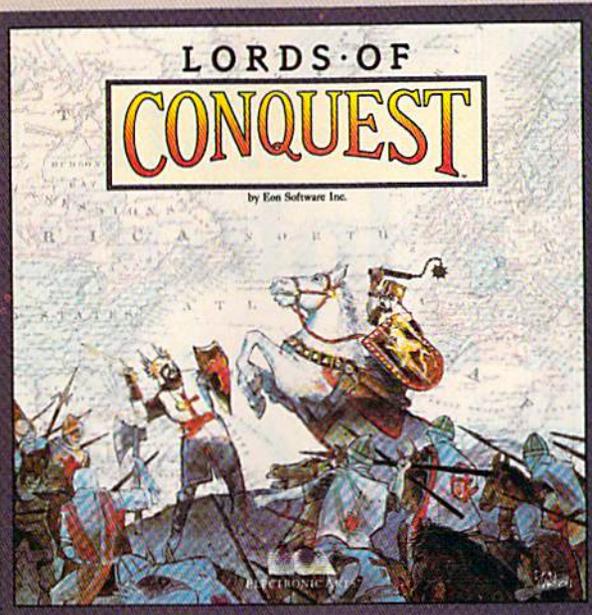
You used to play RISK as a kid. Maybe you still do sometimes — whenever you can get enough people together.

Did you ever wish you could play by yourself? Or make changes in the map? Wouldn't it be great if you could attack North Africa from North America? Or Japan from Brazil?

Announcing Lords of Conquest™ from Electronic Arts.

*It isn't RISK... it's better.*

It's a conquer-the-world board game that explodes with new life and new possibilities because it uses all the power of your computer. Every battle is alive with



music, color graphics, and strategic challenges impossible in a board game.

*Imagine...*

...having an infinite number of unique maps to choose from, so each game is different.

...marching your armies

onto warships for attacks across oceans.

...great multi-player games, complete with treaties, trades, and treachery.

...playing challenging solo games against an intelligent computer opponent.

...a built-in game editor powerful enough to be called a "Strategy Game Construction Set."

Lords of Conquest. No more mucking around with cards and dice and little pieces of plastic that roll under the couch. Now you're free to concentrate on more important things. Like exterminating the opposition.



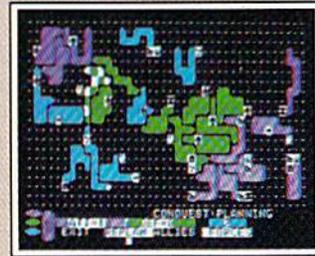
A Great Strategy Game

- Five kinds of forces to fight with—horses, weapons, boats, territory positions, and cities.
- Five kinds of wealth to fight for—gold, timber, iron, coal, and herds of horses.
- For 1-4 players. As fun for one as it is for four.



New Worlds to Conquer

- An infinite variety of game maps.
- Create your own, or play any of 20 built-in maps like Ancient Rome, European Wars, and The World.
- The computer can generate unlimited random maps.



Strategy Game Construction Set

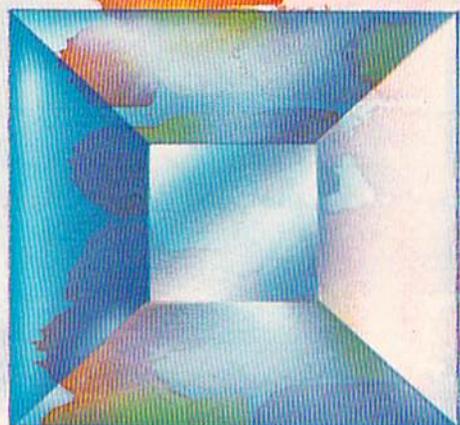
- Variable game settings—you set the locations and abundance of resources, forces, and transport.
- You decide the luck factor.
- 4 levels of complexity
- 9 levels of handicapping.



ELECTRONIC ARTS™

**How to order:** Visit your retailer. If you are unable to find the product at your local retailer, you can call 800-245-4525 for direct VISA or Mastercard orders (in CA call 800-562-1112). The direct price is \$32.95 for the Commodore version. Apple and Atari versions coming soon. To buy by mail, send check or money order to Electronic Arts Direct Sales, P.O. Box 7530, San Mateo, CA 94403. Add \$5 for shipping and handling (\$7 Canadian). Allow 4 weeks for delivery. There is a 14-day, money-back guarantee on direct orders. For a complete product catalog, send 50¢ and a stamped, self-addressed envelope to Electronic Arts Catalog, 1820 Gateway Drive, San Mateo, CA 94404. RISK is a registered trademark of Parker Brothers Co. Commodore is a registered trademark of Commodore Business Machines. Apple is a registered trademark of Apple computers. Atari is a registered trademark of Atari. Borderlands and Cosmic Encounter are registered trademarks of EON Software. Lords of Conquest and Electronic Arts are registered trademarks of Electronic Arts.

Lords of Conquest is based on the board game "Borderlands"™ by EON—the creators of "Cosmic Encounter"™



# An Introduction To Compilers

Todd Heimarck, Assistant Editor

*A compiler is a powerful utility that translates programs written in a high-level programming language, like BASIC, into machine language that your computer can understand without first having to interpret each step. Here's a beginner's guide to one of the most useful items in a programmer's toolkit.*

The BASIC programming language has a built-in speed limit that you'll encounter sooner or later. Let's say you've worked hard on writing a large and complex BASIC program. Perhaps it's an arcade-style game, or maybe it's a program to manipulate 1000 customer records for a small- to medium-sized business. The program works; it runs without evident errors. But it's slow—excruciatingly sluggish. You've hit the speed limit.

The fact is, BASIC is not always very good at high-speed screen movement, such as you'd need in an action game. And it's not very fast at sorting large lists, especially if there are lots of strings of data involved. There are many occasions where a program written in BASIC will be excessively slow.

## Three Wise Men

Let's say you bring your BASIC program to a local user group meeting and ask the two wisest programmers for their advice. You're

looking for techniques to put some more zip into the program.

The first one, an experienced BASIC programmer, says, "I think I see a subroutine that could be rewritten. And this section should be removed and changed to a three-dimensional array. You know, of course, that this bubble sort is not as efficient as a quick sort, although a shell sort might be acceptable. Yes, give me a week or two and I could have it running 20 percent faster. I'll speed it up. Why, my notebook is full of hints and...."

The second one, the best machine language programmer around, interrupts, "Yes, your collection of hints and tricks, I know. But that's just BASIC. I could rewrite it in machine language, using my own algorithms and relative files and perhaps even some sprites and alternate video banks. Hmmm, that would be a nice touch. Of course, it might take a month or so to convert, but it would be worth it."

Then a third person you've

never seen before speaks up. "Excuse me; this is my first meeting and I don't know a lot about programming, but I might be able to help. Give me a minute or two."

He comes forward with a disk in hand, types a few commands, switches disks, presses a key, and waits for a few minutes. Your original program is changed, almost magically, into a new program that runs about four times faster, and not a single line has been changed. What's happened? Your slow BASIC program has been *compiled*.

## The BASICs Of Speed

A BASIC compiler can significantly speed up a BASIC program by converting it into a form that's essentially machine language (ML). To understand how this is possible, we should first take a look at what happens when you run a normal (uncompiled) BASIC program.

Consider the PRINT command. Its purpose seems simple enough—it prints something, usually to the screen—but it can perform a wide variety of actions:

```
PRINT
PRINT "HELLO"
PRINT A
PRINT ABS(A+B)
PRINT "THE NUMBER"; LOG(VAL(AS));
"IS THE NATURAL LOG OF ";AS
```

**... With Spectacular Results!**

Football puts you in control of every aspect of the game. You call the plays, offense and defense. Make substitutions from your 18-player bench. Then become an active participant in the play you've selected. You control the quarterback, then the running back or receiver once the ball is transferred. On defense, you become the in-action safety or linebacker for the play you've selected.

Discover how enjoyable a football simulation game can be. You will agree that **Football** is the first real football game on a computer. Available on disk for the Commodore 64/128 computers.

**See Your Dealer ...**  
or write or call for more information. For direct order please enclose \$39.95 plus \$2.00 for shipping and specify UPS or first class mail delivery. Visa, MasterCard, American Express, Diners Club cards accepted.

Commodore 64 and Commodore 128 are trademarks of Commodore Electronics, Ltd.

**subLOGIC Corporation**  
713 Edgebrook Drive  
Champaign IL 61820  
(217) 359-8482 Telex: 206995  
Order Line: (800) 637-4983  
(except in Illinois, Alaska, and Hawaii)

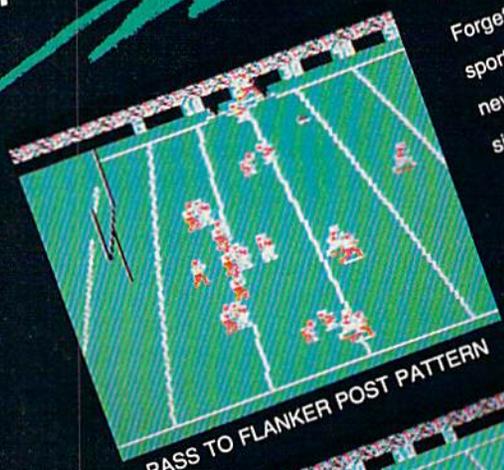
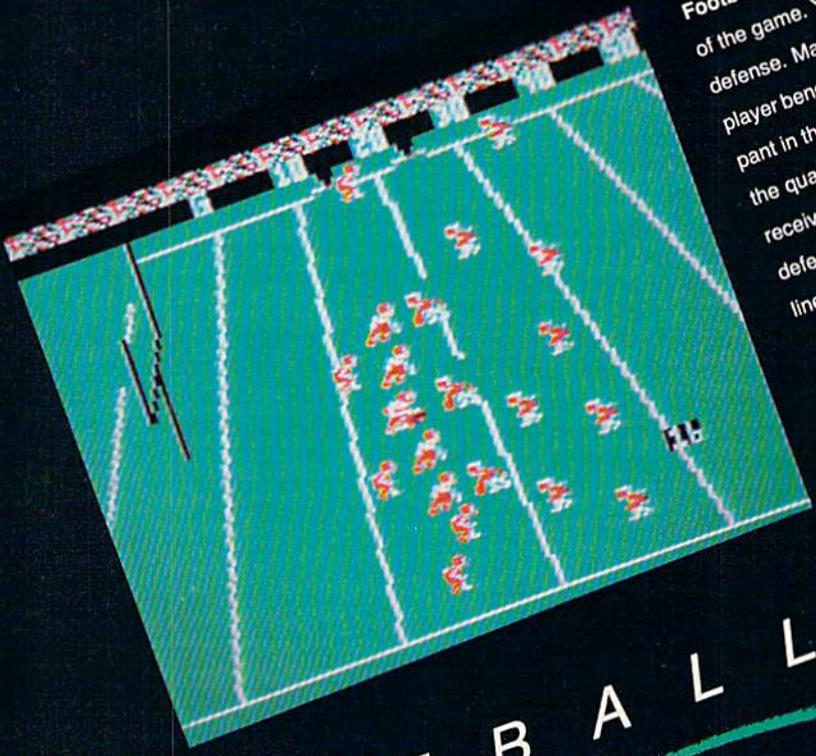
# FOOTBALL

**A True-to-Life Simulation ...**

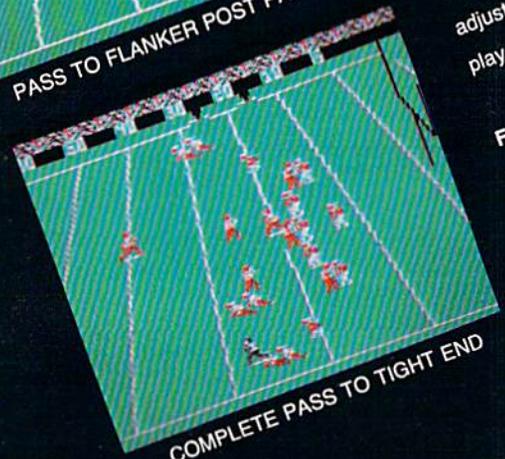
Forget everything you've seen or heard about sports simulation programs; **Football** sets new standards in realism and playability by simulating the real physics of the game.

Every offensive and defensive player has individual physical attributes (speed, power, and catching ability). Each quarterback's passing abilities are different. Players act and move individually on each play. And you can adjust the performance characteristics of any player, any way you like.

**Football's** overhead 3D perspective gives you a clear view of the entire field. The ball carrier is always highlighted for easy identification. And **Football's** real-time 30-second clock means fast-moving action from start to finish, with no game-slowng disk access.



PASS TO FLANKER POST PATTERN



COMPLETE PASS TO TIGHT END

When a program is running and a PRINT statement comes up, BASIC has to analyze the context. Is it a single PRINT with nothing after it? Is it followed by a string inside quotation marks? Does it refer to a variable? A function? A series of strings, functions, and variables separated by semicolons?

You might think of PRINT as a single command, but it has many flavors. Before your computer executes a PRINT statement, it has to scan forward in the line to decide which sort of PRINT you intend to use. If there are parentheses, the process gets more complicated—the computer has to build up the meaning of the phrase by starting at the innermost parentheses and building outwards.

There's also a second stage, at least when variables are involved. After the computer has figured out that PRINT AB means that it's supposed to print the number held in the variable AB, it has to find the variable's location in memory. If 57 variables have been defined before AB is used for the first time, it will be 58th on the list of variables and the PRINT routine will have to search through all 58 variables before AB can be located. When AB is finally found, its value will be printed out.

### A Matter Of Interpretation

This process of taking apart a line while the program is running—figuring out what a single command is supposed to do, analyzing the context, looking up variables, and so on—is called *interpreting*. While a BASIC program is running, every command that's executed has to be interpreted first. Interpreting takes time and generally slows down the program.

A compiler speeds things up by interpreting some or all of the commands before the program is run. For example, a compiler might examine a command such as PRINT AB and assign a small portion of memory to this variable AB; let's say AB is going to occupy location 5003. The compiler will then store in the compiled program a command that reads something like this: PRINT (the value at 5003).

Instead of having to look up the variable's location when the

program is running, which is what the uncompiled program will do, the compiler figures out the address at the time the program is compiled. When the compiled program is run, the computer can go directly to that address instead of spending time looking through memory for a variable.

As another example, consider the line  $A = C * 34.85$ , which multiplies a variable C by 34.85 and assigns the result to the variable A. In a standard BASIC program, the computer will have to find the number in C and then find the floating-point equivalent of the five characters "34.85" (floating-point format is a way of representing numbers that makes it easier to perform mathematical operations). The two numbers will then be multiplied together and the result stored in A.

A compiler has to go through the same steps, but most of them happen at the time the BASIC program is compiled. The compiler figures out the floating-point format of the number 34.85 and decides ahead of time where A and C will be stored. When you run the compiled program, the math is much faster because the computer doesn't have to spend time translating numbers and looking up variables. The compiler has already done much of the work—the interpreting.

One more example: A command such as GOTO 780 causes several actions to take place. First, the computer translates the three characters "780" to a binary integer (in low-byte/high-byte format), because that's how line numbers are stored in memory. It then compares this number to the current line being executed. If 780 is smaller, the program goes back to the first line of the program and searches through every line number, looking for line 780. If 780 is higher than the current line number, the computer starts searching forward in memory from where the program is. Finally, control is transferred to line 780.

Compare that to how a compiler handles the GOTO. It, too, has to translate the number 780 to an integer. It also has to locate the actual line and the equivalent memory address within the compiled program.

Finally, it inserts a machine language jump (JMP) instruction at the appropriate place in the program. But all of the translating and searching happens during compilation, not while the program is running. The result, of course, is a faster program. The compiler does a lot of the work ahead of time so the program can be speedier when the compiled version is run.

### A Few Handicaps

As useful as they are, compilers do have some drawbacks and shortcomings.

One problem is that some BASIC compilers support only a subset of BASIC commands. There are some keywords they don't recognize, so you can't use these commands in your programs. (Some compilers do support all BASIC commands, so this is not always a problem.)

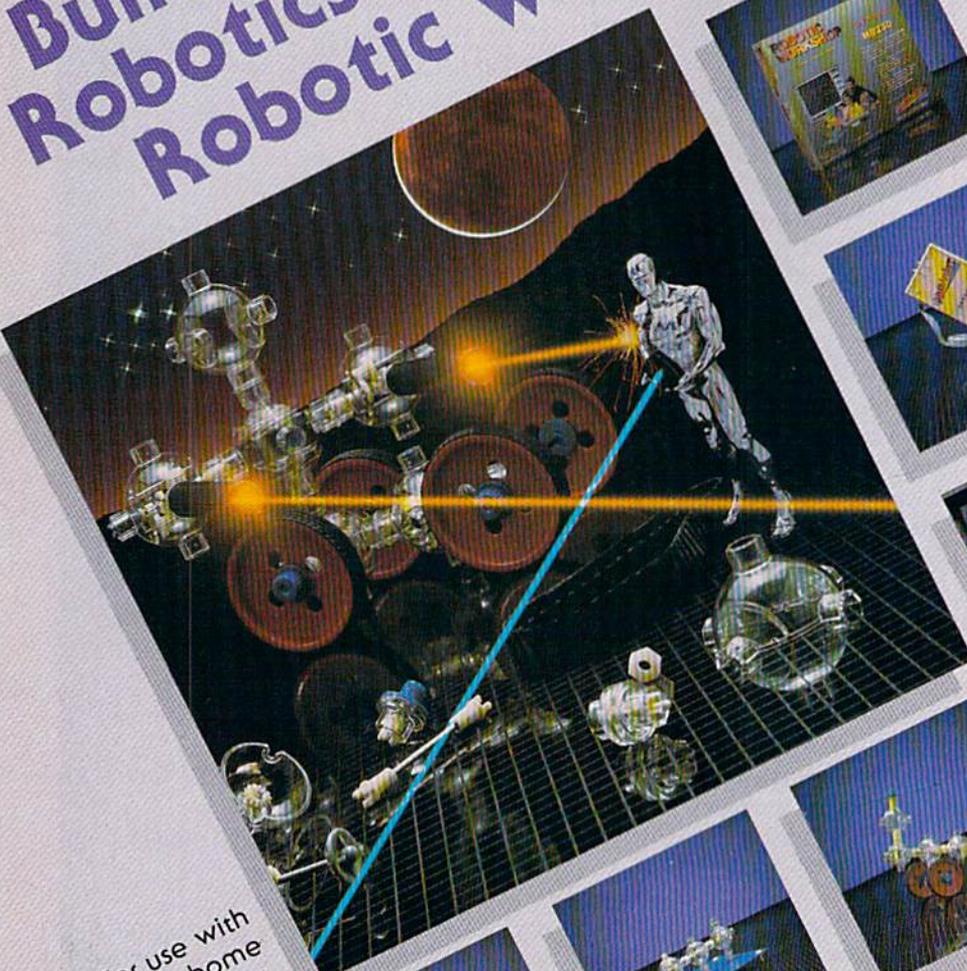
Some compilers are extremely fast when programs are limited to integer math (whole numbers), but not when fractions and decimal points are included. In a financial program that uses percentages and dollar amounts rounded to the nearest penny, the time savings afforded by a compiler might not be very significant. Again, this depends on the individual compiler.

Programmers who program interactively generally prefer interpreted languages. They like being able to type a few lines, run the program, change a variable or two, run it again, add a subroutine, use GOTO to test the routine, and so on. With BASIC, you can have the best of both worlds. Use the interpreter to write the program and test it. Then, when it's all done, you can compile it to make it run faster. Some languages are available only in a compiled version, which means a few seconds (or possibly several minutes) of waiting for the source file to be compiled before you can test it. Interactive programmers suggest that this pause stifles their creativity.

One thing that stops programmers from using compilers is the fact that a compiled program is often several times longer than the uncompiled version. An already long program may compile into a version that's too big for memory. Or, if the program fits memory,

# Build Your Own Robotics with the Robotic Workshop

For Ages 10 years old and up.  
 \$149.95 List Price (C64/128)  
 Coming for Apple, Atari, and IBM.



For use with your home computer.

The Robotic Workshop is the ultimate high-tech construction set. Discover how easy it is to build hundreds of Robotic Projects and control them with your home computer.

Simple and easy to use (For the Beginner)

- Parts just snap together
- No knowledge of programming needed
- 50 Tutorial projects
- Over 50 components (2 motors, gears, wheels, sensors, etc.)
- Electronic control unit
- Full instruction manual
- Joystick or keyboard control
- Teaches principles of science/engineering
- Includes CAPSELA® motorized parts

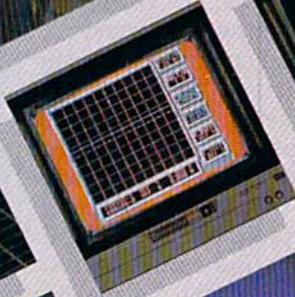
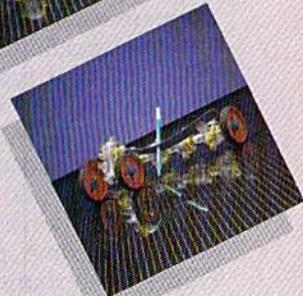
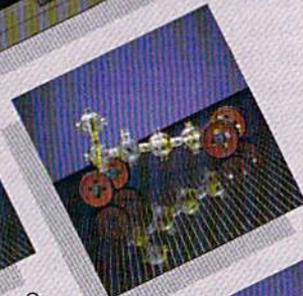
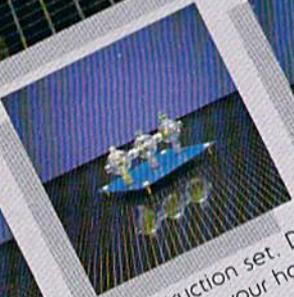
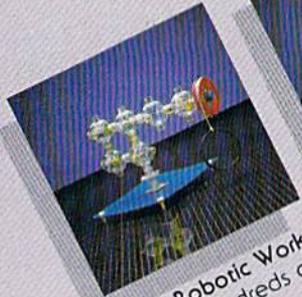
Advanced Features (For the Programmer/Hobbyist)

- Speed/direction control of 3 motors at once
- Robotic Operating Software (R.O.S.)
- 25 additional 'BASIC' commands
- Programming instructions
- Advanced commands and techniques
- Precise timing, counting and switching
- Digital Voltmeter
- Digital Oscilloscope
- Digital Speech Storage
- Technical information
- Add on modules and parts (purchased separately)

For more information call 1-800-824-2549

**ACCESS**<sup>TM</sup>  
 Software Incorporated

#A 2561 South 1560 West,  
 Woods Cross, Utah 84087



there may not be enough room left for all the variables.

Some Commodore owners argue that compilers are nice, but if what you want is flat-out speed of execution, nothing beats machine language (ML). A well-written ML program will almost always beat the speed of a compiled program. You don't necessarily have to write a whole program in ML; if the slow part of the program is the alphabetizing routine, you can use an ML sort program to take care of the problem.

## Beyond BASIC

So far, we've discussed only compilers that speed up BASIC programs. But compilers are also available for Pascal, C, Forth, and other programming languages.

A compiled language generally requires that you type in the program (also called *source code*) using a word processor or a text editor program. When the source code is finished, you save it to disk and run the compiler program. The compiler then creates the runnable program (the *object code*). To make a change, you must load the word processor or editor again, reload the source code, insert corrections, save, and recompile. It's rare to find a language that includes both an interpreter and a compiler, although both are usually available in Forth.

You should also be aware that there are two types of compilers. The first kind compiles the source code directly into machine language. The second creates a file written in pseudo-code (*p-code*). A p-code program is then combined with a runtime package that includes math routines, printing routines, and all the other features of the language. You may have to load the runtime package as a separate program or use a compiler command to append it to the end of the p-code portion of the program.

We can only begin to scratch the surface here in detailing all of the many features related to different compilers. For more information, contact the following manufacturers about their particular compilers for the Commodore 64 and 128. While this list is not a comprehensive survey of all compilers available, those listed here should help you get started.

### **ADA Compiler** (\$39.95)

An ADA programming language compiler for the 64 (Abacus Software, P.O. Box 7211, Grand Rapids, MI 49510).

### **BASIC Compiler** (128 version, \$59.95; 64 version, \$39.95)

BASIC compiler and development package for the 64 and 128; separate versions (Abacus Software, P.O. Box 7211, Grand Rapids, MI 49510).

### **Blitz!** (\$49.95)

A BASIC compiler for the 64 (Skyles Electric Works, 231 E. South Whisman Rd., Mountain View, CA 94041).

### **C Power** (\$99.95)

A C compiler that contains both book and disk (Pro-Line Software, 755 The Queensway East, Unit 8, Mississauga, Ontario, Canada L4Y 4C5).

### **COBOL Compiler** (\$39.95)

A 64 COBOL programming language compiler and development package (Abacus Software, P.O. Box 7211, Grand Rapids, MI 49510).

### **C-64 Forth/79** (\$69.95)

A Forth programming language package for the 64 (Performance Micro Products, P.O. Box 370, Canton, MA 02120).

### **Forth-64 Language** (\$39.95)

A Forth programming language compiler and development package for the 64 (Abacus Software, P.O. Box 7211, Grand Rapids, MI 49510).

### **Gnome Speed** (\$59.95)

A 128 BASIC compiler (SM Software, P.O. Box 27, Mertztown, PA 19539-0027).

### **KMMM Pascal** (\$99)

A Pascal programming language compiler and development package for the 64, recently updated (Wilserv Industries, P.O. Box 456, Bellmawr, NJ 08031).

### **Kyan Pascal** (\$49.95)

A Pascal programming language compiler for the 64 (Kyan Software, Suite 183, 1850 Union St., San Francisco, CA 94123).

### **MasterForth** (\$100)

A Forth programming language compiler and development package, including a graphics system (MicroMotion, 8726 S. Sepulveda Bl., #A171, Los Angeles, CA 90045).

### **PROMAL** (end-user version, \$49.95; developer version, \$99.95)

A 64 PROMAL programming language development package (SMA, 3700 Computer Dr., P.O. Box 20025, Raleigh, NC 27619).

### **The Sixty Forth** (\$39.95)

A Forth programming language compiler for the 64 (Elcomp Publishing, 2174 West Foothill Blvd., Unit E, Upland, CA 91786).

### **Super C Language Compiler** (128 and 64 versions, \$59.95 each)

A C compiler on disk in both 64 and 128 versions (Abacus Software, P.O. Box 7211, Grand Rapids, MI 49510).

### **Superforth 64** (\$59.95)

A Forth programming language compiler and development package for the 64 (Parsec Research, Drawer 1766, Fremont, CA 94538).

### **Superforth 64+ Artificial Intelligence** (\$99)

A Forth programming language compiler and development package, plus an expert system development module (Parsec Research, Drawer 1766, Fremont, CA 94538).

### **Super Pascal** (128 version, \$59.95; 64 version, \$39.95)

A Pascal programming language compiler and development package for the 64 and 128; separate versions (Abacus Software, P.O. Box 7211, Grand Rapids, MI 49510).

### **White Lightning** (\$49.95)

A 64 compiler and development kit for the Forth programming language (Oasis Software, 377 Oyster Point Blvd., Unit 15, San Francisco, CA 94080).

NEW

# PARTNER 128™

## THE 1<sup>ST</sup> DESKTOP ACCESSORY THAT WORKS "CONCURRENTLY" WITH OTHER C128 SOFTWARE.



**PARTNER!** A cartridge-based program with eight convenient memory-resident desktop "accessories" that operate "concurrently" with other C128™ software programs.

Like Sidekick™, PARTNER automatically suspends the existing program in your computer while you use the PARTNER accessories. When you are through, press a button and PARTNER returns you to the point in your program where you left off.

### Accessories at your command:

- **Appointment calendar and date book:** Keep track of appointments and deadlines. At the press of a key, you'll be able to review your appointments for a day, week, or month. Months may be viewed in their entirety in a traditional calendar format, and then printed out.
- **Memo pad:** Write yourself important notes. Print them out on paper or save them onto disk.
- **Name and address list:** Keep track of important names and addresses. Available instantly, any time you are using your computer.
- **Calculator:** A multi-function calculator with an optional "paper tape" that prints out your calculations on your printer.
- **Typewriter:** Turns your computer and printer into a traditional typewriter.
- **Envelope addresser & label maker:** Use this feature and your name and address list to address envelopes or create mailing labels – quickly, without leaving the software you are working with.
- **Phone list & auto dialer:** Keep track of important phone numbers. At your command, the computer will search through your list for the number you want, and automatically dial the number for you.\*\*
- **Screen print:** At the press of a key, the contents of your computer display will be duplicated on your printer.

### Other features:

- **SwiftDOS:** Allows you to access Commodore disk drive commands any time.
- **SwiftLock:** Enter your secret code before you leave your computer. The keyboard will be locked until you re-enter your code.
- **Extended Printer Control:** Allows you to send commands directly to your printer at any time.
- **SwiftLoad:** Allows your Commodore 1541 disk drive to load as fast as the Commodore 1571 disk drive.

### Suggested Retail Prices:

C128 (128K, 80 column):

**\$69.95**

C64 (64 K, 40 column):

**\$59.95**

Available at your favorite Dealer, or call Timeworks today.

### TO ORDER CALL:

**1-800-535-9497**



*More power for your dollar*

Timeworks, Inc. 444 Lake Cook Rd., Deerfield, IL 60015  
312-948-9200

\*\* An auto-dial modem is required to use the phone-dialer feature.

\* Commodore 128™ is a trademark and Commodore 64 is a registered trademark of Commodore Electronics, Ltd., Sidekick is a trademark of Borland International, Inc.

© 1985 Timeworks, Inc. All rights reserved.

**CUSTOMER TECHNICAL SUPPORT  
HELPLINE – Toll-Free**  
**MONEY BACK GUARANTEE**  
Details on every package

# BASIC for beginners

## The PRINT Statement

Larry Cotton

As promised, we're going to look at more uses for PRINT, one of the most versatile BASIC statements. The best way to get familiar with PRINT is to write simple programs which feature it, which we'll do this month.

But first, you need to know how to save a BASIC program on a disk. The procedure is as follows:

1. The disk must be compatible with Commodore computers. Almost all are. If you have any doubts, buy your disks from a dealer who knows what he's selling.

2. A new disk must be set up (formatted) to receive information (files). To format a disk, put a new disk (or one that contains expendable files) in the drive and close the door. For the Commodore 64 or VIC, type

```
OPEN 15,8,15:PRINT#15,"N0:MISC,  
GZ":CLOSE 15
```

and press RETURN. That statement will also work on the Plus/4, 16, and 128, but those computers also have a simpler statement that performs the same function. Type

```
HEADER "MISC",D0,IGZ
```

and press RETURN.

After a couple of minutes the drive will stop running and the busy light will go out. The disk is now formatted and ready to receive information. You can substitute any name for the word MISC as long as it's not over 16 characters long. In the VIC/64 command, follow your disk's name with a comma and two characters for the disk ID. The example statement above uses the letters GZ for the disk ID, but you can use any two characters you like. Just be sure to give each disk a unique ID. For the HEADER command, the ID is specified in the two characters following the ,I at the end of the command.

3. Make sure there is enough room on the disk for your program. (One program we'll write takes about two *blocks*—a measure of disk capacity). To check the contents (directory) of the disk on the VIC or 64, type

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

and press RETURN. That command also works on the Plus/4, 16, and 128, but those computers have a simple command to perform the same function. Type

```
DIRECTORY
```

and press RETURN. (The 128 also has a CATALOG command, which functions exactly the same as DIRECTORY.)

4. To save a program on the formatted disk (the program, of course, must be in the computer's memory), type

```
SAVE "PRINT EXAMPLES",8
```

and press RETURN. As with the other statements, the Plus/4, 16, and 128 have a simpler form. Type

```
DSAVE "PRINT EXAMPLES"
```

and press RETURN.

The drive will run, the busy light will come on, and your program will be saved on the disk. Substitute anything you want, up to 16 characters long, for the filename PRINT EXAMPLES. Once the drive stops, you can turn the computer off, which erases your program. By the way, it's not a good idea to cram a disk full. The more programs you have on a disk, the more you stand to lose if the disk is accidentally damaged or erased.

5. If you really like a program, save it on two disks.

### The Versatile PRINT Statement

The *Commodore 64 Programmer's Reference Guide* says there is "no statement in BASIC with more variety than the PRINT statement...it

might almost be considered as a language of its own...."

You already know that PRINT sends information directly to the TV or monitor screen. You can put words, numbers, and symbols anywhere on the screen using only PRINT. It may be used in either the *immediate mode* (as a command you just type on screen and follow by pressing RETURN) or *program mode* (as a statement within a program).

Be sure to remember that any time you type something in immediate mode, you must press the RETURN key when you're finished with the command, or when you want to see the results.

And when you're typing in, or changing, BASIC program lines (they always have numbers in front of them), be sure to press RETURN to store each line in the computer's memory. I'm not always going to note that you should press RETURN, except in unusual circumstances.

(Many non-Commodore computers call the RETURN key the ENTER key. The Commodore 128 computer has an ENTER key with its new numeric keypad. It serves the same purpose as RETURN.)

### Printing Variables

Start by typing this:  $X = 4$ . You should press the RETURN key right after that. This causes the computer to "remember" what  $X$  is until you change it or reset the computer's memory.  $X$  is known as a *variable*, because its value can vary.

When you assign a letter a value, you can see what its value is by typing PRINT  $x$ , where  $x$  is the letter representing the variable. (Incidentally, you can abbreviate PRINT with a question mark.) For instance, type: ?  $X$ . You should see 4 (assuming you typed  $X = 4$  above). Now add something to  $X$ —say 5, like this: PRINT  $X + 5$ . You should see 9. You can also assign another vari-

# Why you should get your hands on a **MAGNUM**

High Performance Software now demands a more **POWER** you can use!  
 With a radical new approach to joystick design — The **Magnum** abandons "old fashioned" slow switching joysticks and replaces them with **High Speed Electronics**.  
 Engineered in Europe by **MASTERTRONIC**, The **Magnum's** revolutionary blend of advanced **ERGONOMIC STYLING & Innovative Electronic Design** leaves all other joysticks **in the Stone Age**.

Check The **Magnum's** advanced specification against any other joystick and then you'll see why!

RECOMMENDED  
 RETAIL PRICE

**\$19.99**

## JUST LOOK AT THE MAGNUM'S SPECIFICATION

### Floating Activator:

The activator is actually free-floating, ensuring the smoothest play-action around.

### Ergonomic Design:

'Ergo-form' design by one of Europe's leading industrial design groups gives perfect joystick balance. This and the latest moulding techniques will ensure hours of perfect use.

### Hair-action trigger:

Fatigue-free rapid action fire power ensured by superlight 5 oz trigger weight and sensitive 1.5 mm travel.

### Left/Right Hand Usage:

The **Magnum** is unique in its ambidextrous capability. Fits left-handed and right-handed players perfectly.

### Extra-long Cable:

At a full 6 feet. The **Magnum** comes supplied with more cable than any other joystick.

### Instant 'Posi-Action' response:

A unique innovation guaranteeing razor sharp tactile response. Highly-rated microswitch components exclusive to **Mastertronic** mean that the **Magnum** responds to commands faster than any other joystick in the market and leaves conventional leaf-spring mechanisms way behind.

### Full Compatibility:

The **Magnum** has been designed to be fully compatible with all Atari Computers including the Atari 2600 Games Console. The **Magnum** components are warranted for over 10 million operations.

Ballast weights in handle ensure perfect balance even when in frantic use.

Mastertronic International Inc., 7311B Grove Road,

Frederick, Maryland 21701, USA.

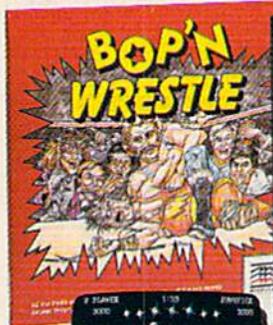
Available through good dealers everywhere or contact the **MAGNUM HOTLINE** on (301) 695 8877



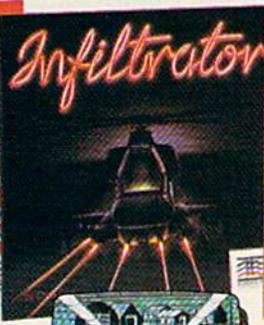
# There seems to be some disagreement as to which one of our Commodore® programs is the most fun.

Sometimes it's tough to make everybody happy all of the time. But that's not your problem. Mindscape makes so many great Commodore® software

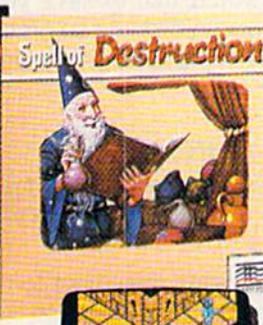
titles you'll surely find at least one you have to get your hands on. Maybe two. Even three. The choice is up to you. No holds barred.



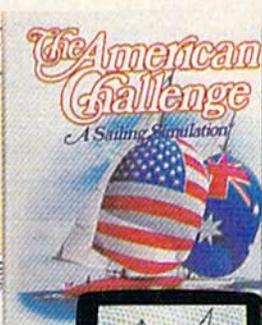
Slam. Bam. With plenty of pow. *Bop 'n' Wrestle™* puts you in the ring with a crazy collection of bone crushers. For one or two players, this first truly 3-dimensional combat sports simulation lets you climb, gouge, and claw your way to the top of the heap. Drop kicks, full nelsons, and the turnbuckle fly have never been this much fun before.



Be prepared to take evasive action. In *Infiltrator™* by Chris Gray, you're Captain Johnny "Jimbo Baby" McGibbits, ace chopper jockey. Your mission is no day at the races. When you make it through hostile enemy airspace, this realistic flight simulation converts to covert ground-based animated graphic adventure. Now just destroy the mad leader and his angry troops. Thumbs up!



Get ready to work some magic. *Spell of Destruction™* makes you a wizard's apprentice inside the Castle of Illusions. You must find and destroy the Prime Elemental. You're armed with a supply of spells and fireballs, but there are plenty of lessons to learn before you pass the Loremaster's challenging trial. Music and 3-dimensional graphics of 70 eerie locations make this adventure truly awesome.



Hoist a sail on your monitor. And sit down at the keys. *The American Challenge: A Sailing Simulation™* will make you a better sailor in a few short strokes. Race against the program, another skipper head-to-head, or via modem from coast-to-coast. When you've mastered the basics you're ready to meet the Aussies and reclaim The America's Cup. Set your sails and your sights on the waters of Silicon Bay.



Without question, this quest is for you. *Fairlight™* combines magic, adventure, strategy, and action as you meet the challenge to find the Book of Light. You're in a far away and ancient land. But 3-dimensional high-resolution graphics make it all seem real. This epic will grab you. Only the strong and resourceful will conjure up the courage it takes to survive.

**Mindscape**   
Software that challenges the mind. MINDSCAPE, INC.

Visit your retailer or call 1-800-443-7982 (in Illinois 1-800-654-3767) for VISA or MasterCard orders. To purchase by mail, send VISA or MasterCard number with expiration date, check or money order to Mindscape, P.O. Box 1167, Northbrook, IL 60065. Add \$3.00 for shipping and handling. Allow 3-5 weeks for delivery. All of the above C64/128 products are \$29.95 each.

If you're an attorney read this: Commodore is a registered trademark of Commodore Electronics Ltd. Copyright © 1986 Mindscape, Inc. Mindscape is a trademark of Mindscape, Inc. *Spell of Destruction* copyright © 1985 Softex International, Ltd. *Infiltrator* software copyright © 1986 Chris Gray Enterprises, Inc. Licensed in conjunction with International Computer Group. *Bop 'n' Wrestle* copyright © 1986 Beam Software. All rights reserved. Licensed in conjunction with International Computer Group. *The American Challenge: A Sailing Simulation* is a trademark of Mindscape, Inc. *Fairlight* copyright © 1985/1986 Bo Jangeborg and the Edge. Licensed in conjunction with International Computer Group.

able, such as Y, for the 5. Type Y = 5; then type PRINT X + Y. (Think of the implications for doing math on your computer. Later, we'll devote a column or two to BASIC math functions.)

You can also make words variables. How does the computer distinguish between numbers and words? Use a \$ sign after the variable letter to make it a word. For instance, type A\$ = "PIECE " (note the space between the E and the quotation marks); then type PRINT A\$. You should see the word PIECE printed out.

Believe it or not, BASIC allows words to be *added together*. How? Type PRINT A\$ + "OF CAKE" (always remembering to press RETURN). You should see PIECE OF CAKE printed to the screen.

As with numbers, you can use another variable—say, B\$—for "OF CAKE": Type B\$ = "OF CAKE", and then type PRINT A\$ + B\$. Voilà. These word variables (\$) are called *strings*. A\$ is called A-string, B\$ is called B-string, and so on. There are probably as many applications for manipulating strings as there are for arithmetically manipulating numbers.

## Printing Symbols

Temporarily, we'll leave printing numbers and words, and go to the symbols that are on the front side of the computer's keys. These are called graphics characters, and are unique to Commodore. They have many uses.

You can print these symbols to the screen by holding the SHIFT or the Commodore key while typing any key with a graphics character on it. The best way to learn to use symbols is to experiment. Because of the variety of symbols, it's possible to create pictures, graphs, and charts, and to enhance the appearance of a printed screen by using the symbols to form borders and boxes.

## Moving The Cursor

The cursor's position—the spot where things are printed on the screen—can also be controlled with the PRINT statement. Commodore uses a somewhat arcane method of indicating which way the cursor will move; a short BASIC program and practice are the best teachers

here. (Remember, you can use a ? instead of typing PRINT. When you LIST the program, the word PRINT will be displayed.) {DOWN} means you should press the cursor-down key, located next to the right SHIFT key.

```
10 PRINT"FIRST"  
20 PRINT"SECOND {DOWN}"  
30 PRINT"THIRD"  
40 PRINT"{DOWN}"  
50 PRINT"FOURTH"
```

Run the program and study the results. Line 10 prints the first word, then moves the cursor to print the next item on the line immediately below. In line 20, however, there is a cursor-down character before the second quotation mark, which makes the cursor skip a blank line between the second and third words.

Line 40 contains a cursor down on its own separate line, which yields two blank lines between the third and fourth words.

Also try experimenting with cursor-right, -left, and -up characters. If you'd like to save your experiments on disk, do so now. Then reset the computer by turning it off, then on.

## Other PRINT-ables

There are several other miscellaneous, but very convenient, uses for the PRINT statement:

1. Moving the cursor to the top left corner of the screen.
2. Moving the cursor to the top left corner of the screen and clearing the screen at the same time.
3. Changing text colors.
4. Printing characters in reverse video.
5. Printing blank lines.

## A Demonstration

We'll type in another short BASIC program, line by line, which illustrates all the discussed uses for the PRINT statement. It will print two messages inside a small border.

The example program contains a number of underlined characters and words in braces ({}). These are the GAZETTE's way of representing characters which require special typing. You'll need to understand these *listing conventions* to type in any programs in the magazine. For example, when you see an underlined character, you should hold down the SHIFT key while typing

that character. For a detailed description of the conventions, refer to the article "How to Type In COMPUTE!'s GAZETTE Programs" elsewhere in this issue.

Let's begin the program with a line that turns the screen black—both background and border. To do this, we must use BASIC statements we haven't covered yet—POKE on the 64 and COLOR for the Plus/4, 16, and 128. We'll look at these in a future column, but for now, just type line 10 as you see it.

For the Commodore 64:

```
10 POKE 53280,0:POKE 53281,0
```

For the Plus/4, 16, or 128:

```
10 COLOR 0,1:COLOR 4,1
```

Now let's clear the screen (which also moves the cursor to the upper left corner of the screen—called the *home* position):

```
20 PRINT"{CLR}"
```

The cursor needs to be moved down somewhat from the top of the screen:

```
30 PRINT"{6 DOWN}"
```

(If you examine the GAZETTE's listing conventions, you'll notice that the {6 DOWN} means to press the cursor down key six times.)

The next line prints the top of a horizontally centered border. It's composed of cursor-right, SHIFT-U, SHIFT-\*, and SHIFT-I characters. Notice the rounded corner and horizontal line symbols on the U, \*, and I keys. The cursor-rights are necessary because the cursor always starts at the left edge of the next line down after a PRINT statement.

```
40 PRINT"{9 RIGHT}{U}{17 Δ}"
```

(Again, you'll need to understand the GAZETTE's listing conventions to enter this line properly. For example, the {17 Δ} means to hold down the SHIFT key and type the \* key 17 times.)

To PRINT the sides of the border, we'll use the same program line, repeated seven times. There are other ways to do this, but let's save them for another time. Type in the line 50 shown below and press RETURN. Then move the cursor back up over the 5 in the line number and type a 6 to make 60; then press RETURN again. LIST the program. You'll see both lines 50 and 60, and they will be identical. Do the same for lines 70–110. This is

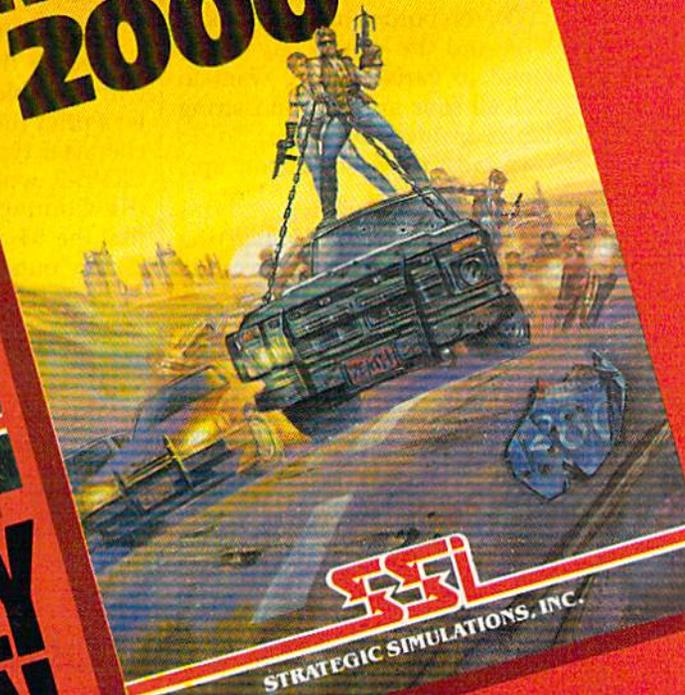
# UNREAL.

# UNSAFE.

## Shard of Spring



## ROADWAR 2000™



# UNBELIEVABLY FUN.

SHARD OF SPRING™, the new multiple-character role-playing game from SSI, promises an adventure unbounded by the mundane constraints of reality. It is set in a world where magic overrides the laws of physics, where monsters, gnomes and elves outnumber mere humans. Your quest is to recover the wondrous Shard, the giver of eternal Springtime. This precious crystal has been stolen by a demonic sorceress. Assemble five characters and endow them with different combinations of speed, intellect, strength, endurance, and warrior/wizardry skills. Then guide them wisely through evil dungeons and treacherous lands as they search to regain the Shard.

This fantasy game boasts a unique feature: During combat, the tactical screen is an exact zoom-in shot of where you are on the overall map.

On disk for 84K Apple® II series and C-64™. IBM® version coming soon.

In ROADWAR 2000™, you get to break a new set of rules, namely the law of safe driving. In the year 2000, bacteriological warfare has ripped apart the very fabric of American civilization. Cities have turned into gangland prizes, the highways, into battlefields. As the patriotic leader of a road gang, you are asked by what is left of the Federal Government to locate eight scientists and return them to a secret underground lab to develop a cure for the dreaded disease. As you crisscross the nation's highways on your desperate mission, you must constantly battle mutants, cannibals, and rival road gangs for new recruits, vehicles, supplies, food, gas, guns, ammunition, and medicine. In this brutal land, they are more precious than gold.

On disk for 48K Apple® II series and C-64™.

For excitement that is unreal and unbearable, check out these games at your local computer/software or game store today!

If there are no convenient stores near you, VISA & M/C card holders can order these \$39.95 games directly by mail, send your check to: STRATEGIC SIMULATIONS, INC., 1046 N. Rengstorff Avenue, Mountain View, CA 94043. (California residents, add 7% sales tax.) Please specify computer format and add \$2.00 for shipping and handling.

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

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

Apple, Commodore, and IBM are trademarks of Apple Computer, Inc., Commodore Electronics, Ltd., and International Business Machines Corp., respectively.



© 1986 by Strategic Simulations, Inc. All rights reserved.

what makes BASIC programming so easy on Commodore computers.

```
50 PRINT "{9 RIGHT}B{17 SPACES}B"
```

The bottom of the border is almost like the top, so let's make a virtual copy of line 40. Just move the cursor to line 40 and type 120 over the 40, change the SHIFT-U to SHIFT-J and the SHIFT-I to SHIFT-K, and press RETURN.

```
120 PRINT "{9 RIGHT}J{17 *}K"
```

The next three lines assign numeric variables X and Y and string variables A\$ and B\$:

```
130 X = 4:Y = 5
```

```
140 A$="X IS EQUAL TO"
```

```
150 B$="Y IS EQUAL TO"
```

OK, the border has been taken care of, and the values have been assigned to variables. We want to PRINT all four numeric and string variables inside the border. To do this we must move the cursor up:

```
160 PRINT "{7 UP}"
```

The next line will move the cursor over from the left edge of the

screen and print the first message. The first character typed after the opening quotation mark is CTRL-8, which changes the text color to yellow.

Note that the variables A\$ and X are typed right after the second quotation mark. This insures that what you want to print stays on the same line with the cursor after it's been moved to the right.

```
170 PRINT "{YEL}{11 RIGHT}"A$:X
```

Now we want to print a blank line between messages. One way to do this is to type PRINT as a single statement.

```
180 PRINT
```

Next, the cursor must be moved to the right and the other two variables printed. This time, let's print them in reverse. The first character typed inside the quotes is CTRL-9, which reverses the text on the Commodore 64. Note again that the B\$ and Y are typed immediately outside the quotes.

```
190 PRINT "{RVS}{11 RIGHT}"B$:Y
```

Last, let's send the cursor back to the upper left corner of the screen—the home position.

```
200 PRINT "{HOME}"
```

What do the colons in lines 10 and 130 do? Their main purpose is to allow you to combine two BASIC statements on one line. If the statements were placed in separate lines, the program would run the same. Colons often separate BASIC statements which are similar. They make the program more compact, and, when used judiciously, easier for others to understand.

Have you run the program yet? If not, do so, and don't forget to save it on disk for future reference.

Next month we'll look at more features of the PRINT statement, and some new BASIC commands.

The #1 DISK UTILITY FOR OVER A YEAR, STAYS #1!

# FAST HACK'EM

FOR THE COMMODORE 64/128

**SINGLE**  
1541/71

- Back-up all standard disks in less than 2 minutes.
- Using a C-128 and 1571 in 128 mode, copies top or bottom side in only 70 seconds!
- Fast file copier. Copies a 100 block file in 20 seconds! Formats a disk in 8 seconds!
- Nibble a protected disk in just over 2 minutes, tracks 1-40.

**TWO**  
1541/71's

- Back-up a standard disk in only 35 seconds!
- Nibble a protected disk in under 60 seconds, tracks 1-40.
- Equipped with Special Auto-Backup\*\*

**MSD**  
**DUAL DRIVE**

- Automatic Backup of nearly all protected disks in 70 seconds!
- Also equipped with Special Auto-Backup\*\*
- Built-in FASTBOOT. Can be used to load other programs up to 7 times faster than normal.
- Also included is an extensive 28-page documentation manual.

What sets Fast Hack'em apart from our nibbling competition:

It's called a Parameter Copier. By using special copy parameters that tell the nibbler how to either copy or remove protection from a particular disk, programs that would normally be impossible for any nibbler to ever copy are easily backed-up by Fast Hack'em.

Parameter updates of 25 to 30 new parameters are released bi-monthly and are \$6.00. Major disk updates will be announced when available and are \$12.00 + original disk.

**Dealer**  
**Inquiries**  
**Welcome!**

### \*\*SPECIAL

Auto-Back-up After booting up, the computer is no longer necessary, and may be disconnected. The drives automatically detect the disk being inserted and removed. An absolute must for multiple back-ups!!!  
All routines are highly reliable and include full verify option.

**NOW**  
**SHIPPING**  
**V3.0**

**EASY TO USE**  
ALL VERSIONS  
ON ONE DISK

**ONLY \$29.95**  
ADD \$3.00 SHIPPING



Check, Money  
Order, **VISA**,  
**MASTERCARD**  
Accepted  
Add \$3.00 for  
C.O.D.'s



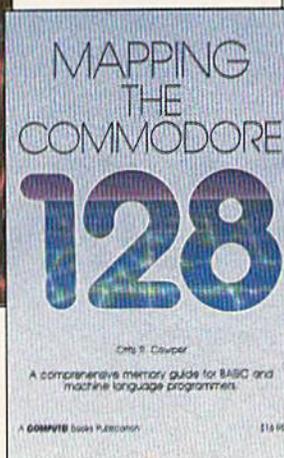
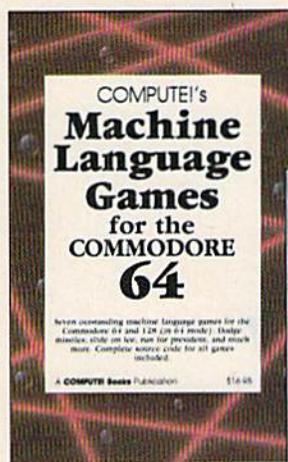
**BASEMENT BOYS SOFTWARE**

P.O. Box 30901 Portland, OR 97230-0901

**(503)761-1114**

# Calling All COMMODORE

## Users!



Three new books from COMPUTE! bring you fully tested and completely documented machine language programming tutorials, exciting games, valuable

utilities, and easy-to-use applications for home, business, and school.

**Exceptional new books from COMPUTE! for your 64 and 128.**

### Mapping the Commodore 128

Ottis R. Cowper

This clearly written, comprehensive memory map and programmer's guide, written by the technical editor of COMPUTE! Publications, provides a detailed explanation of the inner workings of the Commodore 128 computer. Topics include memory management, BASIC 7.0, I/O chip registers, the operating system, system RAM, and much more. This is an important reference for both BASIC and machine language programmers.

**\$16.95** ISBN 0-87455-060-2

### COMPUTE!'s Machine Language Games for the Commodore 64

Edited

This collection of the best machine language games from *COMPUTE!* magazine and *COMPUTE!'s Gazette* is a must for 64 game players and machine language programmers. The book includes both the source code (studying these listings is an excellent way to improve your machine language programming) and object code for the popular games "Cut-off!," "Campaign Manager," "Nessie," "Miami Ice," "Heat Seeker," "Whirlybird," and "Laser Beam." *A disk is available for \$12.95 which includes programs in the book, 610BDSK.*

**\$16.95** ISBN 0-87455-061-0

### The Complete 64

Edited

A book/disk combination with seven powerful, sophisticated applications on disk. The book has complete, easy-to-follow documentation for each of the six applications. It features *SpeedScript* and *SpeedCalc*, COMPUTE!'s commercial-quality word processing and spreadsheet programs; "Plus/Term," an easy-to-use, yet versatile, telecommunications program; and "Sidplayer," a powerful music editor and player. "Hi-Resolution Sketchpad," "Ultra-Font +," and "Mini-filer" are also included. All the applications are on a disk ready to load and use on the Commodore 64 and 128 running in 64 mode.

**\$29.95 for book/disk package**

ISBN 0-87455-062-9

Visit your local book or computer store and ask for one of these new summer releases from COMPUTE! Books.

You can order directly from COMPUTE! by calling toll-free 800-346-6767 (in NY 212-887-8525) or writing COMPUTE! Books, P.O. Box 5038, F.D.R. Station, New York, NY 10150.

Please include \$2.00 per book or disk for shipping and handling in U.S. and surface mail or \$5.00 per book airmail. NC residents add 4.5 percent sales tax. NY residents add 8.25 percent sales tax.

Please allow 4-6 weeks for delivery.

**COMPUTE!** Publications, Inc. 

Part of ABC Consumer Magazines, Inc.  
One of the ABC Publishing Companies  
825 7th Avenue, 6th Floor, New York, NY 10019  
Publishers of COMPUTE! COMPUTE!'s Gazette, COMPUTE!'s Gazette Disk, COMPUTE! Books, COMPUTE!'s Apple Applications, and COMPUTE!'s Atari ST Disk and Magazine.

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, and in Canada from McGraw-Hill, Ryerson Ltd., 330 Progress Ave., Scarborough, Ontario, Canada M1P 2Z5.

# BUMP -N-RUN

Tim J. Midkiff, Editorial Programmer

*Challenge a friend in this fast-paced, action-strategy game for the Commodore 64. It's written entirely in machine language for rapid play and smooth movement. Two joysticks are required.*

This two-player action game can be played at two conceptual levels: When you first play, it seems to be purely an action game—all speed and reflexes—but after you and your opponent master the basics of the game, you'll discover the importance of having a strategy.

The object of "Bump-N-Run" is to get the ball and shoot it into the other player's goal. Of course, your opponent is trying to do the same, and this is the conflict which is the heart of the game.

## Typing It In

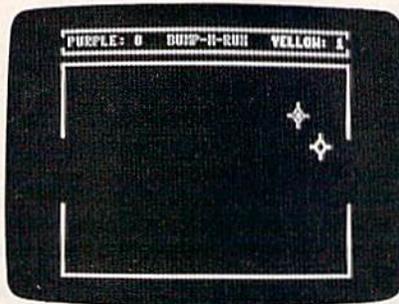
Bump-N-Run is a machine language game, so you must use "MLX," the machine language entry program found elsewhere in this issue, to type it in. Be sure you understand how to use MLX before you begin entering the data for Bump-N-Run. After loading and running MLX, respond to the prompts with the following:

Starting address: C000

Ending address: C6A7

Save a copy to disk or tape when you've finished typing. To

load the game, type LOAD "BUMP-N-RUN",8,1 (tape users should type LOAD "BUMP-N-RUN",1,1) and SYS 49152 to begin play. Be sure to have two joysticks plugged in. Press RESTORE to exit the game, and SYS 49152 to replay.



*One player has the ball and is threatening to score. The other is going to try to steal the ball by bumping his opponent.*

## Bumping And Running

As with many computer games, the best way to learn this one is by playing it. The game begins with the ball in the middle of the court

and each player guarding his own goal. The joystick in port 1 controls the purple player. The yellow player is controlled by the joystick in port 2. Catch the ball by touching it with your player. Your opponent can then steal the ball by bumping into you. The direction and speed your player travels is controlled by the joystick. When you first push the joystick, you move slowly; keep pushing and you'll accelerate. Press the fire button to shoot the ball. When the ball is released, you lose your speed, but the ball continues on with your previous speed and direction. Make sure your shot is accurate, because once you shoot the ball you can't catch it again until it bounces off a wall. Remember that you can steal the ball from your opponent at any time simply by bumping him. The first player to score 15 goals wins, and the game is reset when both players press the fire button.

Here are a few more details concerning the physics of the game. When players collide, their velocities and directions are exchanged. Collisions with the walls cause players to bounce back. A player may go beyond the walls only if he is pushed by another player.

See program listing on page 112. ☐

## Graphics

BASEBALL's highly-detailed animated graphics give you a perfect view of the playing field. Each player acts and moves individually on every play. Three different stadiums are included with the program, and an optional Stadium Disk lets you play in any Major League stadium in the United States.

## Statistics

BASEBALL can maintain a complete statistical record of each team player's performance. All player stats and game Box Scores can be displayed on the screen or sent to an external printer for a hardcopy printout.

BASEBALL also includes a unique Auto-Play option that lets the computer play a complete game in less than three minutes. A whole series of games can be played unattended, and an entire season of player and team statistics can be compiled over several days with all game stats printed out for your records.

## See Your Dealer...

or write or call for more information. BASEBALL is available on disk for the Commodore 64 and Commodore 128 computers. For direct orders please enclose \$49.95 plus \$2.00 for shipping and specify UPS or first class mail delivery. Visa, MasterCard, American Express, and Diners Club cards accepted.

Commodore 64 and Commodore 128 are trademarks of Commodore EElectronics, Ltd.

# B A S E B A L L

From the author of FOOTBALL comes an incredibly sophisticated, realistic and complete statistical baseball simulation for one or two players. Game play, manager's functions, graphics, and a statistical library establish BASEBALL as the ultimate sports simulation program.

## Game Play

BASEBALL's underlying statistical framework simulates the realities of baseball like never before. Within this framework, the program considers each player's batting statistics against both left-handed and right-handed pitchers, and pitchers statistics vs. left- and right-handed batters. Every player's fielding and base-running abilities are also considered (an important factor when attempting to steal a base, etc.).

Select the team you'd like to manage, then pick the team you want to play against. Every team from the 1985 season is accurately represented, along with eight classic teams from the past. Determine your starting lineup, designate a starting pitcher, and make player substitutions when necessary. You call the plays, offense and defense. In a one-player game, your computer opponent displays uncanny intelligence in reacting to your managing decisions.

## Manager's Functions

Built-in manager's functions provide extra versatility. You can trade team players, draft new players, create your own team, even form your own league. The program's stat-tracker keeps track of your team's season statistics and individual player year-to-date stats.



© 1986 MLBPA

**subLOGIC**  
Corporation

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

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

# Obstacle 128

Stephen Cheng

*Here's an example of how to tap the power of BASIC 7.0. It's a short program and uses no machine language—yet the result is a fine, fast, two-player, hi-res action game. For the Commodore 128.*

"Obstacle 128" is a short two-player arcade-style game for the 128. At a length of roughly 1K, it's a much more condensed program than a similar version for the 64 would be.

The game concept is not new. It's basically a version of the classic *Tron* game where two light-cycles duel to see who survives. Four choices face you as your light-cycle tools around the playing area: Do you move up, down, left, or right? If you make no choice, you continue in the direction in which you were already moving.

Trailing behind each player is a wall of light, which both must avoid hitting. Eventually one player or the other gets trapped in an ever-shrinking area and crashes into a wall. The survivor wins one point.

After typing Obstacle 128 in, save a copy. To play, load it and type RUN. Be sure to have two joysticks plugged in. The first player to accumulate five points is declared the winner. There is some variety in every battle as the size of the arena changes and the players start moving in different directions. There are

several strategies to this game, but in general the player who carves out the most area and commits the fewest mistakes will be the winner.

## How It Works

The program is divided into three parts: the setup of the screen in lines 10-40, joystick control and graphics in lines 50-200, and sound effects and scoring in lines 210-320. Let's look at the program in some detail.

In line 10, GRAPHIC 3,1 turns on the multicolor graphics mode and clears the screen. SOUND 3,100,30000 generates an incessant beat of a low frequency (100 cycles per second) for 30000 jiffies, so this will last 8 minutes and 20 seconds, enough for the whole game.

# Infocom introduces four new gam

Infocom,™ the crazy people who brought you "Zork"® and "The Hitchhiker's Guide to the Galaxy,"™ has a habit of coming up with games that add a new dimension to interactive fiction. And the best keeps getting better. Case in point: "Leather Goddesses of Phobos."™ It has a scratch n' sniff card and a 3-d comic book to excite all your senses. Once your interest is

piqued, you'll embark on a rowdy romp through the solar system. This hilarious spoof of 1930's pulp science fiction has 3 "naughtiness levels," for the prude to the lewd. "Leather Goddesses" is sure to amuse members of either sex.

## One's really warped.

Then there's "Trinity."™ It answers the question of whether a game can be both light-hearted

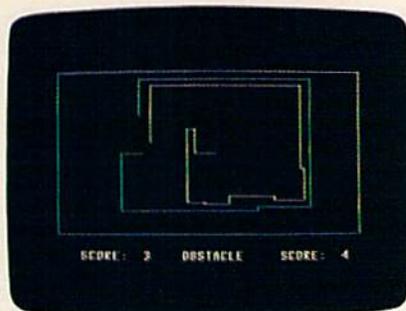
and profound. You journey through a time warp into a mischievous fantasy world where all atomic explosions are mysteriously connected. "Trinity" takes you back to the dawn of the atomic age and puts the course of history in your hands.

## One's a real circus.

It has been said that the circus is the only really mysterious thing left in civilization.

One thing's for sure, there is plenty of mystery in "Ballyhoo."™ While trying to locate the circus owner's kidnapped daughter, you are somersaulted into a three-ring world of deception and crime. To solve the crime





Note how both players have closely followed each other in an attempt to cut each other off. Current positions are in the upper left section of the screen.

Line 20 sets the background color, the border color, and multi-color 1 and 2. A random number between 30 and 69 determines the size of the playing field. The handy CHAR command places text anywhere on the screen. The +S and -S in the DRAW commands are used to shrink the y-axis (the height) of the arena.

Line 40 generates the locations and the starting positions of the combatants in the arena. X and Y are the x and y coordinates for the

position of the first player, and A and B are the coordinates of the second player. In line 40, X is subject to a little randomness, as is A, so that the players start at different x coordinates when the game begins. Y and B are set at 100, so both players will start in the middle of the screen.

Next, random values are assigned to J and K, the directions of movement of player 1. If J is 1, the player travels to the right, and if J is -1, the player travels to the left. If K is 1, the player moves down, and if K is -1, the player moves up. Since this game has no diagonal movements, one of the two directions has to be zero, while the other is nonzero. L and M are the corresponding movement directions for player 2. Notice that L=J and M=K, so both players will start traveling in the same direction at the beginning of the game.

### The Main Loop

After the board is set up, we're ready to start the game. Lines 50-200 are the main loop, where all the action takes place. The joystick reading function (JOY) is quite handy. In line 50, J1=JOY(1) as-

signs a number to variable J1 depending on where joystick one is pointing. If the joystick is untouched (centered), J1 equals zero and the program skips the next four lines.

Lines 60-90 control the direction of movement of player one, adjusting the x and y coordinates based on the current state of the joystick.

Line 100 sees if the cyclist bumps into anything such as his trail, the other player, or the arena walls. LOCATE X+J,Y+K moves the pixel cursor to the new position, which is calculated by adding the direction of movement to the player's current position. Then we read the dot color of the selected pixel, using RDOT(2). If the color is either 2 or 3, player one has crashed into something and lost a battle. Thus, in line 100, if RDOT(2) > 1 THEN J3=1. J3 is a flag which signals whether the player has crashed or not. Line 110 updates the position of player one, and the DRAW command puts a small dot with color 3 on the screen representing the player.

Lines 120-180 are the analogous lines for player two. The only thing different is that new variables

# es. One really smells.



Every package includes an integral set of props to excite your senses and enhance the game.

and save your hide from a permanent spot in the freak show, you'll need to stretch your puzzle-solving skills to the limit.

## One's really haunting.

Wrapping up this new quartet is a classic gothic mystery set in a haunted castle on the mist-shrouded seacoast of Cornwall. In "Moonmist"™ you'll explore the darkest reaches of Tresyllian

Castle and get involved with an eccentric cast of characters, including British nobility, while trying to save your best friend from a vengeful ghost. "Moonmist" offers four distinctly different sets of clues, problems, solutions and hidden treasures. So you'll die to replay it again and again.

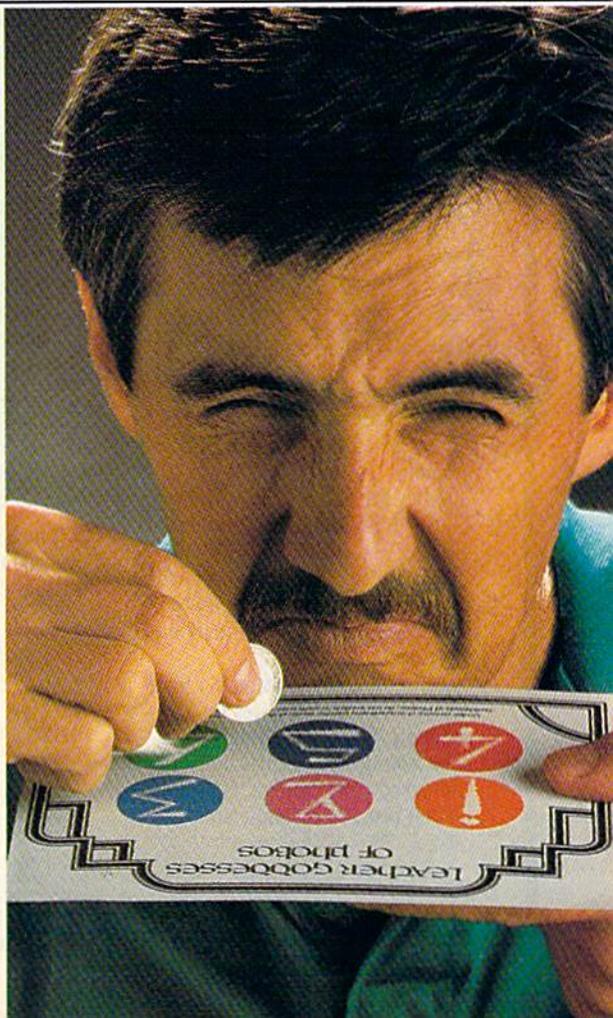
## All four are easy to get.

Simply follow your nose to your local software store today.

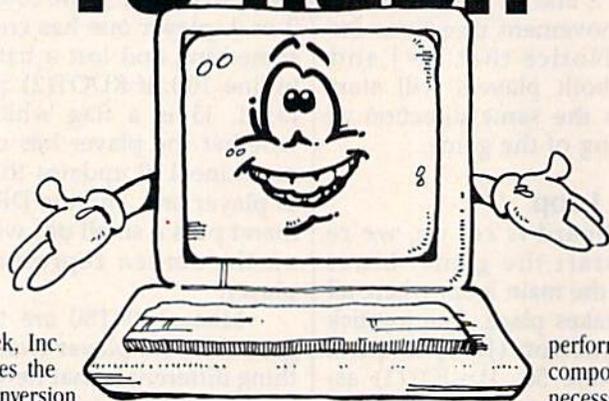
# INFOCOM™

For more information, call 1-800-262-6868, x. 17F. Or write to us at 125 CambridgePark Drive, Cambridge, MA 02140.

© Infocom, Inc. Zork is a registered trademark and Ballyhoo, Trinity, Leather Goddesses of Phobos and Moonmist are trademarks of Infocom, Inc. The Hitchhiker's Guide to the Galaxy is a trademark of Douglas Adams.

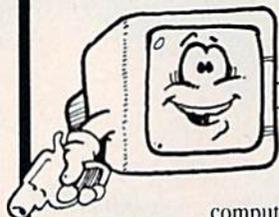


# CONVERT YOUR COMPOSITE MONITOR TO RGBI!



DigiTek, Inc. introduces the RGBI Conversion System!

Now you can convert your 1702 composite monitor\* to true, 100%, full color RGBI (all three guns driven separately)! With the flip of a switch go to composite or RGBI. This is not an emulation of RGBI or a



mono-chrome cable and requires no software or use of

computer memory. With our conversion system your composite monitor IS an RGBI monitor.

Enjoy the full potential of your C128 - use of the 80 column mode, the high resolution mode and the full 2 MHz speed. All this with a picture quality that equals any factory built RGBI monitor (but for a fraction of the price)!

Our conversion system is a hardware add-on and requires minor assembly. The system comes complete with detailed instructions for converting your monitor. Our conversion process is simple and easy to

perform. All components necessary for

assembly are included. For those requiring additional assistance we have provided a technical support number to call. We are firmly committed to customer support.

So don't wait any longer — get the full use of your monitor — convert it to RGBI with DigiTek, Inc.'s RGBI Conversion System! Just send \$49.95 plus \$3.50 for postage and handling.

For more information or to place your order call our customer service line at (813) 933-8023, or write to: DigiTek, Inc., 10415 N. Florida Ave., Suite 410, Tampa, Florida 33612.

There is a \$5.00 additional charge for C.O.D. orders. Dealer inquiries welcome.

\*Conversion available for all composite monitors, write or call for further information.



**DigiTek, Inc.**

10415 N. Florida Ave, Suite 410  
Tampa, Florida 33612

(813) 933-8023

are needed to store the data for player two.

Line 190 tests whether either player has crashed. If so, the program jumps to the scoring section in lines 210-310. Line 200 directs the program back to the start of the joystick-reading part beginning at line 50 to continue with the movement of both players.

The final part of the program contains the routines for scoring, sound effects, and printing crash messages on the screen. Line 210 makes an explosion sound and prints the CRASHED message for player 2. Lines 220-230 detect the rare occurrence when both players crash at the same time. Line 240 prints the CRASHED message for player 1. Line 260 creates another explosion, and the computer SLEEPS for one second so that the players can view the screen for a short time. The two scores are converted to strings, because CHAR can't handle numeric variables, and printed to the hi-res screen. Lines 280-290 check whether either player has won five matches. If so, a congratulatory message is displayed for the winner, and the program jumps to line 310. Otherwise J3 and J4 (the collision flags) are reset to zero and another round begins.

There are several ways programmers could modify and enhance the game. When a player crashes into a wall, perhaps you could use CIRCLE to draw a series of concentric circles to mark the spot where the crash happened. Then flash the hi-res screen by alternating background colors (COLOR 0) a few times. You might also want to experiment with the sound effects and the victory song at the end of the game. To make the game more challenging, use CIRCLE or BOX to put some barriers on the screen. The players would face the additional challenge of avoiding the obstacles.

It wouldn't be especially difficult to convert Obstacle 128 to a one-player game—you against the computer. A simple technique for moving the computer player is to use RDOT to check for an imminent collision, then pick a right or left turn. A slightly more intelligent routine would look ahead, to see which direction has more empty space.

See program listing on page 116. ■

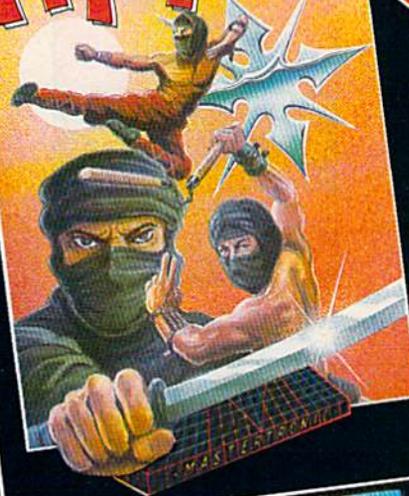
# MASTERTRONIC

## Latest Releases

COMMODORE 64/128K

\$9.99

### NINJA



### NINJA

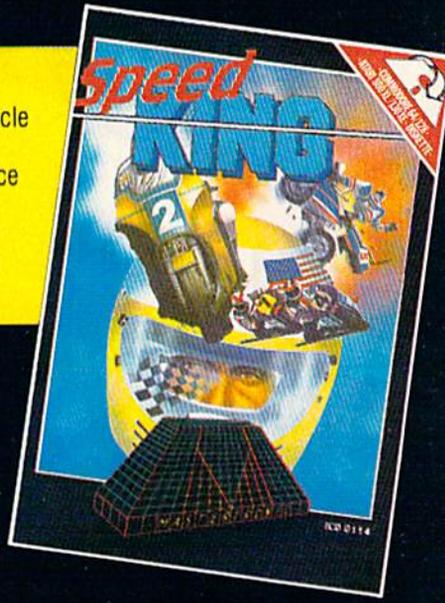
This remarkable martial arts simulation features authentic multi combat fight routines and has some of the most exciting action sequences yet seen on the home computer!



### SPEED KING

Rated the best motor cycle race game on the Commodore 64/128. Race on world class circuits against nineteen tough competitive riders in the action game of '86.

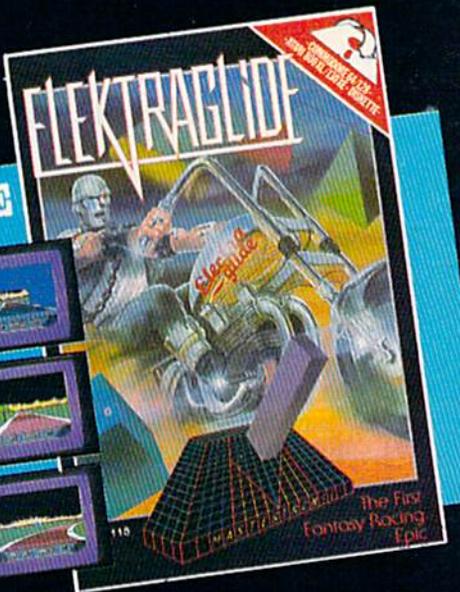
### Speed KING



### ELEKTRAGLIDE

### ELEKTRAGLIDE

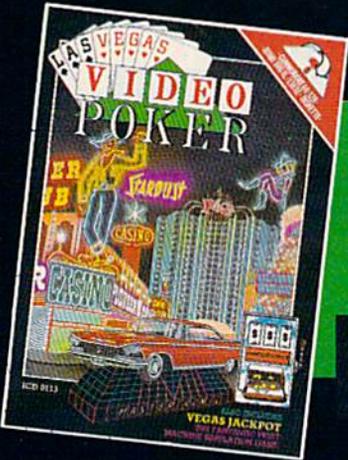
The first fantasy racing epic. Move at awesome speeds through 100% hi-res landscapes in one of the most incredible arcade action games to hit your screens in a long time!



### VIDEO POKER

### VIDEO POKER

The great gamble always pays off in these realistic Las Vegas poker and fruit machine simulations.

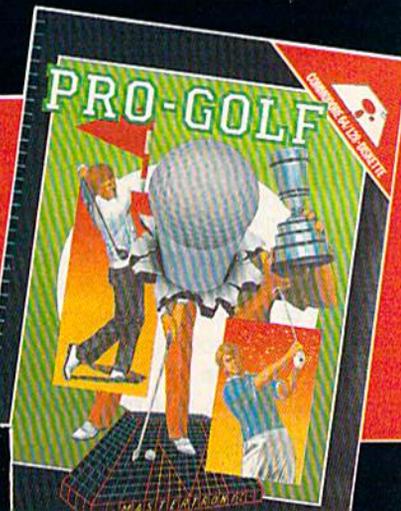


### STAR RELEASE

### PRO-GOLF

A totally realistic joystick controlled golf simulation that knocks "all other golf games into the rough." Features touch sensitive club controls and full 3D perspective animated graphics. A complete experience of top class tournament golf!

### PRO-GOLF



**CURRENT HITS ALSO AVAILABLE**  
 5 a Side Soccer · Slugger · Master of Magic · SpaceHunter · Kik Start · Action Biker · The Last V8 Not all titles available at all outlets.

Mastertronic programs are now available at all locations of Child World and Children's Palace. Also featured at good software dealers and locations of Caldor, Crazy Eddie, Gemco, Electronic Boutique, Service Merchandise, and Toys R Us.

MASTERTRONIC INT INC  
 7311B GROVE ROAD FREDERICK MD 21701  
 (301) 695 8877





# Match Blox

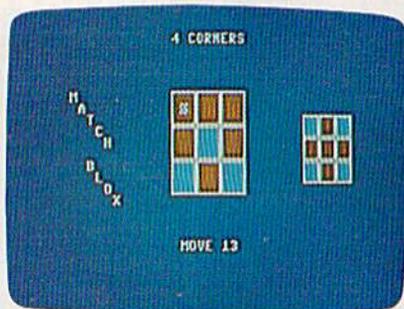
Mark Tuttle

*If you like puzzles, try your hand at one of the five variations of this entertaining solitaire game for the 64, Plus/4, and 16. A joystick is required.*

"Match Blox" is a solitaire puzzle game in which you try to solve any of the five variations in the fewest number of moves possible. Each game is played on a  $3 \times 3$  matrix of squares, and each square is colored blue or orange. The object is simple: Manipulate the squares until they match the pattern displayed.

The program listing (Program 1) for Match Blox is for the Commodore 64. If you have a Plus/4 or 16, type in Program 1, but substitute the lines from Program 2 for the corresponding lines in the Program 1 listing.

After you type in the program, save a copy. To use it, plug a joystick into port 2 (port 1 on the Plus/4 or 16), load it, and type RUN. The program first displays the titles of the game variations, numbered 1-5. A box at the bottom of the screen displays the number 1, which corresponds to the first game variation. (If you want to start with this one, just press the fire button.)

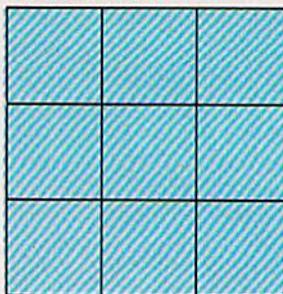


*You must think ahead for success in this solitaire strategy game for the Commodore 64.*

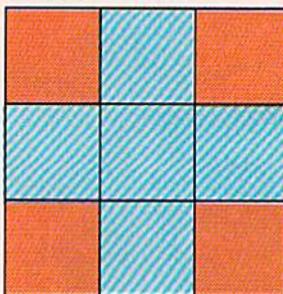
To select any of the five games, move the joystick left or right. Right increments the variation number (it will roll over from 5 to 1), and left decrements the number (it will roll over from 1 to 5). Press the fire button when the number displayed corresponds to the game you wish to play.

The patterns to be matched for each of the game variations are as follows:

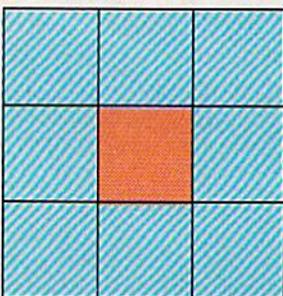
## UNI-COLOR



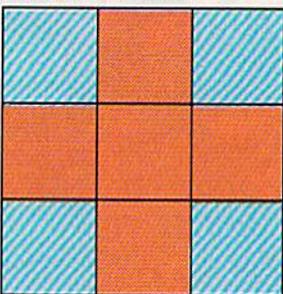
## CROSS



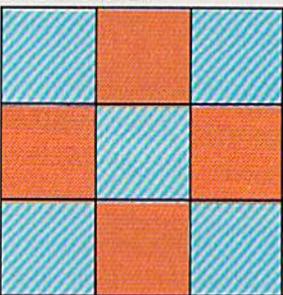
## NO CENTER



## FOUR CORNERS



## FIVE POINTS



## Matching The Pattern

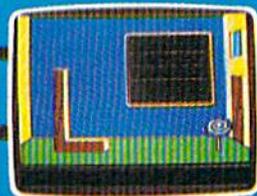
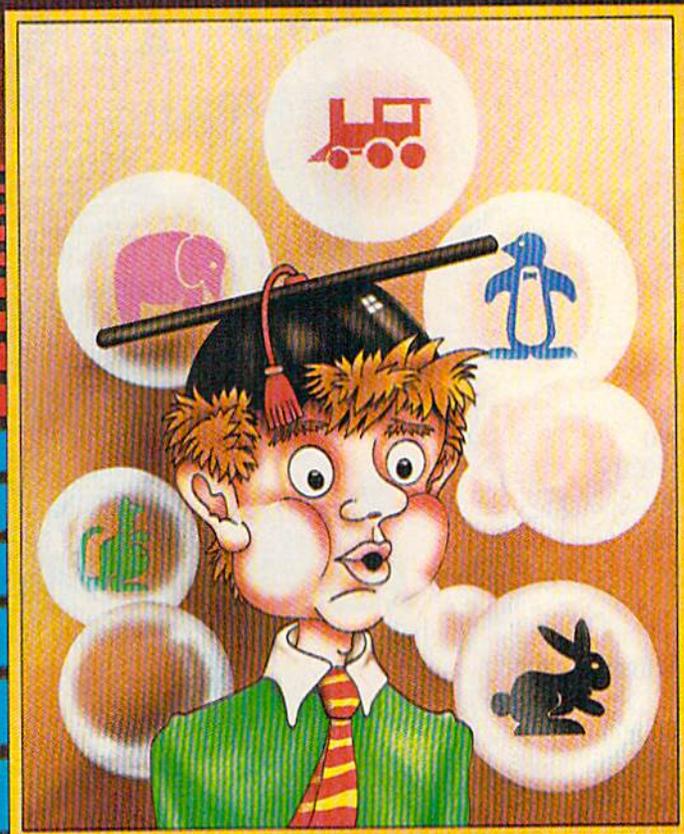
After you choose a game, the screen displays the game board in the cen-



FIREBIRD

# TALKING TEACHER

SOFTWARE  
THAT TALKS  
AGES 2-8



Talking Teacher combines revolutionary software speech, superb graphics and engrossing play action to provide you with the next step in home computer software. No special hardware is required to make your computer talk! Talking Teacher contains three separate learning games for children ages 2-8. The lessons teach:

- Capital and lower case letter identification and keyboard location
- A basic vocabulary and initial letter sounds of over 100 words.
- Spatial relationships (left, right, higher and lower).

Lesson One pronounces and prints each letter as it is typed. Children can type their names, short messages or just have fun with the keyboard! Ages 2-5.

Lesson Two Leads your child through the alphabet, pronouncing each letter and using it in a word. Typing the right letter causes a countryside filled with fantastic creatures and objects to unfold. Ages 3-6.

Lesson Three asks your child to identify the beginning letter of the words presented in Lesson Two. Mistakes are

reviewed and correct answers are musically rewarded. Ages 4-8.

**NOTE TO PARENTS:** After loading, all three lessons may be enjoyed by your children without your direct supervision. However, the educational value can be enhanced by your participation and encouragement.

FACTSHEET/ORDER HOTLINE: 201.934.7373 FIREBIRD LICENSEES INC. P.O. BOX 49, RAMSEY, N.J. 07446

COMMODORE 64/128 ARE TRADE MARKS OF COMMODORE BUSINESS MACHINES.

COMMODORE  
64/128K

# SCIENTISTS DISCOVER NE

When we started our company on the west coast, people thought we were a little spaced out. So you can imagine their reactions when we announced we'd discovered a new universe.

People laughed. People scoffed. And they really freaked out when we told them where we'd found it:

Inside a Commodore 64.

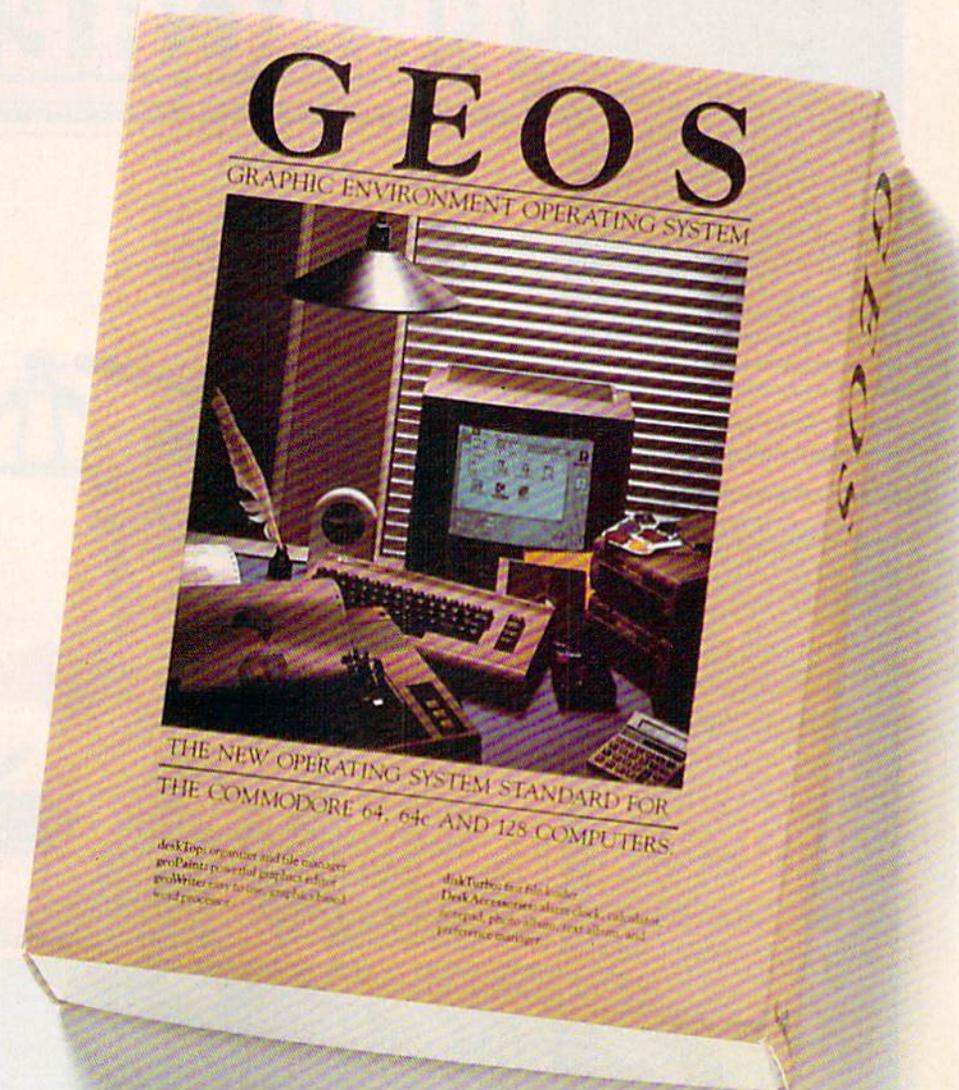
It's called GEOS. And it turns any Commodore into a powerful PC that holds its own against any computer, no matter what kind of fruit it was named after.

**GEOS: The superior intelligence.** Of course, we always knew Commodores possessed superior brains. It just took GEOS to discover them.

You see, GEOS opens your Commodore to a huge universe that can hold an infinite number of applications. Which means that GEOS can do just about anything the expensive PC's can do, including one thing they can't:

Add even more GEOS applications that are being developed even as you read this.

**Increase your speed to warp factor 7.** The first thing you notice with GEOS is how its diskTurbo speeds up your Commodore's disk loading and storing time.



Not twice or three times as fast. But five to seven times faster than normal. Which lets you streak through files and documents at what seems like warp speed.

And that saves you endless time.

**Every universe comes complete with a desk.** The way to keep order in our universe is with the GEOS Desktop. It's just like your desk at home, only without the coffee stains.

The Desktop keeps your art and documents filed, and comes

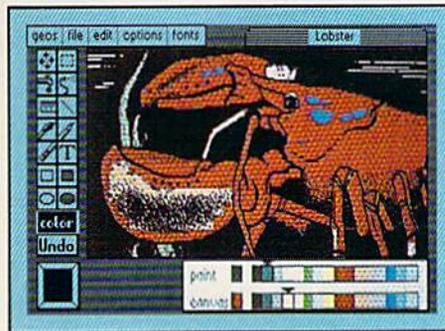
# AT BERKELEY W UNIVERSE.

with all the accessories you need to keep you organized:

An alarm clock keeps you punctual. A notepad keeps your memos. And a calculator keeps your accountant honest.

**How to communicate with a new universe.** With geoWrite, you can rearrange your written words. Move blocks of copy. Cut and paste. And even display your text in fonts of different styles and sizes, right on the screen.

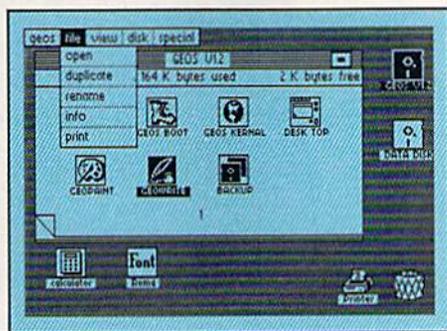
With geoPaint, you become a Michelangelo with a mouse.



Sketching and painting with all kinds of colors, textures and patterns.

You can invert, mirror and rotate images. Insert them into your geoWrite documents. And save them in your GEOS Photo Album for use later.

**Finding your way through the universe.** The most difficult



thing about a new universe is finding your way around. But with GEOS, you only need to remember two things:

Point and click.

When GEOS offers you options, you just point to your answers and click your mouse or joystick.

You want to draw? Point and click.

You want to write? Point and click.

You want to fill in that obtuse rhomboid with an air-brushed geometric pattern in a lighter shade of pink? Point and click.

Easy, huh? And in case you ever do make a mistake, GEOS backs you up with an "Undo" feature that undoes the very last command you entered.

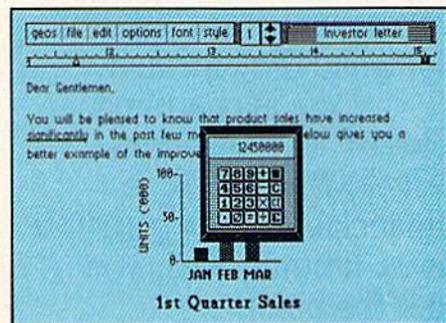
 **Berkeley  
Softworks**

## Running out of space.

With GEOS, that's hardly likely. Because there's endless space in the universe for new applications.

Unfortunately, there's only so much space in this ad.

So zip down to your nearest software dealer. Tell him you want to explore the new universe in your Commodore.



And if he looks at you like you're some kind of alien, well, just tell him Berkeley Softworks sent you.

The name is universally known.

To order, call 1-800-443-0100 ext. 234

**GEOS is just \$59.95**

(California residents add 6.5% sales tax.)

\$2.50 US/\$5.50 Foreign for shipping and handling. Allow six weeks for delivery.

Commodore 64 and C64 are trademarks of Commodore Electronics, Ltd. GEOS, GEOS Desktop, geoPaint, geoWrite, diskTurbo and Berkeley Softworks are tradenames of Berkeley Softworks.

The brightest minds are working at Berkeley.

# THE UNIVERSE

Well, we told you it wouldn't be long until the first GEOS applications were ready. And these are just the first. The number of satellites in the GEOS universe is infinite.

**Judge Font Pack on looks alone.** Let's face it. People judge your work not only by what it says, but how it looks.

That's why we developed Font Pack. A collection of 20 different type styles that not only say what you mean, but really look like they mean it.

Charming is charming. **Boalt** is all business. **FontKnox** is financial. And **Telegraph** is ... hmmm, well, you get the point.

When you combine these 20 fonts with the five you get with geoWrite, your work not only reads



better, it practically speaks for itself.



**Look what we found in your desk.** You know how there's always one drawer in your desk that's filled with really neat stuff? Well, GEOS has one of those, too.

It's called Desk Pack. The ingenious Desk Pack Graphics Grabber copies graphics from clip art galleries like Print

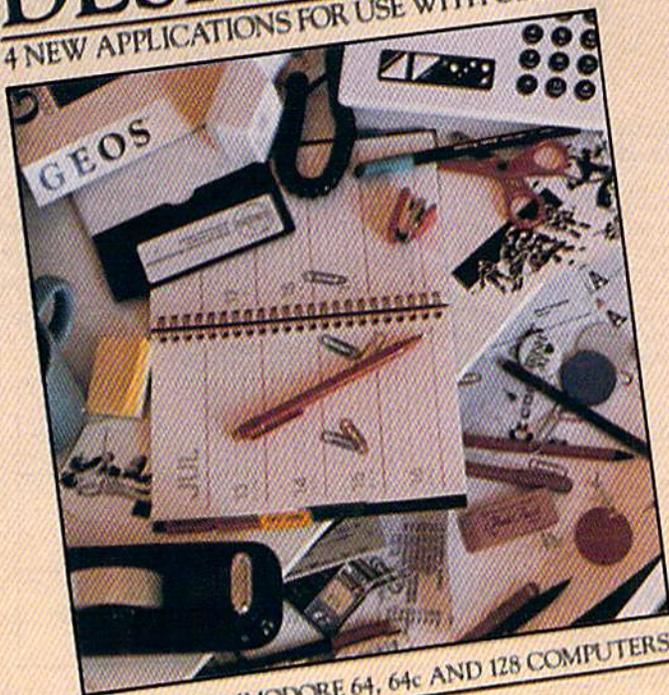
Shop, Print Master and Newsroom for use in geoWrite and geoPaint.

The Desk Pack Calendar pops up whenever you need to plan your schedule. And since it's valid until the year 9999, you'll never have to miss one of those swell family

# IS EXPANDING.

## DESKPACK 1™

4 NEW APPLICATIONS FOR USE WITH GEOS™



FOR THE COMMODORE 64, 64c AND 128 COMPUTERS

Art Grabber: allows access to "clip art"  
Icon Editors: create your own icons

Calendar: for all your dates  
Black Jacks: gaming for fun



reunions ever again.

There's even an Icon Editor, which lets you customize your GEOS file icons with the graphic of your choice.

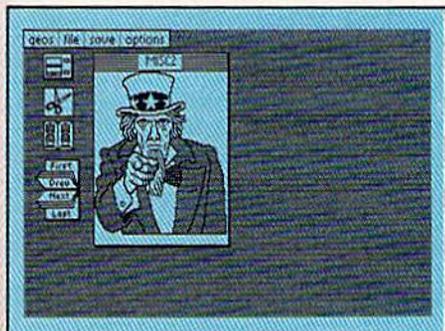
And when you can't deal with work, Desk Pack

deals the sharpest Black Jack game this side of Vegas, complete with graphics and sound effects.

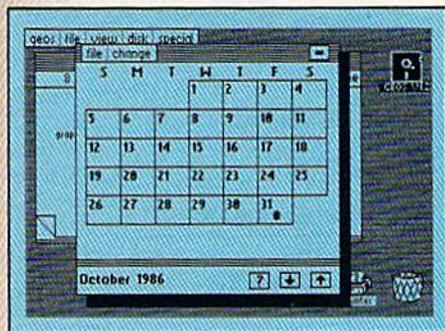
 **Berkeley  
Softworks**

The brightest minds are working at Berkeley.

New discoveries reported. The GEOS universe is expanding. And we'll report each new discovery to you as it occurs.



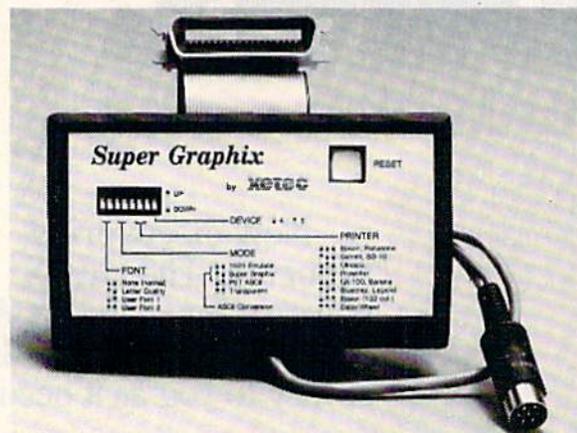
In the meantime, add Desk Pack and Font Pack to your GEOS system. And see how much you can explore.



To order, call 1-800-443-0100 ext. 234  
**Font Pack \$29.95 Desk Pack \$34.95**  
(California residents add 6.5% sales tax.)  
\$2.50 US/\$5.50 Foreign for shipping and handling. Allow six weeks for delivery.

Commodore 64 and C64 are trademarks of Commodore Electronics, Ltd. GEOS, GEOS Desktop, geoPaint, geoWrite, diskTurbo and Berkeley Softworks are tradenames of Berkeley Softworks.

# Super Graphix



**Includes:  
Utility Disk  
With  
27 Fonts  
And  
Font  
Creator**

**GRAPHICS and FONTS plus an 8K BUFFER for the ultimate in performance and speed. The XETEC Super Graphix interface for Commodore Computers now offers a new high in technology with these features:**

- 8K Buffer Standard
- 10 Printing Modes
- 3 Internal Screen Dumps
- Extensive Command Channel
- Reset Button to Halt Printing from Buffer
- Switch Settings on Label for Quick Reference
- Correspondence Quality Font Built-In
- Capable of Storing 2 Additional Fonts
- Correct Graphics/Text Aspect Ratio for all Major Printers
- 8 Active Switches with Changes Constantly Monitored
- Internal Fonts Support Super-script, Sub-script, Underlining, Bold-face and Choice of 9 Pitches

**Suggested list \$99.95 • Includes Lifetime Warranty**

**XETEC, Inc. / 2804 Arnold Rd. / Salina, KS 67401 / 913-827-0685**

## COMMODORE BRAND SOFTWARE FOR THE 64 AND 128 COMPUTERS BELOW ORIGINAL WHOLESALE

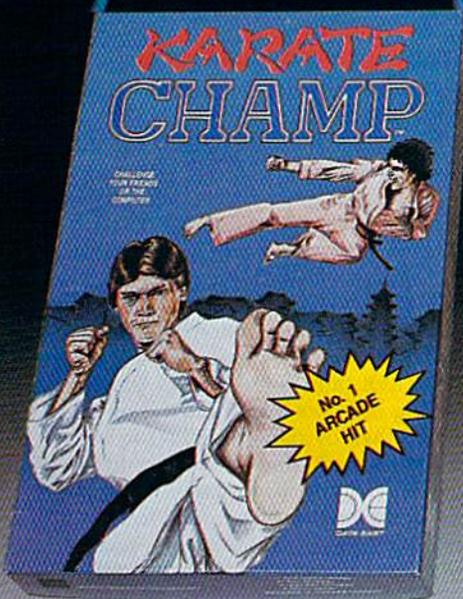
PROGRAMMING AIDS	VIDEO ARCADE	PUBLIC DOMAIN
Assembler \$15	Kickman (C) \$5	Business \$3
Super Expander (C) 12	Clowns (C) 5	English I 3
Pilot 14	Visible Solar System (C) 6	English II 3
Screen Editor 12	Tooth Invaders (C) 6	English III 3
	Blue Print (C) 6	English IV 3
	Solar Fox (C) 8	English V 3
	Star Rangers (C) 8	English VI 3
	Viduzzles (C) 8	English VII 3
	Satan's Hollow 10	Math I 3
	Triad 9	Math II 3
	Chess 10	Math III 3
	Rally Speedway 10	Math IV 3
		Math V 3
		Math VI 3
		Math VII 3
		Math VIII 3
		Math IX 3
		Math X 3
		Math XI 3
		Math XII 3
		Math XIII 3
		Math XIV 3
		Math XV 3
		Math XVI 3
		Math XVII 3
		Math XVIII 3
		Math XIX 3
		Math XX 3
		Math XXI 3
		Math XXII 3
		Math XXIII 3
		Math XXIV 3
		Math XXV 3
		Math XXVI 3
		Math XXVII 3
		Math XXVIII 3
		Math XXIX 3
		Math XXX 3
		Math XXXI 3
		Math XXXII 3
		Math XXXIII 3
		Math XXXIV 3
		Math XXXV 3
		Math XXXVI 3
		Math XXXVII 3
		Math XXXVIII 3
		Math XXXIX 3
		Math XL 3
		Math XLI 3
		Math XLII 3
		Math XLIII 3
		Math XLIV 3
		Math XLV 3
		Math XLVI 3
		Math XLVII 3
		Math XLVIII 3
		Math XLIX 3
		Math L 3
		Math LI 3
		Math LII 3
		Math LIII 3
		Math LIV 3
		Math LV 3
		Math LVI 3
		Math LVII 3
		Math LVIII 3
		Math LIX 3
		Math LX 3
		Math LXI 3
		Math LXII 3
		Math LXIII 3
		Math LXIV 3
		Math LXV 3
		Math LXVI 3
		Math LXVII 3
		Math LXVIII 3
		Math LXIX 3
		Math LXX 3
		Math LXXI 3
		Math LXXII 3
		Math LXXIII 3
		Math LXXIV 3
		Math LXXV 3
		Math LXXVI 3
		Math LXXVII 3
		Math LXXVIII 3
		Math LXXIX 3
		Math LXXX 3
		Math LXXXI 3
		Math LXXXII 3
		Math LXXXIII 3
		Math LXXXIV 3
		Math LXXXV 3
		Math LXXXVI 3
		Math LXXXVII 3
		Math LXXXVIII 3
		Math LXXXIX 3
		Math LXXXX 3
		Math LXXXXI 3
		Math LXXXXII 3
		Math LXXXXIII 3
		Math LXXXXIV 3
		Math LXXXXV 3
		Math LXXXXVI 3
		Math LXXXXVII 3
		Math LXXXXVIII 3
		Math LXXXXIX 3
		Math LXXXXX 3
		Math LXXXXXI 3
		Math LXXXXXII 3
		Math LXXXXXIII 3
		Math LXXXXXIV 3
		Math LXXXXXV 3
		Math LXXXXXVI 3
		Math LXXXXXVII 3
		Math LXXXXXVIII 3
		Math LXXXXXIX 3
		Math LXXXXXX 3
		Math LXXXXXXI 3
		Math LXXXXXXII 3
		Math LXXXXXXIII 3
		Math LXXXXXXIV 3
		Math LXXXXXXV 3
		Math LXXXXXXVI 3
		Math LXXXXXXVII 3
		Math LXXXXXXVIII 3
		Math LXXXXXXIX 3
		Math LXXXXXXX 3
		Math LXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3
		Math LXXXXXXXIII 3
		Math LXXXXXXXIV 3
		Math LXXXXXXXV 3
		Math LXXXXXXXVI 3
		Math LXXXXXXXVII 3
		Math LXXXXXXXVIII 3
		Math LXXXXXXXIX 3
		Math LXXXXXXXX 3
		Math LXXXXXXXXI 3
		Math LXXXXXXXII 3

# NUMBER ONE ARCADE HITS...

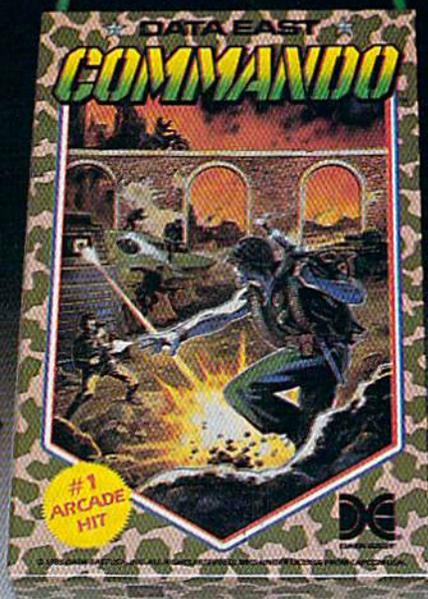


LOOK FOR  
**Capcom**  
WRESTLING™  
ON C-64™/128

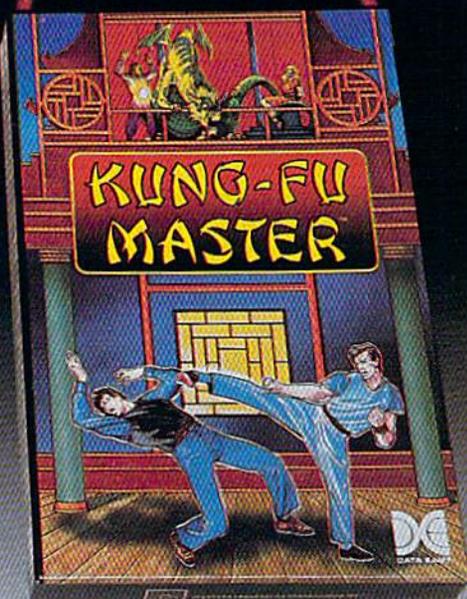
## FOR YOUR COMPUTER.



Put on your black belt and challenge your friends or the computer through nine picturesque settings in this leading Martial Arts Game to become the **KARATE CHAMP**. For the Commodore 64™/128 and the 48K Apple II® Series.



As the crack shot **COMMANDO**\*, battle overwhelming odds to defeat advancing rebel forces. Armed with only a machine gun and hand grenades, you must break through the enemy lines to reach the fortress. For the Commodore 64™/128.



Prepare for the flight of your life... you are the **KUNG-FU MASTER**\*\*. Battle the evil forces through the five dangerous floors in the wizard's castle to rescue the captive fair maiden. For the Commodore 64™/128 and the 48K Apple II® Series.

Apple and Commodore 64 are trademarks of Apple Computer, Inc. and Commodore Electronics, Ltd. respectively.

\* © Data East USA, Inc. Mid. under license from Capcom USA.

\*\* © Irem Corp. Mid. under license by Data East USA, Inc.

**DATA EAST**

**DATA EAST USA, INC.**

470 Needles Drive, San Jose, California 95112  
(408) 286-7074

© 1986 Data East USA, Inc. All rights reserved.

## Vizawrite Classic 128

*Vizawrite Classic 128*—written by Kevin Lacy, author of *Omniwriter 64* and *Vizastar 64*—may just be the most powerful word processing tool presently available for the Commodore 128. Frankly, it's hard to imagine needing a word processor to do something that *Vizawrite* cannot do. Besides having all the standard word processing features that users have come to expect, such as moving, copying, and deleting blocks of text; searching and replacing words and phrases; and centering, justification, and highlighting of text, *Vizawrite* has many extraordinary features. Those include the ability to do newsletter-like columns, a glossary of frequently used words and phrases for quick insertion, onscreen highlighting of text (boldface and/or underline), and automatic formatting of each page as you type. Except for certain text enhancements, such as italics, *Vizawrite* is a "what you see is what you get" word processor, permitting you to see onscreen what your document will look like when printed out. *Vizawrite* has over 59K of text memory, enough for a 25-30 page document. Of course, the program can link multiple files for creating extra long documents. To top it off, all of these features are in the 128's 2 MHz fast mode and are displayed in 80 columns.

In addition to these many advanced word processing features, *Vizawrite* provides a great degree of control and flexibility over the system. You can easily customize the display colors to your own choosing, and when a screen is customized and the file saved to disk, the color choices are saved along with it. A built-in calculator with memory is available from a single keystroke, as well as online help windows that you can customize. A full range of disk commands is available from within the program—you can format new disks; save, scratch, and verify files; and perform any DOS commands available from BASIC 7.0 (such as switching a 1571 from single-sided to double-sided format and vice versa).

*Vizawrite* allows you to take full advantage of your printer's capabilities by employing a "printer profile" system allowing you to create a custom printer profile to meet the exact needs

of your printer. The program then allows you to go through an extensive series of options to define exactly what you want to print. *Vizawrite's* use of the printer is so extensive, however, that setting up a file to print the way you want may take some time initially. Between working through all the options and figuring out which are appropriate for use with your printer and the document in question, preparing to print is not simple. Fortunately, once you've completed the exercise, your choices can be saved with the file. I found it useful to set up the desired printing options (and screen colors) and save a blank file to disk. Then before creating a new document, I load in the blank file containing the desired options and save the time and trouble of setting up the options for every new document.

An additional printing capability of *Vizawrite* is its built-in proportional and near-letter-quality (NLQ) fonts. The program offers four different proportionally spaced fonts and three different NLQ fonts. However, I could not get all of the proportionally spaced and NLQ fonts to work with my Epson printer. Also, the NLQ fonts only permit 49-1/2 lines per page, as opposed to the standard 66 lines per page. The fonts that worked with my Epson looked extremely good. In fact, the *Vizawrite* user's manual was produced using the program's NLQ fonts.

Usually, the price of such power and versatility in a word processor is complexity and difficulty of use. However, *Vizawrite* does an admirable job of making itself relatively easy to use. *Vizawrite* utilizes a command bar at the top of the display screen and drop-down menus for most file, disk, printing, and utility commands. To activate the command bar, simply press the Commodore key; then use the cursor and RETURN key to drop a particular menu down into its subcommands. From there, you again use the cursor and RETURN keys to activate the desired subcommand. However, once you become familiar with the commands available, you can employ a much faster command execution by simply pressing the Commodore key and then the key corresponding to the first letter of

the words representing the desired command and subcommand.

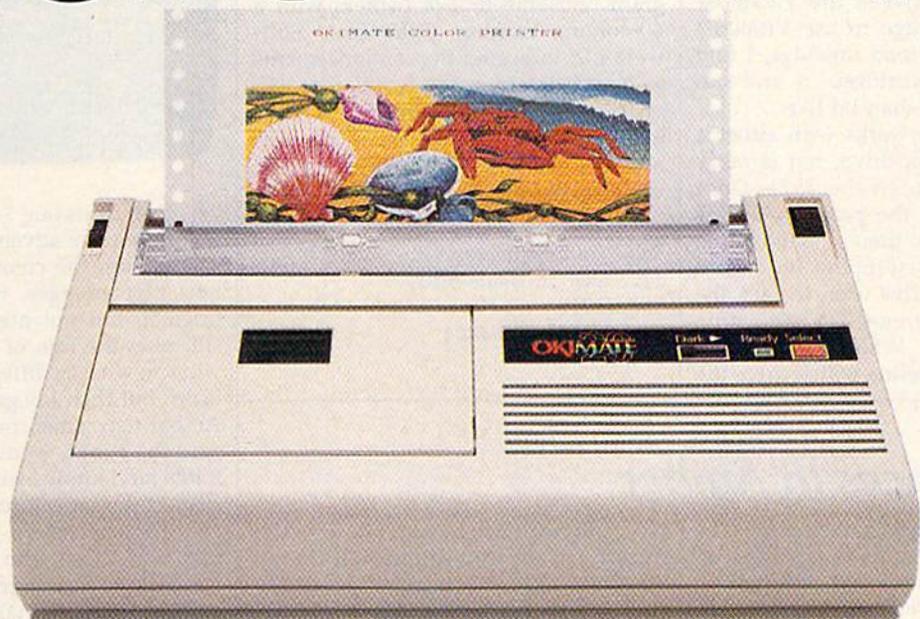
The word processing commands are fairly standard, using function and control keys. There are two quirks that may represent differences between European and American command conventions. First, the DELETE key erases the character on which the cursor is placed. Second, commands executed with the CONTROL key (such as CONTROL-E, which begins and ends the boldfacing of a portion of text) are accomplished by pressing CONTROL and releasing it, then pressing the E key. The most common convention requires holding down CONTROL while pressing the other key to complete the command.

The formatting of text is accomplished by the use of embedded codes and what *Vizawrite* calls a *format line*—a dotted line that appears above the text to be manipulated by the desired format commands, such as tabs, margins, line spacing, column setting, and page breaks. Additionally, special printer codes can be defined on a format line, allowing the user to embed the necessary codes in the text to produce special characters or text enhancements, such as international characters, italics, and super- or subscripts.

While the embedded codes, format lines, and faint dots *Vizawrite* places in text between words—and wherever else the user leaves a space using the space bar—may be visually distracting, *Vizawrite* provides the option to hide such formatting symbols. You simply press CONTROL and then H, and the formatting symbols are "hidden" on the screen, thereby permitting you to view your document almost as it would appear when printed on paper. I say *almost* because some text enhancements are not displayed on the screen, such as italics, condensed print, superscripts, and subscripts. Seeing your document as it will appear on paper as you are editing is a tremendous feature in a word processor—one that cannot be overstated. Besides allowing you to be more creative while writing, the hide option saves you a significant amount of time because you don't have to switch between an edit and a preview mode or print out the document to see how it will appear on paper.



# One for all.



## Affordable, Compatible, and Full-Color Capable!

Besides being the one printer for all the PC's pictured above, the OKIMATE® 20 is also the one for all your printing needs.

Want to spruce up your homework with colorful charts and graphs? The OKIMATE 20 is for you.

Need crisp "Near Letter Quality" printing for business correspondence?

The OKIMATE 20 is for you. Maybe you want expanded or fine print, italics, underlining, superscripts, or subscripts? You guessed it, the OKIMATE 20 is for you, too.

In fact, no matter what you have in your PC, you can put it on paper with the OKIMATE 20.

With this versatile printer you

also get such high-end features as built-in type fonts, a 24-element printhead and the ability to make transparencies for overheads.

All at a very low-end price: \$268\* complete with "Plug 'n Print\*" personality module.

For the name of the OKIMATE 20 retailer nearest you, simply call 1-800-OKIDATA.

\*Suggested retail price. Dealer price may vary.

**OKIDATA®**  
an OKI AMERICA company  
We put business on paper.

Yet another great feature of *Vizawrite* is its integrated 30,000-word dictionary, which allows you to access the spell-checking functions from the command bar without having to save your document file to disk before checking the spelling. The spell-checking abilities include listing the words in your document alphabetically, according to usage, and by unrecognized words. Provided are several utilities which allow creation of a user dictionary for specialized use, and expansion and restructuring of the existing dictionary.

The package includes a disk containing the *Vizawrite* program on one side and the dictionary on the other, and a cartridge for the user port. Since the cartridge must be in place before the program will load, the disk is supplied to the user without copy protection. This enables you to easily make backup and working copies of the program and dictionary files. I must note, however, that I'm not crazy about having to plug in the cartridge every time I want to use the program. Between the *Vizawrite* cartridge, a cartridge to use *Vizawrite* 128, and my fast load cartridge, I find myself pulling cartridges in and out much more often than I'd like.

The program works with either a 1571 or 1541 disk drive, but is fairly slow to load even on the 1571. Once loaded, however, the program disk is no longer needed, thereby eliminating most of the disk-swapping headaches of a single-disk-drive user. In fact, the program is almost easier to use with a single disk drive. While *Vizawrite* allows the user to define which drive the

program should look to, it does not allow simultaneous use of two disk drives. Frankly, I find it easier to flip the lever on the disk drive and switch disks than to remember the command to switch to a different drive number.

*Vizawrite* is not a program you can load up and use immediately. Fortunately, it comes with a fairly well-written and concise manual, as well as a couple of example document files on the program disk. While infrequent users will probably find themselves leafing through the manual periodically to refresh their memory on certain commands, the frequent user should be able to shelve the manual after the first few documents produced.

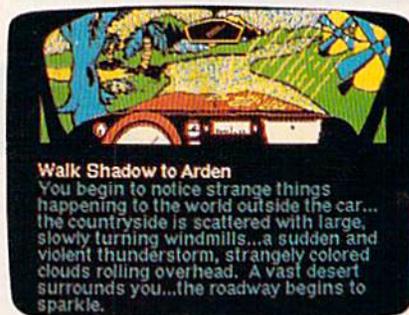
All in all, *Vizawrite* is a top-notch program. Its power, versatility, and design leave little room for disappointment. It could become a, if not *the*, word processor of choice for the 128. The only noticeable shortcoming is the absence of an option to use a 40-column display, which makes the program unusable to 128 owners with a 40-column monitor. Solid State Software has indicated that enhancements to *Vizawrite* are in the works that will enable it to take advantage of the RAM expanders for the 128 as RAMdisks, and to add a font editor permitting you to define your own font styles.

—Scott Thomas

Solid State Software  
1125 East Hillsdale Blvd.  
Suite 104  
Foster City, CA 94404  
\$79.97

me, but after a while I gained a feel for Zelazny's world and an interest in Corwin's situation. But then I hit a snag, a puzzle I simply could not solve. So I did the only reasonable thing: I gave up. Restoring games with the 1541 drive encourages surrender.

Then I read Zelazny's books, and I decided to return to the game. Everything became, of course, much clearer, and I began to move through the story very quickly. I even got past the snag, because it is something Corwin experiences in the novel. Suddenly, though, I realized I was doing everything perhaps *too* quickly; having read the books, the challenge simply wasn't there. I began to wonder if I was going to just walk through the entire thing.



As it turns out, I didn't. After a certain point, the adventure veers significantly from the course of the book. A new plot emerges, reminiscent of the original, but not merely a clone. You still play the role of Corwin, but Corwin's new tasks differ from his original tasks. But then I began to wonder if an Amber newcomer, one who had never read the books, would ever have made it this far. I know I wouldn't have, and I suspect the same is true for others. Still, even for newcomers, the story is a good one, and those who hit snags can always run to the library or the bookstore and read the original.

*Nine Princes*, then, combines the established story with a new one. In doing so, it finds the balance between Amber newcomers and Zelazny veterans. Newcomers can play and enjoy the game, albeit with a fair bit of difficulty, and veterans will find something new to interest them.

The game has two outstanding features. First, it uses a large vocabulary for interaction and diplomacy. Conversing and dealing with other characters is simple and interesting. Second, at certain points you enter the fencing game, with commands such as Parry, Thrust, and Feint that really work. Impressively, both features are as essential to the game as they were to the novel.

Because these features, along with the adherence to the original story, show the game's faithfulness to the

## Nine Princes In Amber

An interesting recent development in interactive fiction is the adaptation of novels into computer text adventures. While Infocom's *The Hitchhiker's Guide to the Galaxy* is among the most famous of these, Telarium Software has specialized in them from the beginning. With early titles such as *Fahrenheit 451*, *Rendezvous with Rama*, and *Dragonworld*, Telarium has had plenty of experience bridging the two fields.

*Nine Princes in Amber* for the Commodore 64 demonstrates the pros and cons of such an enterprise. Based on the first two novels of Roger Zelazny's well-known Amber fantasy series, the story takes you, in the role of Corwin of Amber, through many adventures on your hopeful path to the Amber throne. You begin, like the Corwin of the book, in a hospital bed, the victim of amnesia, and from there you play out many of the book's most important scenes. You meet your siblings—Eric, Random, Flora, Deirdre, Julian, and others—whom you

try to ally with you in your quest for the throne. On the way you must learn the art of fencing, and you must successfully walk the Pattern of Amber.

If you understood the previous paragraph, you'll enjoy Telarium's product. You have also read the books. If you didn't understand the paragraph, you still might enjoy the product, but that is nearly impossible to predict. The major difficulty in adapting novels to interactive fiction is, I think, finding the balance between those who know the original and those who do not. If the adventure slavishly reproduces the novel, players who know the story will quickly become bored. But if knowledge of the original is assumed, players who have not read it will easily become confused. *Nine Princes in Amber* reflects these problems, but in the end it is a creditable adaptation.

When I first tried the interactive version, I had not yet read the original. The whole thing was very strange to

# Tokyo for \$19.95

In the continuing evolution of scenery, SubLOGIC introduces the Japan and San Francisco Bay Area Scenery Disks for Flight Simulator II and Jet.

- Tokyo to Osaka is a comfortable 240-mile flight. The natural beauty of the Japanese coastline and mountain ranges complement the standard cross-country details.
- The beautiful San Francisco Bay Area "Star" Scenery Disk is perfect for concentrated sight-seeing.
- For the cross-country adventurer, our standard Western U.S. scenery (Disks 1-6) contains major airports, nav-aids, cities, highways, rivers, lakes, and mountains.

SubLOGIC Scenery Disks are available individually for \$19.95. The six-disk Western U.S. set is available for \$99.95. See your dealer, or write or call SubLOGIC for more information.

**subLOGIC**  
Corporation  
713 Edgebrook Drive  
Champaign IL 61820  
(217) 359-8482 Telex: 206995  
Order Line: (800) 637-4983  
(except in Illinois, Alaska, and Hawaii)



東京



novels, *Nine Princes in Amber* is a worthwhile adventure game. With added touches such as graphics screens of important scenes, and occasional bursts of music, the game captures quite nicely Roger Zelazny's weird and unpredictable world. I suspect it will appeal most to veterans who have not read the novels for a while, but new-

comers and recent readers should also find it worth looking at.

—Neil Randall

Telarium  
Spinnaker Software  
One Kendall Square  
Cambridge, MA 02139  
\$32.95

## The Music System And The Advanced Music System

From Firebird come *The Music System* and its big brother, *The Advanced Music System*, the latest and perhaps most comprehensive single-disk "music processors" for the Commodore 64. Intended for musical hobbyists, both packages are thoughtfully designed and well-produced, and they sport excellent documentation, including many helpful diagrams.

Both systems are substantial and complex. You'd need to spend some time and effort on both programs, as you would with any complete system of this scope. Outstanding features include extremely clean hi-res graphics and Macintosh-style pop-up menus and icons. The programs also function well with monochrome monitors, and joysticks are not required. Icons and other graphics insure that anyone with minimal musical background may approach these systems—another real strength, which should also facilitate use by those whose primary language is not English. The advanced system will even insert bar lines or automatically correct them for you.

The systems are operationally well-conceived. Four function keys access standard sets of menus throughout (Files, Values, Commands, Info). And the space bar advances you clockwise (or counterclockwise) around the screen to access the various *devices* pertinent to each program or to highlight a desired menu selection. Pressing RETURN enters your choice. The RUN/STOP key always starts/stops sequence play. And the Commodore-RUN/STOP key combination initiates record mode.

Below this level, things get more complicated. It's difficult to remember which key(s) to press for what. Where options are most numerous—in *The Advanced Music System*—a most welcome "Quick Key Reference Guide" is provided. (An innovative, but more expensive solution would be to create a custom input device, such as a touch tablet. It seems that many special-purpose systems would be friendlier with similar peripherals.) Lacking such a device, *The Music System* designers

might have implemented the more intuitive back arrow and cursor control keys—the latter remain unused in either package.

The basic *Music System* package consists of two modules—a keyboard/editor and a synthesizer—one on either side of the disk. Both modules contain sequencers. The programs write and access the same music and sound files, and the systems are 100-percent compatible. Synthesizer modules in *The Music System (TMS)* and *The Advanced Music System (AMS)* are virtually identical. In *AMS*, the keyboard and greatly expanded editor are separate, however. Additionally, *AMS* includes linker, printer, and MIDI programs—all accessed through a master icon menu. These add-ons expand system capability, but the *TMS* basic system is complete and workable on its own. It's also much more approachable for the beginner.

The keyboard modules allow you to enter—either in "tinker" or record mode—notes and rhythms from the top two rows of Commodore 64 keys. This arrangement gives immediate access to almost two octaves of pitches. Octave shifts higher and lower are available—as are a number of other options—by pressing special key combinations. It is these combinations that are difficult to remember. One voice only may be performed at a time. On playback, you may select up to three voices. An ever-present visual metronome icon—with variable tempo—keeps you in time, to three varying degrees of resolution. In *AMS*, it optionally "clicks" if a voice is available to play it.

You may watch the single voice you play through the Voice Monitor Window. In *TMS*, you can also view all three voices on playback. This is the same window through which you edit: add, delete, change bar lines, pitches, rhythms, and instruments (which can be redefined at any point—an important feature). *AMS* doesn't use this window to edit since it has a separate editing module.

The keyboard/editor module in *TMS* is a most useful hybrid. Of course, it's appropriate in *AMS*—where editing

tasks become more comprehensive—for this process to be handled separately. Although your effort must be painstaking, you can optionally enter compositions note by note through the Voice Monitor Window, one voice at a time. Most users will probably choose to play "rough draft" tracks on a keyboard (synchronized aurally to previous tracks and visually to the metronome) and then polish things with the editor.

Whereas music/sequence files are saved from the keyboard and editor modules, it's the synthesizer module that creates sound files. Sound files are groups of 15 "instruments" (waveform/envelope combinations) and four sets of filter parameters. A single filter setting is available to all instruments simultaneously; it may be switched in or out for each instrument as desired. Although only one sound file is active at any given time, a second is coresident in memory and may be manually "swapped" on a moment's notice.

Experienced music hobbyists may miss the presence of ring modulation (there is no way of getting bona fide bell tones), sync, and voice 3 envelope and oscillator modulation. Perhaps this is why the packaged sound files (two in *TMS*, three in *AMS*) tend to sound rather bland and unexciting. Also, there is no way to tune voices to near unisons, for a rich, chorus effect. Filter cutoff points are preset by the user and cannot "track" oscillator pitch.

However, this just opens the door for perhaps the most innovative device contained in *TMS* and *AMS*—the Dynamic Response Envelope (DRE). The DREs are three-stage control-envelope contours, available either once per event (note) or repetitively. There are two of them for each instrument: one modulates pitch and/or pulse width; the other, filter contour. Each stage is expressed in terms of number of steps (time), slope of curve (rate), and step time (overall speed); they roughly correspond to envelope segments (and programming) on Casio CZ keyboard synthesizers. (Slower step times can create a limited range of "sampling" effects.) As useful as this capability is, it's too bad that there are only three stages (a simple pulse modulation, like a modern police siren, requires four stages), and that the contour ceases automatically at the onset of the note's release stage. This should be an option, not automatic.

The *advantage* of the DRE approach to modulation over the traditional "voice 3" method is that it allows three-voice harmony to continue, and that all voices may be modulated simultaneously, even with contrasting contours.

One other notable characteristic of

# PaperClip™

“The **#1** Best Selling Word Processing Package” – BILLBOARD'S COMPUTER SOFTWARE CHART\*

## **PAPERCLIP II** FOR THE COMMODORE 128

- Compatible with C-64 PaperClip files: the natural choice for C-128 upgrades
- Includes integrated 38,000-word spelling checker
- Built-in telecommunications module: access on-line services, incorporate on-line data in your work, and send text to other users
- New editing features include multiple columns, reverse video scroll, chaptering, powerful macros
- Maximum document size expanded to 999 lines

## **PAPERCLIP FOR THE APPLE IIe, c**

- Insert/Delete, Move & Copy, Cut & Paste, Global Search & Replace
- Automatic page numbering, headers and footers
- Simplified columns, tabbing and scrolling
- Form letter and mailing label functions
- Unique new capabilities for Apple: dual text windows, automatic text protection, macro commands and more

## **PAPERCLIP**

### FOR ATARI HOME COMPUTERS (WITH SPELLPACK FOR THE 130 XE)

- All the high-productivity editing features plus: Dual Text Windows, Automatic Paging, Macros and much more
- Fully-integrated SpellPack spelling checker on the same disk
- 36000 words in the SpellPack dictionary plus you can add thousands more
- Memory-resident for speed and convenience: no need to quit the word processor to check a document

## **PAPERCLIP with SPELLPAK** FOR THE COMMODORE 64

- Built-in spelling checker
- All the high-productivity text editing features
- Move, Copy, Insert, Delete – words, sentences or entire blocks of text
- Macro power: define & store up to 52 repetitive words/phrases, then enter them with just one keystroke
- Includes 80-column Print Preview display, requires no extra hardware
- Sophisticated Global Search & Replace, Mail Merge and Mailing Label functions

## **PAPERCLIP ELITE FOR THE ATARI ST and COMMODORE AMIGA**

- Go beyond word-processing, with idea processing, text/graphics integration, real-time spell checking, independent variable columns and so much more. Look for PaperClip Elite. Coming soon.



“you can't go wrong choosing Paper Clip”

– THE GUIDE TO COMPUTER LIVING

“the Cadillac of word processors.”

– OMNI MAGAZINE

“best professional word processor available”

– RUN MAGAZINE

“by far the best word processor ever available

... So clearly superior, ... State-of-the-art word processing”

– ANTIC

“as far as we are concerned, PaperClip is the top word processor running on a micro computer.”

– HOME APPLICATIONS FOR THE C-64

“Performance: excellent. Error-handling: excellent. Value: excellent... You'll find yourself growing spoiled.”

– FAMILY COMPUTING

“Exceptional word processing...”

– INPUT

“many features ... easy to use”

– ATARI EXPLORER

“A superb word processor ... the most sophisticated to date.”

– COMPUTE MAGAZINE

“... the ultimate word processor

– ANALOG MAGAZINE

“One of the easiest of the professional word processors ... a sensible manual ... plenty of aids for the accident prone.”

– COMPUTING NOW

“An excellent word processor ... well designed ... many advanced features.”

– INFOWORLD

“a ‘must have’ in an ideal software library”

– ELECTRONIC LEARNING

“... most powerful of packages”

– COMMODORE MAGAZINE

“PaperClip is a logical evolutionary step forward.”

– AHOY

“... facts attest to its excellence!”

– FAMILY COMPUTING

**COMING  
SOON!**



BATTERIES INCLUDED, an ITM company, 30 Mural Street, Richmond Hill, Ontario, Canada, L4B 1B5 (416)881-9941, Customer Information (416)881-9816. If you can't find this product at your local retailer, you may order it direct from us at the full suggested list price plus \$5.00 for postage and handling. For product orders please call 1-800-387-5707 (U.S. only). For most Batteries Included products you can always have the latest version of your program by returning the original disk and \$10.00. Write to us for our full color catalog of products for the APPLE, APPLE MACINTOSH, ATARI, ATARI ST, COMMODORE, COMMODORE AMIGA, AND IBM SYSTEMS.

©1986 Batteries Included. APPLE, APPLE MACINTOSH, ATARI, ATARI ST, COMMODORE, COMMODORE AMIGA, AND IBM are registered trademarks respectively of APPLE COMPUTERS INC., ATARI CORPORATION, COMMODORE BUSINESS MACHINES INC., AND INTERNATIONAL BUSINESS MACHINES INC. Some features may vary with computer system used.

\*AS COMPILED FROM NATIONAL RETAIL SALES REPORTS



**Integral  
Solutions**

the synthesizer module is its ability to repeat sequences infinitely while you try out different instruments. It's like changing instrumentation while the piece is playing—a real arranging tool. Of course, there is also a key to press for a single tone or repeats thereof (you may specify pitch and duration).

In AMS, editing capability is greatly expanded to include the handling of triplets (notably missing in TMS), multiple repeat structures and "loops" (infinite repeats of specified sections), and "macros" to facilitate the editing of groups of notes (even complete voices). Also included is a "notepad" file which can be separately saved to facilitate moving material among voices, repositioning it or copying it, and so forth. In contrast to TMS, the editor transposes *in notation* as well as in sound.

Don't look to AMS for anything fancy in terms of MIDI capability. However, the basics *are* covered. You'll need a SIEL or Passport MIDI interface plus a MIDI keyboard. With them, you can enter data from an external keyboard one voice at a time, edit the MIDI music files, and then play them back through the MIDI keyboard. Unfortunately, for editing, files must be converted from MIDI type to the normal AMS format. Whereas MIDI allows up to six tracks, AMS files are limited to three voices, and they eliminate much important musical information (such as pitch bend, slides, after touch, modulation). Each MIDI track is limited to one voice, and only one MIDI keyboard can be controlled by the sequencer at a time. As a simple sequencer storage device, and for keyboard pitch and rhythmic input, the MIDI module would seem most useful. I am unaware of comparable hobbyist-oriented packages which offer this feature.

The AMS linker module allows you to create link files, which are collections of individual music files. Longer arrangements, with complex sectioning, are thus possible.

Finally, the printer module permits hi-res dot-matrix printing of one to three voices, at the rate of 10 to 15 minutes per page. Commodore and Epson (Epson-compatible) printers are supported. Although printing details are especially clean, the result is only marginally useful since each voice is widely separated from the others and is printed on a double (grand) staff rather than on a single line. (Note that, with three voices, there is only one system per page.) This module also includes a text option, where you add text to the lead voice. Text is saved as a separate file, and several useful spacing options are provided. One limitation is that text is printed out only (optionally) under the top voice.

Here are my recommendations. If you primarily want rich and/or "wild" sounds, are looking for a full-featured MIDI sequencer/editor, or are a professional composer/arranger, these products are not for you. But consider *The Music System* seriously if you are an average hobbyist seeking a reasonably priced, single-disk music package to experiment with or for making short, simple arrangements. If you want an introduction to MIDI (wish to use a real keyboard) or want to make longer, more involved arrangements, take a good look at *The Advanced Music System*. (A \$40 upgrade to *The Advanced Music System* is offered with the basic package.) Both are solid, state-of-the-art pieces of software.

—Art Hunkins

Firebird Licensees  
P.O. Box 49  
Ramsey, NJ 07446  
The Music System, \$39.95  
The Advanced Music System, \$79.95

## Superbase 128

*Superbase 128* is a database designed specifically to take advantage of the advanced features of the 128. As such, it offers a lot: full 80-column display, automatic booting, and formatting of both sides of your data disks (with the 1571 drive). And to keep everything both readable and easy on the eyes, the default screen colors are green on black, emulating a monochrome monitor. Rather suddenly, your computer is displaying the power you knew was there. But now what do you do with it?

If you haven't yet used a database, a few definitions are in order so that you'll better understand the features to be evaluated.

The smallest part of a database is the *field*. This is one item of information, such as a name. Multiple fields make up a *record*—for example, the address, phone number, amount owed, and so on. Multiple records comprise a *file*. Ideally, all records in a file will have a common denominator, such as everyone who owes you money. And multiple files—everyone you know—comprise a database.

Uses for a database go far beyond merely keeping lists of names and addresses for your Christmas card list. Depending on how powerful a base is in allowing you to manipulate fields, records, and files, it may also be useful in building an invoicing system; keeping a "preferred customer" list complete with date and amount of last purchase; and cataloging your collection of Barbra Streisand albums with information on composer and lyricist of each song, as

well as the writer of the liner notes.

Fortunately, *Superbase 128* has the power to do all this and more because it is a programmable database. And being programmable means that it has a great deal of flexibility, not only in creating records, but also in accessing information from records once they have been stored.

If, for example, you want your Deadbeat file to print out (to screen or printer) everyone who owes you more than ten dollars, it is easily done. Or, if you want to access your invoice files to find out how many widgets were sold between May and July of 1985, the number of multiple sales, the number of repeat customers, and the average cost and selling price per widget, it can be done.

The key to doing all this is in two parts: designing your files at the field level, and being able to write a program that will tell *Superbase* which file to report on and which fields to manipulate.

For the former, *Superbase* allows for easy creation of records. From the first menu screen, you select Edit and are then presented with an almost blank screen. Type the title for the field, such as Lastname; specify the type of field (text); then set the length of the field according to the maximum amount of information you may have to enter (up to 255 characters for text, up to nine digits for numeric).

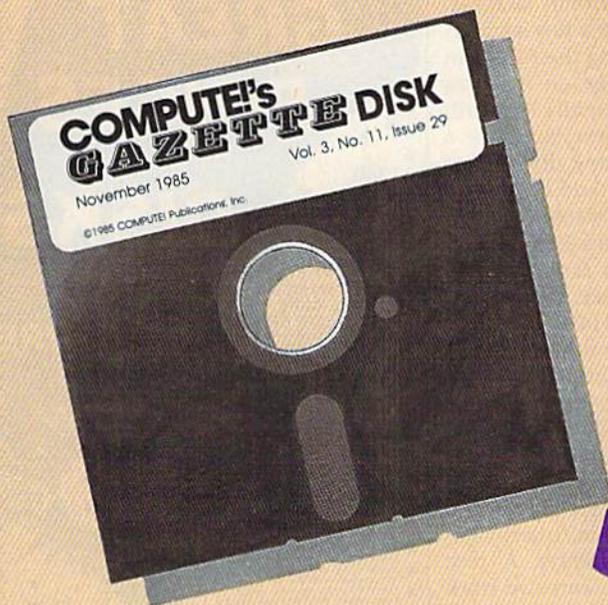
When you get to a Date field, define it as such and it will accept no other type of information. (If you use the Calendar designation, entering any date in this century will cause *Superbase* to supply the day of the week.) Similarly, a Numeric field is designed to accept only digits and may include up to four decimal places. Use this for amount owed in your Deadbeat file.

You can go on with this for quite some time: Each record can contain as many as 127 fields and comprise as many as four pages (screens) of information. Further, *Superbase* places no limits on the number of records that can be contained in a file. Think of this as a constantly expanding file cabinet; each time you add a new folder, the cabinet grows to accommodate it.

If a record is to contain calculations, you'll also want to specify a field to hold the result of those calculations. Once you've finished and saved the form of such a record, you'll be prompted for a calculation for the Result field. In the case of our Deadbeat file, we could answer the prompt with:

[balance] = [amount owed] - [amount paid]

This example illustrates the programmable part of *Superbase*, and it can be as simple as that. Dozens of new,



# BUILT FOR SPEED

---

Now Get Inside Your Commodore with  
**COMPUTE!'s Gazette Disk.**

---



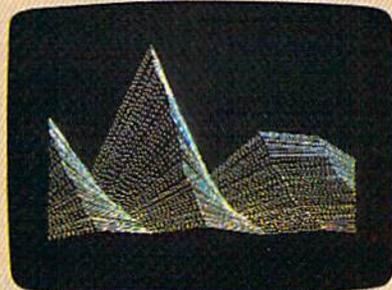
Now there's a way to get all the exciting, fun-filled programs of **COMPUTE!'s Gazette**—already on disk—with **COMPUTE!'s Gazette Disk**.

Subscribe today, and month after month you'll get a new, fully-tested 5¼-inch floppy disk guaranteed to run on your Commodore 64, Commodore 128, or VIC-20 personal computer.

**COMPUTE!'s Gazette Disk** brings you all the latest, most challenging, most fascinating programs published in the corresponding issue of **COMPUTE!'s Gazette**. So instead of spending hours typing in each program, now all you do is insert the disk...and your programs load in seconds.

RESULT: You have hours more time to enjoy all those great programs which appear in **COMPUTE!'s Gazette**—programs like Disk Editor, Face-Off, Turbo Copy, Arcade Baseball, Sound Designer, SpeedScript, and hundreds of others.

So don't waste another moment. Subscribe today to **COMPUTE!'s Gazette Disk** at this money-saving price. Take a full year's subscription for just \$69.95. You save 55 percent off the single issue price. Subscribe for two years and save even more! Return the enclosed card or call toll-free 1-800-247-5470 now (in Iowa call 1-800-532-1272).



Individual issues of the **Disk** are available for \$12.95 (plus \$2.00 shipping and handling) by calling 1-800-346-6767 (in NY 1-212-887-8525).

plain-English commands have been added, and you'll be able to use all the math operators you've used in your other programming endeavors.

Once a file of records has been created, you'll need to specify the type of information you wish to extract. Though the menu offers an Output option, this prints each record in full (to screen or printer)—and this may not always be desirable.

For those times when you may want to see only the most pertinent parts of a record, there's an easy-to-use Report Generator included in *Superbase*. Answer the prompts concerning file to work on, calculations, breaks and subtotals, and so forth, and the generator builds a BASIC program that will manipulate the information just as you want it to be manipulated.

To check this out, select Program from the menu and you'll see your report in program form, complete with line numbers. As with any BASIC program created on the Commodore, full-screen editing allows you to alter or add to the program as you wish.

While the documentation of over 200 pages does all it can to provide clarity and detailed instructions, it does fall somewhat short as a reference tool. The novice, following the step-by-step instructions in the three extensive tutorials, will be able to create an address list, a simple invoicing file, and a more complex invoicing file—but only exactly as stated in the book. For any kind of report generation that is not detailed in the documentation, you must have something more than a nodding acquaintance with BASIC.

In storing records, *Superbase* operates on a "key field" basis. Any field in a record can be specified as the key, and in our Deadbeat file we would probably want that field to be LASTNAME. Though the explanation is simplified, think of it this way: When a record is completed and stored, a separate directory consisting of only the key fields is set up on the disk. To access the record, specify the last name. *Superbase* picks it out of the key directory and finds a pointer leading to the full record. It is in this way that *Superbase* can retrieve a record in 0.3 seconds—and that's fast.

You may direct that your sort be on a field that is not the key field, but retrieval will not be as fast. You may also do multiple sorts on as many as 34 fields: With this feature you could call up the records of those who owe you money; who live in zip code 63146; who have blue eyes; and who part their hair on the left side. And that is only four fields deep. Complex sorts require more time.

I also like the manner in which a record is entered. When it's complete,

storage is to disk rather than to RAM. While this process takes a few seconds more than simply storing the record in memory for later storage on the data disk, the time would certainly be worth it in the event of a power failure or a system lockup: Everything done up to the time of the crash would be saved.

*Superbase 128* was created by Precision Software and is marketed by Progressive Peripherals & Software. Precision also developed *SuperScript 128* for word processing (also marketed by Progressive Peripherals), so it's not surprising that the two programs are integrated. With such an arrangement, it's possible to design a database report that picks out only the names and addresses from a file (and only the addresses within a particular zip code if you like) and affixes them to form letters created with *SuperScript*. A nice surprise is that *Superbase* can also work in this way with Commodore's *EasyScript* as well as with other word processors that create sequential files.

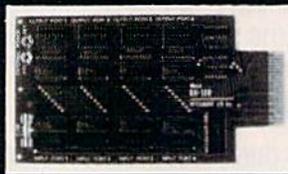
To sum up, *Superbase 128* is a powerful database, one of the most powerful available for Commodore computers.

—Ervin Bobo

Progressive Peripherals & Software  
464 Kalamath St.  
Denver, CO 80204  
\$99.95

## DISCOVER THE HIDDEN POWER!

- Control lights, appliances, heating & cooling systems, relays, motors and virtually any electrical device.
- Connect to temperature, light, sound, moisture, fluid level, pressure and vibration sensors - plus many more.
- Use as an advanced security system.
- Perform automated tests and experiments.
- Use for laboratory data acquisition.
- Access each memory mapped port via one statement in BASIC. NO INTERFACE COULD BE EASIER TO USE.
- 32 separate buffered digital output lines.
- 32 separate digital input lines.



### Expands to meet your needs:

- 1 channel A/D plug-in conversion module: \$30.
- 8 channel A/D plug-in conversion module: \$45.
- User Manual includes instructions, sample programs & diagrams of typical hookups.
- BH100 I/O Card: ONLY \$129.
- Beginner's Module with 8 LED'S, 8 switches and 1 relay: \$25.
- Beginner's I/O Interface Course Book: \$15.
- BH100, Beginner's Module and Course Book: \$159.

Intelligent I/O, Inc. P.O. Box 70  
Potsdam, NY 13676 (315) 265-6350

Please add \$2 for postage

Specify C-64, VIC-20 or Apple 2+/2e

# GREAT PRICES ON DISKS FOR THE COMMODORE!

FROM **29¢**

**WE DON'T SELL FANCY NAMES, BUT WE SURE SELL THEIR DISKS!** When you buy a name-brand disk, you pay for more than just the disk, you pay for fancy advertising, fancy packaging. But when you buy a UNITECH disk, you get a PREMIUM QUALITY, HIGH RELIABILITY, fully guaranteed disk, identical to disks that sell for many times the price. When you buy a more expensive diskette, you aren't necessarily buying a better product.

**WHO MAKES UNITECH DISKS?** They are made by top USA makers and should not be confused with low-ends or seconds. Since we are one of the largest disk buyers in the world, the manufacturers give us their best prices! In our agreements with the manufacturers, we can't reveal their names, but when you receive them you'll recognize these as among the highest-quality disks made!

**GREAT PRICE AND HIGH QUALITY!** We've tried almost every brand of disk made, but we haven't found a more reliable, higher quality disk than the Unitech Disk. Unitech is so sure that our disks are 100% perfect that we offer our famous UNCONDITIONAL 30 MONEY-BACK SATISFACTION GUARANTEE, AND OUR LIFETIME REPLACEMENT WARRANTY!

**PROPERLY PACKAGED & PRICED!** You can buy Unitech disks BULK (N-Pak) in no sleeve or box; BOXED IN DISK (D-Pak) or BOXED IN 25's (A-Pak) with label, sleeve, box, and tabs. Order D-pak, add 2¢ per disk. Please specify type when ordering.

	BULK			BOXED		
Prices are per disk. Call for 5000+ price.	100	500	1K	5K	25	100
For the Apple II, II+, IIe, IIc WUDA	37c	35c	33c	29c	49c	44c
SS/DD for single side computers #UD1	39c	37c	35c	32c	52c	46c
DS/DD for IBM-PC and compatibles #UD2	41c	38c	36c	33c	54c	48c
DS/HD-Density for IBM AT #UAT	1.75	1.71	1.68	1.65	1.90	1.83
3 1/2" single side for Mac #UD3	1.49	1.44	1.41	1.39	1.59	1.44
3 1/2" double side for Mac & Amiga #UD6	1.95	1.91	1.88	1.84	1.99	1.91
5 1/4" SLEEVES: 24# white wave #SLV	4c	3.5c	3c	2.7c		
5 1/4" SLEEVES: white Tyvek #TVY	6c	5c	4.5c	4c		

MINIMUM ORDERING DISK: 100

## MORE GREAT PRICES!

LIBRARY DISK STORAGE CASES, clear plastic #FD 99¢ ea. 10 for \$9.50  
 DISK PAK DISK CARRIER MAILERS, hard plastic, holds 5 disks #PKA 99¢  
 UNIPAK CARDBOARD DISK MAILERS, holds 3 disks & letter, 6x8" #UNIPAK 10.5¢  
 FLIP TOP DISK FILES, holds 70 disks, smoked plastic #FD \$8.88  
 GIANT DISK STORAGE FILE, holds 100 disks, removable top w/lock key #FD10 \$11.88  
 GIANT FLIP TOP STORAGE FILE, holds 100 disks, flip-top #FD11 \$11.88  
 COMPUTER POWER CABLES, fits Apple, IBM & compatibles 5ft #CPC \$2.00  
 DRYS GENDER CHANGERS, all pins wired, choose M/M (#MGC) or F/F (#FFC) \$7.77  
 8 PARALLEL (HASP) OR SERIAL (HASP) SWITCH BOX, your choice \$19  
 5" HEAD CLEANER KIT, 3 cleaner disks & solvent, 45 uses! #CKC \$4.95  
 COLOR DISK ASSIST, 25 disks w/slv, DS DD, #UC21-ASST \$18.75 / 75¢ ea  
 DISK DRIVE DUMMIE PANELS, full height #FHP or half height #HHP \$1 each  
 COMPUTER MAILING LABELS, std 5 lines x 3.5" #LAB \$1.95 box of 5000  
 COPY II FOR COMMODORE SOFTWARE, backs up protected programs #CCOM \$39

## INCREDIBLE PRICES ON ACCESSORIES!

UNI-NOTCH DISK NOTCHER \$7.77  
 RIGID-PAK DISKETTE MAILER/CARRIER \$3  
 SURGE PROTECTOR \$19

Access 2nd side of disk #2N1  
 Holds 5 disks Hard plastic #RPAK  
 Six switched outlets w/circuit breaker #ACPC2

RIBBONS FOR COMMODORE 801 #PR894 \$5.80 ea 12 \$63.80  
 RIBBONS FOR COMMODORE 803 #PR895 \$5.80 ea 12 \$63.80  
 RIBBONS FOR COMMODORE 8022 8022, EPSON M380 PR470 \$4.50 ea 12 \$49.50  
 RIBBONS FOR COMMODORE 2022 2022, GEMINI 10 15 15X #PR180 \$2.15 ea 12 \$23.65  
 RIBBONS FOR OKIDATA 80 81 82 82A 83 83A 92 93 #PK180 \$2.15 ea 12 \$23.65  
 RIBBONS FOR EPSON MX 80 FX 80, #PR470 \$4.50 ea 12 \$49.50  
 RIBBONS FOR APPLE II/IIe/IIc, CITRON PROWRITER, PR498 \$4.50 ea 12 \$49.50  
 WRITE PROTECT TABS, #TAB 100 tabs \$1.00, 1000 tabs \$9  
 MEMORY EXPANSION RAMS, 150ms, 4164 (64K) \$1.50 ea; 41256 (256K) \$5.40 ea

**DS/DD COLORED DISKS from 62¢**  
 Helps keep files organized! Available in light blue, dark blue, yellow, green, brown, red, lavender, maroon, grey, white, magenta, orange.  
 Packed 25 per pack, order in multiples of 25 per color. Mix and match colors for quantity discounts! Notched, with hub rings. Comes with sheets of labels, write protect tabs. Purchase sleeves separately. For the IBM-PC, compatibles, Apple II series, Commodore, TRS-80, Atari, Kaypro, etc. Order by #UC2N-color  
 25/79¢ each 100/69¢ 500/62¢ 1000+ call

**HOW TO ORDER:** Pay by MC, Visa, Amex, COD, or send check with order. Min order \$20, add \$3 for UPS shipping +\$2 if COD (no extra charge for credit cards). We can ship open account to schools, min school purch order \$100. FOB Unitech. All orders must include daytime phone and STREET address. MONEY BACK 30-DAY SATISFACTION GUARANTEE! SEND FOR FREE CATALOG LISTING 100'S OF COMPUTER BARGAINS!

202 HURLEY STREET  
CAMBRIDGE, MA 02141-2176  
IN MASS (617) UNITECH

# UNITECH

(800)343-0472

**BBS 64 or 128****\$39.95**

These are full performance BBSs that include all the options of the big boards. Including 300/1200 baud, remote access, printer options, 10 levels of security, X-Modem-New Punter & Midwestern Protocols. These programs use one or two disk drives, are easy to set up and run. Anyone can do it.

**N-CODER & D-CODER****\$29.95**

These are Machine Language helpers everybody should have. D-Coder reads data right off the disk and gives you an English translation of each command. Can be used to examine any Machine language programs protection routines. N-Coder ALLOWS YOU TO MAKE CHANGES IN MACHINE LANGUAGE PROGRAMS...RIGHT ON THE DISK. Now both programs are included in one price.

**GRAPHIC LABEL MAKER****\$24.95**

This program will allow you to use graphics provided or use your Print Shop Graphics when you print your labels. It also works with the XXX Rated Data Disk XXX. All you have to do is insert 3 lines of text then choose the picture you want to run then, print and your done.

**MAGNUM LOAD****\$29.95**

Magnum Load is a new replacement for the KERNAL ROM for both the C-64 or C-128. Magnum Load will increase your load speed by 6x faster. In most cases it will load faster than FastLoad or Mach 5. Unlike Fastload and Mach 5, using Magnum Load allows your cartridge port to be free for other use.

**PHOTOCOPY****\$24.95**

Photocopy is a graphics integration program used to transport your favorite graphics from one program to another. It can convert Print Shop to Newsroom, Hi-Res to Print Shop or Newsroom. Photocopy works with a variety of files doodle, Flexidraw, Print Shop, Screen Magic, Graphics Basic and Computer-eyes.

**C-64/128 TERMINAL PACK. +****WARGAMES  
AUTODIALER****\$29.95**

This is a full featured package...It has EVERYTHING already included. There's Swifterm 64, Swifterm 128, and WarGames Autodialer for both the 64 & 128. Features include up/down load with New Punter, X-Modem, and Midwestern. 29k buffer, 300/1200 baud, printer dump, phone book, and auto dial to name a few.

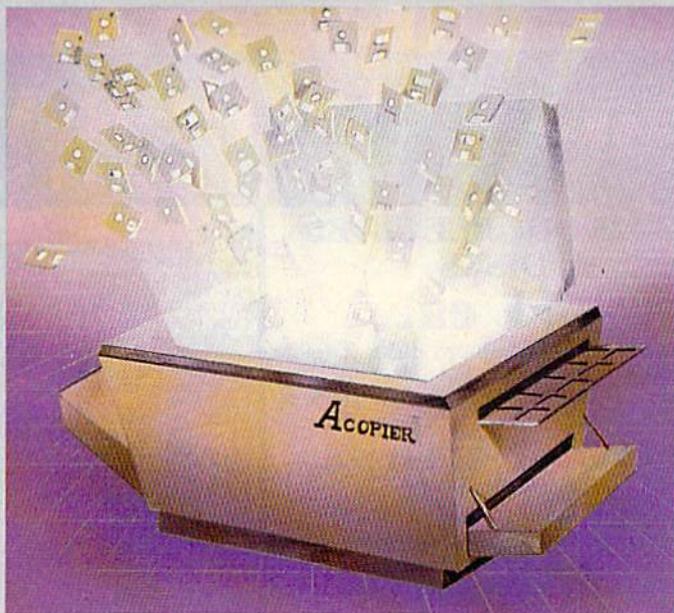
**THE SOFTWARE  
PROTECTION HANDBOOK****\$29.95**

Over 250 pages that cover software protection, copying, protect and unprotect software, and the legalities involved. This FOURTH EDITION includes Track Trap, the most unusual and inovative protection analysis tool for the C-64 yet! This addition will allow you to load an 8K block of data (a whole track at a time) into the drive, then sends it over to the computer for modification before saving it back to the disk. This allows you to copy virtually any track.

Dealer and Distributor Inquires Invited.

Enclose Cashiers Check, Money Order or Personal Check. Allow 2 to 6 weeks for delivery.

\$3.00 S & H on all orders  
Software Submissions Invited

**A-COPY and TOOLS 64/128**

This is the first full featured copier with a complete set of tools to go with it. There are none better or faster than A-Copier. Parameter are built in and require no additional time spent looking for the right parameter...LIKE ALL THE REST REQUIRE... The copier is fully automatic, fast and easy to use. This copier will work with one or two 1541s drives or...1571s in the 64 or 128 mode. Other major features include...Fast File Copy, Hesmon, Drive Alignment Prg, Directory + and Drive Monitor.

**List of available features**

A-Copier	Fast File Copier
Hesmon by Hesware	Drive Alignment Prg.
Directory +	Write Protect
Bootmaker	Unnew a Program
Drive Monitor	Repair a Track

**10 Sec Format**

This package is the most effective tools available at any price. This package also comes with a complete easy to understand manual for all programs listed.

**\$39.95****SPECIAL DEALS**

HESMODEM 1  
with QUANTUM LINK ..... **\$19.95**

DISK NOTCHERS ..... **\$ 5.99**

128 40/80 COLUMN  
ADAPTER with SOUND ..... **\$12.95**

10 FOOT LONG  
DRIVE CABLE ..... **\$ 7.95**

To place your order by phone Call (206) 687-7176  
or in Canada call (705) 746-8081

For mail Orders:

**MegaSoft**  
LTD

P.O. Box 1080  
Battle Ground, WA 98604

or in Canada: **MegaSoft Canada LTD**  
P.O. Box 10  
Parry Sound, Ontario 92A 1P8



# SUPER VALUES

## PROTECTO ENTERPRISES



### C-128 DOUBLE SIDED DISKS

# .44 ea.

100% Certified 5 1/4" floppy disks. Lifetime Warranty, automatic lint cleaning liner included. 1 Box of 10 \$4.90 List \$1.99 ea. SALE \$ .44 ea.

### VOICE SYNTHESIZER

# \$39.95

List \$89

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! PLUS (\$19.95 value) TEXT TO SPEECH program included FREE. (Disk or Tape) List \$89.00 SALE \$39.95

### VOICE COMMAND MODULE

# \$39.95

List \$80

The VCM is a speech recognition device that lets you give commands to your C-64 with your voice. List \$79.95 SALE \$39.95

### SUPER AUTO DIAL MODEM

# \$29.95

List \$99

Easier to use than dialing your telephone. Features on-line clock, dialing from keyboard, capture and display high resolution characters, and much more. Includes exclusive easy to use program for up and down loading to printer and disk drives. Best in U.S.A. List \$99.00 SALE \$29.95

### 1200 BAUD MODEM

# \$79.95

List \$199

Same features as the above modem along with C-128 mode and 1200 Baud speed. List \$199.00 SALE \$79.95

## SOFTWARE

ACCESS	
ACTION PACK (D)	\$14.95
LEADER BOARD (D)	23.95
COURSES FOR LEADER BOARD (D)	13.95
MACH 5 (C)	19.95
MACH 128 (C)	28.95
TENTH FRAME (D)	23.95
ACCOLADE	
ACE OF ACES (D)	\$18.95
DAM BUSTERS (D)	18.95
ACCOLADE FOOTBALL (D)	19.95
FIGHT NIGHT (D)	18.95
HARDBALL (D)	18.95
LAW OF THE WEST (D)	18.95
KILLED UNTIL DEAD (D)	19.95
COSMI	
SUPER HUEY II (D)	\$14.95
TALLADEGA (D)	12.95
BEYOND FORBIDDEN FOREST (D)	14.95

BCI	
PRO GOLF BY TOM WEISKOPF (D)	\$11.95
MR. TESTER (D)	5.95
PRINTERS LIB. 1 (D)	8.95
PRINTERS LIB. 2 (D)	8.95
DATABASE MGR./PLUS FOR C128 (D)	14.95
TASK FORCE (D)	4.95
BROODERSUN	
PRINT SHOP (D)	\$27.95
GRAPHICS LIB. 1,2 or 3 (D)	15.95
COMPANION (D)	22.95
TOY SHOP (D)	39.95
WHERE IS CARMEN SAN DIEGO (D)	21.95
GRAPHICS LIB. HOLIDAY ED. (D)	15.95
DATA EAST	
COMMANDO (D)	\$22.95
KARATE CHAMP (D)	22.95
KUNG FU MASTER (D)	22.95
DATA SOFT	
BAKER STREET (D)	\$18.95
MERCENARY (D)	18.95
NEVER ENDING STORY (D)	18.95
MIND PURSUIT (D)	18.95
VIDEO TITLE SHOP (D)	18.95
THEATRE EUROPE (D)	19.95
DESIGNWARE	
BODY TRANSPARENT (D)	\$26.95
EUROPEAN NATIONS & LOCATIONS (D)	19.95
STATES AND TRAITS (D)	19.95
ELECTRONIC ARTS	
HEART OF AFRICA (D)	\$9.95
ONE ON ONE (D)	9.95
PINBALL CONSTRUCTION (D)	9.95
MUSIC CONSTRUCTION (D)	9.95
RACING DESTRUCTION (D)	9.95
MARBLE MADNESS (D)	24.95
CHESSMASTER (D)	26.95
BATTLEFRONT (D)	26.95
LORDS OF CONQUEST (D)	22.95
BLUE CHIP	
BARON (D)	\$16.95
MILLIONAIRE (D)	16.95
TYCOON (D)	16.95
EPYX	
CHAMPIONSHIP WRESTLING (D)	\$23.95
FAST LOAD (C)	22.95
MOVIE MONSTER (D)	23.95
WINTER GAMES (D)	23.95
WORLD GAMES (D)	24.95
WORLD KARATE (D)	17.95
WORLD'S GREATEST FOOTBALL (D)	22.95
FIREBIRD	
COLOSSUS CHESS (D)	\$22.95
ELITE 64 (D)	22.95
FRANKIE GOES TO HOLLYWOOD (D)	22.95
BATTLE OF BRITAIN/BATTLE OF MIDWAY (D)	9.95
IWO JIMA/FAULKLANDS (D)	9.95
TALKING TEACHER (D)	24.95
HI-TECH EXPRESSIONS	
CARD WARE (D)	\$7.95
HEART WARE (D)	7.95
PARTY WARE (D)	9.95
WARE WITH ALL KIT (D)	9.95
JINGLE DISK (D)	4.95
HOLIDAY PRINT PAPER (D)	7.95
SUB-LOGIC	
FLIGHT SIMULATOR II (D)	\$31.95
JET (D)	26.95
FOOTBALL (D)	27.95
BASEBALL (D)	31.95
S.S.I.	
ROADWAR 2000 (D)	\$23.95
BATTLE OF ANTIETAM (D)	31.95
GETTYSBURG (D)	35.95
MECH BRIGADE (D)	35.95
NAM (D)	23.95
U.S.A.A.F. (D)	35.95
KAMPFGROPPE (D)	35.95
WAR SHIP (D)	35.95
HAYDEN	
SARGON II (D)	\$9.95
SAT VERBAL (D)	14.95
SAT MATH (D)	14.95
SAT PRACTICE TEST (D)	14.95
SOFTSYNC	
ACCOUNTANT, INC. C128 (D)	\$85.95
DESK MANAGER (D)	24.95
KID PRO Q/U (D)	18.95
MODEL DIET (D)	18.95
TRIO C64 (D)	32.95
SPINNAKER	
DELTA DRAWING (C)	\$4.95
NUMBER TUMBLERS (C)	4.95
SEA SPELLER (C)	4.95
UP & ADD'EM (C)	4.95

**BEST SERVICE IN THE U.S.A. • 90 DAY REPLACEMENT WARRANTY • ONE DAY EXPRESS MAIL • 15 DAY FREE TRIAL • OVER 500 PROGRAMS • A CUSTOMER LIST OF OVER 3,000,000 LARGEST IN THE U.S.A.**

**CALL FOR FREE CATALOG WITH \$2.00 OFF COUPON!**

## SPECIAL BONUS 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 \$250 off sale prices!

### (EXAMPLES)

## PROFESSIONAL SOFTWARE COMMODORE 64

Name	List	Sale	Coupon
Paper Clip	\$59.95	\$34.95	\$29.95
Consultant	\$59.95	\$34.95	\$29.95
Leader Board	\$39.95	\$22.95	\$21.95
The Print Shop	\$44.95	\$27.95	\$25.95
Bop 'N' Wrestle	\$39.95	\$19.95	\$18.95
Super Huey	\$19.95	\$12.95	\$11.95
Voice Command Module	\$79.95	\$39.95	\$34.95
Nine Princes in Amber	\$32.95	\$20.95	\$19.95
Super Bowl Sunday	\$35.00	\$19.95	\$17.95
Flip and File Disk Filer	\$24.95	\$14.95	\$12.95
Pro Joystick	\$19.95	\$12.95	\$10.00
Party Ware	\$19.95	\$14.95	\$ 9.95
Dust Cover	\$ 8.95	\$ 5.95	\$ 3.95
Financial Planner	\$49.95	\$29.95	\$25.95
Hardball	\$29.95	\$17.95	\$16.95
C64 Troubleshoot & Repair Guide	\$24.95	\$12.95	\$10.95

(See over 100 coupon items in our catalog.)

**Write or Call for sample Special Software Coupon!**

## PHONE ORDERS

8 a.m. - 8 p.m. C.S.T. Weekdays  
9 a.m. - 12 noon C.S.T. Saturdays  
**(312) 382-5244**

## THE 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.**

Add \$3.00 for shipping, handling, and insurance. Illinois residents please add 6 1/2% sales tax. Add \$6.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. All orders must be in U.S. Dollars. WE DO NOT EXPORT TO OTHER COUNTRIES EXCEPT CANADA. Enclose Cashier Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail. Prices & Availability subject to change without notice. Hardware shipping prices vary according to weight. Please call for amount.

VISA—MASTER CARD—C.O.D.

C.O.D. on phone orders only.

**SAVE**

# SUPER DEALS

(312) 382-5244 TO ORDER

**SALE**

**COMMODORE 64  
COMPUTER  
\$99.00\*** List \$299

\*You pay only \$99.00 for the Commodore 64 when you purchase a Pocket Writer 64 word processor for only \$39.95. List \$299.00 SALE \$99.00

**1541 DISK DRIVE  
\$179.00** List \$249

To run all that software and add to the prestige of your system, you'll want the 1541 disk drive. Runs all of the 3,000 plus pieces of software for the Commodore 64. List \$249.00 SALE \$179.00



**COMMODORE 128  
COMPUTER  
\$289.00** List \$399

This powerful 128K computer has three modes. One for C-64 software, one for C-128 software, and one for CP/M business software. List \$399.00 SALE \$289.00

**340K 1571 COMMODORE  
DISK DRIVE  
\$259.00** List \$349

Double sided, single disk drive for the C-128 allows you to use the C-128 mode plus CPM mode. 17 times faster than the 1541, and runs all the 1541 formats. List \$349.00 SALE \$259.00

**PRINTER/TYPEWRITER  
COMBINATION  
\$199.95** List \$299

Superb letter quality daisy wheel printer/typewriter combination, just a flick of the switch to interchange. Extra large carriage, typewriter keyboard, automatic margin control, compact, lightweight, drop in cassette ribbon! (90 day warranty) Centronics Parallel Interface is built in. List \$299.00 SALE \$199.95

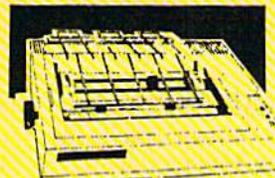
**10" COMSTAR 1000  
PRINTER  
\$179.95** List \$349

This is one of the best values in the United States today. Print letters, documents, programs, and more at 100 characters per second or 20 cps in Near Letter quality mode. Some features are dot addressable graphics, adjustable tractor and friction feed, margin settings, pica, elite, condensed, italics, super & subscript, underline, bold, and double strike. List \$349.00 SALE \$179.95

**CALL BEFORE YOU ORDER: • OUR PRICES MAY BE LOWER  
& AND WE OFFER SPECIAL SYSTEM DEALS •**

**BIG BLUE PRINTER  
\$39.95**  
List \$199.00

This is the affordable printer you have been waiting for! This 8½" letter size, 80 column thermal printer features upper and lower case, underline, graphics, word processing, and much more. List \$199.00 SALE \$39.95



**PREMIUM QUALITY  
150-170 CPS COMSTAR  
AERO 160 PRINTER  
\$199.00** List \$499

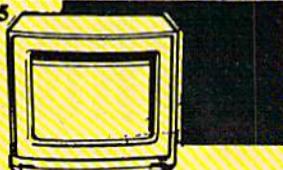
The Comstar Aero 160 gives you a 10" carriage, 150-170 CPS, 9x9 dot matrix with double strike capability for 18x18 dot matrix (near letter quality), high resolution bit image (120x144 dot matrix), underline, back spacing, left and right margin setting, true lower descenders with super and subscripts, prints standard, block graphics and special characters. It gives you print quality and features found on printers costing twice as much! (Centronics Parallel Interface) List \$499.00 SALE \$199.00

**13" COLOR MONITOR  
\$139.95** List \$329

This premium quality monitor comes with speaker and audio hook up, High lines, front panel controls and much more. Can also be used with VCR. One year warranty. List \$329.00 SALE \$139.95

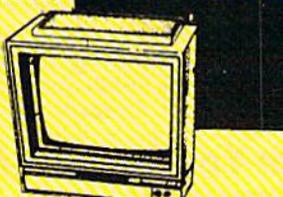
**TV TUNER  
\$49.95** List \$130

This tuner has dual UHF/VHF selector switches, mute, automatic fine tuning and computer/TV selector switches. Hook it up between your computer and monitor! Inputs included for 300 ohm, 75 ohm, and UHF. List \$129.95 SALE \$49.95



**12" 80 COLUMN  
MONITOR  
\$79.95** List \$129

Super High Resolution green screen monitor. 80 columns x 24 lines, easy to read, plus speaker for audio sound included. Fantastic value. List \$129.00 SALE \$79.95



**14" RGB & COMPOSITE  
COLOR MONITOR  
\$239.95** List \$399

Must be used to get 80 columns in color with (RGB cable \$19.95) Add \$14.50 shipping. List \$399.00 SALE \$239.95

**ATTENTION  
COMPUTER CLUBS • DEALERS  
We offer big volume discounts!  
CALL TODAY**

## PROTECTO

*We Love Our Customers*

22292 N. Pepper Rd., Barrington, Illinois 60010  
**(312) 382-5244 to order**

# Color Monitor Sale



*(Premium Quality)*

- Built in Speaker & Audio
- For Video Recorders
- For Small Business Computers
- Apple - Commodore - Atari - Aplus 3000 -etc.
- One Year Warranty\*



*(Premium Quality)*

- Beautiful Color Contrast
- High Resolution
- Sharp Clear Text
- Anti-Glare Screen
- 40 Columns x 24 Lines
- Front Panel Controls

List \$329<sup>00</sup>

**Sale \$139<sup>95</sup>\***

Add \$14.50 Shipping



**13" Color Computer Monitor\***

\* C64/Atari composite cable \$9.95

\* C128 RGB/Composite 80 column cable \$19.95.

## 14" RGB & Composite Color Monitor

Allows use of C-128 and C64 mode - composite and 80 column RGB mode. Must be used to get 80 columns in color with 80 column computers. Specially designed for use with the C128's special composite video output, plus green screen only option switch. (add \$14.50 shipping)

List \$399.00

**Sale \$239<sup>95</sup>\***

## 12" 80 Column Green/Amber Monitor

List \$129.00

Super high resolution composite green or amber screen monitor. 80 columns x 24 lines, easy to read. Fantastic value. Limited Quantities.

**Sale \$79<sup>95</sup>\***

## 9" Samsung Hi Res Green Screen Monitor

Super High Resolution 80 column monitor perfect for Apple & Laser 3000/128 computers. Fantastic Value. Very Limited Quantities.

List \$129.95

**Sale \$59<sup>95</sup>\***

## Turn Your Monitor into a TV Set Without Moving Your Computer

Elegant TV Tuner with dual UHF/VHF selector switches goes between your computer and monitor. Includes mute, automatic fine tuning and computer-TV selector switches. Inputs included for 300 ohm, 75 ohm, and UHF. Can be used with cable TV and VCR's. Fantastic Value. Limited Quantities. (Includes loop antenna for UHF & RCA connecting cables) (Add \$3.00 Shipping. Plus \$3.00 for APO/FPO).

List \$129.95

**Sale \$49<sup>95</sup>**

**15 Day Free Trial - 90 Day Immediate Replacement Warranty**

• **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 1/4% tax. Add \$20.00 for CANADA, PUERTO RICO, HAWAII, and ALASKA orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES, EXCEPT CANADA. Enclose Cashier Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Prices & Availability subject to change without notice. VISA — MASTER CARD — C.O.D. C.O.D. on phone orders only

**PROTECTO**

*We Love Our Customers*

22292 N. Pepper Rd., Barrington, Illinois 60010

**312/382-5244 to order**

**Famous National Brand**

**Commodore® • Atari® • Apple® • IBM®**

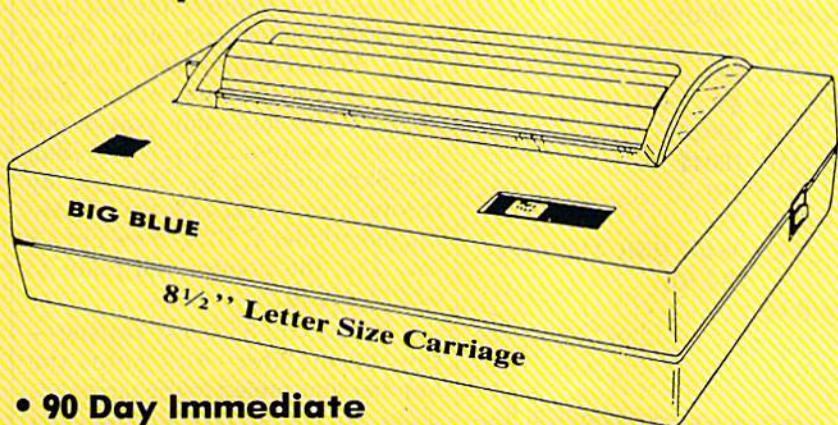
**We Like this Printer so much  
We Bought Out the Factory.**

List \$199.00  
**Sale \$39.95**

List \$199.00  
**Sale \$39.95**

# 80 Column Printer Sale

- Word Processing • Program Listings • Graphics • Quiet Operation • Upper and Lower case • All points addressable Graphics • Underline • Enhanced • Much much More



## Super Print Quality

This printer was made by Canon® for one of the largest computer manufacturers in the world. The Big Blue printer comes ready to hook up to the serial port of the IBM® PC jr. Plus with low cost adapter cables you can connect the Big Blue printer to the IBM® PC, IBM® XT, IBM® AT, IBM Compatibles, Apple® II, IIe, IIc, Apple Compatibles, Commodore® 64, 128, Atari®, plus many more.  
(Also VIC 20)

- 90 Day Immediate Replacement Warranty
- 15 Day Free Trial-Satisfaction or Money Back

Now you can have a full fledged 8½" letter size 80 column printer for less than the cost of a large box of paper. This printer uses advanced thermal technology to print upper and lower case (with true lower descenders), underline, enhanced, all points addressable graphics (works with Printshop) plus More. Print out pictures, program listings, wordprocessing pages, graphics and more. Perfect for the homeowner or student and definitely affordable. Fantastic Printer at an unbeatable price. List \$199.00 Sale \$39.95

Paper (2 Rolls) List \$19.95 Sale \$9.95

**Intelligent Commodore Interface**— Allows you to connect the Big Blue printer to the printer port of the Commodore 64 and 128 computer. Print Commodore graphics, use Printshop, Word processors and more...  
List \$49.95 Sale \$24.95

**Intelligent Atari Interface**— Allows you to connect the Big Blue printer to Atari computers (except 1200). Print Atari graphics, Printshop, word processors, and more... List \$49.95 Sale \$24.95

**IBM® PC, AT, XT, PC jr. Apple® RS-232 Adapter** — Adapts the Big Blue printer to be used with any RS-232 port. List \$19.95 SALE \$9.95

**Apple II, II plus, IIc, IIe, Atari 520 ST, Laser 128, Amiga interface** — List \$24.95 SALE \$12.95

IBM, Apple, Canon, Commodore, Atari are trademarks of International Business Machines, Apple Computer, Canon Inc, Commodore Business Machines, Atari Inc. Respectively.

Add \$10.00 for shipping, handling, and insurance. Illinois residents please add 6¼% sales tax. Add 20.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. All orders must be in U.S. Dollars. WE DO NOT EXPORT TO OTHER COUNTRIES EXCEPT CANADA. Enclose Cashier Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail. Prices & Availability subject to change without notice.

**VISA — MASTER CARD — C.O.D.** C.O.D. on phone orders only.

## PROTECTO

*We Love Our Customers*

22292 N. Pepper Rd., Barrington, Illinois 60010

**312/382-5244 to order**

# machine language for beginners

## A Practical Program

Richard Mansfield  
Senior Editor

Last month we started using the primary tool of machine language (ML) programming: an assembler to create executable programs. Now let's put our assembler to work and write a program for the 128 and 64 which will test RAM memory.

The program will POKE in every possible number (0-255) that can be held in a RAM memory cell, and it will then check to see whether that number really made it into the cell to which it was POKEd. Aside from allowing you to spot defective RAM chips (the routine will report the address of any offenders), it will allow us to explore some fundamentals of ML programming. This month we'll set it up to test screen RAM so that we can see it working (128 users should set the screen to 40-column mode).

Take a look at the "Screen Test" program below. When you first start to learn ML, the three-letter codes which are its commands seem quite mysterious. Actually, there are about as many commands in ML as in BASIC and, as you would expect, you'll use only about 20 of them most of the time. However, where BASIC spells out command words, ML abbreviates. For example, RETURN in BASIC is the equivalent of ML's RTS (ReTurn from Subroutine) command; BASIC's  $X = X + 1$  becomes INX (INcrement X); and GOTO becomes JMP (JuMP). But you get used to these abbreviations very quickly.

If you're using the simple assembler published last month, give 10000 as the start address of this program and then type in the three-letter ML commands in the program. Note the different number at address 10041 required for the 64. If you're using a different assem-

### Screen Test

```
10000 LDA #4
10002 STA 253
10004 LDA #0
10006 STA 252
10008 TAY
10009 TAX
10010 STA (252)Y
10012 CMP (252)Y
10014 BNE 10037
10016 DEX
10017 BEQ 10023
10019 TXA
10020 JMP 10010
10023 INY
10024 BNE 10010
10026 INC 253
10028 LDA 253
10030 CMP #8
10032 BNE 10010
10034 JMP 10044
10037 LDA 253
10039 LDX 252
10041 JSR 36402 (JSR 48589 for
the 64)
10044 RTS
```

bler, insert a comma between the right parenthesis and the Y in lines 10010 and 10012: ),Y.

When you're finished, you can SYS 10000 to test it. The screen will be POKEd with all the possible characters—but it will happen too fast to see. After each cell has been tested, the letter A, the last POKE, will remain behind.

### A Feel For The Language

Let's now go through the program step by step to get a feel for how the language works. We start off by putting a 4 into address 253. Address 253 is going to be a *pointer* into memory. It will always hold the *page* of the address being acted upon while we PEEK and POKE during the program. Memory can be conveniently divided into 256-cell chunks called pages. So, by

putting a 4 into our pointer, we're directing the action to the fourth page (4 \* 256 is 1024, the start address of the screen RAM cells in the 64 and 128).

When you want to POKE a number in ML, you must first enter that number into a *register*. The accumulator is the most often used register. We LDA (LoaD the Accumulator) with 4 by using the # sign before the 4 to show that we mean the *actual number 4* rather than whatever number might be currently held in *address 4*. So our first job is to set up a pointer, and we load the accumulator and store the 4 (STA 253). Pointers are two-byte units, so we then put a zero into 252, the less important part of our pointer. Address 252 points *within* the page defined by 253. So, by storing a zero into 252, we're leaving the pointer at 1024. If we put a 6 into 252, the pointer will point to address 1030.

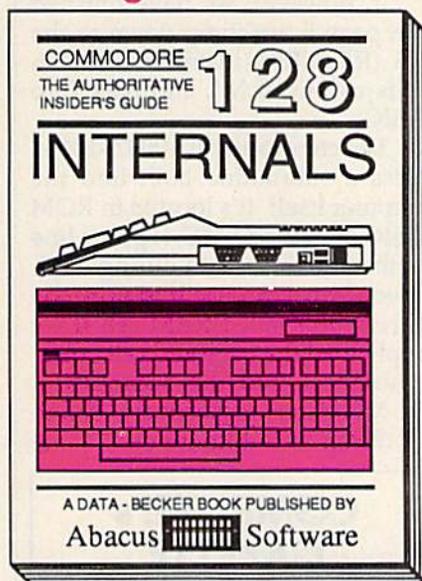
When you STA, the register—the accumulator—still holds the number you copied to the target address. So, we can take advantage of this by transferring the zero still sitting in the accumulator to the X and Y registers by TAX and TAY. We could have used LDX #0 and LDY #0, and the effect would have been the same; we just took a shortcut.

We're zeroing X and Y because we're going to use them as loop counters. You don't have FOR-NEXT commands in ML, so you set up your own counters. Our main loop starts with STA (252)Y, which causes whatever is in the accumulator to be stored into the cell *pointed to by the pointer* we set up *plus the value of Y*. In this first pass through this command, Y is a zero, so a zero is stored in address 1024, and we then compare what's in the cell to what's still in the accumulator (CMP). They should be the same unless RAM is faulty and can't accept the zero we just stored there.

One good book...

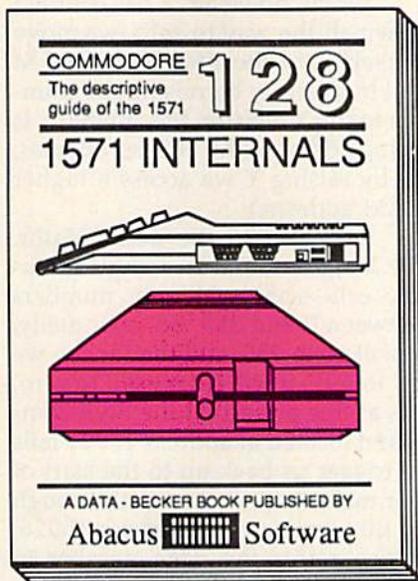
deserves another...

and another...



**C-128 INTERNALS**

Detailed guide presents the 128's operating system, explains graphic chips, Memory Management Unit, 80 column graphics and commented ROM listings. 500pp \$19.95



**1571 INTERNALS**

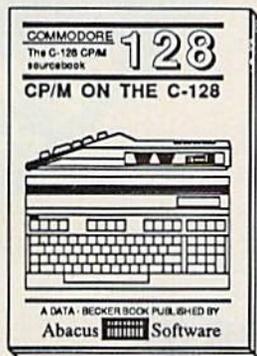
Insiders' guide for novice & advanced users. Covers sequential & relative files, & direct access commands. Describes DOS routines. Commented listings. 450pp \$19.95



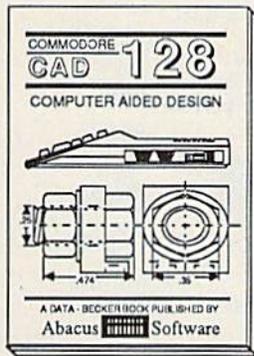
**C-128 TRICKS & TIPS**

Filled with info for everyone. Covers 80 column hi-res graphics, windowing, memory layout, Kernal routines, sprites, software protection, autostarting. 300pp \$19.95

And so on... and on... and on... and on... and on...



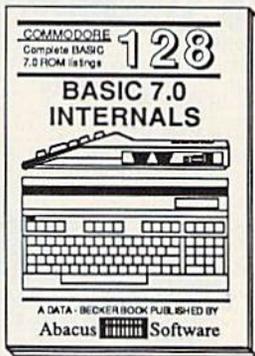
**C-128 CP/M USER'S GUIDE**  
Essential guide for everyone interested in CP/M on the 128. Simple explanation of the operating system, memory usage, CP/M utility programs, submit files & more. \$19.95



**C-128 Computer Aided Design**  
Learn fundamentals of CAD while developing your own system. Design objects on your screen to dump to a printer. Includes listings for '64 with Simon's Basic. 300pp \$19.95



**C-128 BASIC Training Guide**  
Introduction to programming; problem analysis; thorough description of all BASIC commands with hundreds of examples; monitor commands; utilities; much more. \$16.95



**C-128 BASIC 7.0 INTERNALS**  
Get all the inside information on BASIC 7.0. This exhaustive handbook is complete with fully commented BASIC 7.0 ROM listings, more. \$19.95



**C-128 PEEKS & POKES**  
Presents dozens of programming quick-hitters. Easy and useful techniques on the operating system, stacks, zero-page, pointers, the BASIC interpreter and more. \$16.95

Commodore 64<sup>®</sup> and Commodore 128<sup>™</sup> are trademarks of Commodore Electronics Ltd.

**Abacus**

P.O. Box 7219 Dept. CB Grand Rapids, MI 49510 - Telex 709-101 - Phone (616) 241-5510

If you want to start up (or add on to) the most comprehensive and coordinated series of **Commodore 128 reference books** available anywhere, check your local bookstore or software dealer. Or order directly using your MC, Visa or Amex credit card. Add \$4.00 per order for shipping and handling. Foreign orders add \$10.00 per book. Call now or write for your **free catalog**—also contains information on our C-64 books and software. Dealers inquires welcome—over 1400 dealers nationwide.

## GOTO And NEXT

If there is a failure, we are sent off to an error-reporting subroutine at address 10037 within our program. BNE means Branch if Not Equal. It causes the program to GOTO its target address if the previous action (the CMP in this case) was not equal. In other words, if the number currently in the accumulator is not the same number discovered in the RAM cell sampled by the CMP, the branch takes place. Conversely, if the compared numbers are equal, the program passes right over the branch and ignores it. An ML branch, then, is the equivalent of IF-THEN-GOTO.

Now we come to the ML equivalent of BASIC's NEXT command. DEX reduces the X register by one, and BEQ (Branch if Equal to zero) tests to see whether the X register has reached zero yet. If so, we are branched out of this loop and sent down to address 10023. However, while X is still counting down, we don't want to branch, so we transfer the value of X (the next number we're going to be POKEing into the RAM cell currently under test). Then

we jump back up to the start of our POKE-PEEK loop at 10010.

When, however, X has counted down all the way to zero, we move ourselves to the next higher RAM cell in memory by raising the number in the Y register. (Recall that Y is being added to the pointer address, so by raising Y we access a higher RAM address.)

But Y—like the accumulator, the X register, and any single memory cell—can hold only numbers between 0 and 255. So, eventually, Y will go to 255, and then when we try to INY, it will reset itself to zero. It's at this point that the BNE command located at address 10024 fails to trigger us back up to the start of our main loop, and we fall through to the command at address 10026, which raises the page number in our pointer by one. (INC means increment.) Then we load the page pointer into the accumulator and check to see whether it is yet an 8 (which would mean we've reached the bottom of screen RAM). If not, we return to loop through the next page (we just INCed the page pointer, so now we're ready to test

a new, higher 256-byte-size chunk of RAM).

If, however, we have finished with page 8, we jump down to the RTS (RETURN) instruction which sends us out of ML and back into BASIC.

The commands at 10037-10041 access a subroutine built into the computer itself. It's located in ROM BASIC and, for BASIC, it prints line numbers to the screen during LIST. However, we can use it to print the address of a failed RAM cell if we simply load the page and cell pointer numbers into the accumulator and X register, respectively, before JSR (Jump to SubRoutine). 

**COMPUTE!'s  
GAZETTE  
TOLL FREE  
Subscription  
Order Line  
1-800-247-5470  
In IA  
1-800-532-1272**

**THEY'RE BACK!!**



"If there's something strange on any track, ZAP it with our POWER-PAK!"

"If you can't get a copy to work at all, then who you gonna call?? DISKBUSTERS™ !!!"

"If there's a disk you can't crack, you'll need our Super POWER-PAK!"

**DISKBUSTERS™ 2**  
THE SUPER NEW COPIER FOR C128 & C64!  
For SUPER "Paranormal" Copying!

**NEW!!  
VOL. 2!**

**HAS SOMETHING STRANGE BEEN PREVENTING YOU FROM COPYING YOUR SOFTWARE? THEN DISKBUSTERS2™ IS THE COPIER YOU'VE BEEN WAITING FOR!!!**

You'll be amazed when you load up DISKBUSTERS2™ and see it copy software that nobody else can! NEW POWER-PAK Parameters ZAP through over 100 NEW protection schemes! DISKBUSTERS2™ copies HUNDREDS of software titles in just 2-3 minutes! A DISKBUSTERS2™ copy even loads some software many times FASTER! And for software yet to be released... the NEW DISKBUSTERS2™ GCR Nibble Buster is so good it's scary!!! Specially designed for the C128, C64, SX-64, with 1541/1571 drive. C128 owners... just put the DISKBUSTERS2™ disk in your drive and Power-Up, it loads automatically!

**DISKBUSTERS2™ COPIES NEW C128 SOFTWARE  
USING 1571 DRIVE!**

Order by phone VISA/MASTERCARD/COD or send check/money order to "db software" & include ship charges: 3.50 ship USA, UPS AIR 5.50, ship CANADA 7.50. CA addresses add 6% tax.

**Still ONLY  
\$29.95!**

**CALL 805-569-1644  
Operator 10**

**Ask about DiskNotcher  
& SPECIAL COPY-PACK!**



**WE AIN'T AFRAID OF NO DISKS!**



db software \* box 31169 \* Goleta \* CA \* 93130

# "We speak your language"

Make your BASIC programs

## ZOOM

Convert them to high-speed machine language

### BASIC Compiler

**BASIC Compiler**  
Complete BASIC compiler and development package. Speed up your programs 5x to 35x. Compile to machine code, compact p-code or both. '128 version: 40 or 80 col. monitor output and FAST-mode operation. '128 version includes extensive 80-page programmer's guide. A great package that no software library should be without. C-128 \$59.95 C-64 \$39.95

## C Language

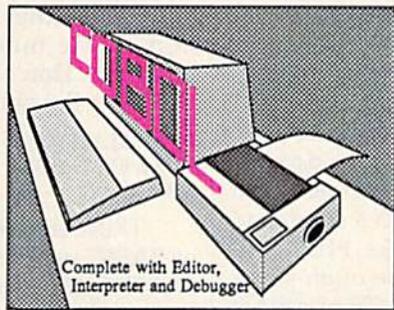
Learn the the language of the 80's and beyond on your C-128 and C-64

**Super C Compiler**  
For school or software development. Learn the C language on the '64 or '128. Compiles into fast machine code. Added '128 features: CP/M-like operating system; 60K RAM disk. Combine M/L & C using CALL; 51K available for object code; Fast loading; Two standard I/O libraries plus math & graphic libraries. C-128 \$59.95 C-64 \$59.95

"Super Pascal"  
64

Let your '64 speak Pascal

**Super Pascal Compiler**  
Not just a compiler, but a complete system for developing applications in Pascal—with graphics. Extensive editor with search, replace, renumber, etc. Standard J & W compiler that generates machine code. High-speed disk access. 48K RAM is available. If you want to learn Pascal or to develop software using the best tools available—Super Pascal is your first choice. C-64 \$59.95



**COBOL**  
Now you can learn COBOL, the most widely used commercial programming language, on your 128 or 64. COBOL Compiler package comes complete with syntax-checking editor, interpreter and symbolic debugging aids. New '128 version works with 40/80 column monitors and is quicker than the '64 version. C-128 \$59.95 C-64 \$39.95

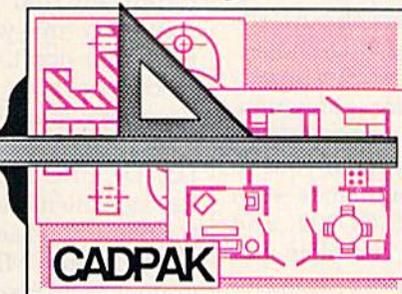
## ... and work hard for you, too!

Use your '128 to communicate with the outside world



SpeedTerm 128

**SpeedTerm-128**  
Let your C-128 communicate with the outside world. Obtain information from various computer networks. Flexible, command driven terminal software package. Supports most modems for the C-128. Xmodem and Punter file transfer protocol. VT52/100 terminal emulation with cursor keys, large 45K capture buffer & user definable function keys. C-128 \$39.95



**Cadpak**  
Easy-to-use interactive drawing package for accurate graphic designs. Dimensioning features to create exact scaled output to all major dot-matrix printers. Input via keyboard or lightpen. Two graphic screens for COPYING from one to the other. DRAW, BOX, ARC, ELLIPSE, etc. available. Define your own library of symbols/objects—store up to 104 separate objects. C-128 \$59.95 C-64 \$39.95

### Personal Portfolio Manager

Complete portfolio management for the individual or professional investor. Manage portfolios, get up-to-the-minute quotes & news, and perform selected analysis. Enter quotes manually or through Warner. C-128 \$59.95 C-64 \$39.95

### Technical Analysis System

Sophisticated charting and analysis system for investors. Chart and analyze the history of a stock. Pinpoint trends and patterns to predict a stock's future. Enter data via keyboard or online financial services. C-128 \$59.95 C-64 \$59.95

### Chartpak

Easily create professional high-quality charts and graphs without programming. Immediately change the scaling, labeling, axis, bar filling, etc. to suit your needs. Accepts data from CalcResult and MultiPlan. C-128 \$39.95 C-64 \$39.95

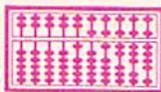
### Xper

XPER is the first "expert system" for the C-128 and C-64. While ordinary data bases are good for reproducing facts, XPER can derive knowledge from a mountain of facts and help you make expert decisions. Large capacity. C-64 \$59.95

Commodore 64® and Commodore 128™ are trademarks of Commodore Electronics Ltd.

Call now for the name of your nearest dealer. Or order directly using your MC, Visa or Amex card. Add \$4.00 per order for shipping. Foreign orders add \$10.00 per book. Call now or write for your free catalog—also contains information on our C-64 books and software. Dealers inquires welcome—over 1400 dealers nationwide.

# Abacus



P.O. Box 7219 Dept. CB Grand Rapids, MI 49510  
Phone 616-241-5510 • Telex 709-101 • Fax 616-241-5510

# Fill-64

Hubert Cross

*This exciting graphics utility for the Commodore 64 adds 15 new commands to BASIC. "Fill-64" allows you to paint any solid shape on the hi-res graphics screen at a speed that's fast enough for animation. Once an animated sequence is complete, you can store the entire animation on disk or tape, to be re-played at a future time. No machine language knowledge is needed to use this program.*

If you're interested in high-resolution graphics on the Commodore 64, you may have used programs that add commands such as PLOT and DRAW to BASIC. Most of these programs allow you to draw a closed shape on the screen with lines, then paint it with a command called something like FILL. Fill commands of this type often suffer from two drawbacks: They cannot draw over existing dots on the screen, and they are much too slow for animation.

"Fill-64" lets you paint a solid shape anywhere on the hi-res screen, even over existing shapes. The program works so fast that it can even be used for animation. Since it adds new commands to BASIC, Fill-64 is easy for anyone to use. With simple commands such as FILL, CLEAR, RECORD, and PLAY, you can draw complete animated sequences, store them on disk or tape, and redisplay them at your convenience.

## Typing It In

Fill-64 is written in machine language and must be typed in with "MLX," the machine language entry program found elsewhere in this issue. However, no machine language expertise is required to use the program. Read the MLX instructions carefully before you type Program 1, and be sure to save a copy when you're done. Here are the addresses required for Fill-64:

Starting address: 83FF

Ending address: 981F

Before loading Fill-64, you

must enter the following lines in immediate mode (with no line numbers). Don't forget to press RETURN at the end of each line.

```
POKE 51,255:POKE 52,63
```

```
POKE 55,255:POKE 56,63
```

```
NEW
```

These statements move the top of BASIC memory down to a point 24,577 bytes lower than usual. That leaves 14K for BASIC programs, more than enough for most applications. The reserved 24K area is used to store Fill-64 and its data. It's very important that you perform this step every time you wish to use Fill-64; if you don't, the program can't work properly.

Next, load Fill-64 with LOAD "PROGRAM",8,1 for disk or LOAD "PROGRAM",1,1 for tape. Replace the name PROGRAM with the name you used when saving the program with MLX. When the program has loaded, type NEW and press RETURN to reset the computer's BASIC pointers.

To activate Fill-64, type SYS 33846 and press RETURN. Fill-64 makes two hi-res screens available at all times. When you first activate the program with SYS, it clears both screens and displays screen 1. Use the function keys to switch from one screen to the other. The f5 key displays screen 2. To return to screen 1, press f3. The f7 key clears the current screen, and f1 returns you to the normal text screen.

## Fill-64 Commands

Fill-64 adds 15 new graphics commands to BASIC. Following is a

summary of what each command does. Later sections of this article contain programming examples and additional information about these commands.

**FILL** *number,color,x1,y1...  
xnumber,ynumber*

The FILL command paints a polygon of the specified color at the designated screen location. The first parameter (*number*) indicates how many vertices (corners) the shape has. For example, a triangle has 3 vertices; a square has 4; and so on. Use a vertex number of 1 to draw a dot; a vertex value of 2 draws a line. The second parameter (*color*) sets the shape's color, using the same color numbers explained in your user's manual. After these values you must supply an appropriate number of *x-* (horizontal) and *y-* (vertical) coordinate pairs. To draw a triangle, for instance, you need three pairs of *x,y*-coordinates, one pair to define each corner. This statement draws a triangle:

```
FILL 3,2,10,10,50,10,30,50
```

Notice that the FILL command automatically displays the hi-res screen. No special command is needed to switch from the text screen to hi-res.

## SWITCH

SWITCH moves from one hi-res screen to the other. If you're in screen 1, SWITCH flips you to screen 2, and vice versa. SWITCH ordinarily erases the screen that it previously displayed. If you perform SWITCH from the text screen, Fill-64 displays screen 1 without erasing its contents.

## FLIP

FLIP works exactly like SWITCH but does not erase the previous screen.

## CLEAR

This command erases both hi-res screens. It's useful at the beginning of a program.

## LOWRES

The LOWRES statement switches to the text screen under program control. In immediate mode (when you're not running a program) you can also do this by pressing the f1 key.

**SETCOLOR** *border, background,  
hi-res1, hi-res2, hi-res 3*

# BY THE TIME YOU FINISH THIS AD, YOU'LL INCREASE YOUR READING SPEED 2500%.

See Spot. See Spot run.  
Go boy.

Yes, your Commodore reads a lot like you did when you were its age.

But today, you're going to meet three enormously useful utilities which change all that. By pushing your computer to speeds heretofore completely impossible.

There now, you're reading faster already.

## DRIVE DRIVES FIVE TIMES FASTER.

Press two keys.

And your 64 or 128 will read virtually any piece of commercial software up to five times faster than usual. Whether it's protected or not.

So a wait of 60 seconds goes down to a blindingly fast 15. And so on.

With the Cartridge in place, you can copy a file in the blink of an eye. Or entire disks in a serious wink.

You can direct commands to the drive, or have the drive send up a directory.

Or do a hundred other chores worth mentioning, if only this ad had room.

Why, you can even use its helpful, built-in assembly language monitor to modify and improve your very own programs.



*Loads your favorite programs in seconds, instead of minutes. It was worth the wait.*

Of course, you'll have to read the instructions first: Plug it in.

## FAST LOAD'S FASTER COMPANION.

Vorpal. You can read into the name anything you want.

As long as you do it twenty-five times faster than normal.

Because that's just about how fast it loads the typical unpro-



*Adding Vorpal to your programs is like adding nitro to the family car.*

TECTED program.

It also recovers lost files or erasures in seconds.

It aligns the head of a 1541 drive at a speed that'll make your head turn.

And, among other things, it formats a disk in twenty seconds, versus minutes.

To have you up and working in no time.

Instead of getting all worked up.

## GRAPHICS WITHOUT GRIEF.

Now, even a complete novice can create complex games. Or animations. Or full blown business presentations.

As easily as they could read this paragraph.

It's the power of assembly language programming, but with the simplicity of BASIC.

Including over a hundred new commands that aren't even in BASIC 7.0.

## A QUICK CONCLUSION.

We could write volumes about these utilities. But we suggest you visit your local computer store instead.

Where your purchase will actually buy you the most useful utility of all. Time.



*The Toolkit makes it easy to try your palette. Instead of your patience.*

**EPYX**<sup>®</sup>

# LYCO COMPUTER

Marketing & Consultants, Inc.

America's Mail Order Headquarters!

## NEW HOURS

Mon-Thur—9 AM-8 PM  
Fri—9 AM-6 PM  
Sat—10 AM-6 PM

### COMMODORE

1571 ..... CALL  
C-64 ..... CALL  
1541 ..... CALL  
128 ..... CALL  
C 1902-A ..... CALL  
C 1350 Mouse ..... 39  
C 1700 128 K RAM ..... 145  
C 1750 512 K RAM ..... 269  
Jane ..... 35  
GEOS ..... CALL  
Perfect Writer ..... 45.95  
Perfect Calc ..... 45.95  
Perfect Filer ..... 45.95

### EPYX-64

Movie Monster ..... 24.75  
Vorpul Kit ..... 22.75  
Fast Load ..... 24.75  
Summer Game II ..... 24.75  
Super cycle ..... 24.75  
World games ..... 24.75  
Football ..... 24.75

### XETEC

Font Master II 64 ..... 32.95

### COMMODORE

1571 ..... CALL  
1541 ..... CALL

### SPRINGBOARD (C-64)

Newsroom ..... 32.75  
Clip Art 1 ..... 18.75  
Clip Art 2 ..... 24.75

### HI TECH

Cardware ..... 8.95  
Partyware ..... 8.95  
Heartware ..... 8.95  
War With All ..... 12.95  
Holiday Paper ..... 8.95

### ACTIVISION

Alter ego ..... 28.75  
Hacker ..... 18.75  
Little People ..... 20.75  
Game Maker ..... 24.75  
Borrowed Time ..... 18.75  
Space shuttle ..... 18.75  
Music studio ..... 22.75  
Mind shadow ..... 18.75  
Road Race ..... 18.75  
Fast Tracks ..... 22.75  
Count down ..... 18.75  
Basketball ..... 18.75

### FIREBIRD (C-64)

Elite ..... 22.75  
Tracker ..... 28.75  
The Pawn ..... CALL

### MICROLEAGUE

ML Baseball ..... 24.95  
General Manager ..... 24.95  
85 team disk ..... 14.95  
Franchise ..... 19.95  
Stat Disk ..... 16.95

### BRODERBUND

Print Shop ..... 24.75  
Graphics Lib I, II, III ..... 15.75  
Karateka ..... 17.75

### BATTERIES INCLUDED

Consultant ..... 32.95  
Paperclip w/spell pk ..... 48.95

### COMMODORE

1902 color ..... CALL  
1802 ..... CALL

### ACCESS (C-64, Amiga)

Leader board ..... 24.75  
Leader board Amiga ..... 24.75

### TIMEWORKS

(C-64)

Data Manager-128 ..... 42.95  
Swiftcalc-128 ..... 42.95  
Wordwriter-128 ..... 42.95  
A/Payable-128 ..... 38.95  
A/Receivable-128 ..... 38.95  
General Ledger-128 ..... 38.95  
Inventory-128 ..... 38.95  
Payroll-128 ..... 38.95

### SUB LOGIC

Flight Simulator ..... 29.95  
Jet Simulator ..... 29.95  
Football ..... 25.95  
Scenery Disk ..... EA 14.95  
Set 1-6 ..... 69.95

### ACTIVISION (Amiga)

Hacker ..... 26.75  
Mind shadow ..... 26.75  
Music studio ..... 34.75  
Borrowed Time ..... 26.75

### INNOVATIVE CONCEPTS

Flip-N-File 10 ..... 2.49  
Flip-N-File 25 Lock ..... 10.53  
Flip-N-File 50 Mini ..... 10.55  
Flip-N-File 50 Lock ..... 15.95  
Flip-N-File ROM ..... 7.99

### REDIFORM PAPER

Qty 1000 9 1/2 x 11 white lazer ..... 19.95  
Qty 200 9 1/2 x 11 white lazer ..... 5.95  
Qty 3000 9 1/2 x 11 white ..... 29.95  
Qty 1000 9 1/2 x 11 white ..... 16.95  
Qty 1000 Mailing labels 1x3 ..... 6.95

### JOYSTICKS

FROM  
WICO & SUNCOM

Bat Handle ..... 16.75  
Boss ..... 11.99  
Super 3-way ..... 19.99  
TAC 3 ..... 9.95  
Slik stik ..... 6.95  
Economy ..... 5.95

## DUST COVERS

### Atari

520ST ..... 11.95  
130XE ..... 6.99  
800XL ..... 6.99  
1050 ..... 6.99  
1025 ..... 7.99

### Commodore

C128 ..... 7.99  
1571/1541 ..... 6.99  
1902 ..... 10.95  
1702 ..... 8.99  
C64/Vic20 ..... 6.99

### Panasonic

1090/1091 ..... 8.99  
1092 ..... 8.99  
1093 ..... 9.99

### XETEC

Super Graphix 64 ..... 64  
Super Graphix Jr 64 ..... 45  
Xetec AT ..... 39.95

**DISK DRIVE  
CLEANING KIT  
\$8.95**

**With Software  
\$17.95**



**NAME BRAND  
VIDEO TAPES**  
from  
**\$4.49**  
Qty. Discounts  
Available

**"WE MAKE YOUR COMPUTER  
FUN TO USE!"**

T  
O  
L  
L  
F  
R  
E  
E  
1  
-  
8  
0  
0  
-  
2  
3  
3  
3  
-  
8  
7  
6  
0

*Buy Lyco and Enjoy*

★ THE LOWEST PRICES ★ TOLL FREE ORDER LINE ★

★ Free shipping on prepaid cash orders in U.S. ★ All Merchandise Factory Fresh ★ Fast Service from one of the oldest and most established Computer Supplier ★ 24 hrs. shipping on in-stock product ★ Access to our Multi Million \$ inventory ★ No deposit on UPS C.O.D. orders ★ Orders outside PA Save state sales tax ★ Air freight service available ★ Full Manufacturer's Warranty apply! ★ Full accessory line in stock ★ Purchase orders Accepted from educational institutions! ★ We check for stolen credit cards! ★ We ship to our servicemen overseas! ★ You'll love our Courteous Sales Staff! ★ We satisfy more customers monthly than most of our competitors combined ★

# LYCO COMPUTER

Marketing & Consultants Inc.  
America's Mail Order Headquarters



## PANASONIC

1080	195
1091	225
3131	249
1092	309
1592	419
1595	595

### DIABLO

D25	549
P-32 CQ1	699
635	1029
P-38	1749
D-80 1F	2395

### BROTHER

HR-15XL-P	359
1509	409

### SEIKOSHA

SP-1000 VC (C-64)	165
SP-1000 A Centronics	185
SP-1000 IBM	185
SP-1000 As Rs-232	185
SP-1000 AP, APIIC	185
BP-1300	469
BP-5200	649
BP-5420	999
Color Kit	119
BP-5420 ribbon	12.50
SP-1000 ribbon	8.50

### JUKI

Juki 6100	CALL
RS-232 Serial board	55
6100 tractor	119
6100 sheet feeder	209
5510 Juki	CALL
Juki 6300	CALL

### LEGEND

808	148
1080	199
1380	229
1385	289



### OKIDATA

Okimate	199
292	499
293	599
120 NLO	205
182	214
192	348
93	CALL

1080 ..... \$195

## SAVE ON THESE IN STOCK PRINTERS

NX-10 ..... CALL

### TOSHIBA

321 P/S	495
351 sheet feeder	529
P 341P	969
P 341S	999
P 351+	1149

### SILVER REED

EXP 420P	209
EXP 600P	489
EXP 800P	649
EXP 770	740

### CITIZEN

120-D	179
MSP-10	285
MSP-15	385
MSP-20	325
MSP-25	485
Premier 35	469

### EPSON

LX80	CALL
FX85	CALL
DX10	CALL
DX20	CALL
DX35	CALL
HI80	CALL
HS80	CALL
FX286	CALL
LQ800	CALL
LQ1000	CALL

### C. ITOH

1550 SP+	CALL
D 1040	CALL
Prowriter Jr	CALL
Prowriter 8510 SP+	CALL

### STAR MICRONICS

LV 12-10 (New)	CALL
NL-10	CALL
NX-10	CALL
NB-15	CALL
SB-15	CALL
SG-15	367
SD-10	319
SD-15	438
SR-10	469
SR-15	578
SB-10	589

## MONITORS

### PANASONIC

TR-122 MYP 12" Amber TTL	139
TR-122 M9P 12" Green TTL	139
TX-12H3P 12" RGB	369
DT-H103 10" RGB	349

### NEC

Multisync	CALL
-----------	------

### TEKNIKA

MJ-22	249
MS-305 RGB	309

### ZENITH

ZVM 1220	89
ZVM 1230	89
ZVM 1240	149

### THOMPSON

365 12 RGB	CALL
------------	------

### HITACHI

MM-1218 12" Green	99
MM-1220 12" TTL Amber	129
CM-1406C 13" color w/cable	179
CM-1409 13" RGB	305
CM-1216 D 12" RGB	385
CM-1455 S 13" 720x350	525
CM-1457 A 13" RGB 720x460	679

### PRINCETON GRAPHICS

MAX-12 Amber	175
HX-12 RGB	458
SR-12 RGB	575

## INTERFACING

### XETEC

Super Graphix 64	64
Super Graphix SR 64	45

### TYMAC

Connection (C-64)	49
-------------------	----

### ORANGE MICRO

Grappler CD (C-64)	79
--------------------	----

### PPI

C-64	49
------	----

## DISKETTES

### 5 1/4" DISKETTES

#### MAXELL

SSDD	9.99
DSDD	12.99

#### BONUS

SSDD	6.99
DSDD	7.50

#### SKC

SSDD	8.50
DSDD	9.50
DSHD 96 TPI	19.50

### 3.5 DISKETTES 3M

SSDD	16.99
DSDD	23.99

#### MAXELL

SSDD	16.99
DSDD	23.99

#### VERBATIM

SSDD	16.99
DSDD	24.99



## DRIVES

### COMMODORE

1571, 1541	CALL
------------	------

### COMTEL

Enhancer 2000 (C-64)	149
----------------------	-----

### INDUS

GT Commodore	179
--------------	-----

## MODEMS

### SUPRA

1064 Modem (C-64)	49.95
Supra 300	39.95
Supra 1200	149.95

COMPUSERVE . . . 18.95

### COMMODORE

1670	155
------	-----

### DSI

Messenger 64/128	39.95
------------------	-------

# TOLL FREE 1-800-233-8760

## RISK FREE POLICY

In PA 717-494-1030  
Customer Service 717-494-1670



or send order to  
Lyco Computer  
P.O. Box 5088  
Jersey Shore, PA  
17740



In stock items shipped within 24 hours of order. No deposit on C.O.D. orders. Free shipping on prepaid cash orders within the continental U.S. Volume discounts available. PA residents add sales tax. APO, FPO, and international orders add \$5.00 plus 3% for priority mail service. Advertised prices show 4% discount for cash, add 4% for MasterCard and Visa. Personal checks require 4 weeks clearance before shipping. We do not guarantee compatibility. We only ship factory fresh merchandise. Ask about UPS Blue and Red label shipping. All merchandise carried under manufacturer's warranty. Return restriction applicable. Return authorization required. All items subject to change without notice.

Sets the screen border, background, and three hi-res colors. The default colors for Fill-64 are white, blue, black, yellow, and white, respectively.

## RECORD

This command records animated graphics sequences. It tells Fill-64 to "memorize" every graphics command that follows, until it encounters a REWIND or PLAY statement (see below). As a reminder, Fill-64 sets the border color to red whenever RECORD is active.

## PLAY

Replays an animation previously recorded with RECORD or stored with DPUT or CPUT (see below). When Fill-64 is PLAYing an animation, it can be interrupted only by pressing RUN/STOP-RESTORE.

## REWIND

Exits RECORD mode. In effect, this command "rewinds" Fill-64's recorder to the beginning, erasing any previously recorded animation.

## MEMORY

Prints the number of bytes available for RECORDing animations.

## DPUT "filename"

Saves an animation to disk. Replace *filename* with any legal Commodore filename.

## DGET "filename"

Loads a previously saved animation from disk.

## CPUT "filename"

Saves an animation to tape (the filename is optional).

## CGET "filename"

Loads an animation from tape (the filename is optional).

## Fill-64 Techniques

Program 2 demonstrates just a few of the effects you can achieve with Fill-64, from detailed kaleidoscopic patterns to three-dimensional animation. Program 3 loads and replays the animations created by Program 2, using the full speed of Fill-64's built-in machine language routines. Since these programs use Fill-64 BASIC commands, you *must* install Fill-64 as described above before you type them in (naturally, you must also install Fill-64 whenever you wish to run these programs). Once Fill-64 is active, press fl to return to the text screen; then

enter Programs 2 and 3 as you would any BASIC program.

Program 2 creates several different animations. For each animated sequence, the program switches into RECORD mode, then performs a series of FILL commands. Then it replays the animation with PLAY and optionally saves the animation. When you run Program 2, it asks whether you wish to save the animations. Answer yes (enter Y) the first time you run the program, and be patient—some of the more complex shapes take considerable time to calculate. Notice how much faster the animation proceeds when replayed with PLAY. When Program 2 has finished, you can run Program 3 to load and replay all the animations in rapid sequence. Together, these two programs demonstrate the complete process of drawing, recording, reloading, and replaying an animation.

Fill-64 has two limitations when painting. First, you can draw any solid polygon with as many as 18 vertices, but the polygon must be convex—that is, its inside angles must be equal to, or less than, 90 degrees. To draw a shape containing obtuse angles (angles greater than 90 degrees), break it down into two or more convex polygons. For instance, a star shape can be built from two triangles, one placed upside down over the other.

Second, although you may start defining the polygon at any vertex, you must proceed in a clockwise direction. The FILL command ignores any vertex written in a counterclockwise direction. This feature is extremely useful for eliminating hidden surfaces in three-dimensional objects.

Let's look at a simple example. This command paints a small triangle in color 2 (yellow):

```
FILL 3,2,10,10,50,10,30,50
```

The first value (3) indicates the number of vertices in the shape, and the second (2) indicates the color. The remaining values contain the coordinates for the triangle. This program shows how SWITCH flips from one hi-res screen to the other.

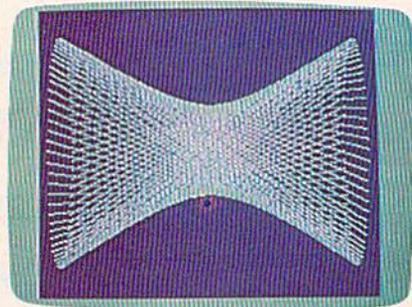
```
FC 100 FILL 3,2,10,10,50,10,30,50
XD 110 SWITCH
CX 120 FILL 3,2,11,10,51,10,31,50
HE 130 SWITCH
```

The triangle moves one pixel to the right. When an animation requires more than a few frames, you'll probably want to use a program loop. This example moves the triangle all the way across the screen with a FOR-NEXT loop:

```
KP 100 FOR X=50 TO 150
QC 110 FILL 3,2,10+X,10,50+X,10,30+X,50
AP 120 SWITCH:NEXT:LOWRES
```

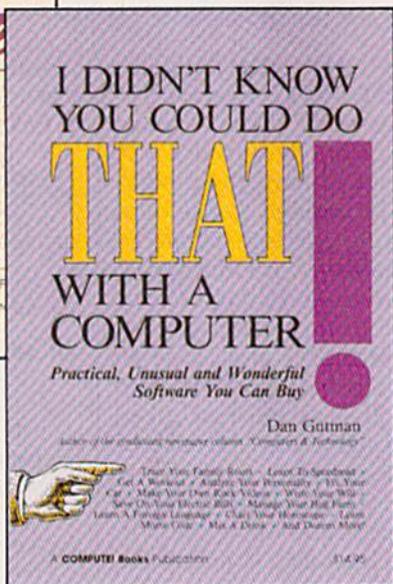
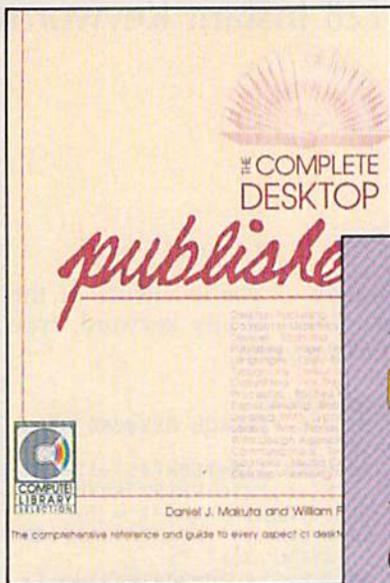
Notice that the triangle moves off the screen without painting any unwanted areas. Fill-64 automatically clips the edge of any shape that moves across a screen border. It faithfully paints only the visible portion of a shape as long as its coordinates do not exceed the range -32768-32767.

See program listings on page 118. ■



These photos illustrate just a few of the thousands of hi-res graphics designs you can create with "Fill-64," a sophisticated graphics utility. Using new BASIC commands such as FILL, RECORD, and PLAY, you can draw animated graphics sequences, store the animation on disk or tape, and reload it for future viewing.

# GET THE MOST From Your Computer!



Two new books from COMPUTE! bring you innovative ideas to exploit the capabilities of your computer to the fullest and to make use of it in ways you didn't know were possible. There's an in-depth look at desktop publishing—how to get started and how to set up your publication. A compendium of special software tells you where to purchase inexpensive software that will open up a new world of applications. The information is non-machine-specific and is designed for beginning to advanced computer users.

## The Complete Desktop Publisher

Daniel J. Makuta and William F. Lawrence  
A comprehensive reference and guide to what is fast becoming one of the most popular uses of computers, this book guides the novice through the intricacies of desktop publishing. Clearly written and understandable, this guide covers all the basics of typography, layout, and design. Sample formats and layout grids make it easy to get started. Details on using graphics to enhance publications, discussions of the desktop publishing software currently available, and comparisons of laser printers, typesetters, and other printing devices give you everything you need to make intelligent decisions. Chapters outline the elements of fitting copy, proofreading, binding and folding, and media conversion. You'll also find a wealth of information on telecommunications—how to transmit your publication for typesetting or printing—as well as tips on dealing with outside design agencies, typographers, and printers. The definitive guide.

\$19.95 ISBN 0-87455-065-3

Look for these books at your local computer or book store.

Or, to order directly from COMPUTE!, call toll-free 800-346-6767 (in NY 212-887-8525), or write COMPUTE! Books, P.O. Box 5038, F.D.R. Station, New York, NY 10150. Please include \$2.00 shipping per book for U.S. and surface mail; \$5.00 airmail. North Carolina residents add 4.5 percent sales tax. New York residents add 8.25 percent sales tax.

Please allow 4-6 weeks for delivery.

## I Didn't Know You Could Do That with a Computer!

Dan Gutman

There's more to computers than processing words, juggling numbers in a spreadsheet, or filing records in a database. A world of unusual, practical, and amazing computer programs is available which can help you do anything from planting a garden to writing a will. These programs range from the simply fascinating to the outright esoteric. More than 100 little-known, yet intriguing commercial software packages are evaluated and reviewed: programs which can plot your astrological future, show you the night skies, plan your next road trip, help you raise your child, and give you the edge at the racetrack. Entertaining—certainly unique—this book puts an end once and for all to the question "Now that I have a computer, what do I do with it?"

\$14.95 ISBN 0-87455-066-1

**COMPUTE!** Publications, Inc. 

Part of ABC Consumer Magazines, Inc.  
One of the ABC Publishing Companies  
825 7th Avenue, 6th Floor, New York, NY 10019  
Publishers of COMPUTE! COMPUTE!'s Gazette, COMPUTE!'s Gazette Disk, COMPUTE! Books, COMPUTE!'s Apple Applications, and COMPUTE!'s Atari ST Disk and Magazine.

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, and in Canada from McGraw-Hill, Ryerson Ltd., 330 Progress Ave., Scarborough, Ontario, Canada M1P 2Z5.

Shawn K. Smith

Save time and typing effort with this short utility for the Commodore 128. Up to 52 keywords can be entered, each an easy-to-remember, two-key combination.

"Instant Keywords" can drastically reduce the time it takes to type in a program. This utility prints a BASIC 7.0 keyword when the Commodore or SHIFT key is pressed in conjunction with a letter key. For instance, pressing the SHIFT and L keys displays the keyword LOOP. A total of 52 keywords can be displayed in this fashion. Refer to the chart for a list of the key combinations. Also, pressing the SHIFT or Commodore key while in quote mode displays the standard graphics characters rather than a BASIC keyword.

Instant Keywords is short and easy to use. Although it contains mostly machine language (ML), you don't have to know any ML to use it. In fact, you can just type it in and run it as a BASIC program. First, type in the program and then save a copy. When you run it, the BASIC loader stores the ML in an area of RAM which is determined by the value S in line 100 (changing the value of S will relocate the utility). Once the data is stored in RAM, the utility is activated, the address to deactivate/reactivate it is displayed, and the loader is erased from memory. Pressing RUN/STOP and RESTORE is another way to deactivate the program.

### Modifying The Program

Readers may wish to rearrange the utility to support a different set of keywords. This can be accomplished with minor changes to the utility. But first, a quick background about keywords is in order. BASIC 7.0 contains 130 plus commands or keywords. Most of the keywords (including all of the keywords in the 64's BASIC 2.0) are represented

by one-byte tokens. For instance, the command PRINT is stored in the computer with a token value of \$99 (153 decimal). Because the 128 has a larger vocabulary, the designers of the 128 decided to use two-byte tokens to represent some of the new commands. All of the new two-byte commands use \$CE or \$FE as the first byte of the token. Instant Keywords will allow you to use any keyword except those that begin with \$CE as the first token value. (This eliminates the use of only eight keywords.)

The last 52 hexadecimal values in the loader (beginning with 0B in line 200) are the token values of the keywords displayed by Instant Keywords. The first 26 hex values are for the SHIFT key (the token for SHIFT-A is the first, and the token for SHIFT-Z is the twenty-sixth). The last 26 values are for the Commodore key. If you plan to add tokens for any two-byte commands, leave off the first byte (\$FE)—the program knows that it is a two-byte command and will adjust itself ac-

Letter	SHIFT	Commodore
A	SLEEP	STR\$
B	BEGIN	BEND
C	CHR\$	COLOR
D	DOPEN	DCLOSE
E	ELSE	ENVELOPE
F	FOR	FILTER
G	GOTO	GOSUB
H	HEX\$	DEC
I	INPUT	INSTR
J	JOY	PLAY
K	DRAW	CHAR
L	LOOP	LOCATE
M	MID\$	MOVSPR
N	NEXT	COLLISION
O	TAB(	SPC(
P	PRINT	PAINT
Q	GSHAPE	SSHAPE
R	RETURN	RESTORE
S	SPRITE	SOUND
T	THEN	TEMPO
U	USING	UNTIL
V	READ	DATA
W	WHILE	WINDOW
X	POKE	PEEK
Y	GRAPHIC	CIRCLE
Z	LEFT\$	RIGHT\$

ordingly. If you're unsure of the token value of any keyword, type in this program:

```
GA 10 GOTO30
EF 20 REM **PLACE KEYWORD HERE
**
HS 30 BANK15:B=PEEK(45)+12+PEEK
K(46)*256:PRINT"KEYWORD
{SPACE}VALUE(S) = ";
BD 40 H=PEEK(B):PRINTRIGHT$(HE
X$(H),2);" ";
AE 50 IFH=254ORH=206THENB=B+1:
GOTO40
```

In line 20, type the keyword for which you want to find the token value. Run the program and it will display the token value for the keyword you've inserted.

See program listing on page 121. ☺



## UNBRANDED DISKETTES

100% ERROR FREE,  
LIFETIME WARRANTY  
With Hub Rings, Write Protect Tabs,  
Tyvec Envelopes, User ID Labels -  
In Factory/Sealed Poly Packs

(YOU GET EVERYTHING BUT THE BOX)  
PRICES ARE PER DISK

5 1/4"			3 1/2"	
SSDD	DSDD	DSHD96TPI	SS	DS
.47	.52	1.69	1.39	1.65



**SPECIAL OFFER!** DATA CASE FOR  
JUST \$5.00 5 1/4" Diskettes  
HOLDS 80!  
(With Order of 100 Diskettes)

### PRINTER RIBBONS



Apple Imagewriter	\$3.95 each
Apple Scriber	\$2.95 each
Epson LX 80/90	\$2.95 each
Okidata 80/82/83	\$1.75 each
Minimum: 6 Ribbons; S&H: 25¢ each; \$2.00/Doz.	

Minimum order: \$25.00. **Shipping and Handling:**  
\$4.00 per 100 diskettes. Continental U.S.A. APO/  
FPO, add \$8.00 per 100 diskettes. Foreign order,  
please call. Reduced shipping charge for larger  
quantities.  
MI residents add 4% sales tax. Prices subject to  
change without notice. HOURS: 8:30 AM-6:00 PM  
Eastern Time.



**Precision Data Products**  
P.O. Box 8367, Grand Rapids, MI 49518  
(616) 452-3457 • Michigan 1-800-632-2468  
Outside Michigan 1-800-258-0028

# How to get a helping hand from your computer without spending an arm and a leg.



Getting your computer to do a lot doesn't have to cost a lot. Not when you have Personal Choice Software. It's personal productivity software that takes on any assignment. Yet, it's every bit as affordable as it is efficient.

*Planner's Choice.* Planner's Choice will not only help the family budget. It can help plan your budget. Your stock portfolio. Your taxes, too.

For example, if you want to refinance your home, Planner's Choice turns your home computer into a spreadsheet. Simply type in the numbers and calculate the effects of different interest rates by pressing a button. You won't have to take out a second mortgage for the privilege, either. Because Planner's Choice is priced to fit any budget plan.



*Writer's Choice.* Writing can be a moving experience with the cut and paste option. While the document preview lets you peek before you print.

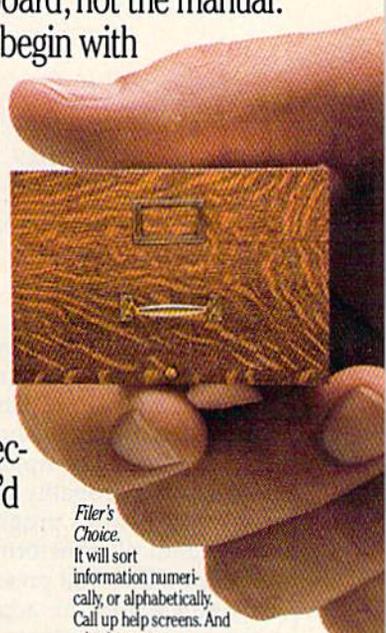
If you're a writer, the value of Writer's Choice is clear from the start. It includes features that some more expensive word processing tools don't.

Like a spelling checker and help screens. So your fingers can work the keyboard, not the manual.

Or, you may wish to begin with Filer's Choice. It's a great place to record, store and sort information in just about whatever way you please.

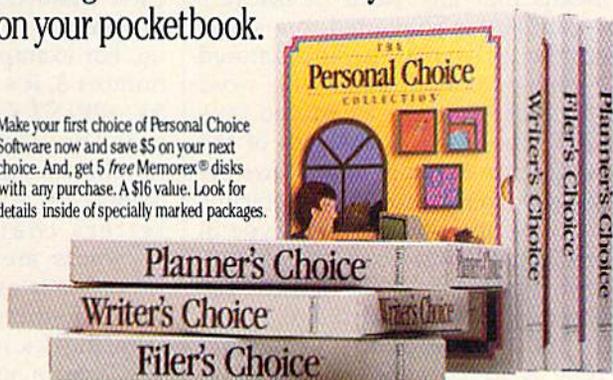
What's more, if you prefer to do all your shopping at once, you can own The Personal Choice Collection for a lot less than you'd normally pay for a single spreadsheet, word processing, or filing program with similar capabilities.

They also work very well together. Which means that Personal Choice Software is the perfect choice. Especially when you want hard working software — that's easy on your pocketbook.



*Filer's Choice.* It will sort information numerically, or alphabetically. Call up help screens. And take down reports.

Make your first choice of Personal Choice Software now and save \$5 on your next choice. And, get 5 free Memorex® disks with any purchase. A \$16 value. Look for details inside of specially marked packages.



**PERSONAL CHOICE**  
SOFTWARE

**A lot of software for a lot less.**

Available for Commodore 128 and 64, Apple II series, IBM PC, PCjr, Tandy 1000 and compatibles. Commodore 64 and 128 are trademarks of Commodore Electronics, Limited. IBM PC and PCjr are trademarks of International Business Machines Corporation. Tandy 1000 is a trademark of Tandy Corporation. Apple II is a trademark of Apple Computer, Inc. Personal Choice Software is a trademark of Activision, Inc. Activision is the registered trademark of Activision, Inc. © 1986 Activision.

# BASIC Examiner

Rick Kephart

*If you'd like to know how your Commodore 64 stores a BASIC program, this utility will help. It operates with any BASIC program and offers a complete analysis of its structure—exactly as it's seen by the computer.*

What happens when you turn on your computer, type in a BASIC program, and run it? The Commodore 64 instantaneously performs a large number of complex tasks—so fast that you probably don't realize that your BASIC program undergoes a radical transformation after you type a line and press RETURN. This article and the accompanying program demonstrate just what happens.

Your BASIC program, as it's stored and run by your computer, looks quite different from what you may expect. First, any BASIC keywords (like FOR, NEXT, GOTO, and so on) are *tokenized*. This means that any word in BASIC's vocabulary is converted to a single number as soon as the line is stored in memory, rather than as the word you type in or see when you type LIST. This reduces the size of the program in memory and allows the program to run much more quickly.

The line numbers you type in are changed into a two-byte, binary form. For example, the number 100 is converted to 0 and 100 ( $0 \times 256 + 100 = 100$ ), and the number 1000 is stored as 3 and 232 ( $3 \times 256 + 232 = 1000$ ).

As each program line is placed into memory, a 0 is appended to the line to identify the end of that line. Three 0's are placed at the end of the program to indicate the last line.

Also added to the program are *line links*. These are two-byte numbers that point to the memory address where the next line begins. Everything in the Commodore 64 is stored at a particular memory location between 0 and 65535. Normally, a BASIC program is stored in memory (RAM—Random Access Memory) beginning with address 2049. The available RAM goes all the way up to address 40959. The program itself shares this space with all of its variables, arrays, and other odds and ends it requires as it runs.

Besides the items just discussed—the tokens, the tokenized line numbers, and the line links—each character that makes up the program is stored as an ASCII value. For example, if you type in the number 3, it's stored as the number 51—PRINT CHR\$(51) will display a 3. The letter A is stored as the number 65—PRINT CHR\$(65) will display an A. (But remember that letters that make up BASIC keywords are tokenized and will not appear as individual characters.) Anything typed within quotation marks is also stored in its ASCII form, even if it is a keyword.

## For Disk And Tape Users

"BASIC Examiner," the program accompanying this article, demonstrates what we've discussed. It works with any BASIC program.

To get started, type in the program and save a copy to disk or tape. Disk users must also type in the following one-line program and save it as a separate file. (For example, save the main program as "BASIC EXAMINER" and the one-line program as "EXAMINER LOADER".)

```
10 POKE44,192:POKE56,208:POKE49152,0:LOAD"BASIC EXAMINER",8
```

To use BASIC Examiner, load and run "EXAMINER LOADER" from disk. It will then automatically load BASIC Examiner. The loader program moves BASIC Examiner to another area in memory (address 49152), out of the way of the BASIC program which it will analyze (stored beginning at address 2049). This method allows a BASIC program of any length to be loaded into its normal location for viewing without disturbing the Examiner.

If you're using tape, first load the program you wish to examine just as you normally would, but do not run it. Then type the following two lines, pressing RETURN after each:

```
POKE 44,192: POKE 56,208: POKE 49152,0: NEW  
LOAD "BASIC EXAMINER",1
```

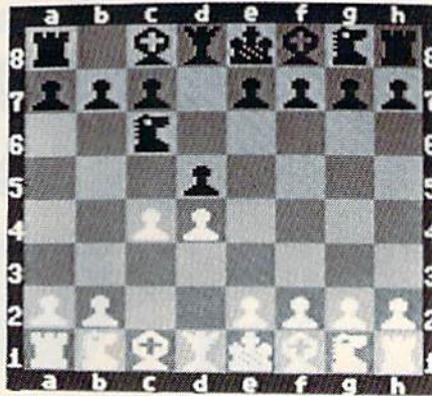
When the program prompts you for a filename, press RETURN.

## Seeing It Work

When run, Examiner requests a program name. If you're using a disk drive, type in the name of any BASIC program on the disk in the drive. (You may wish to view the Examiner itself. If so, type BASIC EXAMINER.) The program then

# At Last! A Chess Program that's On YOUR Side!

**Paul Whitehead  
Teaches Chess  
\$49.95**



**BOARD 180**

**MOVE 3 White  
Hit Choice**  
1=Mf3  
2=cxd5

Chigorin's Defense. A fighting defense. Black develops a piece and attacks in the center. White's Choice: 1=Mf3 is a good developing move; 2=cxd5 is premature.

Now, over 40 hours of interactive animated chess instruction are yours, from the mind of an American Open Champion. For beginners to seasoned tournament players, the techniques of a top master are exposed!

Here is a sampling of what you will see come to life on the screen:

- Rules
- Chess Notation
- Opening Principles
- Piece Development
- Surprise Checks
- Greed
- Traps
- "Desperado" Moves
- Pins
- Forks
- Skewers
- Overloaded Pieces
- In-Between Moves
- Back-Rank Checkmate
- Smothered Mates
- Stalemates
- Sacrifices
- Blockades
- Fianchettoes
- The Lucena Position
- King & Pawn Endings
- The Active Rook

- OPENINGS:**
- King's Gambit
  - Ruy Lopez
  - Scotch Game
  - Giuoco Piano
  - Petroff's Defense
  - Alekhine's Defense
  - French Defense
  - Sicilian Defense
  - Caro-Kann
  - Pirc Defense
  - Center Counter
  - English Opening
  - Bird's Opening
  - Larsen Attack
  - Sokolsky's Opening
  - Benko's Opening
  - Grob's Attack
  - Queen's Gambit
  - King's Indian
  - Benoni Defense
  - Nimzo-Indian
  - Queen's Indian
  - Dutch Defense
  - Gruenfeld Defense
  - The Dunst Opening

... and more!

**ROAD MAPS**

Each package includes a detailed two-sided ROAD MAP that lets you keep track of your journey through the tutorial database. The Road Maps label the parts of the tutorial both by topic and by Board Number. Using the Board numbers and the EXPRESS DEPOT feature, you can hop around the tutorial at will. You can also skip over material you already know.

**FREE!  
COFFEEHOUSE  
CHESS  
MONSTER**

When you want to test your new knowledge against an opponent, a single key calls the COFFEEHOUSE CHESS MONSTER opponent program. It will automatically set up the position you were viewing in the tutorial, offer you a new game, or let you enter a game from a newspaper listing. This is a fully-featured opponent program, which allows you to save an unlimited number of your own games onto disk, modify them, print them out, and re-animate them later.

**ORDER TOLL FREE! 1-800-621-0851 x 100**

**Enlightenment, Inc.**

**YES! Please rush me PAUL WHITEHEAD TEACHES CHESS!**

Name \_\_\_\_\_  
Address \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
City \_\_\_\_\_

Please enclose \$50.50 (outside Calif.) or \$53.75 (Calif. residents - includes sales tax) per unit. . . includes shipping & handling. Please send to: ENLIGHTENMENT INC., 1240 Sanchez St., San Francisco, CA 94114.

**DELIVERY:** 5 days from receipt of order.

IBM PC PC jr.  Apple II  Commodore 64  Atari ST  
Enclosed is: \$ \_\_\_\_\_



IBM PC/PC jr (color or mono)  
Apple II (64K)  
Commodore 64  
Atari ST (December 1st)

# PRO-TECH TRONICS

## MONITORS

RETAIL  
\$120

**\$59**



GREEN SCREEN

RETAIL \$299

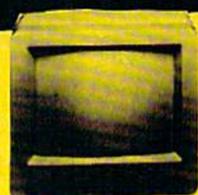
**\$99**



FULL COLOR

RETAIL \$400

**\$238**



RGB

## DISK DRIVE

1541  
COMMODORE



**\$139**

## MODEMS

300  
BAUD

**\$28**



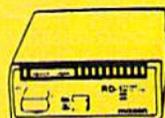
1200 BAUD  
HAYES COMPATIBLE

**\$88**



## RADAR DETECTORS

HIGH  
PERFORMANCE



SUPERHET

RETAIL  
\$249

NOW  
**\$78<sup>00</sup>**

FREE HOME TRIAL

## VIDEO

VHS-HQ

CAMERA  
& VCR  
ALL IN ONE!



\$1600  
RETAIL

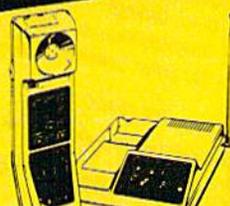
- LOW LIGHT
- LIGHT WEIGHT

**\$1299**

## CORDLESS PHONE

RETAIL  
\$189

**\$69**



FREE TRIAL

## COMPACT DISC PLAYER

RETAIL  
\$289



"TOP OF THE LINE"

**\$169**

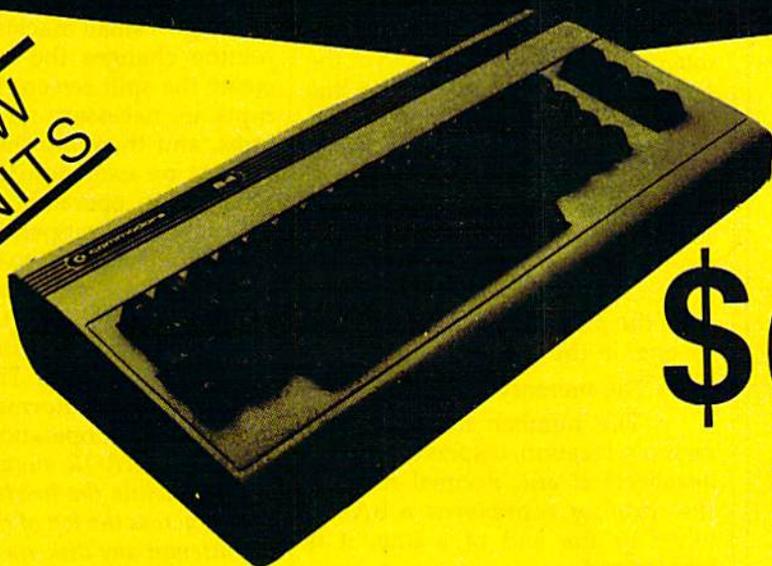
FREE HOME TRIAL

CALL  
TODAY

**1-800-345-5080**

# COMMODORE C-64 COMPUTER

NEW  
UNITS



**\$99**

\*WITH PURCHASE OF OUR SPECIALLY PRICED SOFTWARE

## COMPUTER

**128k**

INCLUDES  
DISK DRIVE



**\$395**

Laser 128

FREE HOME TRIAL

## PRINTERS

DOT  
MATRIX

RETAIL  
\$200



**\$69**

COMMODORE

FREE HOME TRIAL



NEAR LETTER QUALITY

**\$149**

## POWER SUPPLY



**\$39**

C-64

## CAR STEREO

FM/AM CASSETTE



**\$39**

FREE CAR TRIAL

**QUICK DELIVERY** 



C.O.D.

SCHOOL P.O.'s ACCEPTED

**PRO-TECH-TRONICS**

6870 Shingle Crk. Pkwy. #103  
Minneapolis, MN 55430  
(612) 560-6603

# ATTENTION ALL COMMODORE CBM USERS!

**This could be your  
last opportunity to add  
on or replace your  
existing equipment at the  
lowest price ever.**

 **commodore**

## COMMODORE CBM COMPUTERS

8032..... \$ 275.00  
4032 (Pet) ..... \$ 229.00

## COMMODORE CBM DISK DRIVES

8050 (1mg) ..... \$ 395.00

## COMMODORE CBM PRINTERS

8023P (160cps) .... \$ 129.00  
4023 CBM (100cps) . \$ 115.00

## COMMODORE CBM CABLES

Pet-IEEE ..... \$ 29.00  
IEEE-IEEE ..... \$ 32.95

**ALL PRODUCTS ARE BRAND NEW  
IN ORIGINAL COMMODORE BOXES.**

**ALL PRODUCTS ARE GUARANTEED  
FOR 60 DAYS.**

MasterCard & Visa accepted  
add 3% surcharge for credit cards

F.O.B. Dallas, Texas

ORDERS ONLY CALL

**1-800-527-1738**

INQUIRIES & INFORMATION  
PLEASE CALL

**1-214-231-2645**

**Micro-Sys**

D I S T R I B U T O R S

641 Presidential Drive  
Richardson, Texas 75081  
9:00 a.m. - 4:30 p.m. (Mon.-Fri.)

asks for a line number at which to begin dissecting the program. Press RETURN to start at the beginning of the program. You don't have to choose a line number in the program. The Examiner will automatically jump to the next available line if the line number you enter is not in the program. If the number entered is higher than the highest line number in the program, the Examiner will start at the last line, indicate that it has found the end of the program, and ask for another line number. (Whenever the end of a program is reached, you're asked for a line number to restart the process.) As noted, pressing RETURN starts examining at the beginning of the program.

Every memory location used to store the program is displayed, one by one, in the following format:

- The memory location.
- The number stored in that memory location, displayed in both hexadecimal and decimal form. If the number represents a BASIC token or the end of a line, it is highlighted.
- If the number is not a BASIC token, the character-string form of the ASCII number is displayed.
- The BASIC token, or any especially significant ASCII value (one that clears the screen or changes a screen color, for example), is printed. Also, if a number is part of a line link or line number, that information is printed.

You may slow down the listing at any time by pressing the CTRL key. The listing may be paused by holding down SHIFT or SHIFT-LOCK. If you wish to view another part of the program, press and hold down RUN/STOP, then type in the new line number.

The top line of the screen retains the headings regardless of the rest of the screen's scrolling or clearing. A small machine language routine changes the interrupts to create the split screen. These interrupts are necessary for disk operations, and therefore the disk drive cannot be used while the split-screen is in operation. The RUN/STOP key is trapped in order to prevent any attempt to use the disk drive while the split screen is being displayed. Use the RUN/STOP-RESTORE combination to break out of the program. This, in turn, will restore the normal interrupt and make disk operations safe. *If a SYNTAX ERROR should stop the program while the headings are displayed across the top of the screen, do not attempt any disk operations until that line has been removed by pressing RUN/STOP-RESTORE.*

BASIC Examiner is written in BASIC, but includes a few machine language subroutines. Machine language is used to create the split screen and also, in the interest of space and time, to print out the BASIC tokens as keywords and to search for the location of the beginning line number requested.

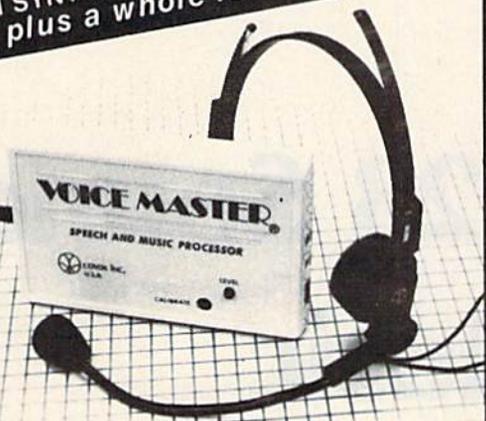
See program listing on page 113. 

## Program Variables

A: value of the Accumulator for the machine language subroutines  
B: flag to indicate if the value is a BASIC token  
D: used by the functions for decimal/binary/hexadecimal conversions  
F: length of the filename being loaded from the program  
I and J: used in loops and to read DATA  
M: memory location currently being examined  
Q: flag to indicate whether quote mode is on or off  
S: starting line number  
V: value stored in that memory location  
X: X-Register for machine language subroutines  
Y: Y-Register for machine language subroutines  
V(0) and V(1): two bytes of the line number or line link  
D\$: character-string expression for DELETE  
F\$: filename to be loaded  
I\$: string containing the introductory message  
S\$: string form of the starting line number  
Q\$: character-string expression for quotation marks  
S\$( ): string array containing miscellaneous messages  
FNC( ): function to convert a decimal number 0-15 to a hexadecimal digit O-F  
FNH( ) and FNL( ): functions to convert a decimal number into high-byte/low-byte binary form

# THE AMAZING VOICE MASTER

SPEECH SYNTHESIS—VOICE RECOGNITION  
plus a whole lot more!



**Your computer can talk in your own voice.** Not a synthesizer but a true digitizer that records your natural voice quality—and in any language or accent. Words and phrases can be expanded without limit from disk. Speech Editor program alters or improves sounds.

**And it will understand what you say.** A real word recognizer for groups of 32 words or phrases with unlimited expansion from disk memory. Speech playback and word recognition can work together. **Have a two way conversation with your computer!**

**Easy for the beginning programmer** with new BASIC commands. Machine language programs and memory locations for the more experienced software author.

**Exciting Music Bonus** lets you hum or whistle to write and perform. Notes literally scroll by as you hum! Your composition can be edited, saved, and printed out. You don't have to know one note from another in order to write and compose!

Based upon new technologies invented by COVOX. One low price buys you the complete system. Includes a host of sample programs! In addition, you will receive periodic information about speech technology, applications, new products, up-dates, and user contributions. **You will never find a better value for your computer.**

**ONLY \$89.95** includes all hardware and software.

Available from your dealer or by mail. When ordering by mail add \$4.00 shipping and handling (\$10.00 foreign, \$6.00 Canada).

The Voice Master is available for the Commodore 64, 128, Apple IIc, IIe, II+, and Atari 800, 800XL, 130XE. Specify model when ordering. Apple II+ (with 64K) owners must have joystick adapter. Available from Covox at only \$9.95.

**Apple IIe and II+ owners:** Enhance speech quality and music capabilities with optional Sound Master hardware card. Installs in slot 4 or 5. Available separately for \$39.95 with demo software, or order with Voice Master for only \$119.95 (saves \$10 when ordered together).



**DEMO SPEECH DISK AVAILABLE** New! An introduction to Covox speech. The \$5 disk gives several general vocabularies that you can use in any of your own programs. Sample programs include a talking keyboard, calculator, clock, and more. English, French and German selections. Samples of level 1 and 2 speech editing. 28 page booklet included. Price is \$5 including postage (\$7 outside North America). Check, money order, or cash only. SPECIFY COMPUTER BRAND.

For telephone demo, additional information, or prompt service for credit card orders (except \$5 talking disk).

**CALL (503) 342-1271**

Call or write today for complete product information.



**COVOX INC.**

675-D Conger Street, Eugene, OR 97402  
Telex 706017 (AV ALARM UD)

(503) 342-1271

# PRINTER OF THE YEAR.



## C. Itoh's Riteman C+ is Commodore's First Mate.

If you've been looking for a quality printer for your Commodore® one that's small enough to fit in a briefcase or on the corner of your desk, sturdy enough to take day-in, day-out printing without a whimper, and inexpensive enough to save your wallet from that empty feeling, look no further.

C. Itoh's Riteman C+ gives you more printer for the money.

For starters, the C+ gives you easy-to-read print with full descenders. In bold, italic, underline, subscript, superscript and more. At up to 44 lines per minute. And one button shifts you from draft to crisp, readable Near Letter Quality.

What's more, the Riteman C+ features an exclusive front paper feed design that makes loading paper *really* easy for the first time. According to *PC Magazine*, which awarded the printer its coveted Editor's Choice, "The most unique aspect of the [Riteman C+] is its paper feed and platen system. The paper never jams, alignment is easy and the impression is good. In addition [it] supports a high-resolution graphics mode like that of the IBM® and Epson FX® series printers."

Like all printers in the C. Itoh Riteman line-up, the C+ is quality built and backed by a full one-year warranty.

Want a great little First Mate for your Commodore? Get yourself a Riteman by C. Itoh. For the name of the dealer nearest you, call C. Itoh today at (800) 423-0300.

# C. ITOH

**C. Itoh Digital Products, Inc.**

19750 S. Vermont Avenue • Suite 220 • Torrance, CA 90502  
Telephone: (213) 327-2110 or (800) 423-0300

# Mastering 128 Sound And Music

## Part 2

D. C. Holmes

*Translating a melody from sheet music is easy with the 128's PLAY statement. This month the author describes and illustrates how this can be done with one-, two-, or three-voice compositions, and includes a Bach minuet.*

Last month we discussed how the 128 has streamlined the music-programming process with the sound and music statements of BASIC 7.0. The key to this instant virtuosity is the PLAY statement. This month we'll see how we can translate sheet music into BASIC program lines using the PLAY statement.

The format for the PLAY statement is PLAY "Vn, Tn, On, Un, Xn, elements, notes". The capital letters represent characters you type; for the lowercase letters, substitute one of numbers or characters from the list below. Note that if you omit one of the control characters, the 128 uses the default value.

Vn = Voice (n=1-3, default n=1)  
Tn = Tonal envelope (n=0-9, default n=0)  
On = Octave (n=0-6, default n=4)  
Un = Volume (n=0-8, default n=9)  
Xn = Filter (n=1 for on, n=0 for off; default n=0)  
Notes: C,D,E,F,G,A,B

Elements: #—sharp ( # )  
\$—flat ( b )  
W—whole note (  )  
H—half note (  )  
Q—quarter note (  )  
I—eighth note (  )  
S—sixteenth note (  )  
.—dotted note  
R—rest  
M—wait for end of measure  
voice

For example, to play the first five notes of a C-major scale with voice 2 and volume 6, you would use PLAY "V2 U6 CDEFG" or you could use a string variable: A\$ = "V2 U6 CDEFG": PLAY A\$ (the spaces are optional, but they make the string a little more readable).

The SID chip is capable of producing three independent voices (sounds) simultaneously. When the control character Vn appears in a character string used in a PLAY statement, it specifies which one of the three voices is to be programmed by the characters which follow. The characters apply to that

voice until another Vn control character is found in the string. If no voice is specified, the default of V1 (voice #1) is assumed.

### Tonal Envelope

The tonal quality of each of the voices used can be selected from one of ten envelopes. One of the 128's preset envelopes can be used (as we discussed last month), or you can create your own customized tonal envelope using the ENVELOPE and FILTER statements (we'll devote next month's installment to this). The control character Tn specifies the envelope for the voice whose control character most recently preceded it. The SID will continue to be tuned to this envelope for this voice until this Vn immediately precedes another Tn.

For example, take a look at line 70 of this month's program, "Minuet":

```
70 PLAY "V1 T7 V2 T0"
```

The SID is set to play voice 1 (V1) in envelope 7 (T7)—a piano sound—and voice 2 (V2) in envelope 0 (T0)—an organlike tone.

If no envelope is specified for a voice, that voice will use the default envelope of 0.

The semantics of the *Tn* control character are somewhat different from the other control characters in the PLAY string. Whereas *Tn* always refers to only the *Vn* which most recently preceded it, the other control characters (*On*, *Un*, *Xn*) refer to the notes which follow, regardless of which voice is programmed to play them.

### Octave

Notes may be programmed in a six-octave range, corresponding roughly to the middle 72 keys on the piano. The control character *On* in a PLAY-statement character string dictates the octave range for all notes which follow, until another *On* control character is encountered. If no octave is specified, the default of O4 is assumed.

### Volume

Dynamic level (volume) may be controlled by using the character *Un* in a PLAY string. The parameter *n* may range from 0 (no volume) to 9 (maximum volume), and it applies to all notes which follow in all voices until another *Un* character appears. You can't set individual volumes for the three voices, although changing the sustain values (with ENVELOPE) can make some sounds louder or softer than others. If *Un* does not appear in a program, the default value of U8 is used. Volume may also be specified using the VOL statement. The format is VOL *d* where *d* is a value from 0 (off) to 15 (maximum volume).

Notice that the range of volume settings, normally 0-15 when controlling volume with the VOL statement or with POKES, is compressed in the *Un* control character to 0-9. Apparently the programmers who wrote the PLAY routine didn't want to have to deal with two-digit parameter settings (all the other PLAY control characters take only single-digit parameters). U0 corresponds to VOL 0, while U9 corresponds to VOL 15. Other volume settings are distributed roughly evenly between. For example, U4 corresponds to medium volume (the equivalent of VOL 7). The *Un* control character in a PLAY string allows more precise volume control than the VOL statement, but there are situations when it is more desirable to have volume control outside

THE ATARI  
TEN COMMANDMENTS

# 1

**"We shall create a computer that will be a landmark in the history of computers."** *Just Framed*  
ATARI CORP.

Recently, a writer compared the revolutionary 1040ST™ to Henry Ford's Model T.™ You may be surprised to learn that we were very complimented.

The truth is that both the ST™ and the Model T were designed to be machines of great power and usefulness at a price that was affordable to everybody.

The only difference is that the 16-bit 1040ST uses the most advanced technology in the world. And the result is a computer that has 1024 Kbytes of memory for the amazingly affordable price

of \$999. That's actually less than \$1 per Kilobyte. We think Henry Ford would be very proud.

The ATARI 1040ST is at your computer retailer now.



© 1986, Atari Corp.  
ATARI, 1040ST, and ST are TM's or reg. TM's of Atari Corp.  
Model T is a TM of Ford Motor Company.

of a character string, using the VOL statement.

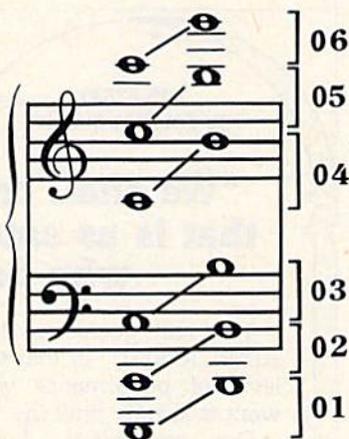
### Filter

The *Xn* control character allows additional creative control over the tonal quality of the 128's sound. X1 turns on the filter for a given voice and X0 turns it off. Within a composition, you may use the filter on one or more voices. The SID chip has only one filter, however, and it applies to all filtered voices at any one time.

### Notes And Elements

To sound a note, place the letter of the note you want to play within the PLAY character string. Sharps and flats may be played by including the # (sharp) or \$ (flat) element prior to the letter of the note. Octaves start at C and end at B, with middle C being O4 C.

The length of time the note is to be held is specified by preceding it with one of the duration elements (W,H,Q,I,S). When a dot (.) precedes a duration element, it increases the duration value of that element by half. For example, in



common time (4:4), the elements have these values:

S (sixteenth note)	1/4 beat
I (eighth note)	1/2 beat
.I (dotted eighth note)	3/4 beat
Q (quarter note)	1 beat
.Q (dotted quarter note)	1-1/2 beats
H (half note)	2 beats
.H (dotted half note)	3 beats
W (whole note)	4 beats
.W (dotted whole note)	6 beats

A rest can be included in the PLAY character string by following a duration element with the R element (QR programs a quarter rest, SR a sixteenth rest, and so on).

The M element in a PLAY character string instructs the computer to wait for all voices currently playing to end the current measure.

With all of this in mind, we're now ready to begin writing music to PLAY on the Commodore 128. Let's start with the first measure in voice 1 of Bach's G Major Minuet. The first note is a quarter note D in octave 5 (O5QD). This is followed by eighth notes G, A, and B in octave 4 (O4IGIAIB) and eighth note C in octave 5 (O5IC). To play only the first measure of voice 1, type:

PLAY "V1 O5 QD O4 IG IA IB O5 IC"

Synchronizing voice 2 with voice 1 is a little trickier, though. Voice 2 begins with a half note G in octave 3 followed by a quarter note A in the same octave (O3HGQA). We want to program these notes in such a way that the half note G begins at the same moment as the quarter note D in voice 1, and the quarter note A is synchronized with the eighth note B in voice 1.

In order to understand the coordination of voices, let's consider the logical way the computer reads and plays the notes in a PLAY char-

acter string. When the 128 reads a note, it follows these two rules in determining when to start playing that note:

1. If the voice specified for this note is currently playing another note, the new note will begin after the old note has been played for the full duration specified. If this voice is not currently playing, the note begins immediately. (Remember that the voice is specified by the last Vn character to precede a note in a PLAY string.)

2. The computer will not proceed to the next note in a string until the note just read has begun to be sounded (regardless of whether the notes are specified for the same, or different, voices).

So, we list the notes in the following order to play both voices in sync:

V2O3HG V1O5QD O4IG IA IB V2O3QA V1O5IC

This measure is programmed by the character string A\$ in line 90 of the program "Minuet." I've found that the practice of assigning a name to a string in one line, and

then PLAYing that string in another line, facilitates organization and debugging of my musical programs.

The notes of the second measure are listed in the same manner to synchronize their playing:

V1O5QD V2O3.HB V1O4IG IR IG IR

This string is named B\$, the third measure C\$, and so on.

Note that this melody was written in the key of G Major, and that there is one sharp (F#) in the key signature. The 128 doesn't know what key it's playing in, so any sharp or flat notes must be preceded by a # (sharp) or \$ (flat) in the PLAY character string.

One more important note about synchronization: *The Commodore 128 System Guide* offers this advice (page 156) on synchronizing notes of different durations: "As a rule, always start with the note with the longer duration." This is a rule with which I disagree. If we followed this rule, we would come up with the following PLAY strings for the first six measures of "Minuet":

A\$="V2O3HG V1O5QD O4IG IA V2O3QA V1O4IB O5IC"  
 B\$="V2O3.HB V1O5QD O4IG IR IG IR"  
 C\$="V2O4.HC V1O5QE IC ID IE I#F"  
 D\$="V2O3.HB V1O5QG O4IG IR IG IR"  
 E\$="V2O3.HA V1O5QC ID IC O4IB IA"  
 F\$="V2O3.HG V1O4QB O5IC O4IB IA IG"

If you type these in and PLAY them, you'll find that the voices gradually lose their synchronization. By the end of the fifth measure, voice 2 is an eighth note ahead of voice 1. The explanation for this is fairly simple: There is a very small, but definite, period of time required for the computer to read and process each note. While a whole note should play for exactly the same duration as two half notes, the two half notes will take slightly longer to play on the 128 than the whole note because there are two notes to read and process instead of one. Four quarter notes, then, take longer to play than two half notes; eight eighth notes longer yet; and sixteen sixteenth notes even longer.

To overcome this inherent problem with the PLAY statement, I have my own rule for synchronization. To synchronize two or three notes to start playing at the same time, the notes should be listed in the following order in the PLAY character string:

THE ATARI  
TEN COMMANDMENTS

# II

**"We shall create a computer that is as smart as the people who buy it."** *Just Personal*  
ATARI CORP.

The real genius of the ATARI 1040ST™ is that the level of performance you want is already built in.

Our competitors, however, think they can sell you a computer with a puny memory, and then charge you a small fortune to expand it.

We don't think that makes much sense.

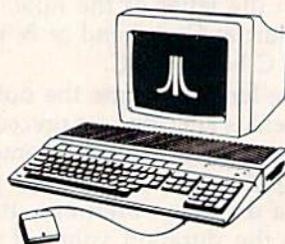
That's why the 1040ST offers you 1024 Kbytes of memory built in for the incredibly low price of just \$999. That's less than \$1 per Kilobyte.

About the only thing the competition offers is the

chance to spend big bucks to upgrade their systems to where the ST™ started in the first place.

We're pretty sure which computer smart shoppers will buy.

The ATARI 1040ST is at your computer retailer now.



ATARI

© 1986, Atari Corp.  
ATARI, 1040ST, and ST are TM's or reg. TM's of Atari Corp.

1. List first the note played by the voice which is the last to stop playing prior to the point of synchronization. If more than one voice is currently playing, this voice will be the one which was last named in a PLAY character string.

2. List second the note played by the voice which is next to last to stop playing prior to the point of synchronization.

You can see how I've followed this rule in lines 100-160 in Minuet. Strings B\$, C\$, D\$, E\$, and F\$ all begin with voice 1 since voice 1 was playing the last note specified in each preceding string.

Once these few concepts are understood, the listing of character strings for the rest of the piece is fairly straightforward. Although Minuet uses only two voices, the principles of listing and synchronization are the same for musical arrangements using all three voices. Next month, we'll explore the ENVELOPE statement and its parameters in more detail. We'll see how to use this statement for creative control of the SID's tonal quality.

See program listing on page 115. ©

THE ATARI  
TEN COMMANDMENTS

# IIII

**"We shall create a computer that sets a new standard for speed and performance."** *John Farnham*  
ATARI CORP.

The revolutionary 1040ST™ has a sizzling clock speed of 8 MHz that the competition just can't touch. And the more speed your computer has, the less time you'll waste waiting for it to do its job.

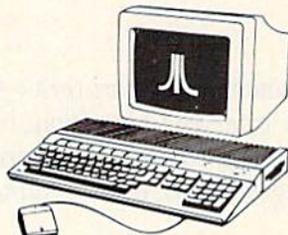
It's what you would expect from a system driven by a powerful 68000 microprocessor.

Similarly, the 1040ST delivers one Megabyte of memory for you to work with, which is two to four times more than our competitors deliver.

And we've succeeded in creating this amazing combination of speed and performance for the incredibly low price of just \$999.

Which means the 1040ST sets new standards for speed, performance and price!

The ATARI 1040ST is at your computer retailer now.



ATARI

© 1986, Atari Corp.  
ATARI and 1040ST are TM's or reg. TM's of Atari Corp.

## Commodore SERVICE

POWER SUPPLY (C-64) .....	29.95
1541 (Alignment) .....	35.00
C-64 (Repair) .....	44.95
C-128 (Repair) .....	95.00
1541 (Repair & Alignment) .....	75.00
1571 (Alignment) .....	40.00
1571 (Repair & Align) .....	135.00
POWER SUPPLY (C-128) .....	99.95
PARTS C-64 & C-128 .....	CALL

PARTS AND DIAGNOSTICS INCLUDED  
(FREE Return Freight in the USA.  
APO-FPO, C3PO add \$10)

**TO SAVE C.O.D. CHARGES -  
SEND UNIT & POWER SUPPLY  
WITH CHECK OR M.O.**  
(916) 364-5134

### Second Source Engineering

2664-B Mercantile Drive  
Rancho Cordova,  
CA 95670



## COPY II 64/128™

### BACKUP PROTECTED SOFTWARE FAST.

From the team who brought you COPY II PLUS (Apple), Copy II PC (IBM) and COPY II MAC (Macintosh) comes a revolutionary new copy program for the Commodore 64 and 128 computers.

- Copies many protected programs—automatically. (We update Copy II 64/128 regularly to handle new protections; you as a registered owner may update at any time for \$15 plus \$3 s/h.)
- Copies even protected disks in under 2 minutes (single drive).
- Copies even protected disks in under 1 minute (dual drive).
- Maximum of four disk swaps on a single drive.

- Includes fast loader, 12-second format.

Requires a Commodore 64 or 128 computer with one or two 1541 or 1571 drives.

Call 503/244-5782, M-F, 8-5  
(West Coast time) with your   
in hand. Or send a check  
for \$39.95 U.S. plus \$3 s/h, \$8  
overseas.

**\$39.95**

Central Point Software, Inc.  
9700 S.W. Capitol Hwy. #100  
Portland, OR 97219

*Central Point  
Software*  
INCORPORATED

Backup utilities also available for the IBM, Apple II, Macintosh and Atari ST.  
This product is provided for the purpose of enabling you to make archival copies only.

# 64 Multitasker

Richard F. and Sally J. Daley

*Many powerful computers—such as the Amiga—have an advantage over the Commodore 64: They're capable of multitasking, running two or more programs at the same time. Here's a way to give your 64 the same capability.*

The April 1985 issue of the GAZETTE included a program which partitioned the memory of the Commodore 64 into three individual 12K blocks. "Triple 64" allowed you to treat each block of memory as an independent computer. Each block could contain an independent program with its own variables. Now, "64 Multitasker" takes this idea one step further and lets you run two programs simultaneously.

## Installing The Program

Since 64 Multitasker is written entirely in machine language, it must be entered using the "MLX" machine language entry program found elsewhere in this issue. Be sure you read the instructions for using MLX before you begin entering the data for Multitasker. When you run MLX, you'll be asked for the starting and ending addresses for the data you'll be entering. The correct values for Multitasker are as follows:

Starting address: C000  
Ending address: C30F

When you've finished entering all the data, be sure to save a copy before leaving MLX.

To use Multitasker, load the program with a statement of the

form LOAD "MULTITASKER",8,1. (Substitute the name you used when you saved the program. Tape users should substitute ,1,1 for the ,8,1.) Activate 64 Multitasker by typing SYS 49152. After a brief delay, the computer will respond with a READY prompt. Now press the f1 function key. You won't see anything happen yet (except possibly a blink of the cursor). Now type SYS 49155 and press RETURN. This time the screen will clear and the message MULTITASKER ENABLED will appear on the second line of the screen.

The memory is now configured into two separate and independent blocks—effectively two computers—ready for your use. At this point, you're in block 2. To confirm this, press f7. This key tells you which of the two blocks of memory is currently selected.

Blocks 1 and 2 each have 17917 bytes of memory available—you can check this by typing PRINT FRE(0). Now press f3, and you'll instantly switch to block 1. (This was the block you were in before the last SYS command.) Pressing f3 switches you from one block to the other.

*Do not, under any circumstances, use the RUN/STOP and RE-*

*STORE sequence while using 64 Multitasker. It could cause the computer to lock up.*

## A Simple Test

If you've followed the procedure described above, you're now in block 1. If you're in block 2, press f3 to go back to block 1. If you're not sure which block you're in, press f7 to find out. Once in block 1, type in the following program:

```
100 FOR I=0 TO 10000
110 PRINT I
120 NEXT I
```

When you're finished, press f3 to switch to block 2 and type in this program:

```
100 FOR I=10000 TO 0 STEP -1
110 PRINT ,I
120 NEXT I
```

You can see that both programs are in memory at once by pressing f3 to switch between memory blocks and then typing LIST in each block.

Now go to block 1. Type RUN and press RETURN. You'll see a column of numbers at the left side of the screen counting up from zero. Watch it for a few seconds; then press f3 to get to block 2. Type RUN and press RETURN. You'll see a column of numbers counting down from 10,000. Because of the comma in the PRINT statement, the column is about one-fourth the way across the screen. This lets you easily differentiate between the two

blocks. Watch the programs run for a few seconds.

Press f3. You'll again see the program in block 1 running. Although pressing f3 allows you to switch between viewing the two programs running, the 64 still isn't really multitasking—if you watch carefully as you switch between the blocks, you can see that each program runs only while you view it. However, the more quickly you press f3, the closer you come to true multitasking.

### Even Closer

You don't have to keep pressing f3 to make your 64 a multitasking computer. Pressing f5 makes the computer quickly swap tasks back and forth by itself. You may notice that the counting slows down to about half its previous speed. Your Commodore 64 is now running two programs, even though you can see only one screen at a time. You can check this by pressing f3 to swap screens.

The f5 key starts and stops the automatic functioning of the two blocks of memory as two independent computers. When you start multitasking, the program automatically switches between the two blocks, running both programs simultaneously. This switching occurs every three system interrupts, or 20 times per second.

The accompanying table is a guide for using the function keys. It also includes a number which can be POKEd into location 725 to simulate the pressing of a function key. You'll find this useful if you write programs to run under 64 Multitasker.

### Applications

You may already have some ideas for using the 64 Multitasker. If not, here are a few suggestions to get you started.

Background processing is an exciting possibility. For example, if you have a long sort to run, set it up and run the sort in one block; then swap blocks and do something else in the other block. You could write or edit a program, play a game, list a program to the printer, or look at a disk file.

How about creating a new form of game? You and a friend

Function Key	POKE	Action
f1	4	Saves the contents of memory locations 0-1023 (needed only during installation)
f3	5	Switches between blocks in single process mode and between screens in multitasking mode
f5	6	Toggles the multitasking mode on and off
f7	3	Tells you which block is currently in use

could design competitive items, such as spacecraft; then, using multitasking mode and sprites, you could let the two programs battle it out. The winner could be the program which destroys the creation of the other. Many variations on this theme are possible.

There are numerous possibilities for switching blocks under program control (remember, POKE 725,X—see the table). This can get complicated, but you could have a program in block 1 which would call a subroutine from block 2. The advantages are that you wouldn't have to worry about screen setup, variables, line numbers, or any of a number of other possible conflicts. Each block has its own screen, variables, and operating system memory from 0 to 1023.

### Limitations

Unfortunately, 64 Multitasker does have some limitations. There are several items that are not separate for each block of memory. Most significant of these are the color memory and the I/O block. Also, if you set up a video effect, it affects both blocks. This is useful, however, in that sprites could be controlled from both blocks on one screen—an advantage for the two-program-game idea discussed above. Other items such as high-resolution graphics, programmable characters, and sound effects are also common to both blocks.

Another problem is the physical limitation of having only one screen, keyboard, serial port, and so on. If a program requires keyboard input as it is operating in the background, it must wait until you switch back into its block. An especially messy situation could occur if both programs tried to access the serial port at once.

64 Multitasker uses the function keys f1, f3, f5, and f7. If you wish to run a program that uses one or more of these function keys from

within 64 Multitasker, you may have to change that program (f2, f4, f6, and f8 may be available). Another conflict arises when you try to run a program that uses memory beginning at location 49152 (\$C000). This is the area where 64 Multitasker resides. Unfortunately, many other programs also are designed to be used at this location. In cases like this, it may be possible to relocate the code or data above location 49934, where 64 Multitasker ends.

Also remember that as long as two programs are running, each of them will run only at about half speed. This may affect some games.

### How It Works

The principle of operation for 64 Multitasker is to exchange the operating system memory in pages 0-3 (locations 0-1023) during each system interrupt. These pages are transferred to a holding buffer. The two screens are maintained in different areas in memory, so they are not buffered—the video chip is simply set up to look at the user-selected screen. We chose not to exchange color memory because of the need also to exchange color registers in the video chip.

Moving the stack (page 1 of memory—locations 256-511) causes a few headaches. If you're new to machine language, the stack is a place designed to hold return addresses for subroutines and interrupts. If the stack or the stack pointer has been changed, an RTS instruction will not find the correct address on the stack. The CPU, unaware of the problem, will faithfully try to execute whatever instruction is found at the address located at the top of the stack. This usually results in a computer lock-up. The moral of the story is that the computer must copy the stack pointer and the stack whenever an exchange of system memory takes place.

See program listing on page 115. ☐

# 1526 Underliner

Georg Zimmer

With this short machine language program, you can now have underlined characters on documents printed with the Commodore 1526 or MPS-802 printer. Written for the Commodore 64, it's fully compatible with SpeedScript versions 2.0, 3.0, 3.1, and 3.2.

SpeedScript is a powerful word processor, but it doesn't allow you to underline words or sentences when used with 1526 or MPS-802 printers. Now, with "1526 Underliner" you can do just that. Although Underliner is designed to work with SpeedScript, you can use it with any BASIC program or any program that doesn't disturb RAM locations 52809 to 53247.

## Using Underliner With SpeedScript

First, you must modify SpeedScript so that it won't overwrite Underliner. To make a new copy with the underlining feature, load SpeedScript. If you're using SpeedScript 3.x, then type the following commands in direct mode:

```
POKE 2481,205
SAVE"UL.SPEED",8
```

If you're using SpeedScript 2.0, use these commands instead:

```
POKE 2370,164
POKE 2985,204
POKE 6547,204
SAVE"UL.SPEED",8
```

Now type in Underliner and save a copy on the same disk as your modified copy of SpeedScript (UL.SPEED). The next time you're ready to use SpeedScript with this feature, load and run Underliner instead. It will automatically load SpeedScript for you. Here's how to put Underliner into operation. A feature of SpeedScript known as *printkeys*—designed to let you use all of your printer's features—allows you to easily underline characters, words, or phrases. We'll use two of these printkeys. SpeedScript 2.0 allows only the numbers 1–8 to be used

as printkeys, but SpeedScript 3.x allows any character. First, we'll define a new underline character. To do this, go to the top of your document, press CTRL-£, and then press the key you wish to use for underlining (I use the minus key (-) for SpeedScript 3.x. Use 1 with SpeedScript 2.0). Then type "=255". Now define a reset character with a value of zero. To do this, press CTRL-£ again. Then press the key you wish to use (I use the 0 key for SpeedScript 3.x. Use 2 with SpeedScript 2.0) and type "=0". SpeedScript 3.x users should end up with something that looks like this:

```
■=255■=0←
Text goes here.←
Text . . . ■This will be underlined■.←
Text . . .←
■←
```

If you're using SpeedScript 2.0, you should see 1's instead of minus signs, and 2's instead of 0's.

To toggle underlining, press CTRL-£, and then the minus key (1 with SpeedScript 2.0). This is the same procedure normally used by SpeedScript to underline with non-Commodore printers. When you've finished typing, put the reset character at the bottom of your document. To do this, go to the end of your file with CTRL-Z. Then press CTRL-£, and then 0 (2 with SpeedScript 2.0). The reset character should now be the last character in your document.

It's always a good idea to print the document to screen before printing it on paper just to make sure everything is how you want it. Do this by pressing CTRL-SHIFT-P and selecting SCREEN at the prompt. If

everything looks correct, then print your document with CTRL-P.

If you exit SpeedScript, Underliner is, of course, turned off. To reactivate it and reenter SpeedScript, type:

```
SYS 52809
RUN
```

Underliner also works with BASIC. Load Underliner and change line 120 to SYS 52809 (delete everything after the SYS in the existing program). Run the program. Now use CHR\$(255)—the pi sign—as the underline toggle. This can be done either in direct mode or within a program. To reset, print CHR\$(0), or SYS 52809.

## A Look Inside

Underliner is a small machine language subroutine that "patches"

into the operating system (OS) of the 64. Whenever the OS wants to print a character, this subroutine takes control. It stores the characters it receives into a 255-byte buffer, then returns control to the OS, which sends the characters to the printer. When the OS tries to print a carriage return and linefeed, Underliner sends the carriage return only. It then scans the buffer for bytes of 255, which act as toggles for the underlining. If the underline toggle is on, it prints CHR\$(164)—the underline character. If the toggle is off, it prints a space. Then it prints a linefeed, resets the buffer pointer, and returns control to the OS. Underliner repeats this process until the entire document has been printed.

See program listing on page 111. ☐

With NRI training at home, you can . . .

# Move up to a high paying career servicing computers



## And you can start by actually building NRI's 16-bit IBM-compatible computer.

You can create your own bright, high paying future as an NRI trained computer service technician. The biggest growth in jobs between now and 1995, according to Department of Labor predictions, will occur in computer service and repair, where demand for trained technicians will double. There is still plenty of room for you to get in on the action—if you get the proper training now.

### Total computer systems training, only from NRI

To learn how to work on computers, you have to get inside one. And only NRI takes you inside a computer, with total systems training that gives you hands-on experience with computers, peripherals, and software. As part of your training, you'll build a Sanyo MBC-550-2, which experts have hailed as the "most intriguing" of all the new IBM-compatibles.

Even if you've never had any previous training in electronics, you can succeed with NRI training. You'll start with the basics, rapidly building on the fundamentals of electronics until you master advanced concepts like digital logic, microprocessor design and computer memory. You'll probe into electronic circuits, using the exclusive NRI Discovery Lab® and professional Digital Multimeter, that you keep.

### Learn to service today's computers

You'll assemble Sanyo's intelligent keyboard, install the power supply and disk drive, and attach the high resolution monitor—all the while performing hands-on experiments and demonstrations that reinforce your skills.

As you complete your Sanyo, you grasp the "secrets" that qualify you for a new career. You'll

learn to program in BASIC and machine language. You'll use utility programs to check out the Sanyo 8088 microprocessor (the same chip used in the IBM PC). And you also get over \$1,000 worth of software, including WordStar and CalcStar.

### Learn the basics at home

Most importantly, you'll understand the principles common to all computers. Only a person who fully understands all the fundamentals can hope to be able to tackle all computers. NRI makes sure that you'll gain the knowledge and skills to maintain, troubleshoot and service computers.

With NRI training, you'll learn at home on your own time. That means your preparation for a new career or part-time job doesn't have to interfere with your current job. You'll learn at

your own pace, in the comfort and convenience of your own home. No classroom pressures, no rigid night school schedules. You're always backed up by the NRI staff and your instructor, who will answer questions, give you guidance and be available for special help if you need it.

### Send for free NRI catalog

Let others worry about computers taking their jobs. With NRI training, you'll soon have computers making good paying jobs for you. Send the coupon today for NRI's 100-page catalog, with all the facts about computer training. If the coupon is missing, write to NRI Schools, 3939 Wisconsin Ave., Washington, D.C. 20016.

IBM is a Registered Trademark of International Business Machines Corporation.

# NRI

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
- Color TV, Audio, and Video System Servicing
- Electronic Design Technology
- Digital Electronics

- 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) \_\_\_\_\_

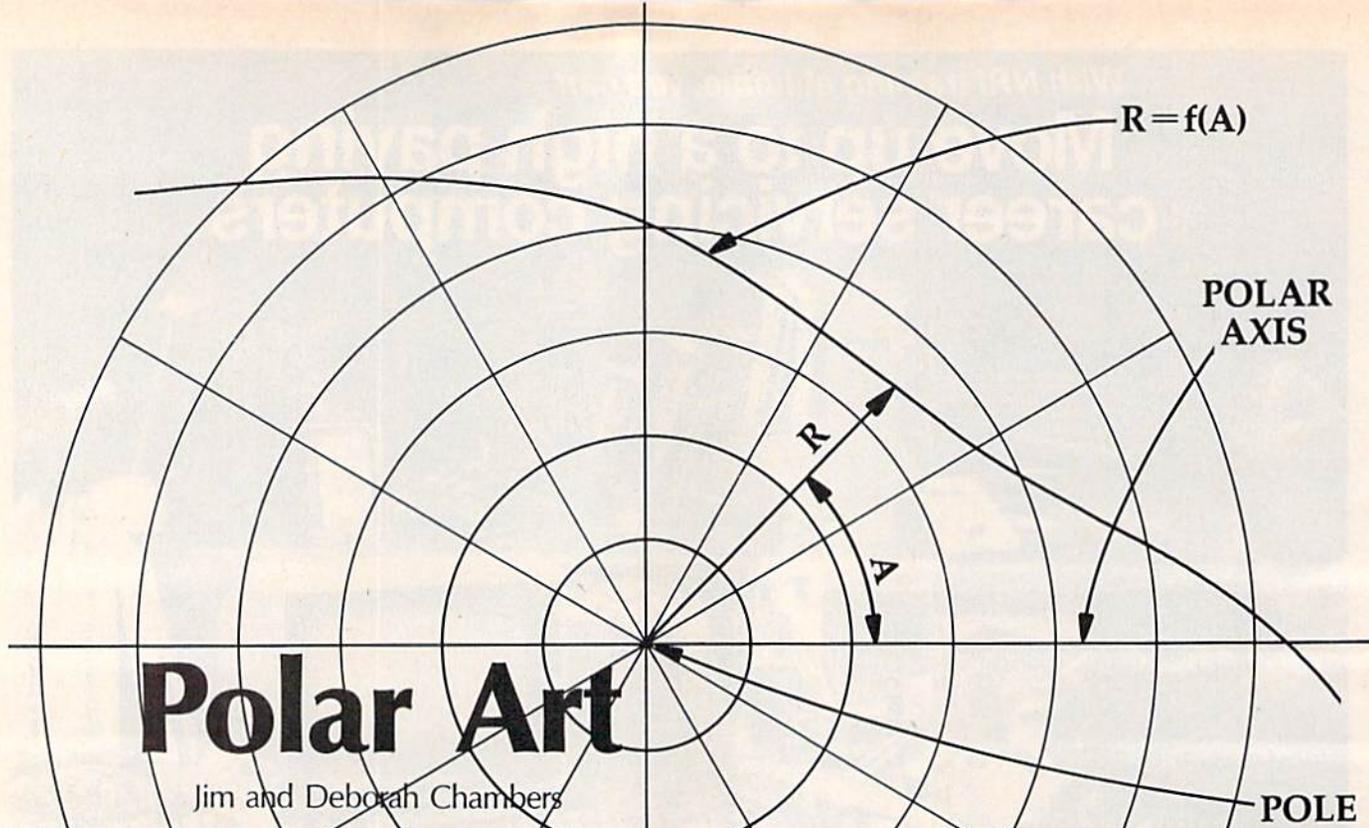
Age \_\_\_\_\_

Street \_\_\_\_\_

City/State/Zip \_\_\_\_\_

Accredited by the National Home Study Council

153-116



# Polar Art

Jim and Deborah Chambers

This program uses your input to create some fascinating images on the high-resolution screen. Included are versions for the Commodore 64, 128, Plus/4, and 16.

As a matter of introduction, polar art is not what happens when you give a polar bear finger paints. It is, instead, a result of the beauty and elegance of mathematical equations of the form  $R=f(A)$ , in which the points of a curve are described by a distance  $R$  (radius) from an origin or pole, and by an angle  $A$  (see figure above). This is different from the more familiar  $x,y$  method of graphing in the Cartesian coordinate system (named for René Descartes).

The advantage of polar graphing is that certain types of curves (such as circles, ellipses, and heart-shaped figures known as cardioids) are more easily described by using polar rather than Cartesian equations. The program that accompanies this article uses two different forms of polar equations and allows you to manipulate the constants. It then computes the coordinates of a number of points on the resulting curve and plots them on the hi-res screen. The result is polar art.

After typing in the program (Program 1 for the 64, Program 2 for the 128, Plus/4, and 16), save a copy. To use it, load it and type RUN. You're first asked to choose between two different drawing modes, Art I or Art II. Select one of

these; then, when you're prompted for input, simply type in the required three or four constants (three for Art I, four for Art II). Separate these values by commas; then press RETURN. For starters, try the values shown below; then substitute some of your own. As written, the program will not allow invalid entries, so feel free to try fractions (like 0.1 or 1.5), negative numbers, and very large numbers (like 20,000).

### Art I

N	R1	R2
1.5,	30,	60
3,	45,	78
3,	30,	60

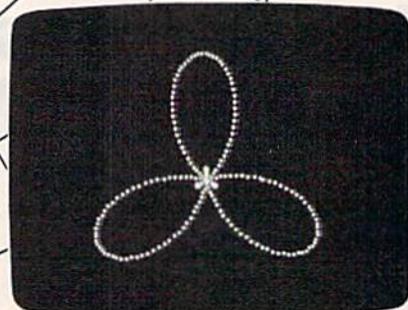
### Art II

N1	N2	R1	R2
2,	8,	80,	16
2,	8,	40,	64

## The Math Behind The Art

In Art I, the equation is  $R=R1+R2*\text{SIN}(N*A)$ , where you choose the constants  $N$ ,  $R1$ , and  $R2$ . In most cases, this equation generates circular curves and patterns.

In Art II, the equation is  $R=R1*\text{SIN}(N1*A)+R2*\text{SIN}(N2*A)$ , where you set the constants  $N1$ ,  $N2$ ,  $R1$ , and  $R2$ . This equation can produce some very exotic curves.



This three-petal flower is typical of the attractive patterns produced with Art I. (Values used for this pattern are  $N=3$ ,  $R1=50$ ,  $R2=60$ .)



Art II's formula created this complex shell-like picture. (Values used for this pattern are  $N1=8$ ,  $N2=1$ ,  $R1=50$ ,  $R2=60$ .)

Note that the greater the values for the constants, the longer it takes to plot the resulting curve. See program listings on page 114. ☐

# Draw 128

Mike Cortese

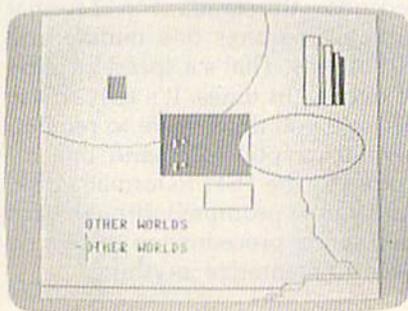
*This short, easy-to-use 128 drawing program lets you sketch, draw circles, ovals, squares, and rectangles in any of 16 colors—and add text to your artwork. Also included is the ability to save and load your work. A joystick is required.*

This program demonstrates how a compact program can be very useful with BASIC 7.0's powerful commands. "Draw 128" lets you create your own masterpieces with a few commands. The premise for the program is simple: With a joystick, you draw freely anywhere on the screen. By pressing any of the assigned keys (see below), you can create circles, ovals, rectangles, and boxes, and fill designated areas with color. You can choose to draw in any of the 128's available 16 colors. Also included is a command that lets you add text to your graphics screen. Additional commands allow you to save and load drawings for future use. Finished products can be used as title screens or pictures in your own BASIC programs. If you're not yet familiar with BASIC 7.0, you can study the program listing and see how to use some of these powerful commands.

## An Empty Canvas

To get started, type in the program and save a copy to disk. Load the program, then plug a joystick into port 2 and run Draw 128. The crosshairs symbol appears at the center of an otherwise blank screen, and indicates the cursor position. You can toggle the cursor on and off by pressing the X key. Moving the joystick in any of the eight directions will result in moving the cursor and drawing a line if drawing mode is

on (which it is when the program is first run). You can turn drawing mode on and off by pressing the D key. When the program is first run, it's in Fast mode—the cursor moves at a reasonable speed. If you want to draw in detail, you'll probably want to slow down the cursor speed. You can toggle fast mode on and off by pressing the F key. Also, when the program is first run, it's in Width 1 mode, which draws thin vertical lines. You can change these to double width (vertical lines only) by pressing W. Pressing W again turns off the double-width line.



*This drawing program features hires graphics, text, and color.*

You can change the drawing color by pressing the C key until the color you want is displayed. The border color changes to indicate the drawing color. All drawing is done in the color selected, including

drawing ovals and rectangles and painting. Note that if you draw with more than two colors in the allotted 8 × 8-pixel area, the color breaks will appear blocky (like stairsteps in many cases) and won't look as you intended. This is due to the color limitations in graphic mode 1, which is used to allow for the most detail.

## Rectangles, Squares, Ovals, and Circles

To draw a rectangle or square, move the cursor (which can be on or off—see above) to one of the four corners and press B. Then move the cursor to where you want the opposite corner and press B again. The rectangle or square will then be drawn in the current drawing color.

To draw a circle, move the cursor to the center of the area in which you want the circle drawn and press O. Then move the cursor left or right of the center (on exactly the same horizontal line) to the desired radius and press O twice. To draw an oval, move the cursor to the center of the oval to be drawn, press O, then move the cursor up or down (actually, any direction except due east or west) relative to the center and press O twice. Note that when drawing an oval, the second cursor position marks the maximum length and width of the oval, but does not lie on its outer boundary. It is suggested that you experiment with this feature before using it in any serious endeavor. The oval will be drawn in the current drawing color. This command can be used to make curves by having part of the oval drawn off the visible screen.

## Fills And Text

To paint—or fill—an object, move the cursor in the area to be painted and press P. If the object is not completely closed, the color will leak out into the rest of the screen. To paint an area, it's best to draw with the double-width feature. There's less chance of color leaking.

To add text to your graphics screen, first select a color and then move the cursor to the position where you want the first letter to appear. Press T and the screen will clear. Then respond to the TEXT: prompt by typing your message. Press RETURN after typing the message, and the graphics screen will reappear with your text in place.

Pressing the E key erases the entire screen, moves the cursor to the middle of the screen, and sets the drawing color to black. The back arrow (←) key—in the upper left corner of the keyboard—places the cursor back in the center of the screen. After a screen is erased, it cannot be retrieved unless it was saved to disk.

The following keys move the cursor quickly to another part of the screen:

- ← center
- 1 top left corner
- 2 top right corner
- 3 bottom left corner
- 4 bottom right corner

To save the graphics screen to disk, press S and type the filename. (Be sure the filename is unique, not one that already exists on your disk.) The screen will be saved and then displayed again.

To load a previously saved screen, press L and type the filename. It will automatically be loaded and the screen will be displayed. Then you can modify the screen and resave it if you wish. To view the disk directory, type D at the FILENAME: prompt.

To use a screen made with Draw 128 in a BASIC program, add these lines to the program:

```
BLOAD"filename", B0,P7168  
GRAPHIC 1
```

To save a screen in program or immediate mode, use BSAVE "filename",B0,P7168 TO P16383. This can be used to save any picture created in graphic mode 1.

See program listing on page 116. ☐

# Turbo Format

Ross Ouwinga

*If you're interested in saving time, and wear and tear, on your 1541 disk drive, you'll put this program high on your list of utilities. It formats a disk in only 9-1/2 seconds—a super speed-up from the usual minute and 20 seconds—and it eliminates head knocking. Also, it's easy to use—just answer a few prompts, and you're seconds away from a formatted disk.*

"Turbo Format" is a fast, easy-to-use disk formatting program. It formats a disk in only 9-1/2 seconds—the standard 1541 format program requires one minute and 20 seconds. That's a speed increase of over eight times. It's easy to use because you don't have to remember the cryptic command line required by the 1541 to format a disk. And you're prompted through each step of the procedure so there's no need to memorize anything.

## Typing It In

The program is written entirely in machine language. "MLX," the machine language entry program found elsewhere in this issue, is required to type it in. After loading and running MLX, answer the prompts for starting and ending addresses with the following:

```
Starting address: 0801  
Ending address: 0EC8
```

Type in Turbo Format and save it to disk. To run it, type LOAD "filename",8 and RUN. There will be a short delay (while most of the program is transferred to the memory in the disk drive), and a title screen with the first prompt will be displayed.

## Three Easy Steps

You're first prompted to enter the disk name (up to 16 characters). Virtually any character may be used in the name, but some may cause undesirable side effects, so caution is recommended whenever characters other than letters or numbers are used.

The second prompt is for the disk ID. This is the number used by the disk drive primarily to determine when a disk has been changed. Normally this number is two characters long, but Turbo Format will allow up to five characters.

More than five characters may be typed in, but only the first five will be used. Only the first two characters will actually be used by the disk drive to identify the disk after it has been formatted, but all five will appear in the BAM (Block Allocation Map).

Next, you'll be instructed to insert the disk to be formatted. *Be sure that you do not leave your disk with Turbo Format in the disk drive.* Formatting the disk will erase everything. A recommended safeguard is to put a write-protect tab on your disk immediately after you have a working copy. Turbo Format does check the write-protect tab, and if one is present, the disk will not be formatted. Also, an error message will appear to notify you that the disk is write protected.

Along with the prompt to insert a disk is an abort option. Press the f1 key to abort. This causes the program to start again at the beginning, prompting you to re-enter the disk name. This option allows you to change your mind and enter a new disk name or ID or correct any spelling errors before formatting the disk.

## Two Kinds Of Formatting

The formatting process does not actually begin until you press the space bar or RETURN. Note, however, that the space bar and RETURN do not perform the same function. If you press the space bar, the disk will be formatted and all data written to the disk will be checked for errors. If an error occurs, the formatting will stop and the type of error will be displayed on the screen. If you press RETURN, the disk will be formatted as quickly as possible without checking for errors.

The reason for offering the two options is to allow you to use the program in a manner which most closely suits your needs. If the disks are verified, the procedure takes 17 seconds rather than 9-1/2 seconds. Verifying provides more assurance that the disk is formatted correctly. The additional 7 or 8 seconds may not make much difference to you. On the other hand, if speed is important, you may choose not to verify your disks. Errors occur very rarely and most are self-correcting, provided the disk itself is not dam-

aged. Also, if you have a disk which you know is faulty, but wish to format anyway, you must use the no-verify option. I strongly recommend using the verify feature if you're formatting the back side of a disk certified only for single-side use, or if the disk is well used, or if you use an inexpensive, off-brand disk.

## No Knock

After pressing the space bar or RETURN to format, the process begins. A feature that will be noticed immediately is that there is no loud knocking noise at the beginning of the format routine. A single short click is heard instead to indicate that the routine is working correctly. This feature is possible since Turbo Format is loaded from a disk at the start and the exact location of the read/write head is saved in memory in the disk drive. The program is then able to calculate the exact position of the first track without the excessive knock. The standard format routine does not necessarily know the position of the read/write head; it therefore assumes the worst-case condition and tries to step the head down 45 tracks. If the head reaches track one before it has stepped 45 times (which is usually the case), it bangs the head against the stop until the count of 45 is complete. It works, but it makes an awful racket and, in some cases, eventually works the disk drive out of alignment.

When the format process is complete, a message is displayed and will indicate OK if there were no errors. At this point you have the option of formatting another disk or quitting. It's important that you press f1 to quit. Do not reset the computer by turning it off and back on. The reason for this is that the format routine leaves the read/write head on track 35 when it finishes. By using f1 to quit, the disk drive is sent an initialize command and also a reset command to set everything back in order. If you accidentally turn the computer off, you should initialize the disk drive using the IO: command. Failure to do so could cause erratic operation. If you accidentally restarted when you intended to quit, it will be necessary to press RETURN for the enter name and ID prompts and press the space bar with no disk in the

disk drive. An error will be detected immediately and you will again be given the prompt to quit by pressing f1.

Using Turbo Format does not mean your disks will become less reliable. It's much faster because it eliminates several very unnecessary and time-consuming routines. Most of the time used to format a disk is spent by a routine whose only function is to space the sectors evenly around the disk. Turbo Format sets this space the same for every sector on every track, but skips a time-consuming calculation process used in the standard formatting process. It's amazing how much time is saved by this one modification. To a lesser extent, time is saved by reducing delays when stepping between tracks and by eliminating unnecessary data-conversion routines. A technical discussion of this is beyond the scope of this article, but it should be noted that only those procedures that do not affect reliability were changed. Disks formatted with Turbo Format work just as well as those formatted the standard way.

Intermediate or advanced machine language programmers might be interested to know that the data recorded to the BAM of the disk is at locations \$0B00 (2816) through \$0BFF (3071). If you have a thorough understanding of the BAM and its contents, you can modify this area of the program to customize or personalize the BAM on your disks. Be aware, however, that modifying the BAM may have undesirable side effects and is not recommended for the beginner or someone who knows no more than the basics of disk drive operation.

For those of you with disk drives other than the 1541, Turbo Format will likely work if the drive claims to be 100-percent compatible. Most of the program is transferred to and operates in the disk drive and calls on several routines which are part of the standard program in the drive. If these routines are not at the same addresses as in the 1541, the program will not operate correctly. No damage will occur to your disk drive if this should happen, but it may be necessary to turn it off and on again to regain control.

See program listing on page 112. ☐

# simple answers to common questions

Tom R. Halfhill, Staff Editor

Each month, COMPUTE!'s GAZETTE tackles some questions commonly asked by Commodore users. If you have a question you'd like to see answered here, send it to this column, c/o COMPUTE!'s GAZETTE, P.O. Box 5406, Greensboro, NC 27403.

**Q.** With the VIC-20, you have approximately 3K of free BASIC memory. With the Commodore 64, you have 38K of free BASIC memory. What crazy arrangement kept the VIC-20 from having a lot of memory like the 64? As a result of this, shouldn't the VIC have some other special feature that the 64 doesn't have?

**A.** The "crazy arrangement" which limited the VIC-20 to 3K of BASIC memory was simply the state of computer technology in 1981, the year the VIC was introduced. You may not realize how dramatically computer technology has advanced and prices have dropped in the past five years.

Commodore's goal in 1981 was to bring out the first home computer with color graphics and sound for less than \$300. At that time, the only other personal computers with color graphics were the Apple II (about \$1,200 for 16K), the Atari 800 (\$1,080 for 16K), the Atari 400 (\$630 for 8K), the TRS-80 Color Computer (about \$600 for 8K), and the Texas Instruments TI-99/4 (about \$1,200 with 16K and color TV/monitor). None of those prices included a disk drive, tape drive, printer, or software. Floppy disk drives typically cost \$500 to \$800 during that period, and a dot-matrix printer with no special features cost \$500 to \$1,000. A 300-baud modem was around \$300, not including interface. A 16K memory expansion board for the Atari 800 retailed for \$200.

The VIC-20, introduced at

\$299, was a price breakthrough. It had 5K of RAM (3K free for BASIC), 16 colors, three-channel sound, built-in BASIC language, and a typewriter-style keyboard. It hooked up to a TV set and didn't require a special monitor, and for about \$75 you could add a cassette recorder for loading and saving programs. The VIC was the opening shot in Commodore's home computer price war, and it played a major role in forcing down the prices of competitors.

This was before 64K RAM memory chips were affordable enough to be used in home computers. Instead, 16K RAM chips were the norm. A 16K RAM chip contains 16,384 bits of memory, so it actually takes eight of these chips to yield 16 kilobytes, which we commonly refer to as 16K. Even the IBM PC, introduced soon after the VIC-20, originally came with only 16K RAM. The VIC-20, at \$299 for 5K, offered an attractive price/memory ratio of less than \$60 per kilobyte. An 8K memory expander sold for about \$80, or \$10 per kilobyte.

By the summer of 1982, wholesale prices of the new 64K RAM chips had declined to the point where they became affordable for home computers. (Again, it takes eight 64K RAM chips to yield 64 kilobytes of memory.) For technical reasons, however, it was not practical to redesign the VIC-20 to accept the new chips. So Commodore introduced an entirely new computer—the Commodore 64. At its original retail price of \$599, the 64 was another breakthrough. It offered a price/memory ratio of less than \$10 per kilobyte. If the Commodore 64 had been constructed with the older 16K RAM chips, it would have taken 32 memory chips to yield 64 kilobytes. Not only would the cost have been prohibitive, but the computer would have been much larger and may have re-

quired a cooling fan.

After the 64 was introduced, the home computer price war really heated up and prices plunged. Today you can buy a Commodore 64 for less than \$150, or a Commodore 128 with 128K of RAM for under \$300 (less than \$2.35 per kilobyte). Thanks to the new 256K RAM chips, which are replacing the 64K chips, prices are still dropping. The current price/memory champion is the Atari 1040ST, which comes with one megabyte of memory (1024K) for \$999, including disk drive and monitor—less than \$1 per kilobyte.

On the horizon are one-megabit RAM chips. It takes only eight of these to yield one megabyte, and they should be commonplace within two years.

**Q.** Is it possible to hook up both a TV and a monitor to a Commodore 64 at the same time? If so, can you show something different on each screen at the same time?

**A.** Yes and no. You can connect both a TV and a monitor simultaneously, but you can't show two different screens simultaneously. Both screens will show exactly the same thing.

To connect two screens to a 64, just plug a monitor into the composite output jack and a TV into the RF output jack. This capability comes in handy during group presentations, such as user group meetings and in classrooms. You could also hook up a monochrome monitor to the composite jack for text displays, and a TV to the RF jack for color graphics.

By the way, the Commodore 128 can also display two screens simultaneously—a 40-column display connected to the standard monitor or RF modulator (TV) output, and an 80-column display connected to the RGB output. ©

Fred D'Ignazio  
Associate Editor

For the last several months I've been conducting workshops to introduce teachers to computers, video, electronic keyboards, and other high-tech tools.

The workshops have been an exhilarating, eye-opening experience—for me as well as for the teachers. I've discovered that teachers are extremely interested in becoming competent with high-tech products, and they are enthused about introducing these products into the classroom. Over the last several months I have created a nucleus of highly motivated teachers who have returned to their schools and have started to build multimedia classrooms. The amount of energy and creativity these workshops have unleashed has been truly amazing.

At first, however, I made lots of mistakes. I kept experimenting and trying to do better. Gradually an approach emerged that has proven to be very successful. In the hope that hearing about this approach will benefit other workshop leaders, teacher trainers, and school administrators, I'd like to share some of the key elements with you.

### Honesty

I've learned that the most effective way to reach teachers is to be absolutely honest. In this context, it means that I don't represent myself as a technology expert. Instead, I admit that I make mistakes and sometimes get confused about new machinery myself.

When I make mistakes in front of the teachers, I don't try to cover them up; instead I go out of my way to dramatize them and make them humorous. I leave lens caps on cameras, plug cables in the wrong way, and crash disks with great poise and aplomb. I've learned to look forward

to making mistakes, since they usually turn into the funniest moments of each day's workshop.

### Teachers Come First

I make the point early in each workshop that the equipment is not for kids; it's for the teachers. Teachers usually hear how computers and other high-tech materials are for kids, so no wonder they have little interest in the equipment and have little incentive to learn more about it themselves. If teachers see themselves as technicians or "facilitators" who deliver computer-based learning to students, they can't help feeling devalued and threatened.

Instead I stress that teachers come first and are central to the personal development and growth of each student. In our workshops we look at things that computers can do that spark the interest of teachers and get them personally involved. I start every workshop by having all the teachers write me "Dear Fred" letters that tell me why they are really there and what they hope to get out of the workshop. I read their letters and let each teacher know I don't care about schools, principals, parents, or kids. All I care about is the teacher and his or her need to have a personally meaningful experience with me.

### Quick Tech

I begin each workshop by picking up a huge stack of manuals. I tell the teachers that these are the manuals for the equipment that they see around them in the room. Then the manuals go into the wastebasket and the teachers are promised that they'll learn how to use all the equipment in two days *without reading about them*. There's usually applause at this point.

The message within all this melodrama is that manuals can be an extremely inefficient way for be-

ginners to learn something new. I get the teachers to pressing buttons and pulling switches with great glee and playfulness, and suddenly the need for manuals goes away. Manuals come later when you have the self-confidence and the curiosity to learn how to do something specialized and can't figure it out on your own.

### Fun

In the workshops, there are high-tech workstations all over—computers, video cameras, electronic synthesizers and digital samplers, amplifiers, TV monitors, VCRs, cassette recorders, and special-effects generators. But we avoid the word *workstation* in favor of *sandbox*. Each high-tech work area is a sandbox, and it's to be treated as such. You go there to play, be silly, be creative and imaginative, and have fun. You go there to lose your sense of time, and become oblivious to all the hubbub and confusion going on around you.

The approach works. I've had teachers take off their shoes and play synthesizers with their stockinged feet. Without embarrassment teachers climb onto tables and aim their video cameras at their classmates. They shoot irreverent close-ups of my ears, knees, and beard. They write haunted house stories on the computer and set them to music. They use *Print Shop* and create banners, personalized posters with their names and the graphics icon that they most identify with, and certificates that say, "Graduate of Fred's Multimedia Sandbox." A recent workshop ended with one teacher videotaping the rest of us holding up a banner that read, "All It Takes Is All You've Got!" Some of the teachers blew and popped bubbles. All of us danced together to Beethoven's Third Symphony. Who said learning about high-tech couldn't be fun? 

Todd Heimarck  
Assistant Editor

Programmers sometimes describe a subroutine or technique as being elegant. What is elegance? We might say that a short, simple, and fast program is more elegant than one that's long, complicated, and slow (although this isn't always true). It's almost an aesthetic judgment; a program that looks better and runs better is elegant.

Let's examine two techniques that are sometimes used in BASIC programs. In both cases, there's a better (more elegant) alternative.

### A Page Of IF-THENS

You'll occasionally see a program with several lines that look something like this:

```
60 IF A = 5 THEN B = 7
70 IF A = 6 THEN B = 13
80 IF A = 7 THEN B = -3
90 IF A = 8 THEN B = 6
```

Let's say the value in variable A is an integer between 5 and 21; you'd need 17 IF-THENS to cover all possibilities. Not only do the 17 lines take up memory, but they also slow down the program. If the variable A happens to equal 19, the program has to go through several tests: Is A equal to 5? No. Is it 6? No. Is it 7? And so on.

The 17 lines of IF-THENS could be replaced by the following lines. First, put this at the beginning of the program:

```
10 DIM ZZ(17): FOR X = 1 TO 17: READ
  ZZ(X): NEXT
12 DATA 7,13,-3,6,...
```

The DATA statement would have to be filled in with the appropriate values, which are stored in the numeric array ZZ. Then, later in the program, where all the IF-THENS occur, a single line suffices:

```
60 B = ZZ(A-4)
```

Since the number in variable A is between 5 and 21, we subtract 4 to match it up with the array numbered from 1 to 17. The technique

saves memory and noticeably improves the program speed.

### Substituting A Period For Zero

In many cases, a period all by itself will act like a zero. Word has spread among Commodore programmers that a period is a good substitute. For obtaining random values, many programmers seem to prefer RND(.), which is said to be faster than RND(0) and more random than RND(1). We can test this with two programs. First we'll measure the speed of a period versus a zero:

```
EG 10 TI$="000000"
KM 20 FORJ=1TO1000:K=RND(.):NE
  XT:PRINT TI
SK 30 TI$="000000"
PS 40 FORJ=1TO1000:K=RND(0):NE
  XT:PRINT TI
JF 50 Z=0:TI$="000000"
KM 60 FORJ=1TO1000:K=RND(Z):NE
  XT:PRINT TI
```

On a 128 in 64 mode, the times were 174 jiffies (a jiffy is 1/60 second) when a period was used, 208 for a zero, and 186 for a variable equal to zero. A period is about 16 percent faster than a zero, which is quite an increase in speed. But if we substitute a variable equal to zero, the time saved is only about 6 percent. This example generates 1000 random numbers in roughly 180 jiffies, or 3/1000 second per random number. Six percent of .003 seconds doesn't amount to much, especially when you consider that getting a random number is only a small part of most programs.

Now let's see how the random numbers are created. The program below creates 5000 random numbers from 1 to 1000. A 1000-element array keeps track of how many times each is picked.

```
AM 10 S=0:R=0
GQ 20 DIM A(1000)
EC 30 FORJ=1TO5:PRINTJ,
BX 40 FORK=1TO1000:R=INT(RND(S)
  )*1000+1):A(R)=A(R)+1
XQ 50 NEXTK,J:PRINT
CP 60 FORJ=1TO1000:PRINTJ,A(J):
  NEXT
```

When S was zero, RND(S) gave these results: 90 was picked 16 times, 94 was picked 20 times, and 98 was picked 19 times (your results may vary slightly). The numbers 91, 92, 93, 95, 96, 97, 99, and 100 never appeared at all.

That's not the way a random number generator should work. RND(0) hits every fourth number (at least when you're asking for a number between 1 and 1000). It's like shaking dice 5000 times and seeing only twos and sixes. If you substitute S=1 in line 10, the distribution of random numbers improves greatly. RND(1) is clearly the better choice.

It's true that using a period yields a miniscule improvement in speed. But you should avoid RND(.) because of the problems associated with RND(0). Plus, it's confusing. Even if you understand that periods can replace zeros, RND(.) looks awkward and inelegant.

### Professional Programmers

If you've been reading the GAZETTE for a few years, you might remember the "Inside View" section, where we published interviews with programmers. Fans of that column might enjoy a new book from Microsoft Press called *Programmers at Work*. It includes interviews with 19 well-known and successful microcomputer programmers. It's not an especially technical book, although it helps if you know a little about programming.

Two motifs that run through the book are elegance and simplicity. No two programmers define *elegance* the same way, but after you've read a few interviews, you start to get a pretty good notion of what it means.

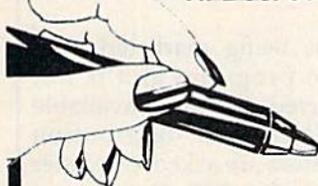
Lots of books teach programming, but very few show you how programmers think. If you'd like to know more about how professional programmers do what they do, I recommend this book. 

W  
I  
L  
D  
C  
A  
R  
D

Be A Winner  
With



From Inkwell  
Systems  
'Til Dec. 31st



**Inkwell Systems**

CREATORS OF PENWARE  
P.O. Box 85152 MB290 • San Diego, CA 92138  
619/268-8792

D  
R  
A  
C  
K  
L  
I  
M

# User Group Update

When writing to a user group for information, please remember to enclose a self-addressed envelope with postage that is appropriate for the country to which you're writing.

Send typed additions, corrections, and deletions for this list to:

COMPUTE! Publications  
P.O. Box 5406  
Greensboro, NC 27403  
Attn: Commodore User Groups

## User Group Notes

The correct address for the Rockland Area Commodore Users Group is 354 East Water St., Rockland, MA 02370.

The Bristol Commodore Users Group now receives mail in care of Computech Systems, Inc., 178 Pine St., Bristol, CT 06010.

Fellsmere's Club Compu-Mania has a new address: P.O. Box 629, Fellsmere, FL 32948.

The VIC Indy Club has changed its name to the Indy Commodore Computer Club (IC3 or ICC3). The address is still P.O. Box 11543, Indianapolis, IN 46201.

The Osage/Kay Commodore User's Group (OKCOM) has changed its address to P.O. Box 1214, Ponca City, OK 74602.

The Commodore Computer Club has changed its address to P.O. Box 23396, Vancouver, BC, Canada V7B 1W1.

## New Listings

### CALIFORNIA

Commodore Users Group of Riverside (CUGR), P.O. Box 8085, Riverside, CA 92515

### ILLINOIS

Meeting 64/128 Users Through-the-Mail, 51 Thornhill Dr., Danville, IL 61832

### MARYLAND

The Annapolis Commodore Users Group, P.O. Box 3358, Annapolis, MD 21403

### MINNESOTA

Albert Lea Commodore Users Group, 2217 N. Bridge, Albert Lea, MN 56007

**K NOW**

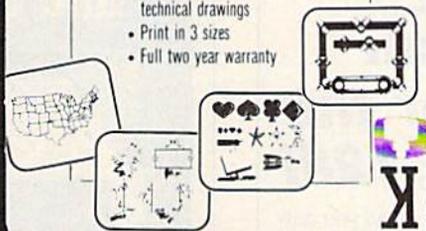
**\$99<sup>95</sup>** *Limited Time*

**Flexidraw™**

**INTERACTIVE HI-RES GRAPHIC SYSTEM**

Complete package includes  
Professional Quality  
Light Pen and Software

- Use to create Artistic/technical drawings
- Print in 3 sizes
- Full two year warranty



### NEW YORK

Commodore Users of Western New York (CUWNY), 27 Oatka St., Warsaw, NY 14569

### OHIO

The Commodore User Group, Inc. (TCUG), P.O. Box 63, Columbus, OH 43109

### PENNSYLVANIA

Commodore 64/128 Club of Pittsburgh, 6337 Helen St., Library, PA 15129

### Outside The U.S.

### AUSTRALIA

Commodore User Group (ACT), P.O. Box 599, Belconnen, A.C.T., Australia 2616

### CANADA

Sudbury Commodore Assembly Language Extension Group, 1326 Hastings Crescent, Sudbury, Ontario, Canada P3A 2R5  
Commodore 64 Users Exchange (CUE), C.P. 1027, Malartic, Quebec, Canada J0Y 1Z0

All programs listed in this magazine are available on the GAZETTE Disk. See details elsewhere in this issue.

**K INTRODUCING**

**the Graphics Galleria™**

**\$24<sup>95</sup>**

A SERIES OF CLIP ART AND ILLUSTRATIONS FOR USE WITH

Flexidraw AND PDD/CI!

Now Available:

- HOLIDAY THEMES
- CLIP-ART POTPOURRI
- BORDERS & SIGNS
- MAPS OF THE WORLD



# news & products

## Commodore Interface

The Deluxe RS-232 Interface from Omnitronix allows you to hook up standard RS-232 computer accessories such as modems, printers, robots, and more to the Commodore 64, 128, Plus 4, and VIC-20. The unit plugs into the user I/O port and supports RS-232 pins 2 through 8, 12, 20, and 22. The RS-232 interface supplies standard RS-232 plus and minus voltage levels, has switches located on the cover, and includes a three-foot cable. The instruction manual contains a BASIC terminal program.

The Deluxe RS-232 Interface has a suggested list price of \$49.95.

Omnitronix, Inc., P.O. Box 43, Mercer Island, WA 98040.

Circle Reader Service Number 200.

## Printer Driver Software For Commodore 64

The PPD is a software printer-driver program that provides complete software support to drive any Centronics compatible parallel printer through the 64's user port. Using the PPD program and an appropriate cable, any parallel printer can be accessed as though it were a standard Commodore serial printer. The software is compatible with much existing software.

PPD contains most selectable features found in other Commodore printer interfaces, including "PETSCII to ASCII" character conversion, a LISTING mode for BASIC programs, a transparent mode for high-resolution bit graphics, and automatic linefeeds after carriage

returns. A feature unique to PPD is a built-in 8K interrupt-driven printer buffer.

PPD is being marketed as a Shareware program, and is not copy protected. It will be available through Shareware distribution channels; users are asked to register their copies for \$10. Registered disks and cables may be purchased through Drude Micro Services; prices are \$35 for disk and assembled cable; \$25 for disk and unassembled cable; \$30 for assembled cable only; and \$20 for unassembled cable kit only.

Drude Micro Services, P.O. Box 533, Cedar Falls, IA 50613.

Circle Reader Service Number 201.



## A REAL Pascal for the C128!

Pascal 128 is a full ISO implementation. Now you can write programs at home that run on mainframes at school or the office. And, Kyan has the power and features needed to develop state-of-the-art software.

Pascal 128 includes a Full Screen Text Editor, Native Code Compiler, Macro Assembler, 300 page Tutorial Manual, and more!

**Kyan Pascal 128 is a bargain at \$69.95!**

Order yours today! See what a real Pascal compiler can do on your C128!

# 415-626-2080

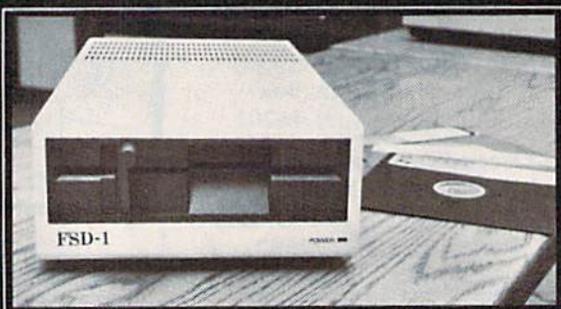
Send Check/Money Order to:

**Kyan Software, Inc. Dept. 3  
1850 Union Street #183  
San Francisco, CA 94123**

Please enclose \$4.50 for shipping; \$15.00 outside North America; Calif. residents add 6.5% sales tax.

All Kyan products come with a 30 day money back guarantee. Kyan Pascal is also available for the C64.

## Commodore Compatible and only... \$139.00



### FSD-1 5 1/4" Disk Drive

**Directly replaces the Commodore 1541 disk drive.**

The FSD-1 Disk Drive is a versatile and efficient disk drive built for the Commodore series of personal computers. This disk drive is fully compatible with the Commodore 64 computer and directly replaces the Commodore 1541 Disk Drive, giving much better performance in terms of data loading and writing speed and memory buffer size.

#### Special Features

- Full 6 month warranty—your assurance of quality
  - Slim line construction—to fit in those smaller places
  - Vented metal chassis—to run cool and efficient always
  - Dual serial port with chaining option for expandability
  - 5 1/4" industry standard format
  - Positive lever lock—to eliminate the "pop out" problem
  - Built especially for C-64 users
- Remember, no sales tax in Oregon.

To Order call toll free  
**1-800-356-5178**

Visa and MasterCard are welcome. Allow \$8.00 shipping and handling. Or mail your order with check or money order to:

# ECI

**Emerald Component International**  
541 Willamette Street  
Eugene, OR 97401  
Tel. 503-683-1154

# How To Type In COMPUTE!'s GAZETTE Programs

Each month, COMPUTE!'s GAZETTE publishes programs for the Commodore 128, 64, Plus/4, 16, and VIC-20. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. All 64 programs run on the 128 in 64 mode. Be sure to read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

We frequently publish two programs designed to make typing easier: The Automatic Proofreader, and MLX, designed for entering machine language programs.

When entering a BASIC program, be especially careful with DATA statements as they are extremely sensitive to errors. A mistyped number in a DATA statement can cause your machine to "lock up" (you'll have no control over the computer). If this happens, the only recourse is to turn your computer off then back on, erasing whatever was in memory. So be sure to *save a copy of your program before you run it*. If your computer crashes, you can always reload the program and look for the error.

## Special Characters

Most of the programs listed in each issue contain special control characters. To facilitate typing in any programs from the GAZETTE, use the following listing conventions.

The most common type of control characters in our listings appear as words within braces: {DOWN} means to press the cursor down key; {5 SPACES} means to press the space bar five times.

To indicate that a key should be *shifted* (hold down the SHIFT key while pressing another key), the character is underlined. For example, A means hold down the SHIFT key and press A. You may see strange characters on your screen, but that's to be expected. If you find a number followed by an underlined key enclosed in braces (for example, {8 A}), type the key as many times as indicated (in our example, enter eight SHIFTed A's).

If a key is enclosed in special brackets, [ ] hold down the Commodore key (at the lower left corner of the keyboard) and press the indicated character.

Rarely, you'll see a single letter of the alphabet enclosed in braces.

This can be entered on the Commodore 64 by pressing the CTRL key while typing the letter in braces. For example, {A} means to press CTRL-A.

## The Quote Mode

Although you can move the cursor around the screen with the CRSR keys, often a programmer will want to move the cursor under program control. This is seen in examples such as {LEFT} and {HOME} in the program listings. The only way the computer can tell the difference between direct and programmed cursor control is *the quote mode*.

Once you press the quote key, you're in quote mode. This mode can be confusing if you mistype a character and cursor left to change it. You'll see a reverse video character (a graphics symbol for cursor left). In this case, you can use the DELETE key to back up and edit the line. Type another quote and you're out of quote mode. If things really get confusing, you can exit quote mode simply by pressing RETURN. Then just cursor up to the mistyped line and fix it.

When You Read:	Press:	See:
{CLR}	SHIFT CLR/HOME	
{HOME}	CLR/HOME	
{UP}	SHIFT ↑ CRSR ↓	
{DOWN}	↑ CRSR ↓	
{LEFT}	SHIFT ← CRSR →	
{RIGHT}	← CRSR →	
{RVS}	CTRL 9	
{OFF}	CTRL 0	
{BLK}	CTRL 1	
{WHT}	CTRL 2	
{RED}	CTRL 3	
{CYN}	CTRL 4	

When You Read:	Press:	See:
{PUR}	CTRL 5	
{GRN}	CTRL 6	
{BLU}	CTRL 7	
{YEL}	CTRL 8	
{ F1 }	F1	
{ F2 }	SHIFT F1	
{ F3 }	F3	
{ F4 }	SHIFT F3	
{ F5 }	F5	
{ F6 }	SHIFT F5	
{ F7 }	F7	
{ F8 }	SHIFT F7	

When You Read:	Press:	See:
←	←	
↑	SHIFT ↑	

## For Commodore 64 Only

[ 1 ]	COMMODORE 1	
[ 2 ]	COMMODORE 2	
[ 3 ]	COMMODORE 3	
[ 4 ]	COMMODORE 4	
[ 5 ]	COMMODORE 5	
[ 6 ]	COMMODORE 6	
[ 7 ]	COMMODORE 7	
[ 8 ]	COMMODORE 8	

# The Automatic Proofreader

Philip I. Nelson, Assistant Editor

"The Automatic Proofreader" helps you type in program listings for the 128, 64, Plus/4, 16, and VIC-20 and prevents nearly every kind of typing mistake.

Type in the Proofreader *exactly* as listed. Since the program can't check itself, type carefully to avoid mistakes. Don't omit any lines, even if they contain unfamiliar commands. After finishing, save a copy or two on disk or tape before running it. This is important because the Proofreader erases the BASIC portion of itself when you run it, leaving only the machine language portion in memory.

Next, type RUN and press RETURN. After announcing which computer it's running on, the Proofreader displays the message "Proofreader Active". Now you're ready to type in a BASIC program.

Every time you finish typing a line and press RETURN, the Proofreader displays a two-letter checksum in the upper-left corner of the screen. Compare this result with the two-letter checksum printed to the left of the line in the program listing. If the letters match, it's almost certain the line was typed correctly. If the letters don't match, check for your mistake and correct the line.

The Proofreader ignores spaces not enclosed in quotes, so you can omit or add spaces between keywords and still see a matching checksum. However, since spaces inside quotes are almost always significant, the Proofreader pays attention to them. For example, `10 PRINT"THIS IS BASIC"` will generate a different checksum than `10 PRINT"THIS ISBA SIC"`.

A common typing error is transposition—typing two successive characters in the wrong order, like `PIRNT` instead of `PRINT` or `64378` instead of `64738`. The Proofreader is sensitive to the *position* of each character within the line and thus catches transposition errors.

The Proofreader does *not* accept keyword abbreviations (for example, `?` instead of `PRINT`). If you prefer to use abbreviations, you can still check the line by LISTing it after typing it in, moving the cursor back to the line, and

pressing RETURN. LISTing the line substitutes the full keyword for the abbreviation and allows the Proofreader to work properly. The same technique works for rechecking programs you've already typed in.

If you're using the Proofreader on the Commodore 128, Plus/4, or 16, *do not perform any GRAPHIC commands while the Proofreader is active*. When you perform a command like `GRAPHIC 1`, the computer moves everything at the start of BASIC program space—including the Proofreader—to another memory area, causing the Proofreader to crash. The same thing happens if you run any program with a GRAPHIC command while the Proofreader is in memory.

Though the Proofreader doesn't interfere with other BASIC operations, it's a good idea to disable it before running another program. However, the Proofreader is purposely difficult to dislodge: It's not affected by tape or disk operations, or by pressing `RUN/STOP-RESTORE`. The simplest way to disable it is to turn the computer off then on. A gentler method is to `SYS` to the computer's built-in reset routine (`SYS 65341` for the 128, `64738` for the 64, `65526` for the Plus/4 and 16, and `64802` for the VIC). These reset routines erase any program in memory, so be sure to save the program you're typing in before entering the `SYS` command.

If you own a Commodore 64, you may already have wondered whether the Proofreader works with other programming utilities like "MetaBASIC." The answer is generally yes, *if you're using a 64 and activate the Proofreader after installing the other utility*. For example, first load and activate MetaBASIC, then load and run the Proofreader.

When using the Proofreader with another utility, you should disable *both* programs before running a BASIC program. While the Proofreader seems unaffected by most utilities, there's no way to promise that it will work with any and every combination of utilities you might want to use. The more utilities activated, the more fragile the system becomes.

## The New Automatic Proofreader

```
10 VEC=PEEK(772)+256*PEEK(773)
   :LO=43:HI=44
```

```
20 PRINT "AUTOMATIC PROOFREADER FOR ";:IF VEC=42364 THEN {SPACE}PRINT "C-64"
30 IF VEC=50556 THEN PRINT "VIC-20"
40 IF VEC=35158 THEN GRAPHIC CLR:PRINT "PLUS/4 & 16"
50 IF VEC=17165 THEN LO=45:HI=46:GRAPHIC CLR:PRINT"128"
60 SA=(PEEK(LO)+256*PEEK(HI))+6:ADR=SA
70 FOR J=0 TO 166:READ BYT:POKE ADR, BYT:ADR=ADR+1:CHK=CHK+BYT:NEXT
80 IF CHK<>20570 THEN PRINT "*ERROR* CHECK TYPING IN DATA STATEMENTS":END
90 FOR J=1 TO 5:READ RF,LF,HF:RS=SA+RF:HB=INT(RS/256):LB=RS-(256*HB)
100 CHK=CHK+RF+LF+HF:POKE SA+L F, LB:POKE SA+HF, HB:NEXT
110 IF CHK<>22054 THEN PRINT "*ERROR* RELOAD PROGRAM AND {SPACE}CHECK FINAL LINE":END
120 POKE SA+149,PEEK(772):POKE SA+150,PEEK(773)
130 IF VEC=17165 THEN POKE SA+14,22:POKE SA+18,23:POKESA+29,224:POKESA+139,224
140 PRINT CHR$(147);CHR$(17);"PROOFREADER ACTIVE":SYS SA
150 POKE HI,PEEK(HI)+1:POKE (PEEK(LO)+256*PEEK(HI))-1,0:NEW
160 DATA 120,169,73,141,4,3,16,9,3,141,5,3
170 DATA 88,96,165,20,133,167,165,21,133,168,169
180 DATA 0,141,0,255,162,31,181,199,157,227,3
190 DATA 202,16,248,169,19,32,210,255,169,18,32
200 DATA 210,255,160,0,132,180,132,176,136,230,180
210 DATA 200,185,0,2,240,46,201,34,208,8,72
220 DATA 165,176,73,255,133,176,104,72,201,32,208
230 DATA 7,165,176,208,3,104,208,226,104,166,180
240 DATA 24,165,167,121,0,2,133,167,165,168,105
250 DATA 0,133,168,202,208,239,240,202,165,167,69
260 DATA 168,72,41,15,168,185,211,3,32,210,255
270 DATA 104,74,74,74,74,168,185,211,3,32,210
280 DATA 255,162,31,189,227,3,149,199,202,16,248
290 DATA 169,146,32,210,255,76,86,137,65,66,67
300 DATA 68,69,70,71,72,74,75,77,80,81,82,83,88
310 DATA 13,2,7,167,31,32,151,116,117,151,128,129,167,136,137
```

# MLX Machine Language Editor For The Commodore 64

Ottis Cowper  
Technical Editor

"MLX" is a labor-saving utility that will help you enter machine language program listings without error. MLX is required to enter all Commodore 64 machine language programs published in COMPUTE!'s GAZETTE. This version of MLX was first published in the January 1986 issue; it cannot be used to enter MLX programs published prior to that date, nor can earlier versions of MLX be used to enter the listings in this issue.

Type in and save a copy of MLX. You'll need it for all future machine language programs in COMPUTE!'s GAZETTE, as well as machine language (ML) programs in our companion magazine, COMPUTE!, and COMPUTE! books. When you're ready to enter an ML program, load and run MLX. It asks you for a starting and ending address. These addresses appear in the article accompanying the MLX-format program listing you're typing. If you're unfamiliar with ML, the addresses (and all other values you enter in MLX) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numerals 0-9 and the letters A-F. But even if you know nothing about ML or hex, you should have no trouble using MLX.

After you enter the starting and ending addresses, MLX offers the option of clearing the workspace. The data you enter with MLX is kept in a special reserved area of memory; clearing this workspace area fills the reserved area with zeros, which will make it easier to find where you left off typing if you enter the listing in several sessions. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session there's no point in clearing the workspace, since the data you load in will fill the area with whatever values were in workspace memory at the time of the last Save.

At this point, MLX presents a menu of commands:

- Enter data
- Display data
- Load data
- Save file
- Quit

Press the corresponding key to select a menu option. These commands are available only while the menu is dis-

played. You can get back to the menu from most options by pressing RETURN.

## Entering A Listing

To begin entering data, press E. You'll be asked for the address at which you wish to begin. (If you pressed E by mistake, you can return to the command menu by pressing RETURN.) When you begin typing a listing, enter the starting address here. If you're typing in a long listing in several sessions, you should enter the address where you left off typing at the end of the previous session. In any case, make sure the address you enter corresponds to the address of a line in the MLX listing. Otherwise, you'll be unable to enter the data correctly.

After you enter the address, you'll see that address appear as a prompt with a nonblinking cursor. Now you're ready to enter data. To help prevent typing mistakes, only a few keys are active, so you may have to unlearn some habits. MLX listings consist of nine columns of two-digit numbers—eight bytes of data and a checksum. You *do not* type spaces between the columns; the new MLX automatically inserts these for you. Nor do you press RETURN after typing the last number in a line; MLX automatically enters and checks the line after you type the last digit. The only keys needed for data entry are 0-9 and A-F. Pressing most of the other keys produces a warning buzz.

To correct typing mistakes before finishing a line, use the INST/DEL key to delete the character to the left of the cursor. (The cursor-left key also deletes.) If you mess up a line badly, press CLR/HOME to start the line over. The RETURN key is also active, but only *before* any data is typed on a line. Pressing RETURN at this point returns you to the command menu. After you type a character, MLX disables RETURN until the cursor returns to the start of a line. Remember, you can press CLR/HOME to quickly get to a line number prompt.

## Beep Or Buzz?

After you type the last digit in a line, MLX calculates a checksum from the line number and the first eight columns of data, then compares it with the value in the ninth column. The formula (found in lines 370-390 of the MLX program) catches almost every conceivable typing error, including the transposition of numbers. If the values

match, you'll hear a pleasant beep, the data is added to the workspace area, and the prompt for the next line of data appears (unless the line just entered was the last line of the listing—in which case you'll automatically advance to the Save option). But if MLX detects a typing error, you'll hear a low buzz and see an error message. Then MLX redisplay the line for editing.

To edit a line, move the cursor left and right using the cursor keys. (The INST/DEL key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. To make corrections in a mistyped line, compare the line on the screen with the one printed in the listing, then move the cursor to the mistake and type the correct key. During editing, RETURN is active; pressing it tells MLX to recheck the line. You can press the CLR/HOME key to clear the entire line if you want to start from scratch, or if you want to get to a line number prompt to use RETURN to get back to the menu.

## Other MLX Functions

The Display data option lets you review your work. When you select D, you'll be asked for a starting address. (As with the other menu options, pressing RETURN at this point takes you back to the command menu.) Make sure the address corresponds to a line from the listing. You can pause the scrolling display by pressing the space bar. (MLX finishes printing the current line before halting.) To resume scrolling, press the space bar again. The display continues to scroll until the ending address is reached, then the menu reappears. To break out of the display and return to the menu before the ending address is reached, press RETURN. A quick way to check your typing is to compare the reverse video checksums on the screen with the data in the rightmost column of the printed listing. If the values match, you can be sure the line is entered correctly.

The Save and Load menu options are straightforward. First, MLX asks for a filename. (Again, pressing RETURN at this prompt without entering anything returns you to the command menu.) Next, MLX asks you to press either T or D for tape or disk. If you notice the disk drive starting and stopping several times during a load or save,

don't panic; this behavior is normal because MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands. For disk, the drive prefix 0: is automatically added to the filename (line 750), so this should *not* be included when entering the name. (This also precludes the use of @ for Save-with-Replace, so remember to give each version saved a different name.) MLX saves the entire workspace area from the starting to ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When saving a partially completed listing, make sure to note the address where you stopped typing so you'll know where to resume entry when you reload.

MLX reports any errors detected during the save or load. (Tape users should bear in mind that the Commodore 64 is never able to detect errors when saving to tape.) MLX also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran MLX; LOAD ENDED AT address, which means the file you're trying to load ends before the ending address you specified when you started MLX; and TRUNCATED AT ENDING ADDRESS, which means the file you're trying to load extends beyond the ending address you originally specified. If you get one of these messages and feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct ending address.

The Quit menu option has the obvious effect—it stops MLX and enters BASIC at a READY prompt. Since the RUN/STOP key is disabled, Q lets you exit the program without turning off the computer. (Of course, RUN/STOP-RESTORE also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or any other key to return to the menu. After quitting, you can type RUN again and reenter MLX without losing your data, as long as you don't use the clear workspace option.

### The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready to see the results. The instructions for loading the finished product vary from program to program. Some ML programs are designed to be loaded and run like BASIC programs, so all you need to type is LOAD "filename",8 for disk or LOAD "filename" for tape, and then RUN. (Such programs usually have 0801 as their MLX starting address.) Others must be reloaded to specific addresses

with a command such as LOAD "filename",8,1 for disk or LOAD "filename",1,1 for tape, then started with a SYS to a particular memory address. (On the Commodore 64, the most common starting address for such programs is 49152, which corresponds to MLX address C000.) In any case, you should always refer to the article which accompanies the ML listing for information on loading and running the program.

By the time you finish typing in the data for a long ML program, you'll have several hours invested in the project. Don't take chances—use our "Automatic Proofreader" to type in MLX, and then test your copy *thoroughly* before first using it to enter any significant amount of data. (Incidentally, MLX is included every month on the GAZETTE DISK.) Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses, then use the Display option to verify that the data has been entered correctly. And be sure to test the Save and Load options several times to ensure that you can recall your work from disk or tape. Don't let a simple typing error in MLX cost you several nights of hard work.

## MLX

For instructions on entering this listing, refer to "How To Type In COMPUTE!'s GAZETTE Programs" elsewhere in this issue.

```

EK 100 POKE 56,50:CLR:DIM IN$,
      1,J,A,B,AS,BS,A(7),N$
DM 110 C4=48:C6=16:C7=7:Z2=2:Z
      4=254:Z5=255:Z6=256:Z7=
      127
CJ 120 FA=PEEK(45)+Z6*PEEK(46)
      :BS=PEEK(55)+Z6*PEEK(56)
      :H$="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}"
      :S$="":D$=CHR$(20):Z$=
      CHR$(0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD
      +23:POKE I,0:NEXT:POKE
      {SPACE}SD+24,15:POKE 78
      8,52
FC 150 PRINT "{CLR}"CHR$(142)CH
      R$(8):POKE 53280,15:POK
      E 53281,15
EJ 160 PRINT T$" {RED}{RVS}
      {2 SPACES}{8 @}
      {2 SPACES}"SPC(28)"
      {2 SPACES}{OFF}{BLU} ML
      X II {RED}{RVS}
      {2 SPACES}"SPC(28)"
      {12 SPACES}{BLU}"
FR 170 PRINT"{3 DOWN}
      {3 SPACES}COMPUTE!'S MA
      CHINE LANGUAGE EDITOR
      {3 DOWN}"
JB 180 PRINT"{BLK}STARTING ADD
      RESS[4]";:GOSUB300:SA=A
      D:GOSUB1040:IF F THEN18
      0
GF 190 PRINT"{BLK}{2 SPACES}EN
      DING ADDRESS[4]";:GOSUB
      300:EA=AD:GOSUB1030:IF
      {SPACE}F THEN190
KR 200 INPUT"{3 DOWN}{BLK}CLEA

```

```

R WORKSPACE [Y/N][4]";A
$:IF LEFT$(A$,1)<>"Y"TH
EN220
PG 210 PRINT"{2 DOWN}{BLU}WORK
      ING...";:FORI=BS TO BS+
      EA-SA+7:POKE I,0:NEXT:P
      RINT"DONE"
DR 220 PRINTTAB(10)"{2 DOWN}
      {BLK}{RVS} MLX COMMAND
      {SPACE}MENU {DOWN}[4]";
      PRINT T$"{RVS}E{OFF}NTE
      R DATA"
ED 230 PRINT T$"{RVS}D{OFF}ISP
      LAY DATA":PRINT T$"
      {RVS}L{OFF}OAD DATA"
JS 240 PRINT T$"{RVS}S{OFF}AVE
      FILE":PRINT T$"{RVS}Q
      {OFF}UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=
      MID$( "EDLSQ",I,1)THEN A
      =I:I=5
FD 270 NEXT:ON A GOTO420,610,6
      90,700,280:GOSUB1060:GO
      TO250
EJ 280 PRINT"{RVS} QUIT ":INPU
      T"{DOWN}[4]ARE YOU SURE
      [Y/N]";A$:IF LEFT$(A$,
      1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IF
      LEN(IN$)<>4THENRETURN
KF 310 BS=IN$:GOSUB320:AD=A:BS
      =MID$(IN$,3):GOSUB320:A
      D=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID
      $(B$,J,1):B=ASC(A$)-C4+
      (A$>"e")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=
      0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(
      H$,B+1,1);:B=A-B*C6:PRI
      NT MID$(H$,B+1,1);:RETU
      RN
RR 360 A=INT(AD/Z6):GOSUB350:A
      =AD-A*Z6:GOSUB350:PRINT
      ":":
BE 370 CK=INT(AD/Z6):CK=AD-Z4*
      CK+Z5*(CK>Z7):GOTO390
PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"{DOWN}STARTING AT
      [4]";:GOSUB300:IF IN$<>
      N$ THEN GOSUB1030:IF F
      {SPACE}THEN400
EX 410 RETURN
HD 420 PRINT"{RVS} ENTER DATA
      {SPACE}";:GOSUB400:IF IN
      $=N$ THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F
      THEN PRINT IN$:PRINT"
      {UP}{5 RIGHT}";
GC 450 FOR I=0 TO 24 STEP 3:BS
      =S$:FOR J=1 TO 2:IF F T
      HEN BS=MID$(IN$,I+J,1)
HA 460 PRINT"{RVS}"B$L$";:IF I<
      24THEN PRINT"{OFF}";
HD 470 GET A$:IF A$=N$ THEN470
FK 480 IF (A$>"/"ANDAS<":")OR(A
      $>"@"ANDAS<"G")THEN540
MP 490 IF A$=R$ AND((I=0)AND(J
      =1)OR F)THEN PRINT B$;:
      J=2:NEXT:I=24:GOTO550
KC 500 IF A$="{HOME}" THEN PRI
      NT B$;J=2:NEXT:I=24:NEX
      T:F=0:GOTO440
MX 510 IF (A$="{RIGHT}")AND TH
      ENPRINT B$L$;:GOTO540
GK 520 IF A$<>L$ AND A$<>D$ OR
      ((I=0)AND(J=1))THEN GOS

```

```

UB1060:GOTO470
HG 530 A$=L$+S$+L$:PRINT B$L$;
:J=2-J:IF J THEN PRINT
{SPACE}L$;:I=I-3
QS 540 PRINT A$;:NEXT J:PRINT
{SPACE}S$;
PM 550 NEXT I:PRINT:PRINT"[UP]
[5 RIGHT]";:INPUT#3,IN$
:IF IN$=N$ THEN CLOSE3:
GOTO220
QC 560 FOR I=1 TO 25 STEP3:B$=
MID$(IN$,I):GOSUB320:IF
I<25 THEN GOSUB380:A(I
/3)=A
PK 570 NEXT:IF A<>CK THEN GOSU
B1060:PRINT"[BLK]{RVS}
{SPACE}ERROR: REENTER L
INE [4]":F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FO
R I=0 TO 7:POKE B+I,A(I
):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN C
LOSE3:PRINT"[DOWN]{BLU}
** END OF ENTRY **{BLK}
{2 DOWN}":GOTO700
GQ 600 F=0:GOTO440
QA 610 PRINT"[CLR]{DOWN}{RVS}
{SPACE}DISPLAY DATA ":G
OSUB400:IF IN$=N$ THEN2
20
RJ 620 PRINT"[DOWN]{BLU}PRESS:
{RVS}SPACE{OFF} TO PAU
SE, {RVS}RETURN{OFF} TO
BREAK[4]{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FOR
I=BT0 B+7:A=PEEK(I):GOS
UB350:GOSUB380:PRINT S$
;
CC 640 NEXT:PRINT"[RVS]";:A=CK
:GOSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA TH
ENPRINT"[DOWN]{BLU}** E
ND OF DATA **":GOTO220
KC 660 GET A$:IF A$=R$ THEN GO
SUB1080:GOTO220
EQ 670 IF A$=S$ THEN F=F+1:GOS
UB1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"[DOWN]{RVS} LOAD
{SPACE}DATA ":OP=1:GOTO
710
PC 700 PRINT"[DOWN]{RVS} SAVE
{SPACE}FILE ":OP=0
RX 710 IN$=N$:INPUT"[DOWN]FILE
NAME[4]";IN$:IF IN$=N$
{SPACE}THEN220
PR 720 F=0:PRINT"[DOWN]{BLK}
{RVS}T{OFF}APE OR {RVS}
D{OFF}ISK: [4]";
FP 730 GET A$:IF A$="T"THEN PR
INT"[DOWN]":GOTO880
HQ 740 IF A$<"D"THEN730
HH 750 PRINT"D{DOWN}":OPEN15,8
,15,"I0":B=EA-SA:IN$="
0:"+IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+"P,W":G
OSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(A
H*256):PRINT#1,CHR$(AL)
;CHR$(AH);
PE 780 FOR I=0 TO B:PRINT#1,CH
R$(PEEK(BS+I));:IF ST T
HEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOT
O940
GS 800 GOSUB1060:PRINT"[DOWN]
{BLK}ERROR DURING SAVE:
[4]":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+"P,R":G
OSUB860:IF A THEN220
GE 820 GET#1,A$,B$:AD=ASC(A$+Z

```

```

$)+256*ASC(B$+Z$):IF AD
<>SA THEN F=1:GOTO850
KH 830 FOR I=0 TO B:GET#1,A$:P
OKE BS+I,ASC(A$+Z$):IF
{SPACE}ST AND(I<>B)THEN
F=2:AD=I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F
>0)+1 GOTO960,970
SA 860 INPUT#15,A,A$:IF A THEN
CLOSE1:CLOSE15:GOSUB10
60:PRINT"[RVS]ERROR: "A
$
GQ 870 RETURN
EJ 880 POKE183,PEEK(FA+2):POKE
187,PEEK(FA+3):POKE188,
PEEK(FA+4):IFOP=0THEN92
0
HJ 890 SYS 63466:IF(PEEK(783)A
ND1)THEN GOSUB1060:PRIN
T"[DOWN]{RVS} FILE NOT
{SPACE}FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(8
30):IF AD<>SA THEN F=1:
GOTO970
SC 910 A=PEEK(831)+256*PEEK(83
2)-1:F=F-2*(A<EA)-3*(A>
EA):AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:P
OKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOS
UB1010:ON OP GOTO950:SY
S 63591
AE 940 GOSUB1080:PRINT"[BLU]**
SAVE COMPLETED **":GOT
O220
AX 950 POKE147,0:SYS 63562:IF
{SPACE}ST<>64 THEN970
FR 960 GOSUB1080:PRINT"[BLU]**
LOAD COMPLETED **":GOT
O220
DP 970 GOSUB1060:PRINT"[BLK}
{RVS}ERROR DURING LOAD:
{DOWN}[4]":ON F GOSUB98
0,990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTIN
G ADDRESS ("":GOSUB360:
PRINT")":RETURN
GR 990 PRINT"LOAD ENDED AT "":
AD=SA+AD:GOSUB360:PRINT
D$:RETURN
FD 1000 PRINT"TRUNCATED AT END
ING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH
*256):POKE193,AL:POKE1
94,AH
FF 1020 AH=INT(B/256):AL=B-(AH
*256):POKE174,AL:POKE1
75,AH:RETURN
EX 1030 IF AD<SA OR AD>EA THEN
1050
HA 1040 IF(AD>511 AND AD<40960
)OR(AD>49151 AND AD<53
248)THEN GOSUB1080:F=0
:RETURN
HC 1050 GOSUB1060:PRINT"[RVS}
{SPACE}INVALID ADDRESS
{DOWN}{BLK}":F=1:RETU
RN
AR 1060 POKE SD+5,31:POKE SD+6
,208:POKE SD,240:POKE
{SPACE}SD+1,4:POKE SD+
4,33
DX 1070 FOR S=1 TO 100:NEXT:GO
TO1090
PF 1080 POKE SD+5,8:POKE SD+6,
240:POKE SD,0:POKE SD+
1,90:POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:PO
KE SD+4,0:POKE SD,0:PO
KE SD+1,0:RETURN

```

## JOHN & BILL ELECTRONICS LIMITED QUANTITY QUICK DATA DRIVES FOR COMMODORE 64 USERS

Now, for Commodore 64 users who need more flexibility in data access time vs. data capacity, we offer the quick data drive. The quick data drive is a continuous loop system that formats the tape the same as a disk drive, so that data can be transferred from your disk drive to tape or from tape to disk drive. It is small, only 2 1/4" x 4" x 5/8", and can acquire data in as little as an 8-sec. avg. or have a data capacity up to 170K. It comes with a tape, but additional tapes in various lengths are available.

A PROM Card with the operating system is also available and highly recommended to save time and internal memory.

DATA DRIVES ..... \$75.00  
PROM CARDS ..... \$15.00

Mail orders to: 105 SERRA WAY  
SUITE 151  
MILPITAS, CALIF. 95035

Add \$4.50 handling charge for each data drive  
Add \$2.50 handling charge for each PROM card  
California residents add sales tax.

## BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

## 1526 Underliner

(Article on page 96.)

GQ 100 PRINT"[CLR]{WHT}LOADING  
ML DATA":FORAD=52809TO  
52992:READML:POKEAD,ML  
JP 110 SU=SU+ML:NEXT:IF SU <>  
{SPACE}22586 THEN PRINT  
"ERROR IN DATA":END  
QG 120 SYS 52809:PRINT"LOADING  
SPEEDSCRIPT":LOAD"UL.S  
PEED",8  
FK 130 DATA 173,251,206,208,12  
,173,38,3,141,251,206,1  
73,39,3,141,252,206,169  
JK 140 DATA 109,141,38,3,169,2  
06,141,39,3,169,0,133,5  
,133,4,133,3,96,133,6  
MD 150 DATA 152,72,138,72,165,  
6,208,6,32,100,206,76,2  
43,206,201,13,240,21  
RD 160 DATA 164,5,153,1,207,20  
1,255,208,4,133,4,169,0  
,32,250,206,230,5,76  
FX 170 DATA 243,206,165,5,240,  
78,165,4,208,4,165,3,24  
0,70,198,5,164,5,185  
KX 180 DATA 1,207,201,32,208,6  
,198,5,16,243,48,53,230  
,5,169,141,32,250,206  
XF 190 DATA 160,0,185,1,207,20  
1,32,208,8,32,250,206,2  
00,197,5,208,241,166,3  
HC 200 DATA 185,1,207,201,255,  
208,9,189,253,206,170,1  
33,3,76,227,206,189,255  
HH 210 DATA 206,32,250,206,200  
,196,5,208,227,169,13,3  
2,250,206,169,0,133,5  
BD 220 DATA 133,4,104,170,104,  
168,165,6,96,76,0,0,1,0  
,32,164

## BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

## Turbo Format

See instructions in article on page 100 before typing in.

```
0801:0D 08 0A 00 9E 28 32 30 05
0809:3D 33 29 00 00 00 A9 16 8F
0811:85 FF A9 00 85 FB 85 FD 3E
0819:A9 0C 85 FC A9 05 85 FE EC
0821:20 89 09 20 51 09 A2 0B C5
0829:20 56 09 A0 00 20 5F 09 52
0831:A0 12 20 5F 09 A0 64 20 C3
0839:5F 09 A0 FF 20 CF FF C8 58
0841:C9 0D F0 0C C0 10 D0 03 43
0849:88 D0 F1 99 90 0B D0 EC E8
0851:C0 10 F0 08 A9 A0 99 90 F7
0859:0B C8 D0 F4 A0 73 20 5F FC
0861:09 A0 FF 20 CF FF C8 C9 F9
0869:0D F0 0C C0 05 D0 03 88 C3
0871:D0 F1 99 A2 0B D0 EC A9 E2
0879:96 8D A7 0B 20 77 09 A0 6F
0881:7F 20 5F 09 20 E4 FF C9 34
0889:00 F0 F9 C9 85 F0 60 C9 2C
0891:0D F0 1E C9 20 D0 ED 20 05
0899:A6 0E A9 A7 20 A8 FF A9 7D
08A1:04 20 A8 FF A9 01 20 A8 0B
08A9:FF A9 26 20 A8 FF 20 AE 1F
08B1:FF A0 46 20 5F 09 20 B5 C9
08B9:0E A0 02 B7 C4 0E 20 A8 1C
08C1:FF 88 10 F9 A9 00 20 A8 AB
08C9:FF A9 05 20 A8 FF 20 AE 1B
08D1:FF A5 BA 20 B4 FF A9 6F 0D
08D9:85 B9 20 96 FF 20 A5 FF 54
08E1:20 D2 FF C9 0D D0 F6 20 0D
08E9:AB FF A0 53 20 5F 09 A0 4A
08F1:C7 20 6B 09 20 E4 FF C9 4A
08F9:00 F0 F9 C9 85 F0 1E C9 18
0901:0D D0 F1 A9 A0 A0 15 99 F1
0909:90 0B 88 10 F4 A0 04 A9 44
0911:41 99 A2 0B 88 A9 32 99 18
0919:A2 0B 4C 24 08 20 B5 0E 45
0921:A9 49 20 A8 FF A9 30 20 10
0929:A8 FF A9 3A 20 A8 FF 20 2C
0931:AE FF 20 B5 0E A9 55 20 DB
0939:A8 FF A9 3A 20 A8 FF A9 C5
0941:00 85 A2 A5 A2 C9 40 30 50
0949:FA 20 AE FF 20 E7 FF 60 B7
0951:A9 93 4C D2 FF A9 20 20 DA
0959:D2 FF CA D0 F8 60 B9 00 F7
0961:0A F0 06 20 D2 FF C8 D0 70
0969:F5 60 B9 00 09 F0 06 20 FD
0971:D2 FF C8 D0 F5 60 A9 08 9F
0979:85 FF A9 00 85 FB 85 FD A8
0981:A9 0B 85 FC A9 04 85 FE 13
0989:20 A6 0E A5 FD 20 A8 FF 33
0991:A5 FE 20 A8 FF A9 20 20 CB
0999:A8 FF A0 00 B1 FB 20 A8 7A
09A1:FF C8 C0 20 90 F6 A5 FB A7
09A9:69 1F 85 FB A5 FC 69 00 9C
09B1:85 FC A5 FD 69 20 85 FD 2F
09B9:A5 FE 69 00 85 FE 20 AE A2
09C1:FF C6 FF D0 C3 60 11 50 A4
09C9:52 45 53 53 20 12 52 45 29
09D1:54 55 52 4E 92 20 54 4F 9F
09D9:20 46 4F 52 4D 41 54 20 D4
09E1:41 4E 4F 54 48 45 52 20 73
09E9:44 49 53 4B 0D 50 52 45 23
09F1:53 53 20 12 46 31 92 20 E3
09F9:54 4F 20 51 55 49 54 11 AC
0A01:05 54 55 52 42 4F 20 46 52
0A09:4F 52 4D 41 54 20 92 0D 6C
0A11:00 11 46 4F 52 4D 41 54 C5
0A19:20 54 49 4D 45 20 49 53 E0
```

```
0A21:20 39 2E 35 20 53 45 43 C8
0A29:4F 4E 44 53 0D 31 37 20 F1
0A31:53 45 43 4F 4E 44 53 20 E7
0A39:57 49 54 48 20 56 45 52 91
0A41:49 46 59 0D 00 0D 46 4F 97
0A49:52 4D 41 54 54 49 4E 47 F2
0A51:0D 00 46 4F 52 4D 41 54 48
0A59:20 43 4F 4D 50 4C 45 54 9F
0A61:45 0D 00 0D 11 44 49 53 AB
0A69:4B 20 4E 41 4D 45 20 3F 08
0A71:20 00 0D 44 49 53 4B 20 C9
0A79:49 44 20 3F 20 00 0D 11 67
0A81:49 4E 53 45 52 54 20 44 F4
0A89:49 53 4B 0D 50 52 45 53 FA
0A91:53 20 12 46 31 92 20 54 66
0A99:4F 20 41 42 4F 52 54 0D 23
0AA1:50 52 45 53 53 20 12 52 E1
0AA9:45 54 55 52 4E 92 20 54 96
0AB1:4F 20 46 4F 52 4D 41 54 D1
0AB9:20 57 49 54 48 4E 55 54 A0
0AC1:20 56 45 52 49 46 59 0D 6C
0AC9:50 52 45 53 53 20 12 53 0B
0AD1:50 41 43 45 92 20 54 4F 28
0AD9:20 46 4F 52 4D 41 54 20 D6
0AE1:57 49 54 48 20 56 45 52 3A
0AE9:49 46 59 0D 00 00 00 00 98
0AF1:00 00 00 00 00 00 00 00 06
0AF9:00 00 00 00 00 00 12 20
0B01:01 41 00 15 FF FF 1F 15 8C
0B09:FF FF 1F 15 FF FF 1F 15 A7
0B11:FF FF 1F 15 FF FF 1F 15 AF
0B19:FF FF 1F 15 FF FF 1F 15 B7
0B21:FF FF 1F 15 FF FF 1F 15 BF
0B29:FF FF 1F 15 FF FF 1F 15 C7
0B31:FF FF 1F 15 FF FF 1F 15 CF
0B39:FF FF 1F 15 FF FF 1F 15 D7
0B41:FF FF 1F 15 FF FF 1F 11 DB
0B49:FC FF 07 13 FF FF 07 13 11
0B51:FF FF 07 13 FF FF 07 13 9A
0B59:FF FF 07 13 FF FF 07 13 A2
0B61:FF FF 07 12 FF FF 03 12 91
0B69:FF FF 03 12 FF FF 03 12 19
0B71:FF FF 03 12 FF FF 03 12 21
0B79:FF FF 03 11 FF FF 01 11 14
0B81:FF FF 01 11 FF FF 01 11 DB
0B89:FF FF 01 11 FF FF 01 A0 73
0B91:A0 A0 A0 A0 A0 A0 A0 A0 A7
0B99:A0 A0 A0 A0 A0 A0 A0 A0 AF
0BA1:A0 A0 A0 A0 32 41 A0 A0 C6
0BA9:A0 A0 00 00 00 00 00 38
0BB1:00 00 00 00 00 00 00 C7
0BB9:00 00 00 00 00 00 00 CF
0BC1:00 00 00 00 00 00 00 D7
0BC9:00 00 00 00 00 00 00 DF
0BD1:00 00 00 00 00 00 00 E7
0BD9:00 00 00 00 00 00 00 EF
0BE1:00 00 00 00 00 00 00 F7
0BE9:00 00 00 00 00 00 00 FF
0BF1:00 00 00 00 00 00 00 08
0BF9:00 00 00 00 00 00 78 88
0C01:AD A2 04 85 12 AD A3 04 04
0C09:85 13 AD A7 04 8D FD 05 30
0C11:A9 A0 8D A7 04 AD 00 1C 45
0C19:09 0C 8D 00 1C 29 10 D0 E0
0C21:05 A9 A6 4C 0F 06 38 A5 66
0C29:22 69 01 85 4A 20 32 06 62
0C31:C6 4A D0 F9 A2 00 86 4B 66
0C39:20 39 06 A9 01 85 22 20 8D
0C41:4B F2 85 43 8A 0A 0A 0A 3B
0C49:0A 0A 85 44 AD 00 1C 29 AC
0C51:9F 05 44 8D 00 1C 20 53 DF
0C59:06 A9 55 8D 01 1C A0 00 1C
0C61:84 4D A5 39 99 00 03 C8 F2
0C69:C8 A5 4D 99 00 03 C8 A5 D5
0C71:22 99 00 03 C8 A5 13 99 CD
0C79:00 03 C8 A5 12 99 00 03 BF
0C81:C8 A9 0F 99 00 03 C8 99 1B
0C89:00 03 C8 B9 FA 02 59 FB A5
0C91:02 59 FC 02 59 FD 02 99 21
0C99:F9 02 E6 4D A5 4D C5 43 12
0CA1:90 C0 98 48 A9 00 85 30 52
0CA9:A9 03 85 31 20 30 FE 68 43
0CB1:AB 88 20 E5 FD 20 F5 FD FC
0CB9:A9 00 85 32 20 61 06 C6 D3
```

```
0CC1:4D D0 F9 50 FE B8 20 00 14
0CC9:FE A9 00 85 32 A5 22 C9 5A
0CD1:12 D0 28 A9 04 85 31 20 7F
0CD9:E9 F5 85 3A 20 8F F7 20 08
0CE1:FE 06 D0 2A A2 09 50 FE 90
0CE9:B8 CA D0 FA 20 53 06 20 55
0CF1:BB 06 20 C9 06 50 FE B8 32
0CF9:20 00 FE 20 26 07 D0 0E 01
0D01:E6 22 20 28 06 A5 22 C9 72
0D09:24 F0 05 4C 40 05 85 4B 43
0D11:AD 00 1C 29 F3 8D 00 1C 0A
0D19:A9 EC 8D 0C 1C A5 4B F0 B4
0D21:05 29 7F 4C C8 C1 60 20 EA
0D29:2B 06 AE 00 1C E8 4C 39 86
0D31:06 20 35 06 AE A0 1C CA D5
0D39:8A 29 03 85 44 AD 00 1C 90
0D41:29 FC 05 44 8D 00 1C A0 59
0D49:06 A2 00 CA D0 FD 88 D0 1C
0D51:FA 60 A9 CE 8D 0C 1C A9 A1
0D59:FF 8D 01 1C 8D 03 1C 60 C9
0D61:20 BB 06 A2 0A A4 32 50 FC
0D69:FE B8 B9 00 03 8D 01 1C D4
0D71:C8 CA D0 F3 A2 09 50 FE D4
0D79:B8 A9 55 8D 01 1C CA D0 BC
0D81:F5 2B B8 06 A0 04 50 FE 2B
0D89:B8 B9 9C 07 8D 01 1C 88 A3
0D91:10 F4 A2 40 A0 04 50 FE FD
0D99:B8 B9 A1 07 8D 01 1C 88 54
0DA1:10 F4 CA D0 EF A9 55 A2 DA
0DA9:08 50 FE B8 8D 01 1C CA BA
0DB1:D0 F7 A5 32 18 69 0A 85 0A
0DB9:32 60 A2 05 A9 FF 50 FE 96
0DC1:B8 8D 01 1C CA D0 F7 60 67
0DC9:A0 BB 50 FE B8 B9 00 01 CA
0DD1:8D 01 1C C8 D0 F4 50 FE FC
0DD9:B8 B9 00 04 8D 01 1C C8 70
0DE1:D0 F4 60 A9 D0 8D 05 18 27
0DE9:2C 05 18 10 0D 2C 00 1C 94
0DF1:30 F6 AD 01 1C B8 A0 00 AC
0DF9:98 60 A9 A1 60 A9 5A 85 AB
0E01:4B 20 E4 06 D0 17 A4 32 26
0E09:A2 0A 50 FE B8 AD 01 1C 8D
0E11:D9 00 03 D0 09 C8 CA D0 59
0E19:F1 A9 00 85 4B 60 C6 4B A5
0E21:D0 DF A9 A0 60 A5 43 85 82
0E29:4D A5 22 C9 12 D0 30 20 8A
0E31:FE 06 D0 63 20 B3 06 20 9A
0E39:E4 06 D0 5B A0 BB 50 FE AC
0E41:B8 AD 01 1C D9 00 01 D0 A8
0E49:4F C8 D0 F2 A2 FC 50 FE 31
0E51:B8 AD 01 1C D9 00 04 D0 BE
0E59:3F C8 CA D0 F1 F0 32 20 85
0E61:FE 06 D0 33 20 B3 06 20 C7
0E69:E4 06 D0 2B A0 04 50 FE FA
0E71:B8 AD 01 1C D9 9C 07 D0 57
0E79:1F 88 10 F2 A2 40 A0 04 D3
0E81:50 FE B8 AD 01 1C D9 A1 45
0E89:07 D0 8D 88 10 F2 CA D0 3A
0E91:ED C6 4D D0 CA A9 00 60 6A
0E99:A9 A5 60 4A 29 A5 D4 55 83
0EA1:4A 29 A5 94 52 20 B5 0E B7
0EA9:A0 02 B9 C1 0E 20 A8 FF 2C
0EB1:88 10 F7 60 A5 BA 20 B1 25
0EB9:FF A9 6F 85 B9 4C 93 FF AC
0EC1:57 2D 4D 45 2D 4D 00 00 71
```

## Bump-N-Run

See instructions in article on page 44 before typing in.

```
C000:A9 00 8D 20 D0 8D 21 D0 D9
C008:8D 20 C7 8D 21 C7 AD 16 C3
C010:03 8D 18 03 AD 17 03 8D 07
C018:19 03 A9 16 8D 18 D0 A9 95
C020:80 8D 91 02 A9 93 20 D2 46
C028:FF A9 00 A2 80 9D 80 3F F8
C030:CA A0 FA A9 18 8D 99 3F 7E
C038:8D A2 3F A9 3C 8D 9C 3F 3C
C040:8D 9F 3F A2 33 BD 4C C6 72
C048:9D C4 3F CA 10 F7 20 1A 19
C050:C5 78 A9 05 8D 14 03 A9 C4
C058:C2 8D 15 03 58 20 80 C2 78
```

```

C060:A9 FF 8D 18 C7 A9 00 8D 5C
C068:15 C7 8D 16 C7 8D 17 C7 E3
C070:8D 1F C7 8D 19 C7 8D 1A 6F
C078:C7 A2 05 A9 00 9D 00 C7 FF
C080:9D 06 C7 A9 5A 9D 00 C7 0F
C088:CA 10 F0 AD 16 C7 29 03 91
C090:C9 03 D0 50 AD 15 C7 D0 F8
C098:4E AE 00 C7 AC 01 C7 AD 0D
C0A0:02 C7 8D 00 C7 AD 03 C7 89
C0AB:8D 01 C7 8E 02 C7 8C 03 5E
C0B0:C7 AD 17 C7 F0 1B C9 01 69
C0BB:F0 0D A9 01 8D 17 C7 A9 3D
C0C0:0B 8D 15 D0 4C D1 C0 A9 AF
C0C8:03 8D 17 C7 A9 13 8D 15 58
C0D0:D0 A2 03 BD 06 C7 9D 0C 36
C0D8:C7 CA 10 F7 A9 01 8D 15 F3
C0E0:C7 CA 2A C1 AD 17 C7 D0 E4
C0EB:18 AD 04 C7 CD 19 C7 D0 12
C0F0:0B AD 05 C7 CD 1A C7 D0 B7
C0FB:03 4C 01 C1 A9 FF 8D 18 CB
C100:C7 A9 00 8D 15 C7 AD 16 E3
C108:C7 2D 18 C7 29 07 C9 05 38
C110:D0 0A A9 01 8D 17 C7 A9 C5
C118:0B 8D 15 D0 C9 06 D0 0A 46
C120:A9 03 8D 17 C7 A9 13 8D F4
C128:15 D0 A2 00 8E 14 C7 A9 BC
C130:09 8D 12 C7 AD 01 DC 8D 13
C138:13 C7 20 DF C2 A2 02 8E 6C
C140:14 C7 A9 12 8D 12 C7 AD 08
C148:00 DC 8D 13 C7 20 DF C2 27
C150:A2 04 8E 14 C7 A9 24 8D F3
C158:12 C7 AD 04 C7 8D 19 C7 3B
C160:AD 05 C7 8D 1A C7 BD 0C 45
C168:C7 DD 06 C7 F0 06 DE 0C ED
C170:C7 4C 7E C1 A9 5A 9D 0C D4
C178:C7 A0 02 20 E4 C3 EE 14 72
C180:C7 AE 14 C7 BD 0C F7 DD 1E
C188:06 C7 F0 06 DE 0C C7 4C 82
C190:02 C2 A9 5A 9D 0C C7 A0 ED
C198:02 20 20 C4 AE 1F C7 0E E7
C1A0:61 A9 00 8D 15 D0 FE 1F 21
C1A8:C7 A2 01 18 20 F0 FF AE CD
C1B0:1F C7 BD 1F C7 0A AA BD D8
C1B8:80 C6 20 D2 FF E8 BD 80 FE
C1C0:C6 20 D2 FF A2 64 A0 FF F1
C1C8:88 D0 FD CA D0 F8 AE 1F 18
C1D0:C7 BD 1F C7 C9 0F D0 27 5B
C1D8:A2 0C A0 10 18 20 F0 FF E8
C1E0:A2 2C 20 E3 C5 A2 0E A0 78
C1EB:0B 18 20 F0 FF A2 41 20 38
C1F0:E3 C5 AD 01 DC 0D 00 DC 95
C1F8:29 10 D0 F6 4C 00 C0 4C CE
C200:5D C0 4C 8B C0 AD 1E D0 70
C208:8D 16 C7 29 03 C9 03 D0 7B
C210:0E A2 00 20 22 C2 E8 20 55
C218:22 C2 A9 0F 8D 19 D0 4C 44
C220:31 EA BD 00 D0 DD 02 D0 83
C228:F0 55 10 2B DE 00 D0 DE A7
C230:06 D0 10 0C E0 01 F0 08 A4
C238:A9 F6 2D 10 D0 8D 10 D0 A4
C240:FE 02 D0 FE 08 D0 D0 37 2C
C248:E0 01 F0 33 A9 12 0D 10 8F
C250:D0 8D 10 D0 4C 7F C2 FE 95
C258:00 D0 FE 06 D0 D0 0C E0 15
C260:01 F0 08 A9 09 0D 1D D0 AB
C268:8D 10 D0 DE 02 D0 DE 08 D9
C270:D0 10 0C E0 01 F0 08 A9 77
C278:ED 2D 10 D0 8D 10 D0 60 FD
C280:A9 4A 8D 00 D0 8D 06 D0 B8
C288:A9 90 8D 01 D0 8D 03 D0 5C
C290:8D 05 D0 8D 07 D0 8D 09 B0
C298:D0 8D B0 D0 A9 0F 8D 02 FE
C2A0:D0 8D 08 D0 A9 AC 8D 0A 25
C2A8:D0 8D 04 D0 A9 12 8D 10 48
C2B0:D0 A9 FE 8D F8 07 8D F9 DA
C2B8:07 A9 FE 8D FA 07 8D FB EF
C2C0:07 8D FC 07 A9 04 8D 27 DC
C2C8:D0 A9 07 8D 28 D0 A9 01 B3
C2D0:8D 29 D0 8D 2A D0 8D 2B 35
C2D8:D0 A9 07 8D 15 D0 60 BD 55
C2E0:0C C7 DD 06 C7 F0 0C DE 73
C2E8:0C C7 4E 13 C7 4E 13 C7 C6
C2F0:4C 00 C3 A9 5A 9D 0C C7 D8
C2F8:20 AD C3 A0 00 20 E4 C3 8A
C300:EE 14 C7 AE 14 C7 BD 0C 2F

```

```

C308:C7 DD 06 C7 F0 0C DE 0C A9
C310:C7 4E 13 C7 4E 13 C7 4C 88
C318:27 C3 A9 5A 9D 0C C7 20 CB
C320:AD C3 A0 00 20 20 C4 AD 3C
C328:14 C7 4D 17 C7 D0 7D AE F1
C330:14 C7 4E 13 C7 B0 08 BD 7D
C338:1B C7 F0 0B 4C AC C3 A9 54
C340:00 9D 1B C7 4C AC C3 BD 69
C348:00 C7 8D 05 C7 BD 06 C7 CC
C350:8D 0B C7 BD FF C6 8D 04 70
C358:C7 BD 05 C7 8D 0A C7 A9 1E
C360:00 9D FF C6 9D 00 C7 9D D5
C368:05 C7 9D 06 C7 BD 00 D0 7E
C370:8D 05 D0 8D 0B D0 FF 0A
C378:CF 8D 04 D0 8D 0A D0 AD BC
C380:12 C7 2D 10 D0 F0 0B AD B7
C388:10 D0 09 24 8D 10 D0 4C 4A
C390:9A C3 AD 10 D0 29 DB 8D 7D
C398:10 D0 A9 07 8D 15 D0 A9 0E
C3A0:00 8D 17 C7 AD 12 C7 49 79
C3A8:FF 8D 18 C7 60 AC 14 C7 B8
C3B0:B9 00 C7 D0 05 A2 00 4C 1A
C3B8:C5 C3 29 80 F0 05 A2 01 23
C3C0:4C C5 C3 A2 02 BC F9 C5 3F
C3C8:4E 13 C7 B0 03 BC FC C5 0B
C3D0:4E 13 C7 B0 03 BC FF C5 19
C3D8:AE 14 C7 98 18 7D 00 C7 BD
C3E0:9D 00 C7 60 BD 00 C7 F0 A4
C3E8:33 29 80 F0 1A BD 01 D0 0E
C3F0:D9 02 C6 B0 06 20 0E C5 5C
C3F8:4C 1C 4A DE 01 D0 DE 07 44
C400:D0 20 EA C4 4C 1F C4 BD C9
C408:01 D0 C8 D9 02 C6 90 06 4F
C410:20 0E C5 4C 89 C4 FE 01 09
C418:D0 FE 07 D0 20 EA C4 60 4E
C420:BD 00 C7 F0 60 10 31 BD F3
C428:FF CF D9 06 C6 B0 13 AD 0E
C430:10 D0 2D 12 C7 D0 0B 20 74
C438:B4 C4 B0 06 20 0E C5 4C D4
C440:85 C4 DE FF CF DE 05 D0 6E
C448:10 3F AD 12 C7 49 FF 2D 11
C450:10 D0 8D 10 D0 4C 89 C4 58
C458:BD FF CF C8 D9 06 C6 90 4C
C460:13 AD 10 D0 2D 12 C7 F0 20
C468:0B 20 8D C4 B0 06 20 0E 69
C470:C5 4C 89 C4 FE FF CF FE 04
C478:05 D0 0D 09 AD 12 C7 0D B5
C480:10 D0 8D 10 D0 20 EA C4 9A
C488:60 20 EA C4 60 E0 05 D0 55
C490:57 AD 17 C7 D0 52 BD FF DB
C498:CF C9 36 10 06 20 DB C4 71
C4A0:4C B3 C4 C9 38 30 3F A9 1D
C4A8:9C 20 D2 FF A9 01 8D 1F 6E
C4B0:C7 A0 0A 00 E0 05 D0 30 7A
C4B8:AD 17 C7 D0 2B BD FF CF 05
C4C0:C9 24 30 06 20 DB C4 4C E4
C4C8:DA C4 C9 20 10 18 A9 9E FE
C4D0:20 D2 FF A9 02 8D 1F C7 06
C4D8:A0 23 60 AD 05 D0 C9 7B DC
C4E0:30 06 C9 A6 10 02 38 60 01
C4E8:18 60 BD 00 C7 30 0D C9 31
C4F0:52 30 05 A9 52 9D 00 C7 BB
C4F8:9D 06 C7 60 C9 AE 10 05 FF
C500:A9 AE 9D 00 C7 49 FF 9D C0
C508:06 C7 FE 06 C7 60 BD 00 04
C510:C7 49 FF 9D 00 C7 FE 00 C8
C518:C7 60 A9 81 20 D2 FF A2 DB
C520:00 A0 02 18 20 F0 FF A9 04
C528:B0 20 D2 FF A2 21 20 C7 10
C530:C5 A9 AE 20 D2 FF A2 02 BE
C538:20 F0 FF A9 ED 20 D2 FF 40
C540:A2 21 20 C7 C5 A9 BD 20 56
C548:D2 FF A2 01 C8 20 F0 FF 4A
C550:A2 0A 20 E3 C5 A2 01 A0 4D
C558:0F 20 F0 FF A2 21 20 E3 4F
C560:C5 A2 01 A0 1C 20 F0 FF E4
C568:A2 15 20 E3 C5 A9 99 20 F4
C570:D2 FF A2 03 A0 02 20 F0 28
C578:FF A9 B0 20 D2 FF A2 21 83
C580:20 C7 C5 A9 AE 20 D2 FF FC
C588:A2 16 20 F0 FF A9 AD 20 20
C590:D2 FF A2 21 20 C7 C5 A9 41
C598:BD 20 D2 FF A2 04 20 F0 BB
C5A0:FF A9 05 20 D0 C5 A2 10 2C
C5A8:20 F0 FF A9 05 20 D0 C5 2B

```

```

C5B0:A2 04 A0 25 20 F0 FF A9 63
C5B8:05 20 D0 C5 A2 10 20 F0 CB
C5C0:FF A9 05 20 D0 C5 60 A9 61
C5C8:C0 20 D2 FF CA 10 F8 60 FF
C5D0:8D 22 C7 A9 DD 20 D2 FF 54
C5D8:E8 18 20 F0 FF CE 22 C7 39
C5E0:10 F1 60 BC 0A C6 CA BD 87
C5E8:0A C6 20 D2 FF CA BD 0A 0D
C5F0:C6 20 D2 FF CA 88 D0 F6 53
C5F8:60 00 01 FF FF FF FE 01 D3
C600:02 01 4F D2 48 D9 2C 2D 15
C608:25 34 30 20 3A 65 6C 70 ED
C610:72 75 70 9C 09 30 20 3A 8F
C618:77 6F 6C 6C 65 79 9E 09 E8
C620:6E 75 72 2D 6E 2D 70 6D D9
C628:75 62 9F 0A 72 65 76 6F 23
C630:20 65 6D 61 67 9F 09 74 2B
C638:65 73 65 72 20 6F 74 20 F0
C640:65 72 69 66 20 73 73 65 CB
C648:72 70 9A 13 18 00 00 18 88
C650:00 00 18 00 00 18 00 00 41
C658:3C 00 00 66 00 00 C3 00 F1
C660:01 81 80 3F 00 FC 3F 00 45
C668:FC 01 81 80 00 C3 00 00 FB
C670:66 00 00 3C 00 00 18 00 25
C678:00 18 00 00 18 00 00 18 E4
C680:A0 30 A0 31 A0 32 A0 33 D3
C688:A0 34 A0 35 A0 36 A0 37 31
C690:A0 38 A0 39 31 30 31 31 02
C698:31 32 31 33 31 34 31 35 96
C6A0:00 00 00 00 00 00 00 00 2E

```

## BASIC Examiner

(Article on page 84.)

```

GR 100 IFPEEK(46)<PEEK(44)THEN
      POKE45,PEEK(174):POKE46
      ,PEEK(175):CLR
KJ 110 GOSUB360:SYS844:POKE808
      ,239:PRINT "{CLR}"
KG 120 POKE648,160:PRINT"
      {HOME}{RVS}LOCATIONBHEX
      BDECIMALBMEANING
      [12 SPACES]":POKE648,4
EA 130 D=256:POKEA,FNH(S):POKE
      X,FNL(S):SYS828:M=PEEK(
      A)+D*PEEK(X):D=16:PRINT
HD 140 FORI=33TO34:V(0)=PEEK(M
      ):V(1)=PEEK(M+1):IFV(0)
      +V(1)=0THENNEXT:GOTO330
RM 150 FORJ=0TO1:V=V(J):PRINTM
      +JTAB(9);
KJ 160 PRINTTAB(9)CHR$(FNC(FNH
      (V)))CHR$(FNC(FNL(V)))T
      AB(14)V(J);:IFJ=0THENPR
      INT
XE 170 NEXT:M=M+2:PRINTTAB(21)
      S$(I)V(0)+256*V(1):PRIN
      T:NEXT:M=M-1
JJ 180 M=M+1:V=PEEK(M):WAIT653
      ,1,1:IFPEEK(203)=63THEN
      350
KS 190 B=(V>127ANDV<204ORV=255
      )ANDNOTQ:IFVTHEN210
KE 200 PRINTMTAB(9)"{RVS}00"TA
      B(15)"0{OFF}"TAB(21)"
      {RVS}END-OF-LINE{DOWN}"
      :M=M+1:Q=V:GOTO140
SM 210 PRINTMTAB(9)CHR$(18*-B)
      CHR$(FNC(FNH(V)))CHR$(F
      NC(FNL(V)))"0{OFF}"TAB(1
      5);
FR 220 PRINTCHR$(18*-B)MID$(ST
      R$(V),2)"0{OFF}"TAB(22);
HQ 230 IFV=32THENPRINT"
      {2 SPACES}"S$(V):GOTO18
      0
QM 240 IFV=34THENQ=NOTQ:PRINTC
      HR$(V):GOTO180
BR 250 IFV=141ANDNOTBTHENPRINT
      "{RVS}M{OFF}"S$(V):GOT
      O180

```

```

PK 260 IFV=255THENPRINT "↑":GO
TO180
RC 270 IFBTHENPRINT " ";:POKEA,
V:SYS936:PRINT:GOTO180
FD 280 IFV>32THEN310
SF 290 PRINT "[RVS]"CHR$(V+64)"
[OFF]"S$(V);:IFS$(V)="
"THENPRINT"[CTRL-"CHR$(
V+64)"]";
PK 300 PRINT:GOTO180
BP 310 IFV<128ORV>160THENPRINT
CHR$(V):GOTO180
QF 320 PRINTQSD$CHR$(V)QSD$TAB
(24)S$(V):GOTO180
XG 330 M=M-1:PRINT"[2 UP]";:PO
KEX,PEEK(214):SYS59903:
PRINT:FORI=0TO2
SD 340 PRINTM+ITAB(9)"00"TAB(1
5)"0":NEXT:PRINT"[UP]"T
AB(22)"[CYN]END OF PROG
RAM[8]"
RB 350 POKEL98,0:GOSUB400:PRIN
T"[CLR]":GOTO130
FH 360 I$="[CLR]"[2 DOWN][8]BAS
IC EXAMINER":DIMS$(160)
:Q$=CHR$(34):D$=CHR$(20
):A=780:X=A+1
SB 370 Y=A+2:DEFN(F)=INT(F/D
):DEFN(L)=F-D*FNF(F):
DEFN(C)=F+48-7*(F>9)
CP 380 FORI=5TO34:READS$(I):NE
XT:FORI=129TO160:READS$(
I):NEXT
RK 390 FORI=828TO931:READJ:POK
EI,J:NEXT
DC 400 F$="":Q=0:IFPEEK(788)=4
9THENPRINTI$:INPUT"
[DOWN]PROGRAM NAME";F$
CF 410 F=LEN(F$):S$="":INPUT"
[DOWN]START WITH LINE #
";S$:S=INT(VAL(S$)):IF
=0THENRETURN
BC 420 FORI=1TOF:POKE678+I,ASC
(MID$(F$,I,1)):NEXT:POK
E183,F:POKE157,128
QK 430 FORI=184TO188:READJ:POK
EI,J:NEXT:POKEA,0:POKEX
,1:POKEY,8:SYS65493
KA 440 POKE44,8:SYS42291:POKE4
4,192:IFST=64THENRETURN
GB 450 PRINT:IFST<0THENPOKEX,5
:SYS42039
GJ 460 OPEN15,8,15:INPUT#15,A,
B$:CLOSE15:PRINT"[DOWN]
[RS]"B$
RD 470 DATA WHITE,,,LOCK,UNLOC
K,,,,,RETURN,LOWER CASE,
'
QM 480 DATA CRSR DOWN,REV-ON,H
OME,DEL,,,,,,RED,CRSR
RIGHT,GREEN,BLUE,SPACE
RX 490 DATA NEXT LINE AT,LINE
[SPACE]NUMBER
DX 500 DATA ORANGE,,,F1,F3,F5
,F7,F2,F4,F6,F8,SHIFT-R
ETURN,UPPER-CASE,,BLACK

```

**COMPUTE!'s  
GAZETTE  
TOLL FREE  
Subscription  
Order Line  
1-800-247-5470  
In IA  
1-800-532-1272**

```

CE 510 DATA CRSR UP,RVS-OFF,CL
EAR,INST,BROWN,LT.RED,G
RAY1,GRAY2,LT.GREEN,LT.
BLUE
GQ 520 DATA GRAY3,PURPLE,CRSR
[SPACE]LEFT,YELLOW,CYAN
,SHIFT-SPACE
EC 530 DATA 134,20,133,21,169,
1,162,8,32,23,166,165,9
5,166,96,96,120,169,127
,141
PQ 540 DATA 13,220,169,3,141,2
1,3,169,120,141,20,3,16
9,129,141,26,208,169,27
,141
AE 550 DATA 17,208,88,160,31,1
85,35,167,153,167,3,136
,208,247,96,41,127,76,2
10
QA 560 DATA 255,169,1,141,25,2
08,162,250,160,199,169,
21,44,18,208,16,6,162,5
7,160
GE 570 DATA 197,169,133,142,18
,208,140,0,221,141,24,2
08,173,13,220,41,1,240,
3,76
CG 580 DATA 49,234,76,188,254,
0,0,8,167,2

```

#### BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

## Polar Art

(Article on page 98.)

### Program 1: Polar Art—64 Version

```

FM 10 F=2*↑:XS=160:YS=100:SF=.
73:BC=0:CC=1:PR=49152:CB
=49365:CN=49408:P=49438
QE 20 DC=54272:CL$=CHR$(147):P
RINTCL$:POKE53280,0:POKE
53281,0
XP 30 FORI=PRTOPR+308:READD:PO
KEI,D:NEXT:FORI=1TO3:REA
DD$(I):NEXT
XB 40 PRINT"[CLR]"TAB(14)"
{YEL}POLAR ART"
FJ 50 FORI=1TO3:SYSP,10+I*2,5:
PRINTI"[LEFT]". "D$(I):NE
XT
DP 60 SYSP,23,10:PRINT"YOUR SE
LECTION?"
KG 70 GETA$:IFA$=""THEN70
DD 80 A=VAL(A$):IFA<1ORA>3THEN
GOSUB290:GOTO40
JE 90 N1=0:N2=0:R1=0:R2=0:PRIN
TCL$:SYSP,3,15:PRINTD$(A
):ONAGOTO100,180,270
AF 100 SYSP,10,0:PRINT"YOU MUS
T ENTER VALUES FOR N,R1
, AND R2."
XR 110 PRINT:PRINT"THE SUM OF
[SPACE]R1+R2 MUST BE <=
135."
BH 120 SYSP,20,5:INPUT"N,R1,R2
";N1,R1,R2:GOSUB400:IFT
>135THENGOSUB280:GOTO90
JA 130 GOSUB310:GOSUB380:FORAN
=0TOFSTEPS:RP=R1+R2*SIN
(N1*AN):GOSUB350

```

```

KK 140 GETA$:IFA$<>"THENAN=F:
GOTO260
RQ 150 NEXT:GOSUB360
XG 160 GETA$:IFA$=""THEN160
MX 170 GOTO260
BD 180 SYSP,10,2:PRINT"YOU MUS
T ENTER VALUES FOR":PRI
NTTAB(2)"N1,N2,R1, AND
[SPACE]R2."
BJ 190 SYSP,13,2:PRINT"THE SUM
OF R1+R2 MUST BE <= 13
5."
AS 200 SYSP,20,5:INPUT"N1,N2,R
1,R2";N1,N2,R1,R2
AB 210 GOSUB400:IFT>135THENGOS
UB280:GOTO90
EC 220 GOSUB310:GOSUB380:FORAN
=0TOFSTEPS:RP=R1*SIN(N1
*AN)+R2*SIN(N2*AN)
BK 230 GOSUB350:GETA$:IFA$<>"
THENAN=F:GOTO260
DG 240 NEXT:GOSUB360
HQ 250 GETA$:IFA$=""THEN250
JA 260 POKE53265,PEEK(53265)AN
D223:POKE53272,21:GOTO4
0
ME 270 SYS58260
ED 280 SYSP,23,2:PRINT"INCORRE
CT DATA ENTRY - TRY AGA
IN"
ME 290 FORI=1TO10:POKEDC+24,15
:FORJ=1TO3:NEXT
CH 300 POKEDC+24,0:FORJ=1TO2:N
EXT:NEXT:FORI=0TO300:NE
XT:RETURN
HM 310 PRINTCL$:SYSP,12,5:PRIN
T"PRESS ANY KEY TO END
[SPACE]DRAWING"
FB 320 SYSP,13,5:PRINT"AND RET
URN TO MENU.":FORI=0TO2
000:NEXT
BK 330 POKE53272,PEEK(53272)OR
8
RX 340 SYSCB:SYSCN,BC+16*CC:PO
KE53265,PEEK(53265)OR32
:RETURN
FA 350 SYSPR,XS+RP*COS(AN),YS+
SF*RP*SIN(AN):RETURN
XJ 360 POKEDC+24,15:POKEDC+1,1
10:POKEDC+5,9:POKEDC+6,
9:POKEDC+4,17:POKEDC+4,
16
DR 370 RETURN
KB 380 S=.04-(N1+N2)*.0015-T*.
00005:IFS<.005THENS=.00
5
PX 390 RETURN
FQ 400 T=ABS(R1)+ABS(R2):RETUR
N
FG 410 DATA 32,253,174,32,158,
173,32,170,177,140,60,3
,141,61,3,32,253,174,32
JF 420 DATA 158,173,32,170,177
,140,62,3,173,62,3,74,7
4,74,141,63,3,173,61,3,
74
GK 430 DATA 173,60,3,106,74,74
,141,64,3,173,62,3,41,7
,141,65,3,173,60,3,41,7
,141
MF 440 DATA 66,3,169,7,56,237,
66,3,141,66,3,169,0,141
,67,3,141,68,3,174,63,3
,240
RA 450 DATA 20,24,169,64,109,6
7,3,141,67,3,169,1,109,
68,3,141,68,3,202,208,2
36
DJ 460 DATA 234,169,0,141,70,3
,173,64,3,141,69,3,14,6
9,3,46,70,3,14,69,3,46,
70,3

```

```

AX 470 DATA 14,69,3,46,70,3,16
9,0 133,251,169,32,133,
252,24,165,251,109,67,3
,133
BP 480 DATA 251,165,252,109,68
,3,133,252,24,165,251,1
09,69,3,133,251,165,252
,109
AP 490 DATA 70,3,133,252,24,16
5,251,109,65,3,133,251,
165,252,105,0,133,252,1
69,1
HB 500 DATA 174,66,3,240,4,10,
202,208,252,141,71,3,16
0,0,177,251,13,71,3,145
,251
HD 510 DATA 96,162,32,169,0,13
3,251,138,133,252,160,0,
169,0,145,251,200,208,
251
HQ 520 DATA 232,224,63,208,239
,169,0,133,251,169,63,1
33,252,160,0,169,0,145,
251
PS 530 DATA 200,192,64,208,249
,96,32,253,174,32,158,1
73,32,170,177,152,160,0
,153
KM 540 DATA 0,4,153,250,4,153,
244,5,153,238,6,200,192
,250,208,239,96,32,43,1
93
KB 550 DATA 132,251,32,43,193,
166,251,76,240,255,32,2
53,174,32,158,173,32,17
0
QG 560 DATA 177,96,ART I,ART I
I,QUIT

```

## Program 2: Polar Art—128, Plus/4, and 16 Version

```

AQ 10 F=2*↑:XS=160:YS=100:SF=.
73:BC=0:CC=1
QA 20 CLS=CHR$(147):PRINTCLS:C
OLOR 0,1:COLOR4,7
FJ 30 FORI=1TO3:READD$(I):NEXT
XQ 40 PRINTCLS:CHAR1,14,1,"":P
RINTCHR$(18)CHR$(158)" P
OLAR ART ";CHR$(146)
PR 50 FORI=1TO3:CHAR 1,14,10+I
*2,"":PRINTI;CHR$(157)CH
R$(46)CHR$(32)D$(I):NEXT
PF 60 CHAR1,12,23,"":PRINTCHR$(
158)"YOUR SELECTION? "
KG 70 GETA$:IFA$=""THEN70
DD 80 A=VAL(A$):IFA<LORA>3THEN
GOSUB290:GOTO40
AK 90 N1=0:N2=0:R1=0:R2=0:PRIN
TCLS:CHAR1,15,3,"":PRINT
D$(A):ONAGOTO100,180,270
BR 100 CHAR1,0,10,"":PRINT"YOU
MUST ENTER VALUES FOR
[SPACE]N,R1, AND R2."
XR 110 PRINT:PRINT"THE SUM OF
[SPACE]R1+R2 MUST BE <=
135."
XB 120 CHAR1,5,20,"":INPUT"N,R
1,R2";N1,R1,R2:GOSUB370
:IFT>135THENGOSUB280:GO
TO90
MH 130 GOSUB300:GOSUB350:FORAN
=0TOFSTEPS:RP=R1+R2*SIN
(N1*AN):GOSUB330
KK 140 GETA$:IFA$<>"":THENAN=F:
GOTO260
DX 150 NEXT:GOSUB340
XG 160 GETA$:IFA$=""THEN160
MX 170 GOTO260
QR 180 CHAR1,2,10,"":PRINT"YOU
MUST ENTER VALUES FOR"
:PRINTTAB(2)"N1,N2,R1,

```

```

[SPACE]AND R2."
HE 190 CHAR1,2,13,"":PRINT"THE
SUM OF R1+R2 MUST BE <
= 135."
CP 200 CHAR1,5,20,"":INPUT"N1,
N2,R1,R2";N1,N2,R1,R2
QQ 210 GOSUB370:IFT>135THENGOS
UB280:GOTO90
MS 220 GOSUB300:GOSUB350:FORAN
=0TOFSTEPS:RP=R1*SIN(N1
*AN)+R2*SIN(N2*AN)
RP 230 GOSUB330:GETA$:IFA$<>"
THENAN=F:GOTO260
RA 240 NEXT:GOSUB340
HQ 250 GETA$:IFA$=""THEN250
QB 260 COLOR0,1:GRAPHIC 0,1:GO
TO40
RE 270 PRINT"[CLR]":END
JD 280 CHAR1,4,23,"":PRINT"INC
ORRECT DATA ENTRY - TRY
AGAIN"
KG 290 VOL 6:SOUND 1,200,15:FO
RTD=1TO700:NEXT:RETURN
BQ 300 PRINTCLS:CHAR1,5,12,"":
PRINTCHR$(5)"PRESS ANY
[SPACE]KEY TO END DRAWI
NG"
CA 310 CHAR1,5,13,"":PRINT"AND
RETURN TO MENU.":FORI=
0TO1000:NEXT
PB 320 COLOR0,1:COLOR1,2:GRAPH
IC 1,1:RETURN
FE 330 DRAW1,XS+RP*COS(AN),YS+
SF*RP*SIN(AN):RETURN
GS 340 VOL6:SOUND 1,900,20:RET
URN
FD 350 S=.04-(N1+N2)*.0015-T*.
00005:IFS<.005THENS=.00
5
XR 360 RETURN
EX 370 T=ABS(R1)+ABS(R2):RETUR
N
DH 380 DATA ART I,ART II,QUIT

```

## Mastering 128 Sound And Music

(Article on page 90.)

### Minuet

```

CM 10 PRINT"[CLR]{5 DOWN}[TAB]
{4 SPACES}MINUET (G MAJO
R)":PRINT{9 SPACES}"
{5 DOWN}[2 TAB]
{3 SPACES}BY":PRINT"
{5 DOWN}[TAB] JOHANN SEB
ASTIAN BACH"
XP 20 TEMPO 10:VOL 6:PLAY"X0U9
":PLAY"V1T6V2T0"
GD 30 A$="V203HGV105QDO4IGIAIB
V203QAV105IC":B$="V105QD
V203.HBV104IGIRIGIR"
EP 40 C$="V105QEV204.HCV105ICI
DIEI#F":D$="V105QGV203.H
BV104IGIRIGIR"
DG 50 FOR R=1TO2:PLAY A$:PLAY
[SPACE]B$:PLAY C$:PLAY D
$:E$="V105QCV203.HAV105I
DICO4IBIA"
MA 60 F$="V104QBV203.HGV105ICO
4IBIAIG":G$="V104Q#FV2QD
O3QBV104IGIAIBV203QGV104
IG"
KE 70 H$="V104QBV2QDO3IDV104HA
V204ICO3IBIA":PLAY E$:PL
AY F$:PLAY G$:PLAY H$
XA 80 I$="V203HBV105QDO4IGIAIB
V203QAV105IC":J$="V105QD
V203QGV104IGIRIGV203QG

```

```

DS 90 K$="V204.HCV105QEICIDIEI
#F":L$="V105QGV203QBO4IC
V104IGIRV203IBIAV104IGIR
V203IG":PLAY I$:PLAY J$:
PLAY K$:PLAY L$
QC 100 M$="V203HAV105QCIDI04I
BV203Q#FV104IA":N$="V10
4QBV203HGV105ICO4IBIAV2
03QBV104IG"
MR 110 O$="V104QAV2QCQDV1IBIAI
GV203QDV104I#F":P$="V10
4.HGV203HGO2QG":PLAY M$
:PLAY N$:PLAY O$:PLAY P
$:NEXT R
BF 120 FOR R=1TO2:Q$="V203.HGV
105QBIGIAIBIG":R$="V105
QAV203.H#FV105IDIEI#FID
"
CX 130 S$="V105QGV203QEQGV105I
EI#FIGV203QEV105ID":T$=
"V105Q#CV203HAV104IBO5I
#CO4QAV202QA"
BP 140 VOL 8:PLAY Q$:PLAY R$:P
LAY S$:PLAY T$:U$="V203
.HAV104IAIBO5I#CIDIEI#F
":V$="V105QGV203IBIRO4Q
DV105Q#FQEV204Q#C"
KH 150 W$="V204QDV105Q#FO4IAV2
O3I#FIRIAV105I#CIR":X$=
"V105.HDV204QDO3QDO4QC"
:PLAY U$:VOL 10:PLAY V$
:PLAY W$:PLAY X$
SQ 160 Y$="V203QBV105QDO4IGV2Q
DV1I#FQGV203QB":Z$="V20
4QCV105QEO4IGV2QEV1I#FI
GV2QC"
BX 170 AA$="V203QBV105QDQCV203
QAQGV104QB":AB$="V104IA
V2HDV1IGI#FIGQA":VOL 6:
PLAY Y$:PLAY Z$:PLAY AA
$:PLAY AB$
HE 180 AC$="V104IDV203HVDV104IE
I#FIGIAV203Q#FV104IB":A
D$="V105QCV203QEQGV104Q
BQAV203Q#F"
CK 190 AE$="V203QGV104IBO5IDO4
IGV202IBIRO3IDV104I#FIR
":AF$="V104.HGV203IGIRI
DIRO2IGIR"
RJ 200 PLAY AC$:VOL 8:PLAY AD$
:PLAY AE$:PLAY AF$:NEXT
R:END

```

## 64 Multitasker

See instructions in article on page 94  
before typing in.

```

C000:4C 59 C0 78 A9 08 8D 88 AE
C008:02 A9 00 8D 00 52 8D 01 33
C010:52 8D 02 52 AA BD DF C2 52
C018:95 2B E8 E0 0E 90 F6 A9 A4
C020:02 8D FF C2 8D 00 C3 A9 CF
C028:25 8D 18 D0 A9 42 85 FB 0D
C030:A9 C0 85 FC A0 00 B1 FB 9B
C038:F0 06 20 D2 FF C8 D0 F6 A0
C040:58 06 93 0D 4D 55 4C 54 F5
C048:49 54 41 53 4B 45 52 20 15
C050:45 4E 41 42 4C 45 44 0D 61
C058:00 78 AD 14 03 8D F6 C2 ED
C060:A9 EC 8D 14 03 AD 15 03 E0
C068:8D F7 C2 A9 C0 8D 15 03 0B
C070:FA 20 8D F0 C2 A9 FF 8D D9
C078:FA C2 A2 A0 A0 A0 20 32 80
C080:CA A2 E0 A0 E0 20 32 C2 E0
C088:AD 28 03 8D F8 C2 A9 C1 0C
C090:8D 28 03 AD 29 03 8D F9 88
C098:C2 A9 C2 8D 29 03 A9 35 F4
C0A0:85 01 A9 4C 8D 34 EB A9 DD
C0AB:AE 8D 35 EB A9 C2 8D 36 F3
C0B0:EB A9 86 8D DB E4 A9 02 04

```

```

C0B8:8D DC E4 AD F3 C2 8D F2 68
C0C0:C2 A9 04 8D F0 C2 A9 01 4E
C0C8:8D 00 C3 8D FF C2 A9 00 C0
C0D0:8D ED C2 8D D5 02 8D 00 97
C0D8:0C 8D 01 0C 8D 02 0C AA DB
C0E0:BD D1 C2 95 2B E8 E0 0E 34
C0E8:90 F6 58 60 AD D5 02 D0 1B
C0F0:21 A9 00 8D F1 C2 AD ED 2A
C0F8:C2 C9 40 D0 08 A9 00 8D D7
C100:EF C2 4C 22 C1 AD EF C2 3F
C108:D0 18 A9 01 8D EF C2 AD 9E
C110:ED C2 C9 04 F0 52 C9 05 1E
C118:F0 2B C9 06 F0 2D C9 03 4B
C120:F0 13 AD F4 C2 F0 11 CE B0
C128:F2 C2 D0 0C AD F3 C2 8D 01
C130:F2 C2 4C 5B C1 4C F9 C1 12
C138:A5 C5 8D ED C2 A9 00 8D DA
C140:D5 02 6C F6 C2 20 70 C2 66
C148:4C 5B C1 AD F4 C2 49 FF 21
C150:8D F4 C2 AD FF C2 CD 00 B1
C158:C3 F0 DD A9 01 8D F1 C2 35
C160:A5 C5 8D C5 98 8D C5 9C 59
C168:AD FF C2 C9 01 F0 07 C9 5B
C170:F2 F0 48 4C 38 C1 BA 8E CB
C178:D6 02 A9 FF 8D FA C2 A2 9D
C180:00 A0 98 20 32 C2 AD F1 2B
C188:C2 F0 2D AE FD C2 8E B1 04
C190:C2 8E BD C2 E8 E8 8E B9 BE
C198:C2 A9 02 8D FF C2 A9 00 5F
C1A0:8D FA C2 A9 B4 8D FB C2 33
C1A8:A9 C1 8D FC A2 A2 9C A0 6D
C1B0:00 4C 32 C2 AE D6 02 9A 29
C1B8:4C 38 C1 BA 8E D6 02 A9 D1
C1C0:FF 8D FA C2 A2 00 A0 9C 26
C1C8:20 32 C2 AD F1 C2 F0 E8 81
C1D0:AE FE C2 8E B1 C2 8E BD 20
C1D8:C2 E8 E8 8E B9 C2 A9 01 2B
C1E0:8D FF C2 A9 00 8D FA C2 0D
C1E8:A9 B4 8D FB C2 A9 C1 8D AD
C1F0:FC C2 A2 98 A0 00 4C 32 51
C1F8:C2 A9 01 85 FB A9 C3 85 54
C200:FC A4 D3 B1 FB F0 05 91 02
C208:D1 C8 D0 F7 AD FF C2 18 4D
C210:69 30 91 D1 E6 D6 A5 D6 5A
C218:C9 18 B0 12 A5 D1 18 69 CD
C220:28 85 D1 90 02 E6 D2 A9 59
C228:00 85 D3 4C 38 C1 C6 D6 7B
C230:D0 F5 86 FC 8E FC 98 8E 64
C238:FC 9C 84 FE 8C FE 98 8C 02
C240:FE 9C AE F0 C2 A0 00 84 6E
C248:FB 8C FB 98 8C FB 9C 84 0A
C250:FD 8C FD 98 8C FD 9C B1 88
C258:FB 91 FD C8 D0 F9 EE FC D5
C260:00 EE FE 00 CA D0 F0 AD AA
C268:FA C2 F0 01 60 6C FB C2 B9
C270:AD 00 C3 99 01 F0 17 A9 85
C278:01 8D 00 C3 A9 10 8D F5 BC
C280:C2 A9 98 8D FD C2 A9 00 0C
C288:8D FE C2 4C A2 C2 A9 02 27
C290:8D 00 C3 A9 20 8D F5 C2 D5
C298:A9 00 8D FD C2 A9 9C 8D 08
C2A0:FE C2 AD 18 D0 29 0F 0D E3
C2A8:F5 C2 8D 18 D0 60 8A AE D8
C2B0:C6 00 EC 89 02 B0 07 9D 4E
C2B8:77 02 E8 8E C6 00 4C 42 91
C2C0:EB AD FF C2 AD 00 C3 D0 9A
C2C8:03 6C F8 C2 C9 AF C9 7F 96
C2D0:60 01 0C 03 0C 03 0C 03 FF
C2D8:0C 00 52 00 52 00 52 01 E6
C2E0:52 03 52 03 52 03 52 00 0E
C2E8:98 00 98 00 98 00 00 92
C2F0:04 00 00 03 00 10 AA AA E8
C2F8:AA AA 00 AA A0 02 02 01 8B
C300:01 15 13 09 AE 07 20 02 0F
C308:0C 0F 03 0B 20 23 00 00 F7

```

## BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

## 128 Draw

(Article on page 99.)

```

QG 10 CLR:GRAPHIC1,1:COLOR1,1:
      COLOR4,1
HG 20 DRAW 1,10,2TO10,7:DRAW 1
      ,1,11TO4,11:DRAW 1,10,15
      TO10,21:DRAW 1,17,11TO20
      ,11
MX 30 SSHAPEA$,1,1,22,22:SPRSA
      V A$,1:T=0:C=1:F=1:X=99:
      Y=160
SE 40 SPRITE1,1:COLOR0,2:GRAPH
      IC1,1
RG 50 J=JOY(2):MOVSPR1,Y+15,X+
      40
QR 60 GETA$:IF A$="F" THEN F=-
      F+1:GOTO 50
PG 70 IF F=1 AND A$="" THEN 30
      0:ELSE 90
QK 80 IF A$="D" THEN D=-D+1:GO
      TO 50
KK 90 IF A$="C" THEN BEGIN:ELS
      E 140
SG 100 C=C+1:IF C>16 THEN C=1:
      ELSE C=C
QF 110 COLOR1,C:COLOR 4,C
KM 120 BEND
AS 130 IF A$="C" THEN COLOR1,C
      :COLOR4,C
JG 140 IF A$="S" OR A$="L" THE
      N 530
RQ 150 IF A$="X" AND T=0 THEN
      {SPACE}SPRITE1,0:T=1:GO
      TO 50
ED 160 IF A$="O" AND RAD=0 AND
      BOT=0 THEN 580
MC 170 IF BOT=1 AND A$="O" THE
      N 600
FJ 180 IF RAD=1 AND A$="O" THE
      N 590
AK 190 IF A$="X" AND T=1 THEN
      {SPACE}SPRITE1,1:T=0:GO
      TO 50
BE 200 IF A$="W" AND W=0 THEN
      {SPACE}WIDTH2:W=1:GOTO
      {SPACE}50
GM 210 IF A$="W" AND W=1 THEN
      {SPACE}WIDTH1:W=0:GOTO
      {SPACE}50
SR 220 IF A$="B"AND B=1 THEN 6
      30
CD 230 IF A$="B"AND B=0 THEN 6
      20
EJ 240 IF A$="E" THEN GRAPHIC1
      ,1:X=99:Y=160:C=1:COLOR
      4,C:COLOR1,C:GOTO 50
ES 250 IF A$="P"THEN 520
PB 260 IF A$="T" THEN 640
AE 270 IF A$="D" THEN D=-D+1:G
      OTO 50
EG 280 IF P=1 AND A$="P" THEN
      {SPACE}520
XE 290 IF A$="4" THEN X=99:Y=1
      60:GOTO 50
FR 300 IF A$="1" THEN X=0:Y=0:
      GOTO 50
SX 310 IF A$="2" THEN X=0:Y=31
      9:GOTO 50

```

```

FC 320 IF A$="3" THEN X=199:Y=
      0:GOTO 50
CH 330 IF A$="4" THEN X=199:Y=
      319:GOTO 50
HJ 340 IF J=0 THEN 50
BA 350 ON J GOSUB 390,380,420,
      410,440,460,500,490
DJ 360 IF D=1 THEN 50
HD 370 DRAW1,Y,X:GOTO 50
HX 380 Y=Y+1:IF Y>319 THEN Y=3
      19
EP 390 X=X-1:IF X<0 THEN X=0
AS 400 RETURN
QC 410 X=X+1:IF X>199 THEN X=1
      99
CK 420 Y=Y+1:IF Y>319 THEN Y=3
      19
RB 430 RETURN
JQ 440 X=X+1:IF X>199 THEN X=1
      99
FC 450 RETURN
AS 460 X=X+1:IF X>199 THEN X=1
      99
XD 470 Y=Y-1:IF Y<0 THEN Y=0
BE 480 RETURN
BR 490 X=X-1:IF X<0 THEN X=0
SC 500 Y=Y-1:IF Y<0 THEN Y=0
AF 510 RETURN
FB 520 D=1:PAINT1,Y,X:GOTO 50
FA 530 GRAPHIC0,1:COLOR0,2:COL
      OR5,1:SPRITE1,0
GG 540 INPUT"FILENAME: ";N$:IF
      A$="L" THEN 560
MP 550 PRINT"[2 DOWN]SAVING "N
      $:BSAVE(N$),B0,P7168 TO
      P16384:GRAPHIC1:SPRITE
      1,1:GOTO 50
FC 560 IF N$="D" THEN CATALOG:
      GOTO 540
JS 570 PRINT"[2 DOWN]LOADING "
      ;N$:BLOAD(N$),B0,P7168:
      T=1:D=1:GRAPHIC1:GOTO 5
      0
FX 580 XC=X:YC=Y:RAD=1:GOTO 50
PX 590 R=ABS(YC-Y):BOT=1:DRAW1
      ,Y,X:RAD=0:GOTO 50
PC 600 IF X=XC THEN BR=R:ELSE
      {SPACE}BR=ABS(XC-X)
DD 610 CIRCLE1,YC,XC,R,BR:BOT=
      0
DM 620 B=1:D=1:X1=X:Y1=Y:GOTO
      {SPACE}50
BC 630 X2=X:Y2=Y:BOX1,Y1,X1,Y2
      ,X2,B=0:GOTO 50
GQ 640 XT=INT(X/8):YT=INT(Y/8)
      :GRAPHIC0,1:INPUT"TEXT:
      ";T$:GRAPHIC1:CHAR1,YT
      ,XT,T$:GOTO 50

```

## Obstacle 128

(Article on page 46.)

```

RC 10 GRAPHIC3,1:SOUND 3,100,3
      0000
RE 20 COLOR 0,1:COLOR3,7:COLOR
      2,5:SOUND 2,20000,150,0,
      2000,100:COLOR 4,1:S=INT
      (RND(.)*40)+30
AP 30 DRAW2,1,1+STO158,1+STO15
      8,198-S:DRAW3,158,198-ST
      01,198-STO1,2+S:COLOR1,8
      :CHAR1,16,22,"OBSTACLE"
MP 40 X=30+INT(RND(.)*40):Y=10
      0:A=80+INT(RND(.)*40):B=
      100:J=INT(RND(.)*3)-1:K=
      INT(RND(.)*3)-1:L=J:M=K:
      IFABS(J+K)<>1THEN40
SA 50 J1=JOY(1):IFJ1=0THEN100
EC 60 IFJ1=3THENJ=+1:K=0

```

```

DF 70 IFJ1=7THENJ=-1:K=0
FA 80 IFJ1=1THENK=-1:J=0
AH 90 IFJ1=5THENK=+1:J=0
MC 100 LOCATEX+J,Y+K:IFRDOT(2)
>1THENJ3=1
FK 110 X=X+J:Y=Y+K:DRAW 3,X,Y
GR 120 J2=JOY(2):IFJ2=0THEN170
RJ 130 IFJ2=3THENL=+1:M=0
QD 140 IFJ2=7THENL=-1:M=0
SS 150 IFJ2=1THENM=-1:L=0
SR 160 IFJ2=5THENM=+1:L=0
XM 170 LOCATEA+L,B+M:IFRDOT(2)
>1THENJ4=1
RA 180 A=A+L:B=B+M:DRAW 2,A,B
FS 190 IFJ3=1ORJ4=1THEN210
GA 200 GOTO50
GQ 210 SOUND 2,40000,70,1,050,
1915,3,4000:IF J=1 THE
N CHAR2,29,1,"CRASHED":
C=C+1:ELSE240
MP 220 LOCATE X+J,Y+K:IFRDOT(2)
=3ORRDOT(2)=2THENJ3=1
HA 230 X=X+J:Y=Y+K:DRAW 3,X,Y
BC 240 IFJ3=1 THEN CHAR3,3,1,"
CRASHED":D=D+1
AG 250 IFJ3=1 AND J4=1 THEN CH
AR 1,12,20,"YOU BOTH CR
ASHED":SOUND 1,5000,90,
2,3000,500,1
FE 260 SOUND1,1024,60,0,0,0,3,
0:SLEEP1:GRAPHIC3,1:A$=
STR$(C):CHAR1,3,22,"SCO
RE: "+A$
PC 270 A$=STR$(D):CHAR1,29,22,
"SCORE: "+A$
XJ 280 IFD>4 AND D>C THEN CHAR
2,29,1,"YOU WON":GOTO3
10
JA 290 IFC>4 AND C>D THEN CHAR
3,3,1,"YOU WON":GOTO3
10
CM 300 J3=0:J4=0:GOTO20
EJ 310 TEMPO30:PLAY"V2T704 H C
CCCCCD R CC RR CCCCCDF
G RRRCCFA R $ B R AGA G
"
SS 320 SOUND 3,0,0:PRINT"{CLR}
":GRAPHIC 0:END

```

## Match Blox

(Article on page 50.)

### Program 1: Match Blox—64

#### Version

```

XC 100 GOSUB820:POKE 53280,6:P
OKE 53281,6:PRINT CHR$(
8)"{CLR}{2 DOWN}{7}{SPC
(14)"MATCH BLOX{2 DOWN}
"
FE 110 L$(1)="{1}{RVS}{O}{Y}{P
{DOWN}}{3 LEFT}{H}{E}{N}
{DOWN}}{3 LEFT}{L}{P}{@
{OFF}}{2 UP}":L$(2)="{7}
"+RIGHT$(L$(1),21)
MQ 120 NA$(1)="{UNI-COLOR":NA$(
2)="{2 SPACES}CROSS":NA
$(3)="{NO CENTER}"
HH 130 NA$(4)="{4 CORNERS":NA$(
5)="{5 POINTS":MV$="{MOV
ES}"
JR 140 DIM Y(10),P$(10),CL(5,9)
:FOR I=1 TO 9:READ V(I
,1),V(I,2),V(I,3),V(I,4
)
SH 150 NEXT:MT=1:UP=8:DN=14:LM
=16:RM=22:TE=5:QX=11:QY
=19:MV=-1:Q=14:X=8:P=0
QK 160 FOR C=1 TO 9:Y(C)=X:P$(

```

```

C)=L$(2):Z=INT(10*RND(1
))
RD 170 IF Z<=5 THEN Y(C)=Q:P$(
C)=L$(1)
MR 180 NEXT
GM 190 T$="{RVS}OP{DOWN}
{2 LEFT}{L}{@}{UP}":FOR RX=
1 TO 5:FOR I=1 TO 9:CL(
RX,I)=8:NEXT I,RX
PD 200 FOR I=1 TO 9:CL(1,I)=14
:CL(3,I)=14:NEXT:CL(3,5
)=8
XD 210 CL(2,2)=14:CL(2,4)=14:C
L(2,5)=14:CL(2,6)=14:CL
(2,8)=14
CF 220 CL(4,1)=14:CL(4,3)=14:C
L(4,7)=14:CL(4,9)=14
JC 230 CL(5,1)=14:CL(5,3)=14:C
L(5,5)=14:CL(5,7)=14:CL
(5,9)=14
MF 240 PRINT SPC(12)"{8}{P}
{DOWN}}{2 LEFT}{N}{RVS}1
{OFF}{H}{DOWN}}{2 LEFT}
{Y}{UP}{RIGHT}{7} UNI-C
OLOR{DOWN}":PRINT SPC(1
2);
CP 250 PRINT"{8}{P}{DOWN}
{2 LEFT}{N}{RVS}2{OFF}
{H}{DOWN}}{2 LEFT}{Y}
{UP}{RIGHT}{7} CROSS
{DOWN}":PRINTSPC(12)"
{8}{P}{DOWN}}{2 LEFT}{N}
{RVS}3{OFF}{H}{DOWN}
{2 LEFT}{Y}{UP}{RIGHT}
{7} NO CENTER{DOWN}"
QG 260 PRINT SPC(12)"{8}{P}
{DOWN}}{2 LEFT}{N}{RVS}4
{OFF}{H}{DOWN}}{2 LEFT}
{Y}{UP}{RIGHT}{7} 4 COR
NERS{DOWN}"
QQ 270 PRINT SPC(12)"{8}{P}
{DOWN}}{2 LEFT}{N}{RVS}5
{OFF}{H}{DOWN}}{2 LEFT}
{Y}{UP}{RIGHT}{7} 5 POI
NTS{3 DOWN}"
AE 280 PRINT TAB(12);"YOUR CHO
ICE{UP}}{2 SPACES}{8}{P}
{DOWN}}{2 LEFT}{N}{RVS}
{SPACE}{OFF}{H}{DOWN}
{2 LEFT}{Y}{7}"
AB 290 S=127-PEEK(56320):IF S=
4 THEN MT=MT-1:IF MT<1
{SPACE}THEN MT=1
DE 300 IF S=8 THEN MT=MT+1:IF
{SPACE}MT>5 THEN MT=5
HB 310 IF S>=15 THEN DZ=MT:GK=
MT:GOTO 330
HR 320 POKE 1929,MT+176:POKE 5
6201,15:GOTO 290
FB 330 PRINT CHR$(31)"{CLR}";
HJ 340 FOR I=0 TO 23:PRINT
{RVS}{BLU}{39 SPACES}"
HP 350 MM=1063+(40*I):POKE MM,
160:POKE MM+54272,6:NEX
T:POKE 2023,160:POKE 56
295,6
BD 360 PRINT{RVS}{39 SPACES}
{HOME}":POKE 53281,15
RH 370 PRINT"{HOME}{2 DOWN}";:
PRINT SPC(15)"{RVS}"NA$(
GK)"{2 DOWN}"
SP 380 PRINT"{HOME}{7 DOWN}"SP
C(3)"{RVS}{BLU}M{DOWN}A
{DOWN}T{DOWN}C{DOWN}H
{2 DOWN}}{3 LEFT}B{DOWN}
L{DOWN}O{DOWN}X"
DC 390 E=1:F=3:PRINT"{HOME}
{8 DOWN}":FOR BJ=1 TO 3
:PRINT SPC(31);:FOR AI=
E TO F
FM 400 POKE 646,CL(GK,AI):PRIN
T T$;:NEXT:E=E+3:F=F+3:

```

```

PRINT"{DOWN}":NEXT
DS 410 GOSUB 420:GOTO 450
DQ 420 PRINT"{HOME}{7 DOWN}"TA
B(15)"{RVS}"P$(1)P$(2)P
$(3):PRINT"{2 DOWN}"TAB
(15)"{RVS}"P$(4)P$(5)P$(
6)
QG 430 PRINT"{2 DOWN}"TAB(15)"
{RVS}"P$(7)P$(8)P$(9)
XQ 440 POKE 782,QY:POKE 781,QX
:POKE 783,0:SYS 65520:P
RINT"{BLK}{+}{LEFT}";:R
ETURN
EK 450 MV=MV+1:U=0:FOR C=1 TO
{SPACE}9:IF Y(C)=X THEN
U=U+1
MH 460 NEXT:IF TC=1 THEN TC=0:
MV=MV-1
FQ 470 IF MV>0 THEN PRINT"
{HOME}{20 DOWN}{RVS}
{BLU}"SPC(16)"MOVE"MV:G
OSUB 440
DD 480 IF GK=1 AND U=9 THEN 75
0
BA 490 IF U=9 THEN 780
QD 500 IF GK=2 AND U=5 AND Y(2
)+Y(4)+Y(5)+Y(6)+Y(8)=4
0 THEN 750
KP 510 IF GK=3 AND U=8 AND Y(5
)=14 THEN 750
CQ 520 IF GK=4 AND U=4 AND Y(1
)+Y(3)+Y(7)+Y(9)=32 THE
N 750
KF 530 IF GK=5 AND U=5 AND Y(1
)+Y(3)+Y(5)+Y(7)+Y(9)=4
0 THEN 750
FF 540 GOTO 610
AF 550 P=U:IF Y(U)=X THEN TC=1
:GOSUB 420:GOTO 450
FA 560 W(1)=V(U,1):W(2)=V(U,2)
:W(3)=V(U,3):W(4)=V(U,4
)
GQ 570 FOR G=1 TO 4:W=0:IF Y(W
(G))=X THEN W=1
KG 580 IF W=1 THEN Y(W(G))=Q:P
$(W(G))=L$(1)
RX 590 IF W=0 AND Y(W(G))=Q TH
EN Y(W(G))=X:P$(W(G))=L
$(2)
XK 600 NEXT:Y(U)=X:P$(U)=L$(2)
:GOSUB420:GOTO450
KE 610 POKE 204,0:JY=15-PEEK(5
6320)AND15:JB=16-PEEK(5
6320)AND16
GX 620 IF JB=0 THEN GOSUB 820:
U=TE:GOTO 550
PB 630 IF JY=8 THEN JY=3
CE 640 IF JY<1 ORJY>4 THEN 610
CJ 650 GOSUB 820:ON JY GOTO 66
0,680,700,720
QS 660 IF QX=UP THEN 610
HQ 670 QX=QX-3:TE=TE-3:GOTO 74
0
PB 680 IFQX=DN THEN 610
PR 690 QX=QX+3:TE=TE+3:GOTO 74
0
PK 700 IF QY=RM THEN 610
FD 710 QY=QY+3:TE=TE+1:GOTO 74
0
KP 720 IF QY=LM THEN 610
FR 730 QY=QY-3:TE=TE-1
CD 740 GOSUB 420:GOTO 610
DK 750 IF MV=1 THEN MV$="{MOVE}"
XC 760 GOSUB 830:PRINT"{RVS}
{BLU}}{7 SPACES}YOU SOLV
ED IT IN"MV;MV$:S1=30:S
2=20:S3=-1
SF 770 GOSUB 840:GOTO 800
QS 780 GOSUB 830:PRINT"{RVS}
{BLU}}{5 SPACES}NO MOVES
AVAILABLE...GAME OVER"
:S1=17:S2=35:S3=1

```

```

JE 790 GOSUB 840
BA 800 PRINT "[DOWN]{RVS}
      {5 SPACES}PRESS FIREBUT
      TON TO PLAY AGAIN{HOME}
      "
CP 810 WAIT 56320,16,16:FOR I=
      54272 TO 54287:POKE I,0
      :NEXT:RUN
XX 820 POKE 204,1:POKE 207,0:R
      ETURN
DK 830 GOSUB 440:PRINT"[RVS]
      [7] {HOME}{19 DOWN}":RE
      TURN
CD 840 POKE 54296,15:POKE 5429
      5,0:POKE 54273,40:POKE
      {SPACE}54278,240:POKE 5
      4277,0
AE 850 POKE 54276,17:FOR A=S1
      {SPACE}TO S2 STEP S3:FO
      R B=A TO 60-A
JD 860 POKE 54273,B:NEXT B,A:P
      OKE 54273,3:POKE 54276,
      0:RETURN
GE 870 DATA 2,4,5,10,1,3,10,10
      ,2,5,6,10,1,7,10,10,2,4
      ,8,6,3,9,10,10,4,5,8,10
      ,7,9
GS 880 DATA 10,10,8,5,6,10,0,0
      ,0,0,0,0,0,0,0,0,0,0,
      0,0,1,240,0,3,248,0,7,2
      52,0
QG 890 DATA 7,252,0,7,252,0,3,
      248,0,1,240,0,0,0,0,0,0
      ,0,0,0,0,0,0,0,0,0,0,
      0,0
MB 900 DATA 0,0,0,0,0,0,0,0,0,
      190

```

**Program 2: Match Blox—Line Substitutions For The Plus/4 and 16**

```

AJ 10 DIMJ(15):J(1)=1:J(3)=8:J
      (5)=2:J(7)=4
BB 100 COLOR4,7,4:COLOR0,7,4:P
      RINT CHR$(8)"[CLR]
      {2 DOWN}[7]"SPC(14)"MAT
      CH BLOX{2 DOWN}
HX 290 S=JOY(1):IF S=7 THEN MT
      =MT-1:IF MT<1 THEN MT=1
PB 300 IF S=3 THEN MT=MT+1:IF
      {SPACE}MT>5 THEN MT=5
CX 320 POKE 3977,MT+176:POKE 2
      953,15:GOTO290
HK 350 MM=3111+(40*I):POKE MM,
      160:POKE MM-1024,70:NEX
      T:POKE 4071,160:POKE 30
      47,70
SS 360 PRINT"[RVS]{39 SPACES}
      {HOME}":COLOR0,15
GX 400 POKE 1339,CL(GK,AI):PRI
      NT T$;:NEXT:E=E+3:F=F+3
      :PRINT"[DOWN]":NEXT
PS 440 POKE 2036,QY:POKE 2035,
      QX:POKE2037,0:SYS65520:
      PRINT"[BLK][+]" :RETURN
AC 610 JY=J(JOY(1)AND15):JB=1-
      (JOY(1)AND128)/128
XM 810 IF (JOY(1)AND128)<>128
      {SPACE}THEN 810
EC 815 RUN
DD 830 GOSUB 440:PRINT"[RVS]
      {LEFT}[7] {HOME}
      {19 DOWN}":RETURN

```

# Fill-64

See instructions in article on page 76 before typing in.

## Program 1: Fill-64

```

83FF:FF 4C 24 88 4C 92 87 4C 2F
8407:78 88 4C 93 88 4C 49 8F C8
840F:4C 86 84 4C 47 88 4C 65 8F
8417:88 4C FB 88 4C FF 88 4C 3F
841F:C9 88 4C CF 88 4C E1 88 77
8427:4C F3 88 4C F7 88 4C F0 94
842F:88 4C F1 88 4C F2 88 A9 3F
8437:8C 8D 04 03 A9 84 8D 05 1A
843F:03 A9 51 8D 06 03 A9 85 4C
8447:8D 07 03 A9 ED 8D 08 03 8C
844F:A9 85 8D 09 03 A9 00 8D 1D
8457:DF 9F 8D DE 9F 8D 17 9F D8
845F:8D 05 40 A9 00 8D 1F 9F 27
8467:A9 40 8D 20 9F A9 01 8D 3C
846F:00 40 8D 04 40 A9 06 8D BC
8477:01 40 A9 00 8D 02 40 A9 E4
847F:07 8D 03 40 4C A9 8E 20 1A
8487:F5 96 4C 61 97 A6 7A A0 BD
848F:04 84 0F BD 00 02 10 07 A8
8497:C9 FF F0 3E E8 D0 F4 C9 C5
849F:20 F0 37 85 08 C9 22 F0 D0
84A7:56 24 0F 70 2D C9 3F D0 AD
84AF:04 A9 99 D0 25 C9 30 90 A6
84B7:04 C9 3C 90 1D 84 71 A0 44
84BF:00 84 0B 88 86 7A CA C8 50
84C7:E8 BD 00 02 38 F9 9E A0 5C
84CF:F0 F5 C9 80 D0 30 05 A0 6C
84D7:F4 71 E8 C8 99 FB 01 B9 B1
84DF:FB 01 F0 38 38 E9 3A F0 97
84E7:04 C9 49 D0 02 85 0F 38 18
84EF:E9 55 D0 9F 85 08 BD 00 1F
84F7:02 F0 DF C5 08 F0 DB C8 1B
84FF:99 FB 01 E8 D0 F0 A6 7A 95
8507:E6 0B C8 B9 9D A0 10 FA 87
850F:F9 9E A0 D0 B4 F0 0F BD 05
8517:00 02 10 BC 99 FD 01 C6 FD
851F:7B A9 FF 85 7A 60 A0 00 41
8527:B9 87 85 D0 02 E8 C8 BD B1
852F:00 02 38 F9 87 85 F0 F5 8B
8537:C9 80 D0 04 05 0B D0 98 30
853F:A6 7A E6 0B C8 B9 86 85 89
8547:10 FA B9 87 85 D0 E0 4C 46
854F:16 85 10 0F C9 FF F0 0B F4
8557:24 0F 30 07 C9 CC B0 06 97
855F:4C 24 A7 4C F3 A6 38 E9 E7
8567:CB AA 84 49 A0 FF CA F0 B3
856F:09 C8 B9 87 85 10 FA 4C 8F
8577:2D 85 C8 B9 87 85 30 05 07
857F:20 47 AB D0 F5 4C EF A6 56
8587:53 45 54 43 4F 4C 4F D2 69
858F:46 49 4C CC 53 57 49 54 45
8597:43 C8 46 4C 49 D0 4C 4F 79
859F:57 52 45 D3 43 4C 45 41 E7
85A7:D2 52 45 43 4F 52 C4 50 2B
85AF:4C 41 D9 44 50 55 D4 44 76
85B7:47 45 D4 52 45 57 49 4E DF
85BF:C4 45 52 41 53 C5 4D 45 6E
85C7:4D 4F 52 D9 43 50 55 D4 10
85CF:43 47 45 D4 54 55 52 42 23
85D7:4F 50 55 D4 54 55 52 42 75
85DF:4F 47 45 D4 52 45 4C 4F E9
85E7:43 41 54 C5 00 00 20 73 7F
85EF:00 20 F6 85 4C AE A7 C9 70
85F7:CC 90 04 C9 DE 90 06 20 10
85FF:79 00 4C ED A7 38 E9 CC EE
8607:0A AA BD 15 86 48 BD 14 B1
860F:86 48 4C 73 00 FF 83 02 3B
8617:84 05 84 08 84 0B 84 0E 20
861F:84 11 84 14 84 17 84 1A 28
8627:84 1D 84 20 84 23 84 26 30
862F:84 29 84 2C 84 2F 84 32 38
8637:84 AD 00 9D D0 01 60 C9 E0
863F:03 10 0C AD 01 9D 2D DF E6
8647:9F D0 03 4C B4 86 60 A0 9E

```

```

864F:00 20 7E 86 A0 09 20 94 9A
8657:86 20 89 8D 20 B0 8C A0 37
865F:03 20 7E 86 A0 06 20 94 20
8667:86 20 89 8D 20 BC 8C A9 80
866F:00 8D DF 9F AD 0B 9F 30 DE
8677:3C A9 80 8D DF 9F 60 20 54
867F:AA 86 AD 08 9F 8D 1C 9F C4
8687:AD 09 9F 8D 1D 9F AD 0A 47
868F:9F 8D 1E 9F 60 20 AA 86 EC
8697:AD 1C 9F 8D 02 9F AD 1D 56
869F:9F 8D 03 9F AD 1E 9F 8D EC
86A7:04 9F 60 20 E4 8B 20 0A 4C
86AF:8C 20 56 8C 60 AD 00 9D F5
86B7:C9 02 10 24 AD 02 9D 0D 2C
86BF:04 9D 0D 05 9D 0D 07 9D F4
86C7:D0 EA AD 03 9D 38 E9 A0 20
86CF:B0 E2 AD 06 9D 38 E9 C8 6E
86D7:B0 DA 20 04 88 4C 29 87 87
86DF:C9 03 10 39 20 51 89 20 A1
86E7:04 88 AD 00 9D C9 02 10 F6
86EF:01 60 F0 21 AD 02 9D CD 44
86F7:04 9D D0 14 AD 03 9D CD 4C
86FF:05 9D D0 0C AD 06 9D 8D 20
8707:04 9D AD 07 9D 8D 05 9D 70
870F:A9 02 8D 00 9D A9 00 8D 46
8717:06 9D 4C 29 87 20 51 89 95
871F:AD 00 9D C9 03 90 18 20 FF
8727:04 88 AD 17 9F F0 03 20 68
872F:3F 87 A9 00 8D 20 98 A9 BC
8737:9D 8D 21 98 20 30 90 60 69
873F:AD 00 9D 0A 69 06 6D 18 CF
8747:9F A9 00 6D 19 9F C9 80 C2
874F:90 06 20 49 8F 4C 35 A4 7D
8757:A9 02 8D 20 D0 AD 18 9F 7C
875F:85 FB AD 19 9F 85 FC AD 32
8767:00 9D 0A 69 02 A8 18 65 FD
876F:FB 8D 18 9F A9 00 65 FC F1
8777:8D 19 9F C8 98 18 65 FC FF
877F:8D 1F 9F A9 00 65 FC 8D C8
8787:20 9F B9 00 9D 91 FB 88 79
878F:10 F8 60 20 8A AD 20 9B D9
8797:BC A5 65 8D 00 9D 20 FD A8
879F:AE 20 8A AD 20 9B BC A5 C8
87A7:65 8D 01 9D A9 00 8D 1B 4A
87AF:9F 8D 1A 9F 20 FD AE 20 A5
87B7:8A AD 20 9B BC 20 CE 87 C0
87BF:EE 1A 9F AD 1A 9F 4A CD 4D
87C7:00 9D 90 E8 4C 38 86 AC DB
87CF:1B 9F A9 00 99 02 9D A5 3F
87D7:65 99 03 9D A5 64 99 04 30
87DF:9D 10 1A A9 FF 99 02 9D A7
87E7:B9 03 9D 49 FF 18 69 01 11
87EF:99 03 9D B9 04 9D 49 FF 05
87E7:69 00 99 04 9D 98 18 69 18
87FF:03 8D 1B 9F 60 AD 00 9D A8
8807:0A 8D 1B 9F A2 01 A0 00 38
880F:BD 02 9D 99 02 9D E8 E8 0E
8817:E8 C8 CC 1B 9F 90 F1 A9 E6
881F:00 99 02 9D 60 A9 00 8D E7
8827:1B 9F 20 8A AD 20 9B BC 3C
882F:A5 65 AE 1B 9F EE 1B 9F 82
8837:9D 00 40 E0 04 10 06 20 B9
883F:FD AE 4C 29 88 4C 78 8F 0D
8847:A9 80 8D 17 9F A9 02 8D A5
884F:20 D0 A9 05 8D 18 9F A9 DF
8857:40 8D 19 9F 60 A9 00 8D 40
885F:17 9F 20 78 8F 60 20 5C 0A
8867:88 A9 05 8D 20 98 A9 40 97
886F:8D 21 98 20 51 88 4C 30 1A
8877:90 AD 17 9F 10 13 A9 80 B9
887F:20 AE 88 AD 18 9F 18 69 11
8887:01 8D 18 9F 90 03 EE 19 01
888F:9F 4C E3 8F AD 17 9F 10 12
8897:13 A9 40 20 AE 88 AD 18 B1
889F:9F 18 69 01 8D 18 9F 90 60
88A7:03 EE 19 9F 4C 0E 90 AC 7B
88AF:18 9F 84 FB AC 19 9F 84 92
88B7:FC A0 00 91 FB 98 C8 91 ED
88BF:FB EE 1F 9F D0 03 EE 20 F8
88C7:9F 60 20 5C 88 4C 51 88 2B
88CF:A9 00 8D 05 40 A9 00 8D ED
88D7:1F 9F A9 40 8D 20 9F 4C 12

```

88DF:C9	88	A9	00	38	ED	1F	9F	84	8B6F:20	A0	8B	20	30	8C	20	56	7C	8DFF:0C	A9	00	8D	02	9F	8D	03	11
88E7:AA	A9	80	ED	20	9F	4C	CD	8D	8B77:8C	20	D1	8B	20	89	8D	20	32	8E07:9F	8D	04	9F	60	A9	FF	8D	09
88EF:BD	60	60	60	A9	01	D0	0C	09	8B7F:B0	8C	20	A0	8B	20	0A	8C	9D	8E0F:02	9F	AD	0B	9F	CD	08	9F	5F
88F7:A9	01	D0	2A	A9	08	D0	04	ED	8B87:20	56	8C	20	F7	8B	20	89	8F	8E17:D0	05	A9	00	8D	02	9F	A9	70
88FF:A9	08	D0	22	AA	A0	01	20	1E	8B8F:8A	20	BC	8C	20	E4	8B	20	A1	8E1F:00	8D	03	9F	8D	04	9F	8D	43
8907:BA	FF	20	43	89	A9	00	85	28	8B97:0A	8C	20	56	8C	20	E4	8D	7C	8E27:10	9F	CE	10	9F	0E	0C	9F	FB
890F:FB	A9	40	85	FC	A9	FB	AE	20	8B9F:60	A9	00	8D	02	9F	8D	04	D7	8E2F:2E	0D	9F	2E	0E	9F	2E	0F	D7
8917:1F	9F	AC	20	2F	D8	FF	68		8BA7:9F	AD	00	9F	8D	03	9F	60	0C	8E37:9F	10	EF	AD	0A	9F	10	03	F2
891F:90	03	4C	F9	E0	60	AA	A0	E2	8BAF:A9	00	8D	02	9F	8D	04	9F	48	8E3F:4C	4D	8E	EE	10	9F	0E	09	BA
8927:01	20	BA	FF	20	43	89	A9	E4	8BB7:AD	01	9F	8D	03	9F	60	B9	C3	8E47:9F	2E	0A	9F	10	F5	4E	0F	FE
892F:00	A2	00	A0	40	20	D5	FF	23	8BBF:02	9D	8D	02	9F	B9	03	9D	98	8E4F:9F	6E	0E	9F	6E	0D	9F	6E	E8
8937:90	03	4C	D1	E1	8E	1F	9F	21	8BC7:8D	03	9F	B9	04	9D	8D	04	AB	8E57:0C	9F	4E	0A	9F	6E	09	9F	35
893F:8C	20	9F	60	A9	00	20	BD	E5	8BCF:9F	60	B9	05	9D	8D	02	9F	1D	8E5F:A2	10	AD	0E	9F	38	ED	09	2B
8947:FF	20	06	E2	20	57	E2	4C	C1	8BD7:B9	06	9D	8D	03	9F	B9	07	EA	8E67:9F	8D	16	9F	AD	0F	9F	ED	4B
894F:BD	FF	A9	00	8D	01	9F	20	46	8BDF:9D	8D	04	9F	60	B9	08	3B	8E6F:0A	9F	90	0A	8D	0F	9F	AD	C1	
8957:58	8A	A9	A0	8D	00	9F	20	44	8BE7:8D	02	9F	B9	09	9D	8D	03	B2	8E77:16	9F	8D	0E	9F	38	2E	03	57
895F:72	89	A9	C8	8D	01	9F	20	9F	8BEF:9F	B9	0A	9D	8D	04	9F	60	7C	8E7F:9F	2E	04	9F	0E	0C	9F	2E	80
8967:58	8A	A9	00	8D	00	9F	20	4A	8BF7:B9	0B	9D	8D	02	9F	B9	0C	49	8E87:0D	9F	2E	0E	9F	2E	0F	9F	2D
896F:72	89	60	20	71	8D	A0	00	2F	8BFF:9D	8D	03	9F	B9	0D	9D	8D	6E	8E8F:CA	D0	CF	AD	10	9F	30	03	7D
8977:8C	00	9E	AD	01	9D	8D	01	1A	8C07:04	9F	60	B9	02	9D	8D	05	58	9E97:4C	EC	8D	EE	10	9F	10	09	DE
897F:9E	20	A0	8B	20	0A	8C	20	19	8C0F:9F	B9	03	9D	8D	06	9F	B9	1E	8E9F:4E	04	9F	6E	03	9F	4C	9A	89
8987:56	8C	AD	0A	9F	0D	09	9F	22	8C17:04	9D	8D	07	9F	60	B9	05	E2	8EA7:8E	60	78	A9	C6	8D	14	03	65
898F:F0	4B	AD	08	9F	8D	16	9F	23	8C1F:9D	8D	05	9F	B9	06	9D	8D	B3	8EAF:A9	8E	8D	15	03	58	A9	00	15
8997:20	30	8C	20	56	8C	AD	0A	A4	8C27:06	9F	B9	07	9D	8D	07	9F	A3	8EB7:8D	DD	9F	20	78	8F	20	5E	A9
899F:9F	0D	09	9F	F0	37	AD	08	A8	8C2F:60	B9	08	9D	8D	05	9F	B9	3B	8EBF:8F	A9	A0	8D	ED	9F	60	48	F2
89A7:9F	CD	16	9F	F0	2F	20	6F	AE	8C37:09	9D	8D	06	9F	B9	0A	E3	8EC7:A5	C5	C9	03	30	0E	C9	07	E6	
89AF:8B	AD	00	9E	0A	6D	00	9E	82	8C3F:8D	07	9F	60	B9	0B	9D	8D	9D	8ECF:10	0A	AD	DD	9F	C9	00	F0	20
89B7:0A	AA	AD	02	9F	9D	05	9E	6C	8C47:05	9F	B9	0C	9D	8D	06	9F	91	8ED7:0C	4C	E0	8E	A9	00	8D	DD	59
89BF:AD	03	9F	9D	06	9E	AD	04	42	8C4F:B9	0D	9D	8D	07	9F	60	AD	3A	8EDF:9F	68	4C	31	EA	A9	3F	8D	8D
89C7:9F	0D	07	9E	A9	00	9D	02	67	8C57:05	9F	49	FF	8D	05	9F	CD	91	8EE7:02	DD	A5	C5	C9	04	D0	06	94
89CF:9E	9D	04	9E	AD	00	9F	9D	4E	8C5F:02	9F	D0	17	8D	08	9F	AD	66	8EEF:20	49	8F	4C	3B	8F	C9	05	D6
89D7:03	9E	EE	00	9E	AD	00	9F	3D	8C67:03	9F	18	6D	06	9F	8D	09	96	8EF7:D0	06	20	5E	8F	4C	3B	8F	9C
89DF:D0	08	B9	08	9D	D0	46	4C	1E	8C6F:9F	AD	04	9F	6D	07	9F	8D	92	8EFF:C9	06	D0	06	20	73	8F	4C	38
89E7:FC	89	B9	08	9D	D0	0E	B9	99	8C77:0A	9F	60	AD	03	9F	38	ED	59	8F07:3B	8F	AD	00	DD	C9	97	F0	93
89EF:0A	9D	D0	39	AD	00	9F	38	02	8C7F:06	9F	8D	09	9F	AD	04	9F	21	8F0F:2B	8A	48	98	48	A5	FB	48	12
89F7:F9	09	9D	90	30	AD	00	9E	DD	8C87:ED	07	9F	90	0A	8D	0A	9F	90	8F17:A5	FC	48	AD	ED	9F	48	AD	58
89FF:0A	6D	00	9E	0A	AA	B9	0B	D6	8C8F:AD	02	9F	8D	08	9F	60	AD	F9	8F1F:00	DD	C9	94	F0	1F	A9	A0	30
8A07:9D	9D	05	9E	B9	0C	9D	9D	B3	8C97:06	9F	38	ED	03	9F	8D	09	3C	8F27:8D	ED	9F	20	DF	96	68	8D	36
8A0F:06	9E	B9	0D	9D	9D	07	9E	9F	8C9F:9F	AD	07	9F	ED	04	9F	8D	1B	8F2F:ED	9F	68	85	FC	68	85	FB	23
8A17:B9	08	9D	9D	02	9E	B9	09	E6	8CA7:0A	9F	AD	05	9F	8D	08	9F	96	8F37:68	A8	68	AA	A9	01	8D	DD	B6
8A1F:9D	9D	03	9E	B9	0A	9D	9D	83	8CAF:60	A2	04	BD	0B	9F	9D	11	21	8F3F:9F	68	4C	31	EA	A9	E0	4C	F0
8A27:04	9E	EE	00	9E	AD	00	9D	0D	8CB7:9F	CA	10	F7	60	AD	11	9F	50	8F47:27	8F	A9	97	8D	00	DD	A9	5E
8A2F:0A	6D	00	9D	0A	38	E9	06	8D	8CBF:49	FF	8D	11	9F	CD	0B	9F	2A	8F4F:C8	8D	16	D0	A9	1B	8D	11	EB
8A37:8D	16	9F	98	38	ED	16	9F	5B	8CC7:D0	26	AD	0C	9F	18	6D	12	93	8F57:D0	A9	15	8D	18	D0	60	A9	33
8A3F:B0	08	98	18	69	06	A8	4C	44	8CCF:9F	8D	0C	9F	AD	0D	9F	6D	E5	8F5F:95	8D	00	DD	A9	D8	8D	16	6C
8A47:80	89	AD	00	9E	D0	06	8D	86	8CD7:13	9F	8D	0D	9F	AD	0E	9F	54	8F67:D0	A9	3B	8D	11	D0	A9	08	C0
8A4F:00	9D	68	68	60	20	5C	8D	29	8CDF:6D	14	9F	8D	0E	9F	AD	0F	DA	8F6F:8D	18	D0	60	A9	94	4C	08	14
8A57:60	20	71	8D	A0	00	8C	00	C9	8CE7:9F	6D	15	9F	8D	0F	9F	60	11	8F77:8F	A9	02	AE	17	9F	E0	80	6D
8A5F:9E	AD	01	9D	8D	01	9E	20	F6	8CEF:AD	0C	9F	38	ED	12	9F	AD	FE	8F7F:F0	03	AD	00	40	8D	20	D0	D6
8A67:AF	8B	20	1D	8C	20	56	8C	2B	8CF7:0D	9F	ED	13	9F	AD	0E	9F	DD	8F87:AD	01	40	8D	21	D0	A2	83	B3
8A6F:AD	0A	9F	0D	09	9F	F0	4B	96	8CFF:ED	14	9F	AD	0F	9F	ED	15	CB	8F8F:A9	8E	8D	CD	9F	A9	80	85	67
8A77:AD	08	9F	8D	16	9F	20	43	E4	8D07:9F	90	26	AD	0C	9F	38	ED	F2	8F97:FC	A9	00	85	FB	AD	02	40	D2
8A7F:8C	20	56	8C	AD	0A	9F	0D	58	8D0F:12	9F	8D	0C	9F	AD	0D	9F	FA	8F9F:0A	0A	0A	0D	03	40	8D	AA	
8A87:09	9F	F0	37	AD	08	9F	CD	35	8D17:ED	13	9F	8D	0D	9F	AD	0E	0B	8FA7:D9	9F	20	C6	9E	A2	C3	A9	7C
8A8F:16	9F	F0	2F	20	3E	8B	AD	67	8D1F:9F	ED	14	9F	8D	0E	9F	AD	93	8FAF:E8	8D	DC	9F	A9	C0	85	FC	94
8A97:00	9E	0A	6D	00	9E	0A	AA	A5	8D27:0F	9F	ED	15	9F	8D	0F	9F	B1	8FB7:A9	00	85	FB	AD	D9	9F	20	50
8A9F:AD	02	9F	0D	02	9E	AD	03	C2	8D2F:60	AD	12	9F	38	ED	0C	9F	53	8FBF:C6	96	A2	DB	AD	E8	8D	DC	E2
8AA7:9F	0D	03	9E	AD	04	9F	9D	98	8D37:8D	0C	9F	AD	13	9F	ED	0D	EA	8FC7:9F	A9	D8	85	FC	A9	00	85	A8
8AAF:04	9E	A9	00	9D	05	9E	9D	7F	8D3F:9F	8D	0D	9F	AD	14	9F	ED	14	8FCF:FB	AD	04	40	8D	86	02	20	87
8AB7:07	9E	AD	01	9F	9D	06	9E	DB	8D47:0E	9F	8D	0E	9F	AD	15	9F	61	8FD7:C6	96	60	20	5E	8F	A9	A0	33
8ABF:EE	00	9E	AD	01	9F	D0	08	2B	8D4F:ED	0F	9F	8D	0F	9F	AD	11	55	8FDF:8D	ED	9F	60	AD	00	DD	29	8D
8AC7:B9	0B	9D	D0	46	4C	E2	8A	F0	8D57:9F	8D	0B	9F	60													

908F:CD	9F	18	69	01	8D	CD	9F	92	931F:CA	F0	19	29	F3	0D	D0	9F	B2	95AF:08	C9	04	F0	0D	8D	E9	9F	F2	
9097:90	BE	EE	CC	9F	4C	57	90	C8	9327:4C	5F	93	AE	E9	9F	CA	F0	FD	95B7:60	A9	03	8D	E9	9F	CE	E8	0B	
909F:C9	40	30	06	20	0E	90	4C	C2	932F:1A	CA	F0	1F	29	03	0D	D3	69	95BF:9F	60	A9	00	8D	E9	9F	EE	4A	
90A7:8E	90	C9	01	D0	03	4C	35	DD	9337:9F	4C	5F	93	AE	E9	9F	E0	A3	95C7:E8	9F	60	AD	FE	9F	29	07	06	
90AF:95	C9	02	D0	03	4C	73	93	1F	933F:02	F0	18	29	C3	0D	CE	9F	C8	95CF:C9	07	F0	0B	EE	EC	9F	90	6B	
90B7:AD	CD	9F	18	6D	E7	9F	90	73	9347:4C	5F	93	29	3F	0D	D1	9F	E2	95D7:17	EE	FE	9F	4C	EF	95	AD	BC	
90BF:03	EE	CC	9F	18	69	02	8D	A9	934F:4C	5F	93	29	0F	0D	D2	9F	6B	95DF:EC	9F	18	69	39	8D	EC	9F	7C	
90C7:CD	9F	90	03	EE	CC	9F	A5	89	9357:4C	5F	93	29	CF	0D	CF	9F	73	95E7:AD	EB	9F	69	01	8D	EB	9F	25	
90CF:FD	18	69	01	85	FD	90	02	7A	935F:A0	00	91	FD	60	78	A9	34	55	95EF:EE	FE	9F	60	AC	E1	9F	B1	2A	
90D7:E6	FE	B1	FD	8D	E6	9F	8C	16	9367:85	01	A0	00	B1	FD	A0	37	A3	95F7:FB	8D	FF	9F	C8	B1	9F	8D	11	
90DF:E4	9F	88	88	B1	FD	38	ED	D8	936F:84	01	58	60	AD	CD	9F	85	93	95FF:FE	9F	C8	B1	FB	8D	FD	9F	78	
90E7:E6	9F	B0	08	B1	FD	8D	E6	8C	9377:FB	18	69	06	8D	CD	9F	AD	C0	9607:A2	01	8E	F5	9F	38	ED	FF	B0	
90EF:9F	8C	E4	9F	88	88	D0	EC	8F	937F:CC	9F	85	FC	69	00	8D	CC	A8	960F:9F	B0	0B	A2	FF	8E	F5	9F	89	
90F7:AC	E7	9F	B1	FD	8D	E5	9F	0A	9387:9F	AD	DF	9F	10	08	AD	DE	BA	9617:AD	FF	9F	38	F1	FB	8D	F7	25	
90FF:8C	E3	9F	88	88	B1	FD	38	1C	938F:9F	10	03	4C	20	90	A9	02	B1	961F:9F	C8	B1	FB	8D	FC	9F	38	1C	
9107:ED	E5	9F	08	08	B1	FD	8D	2C	9397:8D	E1	9F	2D	F3	95	A9	01	3E	9627:ED	FE	9F	8D	F6	9F	4A	8D	30	
910F:E5	9F	8C	E3	9F	88	88	D0	DD	939F:8D	CB	9F	AD	FE	9F	38	ED	24	962F:F1	9F	88	8C	E1	9F	60	AC	12	
9117:EC	AC	E4	9F	8C	E2	9F	A5	47	93A7:FC	9F	90	08	8D	F6	9F	A9	F8	9637:E0	9F	B1	FB	8D	FB	9F	88	D6	
911F:FD	38	E9	01	85	FD	B0	02	24	93AF:FF	8D	CB	9F	AD	F5	9F	10	42	963F:B1	FB	8D	FA	9F	88	B1	FB	24	
9127:C6	FE	A2	02	AC	E2	9F	B1	C3	93B7:27	AC	FC	9F	AD	FE	9F	8D	6D	9647:A2	01	8E	F2	9F	38	ED	FB	BC	
912F:FD	EE	E2	9F	AC	E1	9F	91	21	93BF:FC	9F	8C	FE	9F	AC	FD	9F	1A	964F:9F	B0	0B	A2	FF	8E	F2	9F	C3	
9137:FB	EE	E1	9F	CA	D0	ED	CD	8D	93C7:AD	FF	9F	8D	FD	9F	8C	FF	1A	9657:AD	FB	9F	38	F1	FB	8D	F4	61	
913F:E5	9F	F0	14	AD	E2	9F	38	0D	93CF:9F	AC	CB	9F	F0	05	C8	C8	5A	965F:9F	88	B1	FB	8D	FB	9F	38	3C	
9147:E9	04	8D	E2	9F	D0	DB	AD	E5	93D7:4C	DC	93	88	88	8C	CB	9F	05	9667:ED	FA	9F	8D	F3	9F	4A	8D	57	
914F:E7	9F	8D	E2	9F	4C	29	91	40	93DF:20	C5	97	AD	F6	9F	CD	F7	20	966F:EF	9F	C8	8C	E0	9F	60	AD	52	
9157:AC	E1	9F	A9	FF	91	FB	AC	C2	93E7:9F	B0	47	AD	F7	9F	4A	8D	2F	9677:DA	9F	29	03	8D	F7	9F	0A	64	
915F:E4	9F	8C	E2	9F	A2	02	AC	D4	93EF:F1	9F	A9	00	8D	F0	9F	AE	4B	967F:0A	0D	D7	9F	8D	D5	9F	0A	FE	
9167:E2	9F	B1	FD	EE	E2	9F	AC	E8	93F7:F7	9F	E0	00	D0	03	4C	4D	97	9687:0A	0D	D7	9F	8D	D5	9F	0A	FE	
916F:E0	9F	91	FB	CE	E0	9F	CA	E0	93FF:90	CA	20	7F	94	AD	F1	9F	FC	968F:0A	0D	D7	9F	8D	D4	9F	0A	03	
9177:D0	ED	CD	E5	9F	F0	10	AD	25	9407:18	6D	F6	9F	8D	F1	9F	90	74	9697:0A	8D	D3	9F	0A	8D	D4	8D	08	
917F:E7	9F	CD	E2	9F	F0	DE	A9	0B	940F:03	EE	F0	9F	AD	F1	9F	38	3A	969F:9F	0A	0A	8D	D1	9F	4A	4A	25	
9187:02	8D	E2	9F	4C	64	91	A0	1D	9417:ED	F7	9F	A8	AD	F0	9F	E9	0E	96A7:8D	CF	9F	4A	4A	8D	D0	9F	F1	
918F:00	84	FB	A0	34	8C	E1	9F	94	941F:00	90	09	8C	F1	9F	8D	F0	70	96AF:0D	CF	9F	8D	CE	9F	60	A9	83	
9197:A0	FB	8C	E0	9F	A0	03	84	B3	9427:9F	20	DB	94	20	B9	94	4C	4A	96B7:00	8D	DF	9F	4C	4D	90	A9	A0	
919F:FC	20	F3	95	AD	FE	9F	38	02	942F:F9	93	AD	F6	9F	4A	8D	F1	92	96BF:80	8D	DF	9F	4C	4D	90	A0	DF	
91A7:E9	C8	90	03	4C	4D	90	AD	9A	9437:9F	A9	00	8D	F0	9F	AE	F6	CD	96C7:00	91	FB	C8	D0	FB	E6	FC	A6	
91AF:FE	9F	CD	FC	9F	F0	EA	20	7A	943F:9F	E0	00	D0	03	4C	4D	90	F1	96CF:E4	FC	D0	F5	CC	DC	9F	FC	32	
91B7:36	96	AD	FA	9F	CD	F8	9F	C6	9447:CA	AD	FF	9F	C9	A0	F0	03	F0	96D7:06	91	FB	C8	4C	D3	96	60	B7	
91BF:F0	F5	20	C5	97	AD	FF	9F	4C	944F:20	7F	94	AD	F1	9F	18	6D	81	96DF:AD	ED	9F	C9	A0	F0	0F	C9	A0	
91C7:4A	4A	8D	DB	9F	AD	FB	9F	5D	9457:F7	9F	8D	F1	9F	90	03	EE	69	96E7:E0	F0	73	20	5E	8F	A9	A0	57	
91CF:4A	4A	38	ED	DB	9F	B0	03	52	945F:F0	9F	AD	F1	9F	38	ED	F6	6E	96EF:8D	ED	9F	4C	F5	96	A9	A0	75	
91D7:4C	BE	96	8D	EB	9F	AD	FB	99	9467:9F	AB	AD	F0	9F	E9	00	90	84	96F7:A0	00	99	00	A0	99	00	A1	B5	
91DF:9F	29	03	8D	E9	9F	A9	00	77	946F:09	8C	F1	9F	8D	F0	9F	20	08	96FF:99	00	A2	99	00	A3	99	00	A9	
91E7:8D	F0	9F	8D	EE	9F	20	8A	9B	9477:B9	94	20	DB	94	4C	4D	94	4F	9707:A4	99	00	A5	99	00	A6	99	FC	
91EF:92	AD	F1	9F	18	6D	F7	9F	06	947F:AD	EC	9F	85	FD	AD	EB	9F	25	970F:00	A7	99	00	A8	99	00	A9	B0	
91F7:8D	F1	9F	90	03	EE	F0	9F	B0	9487:85	FE	20	64	93	AC	EA	9F	42	9717:99	00	AA	99	00	AB	99	00	E3	
91FF:38	ED	F6	9F	AA	AD	F0	9F	21	948F:F0	10	88	F0	15	88	F0	1A	1C	971F:AC	99	00	AD	99	00	AE	99	A9	
9207:E9	00	90	0F	8D	F0	9F	8E	22	9497:29	FC	0D	D7	9F	A0	00	91	C4	9727:00	AF	99	00	B0	99	00	B1	13	
920F:F1	9F	20	68	95	AD	F1	9F	86	949F:FD	60	29	3F	0D	D1	9F	4C	34	972F:99	00	B2	99	00	B3	99	00	1D	
9217:4C	FF	91	AD	EF	9F	18	6D	0B	94A7:9C	94	29	CF	0D	CF	9F	4C	99	9737:B4	99	00	B5	99	00	B6	99	56	
921F:F4	9F	8D	EF	9F	90	03	EE	8B	94AF:9C	94	29	F3	0D	D0	9F	4C	E7	973F:00	B7	99	00	B8	99	00	B9	75	
9227:EE	9F	38	ED	F3	9F	AA	AD	B2	94B7:9C	94	EE	FF	9F	EE	EA	9F	60	9747:99	00	BA	99	00	BB	99	00	56	
922F:EE	9F	E9	00	90	0F	8D	EE	BB	94BF:AD	EA	9F	C9	04	F0	01	60	51	974F:BC	99	00	BD	99	00	BE	99	03	
9237:9F	8E	EF	9F	20	A7	95	AD	40	94C7:AD	EC	9F	18	69	08	8D	EC	EB	9757:00	BF	88	D0	9D	60	A9	00	56	
923F:EF	9F	4C	29	92	AD	FE	9F	49	94CF:9F	EC	90	03	EE	EB	9F	A9	00	6D	975F:A0	00	99	00	E0	99	00	E1	61
9247:CA	C7	D0	03	4C	B6	96	20	18	94D7:8D	EA	9F	60	AD	CB	9F	30	88	9767:99	00	E2	99	00	E3	99	00	1C	
924F:CA	95	AD	FE	9F	CD	FC	9F	B2	94DF:29	AD	FE	9F	29	07	C9	07	E2	976F:E4	99	00	E5	99	00	E6	99	0A	
9257:D0	18	20	F3	95	AD	FC	9F	2B	94E7:F0	0B	EE	EC	9F	D0	17	EE	56	9777:00	E7	99	00	E8	99	00	E9	6B	
925F:38	ED	FE	9F	F0	09	90	07	C9	94EF:EB	9F	4C	05	95	AD	EC	9F	AD	977F:99	00	EA	99	00	EB	99	00	55	
9267:AD	FD	9F	C9	FF	D0	03	4C	09	94F7:18	69	39	8D	EC	9F	AD	EB	B4	9787:EC	99	00	ED	99	00	EE	99	B6	
926F:B6	96	AD	FE	9F	CD	F8	9F	01	94FF:9F	69	01	8D	EB	9F	EE	FE	07	978F:00	EF	99	00	F0	99	00	F1	CD	
9277:D0	0E	20	36	96	AD	F8	9F	EC	9507:9F	60	AD	FE	9F	29	07	C9	39	9797:99	00	F2	99	00	F3	99	00	8E	
927F:38	ED	FA	9F	F0	E9	90	E7	CD	950F:00	F0	0E	AD	EC	9F	D0	03	9D	979F:F4	99	00	F5	99	00	F6	9		

## Program 2: Animation Demo

```
JC 90 POKE51,255:POKE52,63:POK
E55,255:POKE56,63
SE 100 INPUT"[CLR]{4 DOWN}DO Y
OU WANT TO SAVE (Y/N)";
NS$:IFNS$="N"THEN140
CH 110 IFNS$<"Y"THEN100
XX 120 INPUT"DISK OR TAPE (D/T
)";DV$
EX 130 IF(DV$<"D")AND(DV$<"T
")THEN120
XQ 140 CLEAR:SETCOLOR 1,6,0,14
,1:SC=9:RECORD:FORS=1TO
70:AN=AN+10:C=C+1:SC=SC
*.94
JE 150 TH=AN*↑/180
KA 160 A(1)=-10:B(1)=10:A(2)=1
0:B(2)=10:A(3)=10:B(3)=
-10:A(4)=-10:B(4)=-10
DA 170 NU=4:GOSUB1000:NEXT
KF 180 IFDV$="D"THEN:DPUT"SQUA
RES"
MB 190 IFDV$="T"THEN:LOWRES:CP
UT"SQUARES"
XM 200 PLAY:PLAY:CLEAR
CJ 210 SETCOLOR 1,6,0,7,1:SC=2
:RECORD:C=0:AN=0:FORS=0
TO70:C=C+1:SC=SC*.94
HJ 220 TH=AN*↑/180
JS 230 A(1)=-60:B(1)=40:A(2)=6
0:B(2)=40:A(3)=0:B(3)=-
75:NU=3:GOSUB1000
HA 240 A(1)=0:B(1)=75:A(2)=60:
B(2)=-40:A(3)=-60:B(3)=
-40:GOSUB1000:AN=AN+5:N
EXT
PD 250 IFDV$="D"THEN:DPUT"STAR
S"
HE 260 IFDV$="T"THEN:LOWRES:CP
UT"STARS"
DQ 270 PLAY:PLAY:CLEAR
DK 280 SC=2:C=0:TH=0:SETCOLOR
{SPACE}1,3,5,7,9:RECORD
:FORS=0TO70:C=C+1:SC=SC
*.94
AM 290 A(1)=-60:B(1)=40:A(2)=6
0:B(2)=40:A(3)=0:B(3)=-
75:NU=3:GOSUB1000
JA 300 A(1)=0:B(1)=75:A(2)=60:
B(2)=-40:A(3)=-60:B(3)=
-40:NU=3:GOSUB1000:NEXT
PD 310 IFDV$="D"THEN:DPUT"MORE
STARS"
GG 320 IFDV$="T"THEN:LOWRES:CP
UT"MORE STARS"
KB 330 PLAY:PLAY:CLEAR
KQ 340 SC=5:C=0:AN=0:SETCOLOR
{SPACE}1,0,7,14,1:RECO
D:FORS=0TO1040:SC=SC+.1
:C=C+1
GX 350 IFC=4THENC=1
HA 360 TH=AN*↑/180:A(1)=0:B(1)
=0:A(2)=0:B(2)=1:NU=2:G
OSUB1000:AN=AN+5:NEXT
AS 370 IFDV$="D"THEN:DPUT"RAYS
"
GF 380 IFDV$="T"THEN:LOWRES:CP
UT"RAYS"
DH 390 PLAY:CLEAR:PLAY:CLEAR
RC 400 OF=135:SC=700:GAP=500:D
G=↑/180:SETCOLOR 1,6,0,
7,1:RECORD
AP 410 FORAN=0TO180STEP5:TH=AN
*DG:FORBE=0TO360STEP5:G
M=BE*DG:DL=(BE+OF)*DG
HB 420 A(1)=-50:B(1)=40*SIN(GM
):C(1)=40*COS(GM)
DB 430 A(2)=50:B(2)=40*SIN(DL)
:C(2)=40*COS(DL)
BB 440 FORN=1TO2:GOSUB4000:GOS
UB5000:NEXT:C=3:GOSUB10
20:NEXTBE:SWITCH:NEXTAN
```

```
AM 450 IFDV$="D"THEN:DPUT"WIRE
S"
ES 460 IFDV$="T"THEN:LOWRES:CP
UT"WIRES"
MC 470 PLAY:CLEAR:LOWRES:PRINT
"[CLR]PLEASE WAIT..."
GM 480 DIM SN(360),CS(360):DG=
↑/180:FORX=0TO360STEP2:
TH=X*DG:SN(X)=SIN(TH)
JH 490 CS(X)=COS(TH):NEXT:OF=1
35:SC=350:GA=25:GM=30*D
G:SETCOLOR 1,0,2,7,5:RE
CORD
BP 500 FORAN=0TO342STEP2:TH=AN
*DG:RESTORE:FORFA=1TO6:
READC
CG 510 FORVE=1TO4:READA(VE),B(
VE),C(VE):NEXTVE
JP 520 FORN=1TO4:GOSUB6000:GOS
UB7000
GE 530 A(N)=A(N)+4-AN/50:B(N)=
B(N)+4-AN/50:C(N)=C(N)-
AN/20:GOSUB5000:NEXTN
MA 540 GOSUB1040:NEXTFA:SWITCH
:NEXTAN
AH 550 IFDV$="D"THEN:DPUT"CUBE
"
DA 560 IFDV$="T"THEN:LOWRES:CP
UT"CUBE"
XB 570 PLAY:PLAY:LOWRES:END
ES 1000 FORN=1TONU:GOSUB2000:G
OSUB3000:NEXT
CP 1010 ON NU-1 GOSUB 1020,103
0,1040:RETURN
MF 1020 FILL 2,C,A(1),B(1),A(2
),B(2):RETURN
XQ 1030 FILL 3,C,A(1),B(1),A(2
),B(2),A(3),B(3):RETUR
N
CM 1040 FILL 4,C,A(1),B(1),A(2
),B(2),A(3),B(3),A(4),
B(4):RETURN
SM 2000 Q=A(N)*COS(TH)+B(N)*SI
N(TH)
AF 2010 B(N)=-A(N)*SIN(TH)+B(N
)*COS(TH)
AE 2020 A(N)=Q:RETURN
BP 3000 A(N)=80+SC*A(N):B(N)=1
00-1.4*SC*B(N):RETURN
QD 4000 Q=A(N)*COS(TH)+C(N)*SI
N(TH)
KB 4010 C(N)=-A(N)*SIN(TH)+C(N
)*COS(TH)
SH 4020 A(N)=Q:RETURN
KS 5000 K=GA+C(N):A(N)=80+SC*A
(N)/K:B(N)=100-1.4*SC*
B(N)/K:RETURN
JC 6000 Q=B(N)*CS(30)+C(N)*SN(
30)
KH 6010 C(N)=-B(N)*SN(30)+C(N)
*CS(30)
KF 6020 B(N)=Q:RETURN
XQ 7000 Q=A(N)*CS(AN)+C(N)*SN(
AN)
SD 7010 C(N)=-A(N)*SN(AN)+C(N)
*CS(AN)
MP 7020 A(N)=Q:RETURN
JF 8000 DATA 1,-1,+1,-1,+1,+1,
-1,+1,-1,-1,-1,-1,-1
HG 8010 DATA 2,+1,+1,-1,+1,+1,
+1,+1,-1,+1,+1,-1,-1
DH 8020 DATA 1,+1,+1,+1,-1,+1,
+1,-1,-1,+1,+1,-1,+1
AE 8030 DATA 2,-1,+1,+1,-1,+1,
-1,-1,-1,-1,-1,-1,+1
PD 8040 DATA 3,-1,+1,+1,+1,+1,
+1,+1,+1,-1,-1,+1,-1
BB 8050 DATA 3,+1,-1,-1,+1,-1,
+1,-1,-1,+1,-1,-1,-1
```

## Program 3: Animation Player

```
KK 130 POKE51,255:POKE52,63:PO
KE55,255:POKE56,63
CC 140 IFA=0THENA=1:LOAD"FILL-
64",8,1
JX 150 SYS 33846:CLEAR
SC 160 DGET"SQUARES":PLAY
MX 170 DGET"STARS":PLAY
BG 180 DGET"MORE STARS":PLAY
FE 190 DGET"RAYS":PLAY
AJ 200 DGET"WIRES":PLAY
JJ 210 DGET"CUBE":PLAY:PLAY:PL
AY
HX 220 SETCOLOR 14,6,0,7,14
BG 230 LOWRES:END
```

### BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

## Power BASIC: 128 Instant Keywords

(Article on page 82.)

```
AE 100 PRINT"[CLR]":S=DEC("130
0"):BANK15:FORD=STOS+17
6:READ A$:POKE D,DEC(A$
):NEXT
HB 110 M=S+22:V%=M/256:V=M-256
*V%:POKE S+12,V%:POKE S
+14,V:M=D-52:V%=M/256:V
=M-256*V%
JG 120 POKE S+65,V%:POKE S+64,
V:SYS(S):PRINT
{2 DOWN}{RVS}{WHT}INSTA
NT KEYWORDS ACTIVATED
RK 130 PRINT"[DOWN]{RVS}TO DE/
ACTIVATE SYS"S:NEW
JG 140 DATA A9,C8,CD,37,03,F0,
04,A2,05,D0,04,A9,13,A2
,16,8D,37,03,8E,36
KE 150 DATA 03,60,EA,48,A6,F4,
F0,04,68,4C,05,C8,A4,D4
,AD,3E,03,85,24,AD
AR 160 DATA 3F,03,85,25,B1,24,
EA,38,E9,41
QA 170 DATA C9,1A,B0,E6,A2,02,
E4,D3,D0,02,69,19,A8,B9
,7D,13,C9,27,B0,09
EE 180 DATA 69,7E,AA,A0,09,A9,
46,D0,05,AA,A0,17,A9,44
,84,24,85,25,A0,00
MK 190 DATA CA,10,0F,B1,24,48,
E6,24,D0,02,E6,25,68,10
,F4,30,EF,C8,B1,24
BH 200 DATA 30,05,20,0C,56,D0,
F6,29,7F,20,0C,56,68,60
,EA,0B,18,C7,0D,D5
KA 210 DATA 81,89,D2,85,CF,E5,
EC,CA,82,A3,99,E3,8E,07
,A7,FB,87,FD,97,DE
QD 220 DATA C8,C4,19,E7,0F,0A,
03,8D,D1,D4,04,E0,E6,06
,17,A6,DF,E4,8C,DA
KQ 230 DATA 05,FC,83,1A,C2,E2,
C9
```

# Sensational Prices!

... On Our Most Popular Items!

from microPal® ...

## THE 59¢ DISKETTE!

Are you paying too much for diskettes? Try our first quality, prime, 5¼" diskettes (no rejects, no seconds) at these fantastic sale prices and save, save, **SAVE!** Disks are packaged in boxes of 50; each box contains 5 shrink-wrapped 10-packs that include diskettes in sleeves, labels, and write-protect tabs.

Each diskette is certified to be 100% error free and comes with a lifetime warranty (if you have a problem, we'll replace the diskette). All diskettes include hub reinforcement rings and write-protect notch.

All diskettes are double density and work in either single or double density drives.

SS, DD Diskettes, Box of 50

32391 **\$29.50-59¢ ea.!**

DS, DD Diskettes, Box of 50

32403 **\$34.50-69¢ ea.!**

## \$ LOWEST PRICES IN U.S.A.! \$

We can offer you some of the lowest prices in the country on the most popular printers, monitors and interfaces. Our normal prices are already low, but to make sure you get the best deal you can, we will also meet most competitive prices in this publication when placed on an equal basis (Remember—we don't charge for use of your credit card, impose excessive shipping fees, or use any other hidden extras to boost the price you pay. Due to the rapid change in prices in the computer industry, we can only meet prices at the time you place your order; we cannot adjust prices on items ordered or shipped on an earlier date.) Another plus for charge card customers — your charge card is billed at time of shipment only for the items shipped — no early billing, no long wait for the merchandise you already paid for.

COMMODORE		STAR MICRONICS		FAMOUS NAME SOFTWARE	
C-128™ Computer	\$CALL	NX-10	\$CALL	Epyx	
1571 Disk Drive	\$CALL	SG-10C	\$CALL	Broderbund	
1902 Monitor	\$CALL	CARDCO		Infocom	
1670 Modem	\$CALL	G-Wiz Interface	\$CALL	Sierra	
<b>EPSON</b>		S'MORE	\$CALL	Timeworks	
FX-85	\$CALL	Super-G	\$CALL	Random House	
FX-286	\$CALL			Activision, and many more!	

★ THE BEST PRICES ★  
★ THE BEST SERVICE ★  
WHY SHOP  
ANYWHERE ELSE?

### COMMODORE-READY PRINTER ONLY \$114.95!

**Fastext 80**  
80-column dot-matrix printer from Smith-Corona includes interface/cable (no other interface needed), 80 cps, bi-directional printing, friction feed (tractor optional), six character sizes, some graphics capabilities.

41740 Fastext 80 Printer **\$114.95**  
41755 Tractor for Fastext 80 **\$19.95**



## POWER and PROTECTION FOR YOUR C-64!®

### POW'R PAK 64

from MicroPal®

Pow'r Pak is a replacement power supply (1.5 amp) for the Commodore 64® ... but that's not all! Pow'r Pak also supplies two additional surge protected outlets (120V) for monitor, disk drive, or other peripherals. On/off switch. Fuse protection. Sturdy all-metal casing is ventilated for heat dissipation. Full 1 year warranty.

34910 **\$49.95**

### EDUCATORS!

We have a catalog just for you! It's chock full of software, hardware and accessories designed for use in schools — from elementary to college level. Products are for Apple, IBM, Commodore, TI and other computers used in schools across the country. And here's the best part: our low, low prices will stretch your dollars farther and let you accomplish more.

Call 1-800-348-2778 now  
and request our Education Catalog!

### OUR BEST MONITOR VALUE EVER!

The black matrix picture tube on this 14" composite monitor provides impressive color — rich blacks, vivid colors and brilliant whites. Includes built-in audio speaker; controls for volume, brightness, contrast, color, tint and sharpness. One year warranty on parts and labor. 2 years on picture tube. From Samsung Supply Limited! Order Today!

40728 **\$149.95**

Monitor Cable (required). Works with C64, C128 (in composite mode), TI 99/4A and many others.

37424 **\$7.95**

**\$149.95**



### CARTRIDGE EXPANDER

Plus \$22.95  
FAST LOAD  
OFFER!



Stop wearing out your computer by endless cartridge swapping! The Navarone cartridge expander features 3 cartridge slots. Reset the computer independently of the power switch. Cartridge slots are vertical for easy access — no blind fumbling behind the computer.

33227 3-slot Cartridge Expander **\$22.95**

The cartridge expander is a great companion for the Epyx Fast Load cartridge — you can keep it permanently installed plus have two slots free for other cartridges!

34216 Fast Load Cartridge (Sug. Retail \$39.95) **\$24.95**

Fast Load Only \$22.95  
with purchase of cartridge expander!

### DUST COVER and "EVERYTHING BOOK" SPECIAL OFFER

Get to know us by ordering this great dust cover for your C-64 or C-128 and our catalog, "The Everything Book for the C-64 and C-128 Home Computers," for \$2.95 (no extra shipping and handling charges). Cover is antistatic, translucent 8-gauge vinyl sewn to our exacting standards with reinforced seams. Discover the savings and easy shipping available from TENEX Computer Express!



**\$2.95**

31627 C-64 Dust Cover and Catalog (G1V)  
38464 C-128 Dust Cover and Catalog (G1V)

### The Right Interface For All Your Printing Needs!!

"... a sound investment for your Commodore." RUN, Dec. '85  
This high-performance graphics parallel printer interface from DSI for C-64 and VIC-20 emulates a Commodore printer. Comes with cables and user's manual.

33565 **\$39.95**

**Super Graphix.** Features 8K buffer, 10 printing modes, 3 internal screen dumps and top mounted dip switches. Supports superscript, subscript, underlining, bold face, and a choice of 9 character widths. From Xetec.

41769 **\$69.95**

**Super Graphix Jr.** A more economical version of the Super Graphix, featuring graphics, normal and correspondence quality printing. Compatible with all major printers. From Xetec.

41774 **\$49.95**

From Your Friends At

**TENEX Computer Express**

We gladly accept mail orders!

P.O. Box 6578  
South Bend, IN 46660

Questions? Call  
219/259-7051

Ad  
G1V

### SHIPPING CHARGES

ORDER AMOUNT	CHARGE
less than \$20.00	\$3.75
\$20.00-\$39.99	4.75
\$40.00-\$74.99	5.75
\$75.00-\$149.99	6.75
\$150.00-\$299.99	7.75
\$300 & up	8.75

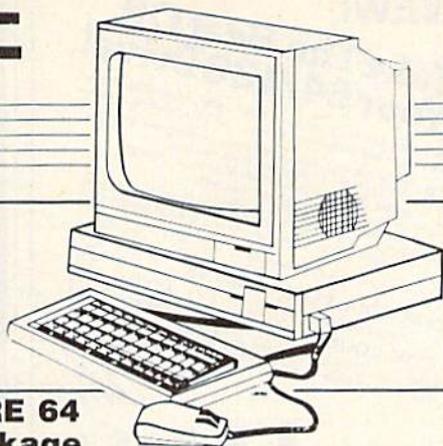


### NO EXTRA FEE FOR CHARGES

WE VERIFY CHARGE CARD ADDRESSES.

ORDER TOLL FREE  
1-800-348-2778

# YOUR COMMODORE CONNECTION



## AMIGA SYSTEM PACKAGE

Includes: AMIGA 1000 CPU, 512K, Mouse, Two 3 1/2" Double Sided Drives, Amiga RGB Monitor, Amiga DOS, Basic, Tutorial, Kaleidoscope, and Voice Synthesis Library.

**ENTIRE SYSTEM**  
**\$1599<sup>00</sup>**

## COMMODORE 128 SYSTEM

INCLUDES: CB128 Computer, CB1571 Disk Drive, Magnavox 8562 RGB/Composite Monitor. **\$759<sup>00</sup>**

## COMMODORE 64 System Package

INCLUDES: CB64 Computer, CB1541 Disk Drive, Taxan 220 Color Monitor **ENTIRE SYSTEM \$479<sup>00</sup>**

### DRIVES

CBM1541.....\$199<sup>00</sup>  
CBM1571.....\$249<sup>00</sup>  
MSD-1.....\$219<sup>00</sup>  
MSD-2.....\$459<sup>00</sup>  
INDUS-GT (64/128)....\$189<sup>00</sup>

### MODEMS

Anchor Volksmodem....\$59<sup>99</sup>  
Anchor Omega 80.....\$139<sup>00</sup>  
Anchor 6480 (64/128)  
300/1200 Baud.....\$119<sup>00</sup>  
CBM 1660 (C-64).....\$59<sup>99</sup>  
CBM 1670 (C-128)....\$179<sup>00</sup>

### MONITORS RGB/COLOR

Taxan 220 composite\$179<sup>00</sup>  
Magnavox 515.....\$289<sup>00</sup>  
NEC 1216.....\$349<sup>00</sup>  
Amiga 1080 Hi-Res...\$299<sup>00</sup>  
Magnavox Monochrome\$79<sup>99</sup>

### PRINTERS

EPSON Homewriter 10\$159<sup>00</sup>  
OKIDATA Okimate 10\$199<sup>00</sup>  
STAR SL10C.....\$219<sup>00</sup>  
PANASONIC 1080.....\$199<sup>00</sup>  
C.I.TOH 7500 AP.....\$169<sup>00</sup>

### DISKETTES

MAXELL SS/DD 5 1/4(10)....\$11<sup>99</sup>  
NASHUA SS/DD 5 1/4(10)....\$9<sup>99</sup>  
Sony SS/SD 5 1/4(10).....\$9<sup>99</sup>  
Sony DS/DD 3 1/2(10).....\$29<sup>99</sup>  
GENERIC DS/DD w/Flip'n File  
10 Disk Holder.....\$11<sup>99</sup>

### ACCESSORIES

CompuGuard Surge and Spike Protector.....\$14<sup>99</sup>  
Curtis SP2 Surge and Spike Protector.....\$39<sup>99</sup>  
Curtis Safety Strip with 6 Outlets.....\$19<sup>99</sup>  
Curtis Universal Printer Stand.....\$14<sup>99</sup>  
Computer Specialties Power Plus.....\$54<sup>99</sup>  
Amaray Disk Tubs 3 1/2 or 5 1/4".....\$9<sup>99</sup>  
CB128 Universal Monitor Cable.....\$16<sup>99</sup>

### INTERFACES

Digital Devices U-Print C\$44<sup>99</sup>  
Orange Micro Grappler \$89<sup>99</sup>  
PPI Printer Interface...\$34<sup>99</sup>  
Xetec 8K.....\$69<sup>99</sup>  
Micro R & D MJ350....\$49<sup>99</sup>

### SOFTWARE FOR 64/128

<b>ATARI/COMMODORE</b>	<b>HES</b>
PacMan.....\$4 <sup>99</sup>	Benji Space Rescue.....\$3 <sup>99</sup>
Centipede.....\$4 <sup>99</sup>	HES Games/Olympics.....\$3 <sup>99</sup>
Defender.....\$4 <sup>99</sup>	
Dig Dug.....\$4 <sup>99</sup>	<b>Professional Software</b>
Donkey Kong.....\$4 <sup>99</sup>	Fleet Systems II C128/64....\$49 <sup>99</sup>
Robotron.....\$4 <sup>99</sup>	Fleet Systems III C128....\$59 <sup>99</sup>
	Trivia Fever.....\$19 <sup>99</sup>
<b>BRODERBUND</b>	<b>PFS</b>
The Print Shop.....\$29 <sup>99</sup>	File.....\$32 <sup>99</sup>
Graphics Library 1,2,3 ea....\$17 <sup>99</sup>	
Bank Street Writer.....\$34 <sup>99</sup>	<b>SPRINGBOARD</b>
Graphics Companion.....\$24 <sup>99</sup>	The News Room.....\$32 <sup>99</sup>
	Clip Arts.....\$19 <sup>99</sup>
<b>COMMODORE</b>	Clip Arts II.....\$27 <sup>99</sup>
Jane-integrated (128).....\$39 <sup>99</sup>	
Assembler 64.....\$9 <sup>99</sup>	<b>SUBLOGIC</b>
Pilot 64.....\$9 <sup>99</sup>	Flight Simulator II.....\$37 <sup>99</sup>
Geos for 64, 64C, 128.....\$49 <sup>99</sup>	Jet Simulator C64.....\$37 <sup>99</sup>
<b>DATA SOFT</b>	<b>SPINNAKER</b>
Genesis.....\$5 <sup>99</sup>	Rhymes & Riddles.....\$9 <sup>99</sup>
Dallas Quest.....\$5 <sup>99</sup>	All Cocor Caves.....\$7 <sup>99</sup>
	Bubble Burst.....\$9 <sup>99</sup>
	Trains.....\$9 <sup>99</sup>

### SOFTWARE FOR AMIGA

<b>ACTIVISION</b>	<b>BATTERIES INCLUDED</b>
Borrowed Time.....\$32 <sup>99</sup>	Isgur Portfolio System.....\$169 <sup>00</sup>
Hacker.....\$32 <sup>99</sup>	<b>DISCOVER SOFTWARE</b>
Mind Shadow.....\$32 <sup>99</sup>	Marauder Back-up.....\$32 <sup>99</sup>
<b>AEGIS DEVELOPMENT</b>	<b>INFOCOM</b>
Animation.....\$32 <sup>99</sup>	Wishbringer.....\$31 <sup>99</sup>
<b>COMMODORE</b>	Hitchhiker's Guide.....\$31 <sup>99</sup>
Textcraft w/Graphic Craft.....\$59 <sup>99</sup>	Spellbreaker.....\$31 <sup>99</sup>
Musicraft.....\$79 <sup>99</sup>	Planetfall.....\$31 <sup>99</sup>
TLC Logo.....\$79 <sup>99</sup>	Witness.....\$31 <sup>99</sup>
Amiga Pascal.....\$79 <sup>99</sup>	<b>MEGASOFT LTD</b>
Lattice "C".....\$119 <sup>00</sup>	A-Copier.....\$34 <sup>99</sup>
Assembler.....\$79 <sup>99</sup>	A-Report.....\$44 <sup>99</sup>
Lisp.....\$156 <sup>00</sup>	<b>MICRO ILLUSIONS</b>
<b>ELECTRONIC ARTS</b>	Dynamic-Cad.....\$319 <sup>00</sup>
Deluxe Paint.....\$59 <sup>99</sup>	<b>MINDSCAPE</b>
Archon.....\$31 <sup>99</sup>	Halley Project.....\$31 <sup>99</sup>
One on One.....\$31 <sup>99</sup>	Deja Vu.....\$34 <sup>99</sup>
Sky Fox.....\$31 <sup>99</sup>	Keyboard Cadet.....\$29 <sup>99</sup>
Financial Cookbook.....\$37 <sup>99</sup>	<b>MICRO SYSTEMS</b>
Seven Cities of Gold.....\$31 <sup>99</sup>	Analyze.....\$59 <sup>99</sup>
Arctic Fox.....\$31 <sup>99</sup>	Scribble.....\$59 <sup>99</sup>
Deluxe Print.....\$34 <sup>99</sup>	On-Line/Comm.....\$49 <sup>99</sup>
Instant Music.....\$34 <sup>99</sup>	Organize Data Base.....\$59 <sup>99</sup>
Deluxe Video.....\$69 <sup>99</sup>	<b>V.I.P.</b>
	V.I.P. Professional.....\$139 <sup>00</sup>

# COMPUTER MAIL ORDER

**CALL TOLL-FREE 1-800-233-8950**

477 East Third Street, Dept. A411, Williamsport, PA 17701

**EDUCATIONAL INSTITUTIONS CALL TOLL-FREE 1-800-221-4283**



1-800-268-3974  
Ontario/Quebec

1-800-268-4559  
Other Provinces

**CANADIAN ORDERS**

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

1-416-828-0866  
In Toronto

Telex:06-218960

2505 Dunwin Drive,  
Mississauga, Ontario  
Canada L5L1T1



## NEW! Take The Heat Off Your 64/128 Drive!

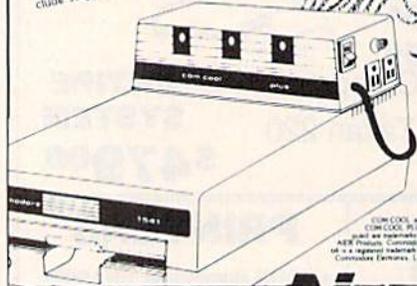
Overheating and line surges are a major cause of frustrating program malfunctions and permanent damage to your Commodore disk drive. Now, for the first time, you can protect your investment with the COM-COOL PLUS™ Cooling Fan/Surge Protector.

1. Washable filters remove dust before forcing air through.
2. Quiet fan can cool unit firmly in place.
3. Foam base holds clip spikes at a safe 130V. Replaceable fuse.
4. Protected outlets clip spikes at a safe 130V. Replaceable fuse.
5. Pilot lights monitor power, ground and SURGE protection.

Two models for use with Commodore 1541 or 1571 drives.

**COM-COOL PLUS™ \$59.95**  
Cooling Fan/Surge Protector

**COM-COOL™ \$39.95**  
Economical cooling unit (does not include surge suppression and line filter)



COM-COOL and COM-COOL PLUS are registered trademarks of AIER Products Corporation and a registered trademark of Commodore Electronics, Ltd.



2 1/4" Dia. Filters

**AIER**

AIER PRODUCTS  
522 West Bergen  
Milwaukee, WI 53217

414-277-9120



Distributed exclusively by:



COMPUTER SOFTWARE SERVICE • A CHAS. LEVY CALCULATING COMPANY  
495-A Buve Road, Elk Grove Village, IL 60007-2114 • In IL call: 800-337-SOFT  
DEALERS ONLY CALL 1-800-422-4912

SPREAD THE WORD

MAKE BIG SIGNS!

WITH THE BANNER MACHINE!

The Banner Machine prints large signs to display your message. • Eight sizes of letters from 1/2" to 6 1/2" high • 4 fonts • 26 graphic symbols • 15 textured background shades • borders • proportional spacing, centering, right and left justification • standard, compressed and emphasize modes • display mode (before printing) • disk commands: save banner, print from disk • extra fonts available •

800 762-5645



Cardinal Software C-64 vers. \$49.95 +S&H  
14840 Build America  
Woodbridge, VA 22191 Info: (703) 491-6494  
Hours: MON-SAT 10-6 (East. Stand. time)

## ARE YOU CAUGHT UP IN THE COPY PROTECTION ARMS RACE?

DEFEND YOURSELF WITH **KRACKER JAX**  
A REVOLUTION IN ARCHIVAL SOFTWARE!

You know the routine by now: you buy an expensive nibbler and next month it's obsolete. How many times is your wallet going to be nibbled?

**Kracker Jax** is NOT a nibbler. It is a parameter copy system. Most volumes contain well over 100 separate copy parameters. What IS a parameter? Just a custom program that allows your 1541 or 1571 disk drive to strip all, and we mean ALL, copy protection from your expensive software, leaving you with UNPROTECTED, TOTALLY BROKEN back-ups that can be copied with even a simple fast copier.

This system has many advantages over the older nibbler type of utilities. For one thing, you don't have to experiment. Each parameter WILL back-up the title it was created for. Period.

For another, a back-up created with **Kracker Jax** will NEVER rattle your disk drive head. And that means less disk drive alignment problems for you.

### KRACKER JAX PROTECTION BUSTERS

BLAST  
DISK  
PROTECTION



★ ALL NEW: VOLUME THREE ★  
Volumes One & Two still available!

Dealer Inquiries Invited  
**ONLY \$19.95 COMPLETE!**  
No shipping or handling charges!  
(C.O.D. please add \$3.00)

Check out some of these exclusive features:

- **Kracker Jax** is the BEST program of its kind!
- **Kracker Jax** will back up titles that the nibblers CAN'T!
- **Kracker Jax** requires NO special knowledge to operate!
- **Kracker Jax** strips protection in a matter of SECONDS!
- **Kracker Jax** is priced RIGHT—just \$19.95 complete!
- **Kracker Jax** is UNPROTECTED—easy to back up!
- **Kracker Jax** updates are available QUARTERLY!

Remember, the minute a new program is released, the **Kracker Jax** team will be developing a new parameter for it. This means that future **Kracker Jax** disks will always contain parameters for the hottest new titles on the market! **Kracker Jax** is the system that cannot fall behind the times!

In the copy protection arms race, **Kracker Jax** is the ultimate defense!

COMPUTER MART

CHECKS, MONEY ORDERS OR VISAMASTERCARD ACCEPTED.

Mail your order to: Computer Mart, Dept. G  
2700 NE Andresen Road / Vancouver, WA 98661  
Phone orders welcome: 206-695-1005  
SAME DAY SHIPPING!



THE LOWEST  
PRICES

THE BEST  
SERVICE

# ELECTRONIC ONE\*

PHONE  
LINES  
OPEN

10-6 E.S.T.  
M-F

**CALL (614) 864-9994 • P.O. Box 13428 • COLUMBUS, OHIO 43213**

## COMMODORE HARDWARE

C128 COMPUTER	249.99
C64 COMPUTER	139.99
64C COMPUTER	189.99
1541 DISK DRIVE	179.99
1571 DISK DRIVE	229.99
1702 MONITOR	179.99
1902A RGB MONITOR	269.99
MPS 1000 PRINTER	239.99
1350 MOUSE	39.99



## PRINTERS

STAR NX10	239.99
STAR POWERTYPE	279.99
EPSON LX80	229.99
PANASONIC 1080	199.99
PANASONIC 1091	229.99
SEIKOSHA SP 1000VC	179.99
COMREX	69.99
PANASONIC 3131	249.99
STAR SG15	359.99
STAR SD10	309.99
STAR SD-15	429.99
STAR SR-10	459.99
STAR SR-15	559.99

## MISC. HARDWARE

G WIZ INTERFACE	46.99
CARDCO G INTERFACE	39.99
TYMAC INTERFACE	49.99
PPI INTERFACE	32.99
XETEC JR.	39.99
XETEC SR. (8k BUF)	56.99
MICRO R&D INTERFACE	29.99
STAR INTERFACE	29.99
MODEMS	
MESSENGER	39.99
TOTAL TELECOMMUNICATION	29.99
COMM. 1200 BAUD MODEM	149.99

## MORE . . .

CARTRIDGE PORT CONVERTER	17.99
128k RAM UPGRADE FOR 128	114.99
XL80 80 COLUMNS BOARD	34.99
X10 COMPUTER INTERFACE	
CABLE, SOFTWARE FOR	
CONTROLLING LIGHTS	49.99
BSR SYSTEM X10	29.99
LAMP, APPLIANCE MODULE	14.99ea.
CARDCO CASS. RECORDER	24.99
MONITORS	
14" THOMPSON COLOR	129.99
13" SAKATA COLOR	139.99
13" GOLDSTAR COLOR	129.99
14" HITACHI COLOR	169.99
14" COMM. 1702	179.99
14" TEKNIKA COLOR	149.99
12" MAGNOVIX AMBER	79.99

WE CARRY SOFTWARE  
FOR ATARI 2600-7800  
8 BIT & ATARI ST. . . .  
INTELLIVISION — TEXAS INSTRUMENTS

## SOFTWARE

KARATEKA	19.99
MUSIC SHOP	25.99
PRINT SHOP	27.99
PRINT SHOP	
COMPANION	24.99
PRINT SHOP LIB.	15.99
ACRO JET	19.99
F-15	22.99
SILENT SERVICE	22.99
KENNEDY APPROACH	22.99
LEADER BOARD	24.99
BARD STALE	CALL
CARRIER AT WAR	FOR
EUROPE ABLAZA	NEW
HEART OF AFRICA	LOWER
MOVIE MAKER	PRICES
SKY FOX	
PINBALL SET	
RACING SET	
SUPER BOWL SUNDAY	19.99
BALLYHOO	22.99
HITCH HIKER	22.99
SPELL BREAKER	26.99
ALTER EGO	26.99
COUNTDOWN	19.99
ROAD RACE	19.99
GAME MAKER	24.99
HACKER	19.99
COMPUTER PEOPLE	19.99
SPACE SHUTTLE	19.99
SUBLOGIC FOOTBALL	26.99
BOB & WRESTLE	18.99
INFILTRATOR	18.99
DAM BUSTERS	18.99
FLIGHT NIGHT	18.99
HARD BALL	18.99
FLIGHT SIM. II	29.99
JET	26.99
MICRO LEAG. BASEBALL	24.99
STAR BASEBALL	19.99
STAR FOOTBALL	19.99

## UTILITY SOFTWARE

PAPER BACK FILER 128	29.99
PAPER BACK FILER 64	24.99
PAPER BACK PLANNER 128	29.99
PAPER BACK PLANNER 64	24.99
PAPER BACK WRITER 128	29.99
PAPER BACK WRITER 64	24.99
SUPERBASE 128	54.99
SUPERBASE 64	44.99
SUPERSCRIP 128	46.99
SUPERSCRIP 64	46.99
DATA MANAGER 128	39.99
SWIFT CALL 128	39.99
WORD WRITER 128	39.99
CONSULTANT	39.99
PAPERCLIP	36.99
PAPERCLIP/SPELL	47.99
NEWSROOM	29.99
FAST LOAD	24.99
MULTIPLAN 128	39.99
PROG. TOOL KIT	24.99
MACH 5	22.99
MACH 128	29.99
MICRO FILER	17.99
SYN CALC	29.99
HOME PAK	39.99
PRINT MASTER	29.99
JANE	34.99
INTRACOURSE	59.99
BASIC 128	54.99
MUSIC STUDIO	26.99
SUPER PASCAL	49.99

## CLOSEOUT SOFTWARE

BREAKDANCE	7.99
ALF COLOR CAVES	3.99
TURTLE TOYLAND	2.99
STORY MACHINE	3.99
COSMIC LIFE	3.99
JUKE BOX	3.99
DELTA DRAWING	3.99
FACE MAKER	3.99
UP FOR GRABS	3.99
GHOSTBUSTERS	7.99
SAMMY LIGHTFOOT	7.99
MISSING LINKS	2.99
THE FACTORY	1.99
SPARE CHANGE	2.99
MUTANT CAMELS	1.99
LEARNING LEEPER	4.99
WIZARD PRINCESS	7.99
JAWBREAKER	4.99
BEAM RIDER	4.99
TYPE ATTACK	6.99
SPACE RESCUE	3.99
JUNO FIRST	3.99
MR. ROBOT	4.99
BC QUEST	6.99
GORTEC (CASS)	1.99
DANCE FANTASY	4.99
LOGIC LEVELS	4.99
SEA HORSE	4.99
WORD GAME	4.99
TRAINS	4.99
AEROBICS	4.99
GYRUSS	6.99
GENESIS	4.99

## ELECTRONIC ONE

CALL (614) 864-9994 OR WRITE  
P.O. BOX 13428 COLUMBUS, OHIO 43213

## AMIGA SOFTWARE CALL FOR CATALOG

DUST COVERS . . . . . 5.99 EACH

## RIBBONS

STAR SG 10	3.99	COMM. 803	8.99
STAR NX 10	8.99	COMM. 801	8.99
PRO WRITER	8.99	COMM. MPS 1000	8.99
LX 80	8.99	COMM. 1526/802	8.99
STAR POWERTYPE	8.99	PANASONIC 1091	8.99

## DISKETTES

SONY 5 1/4" S/S D/D	7.99
BASF 5 1/4" S/S D/D	7.99
PERCISION 5 1/4" S/S D/D	7.99
BONUS 5 1/4" D/S D/D	7.99
CENTECK COLOR S/S D/D	7.99
NASHUA 3 1/2" S/D	19.99
VERBATIM 3 1/2" S/D	19.99
DISK NOTCHER	2.99
FLIP & FILE (50)	6.99

## JOYSTICKS

ATARI	6.99
THE BOSS	11.99
THE BAT	16.99
3 WAY	19.99
KRAFT	9.99
SPECTRO VIDEO 1	4.99
SPECTRO VIDEO 2	7.99
PADDLES	12.99

HOW TO ORDER: CASHIER CHECK, MONEY ORDER, MASTERCARD\* OR VISA\* (ADD 4% FOR CHARGE CARDS) . . . NO PERSONAL CHECKS . . . NO C.O.D.'S . . . SHIPPED U.P.S. . . . ALL PRICES SUBJECT TO CHANGE WITHOUT NOTICE.  
SHIPPING: ADD \$3.00 ON ALL ORDERS UNDER \$100.00 . . . ADD \$5.00 ON ALL ORDERS OVER \$100.00. ACTUAL FREIGHT CHARGED ON MULTIPLE ORDERS.  
INTERNATIONAL: ACTUAL FREIGHT CHARGED ON ALL ORDERS OUTSIDE THE CONTINENTAL UNITED STATES INCLUDING A.P.O.  
POLICIES: NO RETURNS WITHOUT A RETURN AUTHORIZATION . . . NO RETURNS UNLESS DEFECTIVE. ALL DEFECTIVES WILL BE EXCHANGED . . . NO EXCEPTIONS. PLEASE SPECIFY . . .

CALL OR WRITE FOR FREE CATALOG

**CALL ELECTRONIC ONE (614) 864-9994**

**P.O. BOX 13428 COLUMBUS, OHIO 43213**

Authorized

**COMB**

Liquidator

**COMMODORE® COMPATIBLE ACCESSORIES**



We are not allowed to print the famous brand name, but we can tell you if you call us Toll-Free.

**FAMOUS U.S. BRAND DISK DRIVE UNIT**

These famous brand Disk Drives are rebuilt, like new, by factory technicians. They are at a **LOW liquidation price**, and carry a **Factory Warranty**.

- Compatible With Commodore® C64™ and SX64 Computers for Maximum Efficiency.
- 2K RAM, 16K ROM. Maximum Storage of 170K Formatted Data, 35 Trackets.
- Uses 5 1/4" Floppy Diskettes. Serial Interface.
- Data Transfer Rate: 400 Bytes per Second.
- Second Serial Port for Chaining Second Drive or Printer.
- 3 3/4" H x 8" W x 15" D. 9 1/2 lbs.

**Now, Make Quick Back-Up Copies Easily With a SECOND Disk Drive!**

Original List Price ..... **\$269.00**

Liquidation Price ..... **\$149**

Item H-1677-3553-013  
Shipping, handling: \$8.00 ea.

**CONVERSE WITH YOUR COMPUTER**

**AT LAST! A FULL IMPLEMENTATION** of the original ELIZA program is now available to run on your Commodore 64!

Created at MIT in 1966, ELIZA has become the world's most celebrated artificial intelligence demonstration program. ELIZA is a non-directive psychotherapist who analyzes each statement as you type it in and then responds with her own comment or question—and her remarks are often amazingly appropriate!

Designed to run on a large mainframe, ELIZA has never before been available to personal computer users except in greatly stripped down versions lacking the sophistication which made the original program so fascinating.

Now, our new Commodore 64 version possessing the **FULL** power and range of expression of the original is being offered at the introductory price of only \$25. And if you want to find out how she does it (or teach her to do more) we will include the complete **SOURCE PROGRAM** for only \$20 additional.

Order your copy of ELIZA today and you'll never again wonder how to respond when you hear someone say, "Okay, let's see what this computer of yours can actually do!"

**READ WHAT THE EXPERTS SAY ABOUT OUR VERSION OF ELIZA:**  
"Much more than a mere game... You'll be impressed with ELIZA... A convincing demonstration of Artificial Intelligence."  
—PC MAGAZINE

"Delightful entertainment... An ideal medium for showing off your system."  
—MICROCOMPUTING MAGAZINE

"ELIZA is an astounding piece of software... A fascinating program to use and study."  
—BARON'S MICROCOMPUTER REPORTS

"ELIZA is a great way to introduce your friends to computers... A very funny party game."  
—PETER A. McWILLIAMS

"ELIZA is an exceptional program, one that's fun to use, shows off your machine, and has great historical interest."  
—POPULAR COMPUTING MAGAZINE

"This version of ELIZA is the best we have seen. As a party game, it is unmatched."  
—HOME APPLICATIONS FOR THE C-64

**ELIZA IS AVAILABLE IN THE FOLLOWING FORMATS:**  
(Please specify Disk or Cassette)

1. Protected Version ..... \$25  
(Protected Version can be run but not listed or modified)
2. Un-protected Commodore 64 BASIC Source Version ..... \$45  
(Source Version can be listed and modified as well as run)  
Both versions include a six page user manual.

Please add \$2.00 shipping and handling to all orders  
(California residents please add 6 1/2% sales tax)

**ARTIFICIAL INTELLIGENCE RESEARCH GROUP**  
921 North La Jolla Avenue, Dept. G  
Los Angeles, CA 90046  
(213) 656-7368 (213) 654-2214  
MC, VISA and checks accepted



**FOUR PACK OFFICE SOFTWARE**

90-Day Ltd. Fac. Warranty.



NOTE: Software sold individually. Phone for Prices.

- **General Ledger.** 8 Options. Chart Accounts, Custom Statements, More.
- **Inventory Management.** Track 1000 Items. Maintain Perpetual Records.
- **Payroll.** 24 Functions. Calculates Tax. Prints Checks. Interface Ledger.
- **Accounts Payable/Checkwriting.** Interfaces With General Ledger.

Mfr. List For Set of 4: **\$199.80** **\$39**  
Liquidation Price For Set of 4 .....

Item H-1677-7025-059 Ship, handling: \$4.00 pkg.

**TRACTOR FEED FROM COMMODORE®**

Discontinued Model **LOW** Liquidation Price.

- Adapts Your Commodore 803 for Continuous Paper.
- Continuous Form Paper from 2 3/4" To 10" Wide.
- You Can Still Use Your Friction Feed.

90-Day Ltd. Factory Warranty.  
Commodore is a registered trademark of Commodore Electronics Ltd.

Mfr. List .... **\$39.95**

Liquidation Priced At . . . **\$19**  
Item H-1677-7004-286  
Shipping, handling: \$4.00 each

**Toll-Free: 1-800-328-0609**

Credit card customers can order by phone, 24 hours a day, 7 days a week.



SEND TO: C.O.M.B. Direct Marketing Corp. 1405 Xenium Lane No./Minneapolis, MN 55441-4494  
Send the items indicated below. (Minnesota residents add 6% sales tax. Sorry, no C.O.D. orders.)  
Send      Disk Drive(s) Item H-1677-3553-013 at \$149 each plus \$8 each for shipping, handling.  
Send      Software Package(s) Item H-1677-7025-059 at \$39 each plus \$4 each for shipping, handling.  
Send      Tractor Feed(s) Item H-1677-7004-286 at \$19 each plus \$4 each for shipping, handling.  
 My check or money order is enclosed. (No delays in processing orders paid by check.)  
Charge:  VISA®  MasterCard®  American Express®  
Acct. No. \_\_\_\_\_ Exp. / \_\_\_\_\_

PLEASE PRINT CLEARLY

Name \_\_\_\_\_  
Address \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ ZIP \_\_\_\_\_  
Phone ( ) \_\_\_\_\_  
Sign Here \_\_\_\_\_

Sales outside the 48 contiguous states are subject to special conditions. Please call or write to inquire.

**DSI**

**DIGITAL SOLUTIONS INC.**



**Commodore®**

- C-64 Repair (CPU only) ... \$ 38.95
- 1541 Alignment ..... \$ 25.00
- 1541 Repair ..... \$ 69.95
- C-128 Repair (CPU only) ... \$ 74.95
- 1571 Alignment ..... \$ 35.00
- 1571 Repair ..... \$125.00
- C-64 Power Supply ..... \$ 21.95
- C-128 Power Supply ..... \$ 89.95

Includes parts and labor (Power Supply extra)

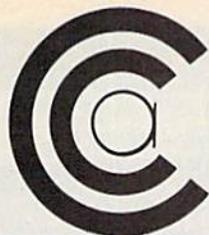
To save C.O.D. charges, send unit and power supply with check or M.O. to:

**DIGITAL SOLUTIONS, INC.**  
1122 9th Street  
Altoona, PA 16601  
**(814) 944-0405**



© 1986 DSI, ALTOONA, PA

**COMB COMB COMB COMB COMB**



# COMPUTER CENTERS GOES PRINTER CRAZY!

IN N.Y. STATE CALL TOLL FREE **1-800-548-0009**  
**1-800-631-1003**

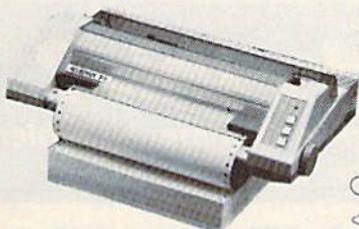
OUT OF STATE CALL  
**1-800-221-2760**

## C.I.TOH

NEVER BEFORE AT THESE PRICES

### RITEMAN C+

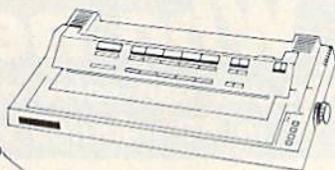
- COMMODORE READY
- FULL GRAPHICS
- NEAR LETTER QUALITY



**\$199<sup>95</sup>**

### RITEMAN 11

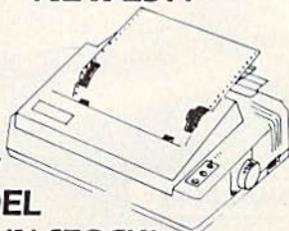
- 10 INCH CARRIAGE
- 160 C.P.S.
- 8K BUFFER
- NEAR LETTER QUALITY
- FULL GRAPHICS



**\$229<sup>95</sup>**



**star**  
MICRONICS  
NEWEST!



**NEW MODEL NOW IN STOCK!**

**\$179<sup>95</sup>**  
**LV 1210**

- 120 CPS
- DOT MATRIX
- FRICTION & TRACTOR FEED
- NEAR LETTER QUALITY
- CONTINUOUS UNDERLINE

WE ARE AN AUTHORIZED STAR REPAIR CENTER  
**CALL FOR PRICES**

**commodore**

1571 DISC DRIVE  
**\$239<sup>95</sup>**

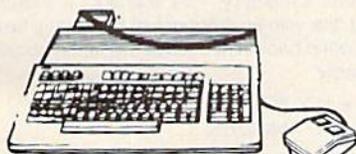
### ALSO AVAILABLE RITEMAN 15

- 15 INCH CARRIAGE
- 160 C.P.S.
- 8K BUFFER
- NEAR LETTER QUALITY
- FULL GRAPHICS

**\$329<sup>95</sup>**

**commodore**

1902 A MONITOR  
**CALL FOR PRICE**



**commodore**  
128  
PERSONAL COMPUTER  
**\$259<sup>95</sup>**

### MEMOREX SPECIAL WORK STATION



• 20 Disks • Disk Case  
**YOUR COST \$18<sup>95</sup>**

### GEOS™

GRAPHIC ENVIRONMENT  
OPERATING SYSTEM

- INCLUDES
- 5 Different Fonts
  - deskTop
  - geoPaint
  - geoWrite
  - Desk Accessories

FOR THE COMMODORE 64  
**CALL FOR PRICE**

### EPYX SPECIALI KARATE - NEW \$19<sup>95</sup>

- |                                |                           |                 |
|--------------------------------|---------------------------|-----------------|
| Karate                         | Kronis Rift - Lucas Games | Temple of Aspha |
| Eidolon - Lucas Games          | Trilogy                   |                 |
| Bailblazer - Lucas Games       | Jet Combat                |                 |
| Rescue Fractalus - Lucas Games | Simulator                 |                 |
| Games                          | GI Joe                    |                 |
| Fastload                       | Summer Games I or II      |                 |
| Wintergames                    | Barbie                    |                 |
| Hot Wheels                     | Baseball                  |                 |



**commodore 64z PACKAGE**  
INCLUDES:  
• Commodore 64 Computer  
• Commodore 1541 Disc Drive  
• A Color Monitor with Cables  
**CALL FOR PRICE**

### Paperback Writer 128



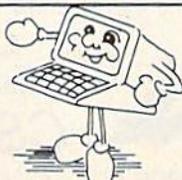
Paperback Filer 128  
Paperback Planner 128  
YOUR CHOICE  
**\$29<sup>95</sup>**

for the Commodore 128

IN N.Y. STATE CALL TOLL FREE  
**1-800-548-0009**  
**1-800-631-1003**  
OUT OF STATE CALL  
**1-800-221-2760**



**COMPUTER**  
CENTERS OF AMERICA  
81 TERMINAL DRIVE  
PLAINVIEW, NY 11803



\*IN CONTINENTAL USA ONLY. APO PLUS FPO EXTRA

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.

# COMB

Authorized Liquidator



**FACTORY  
NEW!  
FIRST  
QUALITY!**

## COMMODORE® VICMODEM™

- Use with the Commodore® C64™, the SX-64 or the VIC-20 Computer.
- Bell 103 Compatible.
- Full Duplex; 300 Baud.
- Manual Dial Direct Connecting.
- FCC Registered.

This Modem is **LOW liquidation** priced because it was closed out by Commodore®. Add it to your computer for access to timely financial information, news and reference libraries...as near as your phone! An affordable introduction to phone/computer services; and you can communicate with computer users who also own modems!

Use with data cassette (included), or with terminal program software, available at computer stores.

**90-Day Limited Factory Warranty.**

Mfr. List Price . . . . . **\$59.00**

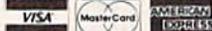
Liquidation  
Priced At Only . . . . . **\$19**

Item H-1678-7041-072

Shipping, handling: \$4.00 each

Commodore is a registered trademark of Commodore Electronics, Ltd.

Credit card customers can order by phone,  
24 hours a day,  
7 days a week.



**Toll-Free: 1-800-328-0609**

Sales outside the 48 contiguous states are subject to special conditions. Please call or write to inquire.

SEND TO: Item H-1678  
 C.O.M.B. Direct Marketing Corp.  
 1405 Xenium Lane No./Minneapolis, MN 55441-4494  
 Send      Modem(s). Item H-1550-7041-072 at \$19 each plus \$4 each for shipping, handling. (Minnesota residents add 6% sales tax. Sorry, no C.O.D. orders.)  
 My check or money order is enclosed. (No delays in processing orders paid by Check.)  
 Charge:  VISA®  MasterCard®  American Express®  
 Acct. No. \_\_\_\_\_ Exp. \_\_\_\_\_  
 PLEASE PRINT CLEARLY  
 Name \_\_\_\_\_  
 Address \_\_\_\_\_  
 City \_\_\_\_\_  
 State \_\_\_\_\_ ZIP \_\_\_\_\_  
 Phone (\_\_\_\_) \_\_\_\_\_  
 Sign Here \_\_\_\_\_

COMB COMB COMB



## Who needs this?

When you can solve disk drive alignment problems in 60 minutes with the CSM program.

**Disk drive alignment problems?  
Drive out of alignment again?  
Tired of waiting two weeks or more to get your drive fixed??**

### WE HAVE THE ANSWER !!

With the 1541 DISK DRIVE ALIGNMENT PROGRAM you can align the drive yourself in an hour or so. Not only that, you can do it at home AND no special equipment is required. Anyone with average mechanical skills can do it!!

**1541 DISK DRIVE ALIGNMENT PROGRAM - VERSION 2.0 - \$44.95 plus shipping**

### CARTRIDGE BACKER II

PACKAGE INCLUDES:

1. EXPANSION BOARD, PROGRAM DISK AND USER'S MANUAL.
2. CARTRIDGE BACKER software to back-up 99% of the most popular C-64 cartridges to disk.
3. SOFTWARE TO BACK UP MANY DISK PROGRAMS.
4. SOLD FOR ARCHIVAL USE ONLY!

**\$54.95 plus shipping**

### PROGRAM PROTECTION MANUAL FOR THE C-64 VOLUME II

Not just a third edition — a new and up-to-date manual covering the latest advances in program protection. Over 275 pages of valuable information. Topics include:

- ENCRYPTION AND DECRYPTION
- UNDOCUMENTED OPCODES
- GCR RECORDING
- CUSTOM DOS ROUTINES
- CARTRIDGES AND EPROMS
- PROTECTING YOUR OWN SOFTWARE
- TIPS FROM EXPERTS ON PROTECTION, BACKUP & MORE
- DISK INCLUDED

**\$34.95 plus shipping**

### PROGRAM PROTECTION MANUAL FOR THE C-64 VOLUME I

- A MUST FOR BEGINNERS
- THE PERFECT INTRODUCTION TO PROGRAM PROTECTION
- DISK INCLUDED

**\$29.95 plus shipping**

Read What Compute!'s Gazette had to say. (Oct., 1984)

"... with 1541 Disk Drive Alignment from CSM Software, you can fix it [the disk drive] yourself in an hour or so and the program will pay for itself the first time you use it...No technical expertise is required to accomplish the alignment procedures, and the manual accompanying the program thoroughly describes the procedures."

### SNAPSHOT 64™

SNAPSHOT 64 is a new utility backup program that literally takes a 'SNAPSHOT' of your computer's memory. This snapshot is then saved to disk with an autoboot so that it may be easily loaded back in. It does all this automatically and easily.

- EASY TO USE. TAKES ONLY 3-5 MINUTES.
- BACKS UP MANY MORE PROGRAMS THAN SIMILAR UTILITIES
- SOLD FOR ARCHIVAL PURPOSES ONLY
- EXCLUSIVE FEATURE - ALLOWS YOU TO STOP MOST PROGRAMS AT ANY POINT, EXAMINE THE COMPUTER'S MEMORY, AND THEN RESTART THE PROGRAM. THIS IS A VERY VALUABLE FEATURE FOR THE HACKER!!

**\$49.95 plus shipping**

### SNAPSHOT ENHANCEMENT DISK

The perfect addition to the best selling memory back up tool. Includes fast loader, cartridge maker, file examiner and more.

**\$14.00 plus shipping**

VISA AND MASTERCARD ACCEPTED

Shipping \$3.50 per item in U.S.; foreign orders extra

COMB is a registered trademark of Commodore Business Machines, Inc.

Available through your local software dealer or call:



## CSM SOFTWARE, INC.

POST OFFICE BOX 563, CROWN POINT IN. 46307, PHONE (219) 663-4335

# Software Discounters of America



Open Saturday

For Orders Only—1-800-225-7638  
PA Orders—1-800-223-7784  
Customer Service 412-361-5291

- Free shipping on orders over \$100 in continental USA
- No surcharge for VISA/MasterCard
- Your card is not charged until we ship

<b>ABACUS</b>	Paperclip w/Spell	Bard's Tale 2: The	Leather Goddesses of	w/70,000 word spell	U.S.A. A.F. (D)
Basic 128	64 or 128	Destiny Knight (D)	Phobos (D)	checker 64 or 128	Wings of War (D)
Cad Pak 64		Chessmaster 2000 (D)	Moonmist (D)	Fleet System 3 (128)	Wizard's Crown (D)
Cad Pak 128		Heart of Africa (D)	Planetfall (D)		
Chart pak 128		Lords of Conquest (D)	Sorcerer (D)	<b>RANDOM HOUSE</b>	<b>SUBLOGIC</b>
Cobol 64		Mail Order Monsters (D)	Suspect (D)	Charlie Brown's	Baseball (D)
Personal Portfolio		Movie Maker (D)	Trinity 128	ABC's (D)	Flight Simulator 2 (D)
Mgr 64		Music Const. Set (D)	Wishbringer (D)	Snoopy's Heading	F.S. Scenery Disks
Power Plan 64	CALL	One-on-One (D)	Zork 1 (D)	Machine (D)	Football (D)
Super C 128	FOR	Pinball Const. Set (D)	Zork 2 or 3 (D)	Snoopy Writer (D)	Jet (D)
Super Pascal 64	PRICES	Racing Dest. Set (D)		Typing Is A Ball	
		Seven Cities of Gold (D)	<b>INTRACORP</b>	Charlie Brown (D)	<b>TELARIUM</b>
<b>ACCESS</b>		Skyfox (D)	Intracourse (Compatibility	Amazon (D)	Amazon (D)
Executive Leader Board		Super Boulder Dash (D)	& Analysis Modules)	Fahrenheit 451 (D)	Fahrenheit 451 (D)
Data Disk	\$14	Timothy Leary's	Intracourse (Compatibility	Dragon World (D)	Dragon World (D)
Leader Board Golf (D)	\$25	Mind Mirror (D)	Module)	Nine Princes in	Nine Princes in
Leader Board		Ultimate Wizard (D)	Intracourse (Analysis	Amber (D)	Amber (D)
Tourn. Disk #1	\$14	Prices too low to	Module)		
Mach 5 (R)	\$23	advertise!!		<b>TIMWORKS</b>	
Mach 128 (R)	\$33	Call	<b>MASTERTRONIC</b>	Accts. Payable (D)	Accts. Payable (D)
Tenth Frame (D)	\$25		Action Biker (D)	Accts. Receivable (D)	Accts. Receivable (D)
			Electra Glide (D)	Data Manager 2 (D)	Data Manager 2 (D)
<b>ACTIVISION</b>			Gates of Dawn (D)	Data Manager 128	Data Manager 128
Alter Ego (Male	\$33	<b>EPYX</b>	Infinity Machine (R)	Evelyn Wood	Evelyn Wood
or Female)		Barbie (D)	Kikstart (D)	Dynamic Reader (D)	Dynamic Reader (D)
Gamemaker Library Disks	\$14	Breakdance (D)	5-A-Side Soccer (D)	General Ledger (D)	General Ledger (D)
Sports	\$14	Champ. Wrestling (D)	Last V-8 (D)	Inventory Mgmt (D)	Inventory Mgmt (D)
Sci Fi	\$14	Destroyer (D)	Master of Magic (D)	Partner 64 (R)	Partner 64 (R)
Garry Kitchen's		Fast Load (R)	Ninja (D)	Partner 128 (R)	Partner 128 (R)
Gamemaker (D)	\$25	Impossible Mission (D)	Speed King (D)	Payroll Mgmt (D)	Payroll Mgmt (D)
Hacker 2 (D)	\$23	Movie Monster (D)	The Slugger (D)	Sales Analysis	Sales Analysis
Little Computer		Multipian 128	Vegas Jackpot (D)	Mgmt (D)	Mgmt (D)
People (D)	\$23	Pitstop II (D)		Swiftcalc/Sideways (D)	Swiftcalc/Sideways (D)
Music Studio (D)	\$23	Summer Games 2(D)	<b>MICROLEAGUE</b>	Sideways (128)	Sideways (128)
Murder on the		Super Cycle (D)	Baseball (D)	Sylvia Porter's Personal	Sylvia Porter's Personal
Mississippi (D)	\$23	Temple of Apshai	Box Score Stats (D)	Fin. Planner 64 (D)	Fin. Planner 64 (D)
		Trilogy (D)	General Manager (D)	Sylvia Porter's	Sylvia Porter's
<b>ACCOLADE</b>		Winter Games (D)	1985 Team Data Disk	Personal Financial	Personal Financial
Ace of Aces (D)	\$19	World Championship		Planner 128	Planner 128
Dambusters (D)	\$19	Karate (D)	<b>MICROPROSE</b>	Word Writer w/	Word Writer w/
Deceptor (D)	Call	World Games (D)	F-15 Strike Eagle (D)	Speller (D)	Speller (D)
Fight Night (D)	\$19	FIREBIRD	Gunship (D)	Word Speller (128)	Word Speller (128)
Hard Ball (D)	\$19	Colossus Chess 4 (D)	Kennedy Approach (D)	<b>UNISON WORLD</b>	<b>UNISON WORLD</b>
Law of the West (D)	\$19	Elite (D)	Silent Service (D)	Art Gallery 1 (D)	Art Gallery 1 (D)
PSI-5 Trading Co. (D)	\$19	Frankie Goes to	<b>MINDSCAPE</b>	Art Gallery 2 (D)	Art Gallery 2 (D)
		Hollywood (D)	Bank St. Music	Print Master (D)	Print Master (D)
<b>AMERICAN</b>		The Pawn (D)	Writer (D)	<b>WEEKLY READER</b>	<b>WEEKLY READER</b>
<b>EDUCATIONAL</b>		<b>FISHER PRICE</b>	Bank St. Storybook (D)	Stickbear ABC's (D)	Stickbear ABC's (D)
Biology (D)	\$12	Alpha Build (R)	Bob & Wrestle (D)	Stickbear Math (D)	Stickbear Math (D)
French (D)	\$12	Dance Fantasy (R)	Color Me: The Computer	Stickbear Numbers (D)	Stickbear Numbers (D)
Grammar (D)	\$12	Hop Along	Coloring Kit (D)	Stickbear Reading (D)	Stickbear Reading (D)
Science: Grades 3/4(D)	\$12	Counting (R)	Fairlight (D)	Stickbear Shapes (D)	Stickbear Shapes (D)
Science: Grades 5/6(D)	\$12	Linking Logic (R)	Great British	<b>WINDHAM CLASSICS</b>	<b>WINDHAM CLASSICS</b>
Science: Grades 7/8(D)	\$12	Memory Manor (R)	Software (D)	Alice in Wonderland (D)	Alice in Wonderland (D)
Spanish (D)	\$12	Number Tumbler (R)	Infiltrator (D)	Below the Root (D)	Below the Root (D)
U.S. Geography (D)	\$12	Sea Speller (R)	Perfect Score SAT (D)	Swiss Family	Swiss Family
World Geography (D)	\$12	<b>GAMESTAR</b>	Spell of Destruction (D)	Robinson (D)	Robinson (D)
World History (D)	\$12	Championship	The American Challenge	Treasure Island (D)	Treasure Island (D)
<b>ARTWORX</b>		Baseball '86 (D)	Sailing Simulation (D)	Wizard of Oz (D)	Wizard of Oz (D)
Beach Blanket		Champ. Basketball (D)	<b>MISC</b>	<b>ACCESSORIES</b>	<b>ACCESSORIES</b>
Volleyball (D)	\$12	Star Rank Boxing (D)	CSM 1541	Anchor 6420	Anchor 6420
Bridge 4.0 (D)	\$16	<b>HAYDEN</b>	Align Kit (D)	300 Baud Modem	300 Baud Modem
Equestrian Show		Sargon 3 (D)	Central Point	Bonus SS. DD	Bonus SS. DD
Jumper (D)	\$12	<b>HES</b>	Copy 2 (D)	Bonus DS. DD	Bonus DS. DD
Strip Poker (D)	\$21	Microsoft Multiplan (D)	Gato (D)	Compuserve Starter Kit	Compuserve Starter Kit
Data Disk #1 female	\$16	Millionaire (D)	Snapshot 64 (R)	(a \$25 Usage Credit)	(a \$25 Usage Credit)
Data Disk #2 male	\$16	Omniwriter w/Spell (D)	Superbase 64 (D)	Disk Case (Holds 50)	Disk Case (Holds 50)
Data Disk #3 female	\$16	Project Space	Superbase 128 (D)	Disk Drive Cleaner	Disk Drive Cleaner
<b>ARTWORX PX</b>		Station (D)	Superscript 64 (D)	Sakata 13" Color Comp	Sakata 13" Color Comp
Hole In One Golf (D)	\$7	<b>HI-TECH EXPRESSIONS</b>	Superscript 128 (D)	Monitor for C64	Monitor for C64
Pro Boxing (D)	\$7	Card Ware (D)	Superscript 64 (D)	Seikoshia SP1000VC 100	Seikoshia SP1000VC 100
<b>AVALON HILL</b>		Heart Ware (D)	VIP Term XL (D)	CPS Commodore direct	CPS Commodore direct
Super Bowl		Party Ware (D)	<b>ORIGIN</b>	connect dot matrix	connect dot matrix
Sunday (D)	\$19	Ware w/all Supply	Ultima 3 (D)	printer	printer
SBS 1984 Team Disk	\$14	Kit	Ultima 4 (D)	Wico Bat Handle	Wico Bat Handle
SBS 1985 Team Disk	\$14	<b>INFOCOM</b>	<b>PENGUIN/POLARWARE</b>	Wico Black Max	Wico Black Max
SBS Champs Disk	\$14	Ballyhoo (D)	Crimson Crown (D)	Wico Boss	Wico Boss
Spitfire '40 (D)	\$23	Cut Throats (D)	Graphics Magician	Hours: Eastern Time	Hours: Eastern Time
Title Bout (D)	\$19	Enchanter (D)	Painter (D)	Mon.-Fri. 9AM-5:30PM	Mon.-Fri. 9AM-5:30PM
Tournament Golf (D)	\$19	Hitchhiker's Guide to	Oo-Topos (D)	Sat. 10AM-4PM	Sat. 10AM-4PM
<b>BATTERIES INCLUDED</b>		the Galaxy (D)	Transylvania (D)		
Consultant (64 or 128)	\$39	Infidel (D)	<b>PROFESSIONAL</b>		
Home Pak (D)	\$33		<b>SOFTWARE</b>		
			Fleet System 2—W.P.		

P.O. BOX 111327—DEPT. CG—BLAWNOX, PA 15238

\*Please Read The Following Ordering Terms & Conditions Carefully Before Placing Your Order: Orders with cashiers check or money order shipped immediately. Personal & Company checks allow 3 weeks clearance. NO C.O.D.'s! Shipping: Continental U.S.A.—Orders under \$100 add \$3; free shipping on orders over \$100. AK, HI, FPO, APO—add \$5 on all orders. Canada & Puerto Rico—add \$10 on all orders. Sorry, no other international orders accepted! PA residents add 6% sales tax on the total amount of order including shipping charges! Prices subject to change without notice. REASONS FOR CALLING CUSTOMER SERVICE—412-361-5291 (1) Status of order or back order (2) If any merchandise purchased within 60 days from S.D. of A. is defective, please call for a return authorization number. Defective merchandise will be replaced with the same merchandise only! NO CREDITS! After 60 days please refer to the manufacturer's warranty included with the merchandise & return directly to the manufacturer. Customer service will not accept collect calls or calls on S.D. of A.'s 800# order lines!

# First, Fast... and Still the Best!

We're the first company to offer fast, expert Commodore service anywhere in the USA. And we're still the best!

For one low price, we repair all problems on most types of Commodore equipment. All regular repairs carry a 30-day warranty, with a full-year warranty available for only \$30 more. For preventive maintenance, we also offer a 1-Year service Contract, at a savings of \$20.00. Check our low prices!

	Repair with 30-day Warranty	Repair with 1-Year Warranty	1-Year Service Contract
C-64 or C-128 Computer	\$59	\$89	\$69
1541 or 1571 Drive	65	95	75
1702, 1802 or 1902 Monitor	75	105	85
MPS-801, 802, 1525 or 1526	59	89	69
1541 or 1571 alignment (only)	Just \$29.95		

And as an extra benefit — our repair customers are eligible for big discounts on software and hardware purchases.

**Call for best prices on Amiga, Okidata and Epson.**

## FREE PERMANENT FIX

A \$69.95 value — includes alignment and modification to stay in alignment. FREE for a limited time with any 1541 repair!

For fast, expert service . . .

Just call our toll free number today!

# 1-800-624-6794

(For your convenience, have your equipment serial number and credit number ready. Checks and money orders also accepted). Add \$7.50 for shipping — includes two-day air service anywhere in the Continental USA. For APO-FPO and P.O. Box addresses, add \$15.00 for shipping (excluding air freight).



3402-E W. Wendover Ave., Greensboro, NC 27407  
1-800-624-6794 or (919) 299-0391

## ELBE: The Echo Lake BASIC Enhancement

# \$49<sup>95</sup>\*

spreadsheet  
POWER

statistical  
POWER

FOR THE  
**COMMODORE 64®**  
OR THE  
**COMMODORE 128™**

- Format memory into up to 3800 records
- Type data directly into record formatted memory
- Access your data directly through **BASIC**
- Process your data through **ELBE'S** statistical routines
- Sorts
- Descriptive statistics
- Analyses of variance
- Analyses of covariance
- Correlations
- Multiple regressions
- Crosstabulations

send check or money order to:

Echo Lake Laboratories • Box 169 • Pascoag, RI 02859-0169

\* R.I. residents add 6% sales tax

Commodore 64 and Commodore 128 are trademarks of Commodore Electronics, Ltd.

# COMMODORE

PERSONAL  
COMPUTER

# 128

CALL FOR  
LATEST  
PRICE



\*COMMODORE 128 is a trademark of Commodore Electronics, Ltd.\*

1571 DISK DRIVE  
CALL FOR LATEST PRICE

1670  
MODEM ..... **139**

1902 MONITOR  
CALL FOR LATEST PRICE

1750 RAM  
EXPANDER ... **169**

MPS 1000  
PRINTER ..... **249**

1350 MOUSE  
CONTROLLER .. **42.95**

# COMMODORE 64C



NEW  
COMMODORE 64C  
WITH GEOS.. **189**

1541 DISK  
DRIVE ..... **CALL**

1802C  
MONITOR .... **209**

1541C DISK  
DRIVE ..... **CALL**

1660  
MODEM ... **49.95**

EST. 1982

# ComputAbility™

P.O. 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 INFORMATION,  
ORDER INQUIRIES, OR FOR WIS. ORDERS  
**414-351-2007**

ORDERING INFORMATION FOR FAST DELIVERY SEND CASHIER'S CHECK MONEY ORDER OR DIRECT BANK TRANSFER. PERSONAL AND COMPANY CHECKS ALLOW 14 BUSINESS DAYS TO CLEAR. CHARGES FOR C.O.D. ARE \$3.00. IN CONTINENTAL U.S.A. INCLUDE 4% SHIPPING ON ALL ORDERS. MINIMUM \$4.00. MASTER CARD & VISA ORDERS PLEASE INCLUDE CARD #, EXPIRATION DATE, AND SIGNATURE. WI RESIDENTS PLEASE ADD 5% SALES TAX. HI., AK, FPO, APO, PUERTO RICO AND CANADIAN ORDERS PLEASE ADD MINIMUM 5% SHIPPING AND HANDLING. MINIMUM \$5.00. ALL OTHER FOREIGN ORDERS PLEASE ADD MINIMUM 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 RAH OR YOUR RETURN WILL NOT BE ACCEPTED FOR REPLACEMENT OR REPAIR. PRICES AND AVAILABILITY SUBJECT TO CHANGE WITHOUT NOTICE.

NOTE ON ALL ORDERS OUTSIDE CONTINENTAL U.S.A. WE SHIP ALL ORDERS FIRST CLASS INSURED U.S. MAIL. IF SHIPPING CHARGES EXCEED THE MINIMUM AMOUNT YOU WILL BE CHARGED THE ADDITIONAL AMOUNT TO GET YOUR PACKAGE TO YOU QUICKLY AND SAFELY.



**NO SURCHARGE ON CREDIT CARDS**



**NX-10 PRINTER & XETEC SUPER GRAPHIC INTERFACE**  
**\$299**

This is a SHIPPED PRICE anywhere in continental USA

**PANASONIC 1091 & XETEC SUPER GRAPHIC INTERFACE**  
**\$309**

This is a SHIPPED PRICE anywhere in continental USA

**C-128 Computer 1902A RGB Monitor**  
**1571 Disk Drive 1750 RAM Expander**  
**1670 Modem 1350 Mouse**  
**MPS 1000 Printer**

Call for Latest Prices

**AMIGA COMPUTER SYSTEM**  
Call for Price and Availability



**NX-10** ..... Call  
**NL-10C** ..... Call

**NX-10C** ..... Call  
**SD-10** ..... 339  
**SD-15** ..... 449  
**SR-15** ..... 369  
**SG-15** ..... Call

**Commodore 64C W/Geos**  
**1541C Disk Drive**  
**1802C Monitor**  
**1581C 3.5 Disk Drive**  
Call for Latest Prices

**AMIGA SOFTWARE**

**PRINTERS**

- Legend 1080 ..... 209
- Legend 808 ..... 169
- Panasonic 1091 ..... 239
- Panasonic 1080 ..... 215
- Silver Reed ..... Call
- Epson ..... Call
- Juki 5510 ..... Call
- Toshiba 321 ..... 529

**MONITORS**

- NAP Amber ..... 89.95
- Commodore 1702 ..... Call
- Goldstar Color ..... Call
- Teknika RGB ..... Call
- Magnovox RGB ..... Call
- Commodore 1902 ..... 289

- Hacker ..... 29.95
- Mindshadow ..... 29.95
- Borrowed Time ..... 29.95
- Liti Comp. People ..... 34.95
- Music Studio ..... 39.95
- MasterType ..... 27.95
- Keyboard Cadet ..... 29.95
- VIP Professional ..... Call
- Racter ..... 29.95
- Analyze ..... 69.95
- On-Line ..... 49.95
- Scribble ..... 69.95
- BBS-PC Bulletin Board ..... 69.95
- Archon ..... 29.95
- One on One ..... 29.95
- 7 Cities of Gold ..... 29.95
- Starfleet I ..... 38.95
- Microleague Baseball ..... 39.95
- Impact ..... 129.95
- Computer Baseball ..... 27.95
- Shanghai ..... 29.95

- Skyfox ..... 29.95
- Artie Fox ..... 29.95
- Marble Madness ..... 34.95
- Return/Atlantis ..... 29.95
- Fin. Cookbook ..... 34.95
- Adventure Const. .... 29.95
- Chessmaster 2000 ..... 32.95
- Instant Music ..... 34.95
- Deluxe Print ..... 69.95
- Deluxe Video ..... 69.95
- Deluxe Paint ..... 69.95
- Paint Utility 1 ..... 20.95
- Paint Utility 2 ..... 20.95
- Aegis Draw ..... 134.95
- Aegis Animator/Images ..... 99.95
- The Pawn ..... 29.95
- Organize ..... 69.95
- Printmaster ..... 32.95
- Art Gallery 1 or 2 ..... 19.95
- King Quest II ..... 34.95
- Black Cauldron ..... 27.95

- Ultima 3 ..... 41.95
- Maxiplan ..... 99.95
- Maxidisk ..... 49.95
- Maxicom ..... 39.95
- Flight Simulator II ..... 34.95
- Silent Service ..... 27.95
- Mean 16 ..... 34.95
- Leader Board ..... 29.95
- Winter Games ..... 27.95
- Rogue ..... 27.95
- Apsahai Trilogy ..... 27.95
- Strip Poker ..... 29.95
- Bratallas ..... 34.95
- Halley's Project ..... 29.95
- Kid Talk ..... 39.95
- Speller Bee ..... 39.95
- Paper Clip Elite ..... 84.95
- Degas Elite ..... 52.95
- Jet ..... 34.95
- Hacker II ..... 34.95
- Zumatont ..... 23.95

- Diablo ..... 23.95
- Hex ..... 27.95
- Delta Patrol ..... 19.95
- Monkey Business ..... 19.95
- Winnie The Pooh ..... 19.95
- Infocom ..... Call
- DB Man ..... 99.95
- Lattice ..... Call
- Amega I Meg/Upgrade ..... Call
- A Filer ..... 34.95
- A Report ..... 34.95
- A Term ..... 34.95
- A Disk ..... 20.95
- Gizmo ..... 34.95
- Digital Link ..... 54.95
- Logistics ..... 169.95
- Autoduel ..... 34.95
- Bard's Tale ..... 34.95
- Music Construction 2.0 ..... 69.95
- Aegis Art Vol. I ..... 23.95
- Coveted Mirror ..... 20.95

**XETEC SUPER-GRAPHIC INTERFACE**  
**69.95**

**SPECIAL GOLDSTAR 13" COLOR COMPOSITE MONITOR**  
**134.95 delivered**

**MODEMS**

- Commodore 1660 ..... 49.95
- Westridge 6420 ..... Call
- Commodore 1670 ..... 139

**COMMODORE SOFTWARE**

**MISCELLANEOUS 64**

- Paper Clip/Spell ..... 49.95
- Consultant ..... 39.95
- B.I. 80 Card ..... 59.95
- Breakers ..... 27.95
- Reach For The Stars ..... 29.95
- Carriers at War ..... 34.95
- Karateka ..... 20.95
- Loderunner's Rescue ..... 20.95
- Fleet System II ..... 44.95
- Sublogic Football ..... 29.95
- Printmaster ..... 21.95
- Art Gallery 1 or 2 ..... 17.95
- Superbase 64 ..... 47.95
- Ultima II ..... 39.95
- Ultima III ..... 34.95
- Ultima IV ..... 41.95
- Newsroom ..... 34.95
- Clip Art I ..... 19.95
- Clip Art II ..... 27.95
- Graphics Expander ..... 23.95
- Certificate Maker ..... 34.95
- Flight Simulator II ..... 34.95
- Brimstone ..... 27.95
- The Hobbitt ..... 23.95
- Animation Station ..... 49.95
- Karate Champ ..... 23.95
- Kung Fu Master ..... 23.95
- Commando ..... 23.95
- Tag Team Wrestling ..... 23.95
- Sublogic Baseball ..... 34.95
- Blazing Paddles ..... 24.95
- Math Blaster ..... 34.95
- Hardball ..... 19.95
- Fight Night ..... 19.95
- PSI 5 Trading Co. .... 19.95
- Deceptor ..... 19.95
- Ace of Aces ..... 19.95
- Accolade Football ..... 19.95
- Kill Until Dead ..... 19.95
- Jet ..... 29.95
- Alternate Reality/City ..... 24.95
- Alt. Reality/Dungeon ..... 24.95
- Mercenary ..... 18.95
- 221 Baker Street ..... 18.95
- Neverending Story ..... 18.95
- Fontmaster 2 ..... 32.95
- Gato ..... 20.95
- Star Rank Boxing ..... 20.95
- On Court Tennis ..... 20.95
- The Pawn ..... 29.95
- A.C.E. .... 16.95
- Geos ..... 39.95
- Light Lab ..... 34.95
- Disney Comics Strip ..... 23.95
- Disney Card & Party ..... 23.95
- Dr. Ruth's Game/Sex ..... 23.95
- Lasser Money Mgr. .... 47.95
- Guild of Thieves ..... 29.95
- WWF Micro Wrestling ..... 27.95
- Starfleet I ..... 34.95
- Partner 64 ..... 39.95
- Type ..... 27.95
- Shard of Spring ..... 27.95
- Roadwar 2000 ..... 27.95
- Battle Front ..... 27.95
- Elite ..... 23.95

**COMMODORE 128 SOFTWARE**

- Superbase 128 ..... 69.95
- Swiftcalc w/Sideway ..... 49.95
- Wordwriter 128 ..... 49.95
- Data Manager II ..... 49.95
- Fleet System III ..... 54.95

- Home Pak ..... 34.95
- Superscript 128/Spell ..... 54.95
- Perfect Writer ..... 49.95
- Sylvia Porter-128 ..... 49.95
- Paperback Writer ..... 32.95
- Paperback Filer ..... 32.95

- Basic Compiler 128 ..... 44.95
- Chart-Pak 128 ..... 31.95
- Card-Pak 128 ..... 44.95
- Super C Compiler ..... 59.95
- Super Pascal ..... 44.95

- Mach V/128 ..... 32.95
- Perfect Filter ..... 49.95
- Trinity ..... 27.95
- Paperback Planner ..... 32.95
- Vizistar 128 ..... Call
- Partner 128 ..... 49.95

**SUPER TIMEWORKS SPECIALS\***  
FOR C-64/C-128

- Data Manager 2 ..... 31.95
- Wordwriter/Spell ..... 31.95
- Swiftcalc w/Sideways ..... 31.95
- Sylvia Porter 64 ..... 31.95
- Sideways 64/128 ..... 18.95
- Partner 64 ..... 37.95
- Business Systems-Ea. .... 37.95
- Data Manager 128 ..... 42.95
- Basic Compiler 128 ..... 44.95
- Chart-Pak 128 ..... 31.95
- Card-Pak 128 ..... 44.95
- Super C Compiler ..... 59.95
- Super Pascal ..... 44.95
- Mach V/128 ..... 32.95
- Perfect Filter ..... 49.95
- Trinity ..... 27.95
- Paperback Planner ..... 32.95
- Vizistar 128 ..... Call
- Partner 128 ..... 49.95

\*Super Special Prices Effective Now Thru November 30, 1986

**COMMODORE 64 SOFTWARE**

**ABACUS 64**

- Chartpak ..... 31.95
- Cad-Pak ..... 31.95
- Powerplan ..... 31.95
- Super C Compiler ..... 59.95
- Super Pascal ..... 44.95
- Basic Compiler ..... 31.95
- Forth ..... 31.95

**ACCESS**

- Mach V-Cart ..... 21.95
- Leader Board ..... 24.95
- Tournament Disk ..... 16.95
- Tenth Frame ..... 24.95
- Executive Disk ..... 16.95

**ACTIVISION**

- Gamemaker ..... 27.95
- Hacker ..... 20.95
- Computer Liti. People ..... 23.95
- Alter Ego ..... 34.95
- Borrowed Time ..... 20.95
- 2 on 2 Basketball ..... 23.95
- Murder/Mississippi ..... 23.95
- Hacker II ..... 23.95
- Tass Times ..... 23.95
- Shanghai ..... 23.95
- Champ. Baseball '86 ..... 23.95
- Game. Sports Libr. .... Call
- Game. Science Fiction ..... Call

**BRODERBUND**

- Bank Street Series-Ea. .... 34.95
- Graph Libr. 1, 2, 3 or 4 ..... 17.95
- Prt. Shop Companion ..... 27.95
- Toy Shop ..... 39.95
- Holiday Graph Library ..... 17.95

**ELECTRONIC ARTS**

- Archon-D ..... 11.95
- Archon II-D ..... 24.95
- Mule-D ..... 11.95
- Murder/Zinderneuf-D ..... 19.95
- Music Construction-D ..... 11.95
- Pinball Constr.-D ..... 11.95
- Skyfox-D ..... 24.95
- One on One-D ..... 11.95
- Seven Cities of Gold-D ..... 11.95
- Mail Ord. Monsters-D ..... 11.95
- Marble Madness ..... 24.95
- Artic Fox ..... 24.95
- Amnesia ..... 27.95
- Bard's Tale II ..... 27.95
- Moebius ..... 27.95
- Murder Party ..... 24.95
- Robot Rascal ..... 27.95
- Ultima I ..... 27.95
- Racing Destruction-D ..... 11.95
- Adventure Constr.-D ..... 29.95
- Fin. Cookbook-D ..... 29.95
- Bard's Tale ..... 27.95
- Europe Ablaze ..... 33.95
- Touchdown Football ..... 11.95
- Lords of Conquest ..... 27.95
- Chessmaster 2000 ..... 27.95
- Ultimate Wizard ..... 24.95
- Super Boulderdash ..... 11.95
- Autoduel ..... 34.95
- Ogre ..... 27.95
- Heart of Africa ..... 11.95

**EPYX**

- Fast Load-Cart ..... 24.95
- The Eldolon-D ..... 24.95
- Winter Games ..... 24.95
- Summer Games II-D ..... 24.95
- Multiplan 64/128 ..... 44.95
- Vorpal Utility ..... 22.95
- Movie Monster ..... 24.95
- World Karate ..... 19.95
- Super Cycle ..... 24.95
- Champion Wrestling ..... 24.95
- World Games ..... 24.95
- Destroyer ..... 24.95

**INFOCOM**

- Deadline-D ..... 29.95
- Enchanter-D ..... 24.95
- Infidel-D ..... 27.95
- Planetfall-D ..... 27.95
- Sorcerer-D ..... 27.95
- Starcross-D ..... 29.95
- Suspended-D ..... 29.95
- Witness-D ..... 24.95
- Sea Stalker-D ..... 24.95
- Zork I, II or III-D ..... 27.95
- Wishbringer-D ..... 24.95
- Spellbreaker-D ..... 29.95
- Ballyhoo ..... 27.95
- Leather Goddess ..... 23.95
- Moonmist ..... 27.95

**MICROPROSE**

- Silent Service-D ..... 23.95
- Gunship-D ..... 23.95
- Accrojet-D ..... 23.95
- F-15 Strike Eagle-D ..... 23.95
- Desicon in Desert ..... 27.95
- Kennedy Approach-D ..... 23.95
- Crusade in Europe-D ..... 27.95
- Conflict in Vietnam ..... 27.95

**MINDSCAPE**

- Crossword Magic ..... 34.95
- Perfect Score ..... 49.95
- Halley Project ..... 20.95
- Quake Minus One ..... 20.95
- Shadowfire ..... 20.95
- Lords of Midnight ..... 20.95

**MINDSCAPE**

- Infiltrator ..... 20.95
- Bop N' Wrestle ..... 20.95
- Spell/Destruction ..... 20.95
- Pixel's Gamemaker ..... 20.95
- Dick Francis ..... 27.95
- American Challenge ..... 20.95

**SSI**

- Wizard's Crown ..... 27.95
- 50 Mission Crush-D ..... 24.95
- Cosmic Balance-D ..... 24.95
- Germany 1985-D ..... 37.95
- Professional Golf-D ..... 24.95
- Broadsides-D ..... 24.95
- Question-D ..... 24.95
- Computer Qtrback-D ..... 24.95
- Field of Fire-D ..... 24.95
- Carrier Force-D ..... 37.95
- Breakthru Ardennes-D ..... 37.95
- Computer Ambush-D ..... 37.95
- Kampfgruppe-D ..... 37.95
- Oper. MKI. Garden-D ..... 32.95
- Gemstone Warrior-D ..... 21.95
- Imperium Galact.-D ..... 24.95
- Phantasia-D ..... 24.95
- Battalion Comm.-D ..... 24.95
- Fighter Command-D ..... 37.95
- Norway 1985-D ..... 21.95
- Wings of War-D ..... 24.95
- Mech Brigade-D ..... 37.95
- Battle/Antietam ..... 32.95
- Panzer Grenider ..... 24.95
- USAAF ..... 37.95
- Phantasia II ..... 27.95
- Rings of Ziffin ..... 27.95
- Battle Group ..... 39.95
- Nam ..... 27.95
- Gettysburg ..... 39.95

EST. 1982

*ComputAbility*

P.O. 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 or money order. Personal and company checks allow 14 business days to clear. School P.O.'s welcome. C.O.D. orders are \$3.00. In Continental U.S.A. include \$3.00 for software orders, 4% shipping for hardware, minimum \$4.00. Master Card and Visa orders please include card #, expiration date and signature. WI residents please include 5% sales tax. HI, AK, FPO, APO, Puerto Rico and Canadian orders, please add 5% shipping, minimum \$5.00. All other foreign orders add 15% shipping, minimum \$10.00. All orders shipped outside the Continental U.S.A. are shipped first class insured U.S. mail. If foreign shipping charges exceed the minimum amount, you will be charged the additional amount to get your package to you quickly and safely. 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 R.A.# or your return will not be accepted. Prices and availability subject to change without notice.



**No surcharge for MasterCard or Visa**



## The Handicapper

Use your **Commodore 64/128** to improve your performance at the track! Programs for **Thoroughbred, Harness and Greyhound** racing rank the horses or dogs in each race quickly and easily. All the information is readily available from the *Racing Form*, harness or dog track program.

**Thoroughbred factors** include speed, distance, past performance, weight, class, jockey's record, beaten favorite and post position. **Harness factors** include speed, post position, driver's record, breaking tendencies, class, parked-out signs and beaten favorite. **Greyhound factors** include speed, past performance, maneuvering ability, favorite box, class, kennel record, beaten favorite and breaking ability.

Complete instructions and wagering guide included. **Thoroughbred, Harness or Greyhound Handicappers**, \$39.95 each on tape or disk. Any two for \$59.95 or all three for \$79.95.



**Federal Hill Software**  
8134 Scotts Level Rd.  
Baltimore, MD 21208



Toll Free Orders 800-628-2828 Ext. 850  
For Information 301-521-4886

C-64™ • VIC™ • SX-64™ • C-128™ • Plus 4™ • C-16™ • B-128™ • PET™ • CBM™ • LCD™

## One disk, 25 business programs, \$19.95

The **Intelligent Software Package** is the one product for your Commodore that can take care of all your data processing needs.

**Customers write:** "... accolades for the authors. This is as slick a deal as I have seen and more than adequate for all except fancy presentations. The best thing is the ease of use..."

"I have come to consider these programs among the most valuable pieces of software I own."

There are no hidden fees for shipping or documentation, and no clubs to join. The package is not public domain software, and is sold only direct to customers by mail: it supports all available printers, and will run on any Commodore computer [except Amiga] with a minimum of 10k RAM, including the C-128 in C-128 mode.

What you get when you order the Package:

**Database**—A complete database manager. All fields completely user-definable. Can be used for any number of tasks, including accounting, checkbook and tax records, mailing lists, inventory control, catalog maintenance, or as an electronic rolodex. A customer writes: "I am especially impressed with Database, and have used it to replace a half-dozen other 'database'-type programs I had been using."

**Word Processor**—A full-featured menu-driven word processor. Allows full control over margins, spacing, paging, indentation, and justification. "Highly recommended."—Midnite Software Gazette. "Provides good basic features."—Compute's Gazette.

**Copycalc**—An electronic spreadsheet. "Excellent program for budgeting, estimating, or any math-oriented use... well worth the money. Highly recommended."—Midnite Software Gazette.

**ReportGen**—creates form letters, mailing labels, etc.

**ReportMerge**—creates statements invoices.

**Baseball Stats**—compiles team batting statistics.

**Index**—indexes W/P's text files.

**Wordcount**—counts words in a text file.

**WPConvert**—converts files to other WP formats.

**DBMerge**—facilitates relational D/B applications.

**DBStat, DBStat2**—analyze D/B files.

**ASCII**—converts text files into program files.

**Checkbook**—reconciles checkbook.

**Inventory**—Maintains inventory records.

**Paper Route**—A/R for paper route.

**Loan Analysis**—computes finance terms, prints schedules.

**Breakeven**—computes break-even analysis.

**Depreciation**—creates depreciation schedules.

**Labeler**—creates labels.

**File Copier**—copies sequential, program files.

**Correlation**—calculates statistical correlation.

Also other Database and Word Processor utilities.

To order, send name, address, and \$19.95 to address below. Please specify regular (1541/1571/2040/4040/2031) disk, 8050 disk, or cassette (cassette not available for Plus 4 or C-16). Add \$3 for credit card or COD orders; Calif. residents add 6%. No personal checks from outside USA. A sampling of program output is available for \$1. **Tear this ad out and keep it handy!**

## Intelligent Software

Quality Software since 1982

Box A Dept. X-9  
San Anselmo, CA 94960  
[415] 457-6153

## CLOCK/CALENDAR

Cartridge for your  
Commodore 64 or 128 Computer

Combines three most needed functions in a single plug-in cartridge:

- ★ Battery-Backed Clock/Calendar
- ★ Battery-Backed RAM
- ★ Application ROM Capability

### Features:

- Crystal controlled clock keeps time in seconds, minutes, hours, day of the week, month and year with auto leap year.
- 8K bytes of battery-backed RAM included.
- Application ROM socket handles up to 128K bytes of application software in EPROM.
- Operating software in ROM included.
- Automatic recognition of computer type (64 or 128) on power-up or reset.
- Maintains power-off, power-on log in RAM for dedicated control applications.
- 30 day unconditional money-back guarantee.

CCSZ Cartridge . . . . . \$49.95

Shipping & Handling:

UPS Surface (USA Only) . . . . . \$3.00  
Foreign (Air Mail Only) . . . . . \$13.00

Master Card, Visa, and Amex Welcome

To Order Toll Free 800-421-7731  
From California 800-421-7748  
Tech Support 916-823-3284



**JASON-RANHEIM**

1805 Industrial Drive  
Auburn, CA USA 95603

## DISCOVER THE SECRETS OF LIFE WITH YOUR C64/128!

**ULTIMATE LIFE:** The oldest and most fascinating computer game of them all is now available for the C64/128: *The Game of Life*. Played on mini-computers by dedicated hackers since the early seventies, it is now available in a new version unlike any other.

Enter the *Life Universe* — a world of constantly changing abstract images and phantasmagorical growth. Create new *Life* forms. Experiment with the rules of existence and watch how growth in your *Life* universe changes. See how a random universe evolves. Use *Life* to create hypnotic video displays, and use it to create amazing printed graphics.

*Ultimate Life* is the most complete implementation of the *Game of Life* ever created for a microcomputer. It's simple to use, yet powerful and fast enough to serve as a research tool.

### Features include:

- Menu-driven operation
- Fully integrated dual-resolution play
- Full control of the rules of the game
- Complete printer control for Epson-compatibles
- Full disk access
- Printer and disk macros
- Context sensitive help
- Detailed typeset documentation with step-by-step tutorial and reference section

All orders are shipped by first class mail within 24 hours of receiving your check or money order.

**JENDAY**  
SOFTWARE

DEALER INQUIRIES INVITED

Ultimate Life: \$24.95

Add \$2.00 postage and handling.  
California residents add \$1.50 sales tax.

P.O. BOX 4313-G  
GARDEN GROVE, CA 92642  
(714) 636-3378

# "TAKE A BYTE OUT OF THIS"

## ABACUS

Ada Training Course	\$29.95
Basic 128	42.95
Basic 64	29.95
Cadpak 128	45.95
Cadpak 64	29.95
Cadpak 64 w/Light Pen	69.95
Chartpak 128	29.95
Chartpak 64	29.95
Cobol	29.95
Personal Portfolio Manager	29.95
Powerplan	29.95
Super C Compiler 64/128	42.95
Super Pascal	45.95
Technical Analysis System	45.95

## BRODERBUND

Where in the World	
is Carmen Sandiego	29.95
P/S Library 1-2-3	15.95
Print Shop	26.95
Print Shop Companion	21.95

## MICRO LEAGUE

General Managers Disk	\$24.95
Micro League Baseball	24.95
Team Disks	16.95

## RIBBON

Axiom Elite 5 LCD	\$ 5.95
Brother 15, 25, 35	5.95
Commodore 1525	6.95
Commodore 1526	6.75
Epson 185	6.95
Epson 85	4.95
Epson mx, fx, rx 100	6.95
Epson mx, fx, rx, 1x 80	4.75
Gorilla Banana	6.95
Juki 6000	4.95
Juki 6100	3.95
Legend 880, 1080, 808	6.75
MPS 801	5.75
MPS 803	6.95
OKI 182, 192	9.75
OKI 82, 92, 83, 93	2.25
SG 10-15	2.25

(Min. 6 per order)

## INFOCOM

Ballyhoo	\$24.95
Enchanter	21.95
Hitchhiker's Guide	21.95
Invisiclues (all)	6.00
Spellbreaker	26.95
Zork 1-2-3	25.95
Trinity 128	24.95

## PRECISION

Superbase 128	\$56.95
Superbase 64	46.95
Superscript 128	47.95
Superscript 64	46.95

## AICP

Disk Drive Cleaner	\$ 7.95
Disks (10)	7.95
Printer Head Cleaner	7.95

## NEW RELEASES

Pure Stat Baseball	34.95
Partner 1 2 8	42.95
Ace	14.95
Graphic Expander	21.95
Murder on the Mississippi	21.95
Where in the World	
is Carmen Sandiego	21.95
Chessmaster 2000	26.95
Commando	21.95
Geos	37.95
Trinity 128	37.95
Super Cycle	24.95

## DIGITAL SOLUTIONS

Pocket Filer 128	\$31.95
Pocket Filer 64	24.95
Pocket Planner 128	31.95
Pocket Planner 64	24.95
Pocket Writer 128	31.95
Pocket Writer 64	24.95

## MICROPROSE

Conflict in Vietnam	\$24.95
Crusade in Europe	24.95
F-15 Strike Eagle	21.95
Silent Service	21.95

## SPRINGBOARD

Clip Art I	\$20.95
Clip Art II	24.95
Newsroom	30.95
Graphic Expander	21.95

## ACCESS

Leader Board	\$24.95
Leader Board Tournament Disk	14.95
Mach 128	30.95
Mach 5	21.95

## ELA

Bard's Tale	\$24.95
Lords of Conquest	24.95
Movie Maker	24.95
Chessmaster 2000	26.95
Mind Mirror	21.95
Ultimate Wizard	19.95

## TIMEWORKS

Data Manager 128	\$42.95
Data Manager II	29.95
Partner 128	42.95
Swift Calc 128 w/Sideways	42.95
Swift Calc 64 w/Sideways	29.95
Word Writer 128 w/Speller	42.95
Word Writer 64 w/Speller	29.95

## ACTIVISION

Alter Ego	\$29.95
Cross Country Road Race	19.95
Mindshadow	19.95
Murder on the Mississippi	21.95

## ACCESSORIES

WICO Boss Joystick	\$11.50
WICO Bat Handle Joystick	15.50
WICO Three Way Joystick	18.95
Disk Notcher	5.95
Kraft Joystick	6.95
Data Case (50)	7.95
Flexidraw	CALL
Xetek Graphic Interface	54.95
Xetek Jr.	34.95

## HOT SELLERS

Geos	\$37.95
Koala Pad	42.95
Bards Tale	24.95
Cadpak 64	29.95
Cadpak 128	45.95
Leader Board	24.95
Koala Printer Utility	16.95
Elite	18.95
Bop n Wrestle	18.95
Print Shop Companion	21.95

## FIREBIRD

Elite	\$18.95
Colossus Chess IV	21.95
Frankie Goes To Hollywood	21.95
Music Systems	24.95
Advance Music Systems	49.95

## 2 Games in One

All Titles Available	\$13.95
Gerry The Germ/ Microcosm	13.95
Willow Pattern Chimera	13.95
UnderWurld Sabre Wulf	13.95
Booty/Cyly Runestone/The Helm	13.95
Chicken Chase/Rasputin	13.95
Battle of Britian Battle for Midway	13.95
ARC of Yesod Nodes of Yesod	13.95

## AMIGA SOFTWARE

Borrowed Time	\$27.95
Hacker	27.95
Mindshadow	27.95
Music Studio	37.95
Aegis Animator w/Images	89.95
Aegis Draw	124.95
Archon	29.95
Deluxe Paint	72.95
Skyfox	29.95
Rogue	24.95
Temple of Apsai Trilogy	24.95
Master Type	24.95
Halley Project	29.95
Racter	32.95

## HITS

Int'l Hockey	\$16.95
Kung Fu II	19.95
Gato	19.95
Fontmaster II	31.95
Master Modem	34.95
Ultima III & IV	ea. 39.95

## SSI

Battle Of Antietam	\$29.95
Carrier Force	36.95
Kampfgruppe	36.95
Phantasie II	24.95
Rings of Zephin	24.95
Wings of War	24.95
Wizards Crown	24.95

**SPECIAL SAVINGS**  
**FREE**  
**PRINTER HEAD**  
**CLEANER KIT**  
**with every**  
**RIBBON ORDER**

## BATTERIES INCLUDED

Consultant 64/128	\$39.95
Paper Clip 64/128	39.95
Paper Clip w/spell 64/128	49.95

## ACCOLADE

Dambusters	\$18.95
Fight Night	18.95
Hard Ball	18.95
Law of the West	18.95
PSI 5 Trading Comp	18.95

## SUBLOGIC

Flight Simulator II	\$34.95
Football	27.95
Jet	27.95
Scenery Disks 1-6	T4.95 ea
Pure Stat Baseball	34.95

## KOALA

Koala Pads 64	\$42.95
Koala Printer Utility	16.95
Programers Tool Kit	24.95

## MINDSCAPE

Bop and Wrestle	\$18.95
Infiltrator	18.95
Halley Project	24.95

## EPYX

Fast Load	23.95
Multiplan 64/128	40.95
Programmers Tool Kit	27.95
Vorpal	21.95
World Karate Championship	18.95
Worlds Greatest Baseball	23.95

## COMMODORE HARDWARE

C-128	CALL
C-1571	CALL
C-1902	CALL
C-1670 Modem 1200	CALL
C-1350 Mouse	CALL

# CALL US

# TOLL FREE

## Orders

# 1-800-634-AICP

## Only

**Customer Service**  
**718-351-1864**  
**10AM to 6PM**  
**E.S.T.**



**AMERICAN INTERNATIONAL**  
**COMPUTER PRODUCTS**

P.O. Box 1758  
Staten Island, N.Y. 10314

**ORDER**  
**INFO**

In stock items shipped within 24 hours for prepaid orders (cert. check, visa, m/c.) C.O.D. orders accepted, please add \$4.00, must be cash or cert. check ONLY. NY State Residents add 8 1/2% sales tax. Advertised prices reflect a 4% discount for cash; credit card add 4%. All orders add \$3.50 shipping and handling within the Continental U.S. International orders add \$15.00 + shipping & handling. Personal checks allow 2 wks. for clearance. Availability and Pricing subject to change without notice. Orders over \$150.00 receive free shipping in Continental U.S. School inquiries invited. Make all checks payable to American International Computer Products. DEFECTIVE EXCHANGES ONLY, REQUIRE RETURN AUTHORIZATION NUMBER.

NEW VERSION 3.0  
FOR C64 & C128  
IN 128 MODE.

WIBBOB  
WIBBOB

THE

MIRROR

WIBBOB  
DISK COPIER  
\$24.95

NO FINER OR MORE ADVANCED ARCHIVAL COPIER AVAILABLE AT ANY PRICE.  
EASY TO USE. DOES NOT CAUSE DRIVE HEAD TO KNOCK.  
COPIES UP TO 41 TRACKS.  
PERIODIC UPDATE POLICY.  
AUTOMATICALLY MAKES BACK-UP COPIES FROM VIRTUALLY ALL PROTECTED SOFTWARE.  
NIBBLES, HALF TRACKS, COPIES EXTRA SECTORS AND EXTRA TRACKS.  
REPRODUCES ALL DISK ERRORS AUTOMATICALLY.  
FAST. COPIES FULL DISK IN AS LITTLE AS 4-7 MINS. EVEN COPIES ITSELF.

WE COPY MORE!  
MASTERCARD, VISA, M.O. OR CHECK OK  
+ \$3 SHIPPING & HANDLING  
C.O.D. OR FOREIGN ORDERS ADD \$2  
CALIF. ORDERS ADD 6% SALES TAX  
— WRITE OR CALL —

Compumed

(408) 758-2436  
P.O. BOX 6939  
SALINAS, CA 93912

FOR COMMODORE 64 AND 1541 DRIVE  
OR COMMODORE 128 AND 1571 DRIVE



## COMMODORE 128 OWNERS THE REVISED CLONE ENDS THE SOFTWARE BACK-UP BLUES!

The complete update to the 1571 Clone is now being shipped. Our new manual is almost 50 pages long and explains all aspects. We improved the GCR & Nibble copiers and added a MFM Copy (back up IBM disks on Commodore?). The expansion section has over 50 files. Included is a block editor, auto boot maker, single or 2 side copy, copy to alt. sides, track analysis (sync marks, density, block size, GCR data, Hex data), bulk erase, format, copy & combine files, plus more. Over 25 selections from menus. Use with a 1 or 2 1571 drive system.



Available from:

**Micro-W.**  
DISTRIBUTING, INC.  
1342B Route 23  
Butler, N.J. 07405  
CALL: (201) 838-9027

STILL ONLY \$49.95

BACKS-UP MOST EVERYTHING

WE'LL STILL GIVE YOU \$10 TRADE  
IF FOR YOUR OBSOLETE COPY DISK

\$10 UPGRADE for all  
registered 1571 CLONE

MACHINE OWNERS  
VISA • MASTERCARD  
DEALER & DIST INQUIRES

C64/128

## GRAPHICS

FOR USE WITH THE NEWSROOM™ PROGRAM  
RJ's 'NEWS' CLIPART

A Two Sided Disk Full of New Clip Art - Pictures, Special Font Letters, Borders, etc.; to make your Newsletters, Signs, Flyers.

\$16.95

FOR USE WITH FLEXIDRAW™ PROGRAM  
CLIPART PLUS DISK

A Two Sided Disk Full of Clip Art, New Fonts, Hi-Res Pictures for Signs, T-shirt Iron-ons, etc.

\$19.95

FOR USE WITH PRINT SHOP™ PROGRAM  
HIGH RESOLUTION GRAPHICS

Now do your Signs, Flyers, T-shirt Iron-ons, in the excellent detail of Hi-Res Graphics. Two Sided Disk with full examples and instructions.

\$17.95

GRAPHICS DISK AND MORE!

120 Graphics, 60 Card Verses, Hints, Aids, Examples and Free Graphics Making Tool.

\$14.95

THEME GRAPHICS DISK

Logo Fixin's    Baseball    Religious  
Military        Restaurant    General Subjects

\$12.95

FOR USE WITH PRINTMASTER™ PROGRAM  
RJ's ART GALLERY

A Disk full of New Graphics for your Greeting Cards, Calendars, Stationery, Signs, Banners, etc.

\$16.95

Add \$2.00 for postage & handling. Calif. residents add 6.5% sales tax.  
SEND CHECK OR M.O. TO

Rj softshop

4102 E. 7th ST., STE. 207E  
LONG BEACH, CA. 90804 Phone (213) 434-1580

The Newsroom is a trademark of Springfield. Print Shop is a trademark of Broderbund Software. Flexidraw is a trademark of Hewlett Systems. Printmaster is a trademark of Unison World Inc.

## THE ULTIMATE CONTROL INTERFACE

Compatible with C64,  
C128 in 64 & 128 modes,  
and C128 in CP/M mode



Universally applicable dual 6522 Versatile Interface Adapter (VIA) board. Intelligently control almost any device. Perform automated testing. Acquire data for laboratory and instrumentation applications. Provides four 8-bit fully bidirectional I/O ports & eight handshake lines. Four 16-bit timer/counters. Full IRQ interrupt capability. Expandable. Includes extensive documentation and programs on disk. \$169 postpaid USA. Each additional board \$149.

### SYMBOL MASTER MULTI-PASS SYMBOLIC DISASSEMBLER

The original and best is now even better with Version 2.0! Disassembles any 6502/6510/undoc/65C02/8502 machine code program into beautiful source. Includes both C64 & C128 native mode versions. Learn to program like the experts! Adapt existing programs to your needs! Outputs source code files to disk fully compatible with your MAE, PAL, CBM, Develop-64, LADS, Merlin or Panther assembler, ready for re-assembly and editing. 100% machine code and extremely fast. 63-page manual. Advanced and sophisticated features far too numerous to detail here. \$49.95 postpaid USA.

### PROFESSIONAL UTILITIES & RESOURCES

- C64 Source Code. Most complete available reconstructed, extensively commented and cross-referenced assembly language source code for Basic and Kernal ROMs, all 16K. In book form, 242 pages. \$29.95 postpaid USA.
- PTD-6510 Symbolic Debugger for C64. An extremely powerful tool with capabilities far beyond a machine-language monitor. 100-page manual. \$49.95 postpaid USA.
- MAE64 version 5.0. Fully professional 6502/65C02 macro editor/assembler. 80-page manual. \$29.95 postpaid USA.

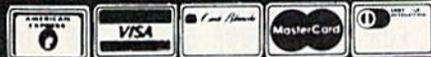
## SCHNEDLER SYSTEMS

1501 N. Ivanhoe, Dept. G11, Arlington, VA 22205  
Information/Telephone Orders (703) 237-4796. VISA/MasterCard

# MONTGOMERY GRANT

115 NASSAU St. Between Beekman & Ann Sts. NYC (212) 732-4500 open Mon-Fri: 8:15am - 6:30pm Sat.: 9:30am - 6:30pm Sun: 9:30am - 6pm

PHONE and MAIL ORDERS CALL COLLECT **(212) 732-4500**

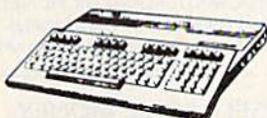


ALL COMPUTERS & PERIPHERALS COME COMPLETE WITH AC ADAPTOR, OWNER'S MANUAL AND ALL CONNECTING CABLES.

ALL MERCHANDISE IS BRAND NEW AND FACTORY FRESH, COMPLETE WITH MFR. U.S.A. WARRANTY.

## commodore C-128

128 K RAM  
Powered  
Personal  
Computer



**\$249<sup>95</sup>**

## commodore

### C-64-C

64 K RAM  
Powered  
Home Computer

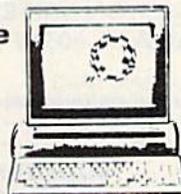


**\$169<sup>95</sup>**

## commodore AMIGA

512 K RAM  
Powered  
Computer System

CALL FOR CURRENT  
LOW PRICE!



## PERIPHERALS

AMIGA 1080  
High-Resolution  
Monitor



**\$269<sup>95</sup>**



C-1541  
Disk Drive

**\$149<sup>95</sup>**



C-1571  
Disk Drive

**\$209<sup>95</sup>**



C-1702  
Computer Monitor

**\$149<sup>95</sup>**



C-1902  
RGB Color Monitor

**\$239<sup>95</sup>**

C-16 16K Computer .....\$39.95

## commodore

### COMPUTER PACKAGES

Get it all together & save!

### C-64 STARTER PACKAGE



- C-64 Computer
- Computer Cassette Drive
- Computer Printer
- 12" Monitor

**\$259<sup>95</sup>**

### C-64 COMPLETE PACKAGE



- Commodore 128 Computer
- Commodore 1541 Disk Drive
- 80 Column Printer
- 12" Computer Monitor

**\$399<sup>95</sup>**

### C-128 COMPLETE PACKAGE



- Commodore 64 Computer
- Commodore 1541 Disk Drive
- 12" Computer Monitor
- 80 Column Printer

**\$529<sup>95</sup>**

TO  
SUBSTITUTE  
1571 for 1541  
ADD \$70

### C-128 DELUXE PACKAGE



- Commodore 128 Computer
- Commodore 1571 Disk Drive
- Commodore 1902 Color Monitor
- Commodore 80 Column Printer

**\$789<sup>95</sup>**

## COMPUTER PRINTERS



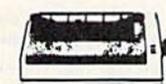
commodore  
MPS-803 Printer

**\$99<sup>95</sup>**

C- MPS-1000 Printer ..... \$219



star  
SG-10C 120 CPS  
High Speed  
Printer



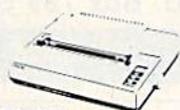
**\$209<sup>95</sup>**

STAR NX-10 Printer ..... \$229

STAR Gemini II Printer ..... \$229

## EPSON

LX-80 High  
Quality Printer



**\$229<sup>95</sup>**

Okidata 20 w/Plug 'n' Print.... \$189.95

## PERIPHERALS



C-1660  
Phone Modem

**\$45<sup>95</sup>**

C-1670 Automodem ..... \$155

C-1350 "Mouse" for  
any Commodore  
Computer



**\$45**

GEOS Program  
\$49.95

C-1700 128 K  
Expansion Module ..... \$99

C-1750 512 K  
Expansion Module ..... \$169

"MAGIC VOICE" Module ... \$49.95

Certified check, bank check, Mastercard, Visa, Amex, Diner's Club and Carte Blanche accepted. Non-certified checks must wait for bank clearance. NY residents add 8-1/4% sales tax. Prices and availability subject to change without notice—so call before placing your order. Not responsible for typographical errors. Returns of defective merchandise must have prior return authorization number.



# V3.0 ULTRABYTE DISK NIBBLER

## NEW SIXTH GENERATION ULTRABYTE COPIER FOR COMMODORE 64 and 128 (in 64 mode)

- Copies 99+% of protected software in 2 min. or less includes parameters for 160 recent, hard-to-copy disks. ( Send stamped envelope for list ). Includes fast file copy program
- Uses 1 or 2 1541 /1571 drives, or MSD dual drive
- More powerful than KeyMaster, Diskbuster, Copy II, Superkit, 21 Second, Clone or Cracker
- Copies itself ( for this reason, no refunds given )

**SPECIAL — BUY A NIBBLER V3.0 AND GET  
YOUR CHOICE OF A FREE \$14.95 PROGRAM  
\$39.95 plus \$4.00 shipping**

- Disk Surgeon -- disk utility .....\$14.95
- Ultramail -- mail list and label printer.....\$14.95
- McMurphy's Mansion -- text adventure ....\$14.95
- Handy-Capper -- race handicap system ...\$14.95

( Above may be ordered separately for \$14.95 plus \$4.00 shipping. Foreign orders add \$2.00 )

Mastercard, Visa, Check or M.O., Calif. add 6.5% (\$2.60) sales tax. Foreign orders / COD add \$2.00. Payment must be in U.S. funds

UPDATES- Return your original Ultrabyte disk with \$10.00 plus \$4.00 shipping. Foreign add \$2.00

To order, write or call 24 hr. order line. For info. write.

**ULTRABYTE ( 818 ) 796 - 0576**  
P.O. Box 789 LaCanada, CA 91011 USA

**DEALERS & DISTRIBUTORS WANTED**

## FACTORY AUTHORIZED COMMODORE REPAIR CENTER

**1-800-772-7289**  
IN ILLINOIS (312) 879-2888

- C64 Repair (cpu only) . 42.95\* AMIGA Repair . . . . CALL
- 1541 Repair . . . . . 79.95\* C64 Power Supply . 34.95
- 1541 Alignment  
only . . . . . 29.95\* CBM & AMIGA PARTS  
C128 Repair (cpu only) . 79.95\* Call (312) 879-2350

\*Includes parts, labor & UPS return shipping. APO/FPO or Air Freight add \$10.00

CALL BEFORE SHIPPING, VISA, MASTERCARD OR MONEY ORDER  
24-48 Hrs. Turnaround (Subject to parts availability)  
Diagnosis fee of \$25.00 for any unit altered or with no defects.

### SAVE YOURSELF SOME MONEY

Due to our vast experience in repairing 64s we have found that the power supply is a major cause of board failures. By inserting our device between the power supply and computer over 63% of our customer's repairs would have been avoided. For only \$19.95 our C64 Over Voltage Sensor will continuously monitor your power supply output. If an overvoltage occurs the Over Voltage Sensor will prevent damage to your 64.

**64 OVER VOLTAGE SENSOR \$19.95**

### TEKTONICS PLUS, INC.

150 HOUSTON STREET  
BATAVIA, IL 60510



CLIP AND SAVE

### Why Not? Computer Enterprises

#### Graphic Labels Plus \$25

Now you can use all those Print Shop and PrintMaster graphics in your library to produce custom labels. **Graphic Labels Plus** is designed to work with any Star, Epson, or Epson compatible printer. Text may be entered from the keyboard or from a data file. Also on this disk are: **Graphic Converter** - a program which can convert graphics from the Print Shop to the PrintMaster format or vice versa; and **File Handler** - to help you maintain your own address list for creating mailing labels.

#### Graphic Label Maker \$20

A new version of **Graphic Labels Plus** Designed to work specifically with Commodore printers. The program will use the Print Shop graphics intended for use with Commodore printers to produce labels. Also included is the **File Handler** program to help you maintain your list of addresses for mailing labels.

#### Pictures Plus \$20

The perfect companion for either of the above. **Pictures Plus** Contains 83 new Print Shop graphics in both Commodore and non-Commodore versions as well as 25 border designs and 12 font styles for use with Print Shop Companion.

#### Golf Handicapper \$30

More than just a handicapping program, **Golf Handicapper** is a complete record-keeping system for a golf league. The system will keep records for 300 golfers in the C64 version or 500 golfers in the C128 version. Records may be maintained for 250 game dates. The USGA method of calculating handicaps is built in or an optional formula may be entered. The system provides calculation of current handicaps as well as reports showing player history or a game-by-game history.

Is there a utility oriented program you've been looking for? Write **Why Not?**. We try to supply the programs you need at a price you can afford.

Prices shown include shipping and handling. To order, send check or money order to:

**Why Not Computer Enterprises**  
P.O. Box 171206  
Arlington, Texas 76017

Commodore is a trademark of Commodore Business Machines.  
Print Shop and Print Shop Companion are Trademarks of Broderbund Software.  
PrintMaster is a trademark of Union World, Inc.

### PROBLEM:

YOU CAN'T USE YOUR COMPUTER  
WHILE YOUR PRINTER PRINTS!



### SOLUTION:

**SERIAL BOX™**  
Lets You Compute, While Your Printer Prints!



### GEOS™ COMPATIBLE

If your Commodore system consists of:  
Commodore Compatible Printer or Printer and Serial Interface  
**SERIAL BOX™** \$79.95  
64K Serial to Serial Print Buffer

If your system consists of:  
Non-Commodore Printer  
**SERIAL BOX-PLUS™** \$149.95  
Serial to Parallel Interface with 64K Print Buffer (Plus FONT FACTORY\*)

If your system consists of:  
Non-Commodore Printer and Massive Printer Output  
**SERIAL BOX-MAX™** \$219.95  
Serial to Parallel Interface with 256K Print Buffer (Plus FONT FACTORY\*)  
Dealer Inquiries Welcome.

CALL 1-800-228-7264 FOR ORDERS AND INFORMATION  
IN PENNSYLVANIA CALL (215) 622-5495 OR WRITE:

**R. J. Brachman Associates, Inc.**  
P.O. Box 1077 Havertown, PA 19083

Please add \$3.00 for shipping and handling USA (Foreign Extra)  
VISA, MC, Check or Money Orders accepted. C.O.D. add \$2.50  
PA residents add 6% (PLEASE ALLOW 4 TO 6 WEEKS FOR DELIVERY)

\*FONT FACTORY is a font design utility program.  
GEOS is a registered trademark of Berkeley Softworks

Prices subject to change without notice.



# MCS

MicroComputer Services

64 • **AMIGA**™ • 128

The Closest Thing to Wholesale!

We will BEAT any price in this issue!

TRY TO BEAT  
OUR PRICES  
AND SERVICE

## 13" COLOR MONITOR

SPECIAL PURCHASE

\$119<sup>95</sup>



COMMODORE 1702R ..... 149.95  
COMMODORE 1902A ..... CALL  
MAGNAVOX (Green/Amber) ... 89.95  
MANY OTHER SPECIALS ..... CALL

SFD 1001 \$179<sup>95</sup>  
1 MEGABYTE



SKYLE IEEE (64) ..... 99.95  
QUICKSILVER 128 ..... 119.95

## CLOSE OUTS

Kwik Load ..... 4.95  
Commodore Datasette ..... 19.95  
Color Ribbons/Paper ..... CALL  
Printer Stand ..... 9.95  
Animation Station ..... CALL  
Koala Pad ..... CALL

LIMITED QUANTITY

## 1200 BAUD

from \$88<sup>00</sup>



SPECIAL PURCHASE  
1670 (300/1200) ..... 134.95  
VOLKSMODEM 6420 ..... 54.95



SX-64

\$349<sup>95</sup>



LIMITED QUANTITY

REFURBISHED  
30 DAY WARRANTY  
SHIPPING \$20.00

## DISKS 40¢

LIFETIME WARRANTY  
TYVEK SLEEVES • LABELS  
WRITE PROTECTS • PACKAGE D

	50-99	100 up
SS/DD	.55	.40
DS/DD	.65	.50
VERBATIM SS/DD...	.90	.80
VERBATIM DS/DD...	1.50	1.30
BASF DS/DD	1.00	.80

## NEW LOW PRICES



64 • 1541 • 1541C • 128 • 1571  
SPECIAL PACKAGE DEALS

## AUTHORIZED COMMODORE REPAIR

64 cpu ..... 44.95    1702 ..... 79.95  
128 cpu ..... 79.95    64 pwr supply ..... 29.95  
1541 ..... 59.95    128 pwr supply ..... 79.95  
1571 ..... 129.95    AMIGA REPAIR CALL  
801 ..... 49.95    PARTS ..... CALL

## MISCELLANEOUS

1350 Mouse ..... 39.95  
128 Monitor Cable ..... 14.95  
WICO Boss ..... 11.50  
WICO Bat ..... 15.50  
WICO 3 Way ..... 18.95  
128K RAM Expansion ..... 119.95  
2200 sh. - Lazer Edge - 20f ..... 19.95



GIVES YOU A CREATIVE EDGE



NEW  
LOW PRICE  
CALL!

Super Prices on Amiga Software

## DISK ACCESS

DISK CASE (75) ..... 6.95  
DISK FILE (120) ..... 9.95  
DISK NOTCHER ..... 4.95  
3 1/2" DATA CASE (30) ..... 7.95  
TEAK 5 1/4" DISK HOLDER (60) ..... 19.95  
TEAK 5 1/4" DISK HOLDER (90) ..... 29.95  
TEAK 3 1/2" DISK HOLDER (30) ..... 19.95

## PET/CBM

NEW!  
4032

\$149<sup>95</sup>



4023 (100 cps) ..... 124.95  
8023 (160 cps) ..... 199.95  
6400 L.O. PRINTER (40 cps) ..... 495.00  
VIC SWITCH ..... CALL

## Canon PJ-1080A COLOR INK JET

\$249<sup>95</sup>  
LIMITED TIME OFFER



NEW LOW PRICE

## PANASONIC 1080 \$189<sup>95</sup>\*

1091 ..... 219.95\*  
1092 ..... 304.00\*  
3131 ..... CALL\*  
1592 ..... 414.00\*

\*With any Interface Purchase, add \$5.00 if purchased alone.



## SEIKOSHA SP-1000VC

COMMODORE READY  
\$164<sup>95</sup>

NEAR LETTER QUALITY  
FRICTION & TRACTOR  
100 CPS • SHEET FEEDER



## LV-1210

FROM \$174<sup>95</sup>

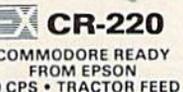
N.L.Q. • 120 CPS  
FRICTION • TRACTOR  
BUFFER



## COMREX CR-220

\$79<sup>95</sup>

COMMODORE READY  
FROM EPSON  
50 CPS • TRACTOR FEED



NX-10	240	SG-15	360
NL-10	280	SD-15	435
SD-10	315	SR-15	570
SR-10	460	NB-15	CALL
SB-10	580	POWER TYPE	CALL

## INTERFACES

MW 350 w/10K BUFFER ..... 69.95  
CPM MODE (BEST BUY!)  
XETEC JR. w/N.L.Q. MODE ..... 44.95  
XETEC SR. w/8K BUFFER ..... 69.95  
UNIPRINT (L.Q. INTERFACE) ..... 34.95

## SPECIAL PACKAGE DEALS

OKI MATE 10 COLOR PRINTER ... \$175  
OKI MATE 20 COLOR PRINTER ... \$195  
STAR 10X ..... CALL

DEALER INQUIRIES INVITED

## COMMODORE 64 EDUCATOR

We Bought 'em All  
FAR BELOW  
DEALER COST

RETAIL  
499.95

REGULAR  
DEALER  
COST  
325.00



- 100% C-64 Compatible
- Built in Hi-Res Green Monitor
- Heavy duty power supply and sturdy case
- All units completely refurbished with full 90 day warranty

\$199.95

ORDERS ONLY **800-433-7756**  
SALESMEN DO NOT HAVE INFORMATION ON  
PREVIOUS ORDERS OR PRODUCT INFORMATION.

CUSTOMER SERVICE **313-427-0267**  
HOURS: MON - SAT 10:00 AM - 6:00 PM

MicroComputer Services

12864 FARMINGTON, LIVONIA, MICHIGAN 48150

See a Better Price?

CALL US

We Want Your Business!

Please cite ad number  
when ordering.



AD #G1186



MC/VISA/C.O.D.  
Please include phone number. Dealer Inquiries Invited.  
All prices discounted for cash or check, add 3%  
for MC/VISA. We check for stolen MC/VISA cards.  
Shipping: Printers \$10.00, Educator \$20.00, Disks \$6.00  
per 100. (West Coast — add \$2.00 per order). Add \$3.00  
for C.O.D. Reduced shipping for large quantities.  
No returns unless defective, call for RA number.  
all defectives will be exchanged or repaired at our option.  
Prices and availability subject to change without notice.  
ALL MERCHANDISE CARRIES  
MANUFACTURERS WARRANTY

## Free Spirit Software, Inc.

**Music of the Masters** - Classical music for the C64\* or C128\* in 64 mode. Approx. 1 hour of music per disk with comments on the composers.

**Volume I** - Mozart's Rondo Alla Turca, Beethoven's Sonata Pathetique and 20 other works by Bach, Handel & many others.

**Volume II** - Beethoven's Minuet in G, Bach's Invention No. 4, and 40 other works by Brahms, Schubert, Chopin & others.

**Volume III** - Mostly Mozart. Overture from Figaro, Sonata Facile, Minuet from Don Giovanni and many other Mozart compositions. \$9.95 per volume. All 3 volumes - \$24.95

**The Great War** - WWI strategy game for the C128\* in 128 mode. Includes one or two player options. Armies of 17 countries. Weather, terrain, lines of supply, etc. affect the outcome. C128\* disk only - \$29.95

**BASICally SIMPLE 128** - How to use all C128\* Basic 7.0 commands, functions and operators in Basic programs. C128\* disk only - \$19.95

**BASICally SIMPLE 64** - How to use all C64\* Basic 2.0 commands, functions and operators in Basic programs. Disk - \$14.95

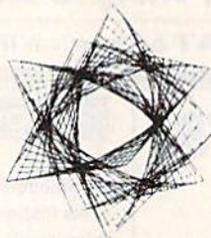
**Datfiler 128** - Database program for the C128\* in 128 mode. Disk - \$24.95

**FREE SHIPPING & HANDLING.** Illinois residents add 7% sales tax. Send check or money order to:

Free Spirit Software, Inc.  
538 S. Edgewood  
LaGrange, IL 60525

\*Trademarks of Commodore Electronics, Ltd.

## CAD-3D NEW ADVANCED 3-D GRAPHICS



For Commodore 64/128 in 64 mode  
View Designs in Multiple Perspectives

- \* Versatile/Fast 360 degree rotation/ Scaling
  - \* 2000 Line Display
  - \* Printer capability with latest compatibles
  - \* 1520 Plotter availability
  - \* Disk Loading and Saving of Designs
  - \* Superimpose Designs/ Modify Partial Designs
  - \* Commercial Graphic program compatibility
- Professional—Educational—Home Applications  
Architects, Engineers, Designers,  
Programmers, Students

CAD-3D!! Enter me into the fastest growing field in graphic technology. At a special introductory price \$49.95. Add \$4.00 for shipping and handling, for C.O.D. add an additional \$4.00. (California residents please include 6% sales tax).

In Europe Contact:  
IHT Technologies  
9 Via Monte Napoleone  
20121 Milan, Italy  
ph 2/701657

**ihT Software**  
2269 CHESTNUT STREET  
SUITE 162  
SAN FRANCISCO, CA 94123

**ORDER LINE • (415) 441-1607**  
Dealers/Distributors inquiries welcomed.

## COMMODORE 64™

SUPER  
SOFTWARE



**New! Best of Games #3**  
Over 40 new games on 2 disks.  
**\$17.95**

**New! Brain Games #1**  
Includes: "Stock Market," "City Manager," "Warehouse," "Civil Battles" and many more fun Brain Games.  
(12 Huge Programs) **\$12.95**

**New! Adventure #1**  
Includes: "Gladiator," "Trip to Atlantis," "Merlyn" and many more Adventure Games.  
(13 Huge Programs) **\$12.95**

**Best of Games #1**  
The original. Over 50 games on 2 disks.  
**\$17.95**

**Las Vegas #1**  
The Classic. Over 20 Las Vegas Games. Bestselling disk.  
**\$12.95**

**New! Education #1**  
Great for schools. For kids between 5-15 years of age.  
**\$12.95**

**Mixer #1 or #2**  
Two separate disks. Each with 20-30 different programs.  
GAMES — MUSIC — BUSINESS/UTILITIES  
Each Only **\$9.95**

**Synthesizer Sounds #1**  
Over 50 well conducted rock songs on 2 disks.  
**\$17.95**

**ADD \$2 (\$3 FOREIGN EXCEPT CANADA) SHIPPING/HANDLING**  
SEND CHECK OR MONEY ORDER TO:

**GSR**

SOFTWARE COMPANY

538 So. 2nd St. • Albion, NE 68620

Commodore 64 is a trademark of Commodore Electronics Ltd.

## Commodore 64 Only SOFTWARE \$4/Disk

- 003 Best of Tplug** - Utilities, Term 64 (modem program).....\$4
- 034 Public #4** - Sampler of various games and utilities.....\$4
- 035 Best of Canada** - Games and music \$4
- 059 The Accountant** - Spreadsheet, Check-book balancer, Graphics, Mailing list.....\$4
- 066 Best Utilities V.1** - Copy disks with a single drive in 4 minutes.....\$4
- 075 The Office** - Wordprocessor, C64 Database, 7 games, Special disk utility program and 35 more programs.....\$4
- 080 Superstar Utilities** - Disk recovery, Label Maker and more; 39 programs in all...\$4
- 085 Space Games** - Starwars, Startrek, Eliza, Easy Dungeon, Planet Probe, Deep Space plus 8 other popular games.....\$4
- 094,095 Best Utilities V.2 (2 disks)** - Communications, BBS lister, Disk doctor.....\$8
- 102 Best Games from England** - Software Pirates, Triads, Brickbuster, Stellar Strike, Space Arena.....\$4

Add \$4 shipping & handling per order. CA residents add 6.5% sales tax

Amount enclosed \$ \_\_\_\_\_  Check  VISA  MasterCard

Card No. \_\_\_\_\_

Signature \_\_\_\_\_ Exp. Date \_\_\_\_\_

Phone (\_\_\_\_) \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Call toll free 800-431-6249 in Calif. 415-550-0512



**BLACKSHIP**  
COMPUTER SUPPLY C110

P.O. Box 883362 San Francisco, CA 94188

## LOTTO CIPHER.

GET THE BEST ODDS ON ANY LOTTERY

SIX NUMBER - PICK FOUR - DAILY GAME

- PRODUCES FOUR COMBINATIONS OF NUMBERS TO CHOOSE FROM
- ANY AMOUNT OF BALLS AND NUMBERS CAN BE PROGRAMMED
- PRINTS OUT PAST LOTTO NUMBERS DRAWN, PAST COMPUTER PICKS, AND NUMBER DRAW FREQUENCY LIST
- COMPLETE NUMBER DATA BASE



\$29.95 C-64 DISK

## Window Magic

SUPER HI-RESOLUTION DRAWING IN MULTI OR MONO COLOR

- POLYGON SHAPES - EXPAND, SHRINK AND ROTATE. THEN STAMP ANYWHERE
- ZOOM - EXPANDS A WINDOW TO DOUBLE SIZE • MIRROR, FLIP, AND SCROLLING WINDOWS • COPY • CLONE COLOR ATTRIBUTES • ZOOM PLOT - DRAW ON AN EXPANDED WINDOW AND YOUR DRAWING AT THE SAME TIME • SAVE AND LOAD YOUR WINDOWS ON DISK • PRINTS ON STANDARD DOT MATRIX PRINTER
- FILL - LINES • DRAW • TYPE LETTERS AND GRAPHICS • COLOR SQUARES

\$24.95 C-64 DISK

## STOCK BROKER.

PROFITS GUARANTEED OR  
YOUR MONEY BACK

- BUYING GOOD QUALITY, VOLATILE ISSUES AND USING THE TRADING SYSTEM WILL HAVE YOU FULLY INVESTED AT THE LOWEST PRICES AND CONVERTING TO CASH AS THE STOCK NEARS ITS PEAK
- TECHNICAL TRADING THAT WORKS
- BAR GRAPH PRINT-OUTS
- RECORD UP TO 144 STOCKS ON A DISK



\$39.95 C-64 DISK



**ABANDON SHIP.**  
S.O.S.

HIRE ARCADE STYLE GAME THAT REQUIRES STRATEGY AND JOYSTICK SKILLS. THERE ARE 52 ROOMS IN THE HMS BLACK. THE BRIDGE, ENGINE ROOM, ARMORY, AND SUPPLY ROOM ARE THE MOST IMPORTANT TO PROTECT  
GIVE MY REGARDS TO DAVEY JONES. \$21.95 C-64 DISK

ACORN OF INDIANA, INC.

2721 OHIO STREET  
MICHIGAN CITY, IN 46360

**219-879-2284**

SHIPPING AND HANDLING, ADD \$1.50 - C.O.D.'S ACCEPTED  
VISA AND MASTER CARD ORDERS ADD 4%  
INDIANA RESIDENTS ADD 6% SALES TAX

## DUST COVERS

- ★ CUSTOM MADE TO FIT
- ★ HEAVY 32-oz. VINYL ANTI-STATIC
- ★ EXTENDS EQUIPMENT LIFE
- ★ Choice of Colors Light Tan or Brown

### COMPUTERS

C-64; Plus 4	8.00
C-128	13.00
Datassette (C2N)	5.00
Amiga 1000	13.00
(W/Amiga Mon. Stacked)	28.00
Keyboard only	7.00
Atari 800XL, 130XE	10.00
Atari 520 ST	14.00
520 Keyboard (only)	10.00
IBM PC XT	28.00
IBM 5051 Keyboard	8.00
(Dimensions Required for IBM Clones)	

### PRINTERS

C-MPS 803, C-1520	8.00
Panasonic 1090/91	13.00
Gemini 10 & Star 10's	13.00
Gemini 15 & Star 15's	16.00
Okidata 92	13.00
Okidata 120/192	13.00
Okimate 10/20	8.00
Epson MX/FX/RX80	13.00
Epson LX80/C-1000	13.00
Soikasha SP-1000	13.00
Comrex 220	13.00
C'ltoh 7500	13.00
Citizen MSP 10	13.00
Atari 1027	13.00
C/DPS 1101	16.00

### DISK DRIVES

C-1541, C-1571	8.00
Amiga 3 1/2" D/Drv	8.00
Amiga 5 1/4" D/Drv	9.00
Indust GT, MSD 5D-1	8.00
MSD 5D-2	10.00
Enhancer 2000	8.00
FSD-1	8.00
Atari 1050	8.00

### MONITORS

C-1702, BMC Color	16.00
C-1902/Amiga	19.00
Amdek 500-700	19.00
Teknika MJ 10/22	19.00
CM-141 (C-1802)	19.00
Gold Star 13" Color	19.00
Thompson CM 365-66	19.00
C-1902A/Magnvx 40	19.00
Magnovox 80	19.00
NEC 1225	19.00
Taxan 220	19.00
Sakata SC-100	19.00
C-1525/MPS 801	10.00
Zenith 122/123	19.00
C-1526/MPS 802	13.00
Zenith 131/133	23.00

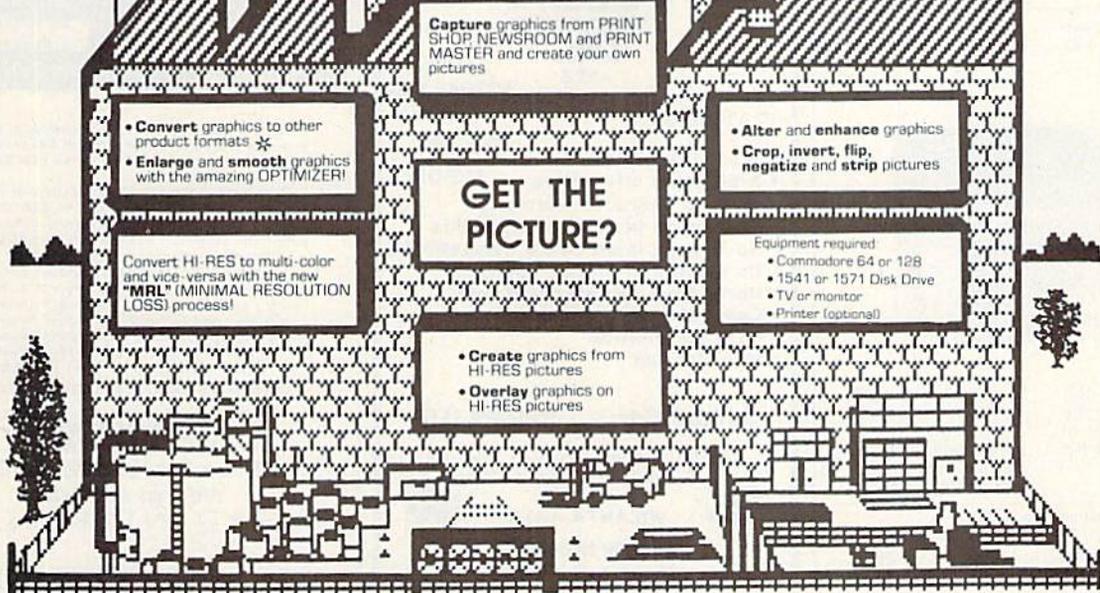
Order by stating MAKE, MODEL and COLOR CHOICE - TAN or BROWN with check or money order plus \$1.50 per item (\$4.50 max.) shipping and handling (Foreign air extra). Calif. Res. include 6.5% State Tax.

SPECIAL COVERS WILL BE MADE TO YOUR DIMENSIONS. SEND YOUR REQUIREMENTS FOR OUR LOW PRICE QUOTES.

## Crown Custom Covers

9606 SHELLYFIELD RD., Dept. A  
DOWNEY, CA 90240  
(213) 862-8391

# ICON FACTORY



Capture graphics from PRINT SHOP, NEWSROOM and PRINT MASTER and create your own pictures

- Convert graphics to other product formats \*
- Enlarge and smooth graphics with the amazing OPTIMIZER!

Convert HI-RES to multi-color and vice-versa with the new "MRL" (MINIMAL RESOLUTION LOSS) process!

## GET THE PICTURE?

- Create graphics from HI-RES pictures
- Overlay graphics on HI-RES pictures

- Alter and enhance graphics
- Crop, invert, flip, negate and strip pictures

Equipment required

- Commodore 64 or 128
- 1541 or 1571 Disk Drive
- TV or monitor
- Printer (optional)

## Photo Finish

— now available,

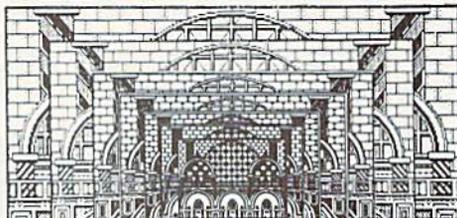
With our **NEW** product, you can get an **"OPTIMIZED PRINT DUMP"**

Take pictures or graphics from the most popular graphic utilities\* for the Commodore 64/128 computers and print them quickly and easily for a truly

### SMO-O-OTH LOOK!

- View and adjust gray scale patterns **ON YOUR SCREEN** to shade your image for a perfect "photo finish".
- Horizontal or vertical output with optional "optimized" print.
- Supports Commodore, Okidata, Epson and compatible printers as well as a user defined printer option.

## BILLBOARDMAKER\*



IMAGINE TAKING YOUR USUAL  
8½ inch by 6½ inch output  
AND ENLARGING IT TO  
4 FEET BY 3 FEET !!!!

\*\*\* SIMPLY INCREDIBLE \*\*\*

#### Features:

- **DUMP** shaded standard and ENLARGED picture to your printer QUICKLY and EASILY
- **TYPESETTER** - overlay specially designed TEXT fonts and ICONS On your picture - A TRUE SIGN MAKER
- **INCREDIBLE RESOLUTION** - allows re-drawing of detail to enlarged sections
- **CONTROL BOARD** - bring your own pictures into your own programs easily
- **CONVERT** picture file formats to other product formats
- **SMOOTH** those ragged lines with the amazing "Optimizer"
- **FLIP** pictures for iron-on applications
- **STRIP** color from your picture
- **REVERSE** picture to negative - CROP and FRAME pictures

AND MANY MORE GREAT FEATURES  
PROFESSIONAL RESULTS - EASY and FUN to USE

ALL AVAILABLE FROM :

solutions unlimited

P.O. Box 177  
Dobbs Ferry, New York 10522-0177  
(914) 693-3496

\* ANIMATION STATION © Suncom. COMPUTEREYES © Digital Vision. FLEXIDRAW © Inkwell. PRINT SHOP © Broderbund Software. BLAZING PADDLES © Baudville. DODDLE © Omni. KOALA © Koala Technologies Corp. SUPERSKETCH © Personal Peripherals. COMMODORE 64/128 © Commodore Business Machines. NEWSROOM © Springboard Software. PRINT MASTER © Unison World. ICON FACTORY © 1986 Solutions Unlimited. BILLBOARD MAKER © Solutions Unlimited

• (BILLBOARD MAKER works with all of the above except NEWSROOM and PRINT MASTER and only with "Screen Magic" section of PRINT SHOP)

# DOUBLE YOUR DISK STORAGE

With The  
**1541 CONTROL**

- Change the device number of the disk drive with the flip of a switch.
- Reset the drive only, the computer only, or the entire system.



- Double your disk storage space by writing on the back of your disks with the flip of a switch.
- Install it yourself. Each unit comes with a thorough, easy to understand illustrated manual that makes installation simple.

— Ordering Information —  
(in U.S. Dollars)

\$34.95 each + \$3.00 per unit shipping & handling  
Bulk orders of 5 or more units \$28.95 each + s & h

Orders from Canada & Mexico add \$6.00  
All other Foreign Orders add \$10.00  
Ohio residents add 5.5% sales tax.

C.O.D. Orders (call)  
SEND CHECK OR MONEY ORDER TO:

**MICRO FABRICATION SYSTEMS**  
P.O. BOX 1114 ■ DELAWARE, OHIO 43015 ■ TEL. (614) 524-4423

## NOW GET TRUE DESCENDERS FOR 801, 1525, 803, GP-100, HUSH 80 & SIMILAR PRINTERS

From the Descender ROM People



### FEATURING :

- True descenders
- A pleasing alternative
- Uniform character formation
- No change in graphic capability
- No change in software compatibility
- No change in printer operation
- North American standard font
- Complete instructions
- Easy installation
- No soldering

**\$39.95 Cdn \$29.95 U.S.**

Ont. Residents add 7% Prov. Sales Tax  
Cheque, Money Order, Visa or MasterCard



**WILANTA ARTS**



1688 Sir Monty's Dr.  
Mississauga, Ontario  
L5N 4J7

**1-416-858-9298**

Get a Wilanta Descender ROM Today  
and make your old nightmare  
Just a font memory of yesterday!

**BEETLES**

ALICE YOU! UP

AC

TIME IS UP

CECILIAL	15	Soft Pace
EGGEM	14	
ALICE	2	
PATTY	0	
DAVE	3	

Rock Challenge

Greatest party game ever! Hundreds of songs in one of the most challenging and fun games out for the Commodore. No two games ever alike! Up to 5 players at a time.

With Rock Challenge Group Editor you can add your favorite group's titles and save them to your own data disk. Later when the group comes out with more songs just add them to your data disk.

Example You choose to play the Beatles with 35 songs to play. The program chooses one of the over 100 songs and places as a series of dashes. Player 1 guesses a letter in the song, if there he wins a point and continues his turn till he guesses wrong or solves the song for a 5 point bonus.

FAST MACHINE CODE PROGRAM

Only \$14.95 + \$1.50 Postage

Send check or money order to:

SoftPace Software Co.  
P.O. BOX 788

Brea, CA. 92622-0788

We ship same day!

**SOLD ON DISK ONLY**

### SPECIAL TRIAL OFFER

Now you can rent Rock Challenge for just \$5.00 to see for yourself if it isn't one of the greatest games out for the C64. After two weeks you can return Rock Challenge or buy it! You receive full credit on the rental cost if you wish to own Rock Challenge. How's that for an offer! We ship same day! Enjoy!

## SpeedScript\* News

Save time and effort with our great C64 products, including SpeedScript (SS) add-ons from the author of ScriptSave and SS Customizer.\*

**/SPEEDGUIDE/ Video** Learn SS quickly with this quality how-to videotape by instructional media experts. VHS/Beta. \$40 + \$5 S&H.

**/WURDS/ Webster's Upstart** Ready Dictionary for SpeedCheck.\* Entered by freq. \$17 + \$3 S&H.

**/SPEEDPAK/** Add alternate screens, phrase macros, help, ASCII converter, encryption, mail merge, Dvorak to SS 3.x. \$17 + \$3 S&H.

**/SPEEDMATE/** 3.x customizer. Set/save margin defaults, 30+ print codes. Print preview 80 columns on screen at once! \$17 + \$3 S&H.

**Speedy User Group** For SS lovers. Send SASE for free details!

### UPSTART PUBLISHING

Dept. G6A, POB 22022  
Greensboro, NC 27420

919/379-9732 for MC/Visa orders.  
US funds. Outside US/Can add \$3 per disk/video. NC res. add 5% tax.

\* Copyrighted programs  
of COMPUTE! Publications Inc.

## DIGITAL SOUND SAMPLING

NOW FOR YOUR COMMODORE 64/128



COMPLETE  
SAMPLER 64  
SYSTEM

ONLY  
**\$89.95**

READY TO USE  
INCLUDES  
MICROPHONE

Record any sound into memory and replay it instantly over several octaves, ascending or descending scale, echo, reverb, endless looping, etc. Many professional and instructional uses and fun for hobbyists.

- Sample editing capabilities
- Full 8 bit ADC and DAC conversion
- Powerful sequencer with real time input
- Live effects menu with real time echo, reverb, digital delay, etc.
- Line and Mic input, line-output and feedback control

### DIGITAL DRUM BONUS!

Get the COM-DRUM Digital Drum Software for only \$14.95 (Reg. \$29.95) when purchased with the Sampler 64.

- Turns Sampler 64 into a digital drum machine
- Real time and step sequencer
- Polyphonic sound
- Includes Digitally Recorded Drumkit Samples and pre-programmed rhythms to get you started.

SEND CHECK OR MONEY ORDER TODAY TO:

### MICRO ARTS PRODUCTS

P.O. Box 2522, Dept. CG  
Philadelphia, PA 19147  
(215) 336-1199

Include \$3.50 shipping and handling. PA residents add 6% sales tax. Visa and MasterCard Accepted.



## LIONHEART

BUSINESS & STATISTICAL SOFTWARE

PC/MS-DOS (5 1/4 & 3 1/2), MACINTOSH, AMIGA  
ATARI ST, C64/128, CP/M, APPLE DOS 3.3

Explanatory books with professional compiled software; the new standard for statistical use. The influential Seybold Report on Professional Computing has this to say about Lionheart "... our sentimental favorite because of its pragmatic approach to the basic statistical concepts... The thinking is that the computer merely facilitates the calculations; the important thing is to be able to formulate a problem correctly and to determine what type of analysis will be most valuable." Let Lionheart help you get ahead of the competition! Spreadsheet compatible.

- BUSINESS STATISTICS ..... \$145
- EXPERIMENTAL STATISTICS ..... 145
- MULTIVARIATE ANALYSIS ..... 150
- EXPLORATORY DATA ANALYSIS ..... 75
- STATISTICS FOR MARKETING ..... 150
- QUALITY CONTROL & INDUSTRIAL EXPERIMENTS ..... 145
- FORECASTING AND TIME-SERIES ..... 145
- SALES AND MARKET FORECASTING ..... 145
- DECISION ANALYSIS TECHNIQUES ..... 110
- LINEAR & NON-LINEAR PROGRAMMING ..... 95
- PERT & CRITICAL PATH TECHNIQUES ..... 95
- OPTIMIZATION ..... 110

VISA, MasterCard, AMEX, Check

P.O. Box 379, ALBURG, VT 05440

(514) 933-4918

# LEROY'S CHEATSHEET®

Keyboard Overlays



For your **COMMODORE 128**

**\$7.95**  
each

**PLASTIC  
LAMINATED**



For your **COMMODORE 64**

**\$3.95** each

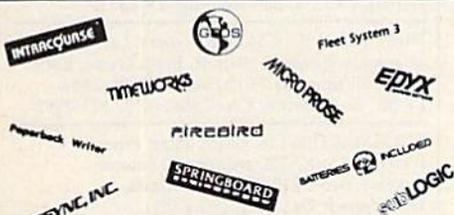
**Put Your Computer's Commands Where They Belong - And Your Manuals On The Shelf.**

Have you ever sat at your computer with the manual in your lap trying to find an elusive command? How much time have you lost searching through manuals to refresh your memory on how to do what you wanted? Now you have a way to end that frustration - **Leroy's Cheatsheets®**

**Leroy's Cheatsheets** help you get into your program right away. We put the commands right at your fingertips, actual keystrokes are in **bold** type, variables are shown in *italics*. Designed by software experts, our durable plastic laminated overlays are comprehensive reference aids which document a product or system completely. Now use your software more easily and more effectively. With Leroy's Cheatsheets you'll never have to hunt for a program command again!!!

See below for ordering information.

## SOFTWARE



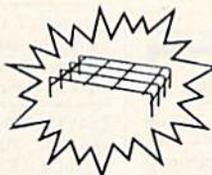
### DISCOUNT SOFTWARE & FREE CHEATSHEET

We carry a complete line of software at competitive prices. **PLUS** - on any software package of \$25.00 or more you get a **FREE Leroy's Cheatsheet®** of your choice! **CALL or WRITE TODAY** for prices.

## The Problem Solver EQUIPMENT STAND

By Leroy

**ONLY  
\$19.95**



Made of **sturdy vinyl coated steel** - strong enough for any computer equipment. This equipment stand will help you **organize your system**. With this unique construction, cables are never in the wrong place, switches are more accessible and your equipment **stays cooler**. The Problem Solver Equipment stand was **specially designed** for Commodore computers 128 & 64. Keeps your monitor at eye level (Great for printers too).

See below for ordering information.

## Order Now and Save ... Money, Time and Frustration

### COMMODORE 128 **\$7.95 ea**

Please send me the following **LEROY'S CHEATSHEETS** for the commodore 128 for only 7.95 each plus shipping.

#### DIE - CUT

- |                                                   |                                           |
|---------------------------------------------------|-------------------------------------------|
| <input type="checkbox"/> Basic 7.0                | <input type="checkbox"/> For The Beginner |
| <input type="checkbox"/> Blanks (3-NOT laminated) | <input type="checkbox"/> Multiplan 128    |
| <input type="checkbox"/> Data Manager 128         | <input type="checkbox"/> Paperback Writer |
| <input type="checkbox"/> Disk 1571                | <input type="checkbox"/> Paperclip 128    |
| <input type="checkbox"/> Easy Script              | <input type="checkbox"/> Superbase 128    |
| <input type="checkbox"/> Elite                    | <input type="checkbox"/> Superscript 128  |
| <input type="checkbox"/> Fleet system 2 & 3       | <input type="checkbox"/> Wordpro 128      |
| <input type="checkbox"/> Flight Simulator 2       | <input type="checkbox"/> Word Writer 128  |

**FREE - Keyboard extender (each order)**

### COMMODORE 64 **\$3.95 ea**

Please send me the following **LEROY'S CHEATSHEETS** for the COMMODORE 64 for only \$3.95 each plus shipping.

#### CUT-OUT-YOURSELF ON DOTTED LINES

- |                                                   |                                           |
|---------------------------------------------------|-------------------------------------------|
| <input type="checkbox"/> Basic 2.0                | <input type="checkbox"/> GEOS             |
| <input type="checkbox"/> Blanks (3-NOT laminated) | <input type="checkbox"/> Multiplan        |
| <input type="checkbox"/> Data Manager             | <input type="checkbox"/> Newsroom         |
| <input type="checkbox"/> Disk 1541                | <input type="checkbox"/> Paperback Writer |
| <input type="checkbox"/> Doodle                   | <input type="checkbox"/> Paperclip        |
| <input type="checkbox"/> EasyScript               | <input type="checkbox"/> Sky Travel       |
| <input type="checkbox"/> Elite                    | <input type="checkbox"/> Speedscript      |
| <input type="checkbox"/> Fleetsystem 2            | <input type="checkbox"/> Superbase 64     |
| <input type="checkbox"/> Flight Simulator 2       | <input type="checkbox"/> Superscript 64   |
| <input type="checkbox"/> For The Beginner         | <input type="checkbox"/> Word Writer      |

**Also fits the COMMODORE 64C**

Please send me Equipment stands for only **\$19.95** each plus shipping.

#### HOW TO ORDER:

\* Send personal check, money order or Master Card / VISA card information.

#### SHIPPING:

\* Leroy's Cheatsheets - **\$1.00** per order (Foreign Orders **\$3.00**)

\* Equipment Stand **\$3.00** each Cont U.S. **\$5.00** each Canada, Alaska, Hawaii

**No foreign orders please**

#### TAXES:

\* Add 6% sales (include shipping) for Pennsylvania residents only

U. S. FUNDS ONLY NO C.O.D

9az 11 Phone orders welcome HOURS: 7:30 AM - 5 PM Eastern Time Monday thru Friday

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_



No surcharge for Visa or MasterCard

VISA  MASTER CARD  PAYMENT ENCLOSED (check or money order)

CARD # \_\_\_\_\_ Exp \_\_\_\_\_ / \_\_\_\_\_

**CHEATSHEET PRODUCTS, INC. P.O. Box 111368 Pittsburgh, PA. 15238 (412) 781-1551**

COMMODORE 64 is a registered trademark of Commodore Electronics, Ltd. COMMODORE 128 is a trademark of Commodore Electronics, Ltd.

# Classified

## SOFTWARE

FREE SOFTWARE for C64, C128, IBM, & CPM  
Send SASA for info (specify computer) to:  
PUBLIC DOMAIN USERS GROUP,  
PO Box 1442-A2, Orange Park, FL 32067

C64 FINEST PUBLIC DOMAIN PROGRAMS  
\*On Disk\* most \$1.50 \*On Disk free list  
You pick the programs you want!!!  
JLH Co., Dept G, Box 67021, Topeka, KS 66607

FREE MEMBERSHIP IN SOFTWARE CLUB.  
Top British C64 programs. Catalog and  
reviews (no strings). ARROW EXPRESS,  
Box 205 G11, Rossland, BC VOG 1Y0

VIDEO TITLE MAKER and colorful, eye-  
catching in-store business advertising  
messages and special effects generator  
\$24.95 (C64 Disk); MicroAds, 145 East  
Norman Dr., Palatin, IL 60067

\$\$ WIN WITH THOROUGHbred HARNESS &  
Greyhound handicapping software: \$29.95,  
Enhanced: \$49.95. For most computers.  
Free info. Software Exchange, Box 5382 CG,  
W. Bloomfield, MI 48033. (313) 626-7208

## PRO COACH®

A FOOTBALL STRATEGY  
GAME

A simple but not simple minded game  
written **exclusively** for 128™ users. Match  
wits with the computer or a friend. Experi-  
ence the intensity of a real game as time  
runs out. You call the plays. You take the  
chances. Send check or money order to:

Omnisoft Associates

P.O. Box 2294, Orlando, FL 32802

**\$19.95** (for cassette version **\$24.95**)  
(Florida residents add 5% sales tax)

DFC-DISKETTE FILE COPY, version 4.0  
Convenient File utility for C64.

No copy protect. Now with support for  
SFD 1001, 8250, & 1571. Still supports  
1541, 4040, 2031, & 8050. (Not for  
protected disks.) Ideal for IEEE 488 &  
other interfaces. Put the files you want  
on the diskettes you file, \$12.95.  
Or get a demo disk with four uses per copy,  
\$4.95. California orders must add sales tax.  
No credit cards or COD. Prices include  
postage in Continental U.S.  
Layton Berry Software, (415) 284-7255,  
573 Merriewood Dr., Lafayette, CA 94549

MUTUAL FUND PROSPECTOR for C64-\$49.95

Be your own investment advisor.  
Send SASE for information. Aspen Glen  
Software, 878 Jackman St., Suite 157,  
El Cajon, CA 92020 (619) 447-5999

C64 LOAN-MORTGAGE CALCULATOR DISK  
With Home Inv, Alphabetizer & Cataloger  
Send \$12.95 Check or M.O. to:  
WOCKENFUSS, 3009 Illinois Avenue,  
Baltimore, MD 21227

5 NEW BIBLE PROGRAMS for Comm 64/128:  
Word Find, Trivia, Worship, more! All  
only \$29.95 ppd. Great gift! D.B. Software,  
P.O. Box 4608, Riverside, CA 92514

## \*\*\*\*\* FREE CATALOG \*\*\*\*\*

Exciting programs for your C64 or C128.  
Games, Utilities, Personal, Creative!  
Write to: M-Ware, 22704 Ventura Blvd.  
#1225, Woodland Hills, CA 91364

## 25 ENHANCED PD PROGRAMS FOR SMALL BUSINESS

Includes: Bookkeeper, Inventory, Invoicer, Bus  
Analysis Calc, Employer's Quarterly Tax, Label  
Maker, Scheduler, Rent or Buy, Sales Growth,  
Depreciation. Also DBase, WProcscr, Col Calc &  
other useful programs.  
Disk for C64: \$20 ppd  
GR ENTERPRISES, P.O. Box 240252  
Charlotte, NC 28224-0252; (704) 553-1942

## \*\*\*WE HAVE THE LOWEST RENTAL PRICES\*\*\*

Guaranteed. Call or write for more info.  
Pioneer Rental, P.O. Box 54, 945 Dartmouth  
Ave., Lovelock, NV 89419 (702) 273-2781

## FREE MEMBERSHIP AND CATALOG - C64

All public domain disks, \$2 each!  
Soft Share, 24365 San Fernando Rd. #154  
Newhall, CA 91321 SASE please.

CONNECT 4, A 3-D TIC-TAC-TOE GAME FREE  
when you ask for your free Commodore  
Software Catalog. Panther Software,  
5425-M Albemarle, Charlotte, NC 28212

C64/128 GRAPHICS DISK - includes CAD  
system, 2/3D function plotters, fractal  
graphics, MOIRE/abstract art, simulations,  
utilities, printer routines. ONLY \$14.95  
A. Leish, 3553 Sawtelle #F, L.A., CA 90066

## 100 PRINTSHOP™ GRAPHICS for the C64

\$8.00 + \$2.00 p/h: "Double Sided Disk"  
To: J.A.H. COMMUNICATIONS  
1452 Santa Fe Ave., Long Beach, CA 90813

PRO FOOTBALL ANALYST. BEAT THE POINT  
SPREAD! Only 5 min per week & your local  
newspaper is all it takes to find hidden overlays  
in the betting line. Winning season  
GUARANTEED! IBM/C64/TI99-\$34.95 (+\$4.55  
s/h) ORDER NOW! 1-800-341-1950 ex 77. Mail  
Orders: RIDGE, 170 Broadway #201-C, NYC,  
NY 10038. Catalog

## DARKSTAR BBS V3.0 \$49.95 US

Multi-Baud, Multi-Transfer, Multi-Drive, Color Graphics or  
ASCII Modes, Bulletins & Sub-Bulletins, All Machine Language  
with ISEQ File Management for Lightning Speed!!!

Message Categories: BBS Text, Commands, & Colors are User  
Definable Allowing Customization to Reflect Your Theme!!!

Cycle Messages, Add Users, etc. while ON-LINE!!!  
DarkTerm with 28,000 Byte Buffer ALSO INCLUDED!!!

DARKSTAR SYSTEMS SOFTWARE 24hr BBS (416) 445-6788  
113 Valleywoods Rd., Unit 95, Don Mills, Ont., Canada M3A 2R8

## COMPUTE!'s Gazette Classified is a low-cost way to tell over 275,000 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.) Inquire about display  
rates.

Forms: Prepayment is required. Check, money order, American Express, Visa, or MasterCard is accepted. Make  
checks payable to COMPUTE! Publications.

Format: 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!'s Gazette, 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.

## \*\*\*\*\* SEA WAR \*\*\*\*\*

Fight for WORLD-DOMINATION of the  
seas in this intense action-strategy  
naval simulation for two players.  
Features strategic placement of ships  
and mines; also an enlarged FIGHTING  
SCREEN with arcade-like graphics. For  
the C64/128 in 64 mode. For your copy  
on disk send \$14.95 to: Jeff Babuschak,  
365 Tilden St., Seward, PA 15954

## RENT SOFTWARE WITH OPTION TO BUY.

Lowest prices with no membership fee.  
100's of brand name programs.  
Send \$1.00 for 20 page catalog to:  
Centsible Software  
P.O. Box 263  
Stevensville, MI 49127  
(616) 465-6632

INEXPENSIVE C64/128 ASTROLOGY. Ten plus  
programs from \$7.95 to \$37.95. All print fast  
hard copy. FREE DETAILS. HETTIGER'S, 315  
Harmony Ct., B, San Antonio, TX 78217

MUST games for C64/128 owners! Las Vegas,  
Monopoly, Songs & Sounds, Brain Game. Each  
\$9.95, all four \$35.95 ch/mo to: DCS, 2254  
Pacific, Long Beach, CA 90806. (213) 595-0899

RULE MASTER 128. Learn about expert  
systems. BASIC 7.0, requires 80 column  
monitor. Send \$19.95 to John Davis,  
1827 Tarbert Dr., Cary, NC 27511

## HARDWARE

C64/128 and VCR STEREO AMPLIFIER  
Great stereo sound \$59. C128 80 char cable  
(works w/reg monitor) \$12. Fast load carts from  
your prog - send disk + \$29. UNITED  
RESEARCH, 7723 Rocking Horse Ln, Boerne, TX  
78006

## MISCELLANEOUS

### New! Bulletin Board Listings!

Put your MODEM to good use with the most  
up-to-date NATIONWIDE BBS listing. Send  
\$3.75 to CJ Innovations, Dept. C2, P.O. Box 6,  
Garnerville, NY 10923

MAKE MONEY WITH YOUR COMPUTER!  
Learn ways of putting your computer to work  
for you. Details: STEWIL Enterprises,  
P.O. Box 1388, Sierra Vista, AZ 85636

# A Printer For All Reasons

## Search For The Best High Quality Graphic Printer

**The Results Are In** We ran many printers through our battery of tests and this one came out first in its class. Our SP-1000, built by Seiko is a 100 characters per second, (12 horizontal by 9 vertical matrix), full bi-directional, logic seeking, true descender printer. The character matrix in NLQ (Near Letter Quality) mode is a very dense 24 (horizontal) by 18 (vertical).

**Features That Won't Quit** With the SP-1000 your computer can now print 40, 48, 68, 80, 96, or 136 characters per line. You can print in scores of style variations. You not only have standard Pica, Elite, Condensed and Italics, but also true Superscripts and Subscripts. Use **bold**, or *italics* to make the words stand out. Or, if you wish to be even more emphatic, underline the words. You can combine many modes and styles to make the variation almost endless.

### Forms? Yes! Your Letterhead? Of Course!

The tractors are adjustable from 4 to 10 inches. You can also use single sheets, plain typing paper, your letterhead, short memo forms, labels, whatever you choose. Any size to 10" in width. It will even load your paper automatically. Multiple copies? Absolutely! Use forms up to 3 thick. Spread sheets with many columns? Just go to condensed mode printing and print a full 136 columns wide all on a standard 8½" wide page. Forget expensive wide-carriage printers and having to change to wide carriage paper.

**An Extra Long Life** (2.5 million character) ribbon cartridge is only \$11.00. Order #2001. You need absolutely nothing else to start printing—just add paper (single sheet or fanfold tractor).

**NOW ONLY \$169.95!**



The warranty has now been extended to 2 years and service centers are located nationwide for your convenience.

### The Bottom Line:

**Commodore C-64 & C-128**, Order #2200, graphics interface & cable built in, **\$169.95**

**IBM-PC and compatibles**, Order #2100, **\$189.95** plus 8' shielded cable #1103, \$16.95

**Apple IIc or Macintosh**, Order #2300, **\$194.95** with cable, specify computer

**Standard Parallel** with 36 pin Centronics connector, Order #2400, **\$189.95** no cable

**Standard Serial** with RS-232 (DB-25) Connector, Order #2500, **\$189.95** no cable

Be sure to specify the order # for the correct version printer designed for your computer.

Interfaces and cables for other computers. Call 805/987-2454 for details.

Shipping in cont. US is \$10.00. UPS Blue is \$22.00.

# Affordable Letter Quality

Finally, for the small personal computer owner there is an affordable **true** letter quality printer. This superb Daisy Wheel is manufactured by Silver Reed and has a very simple and reliable mechanism. It prints at 10 cps and has virtually all the features of its larger counterparts including: bold, underlining, superscript, subscript and dot graphics mode. The print head is logic seeking and it uses both carbon film and nylon ribbons plus



**ELITE-5 \$174.95**  
Order #1805

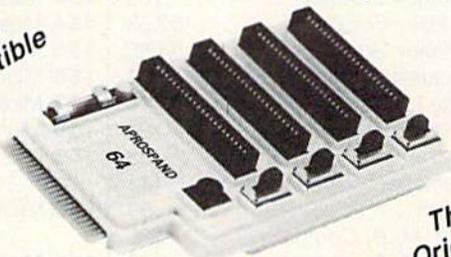
**ELITE-5D \$184.95**  
Order #1806

96 character printwheels available everywhere. We now have this available in a Commodore version, the **Elite-5 CD** which has both Commodore connector and cable **plus** a centronics parallel input for other computers. This is truly a remarkable value, priced at less than a dot matrix. Limited quantity, call your order now.

### APROSPAND-64™

Gives your Commodore 64 or 128 full expandability! This superbly designed expansion module plugs into the expansion port & gives you 4 switchable (singly or in any combination) expansion connectors - plus fuse protection - plus a reset button! Before you buy an expander, be sure that it has a fuse to protect your computer and that you can activate your cartridges in **ANY** combination allowed by the cartridges.

Fully C-128 Compatible



The Original

**NOW ONLY \$29.95**

### Commodore Interfaces and Cables

Cardprint G-WIZ Printer Interface #1108.....	\$46.95
Cardprint B/PS (without Graphics) #1105.....	\$35.95
Amiga Printer Cable (6 ft) #3040-6MF.....	\$17.95
Amiga Printer Cable (10 ft) #3040-10MF.....	\$21.95
Commodore 6 Pin Serial Cable (5 ft) #3006-5MM...\$	6.95
Commodore 6 Pin Serial Cable (8 ft) #3006-8MM...\$	8.95

Add Shipping Per Item: \$3.00 Cont. U.S. \$6.00 CAN, PR, HI, AK, APO, UPS Blue

**ORDERING INFORMATION** California residents add 6% tax. All prices are cash prices — VISA and MC add 3% to total. We ship the next business day on money orders, cashier's checks, and charge cards. A 14-day clearing period is required for checks. Prices subject to change—CALL. Dealer inquiries invited.

For information call **805/987-2454**

TO ORDER CALL TOLL FREE

**1 (800) 962-5800 - USA**

1 (800) 962-3800 - Calif. (8-8 PST)

Or send order to:



**APROTEK**

DEPT. CG

1071-A Avenida Acaso, Camarillo, CA 93010

# advertiser's index

Reader Service Number/Advertiser	Page	Reader Service Number/Advertiser	Page	Reader Service Number/Advertiser	Page
102 Abacus Software	73,75	141 Federal Hill Software	132	176 Solutions Unlimited	139
103 Access Software Inc.	83	142 Firebird Licensees, Inc.	25	177 Strategic Simulations	41
104 Acorn of Indiana, Inc.	138	143 Firebird Licensees, Inc.	51	178 subLOGIC Corporation	9
105 Activision, Inc.	21	144 Free Spirit Software	138	179 subLOGIC Corporation	31
106 Activision, Inc.	83	145 GSR Software Company	138	180 subLOGIC Corporation	45
107 Aier Products	124	146 IHT Software	138	181 subLOGIC Corporation	61
108 American International Computer Products	133	147 Inkwell Systems	105	Tektonics Plus, Inc.	136
109 Aprotek	143	148 Infocom	46,47	182 Tenex Computer Express	122
110 Artificial Intelligence	126	Intelligent I/O	66	183 Timeworks	11
111 Atari Corp.	91	Intelligent Software	132	184 Timeworks	35
112 Atari Corp.	92	149 Jason-Ranheim	132	185 Triad Computers	130
113 Atari Corp.	93	150 Jenday Software	132	186 Tussey Computer Products	26,27
114 The Avalon Hill Game Company	7	151 John & Bill Electronics	111	187 Ultrabyte	136
115 Basement Boys	42	Kyan Software	106	188 Unitech	66
Batteries Included	13	152 Lionheart	140	189 Upstart Publishing	140
Batteries Included	63	Lycor Computer	78,79	190 Why Not? Computer Enterprise	
116 Berkeley Softworks	52,53	153 Mastertronic International Inc.	37		136
117 Berkeley Softworks	54,55	154 Mastertronic International Inc.	49	191 Wilanta Arts	140
118 Blackship Computer Supply	138	155 MegaSoft	67	192 Xetec, Inc.	56
119 Body Log, Inc.	14,15	156 Micro Arts Products	140		
120 Cardinal Software	124	157 Micro Computer Services	137		
121 Central Point Software	93	158 Micro Fabrication Systems	140		
Cheatsheet Products, Inc.	141	159 Micro Prose Simulation Software	2,3		
122 C. Itoh	89	160 Micro Prose Simulation Software	19		
C. O. M. B. Company	126	161 Micro-Sys Distributors	88		
C. O. M. B. Company	128	162 Micro-W Distributing, Inc.	134		
Compumed	134	Mindscape	38,39		
123 CompuServe	1	163 Montgomery Grant	135		
124 ComputAbility	130,131	NRI Schools	97		
125 Computer Centers of America	127	164 Okidata	4		
126 Computer Mail Order	123	Okidata	59		
127 Computer Mart	124	165 Origin Systems, Inc.	IBC		
Covox Inc.	89	166 Precision Data Products	82		
Crown Custom Covers	138	167 Pro-Tech-Tronics	86,87		
128 CSM Software, Inc.	128	168 Protecto	68,69		
129 Data East USA, Inc.	57	169 Protecto	70,71		
130 db Software	74	170 R. J. Brachman Associates, Inc.			
131 Digital Solutions, Inc.	126		136		
132 Digital Solutions, Inc.	BC	171 RJ Softshop	134		
133 Digitek	48	172 S & R Marketing	56		
134 Echo Lake Laboratories	130	Second Source	93		
135 Electronic Arts	IFC	173 Schnedler Systems	134		
136 Electronic Arts	29	174 SoftPace Software Co.	140		
137 Electronic One	125	175 Software Discounters of America	129		
138 Emerald Components International	106				
139 Enlightenment, Inc.	85				
140 EPYX	77				

Classified Ads	142
The Complete Desktop Publisher and I Didn't Know You Could Do That with a Computer	81
COMPUTE! Books' New Releases	
	43
COMPUTE!'s Gazette Disk Subscription	65
COMPUTE!'s Gazette Subscription	17

From Origin, creators of the Ultima™ series,  
comes a new dimension in fantasy role-playing

# MOEBIUS

THE ORB OF CELESTIAL HARMONY

*A danger-filled adventure  
through a complex and  
colorful Oriental world of  
magic, mysticism and intrigue.*

*By Greg Malone.*

Available on Apple®



**M**oebius, the fabled deity of the island kingdom of Khantun, has chosen you, his disciple, to recover the stolen Orb from the renegade Warlord and prevent the destruction of the universe.

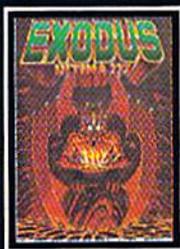


You will journey through the ascending planes of Earth, Water, Air and Fire. At each level your challenges increase in difficulty, demanding greater courage and cunning. All of your martial arts skills will be required to survive the ninja-like assassins who seek to foil your quest. Sword-wielding rebel guards will test your blade every step of the way. And watch out for wild beasts that stalk the forests!

Local villagers can help, but beware—the wrong approach will frighten them away, leaving you in a world where starvation looms ever-present. Wise use of magical charms, prayers and fireballs is essential in reaching the final confrontation with the treacherous Warlord—where victory brings recovery of the long-sought Orb of Celestial Harmony. Good luck!

**ORIGIN**  
SYSTEMS INC.

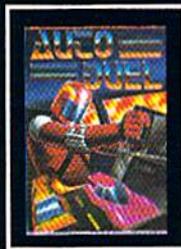
340 HARVEY ROAD, MANCHESTER, NH 03103 (603) 644-3360



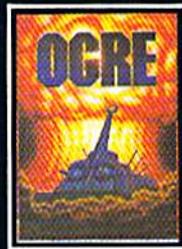
ULTIMA III™ takes you on an incredible fantasy role-playing journey through monster-plagued Sosaria in search of the elusive Exodus.



ULTIMA IV™ is the long-awaited sequel to Ultima III. The Quest of the Avatar is a quest to the final frontier—the self.



AUTODUEL™ is a futuristic, fast-paced strategy role-playing game where the right of way goes to the biggest guns.



OGRE™ is a strategy game fought on the nuclear battlefield of tomorrow as an inhuman juggernaut Cyber-tank battles conventional forces.

Ultima is a trademark of Richard Garriott/Moebius is a trademark of Greg Malone  
AutoDuel and OGRE are trademarks of Steve Jackson/Apple is a trademark of Apple Computer Inc.

**Authors wanted.  
Call us today.**

# Solutions!



**Pocket  
Writer 64**  
Word Processor

PW 128/64 Dictionary  
also available at \$14.95 (U.S.)



**Pocket  
Writer 128**  
Word Processor

MAIL ORDERS:

**CRYSTAL COMPUTER INC.**  
In Michigan 1-517-224-7667  
Outside Michigan 1-800-245-7316

CANADIAN DEALER ENQUIRIES:

**INGRAM CANADA LTD.**  
1-416-738-1700



**Pocket  
Planner 64**  
Spread Sheet



**Pocket  
Filer 64**  
Database



**Pocket  
Filer 128**  
Database

## Only The Name Is New

The professional, full-featured software line from Digital Solutions is now called Pocket Software.

Pocket Writer 128/64.

Pocket Filer 128/64.

Pocket Planner 128/64.

The names are new, but this super software is still the same.

From now on, when you hear the word Pocket, it means software that's full-featured, handy and easy to use.

Pocket Software at prices that won't pick your pocket.

**Serious software  
that's simple to use.**



**Pocket  
Planner 128**  
Spread Sheet

## Best-selling software for Your Commodore 128 or 64

You want the very best software you can find for your Commodore 128 or 64, right?

You want integrated software — word processing, database and spreadsheet applications — at a sensible price. But, you also want top-of-the-line features. Well, our Pocket 128/64 software goes one better.

With Pocket 128 or 64, you'll find all the features you can imagine... and then some. And Pocket 128/64 is so easy to use, you won't even need the reference guide. On-screen and in memory instructions will have you up and running in less than 30 minutes, even if you've never used a computer before.

The price? It's as low as you'd expect for a line of software called 'Pocket'. Suggested Retail Price for the 64 software is \$39.95 (U.S.) and \$49.95 (U.S.) for the 128. Any of the 64 products may be upgraded to their 128 version for \$15.00 (U.S.) + \$3.00 shipping and handling. (Available to registered owners from Digital Solutions Inc. only.)

Pocket Writer 128 or 64, Pocket Planner 128 or 64 and Pocket Filer 128 or 64... **Solutions** at sensible prices from Digital Solutions Inc.

International & Distributor enquiries to:

 **Digital  
Solutions  
Inc.**

30 Wertheim Court, Unit 2  
Richmond Hill, Ontario  
Canada L4B 1B9  
telephone (416) 731-8775

*Pocket Writer 128 and 64 are now available in French.*