The Peripheral Connection: Enhancing Your 64

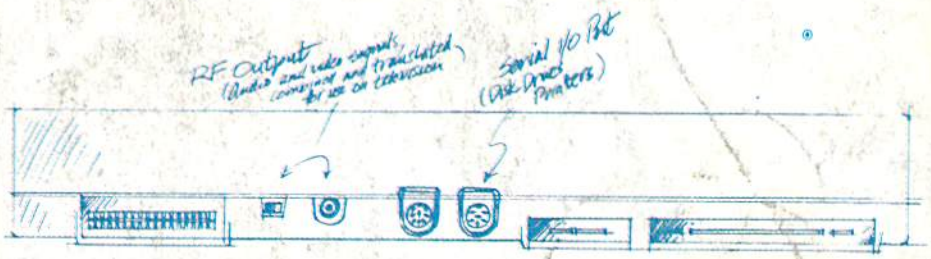
COMPUTE!'s GAZETTE

$2.95
March 1985
Issue 21, Vol. 3, No. 3
02220 $3.50 Canada

FOR **COMMODORE** PERSONAL COMPUTER USERS

Peripherals Of The Future

What new peripherals will we be using in the next decade? A look at some new devices on the way and some already here.



Also In This Issue:

Computing For Families

Machine Language For Beginners: Memory

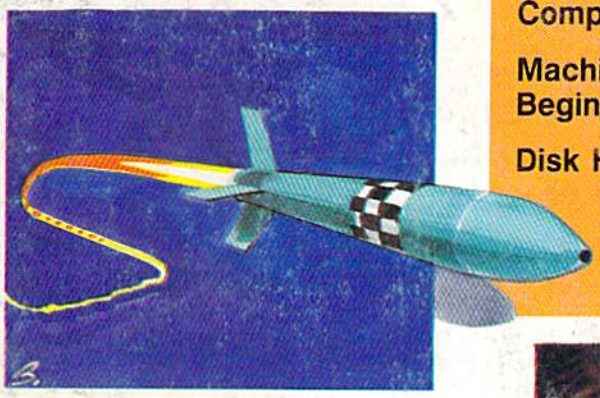
Disk Handler

Software Reviews

And More

Commodore Peripheral Ports

An in-depth look at communication with your computer. For the 64, VIC, Plus/4, and 16.



Heat Seeker

Heat seekers are faster than jets, and you can't shake them—but if you're good enough, you can eliminate their land base. An action/strategy game for the VIC and 64.

Disk Directory Sort

A short, useful utility that alphabetically sorts your disk directories. For the 64, VIC, Plus/4, and 16.

0 71486 02220

COMMODORE ♥ RITEMAN

DISTRIBUTORS:

Hamburg Brothers/NE 412-227-6239
Johnson Drug Company/SE 813-872-6631
Southern Electronics Distributors/SE 404-491-8962
Stokes Brothers/Utah 801-566-4117
Frisco Electronics/TX 512-857-7741
Ryan Distributing/Rocky Mt. 801-972-4721
First Source/SW 602-263-1950
Southern Micro Distributors/TX 214-258-6636

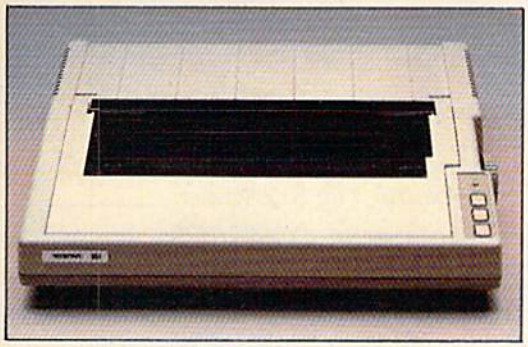
Compare these specs before you buy...

RITEMAN C+ vs. COMMODORE PRINTERS

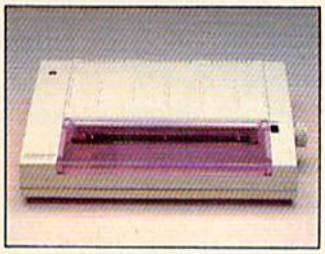
FEATURES	RITEMAN C+	ACTUAL PRINT	COMMODORE PRINTERS				
			MPS 801	MPS 802	MPS 803	VIC1525	VIC1526
PRINT SPEED (CPS)	105		50	60	60	50	60
BIDIRECTIONAL PRINT	YES		NO	YES	YES	NO	YES
(COLUMN WIDTH)							
40 CHARACTERS PER LINE	YES	40 CPL	YES	YES	YES	YES	YES
80 CHARACTERS PER LINE	YES	80 CPL	YES	YES	YES	YES	YES
66 CHARACTERS PER LINE	YES	66 CPL	NO				
132 CHARACTERS PER LINE	YES	132 CPL					
(PAPER HANDLING)							
FRONT LOADING FOR EASY PAPER SETTINGS	YES						
BUILT-IN PRINTER STAND	YES						
PRINT ON POST CARDS	YES						
(WARRANTY)							
ONE-YEAR WARRANTY	YES						
(SOFTWARE COMMANDS)							
DOUBLE STRIKE	YES	DOUBLE STRIKE					
EMPHASIZED	YES	EMPHASIZED					
COMPRESSED	YES	COMPRESSED					
UNDERLINE	YES	UNDERLINE					
SUPER/SUBSCRIPTS	YES	SUPER SUB SCRIPTS					
ITALICS	YES	*ITALICS*					
DOUBLE DENSITY BIT IMAGE	YES	C64					
(CHARACTERS)							
9X9 FONT	YES						
TRUE DISCENDERS	YES	abcgjpqyabc					
ITALICS	YES	*ITALICS*					
COMMODORE GRAPHICS	YES		YES	YES	YES	YES	YES
(OTHER FEATURES)							
SINGLE DENSITY BIT IMAGE	YES	C64	YES	NO	YES	YES	NO
EXPANDED	YES	EXPANDED	YES	YES	YES	YES	YES
REVERSE	YES	REVERSED	YES	YES	YES	YES	YES

NO

RITEMAN R64



RITEMAN LQ



■ LQ is available at Best Products. BEST.

Features

RITEMAN R64

Same as above except:

- 120 cps
- 2 ports: Centronics Parallel & Commodore*
- Portable
- Standard top loading

RITEMAN LQ

- Letter Quality Print
- Portable — Only 6½ lbs.
- Low price
- Centronics Parallel

*Commodore is a registered trademark of Commodore Business Machine, Inc.
**Epson is a registered trademark of Epson America Corp.

:RITEMAN:

INFORUNNER CORPORATION Airport Business Center 431 N. Oak St. Inglewood, CA 90302
(213) 672-4848 (In Calif) (800) 824-3044 (Outside Calif)

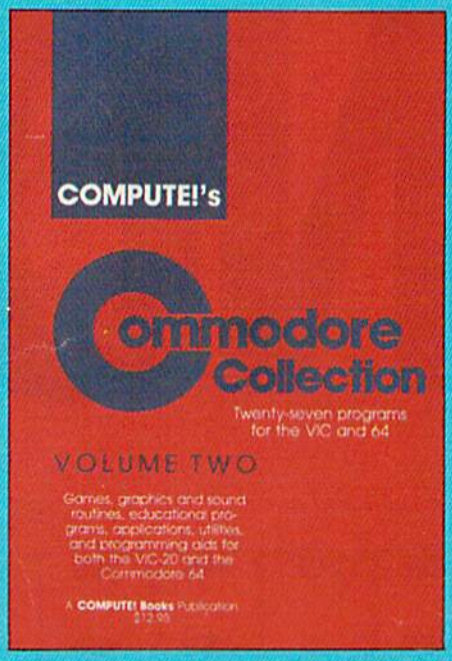
For Commodore owners, the latest collections from COMPUTE! Books

COMPUTE!'s Commodore Collection, Volume 1
Twenty-eight original programs for the VIC and 64

Edited

The *Commodore Collection*, an anthology of 28 previously unpublished programs for the VIC-20 and Commodore 64, continues the COMPUTE! tradition of practical programs in easy-to-use form. Includes exciting games, stimulating educational programs, valuable utilities, and useful applications to make your Commodore computer an exciting part of every day.

$12.95 ISBN 0-942386-55-8



COMPUTE!'s Commodore Collection, Volume 2
Programs for the VIC and 64

Edited

Exciting games, sophisticated applications, versatile educational routines, and helpful programming aids for the VIC-20 and Commodore 64 highlight this second volume in COMPUTE!'s Commodore Collection series. Included are some of the best articles and programs from recent issues of *COMPUTE!* and *COMPUTE!'s Gazette*, as well as many programs published here for the first time. Designed for Commodore computer users of all levels, it's a book that every VIC or 64 owner will want to have.

$12.95 ISBN 0-942386-70-1

To charge your order, call toll free 800-334-0868 or send in this coupon with your payment to COMPUTE! Books, P.O. Box 5406, Greensboro, NC 27403.

Please add $2.00 shipping and handling per copy ordered.

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

Account No. _____ Exp. Date _____

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

Please allow 4–6 weeks for delivery. 753CCG

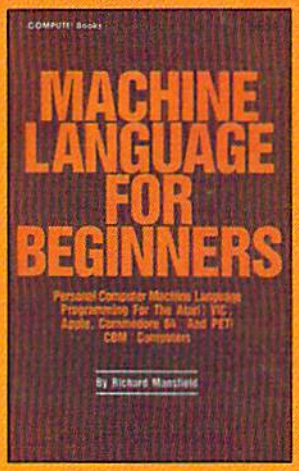
___ copies of *COMPUTE!'s Commodore Collection, Volume 1* @ $12.95 ea. _____

___ copies of *COMPUTE!'s Commodore Collection, Volume 2* @ $12.95 ea. _____

Shipping & handling, $2.00/book _____

Total payment _____

COMPUTE! Books brings you the companion volume to the best seller, *Machine Language for Beginners*, about which the critics have said:



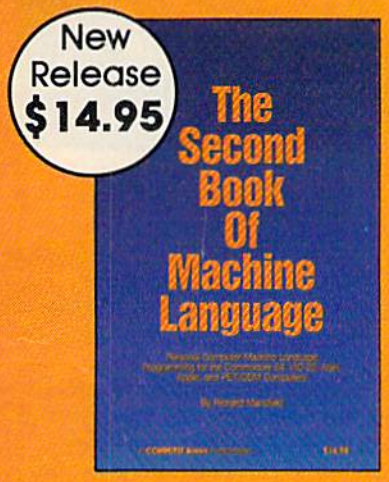
"If you know BASIC and want to learn machine language, this is the place to start . . . . Building on your experience as a BASIC programmer, Mansfield very gently takes you through the fundamentals of machine language."—Whole Earth Software Catalog

"Understandable"—The New York Times

"Presents the machine language novice with a very good tutorial in simple, understandable terms."—Antic

"I highly recommend Machine Language for Beginners as your first introduction to the world of machine language."—Commodore Power/Play

The Second Book of Machine Language for the Commodore 64, VIC-20, Apple, Atari, and PET/CBM



The Second Book of Machine Language picks up where *Machine Language for Beginners* left off. This new book contains one of the most powerful machine language assemblers currently available. The LADS assembler is a full-featured, label-based programming language which can greatly assist you in writing machine language programs quickly and easily.

It's also a clear, detailed tutorial on how large, complex machine language programs can be constructed out of manageable subprograms.

There are powerful computer languages and there is good documentation, but rarely has a sophisticated language been so completely documented as it is in this book. When you finish with this book, you'll not only have a deeper understanding of machine language—you'll also have one of the most powerful machine language assemblers available. And since everything is thoroughly explained, you can even add custom features to the assembler to create a custom language that does just what you want it to (the book shows you precisely how to modify the assembler).

For Commodore 64, Apple (II, II+, IIe, and IIc, DOS 3.3), VIC-20 (8K RAM expansion required), Atari (including XL, 40K minimum), and PET/CBM (Upgrade and 4.0 BASIC). Disk drive recommended.

15% Discount
Buy both books for **$25.00** and save **$4.90**! That's **15%** off the retail price!

Offer Expires March 15, 1985

THE *LADS* Disk

LADS, the assembler used in *The Second Book of Machine Language*, is available on disk for only $12.95. This is a great accompaniment to the book, saving you hours of typing time by providing the complete source and object modules for all versions of the assembler. And LADS disks are specific to your Apple, Atari, or Commodore computers.

To Order: Call Toll Free **800-334-0868** (in NC **919-275-9809**) or mail this coupon with your payment to COMPUTE! Books, P.O. Box 5406, Greensboro, NC 27403. Offer Expires March 15, 1985

_____ *The Second Book of Machine Language*, **$14.95**
_____ *Machine Language for Beginners*, **$14.95**
_____ *LADS Disk* (Apple) **$12.95**
_____ *LADS Disk* (Atari) **$12.95**
_____ *LADS Disk* (Commodore), **$12.95**

☐ Payment Enclosed (check or money order)
☐ Charge ☐ MasterCard ☐ Visa ☐ American Express

Acct. No. _____

Signature _____

Name _____

Address _____

City _____

State _____ Zip _____

_____	1 Book for	$14.95
_____	2 Books for	$25.00
_____	*LADS Disk* for	$12.95
NC residents add 4.5% sales tax		$_____
Shipping and handling ($2.00 per book $1.00 per disk)		$_____
Total Paid		$_____

All orders must be prepaid.
Please allow 4–6 weeks for delivery.

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

753MLCG

Quick.

How many plates can the Juggler juggle?

Chinese Juggler

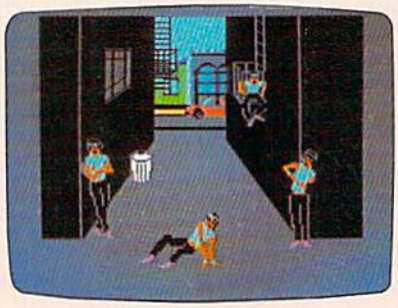
That depends on you. You are the Juggler and your act is the delicate art of plate spinning. Yours will be a tough act to follow if you succeed in matching colors and spinning plates on all 8 poles at the same time.

As your skill increases, so does the pace and the challenge of the game. You must act with speed and precision or the curtain will come down and your act will be all washed up!

Chinese Juggler is a refreshing departure from the usual shoot-em-ups and strategy games. It's fun, fast-paced and will delight players of any age. For Commodore 64. New from Creative Software.

$24.95

How do you moonwalk, snake and tut?



Break Street

You'll soon become a break dancing expert with our latest bestseller, Break Street. Now that combination of gymnastics, mime, funk, and just plain show-off, leaves the sidewalks and comes home to your Commodore 64.

Individual play guides you through the footwork of moonwalk, backspin, windmill, tut, and the rest of those sidewalk moves. Slow motion and lively musical accompaniment help you perform each move step by step. String together a whole series of moves and record them for future replay.

Catch the beat of the street with Break Street. For individual or team play. New from Creative Software.

$24.95

The answers are at your finger tips.

What's the capital of Alaska?

Roll Call USA

Do you know? Get ready to outwit your family and friends with Roll Call USA's fun facts on states,capitals and major industries.

Roll Call USA combines history and geography facts into a colorful question and answer game that challenges your knowledge of the 50 states, their capitals, major industries and statehood dates.

Feel confident? Drill yourself with a Flash Test. The game is speeded up, so think fast. Your answers are tallied up at the end for a final score.

Roll Call USA, a game of USA trivia for team or individual play. For Commodore 64. New from Creative Software.

$14.95

Call and order today! Use your Visa, MasterCard or personal check. Toll Free **1-800-331-7990** (outside California), **1-800-448-1001** (in California), or **1-408-745-1655.** MONEY BACK GUARANTEE. If not completely satisfied, return within 10 days for full refund.

"Commodore 64" is a trademark of Commodore Electronics, Ltd.

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

230 East Caribbean Drive, Sunnyvale, CA 94089

©1984 Creative Software

March 1985 Vol. 3, No. 3

FEATURES

The Peripheral Connection: Enhancing Your 64 *Selby Bateman*	25	64
Peripherals Of The Future *Sharon Darling*	30	*
Commodore Peripheral Ports *Ottis R. Cowper*	40	V/64/+4/16
Inside View: David Crane, The Designer Behind ***Ghostbusters*** *Kathy Yakal*	50	*

REVIEWS

Microsoft Multiplan *Harvey B. Herman*	80	64
Also Worth Noting	84	64

GAMES

Heat Seeker *Jeff Wolverton*	56	V/64
Digger *Ron Long*	60	V/64

EDUCATION/HOME APPLICATIONS

Computing For Families: "Easy-Play" Computer Peripherals For The Family *Fred D'Ignazio*	64	*
Alpha Anxiety *Craig Howarth*	71	V/64
AVAIL *Tom Prendergast*	74	V/64/+4/16

PROGRAMMING

BASIC Magic: Computer Math For Beginners *Michael S. Tomczyk*	96	V/64/+4/16
Machine Language For Beginners: Memory *Richard Mansfield*	103	V/64
Hints & Tips: Abbreviated Printer Codes *John Crookshank*	105	V/64
Power BASIC: Quick Character Transfer *Fabio Coronel*	109	V/64/+4/16
Baker's Dozen: Part 3 *Lawrence Cotton*	111	64
Disk Directory Sort *N. A. Marshall*	113	V/64/+4/16
Disk Handler *B. R. Carson*	114	V/64

DEPARTMENTS

The Editor's Notes *Robert Lock*	6	*
Gazette Feedback *Editors And Readers*	10	*
User Group Update	78	*
Horizons *Charles Brannon*	107	*
News & Products	117	*

PROGRAM LISTINGS

Bug-Swatter: Modifications And Corrections	120	*
How To Type In COMPUTE!'s Gazette Programs	121	*
MLX	122	V/64
Product Mart	147	*
Advertisers Index	160	*

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

COMPUTE!'s GAZETTE is published monthly by **COMPUTE!** Publications, Inc., Post Office Box 5406, Greensboro, NC 27403 USA. Phone (919) 275-9809. Editorial offices are located at 324 West Wendover Avenue, Greensboro, NC 27408. Domestic subscriptions: 12 issues, $24. Send subscription orders or change of address (P.O. Form 3579) to Circulation Dept., *COMPUTE!'s GAZETTE*, P.O. Box 961, Farmingdale, NY 11737. Second class application pending at Greensboro, NC 27403 and additional mailing offices.
Entire contents copyright ©1985 by **COMPUTE!** Publications, Inc. All rights reserved. ISSN 0737-3716.
COMPUTE! Publications, Inc., One of the ABC Publishing Companies: ABC Publishing, President, Robert G. Burton; 1330 Avenue of the Americas; New York, New York 10019.

THE EDITOR'S *notes*

Gazette Editor Lance Elko contributes an editorial this month.

Robert Lock, Editor In Chief

Anticipation is high on the eve of the Winter Consumer Electronics Show. The home computer industry, mired in a sales slump for the past several months, needs a boost, and this CES promises to reveal the direction of the market for the months ahead. There will surely be surprises. Next month, we'll have a first-hand report on the show.

With the introduction of new Commodore computers in 1985, it will be interesting to see how they're marketed. Commodore recently hired a new vice-president of marketing, Frank Leonardi, an ex-Apple marketing strategist.

We can look forward to at least three new machines from Commodore: the Amiga Lorraine (probably fall or winter), the C-128, and the surprise LCD lap (or "notebook") computer. The latter two are expected to be introduced at CES. Unlike Commodore's past ventures with new computers, the lap computer (officially nameless at this writing) was not subject to premature announcements and conjecture. With 32K usable RAM, the lap computer goes one better than many of its competitors. It's powered by four AA alkaline batteries, has non-volatile memory (you don't have to save files with storage devices—they stay in the machine), is programmable, and contains an LCD display with 80 columns and 16 lines. It contains seven built-in programs: a word processor, file manager, spreadsheet, scheduler (with programmable alarm), calculator, memo pad, and address book. And all are integrated.

A 300-baud, auto-answer, auto-dial modem is built in, and RS-232, Centronics parallel, and Commodore serial ports are included. Commodore BASIC 3.6 (a slightly enhanced version of the BASIC in the Plus/4 and 16) and a machine language monitor are resident. We'll have a hands-on report next issue.

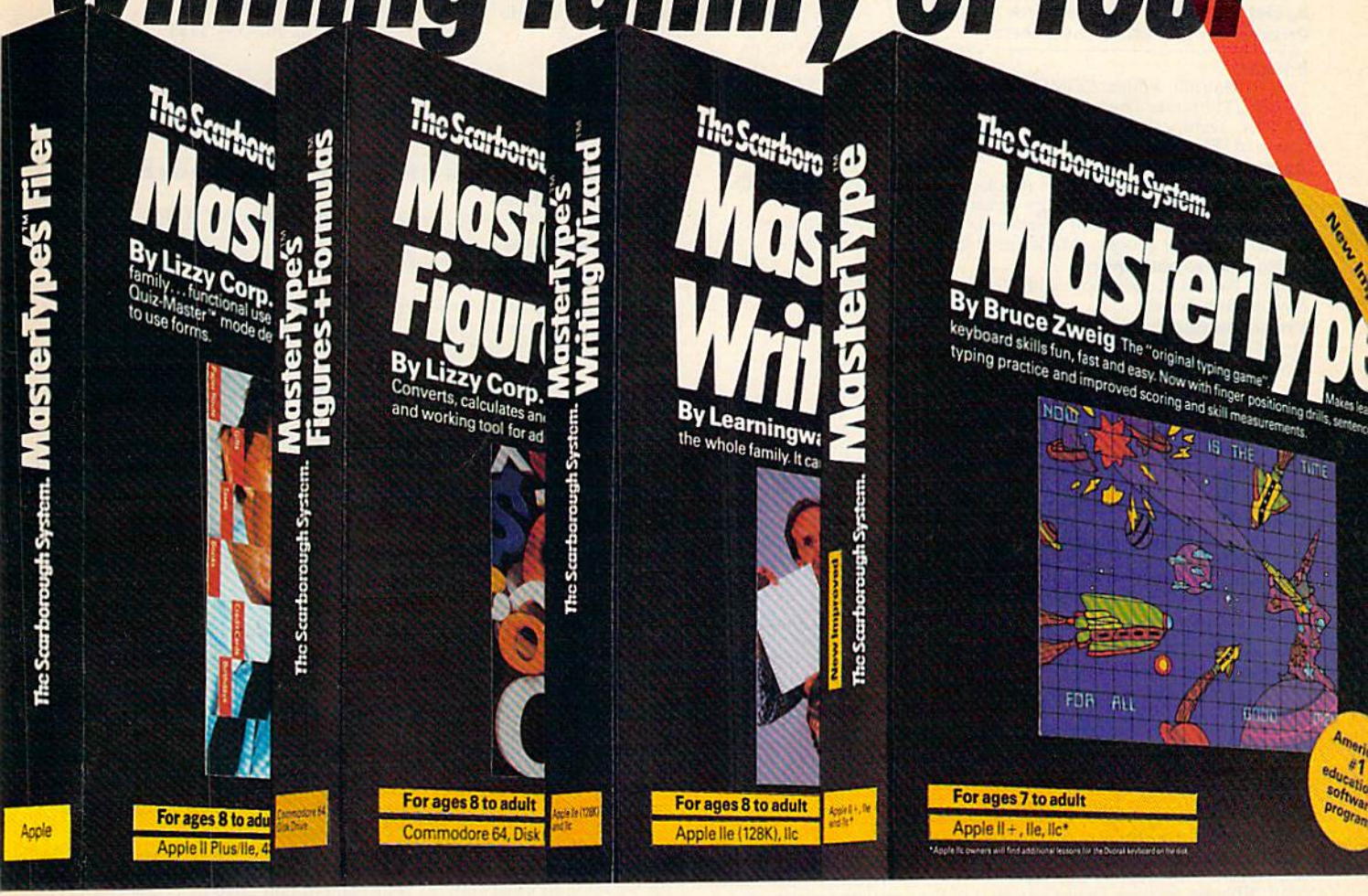
Looking Ahead

In the months ahead, we're planning some changes in the GAZETTE. Beginning with the April issue, we'll take a different approach in the "Reviews" section. We'll review more products, but, so as not to sacrifice space, in shorter and tighter coverage. The "News & Products" section will undergo a similar change. Also, next month is the final appearance of one of our regular features, "Inside View." However, we will continue to print relevant and interesting interviews as appropriate for feature articles.

Also in the works are a variety of outstanding programs and articles which you won't want to miss: "MetaBASIC," a powerful utility that adds 32 commands to BASIC; "ProBASIC," which takes the pain out of programming sound and sprites, plus much more; some interesting telecommunications items; excellent tutorials and programs on sorts and program crunching; and some of the best games we've ever offered. Plus a few surprises. See you next month.

Lance Elko
Editor

Meet MasterType's™ new winning family of four



1. Introducing New Improved MasterType™ that makes it even more fun to be an expert typist even faster.

We've added on-screen finger positioning and sentence practice. Now the #1 best-selling educational program in America produces all the results of a traditional touch typing course, and it's fun, fast-paced and entertaining. Available for: Apple II family, Macintosh, Commodore 64, Atari, IBM PC/PCjr.

2. Introducing MasterType's Classic Software Library. These three new MasterType programs — plus New Improved MasterType — are the basics. You can't begin to get the most from your home computer without them.

MasterType's™ Writing Wizard.™ This easy-to-use, full-function word processor and "writing teaching tool" helps the whole family write more effectively. Dual windows, a database and simple correction commands make writing efficiently a breeze. Color highlighting and multiple typefaces challenge kids to write creatively. Available for: Apple IIc/IIe (128K), Commodore 64, IBM PC/PCjr.

MasterType's™ Figures + Formulas.™ A "computing encyclopedia" of weights and measures for kids and adults. Converts currencies, adapts recipes, translates metric measures to American standards and more. Available for: Apple II family, Commodore 64.

MasterType's™ Filer. It's the only list manager and database for kids and adults that employs functional color and sound. This powerful program organizes, sorts and prints addresses, insurance records, household inventories and all sorts of lists. Available for: Apple II family, Atari, Commodore 64, IBM PC/PCjr.

The Scarborough System.

You'll grow with us.

© Scarborough Systems, Inc., 25 N. Broadway, Tarrytown, New York 10591

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

Publisher Gary R. Ingersoll
Editor in Chief Robert C. Lock
Director of Administration Alice S. Wolfe
Senior Editor Richard Mansfield
Managing Editor Kathleen Martinek
Editor Lance Elko
Assistant Editor Todd Heimarck
Production Director Tony Roberts

Editors
Tom R. Halfhill, Editor, COMPUTE! Magazine; Stephen Levy, Editor, COMPUTE! Books Division; Gail Cowper, Production Editor; Ottis R. Cowper, Technical Editor; Charles Brannon, Program Editor; Selby Bateman, Features Editor

Assistant Editors
Gregg Keizer, J. Blake Lambert (Books); John Krause, George Miller, Philip Nelson (Technical); Kathy Yakal, Feature Writer; Sharon Darling, Research Assistant (Features), Randall Fosner, Assistant Managing Editor (Books); Mark Tuttle, Submissions Reviewer

Editorial Programmers
Patrick Parrish (Supervisor), Tim Victor, Kevin Mykytyn, Kevin Martin, Rob Terrell

Programming Assistants
David Florance, Susan Doss, David Hensley

Copy Editors
Juanita Lewis, Joan Rouleau, Ann Davies

Proofreaders
Ethel Silver, Dwight Smith, Marty Selby

Administrative Staff
Susan Young, Vicki Jennings, Laura MacFadden, Julia Fleming, Iris Brooks, Jan Kretlow

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
Leslie Jessup, Larry Sullivan, (Publications), Debbie Bray (Books); Harry Blair, Illustrator

Associate Editors
Jim Butterfield (Toronto), Harvey Herman (Greensboro), Fred D'Ignazio (Roanoke)

Circulation
Charles C. Post, Circulation Manager; Patty Jones, Assistant Circulation Manager; Fran Lyons, Single Copy Sales Supervisor; Jill Pope, Fulfillment/Subscription Supervisor

Customer Service
Philippa King, Customer Service Manager; Gail Jones, Dealer Sales Supervisor; Judy Taylor, Customer Service Supervisor; Dealer Sales Staff: Rhonda Savage, Debi Goforth, Liz Krusenstjerna; Customer Service Staff: Betty Atkins, Gayle Benbow, Rosemarie Davis, Chris Gordon, Mary Hunt, Jenna Nash, Chris Patty

Lonnie Arden, Warehouse Manager; Staff: Howard Ayers, Steve Bowman, Jim Coward, Larry O'Connor, Sam Parker; Mary Sprague, Mail Room Coordinator.

Data Processing
Leon Stokes, Manager; Chris Cain, Assistant

Accounting
Paul J. Megliola, VP, Finance & Planning; R. Steven Vetter, Director, Finance & Planning; Robert Bean, General Accountant; Karen K. Rogalski, Financial Analyst; Staff: Dale Roberts, Shannon Roesler, Jane Wiggs

Credit
Barry L. Beck, Credit Manager; Staff: Sybil Agee, Susan Booth, Anne Ferguson, Pat Fuller, Doris Hall, Joyce Margo, Linda Miller, Mary Waddell

Purchasing
Gregory L. Smith, Purchasing Manager; Anna Harris, Assistant

Promotion
Mindy K. Kutchei, Promotion Manager; Caroline Dark, Assistant

Advertising Sales
Ken Woodard, Director of Advertising Sales; Bonnie Valentino, Assistant Advertising Manager; Patti Stokes, Production Coordinator; Kathleen Hanlon, Sales Assistant

Sales Representatives

Jerry Thompson	415-348-8222
Ed Winchell	213-378-8361
Harry Blair	919-275-9809

Jules E. Thompson, Inc.
National and Canadian Sales Representatives
1290 Howard Avenue, Suite 303
Burlingame, CA 94010

Address all advertising materials to:
Patti Stokes, COMPUTE!'s GAZETTE
324 West Wendover Ave., Suite 200, Greensboro, NC 27408

Sales Offices, The Thompson Company

New England	617-720-1888
Mid-Atlantic	212-772-0933
Southeast	919-275-9809
Midwest	312-726-6047
Texas	713-731-2605
Northwest, Nevada	408-354-5553
Northern CA	415-348-8222 or 408-354-5553
Southern CA	213-378-8361
Arizona	213-378-8361
New Mexico	213-378-8361
Colorado	303-595-9299

COMPUTE! Publications, Inc., publishes
COMPUTE! **COMPUTE! Books** ***COMPUTE!'s GAZETTE***

Corporate Office:
324 West Wendover Ave., Suite 200, Greensboro, NC 27408

Mailing Address:
Post Office Box 5406, Greensboro, NC 27403

Distribution Center
500-A Radar Road, Greensboro, NC 27419

Telephone: 919-275-9809
Office Hours: 8:30 AM to 4:30 PM Monday–Friday

Chief Executive Officer Robert C. Lock
President Gary R. Ingersoll
Vice President, Finance & Planning Paul J. Megliola
Executive Assistant Debi Nash
Assistant Anita Roop

Member ABC Audit Bureau of Circulations

Subscription Information

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

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

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 961, Farmingdale, NY 11737. 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 © 1984, **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, and Commodore 64 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.

WordPro 3 Plus™/64

The #1 Selling Word Processor for the Commodore 64™

Now Includes SpellRight Plus! Spell Checking Program

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

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

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

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

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

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

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

Professional Software Inc.

51 Fremont Street
Needham, MA 02194

(617) 444-5224
Telex: 951579

Dealer and Distributor inquiries are invited.

WordPro 3 Plus™/64 and SpellRight Plus™ are trademarks of Professional Software Inc.
The WordPro Plus Series was designed and written by Steve Punter of Pro-Micro Software Ltd.
SpellRight Plus was designed and written by Dwight Huff and Joe Spatafora of SpellMaster Systems, Inc.
Some printers may not support certain WordPro 3 Plus functions and/or require an interface. Please check with your dealer.
Commodore 64™ is a trademark of Commodore Electronics Ltd.

GAZETTE FEEDBACK

Editors And Readers

Do you have a question or a problem? Have you discovered something that could help other VIC-20 and Commodore 64 users? Do you have a comment about something you've read in COMPUTE's GAZETTE? We want to hear from you. Write to Gazette Feedback, COMPUTE's GAZETTE, P.O. Box 5406, Greensboro, NC 27403.

One Action At A Time

How can you make more than one thing happen on the screen at one time—for example, a joystick-controlled sprite, a laser sprite triggered by the fire button, and background music, all at the same time?

Walter R. Klis

Computer games might seem to do many things at once, but they're actually doing only one thing at a time. Computers follow instructions sequentially, one after another. A system that does several different things at once is possible, but you would need more than one computer or microprocessor (each operating sequentially).

To give your program the appearance of simultaneous action, you need to plan ahead. Separate the actions into subroutines. IF-THEN can decide whether or not you want to GOSUB to the appropriate routine. It might help to write, in plain English, the conditions and their consequences. For example

IF (button is pressed) THEN (launch laser and set laser flag)
IF (joystick move) THEN (move ship sprite)
IF (one second has passed) THEN (play another note of the song)
IF (laser flag is set) THEN (move laser sprite again)
REPEAT (the above loop)

First, you check for the joystick button. If it's pressed, GOSUB to the appropriate routine. If not, you forget about launching the laser until the next time through the loop. Once you've launched the laser, you want it to continue moving, which is the reason for the laser flag. Whether or not the button was down, you next PEEK the joystick to see if the player wants to move, and update the ship's position. Third, you check the jiffy clock, the variable TI or TI$, to see how much time has gone by. If a second (or whatever time period you've chosen) has passed, play the next note of the song. Next move the laser sprite, if the flag is set, and go back. The program loops around and around, checking the joystick twice, the time, and a variable, taking any necessary actions.

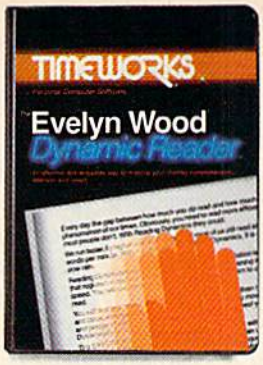
The computer works quickly, so the individual actions seem to be coordinated, all happening simultaneously.

To convert the above outline into a playable game, you would need a few more subroutines. One would check the collision register, in case the laser has hit something. Another would erase the sprite and unset the flag as soon as the laser reaches the top of the screen. And, of course, you'd have to translate the outline into BASIC.

There's another technique which is even closer to simultaneous action. But it requires an intermediate to advanced knowledge of machine language (ML). Sixty times a second, the computer stops what it's doing and takes some time to redraw the image on the screen. The main program is being constantly interrupted. Using a wedge, *you can divert the interrupt to your own ML program which could play music, move sprites, or whatever you choose. Such* interrupt-driven *routines are sometimes difficult to implement, but can be very effective.*

Breaking And Entering

I'd like to know if there is a terminal program that would allow someone calling my computer



The Evelyn Wood Dynamic Reader.™ Now, the world's most renowned master brings the techniques of Dynamic Reading to your computer.

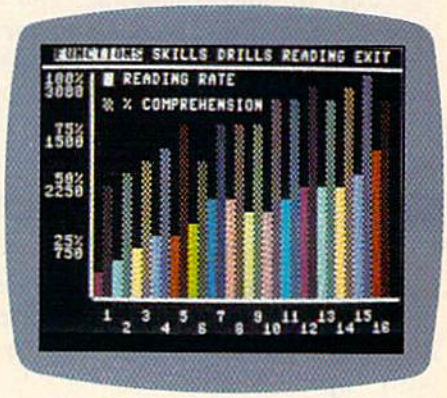
Learning to read faster isn't good enough. With the *Evelyn Wood Dynamic Reader,* you'll learn to read three to ten times faster—but with better comprehension and retention.

Only Timeworks brings this highly successful reading program into your computer. It will guide you like a gifted teacher through the drills and exercises at your own comfortable pace, automatically record your progress, and let you graphically review your results on colorful bar charts.

If it takes you more than 30 seconds to read this ad, you need Evelyn Wood.

Reading Dynamics is not a skimming or "key word" association technique. It is a totally different reading concept that registers every word, every idea, every shade of meaning in the written material. You will use more of your mental capacity and learn to concentrate. Your mind won't wander while you read.

Reading *dynamically* is more enjoyable than reading the old way. Complete thought patterns and ideas emerge from the written material in a smoothly moving picture. Instead of perceiving individual bits and pieces of information and putting them together as best you can, you will see total concepts. Reading *dynamically* is like living in the material.



The Evelyn Wood Dynamic Reader provides you with the exercises and tools you need to help you increase your reading comprehension and speed. Your own personal computer helps you develop your skills at your own pace.

You learn the essential techniques of Dynamic Reading in your own home—at any time convenient for you. You can repeat exercises as often as you wish to assure that you maintain optimal reading efficiency. Each program contains 50 Skill-Builder exercises, 20 reading exercises and 40 quizzes.

Only Timeworks offers the *Evelyn Wood Dynamic Reader.* Now at your favorite dealer. Or contact Timeworks, Inc., 405 Lake Cook Road, Deerfield, IL 60015. Phone: 312-948-9200.

Available for Commodore 64;* IBM;* Apple;* Atari.*

Timeworks Programs:
Data Manager 2 ■ Word Writer ■ Swiftax ■ Money Manager ■ Electronic Checkbook ■ Business System Series ■ Dungeons of Algebra Dragons ■ Spellbound ■ Cave of the Word Wizard ■ Computer Education Kits

TIMEWORKS®

©1984 Reading Dynamics, Inc. and Timeworks, Inc. All rights reserved. *Registered trademarks of Commodore Computer Systems, International Business Machines Corp., Apple Computer, Inc., Atari, Inc.

to take control of it—being able to catalog the disk in my drive, for example.

Timothy Yates

If you think other modem users might call your computer and get information about what's on your disk, don't worry. If the computer is turned off, no one can break into your computer (unless they break into your house first).

On the other hand, if you do want to upload your directory (to a friend, for example), there are a couple of ways to do so. It's unlikely, but your terminal program may allow you to send a directory to your friend—check the documentation to be sure. Or you can create a program file which contains the current directory. Before you go on-line, load the directory (LOAD"$",8) and then save it back to the disk under another name. Then you can upload the file (which contains the directory information) to your friend. In either case, you, *not your friend, would be controlling the computer.*

Also, many bulletin board systems are designed to allow remote users access to the disk directory of the host system. The system operator (sysop) usually controls which files can be accessed by users. Again, the users don't actually take control, rather they are permitted to read the directory. Bulletin board systems are specialized terminal programs which allow the caller to save or load files and messages to or from the host disk. Once you connect to these systems, you typically select from several options and the bulletin board program reacts by accessing the disk.

Write-Protected GAZETTE DISKs

I ordered your August 1984 GAZETTE DISK, which featured "Sprite Magic." The disk is write-protected, so I can't save any of my pictures. Please tell me how I'll be able to save things with "Sprite Magic."

Jason Miller

Insert another disk in the drive before responding to the final prompts to save in "Sprite Magic." By the same token, insert the disk with sprite data if you wish to load previously saved sprite data back into Sprite Magic.

From May through the first disks of August there was a notch in the GAZETTE DISKs. *Users could read from and write to the disk. We began to write-protect (no write notch on the disk)* GAZETTE DISKs *with the later versions of the August disk. This was done in the interest of safety. "Disk Purge," the first program on the menu of the August disk, deletes disk files. Some disk subscribers received their disks and ran the program without reading the article, deleting programs from the* GAZETTE DISK.

We encourage GAZETTE DISK *buyers to make backup copies of their disks. Although our disks are write-protected, they're not copy-protected. You can save any BASIC program to another disk with the usual SAVE "*filename*",8. If you want to save a machine language program (such as "Sprite Magic"), you'll need a special utility program. We've published several such utilities: Program 4, "Machine Language For Beginners," (December 1984* GAZETTE*); "File Copier" (April 1984* GAZETTE*); "Single Drive Copy" (September 1983* GAZETTE*); and "Unicopy" in the October issue of our sister magazine,* COMPUTE!*. You can also use MLX to copy ML programs. You might want to make a separate copy of any programs which create new files (such as "Sprite Magic") so you won't have to continually swap disks.*

Quashed Question Marks

Is there any way to INPUT information without getting those stupid question marks? I tried using GET statements and adding them together, but you can't see the cursor.

Coleman Nee

GET is one of the ways to avoid seeing question marks, as you've noted. The advantage to GET is that it accepts all characters, including commas and colons, which aren't normally allowed in INPUT statements. And it is possible to make the cursor blink during a GET statement.

But there's a better way to turn off the question mark. Closely related to INPUT, the INPUT# command allows you to retrieve information from a previously opened file or device. And it doesn't print question marks.

Since the keyboard is device zero, you can open a file to the keyboard and use INPUT#:

```
10 OPEN1,0: INPUT#1,A$: PRINT A$: CLOSE1
```

It won't accept null input (typing RETURN), nor will it accept spaces by themselves. You can *include spaces between words. Like INPUT, it will read anything up to a comma or colon, but (unlike INPUT) won't give you back an ?EXTRA IGNORED error.*

MLX Upgrades

The MLX program has been a great help in typing machine language programs. When version 2.02 came out, I typed it into my 64 and it ran fine until I tried to save a program to tape. It kept saying "Error On Save. Try Again." I compared an older version to the new one and found a new line 766, with K=E+1. Does this "+1" serve some purpose I don't know about?

Diane D. Junes

Between December 1983 and December 1984, the GAZETTE *has published four versions of MLX (plus*

Fleet System 2.™
Word processing that *spells* V-A-L-U-E.

Complete word processing with built-in 70,000 word spell checking - Only $79.95

Up till now, you'd have to spend a minimum of about $70 to get a good word processor for your Commodore 64™. And if you added a small, *separate* spell checking program, you'd be out well over $100!

Now there's Fleet System 2! It's two powerful programs in one, and it's perfect for book reports, term papers or full office use.

Fleet System 2 combines the EASIEST and most POWERFUL word processor available with a lightning-fast 70,000 word spelling dictionary — all in one refreshingly EASY TO USE integrated system. Finally, spell checking is now available at your fingertips.

You can even add over 15,000 "custom" words to the built-in 70,000 word dictionary. And at a suggested retail price of $79.95, Fleet System 2 really spells V-A-L-U-E, and 70,000 other words too!

Fleet System 2 helps people of all ages to learn to *spell correctly* and *write better* too. It's the ONLY full featured word processor that provides you with helpful writing and vocabulary feedback such as: the total number of words in your document, the number of times each word appears, and total number of "unique" words, just to name a few.

Fleet System 2 has every important feature that will help you make child's play out of the most heavy duty typing tasks. There's Built-in 80 Column Display — so what you see is what you get, Horizontal Scrolling During Typing, Easy Correction and Movement of Text, Page Numbering, Centering, Indenting, Headers and Footers, Math Functions, Search and Replace, Mail Merge, BUILT IN 70,000 word SPELL CHECKING and much, much more!

Ask for Fleet System 2. Exceptionally Easy. Packed with Power. Perfectly Priced.

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

Fleet System 2™ is a trademark of Professional Software, Inc. — Fleet System 2™ was designed and written by Visiontronics, Ltd. — Commodore 64™ is a trademark of Commodore Electronics Ltd. — Some printers may not support certain Fleet System 2 functions and/or require an interface. Please check with your dealer. — Dealer and Distributor inquiries are invited.

one which ran once in COMPUTE! Magazine). Version 1.00 (December '83 only) had three lines which were too long to enter into a 64 without abbreviations. MLX 1.01, not much different from the original version (except for splitting the long lines in half), ran in the first half of 1984.

To save ML programs, you must specify the starting address and the ending address (plus one). The first two versions of MLX did not add one to the ending address, resulting in problems with some programs like "BASIC Aid." That's why line 766 was added.

MLX version 2.00, in the March issue of COMPUTE! (our sister magazine) fixed the ending address problem, but did not save the first byte of the program. Version two also added a numeric keypad option and a disk save-with-replace.

Versions 2.01 (first in the July GAZETTE) and 2.02 (November) are essentially the same. Both correctly save the beginning and ending address, both have a numeric keypad, and both scratch-then-save (rather than use error-prone save-with-replace). The only difference is a slight change in line 300, to remove the vestiges of sprite graphics from the original MLX. Versions 2.01 or 2.02 are reliable, and we recommend you use one of them rather than the earlier versions.

Disk Files

What's the difference between disk files like PRG, SEQ, REL, and USR?

Bob Ideker

The 1541 Disk Operating System (DOS) provides for five types of disk files: PRoGram Files, SEQuential Files, USeR Files, RELative Files, and DELeted Files.

When you save a program, your computer has to read through program memory and send information through the cable to the disk drive. The drive could put the program anywhere on the disk, but you wouldn't want it to overwrite other programs or files. So the Disk Operating System has to keep track of where the programs or other files are. It puts the name of the file into the disk directory, marks it as a program, looks at the Block Allocation Map (BAM) to find some free space on the disk, and then saves the program.

A program file (PRG) is just what the name implies. It's information that was saved as a program. It could contain a BASIC or machine language program. Or it might be a section of memory transferred to disk using the SAVE routine in BASIC (SpeedScript and WordPro, for example, both save text to disk as PRG files). To get the program back into the computer, you use the LOAD command. LOAD works only on PRG files.

A sequential file (SEQ) is most often used for storing information such as mailing lists, inventories, etc. Instead of SAVE, you use OPEN, PRINT#, and CLOSE to write to the file. To read it, you must OPEN, INPUT# or GET#, and CLOSE. Information in such files is accessed sequentially, one item after the other, starting from the first entry in the file. So to get to item number 319, you would have to read through the 318 prior entries.

Relative files (REL) are also used to store information. They're harder to work with, but can save a lot of time when you're working with many files. Such files are accessed with the OPEN command, but the data records are numbered, so before you read in the data, you have to position a pointer. This allows you to home in on the desired record. To reach record number 319, you just set the pointer to 319 and the disk drive finds it right away (rather than having to search through all of the previous records). Relative files are faster than sequential files for individual records and do not require much of the computer's memory, as the entire file is not read into memory. An unexpanded VIC with 3.5K of memory can manage up to 163K of information using relative files.

USR files have a very specialized purpose and you'll rarely see them in use. You can OPEN and write to them as if they were sequential files (replacing the S for sequential with a U for user). And since the Validate command scratches random files, some programmers will create dummy USR files to protect data written directly to disk. There's also a machine language technique for writing DOS programs into USR files.

A deleted file (DEL) is one which no longer exists in the directory and has no blocks reserved for it in the BAM. When you scratch a program or file from the disk, it is not actually erased. The directory entry is marked as a deleted file and the BAM is updated, to de-allocate the space formerly used by the program. The file still exists on the disk—at least until you write other information to the blocks occupied by that file. By using a disk editor, you can change the byte in the directory which indicates a deleted file back to the original value, then VALidate the disk (OPEN 15,8,15: PRINT#15,"V0":CLOSE 15) to update the BAM and restore the file. If other files have been saved on the disk since scratching the file, you may not be able to restore the file.

Searching For Zero-Page Locations

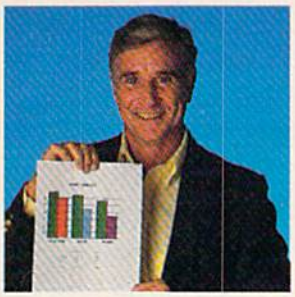
I own a Commodore 64 and I discovered that each time I store a value in a zero-page location, the computer crashes. I'd like to know what zero-page locations are free for the programmer, if any.

Yoav Ben-Yosef

Zero page (locations 0–255 ($00–$FF)) is used heavily by the computer as a "scratch pad" for stor-

COLOR

The OKIMATE 10 Personal Color Printer's got it for $238.*



The first affordable color printer.

Commodore® computer owners, meet the one and only. The new OKIMATE 10 Personal Color Printer. The first personal printer that lets you print in a rainbow of 36 dazzling colors.

Now your Commodore personal computer has new meaning. Because the OKIMATE 10 can bring the information on your screen to life. Printing on plain paper. In brilliant color. For very little green.

Fully equipped for reading, writing and 'rithmetic.

The OKIMATE 10's word processing capability delivers crisp, clean term papers, school reports and homework. At 240 words per minute. So now you can print an assignment off your Commodore personal computer in minutes, instead of typing it in hours. And the OKIMATE 10 lets you highlight words, headlines, paragraphs and charts with wide, bold, or fine print. So you and your information really stand out.

If you use your Commodore personal computer to keep track of mortgage payments, tuition payments, your checkbook or beat Dow Jones to the punch, here's good news: the OKIMATE 10 gets down to business quickly. And easily.

Easy to learn, easy to use.

"Learn-to-Print" software comes with OKIMATE 10 to show you how to start printing. And the OKIMATE 10 Handbook will teach you how to get your wildest ideas and images down on paper. Now you're set.

OKIMATE 10 makes it easy to get color from the screen to paper because it comes with its own "Color Screen Print" program.

Just plug the OKIMATE 10 into your Commodore personal computer with the PLUG 'N PRINT package. And print. It's that easy.

Everything you need for color printing.

With the OKIMATE 10 and the PLUG 'N PRINT package, you get everything you need to discover the joys of color printing. Including a black ribbon, a color ribbon, even a data cable.

Only the OKIMATE 10 can take you and your Commodore computer over the rainbow. So grab onto OKIMATE 10 color printing today.

OKIDATA
an OKI AMERICA company
Mt. Laurel, NJ 08054

Available at retailers everywhere.

Commodore is a registered trademark of Commodore Business Machines, Inc.

*Suggested retail price, including PLUG 'N PRINT package.
The 64 and PLUS 4 require disk drive to run PLUG 'N PRINT software.

COMPUTE!'s *Gazette Disk*

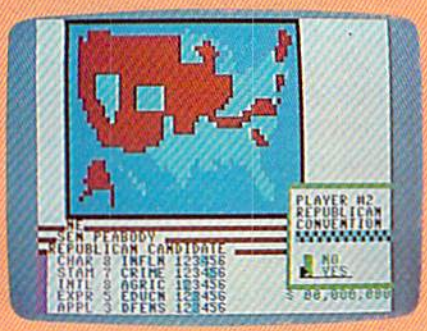
Now you can enjoy the exciting programs from *COMPUTE!'s Gazette* on a ready-to-run disk

Every month you can receive *COMPUTE!'s Gazette Disk*, which includes the fascinating and challenging programs published in the corresponding issue of *COMPUTE!'s Gazette*, ready to load on your Commodore 64 or VIC-20.

The 5¼-inch floppy disk will arrive in your home in time for you to enjoy the quality programs of *COMPUTE!'s Gazette* without having to type a single program.

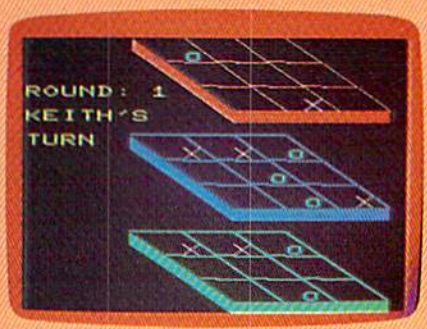
Timesaving

Using *COMPUTE!'s Gazette Disk* saves you time. Instead of spending hours typing in each program from *COMPUTE!'s Gazette*, you can load all the fun and fascinating programs in just a few minutes with the *Disk*. You have more time to enjoy Budgeteer, Mystery at Marple Manor, Vocab Builder, and many other exciting games and applications.



Inexpensive

And *COMPUTE!'s Gazette Disk* is inexpensive, only $69.95 for a one-year subscription. That means the *Disk* costs you $5.83 a month, a savings of 55 percent off the single disk price of $12.95. And what price can you put on the hours of typing time you save?



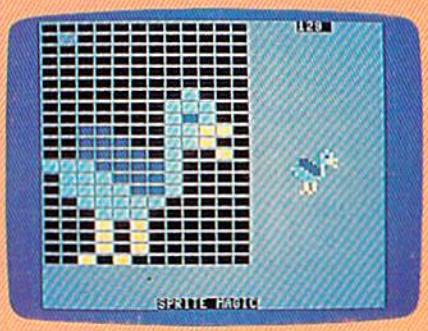
COMPUTE!'s GAZETTE DISK

Risk-Free

All *Disks* are fully tested before they're shipped to you. And full documentation for all programs is in the corresponding issue of *COMPUTE!'s Gazette*. But if you should have a problem with a disk, just call toll free 800-334-0868 and a member of our Customer Service Staff will assist you.

Convenient

COMPUTE!'s Gazette Disk gives you access. As soon as you read about a new and challenging program in *COMPUTE!'s Gazette*, you can load the *Disk* and begin usng it immediately—the *Disk* is ready when you are.



Enjoy the quality programs from *COMPUTE!'s Gazette* on the convenient, ready-to-use *COMPUTE!'s Gazette Disk*.

To order *COMPUTE!'s Gazette Disk*
Call toll free 800-334-0868 (in NC call 919-275-9809) or mail your prepaid coupon to *COMPUTE!'s Gazette Disk*, P.O. Box 901, Farmingdale, NY 11737

YES! I want to save time and money. Please enter my subscription to *COMPUTE!'s Gazette Disk*.

☐ Save 55% off the single issue price. 1 year subscription, **$69.95**

☐ Save even more! 2 year subscription, **$129.95**

All *Disk* orders must be prepaid.

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

Acct. No. _____ Exp. Date _____
Signature _____
Name _____
Address _____
City _____
State _____ Zip _____
(Outside U.S. and Canada, add $36.00 per year for shipping and handling.)
Please allow 4–6 weeks for delivery.

353D02

ing important information. It's also a favorite area of memory with machine language programmers because programs which use zero page take up less memory and execute faster than those that use other areas of memory. And there is a zero-page addressing mode which requires the use of zero-page addresses.

The popularity of zero page sometimes leads to memory conflicts. If you're not careful, you may be trying to use a location that the computer is already using for something else. This can cause the computer to act strangely, forcing you to turn it off and back on to regain control.

Fortunately, the 64 doesn't use all of zero page. Locations 2–6 ($02–$06) and 251–254 ($FB–$FE) are always free. Other locations are free only under certain circumstances. For example, locations 139–143 ($8B–$8F) are free as long as you don't use the BASIC RND function. If your ML program doesn't need BASIC at all, locations 7–143 ($07–$8F) are free. If you don't need the Kernal, locations 144–250 ($90–$FA) are free.

If your ML program uses BASIC and the Kernal and needs lots of zero-page space, you can use any location as long as you restore that location to its original value before returning to BASIC. The easiest way to do this is to have your ML program move the entire contents of zero page to a safe area of RAM before executing, and then move it all back just before returning to BASIC.

For a detailed discussion of each zero-page location, see COMPUTE!'s Mapping the Commodore 64 *or* COMPUTE!'s Mapping The VIC.

Printing Pennies

I've been writing programs which use a lot of dollars and cents. My problem is, how do I get $12.50 instead of $12.5? The zero never shows.

Chuck Stehley

Some versions of BASIC, including BASIC 3.5 on the Plus/4 and 16, offer a PRINT-USING command. You define a format for numbers or strings, in effect forcing the computer to print pennies or dollar signs.

One way to include pennies on a VIC or 64 is to first multiply by 100, to put in the zeros. Then convert the number to a string and insert the dollar sign and decimal point.

```
10 A=12.5
20 B=INT(A*100): B$=STR$(B): L=LEN (B$)
30 PRINT"$"; LEFT$(B$,L-2); "."; RIGHT$(B
   $,2)
```

In line 20, the number 12.5 is multiplied by 100 to get 1250, then converted to a string " 1250" (the space in front would be a minus sign if the number were negative). Line 30 prints a dollar sign, all but the last two characters of B$, a decimal point, and the last two characters.

Also, the Commodore 1526 printer has the equivalent of PRINT-USING. If you own a 1526, you can use the built-in formatting commands (use a secondary address of 2) to automatically print trailing zeros and align the numbers into columns.

A Printer's Gremlin

I'd like to know why sometimes when I have deleted something and hit RETURN, the cursor does not take its normal position, but jumps over to the right, past the last word on the line.

C. M. Woods

Without knowing the full details of the situation, we can only guess what's wrong.

You may have listed a program to the screen and then listed it to a printer (OPEN4,4:CMD4:LIST) without properly closing the file to the printer afterwards. Try to edit a line on the screen, and the cursor will act as you have described. The thing to do is close the printer file (PRINT#4:CLOSE4). The cursor will be back to normal. The same thing may happen if you've used CMD to send output to another type of file—a cassette or disk drive, for example. Always remember to close files you have opened.

Going Off-Line With Gemini

I'm using a Gemini 10-X printer interfaced to my Commodore 64 with a CARDCO +G interface. The Gemini manual indicates that the printer can be turned on- and off-line using CHR$(17) and CHR$(19), respectively. Using *SpeedScript*'s print command, CTRL-P, these commands do not work. But using the SHIFT-CTRL-P command, selecting device 4 and secondary address 4, these commands work. I also have to place a reverse video *a* (CTRL-£ a) at the beginning of the file to get the proper upper- and lowercase lettering.

The commands are useful, for example, when you want to edit the tenth page of a document, and print from that point to the end. The off-line command is placed in the document wherever you want printing to cease—at the beginning in this case. Print the document to the screen once to determine where the page begins. To resume printing, place the on-line command followed by a form feed code, at the place you want to start printing—just after the last character of the previous page. If the last character of the previous page is a return character, place the command codes before it.

Larry Holloway

This useful tip can be used with other interfaces as well, and with some other printers (consult your manual). And it should work with word processors other than SpeedScript, *as long as the word processor allows you to send ASCII characters 17 and 19*

ALL AIRLINES DEPART FROM THIS TERMINAL.

Presenting Travelshopper℠ ...new from CompuServe and TWA.

Now you can save time and money by getting information and reservations on virtually any flight on any airline—worldwide—from one source. It's TWA's new Travelshopper, available now through CompuServe's Information Service.

With Travelshopper, you can scan flight availabilities, discover airfare bargains and order tickets...on your own personal computer...at home or in the office.

You also receive automatic membership in TWA's Frequent Flight Bonus℠ program. And you can build bonus points by staying at Marriott and Hilton hotels and by using Hertz Rent-A-Car.

Besides Travelshopper, CompuServe offers an ever-growing list of other travel-oriented on-line services.

The Official Airline Guide Electronic Edition lists direct and connecting flight schedules for over 700 airlines worldwide plus over 500,000 North American fares.

Firstworld Travel offers worldwide travel advice and service.

Discover Orlando provides complete prices, hours and features on all of Central Florida's attractions and accommodations.

West Coast Travel offers travel information for the western states.

Pan Am's Travel Guide contains up-to-date information on immigration and health requirements for most foreign countries.

And TravelVision® provides complete automotive information, including road maps and an expert, personalized routing service.

Let your travel plans really take off. Use Travelshopper and lots, lots more from CompuServe.

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

CompuServe

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

1-800-848-8199

In Ohio, Call 1-614-457-0802

Travelshopper and Frequent Flight Bonus are Service marks of TWA

An H&R Block Company

and your printer recognizes these as commands for going on-line and off-line. Commodore printers do not have this feature.

The secondary address of four is for the Cardco graphics (or transparent*) mode. Use the correct secondary address for your interface, and remember that some interfaces require you to send commands in unusual ways.*

To print to the screen so you can preview the page breaks, use the SHIFT-CTRL-P command followed by device 3 and secondary address 3. Use of the above codes requires you to use the reverse video numbers, which can be assigned values in SpeedScript. *At the top of the file, define three of the reverse video numbers to the desired values, 17, 19, and 12 (for form feed).*

For example, to define the form feed command, use [5]=12. (The brackets represent a reverse video number, obtained by pressing CTRL and £ simultaneously, followed by the number 5.) If you define [6]=17 and [7]=19, you would insert [7] to stop printing, and [6][5] to resume, with a form feed. You may have to experiment to get the results you want. Remember that SpeedScript *doesn't know what you're doing, so the printout can look strange in some cases. For example, when you send the code to go back on-line followed by a code for a form feed, the printer knows to go to the top of the next page, but as far as* SpeedScript *is concerned, the form feed was just another character.* SpeedScript *might think it's printing the middle of a page, and headers and footers will print incorrectly.*

Long Tapes

Do you really think that cassette tapes over 30 minutes will affect the Datassette?

Rick Stockhorst

No, long tapes probably won't do any harm to your cassette drive. But you might want to consider some of the reasons not to store programs and data files on them.

Tapes over 30 minutes are generally thinner and less reliable than shorter tapes. And it's harder to find the right spot on the tape; you may have to wait for a while before a program is located. Tapes should be tightly wound, and a long tape is more prone to slip and slide, leading to loss of data; the solution is to fast-forward and then rewind the tape, which (again) takes time.

Finally, think what would happen if the tape was lost or destroyed. Loss of a long tape with many programs could be a disaster, especially if you don't have backup copies.

The RESTORE Key

I own a VIC-20 and now have a Commodore 64. I've had problems using the RESTORE key. On the VIC-20, it worked every once in a while, and on the 64 it doesn't work at all. In the User's Guide, it says SYS 64759 will restore the computer to the state of just being turned on. Is there a SYS number that does the same thing as RESTORE, but doesn't erase the program in memory?

Allen D. Brewer

Unlike any other key on the keyboard, RESTORE is wired directly to the chip that controls your VIC or 64. When you tap RESTORE, the computer checks to see if RUN/STOP is being pressed. So you must hold down RUN/STOP before pressing RESTORE.

On a VIC, RUN/STOP–RESTORE works well, but on a 64 you may have to smartly tap the RESTORE key. Gently pressing it doesn't always do the job, for some unknown reason.

Your 64 User's Guide contains a misprint—SYS 64759 does not perform a cold start. That particular SYS enters the cold-start routine from the wrong place and eventually hits a BReaK (BRK) instruction (see below). The Programmer's Reference Guide correctly lists the cold-start routine—SYS 64738 (SYS 64802 on a VIC). The Commodore Plus/4 and 16 do not have a RESTORE key. On those computers you have to hold down RUN/STOP and press the reset button on the right side. You'll end up in the built-in machine language monitor (type X to exit back to BASIC).

The cold-start SYS will erase the program in memory (although you can get it back with an UNNEW program). RUN/STOP–RESTORE leaves the program intact in memory. Its equivalent in machine language is the BRK instruction, with a value of zero. SYS to a memory location that holds a zero and the computer will perform a RUN/STOP–RESTORE. For example, **POKE 828,0: SYS 828**.

Self-Modifying BASIC Programs

Is there a way to make a program write its own DATA statements from user input?

Todd Swearingen

Yes, you can write a program that changes itself via the dynamic keyboard *technique.*

To understand how it works, you should know that Commodore computers have two different types of carriage returns. In program mode (when a program is running), printing a CHR$(13) carriage return moves the cursor to the beginning of the next line. But that's all it does: move down a line. But in immediate mode (when you're writing a program), RETURN moves the cursor to the next line and *does one of two things. If there's a number at the beginning, the line is added to the BASIC program in memory. If not, the commands you typed are immediately executed.*

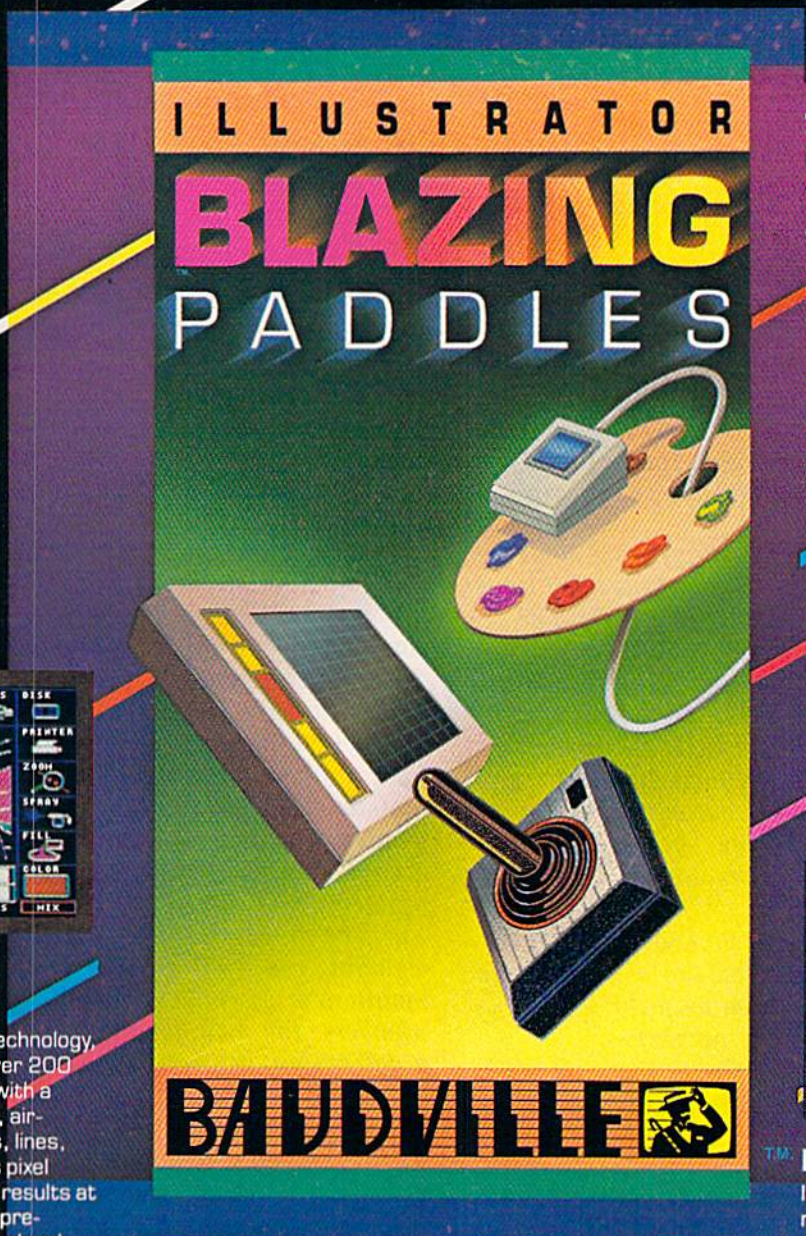
Thus, to write a program that adds DATA

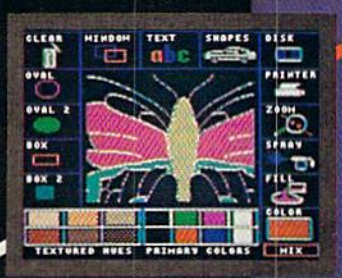
Apple
Commodore

Now You Need...

The All-In-One Illustrator

It draws, paints & prints your high resolution illustrations with ease. Works with any standard input device, including touch tablets, joy sticks, light pens, mice & professional graphics tablets.





Sophisticated Features

State-of-the-Art input technology, color mixing to create over 200 textured hues, painting with a variety of brush strokes, air-brushing, inserting ovals, lines, rectangles. Zoom allows pixel editing while viewing the results at full scale. Text fonts and pre-drawn shapes are included and may be added at any time. A printer dump for most dot matrix printers is included.

See Your Dealer...

or for direct orders enclose
$49.95 Apple Version
$34.95 Commodore Version
plus $3.00 for shipping & handling.
Mastercard and Visa accepted.

616/957-3036

Productive Fun

Includes all the artistic tools needed to create striking computer art. So versatile that young children are able to use it like a coloring book, yet sophisticated enough for a computer artist to use. Perfect for Home, Business, Education, and the Art. The possibilities are endless...

APPLE is a registered trademark of APPLE COMPUTER
COMMODORE is a registered trademark of COMMODORE COMPUTER

BAUDVILLE™

Baudville, 1001 Medical Park Dr. S.E.,
Grand Rapids, Michigan 49506

statements to itself, you have to toggle back and forth between the two modes. You print to the screen in program mode, END the program, and have the computer automatically hit RETURN over the lines. The following program illustrates:

```
10 DL=1000
20 D$="DATA"
30 INPUTA$
40 PRINTCHR$(147);DL;D$;A$
50 PRINT"10 DL=";DL+1
60 PRINT"RUN"
70 POKE631,19:POKE632,13:POKE633,13:POKE6
   34,13:POKE198,4:END
```

Lines 10–30 define two variables and input an item which will be added to the program. Line 40 clears the screen and prints the line number (DL), "DATA", and the user input. Line 50 prints a new line 10, where DL is increased by one (for the next time). Line 60 prints "RUN".

The dynamic keyboard technique happens in line 70. Four numbers are POKEd into the keyboard buffer (ten memory locations from 631 to 640) and a 4 is POKEd into 198 (which keeps track of how many keys have been pressed). Then the program ends.

The computer switches from program mode to immediate mode, and it thinks four keys have been pressed. The first key is HOME (CHR$(19)). The next three are carriage returns (CHR$(13)). The carriage returns are the kind we want: They'll add the lines to BASIC memory. A DATA statement is entered, line ten is changed, and RUN is executed. The program loops back to get more input. Press RUN/STOP–RESTORE to get out of the INPUT statement and end the program. Then save the program, which contains the newly created DATA statements.

The dynamic keyboard technique can do more than add DATA statements. You can use it to erase a block of lines from a program by printing a CHR$(13) over a series of line numbers.

Printing Characters In Machine Language

I've been trying to put Commodore or ASCII characters into screen memory in machine language. I've converted the POKE values into hexadecimal and then "stored" the value into the screen location. But I always get characters that are wrong. How do I solve this problem?

Drew McKenna

You've got the right idea, and it should work. A machine language store instruction works just like the POKE command in BASIC.

When you're writing a machine language program, it often helps to think about how you would do something in BASIC, and then translate the idea into ML. BASIC and machine language are not as different as you might think.

There are a couple of ways to put a character on the screen in BASIC. You can do a POKE to screen memory, followed by a POKE to color memory. Or you can use the PRINT command. Both options are available in machine language.

In BASIC, to POKE a yellow letter A into the upper lefthand corner of the screen on the 64, run the following program:

```
10 POKE 1024,1: POKE 55296,7
```

The equivalent in ML is:

```
828  LDA #1
830  STA 1024
833  LDA #7
835  STA 55296
838  RTS
```

Or, in hexadecimal:

```
033C LDA #$01
033E STA $0400
0341 LDA #$07
0343 STA $D800
0346 RTS
```

Once the ML program is in memory, SYS 828 to activate it.

First, using the LDA/STA method, you have to store a value into both screen and *color memory, just like BASIC. And if you're SYSing from BASIC, you have to end the ML program with an RTS (ReTurn from Subroutine), which is similar to a RETURN in BASIC. The LoaD Accumulator (LDA) instruction has many different addressing modes. LDA #$01 puts the actual value $01 into the accumulator. LDA $01, on the other hand, will take whatever value is in location 1 and put it in the accumulator. This may be the cause of your problems.*

The number sign (#) after LDA is important, signaling you want the value one. Also, some ML monitors or assemblers allow either hex or decimal numbers. You may have to mark hex numbers with a dollar sign, as in the example above.

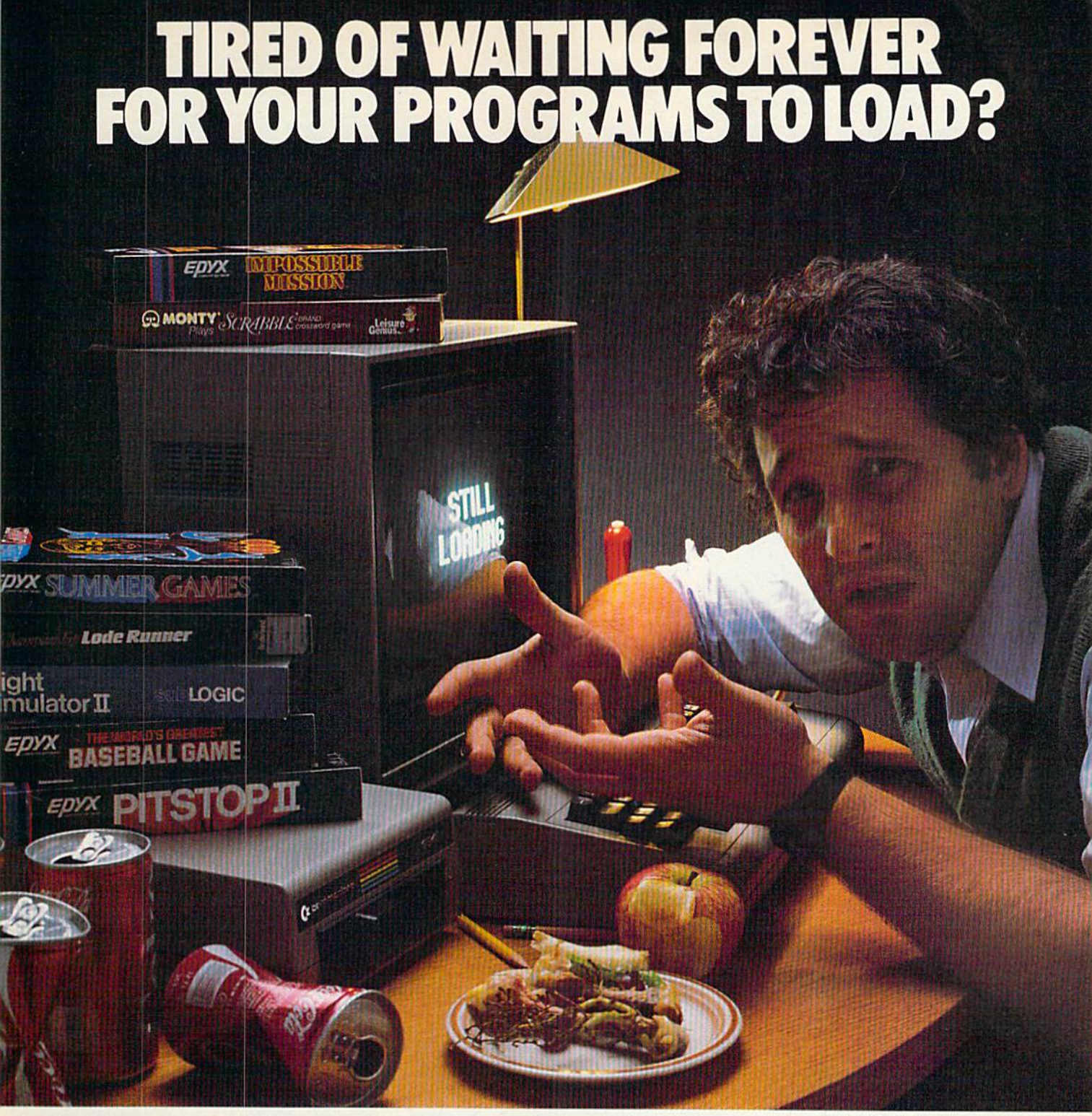
Finally, there are two numbers for the letter A, just like in BASIC. If you're POKEing (LDA followed by STA in machine language), you use 1, the screen code. *But if you're printing, you print a CHR$(65), the* ASCII value.

To print in ML, you do a JSR to $FFD2. As an alternative to the above program, try this:

```
033C LDA #$41
033E JSR $FFD2
0341 RTS
```

Again, SYS 828 makes the program run. Hexadecimal $41 is the same as decimal 65 (the ASCII value of "A"). When you Jump to SubRoutine (JSR) $FFD2, the letter A is printed to the screen in the current cursor color. $FFD2 is a Kernal entry point for PRINT. The Kernal routines occupy the same locations on the VIC, 64, and Plus/4 computers.

TIRED OF WAITING FOREVER FOR YOUR PROGRAMS TO LOAD?



INTRODUCING THE FAST LOAD CARTRIDGE FROM EPYX.

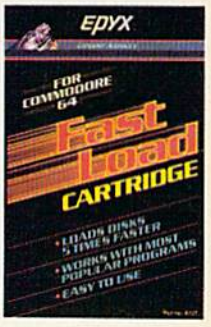
You're tired of waiting forever for your Commodore 64 programs to load. But it's no use glaring at your disk drive. Calling it names won't help, either. It was born slow — a lumbering hippo. You need the FAST LOAD CARTRIDGE from EPYX. FAST LOAD transforms your Commodore 64 disk drive from a lumbering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

FAST LOAD can load, save and copy your disks five times faster than normal. It plugs into the cartridge port of your Commodore 64 and goes to work automatically, loading your disks with ease. And that's only the beginning. You can copy a single file, copy the whole disk, send disk commands, and even list directories without erasing programs stored in memory.

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

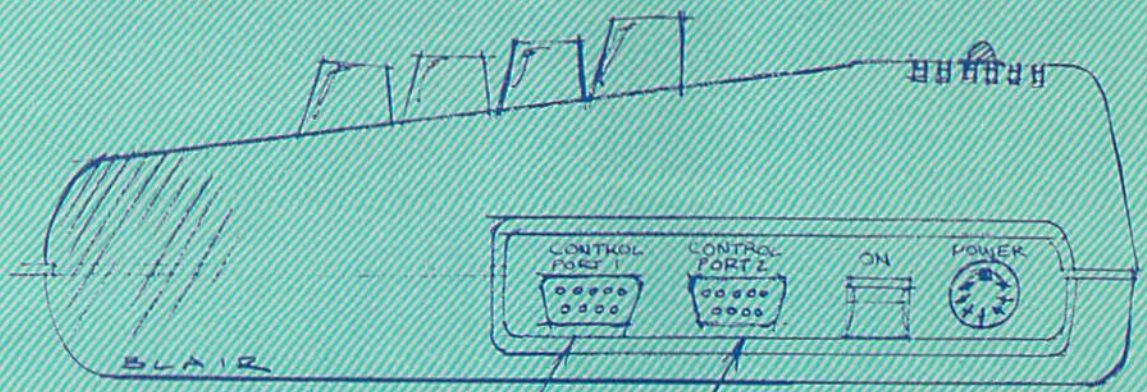
The FAST LOAD CARTRIDGE from Epyx. Easy to insert, easy to use and five times faster. So why waste time waiting for your disks to load?

Speed them up with FAST LOAD!



EPYX™

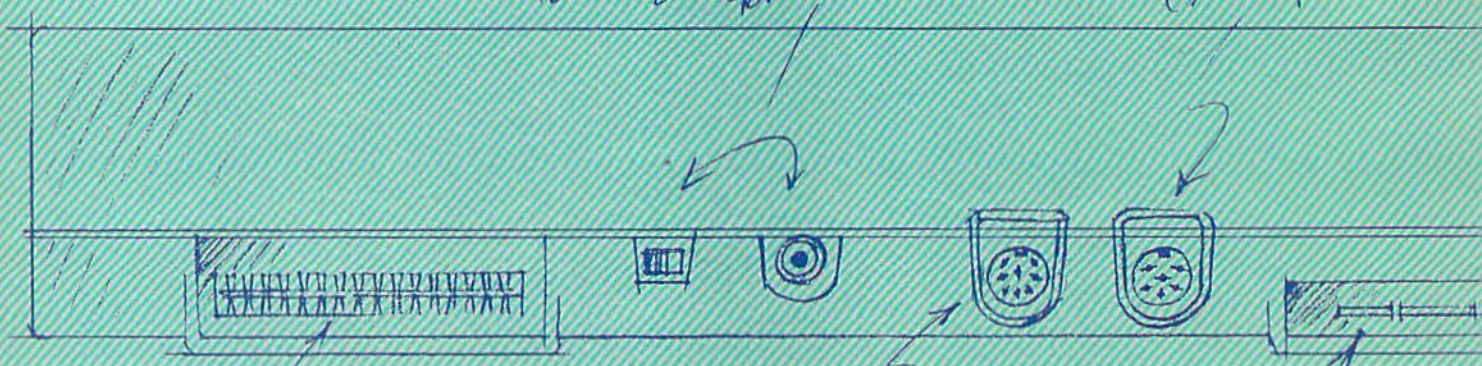
COMMODORE 64



Control Ports
(Joysticks, Paddles, Lightpens)

RF Output
(Audio and video signals combined and translated for use on television)

Serial I/O Port
(Disk Drives, Printers)



Expansion Port
(ROM Cartridges, CP/M Coprocessor, Magic Voice Speech module, etc.)

Audio/Video Port
(Composite video and audio. If eight-pin plug, separate chroma/luma outputs available. In addition, an audio input is available so external sounds can be mixed into the audio output.)

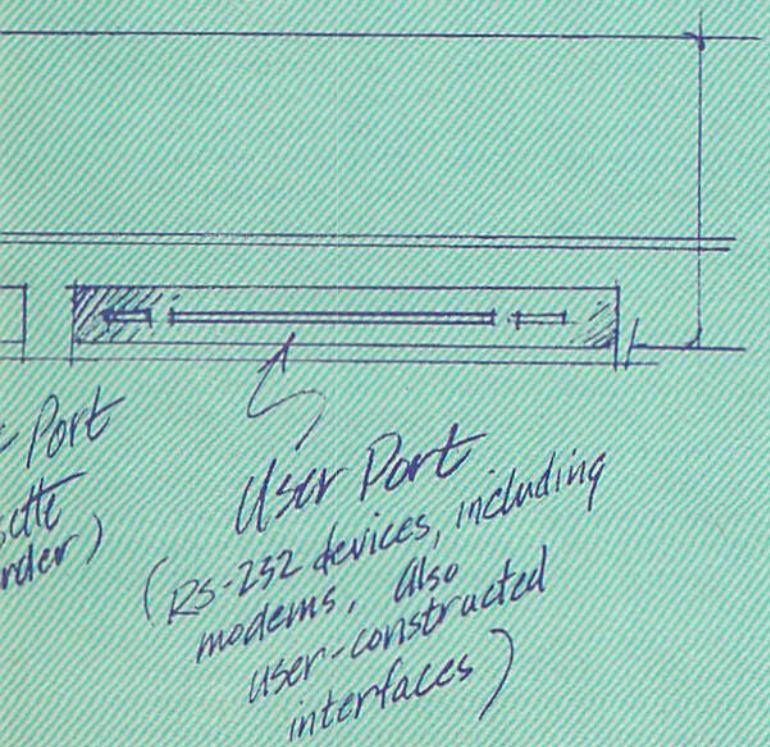
Cassett
(Dat
re

THE PERIPHERAL CONNECTION

ENHANCING YOUR 64

Selby Bateman, Features Editor

Peripherals can bring much more power and flexibility to your Commodore 64. And they're available as never before. That translates into a multitude of opportunities—and changes—as you continue to enhance your computer's capabilities. Here's an overview of the expanding peripheral marketplace for the 64.



Once you've made the choice to purchase a Commodore 64 computer, your decisions begin to multiply. If you thought choosing a microcomputer to suit your needs was challenging, you'll soon find yourself overwhelmed by the peripheral options open to you. Even experienced computer owners discover it's hard to stay abreast of the rapidly growing inventory of peripherals designed for the 64.

But this proliferation of products means that some people are making mistakes, says Tom Dow, product manager for Commodore's Computer Systems Division. "It's obvious—but a very important consideration for people who are buying 64s or any computer—that they get involved with applications that are really going to benefit them. It's important for people to understand what they need

to do and get themselves plugged into a product that is best going to suit those needs." And that means *before* you make peripheral purchases which may be two or even three times the cost of the 64 itself.

Many people buy peripherals without first fully understanding what they are going to do with them, how they interact with the Commodore 64, and what software is to be used, adds Dow.

If you follow the general rule that a *peripheral* is any piece of hardware which can be plugged into your computer to enhance its function, the list of such products includes literally hundreds of items from scores of manufacturers. The good news is that there's plenty of information at hand for the discerning consumer. And the peripheral options really aren't difficult to categorize and compare if you'll take the time to think through your choices and your needs.

The MSD Super Disk drives.

There are basically five major categories of peripherals for most microcomputers, including the 64. When you begin to think about building a *system* around your computer, your choices include the following:

1. *Mass storage devices*—An absolute necessity for your computer since it is this attachment which lets you store information (on tape or disk) for later use and also allows you to run commercial software not on cartridge. For the 64, the choices have grown rapidly during the past year.

2. *Display devices*—Essentially the television set or video monitor which lets you see what you and the computer are doing together. There are surprising indications here that 64 owners are changing their preferences about what display they wish to use (more on this later).

3. *Printers*—Although printers could be listed as an alternative display device, their importance and special functions require a separate category. Commodore 64 owners have more choices here than ever before, generally at lower prices for better quality.

4. *Communication devices*—Modems (and telecommunications software) are now among the hottest items for Commodore 64 owners. The popularity of bulletin boards and the growth of major telecommunications services are changing the face of personal computing.

5. *Input devices*—There are many ways other than your computer keyboard for you to interact with the 64. Joysticks, light pens, touch tablets, and track balls are just a few. And soon, even the popular table-top controller called a *mouse* should be available for the 64.

Let's take a look at some of the changes affecting these peripheral product lines for the Commodore 64.

Commodore officials were pleasantly surprised during 1984 by a significant change in the buying patterns of 64 owners looking for storage devices. Over 90 percent of these purchases from Commodore were 1541 disk drives rather than the more inexpensive Datassette recorders.

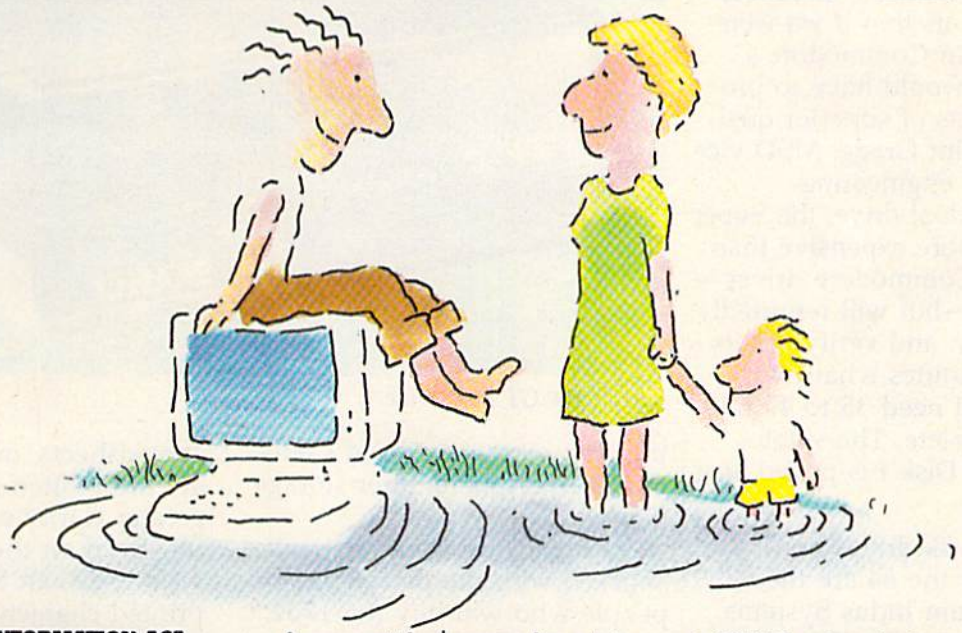
"That was one of the things that really threw us for a loop," says Commodore's Dow. "The percentage of people who actually bought disk drives to go with the 64 was *very* high." Commodore was caught by surprise and there was a period about a year ago when 1541s were in very short supply.

Since there are some other sources for inexpensive cassette tape drives compatible with the 64, it would be wrong to presume that the 90 percent figure would apply throughout the Commodore 64 marketplace. However, the combination of low price (about $250 for the 1541), the relatively faster access times of a disk drive over tape, and the trend toward putting more and more commercial software on disk rather than cassette has dramatically altered the situation.

"For the majority of the people who purchase the 64, the first buy will be the disk drive," says Dow. "When the 64 first came out, there was a lot of software on cartridge since there was skepticism about how many people would purchase the disk drive." That is true no longer.

As any Commodore 64 owner quickly learns, the computer accesses data from a cassette tape drive in a sequential manner. The tape slides by the read/record head in a linear fashion. You can't get to the third program on a tape without winding past the first two programs. The disk drive, however, is a random access device. The read/write head can jump from spot to spot on a disk much as a record player needle can be placed anywhere on the surface of a record. Such accessibility and speed have proven too attractive for most 64 owners to ignore.

GET YOUR FEET WET...



...IN THE INFORMATION AGE WITH THE DOW JONES NEWS/RETRIEVAL® MEMBERSHIP KIT. SAMPLE A CONTINUOUS STREAM OF KNOWLEDGE AT A PRICE YOU CAN AFFORD.

Now you and your whole family can experience the information age without getting in over your head.

For just $29.95, the new Dow Jones News/Retrieval Membership Kit leads you step-by-step into entertaining and informative data bases. With **five free hours** to sample and explore, you can find a fact, shop at home, get the scores, plan a trip, review a movie, choose a stock, or check world and business news. There's a lot more, too. All you need to get started is a computer and modem:

The Membership Kit is a big value that entitles you to:

- FREE password ($75 value)
- Easy, step-by-step User's Guide
- FIVE FREE HOURS of unrestricted usage to explore the magic of this comprehensive service
- FREE subscription to *Dowline*, the magazine of Dow Jones News/Retrieval
- A special introductory offer!

Get your feet wet in the information age with the Dow Jones News/Retrieval Membership Kit. At $29.95, you'll enjoy the dip without getting soaked. Available at your local computer retailer, or call Dow Jones at:

1-800-257-5114
In New Jersey, Canada, Hawaii and Alaska
1-609-452-1511

"Toss away any preconception that Dow Jones News/Retrieval is a stuffy, one dimensional data base service designed only for an elite corps of stock analysts and Wall Street wizards. Far from it—Dow Jones News/Retrieval also provides entertaining movie reviews, current weather and sports reports, convenient electronic shopping and inexpensive electronic mail. . .Dow Jones News/Retrieval is informative, entertaining and well worth the money."
-Brad Baldwin, *InfoWorld* Magazine

DOW JONES NEWS/RETRIEVAL®

Copyright © 1984 Dow Jones and Company, Inc. All Rights Reserved. Dow Jones News/Retrieval® is a registered trademark of Dow Jones and Company, Inc.

Although the first purchase for 64 owners may be a disk drive, that doesn't necessarily mean it will be the 1541. As the installed base of Commodore 64s has increased, the peripheral marketplace has become crowded with competitors. And that includes disk drive manufacturers.

For example, MSD Systems, Inc., has developed single and dual Super Disk Drives for the Commodore 64 aimed at being faster, cooler running, and more dependable than the 1541. "It was clear to us that if we were to compete in Commodore's market, we would have to produce products of superior quality," states Jim Gragg, MSD vice president of engineering.

MSD's dual drive, the Super Disk II, is more expensive than two single Commodore drives—about $695—but will reportedly format, copy, and verify in less than two minutes what two 1541s would need 35 to 40 minutes to complete. The single-drive Super Disk I is priced at $399.

Other disk drives now available for the 64 are the $399 Indus GT from Indus Systems, which is reportedly 400 percent faster than the 1541, and the $369 Commander II from Commander Electronic Systems. Here again, as with the MSD drives, there are price/performance tradeoffs in relation to Commodore's 1541 drive.

While the competition heats up between 64 disk drive manufacturers, there is a clear move away from the slower sequential access tape drives which so dominated during the early days of the VIC-20 and 64. As the market matures, so do the tastes and demands of 64 owners.

For those who wish to use a cassette drive, Electronic Components of Elma, New York, has engineered a way for you to save even more money. Rather than buying a Commodore Datassette recorder, the company offers the Computer Patch Cord (CPC-1000), a $29.95 cord which lets you use a 64 or VIC-20 with an ordinary cassette recorder.

Another surprise for officials at Commodore last year was the popularity among 64 owners of the 1702 color video monitor. It became, on average, the next most-purchased Commodore peripheral after storage devices.

The Indus GT disk drive.

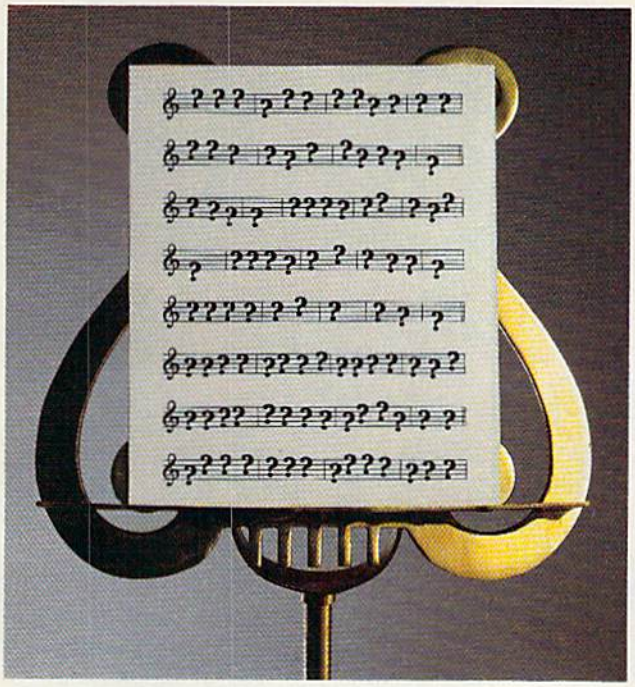
"Again, we were relatively shocked with the percentage of people who will buy the 1702," says Dow. "It boils down to a number of different reasons. Obviously, resolution is much better on the 1702 than it would be on a television set. The second thing we've found—although we give the proper hookup requirements to attach a 64 to a television set—a lot of people don't like to tie up their TV set with the computer. So by buying the 1702 monitor, it gives them the ability to have a dedicated work station without interrupting a television set."

Just as inexpensive tape drives bring you functionality at a low price, so your television set can bring you a computer's video images without additional expense. All you need to do is attach the RF modulator to your black and white or color TV, and you're in business.

Commodore 64 owners are turning toward disk drives for much the same reason they're now using dedicated video monitors in increasing numbers: greater performance for more serious applications. Especially with the rising interest in productivity programs such as word processors, data bases, and spreadsheets, owners of the 64 are more often asking for the greater clarity of a video monitor. Even on the best color television sets, an 80-column line of printed characters (now available in several word processor and spreadsheet formats for the 64) is all but unreadable. Not so with the variety of video monitors on the market from companies like Cardco, Commodore, Roland DG, Samsung, Teknika, Amdek, Sakata, and others.

Some Commodore 64 owners are opting for both color television and the high-quality of direct video monitors. Cardco's $199.95 MT/1 Monitor Tuner, for example, is a remote-controlled, 60-channel, cable-ready tuner which provides separate video and audio output matched to composite input computer monitors. It works with any color or monochrome monitor, transforming it into a television set with the flip of a switch.

Compose music, even if you can't read a note.



With the Bank Street MusicWriter by Glen Clancy, you compose by computer.

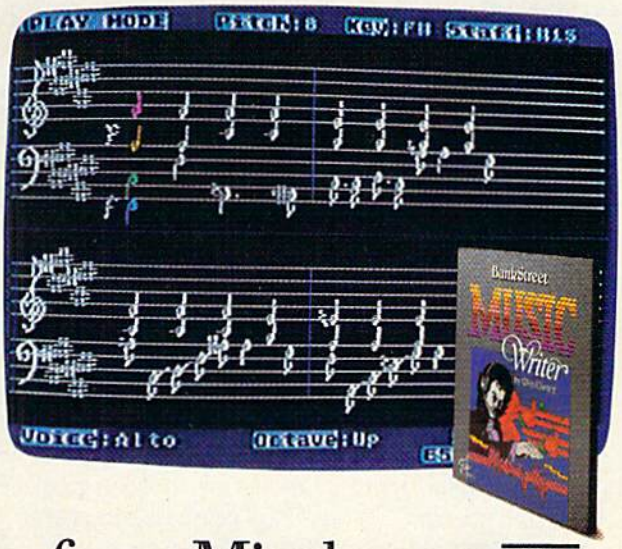
It's so simple, people who don't know a pianissimo from a pizza can start composing in less than an hour.

All you do is match the sound that you hear in your head. And the MusicWriter writes it down.

But don't be fooled by the simplicity. It's not a toy. It's a tool.

In fact, MusicWriter has everything you need to compose a serious symphony. It has repeats, endings and triplets. It has articulation and transposition. It can shape tones, store 75 staffs, and play up to 4 voices.

But even if you don't know what all that means, it won't stand in your way. Because if you can hum a tune, you can write a tune.



Bank Street MusicWriter from Mindscape

Compatible with Atari® and Commodore®. Mindscape, Inc., 3444 Dundee Road, Northbrook, Illinois 60062.

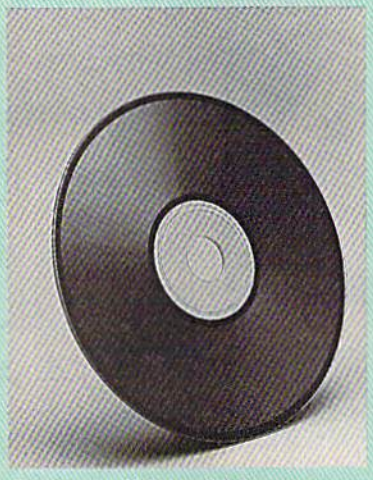
For more information, call 1-800-221-9884. In Illinois, 1-800-942-7315.

PERIPHERALS OF THE FUTURE

Sharon Darling, Research Assistant

If you've never heard of brain wave input, read/write laser disks, flat screen video, or sound sampling, you're in good company. Many of these products are still in development, still in prototype in laboratories. Nevertheless, these peripherals could add great power to your computer. Some are available now, some will be soon. Here's an overview of the next generation of input and output devices.

• **Compact disks:** The disk that is revolutionizing the recording industry can also work with computers. Current models can only act as Read Only Memory (ROM) data storage devices. Electronics giants Sony and Philips are both working on computer applications for compact disks, and Nippon Columbia of Japan has introduced a compact disk that has a storage capacity of more than 550 megabytes per side—the equivalent of 500 to 1,000 floppy disks.



Compact disks, which measure about five inches across, have the capacity to become mass storage devices for computers.

Measuring about five inches across, a compact disk uses the same type of laser mechanism as audio compact disks. Sound and data, as well as digitized images, can be stored on the disks.

However, engineers are at work on a read/write CD that would provide home computers with astounding amounts of online memory and would quickly replace current floppy disk devices.

• **Electromyograph/Brain Wave Input:** Synapse Software Corporation already sells a headband controller-based biofeedback system called *Relax*. And Atari, Inc., (before corporate reformation) exhibited a similar system, MindLink, at the Summer 1984 Consumer Electronics Show. Both are based on electromyographic impulses—slight electrical pulses from muscles in the forehead—which permit the user to control onscreen computer action without touching a keyboard, joystick, or other input device.

• **Laser disks:** More and more uses are being found for laser disks as computer peripherals. For now, most applications are commercial or governmental, things like employee training, says David S. Backer, director of videodisk research for Mirror Systems Inc., a firm that is developing uses for laser disks in the business market.

With the ability to put more than 50,000 live action images on one side of a disk, and the availability of inexpensive interfaces, the future looks bright for this peripheral. Digital Research, for example, markets a $49 interface which attaches a Commodore 64 to a laser disk player.

"I think you're going to begin to see large image data bases, or big slide-a-thons produced by various institutions—everything from museums like the Smithsonian on up to publishers—people who have some kind of interesting image file. That [area] has consumer potential," Backer predicts.

Laser disks will probably be a major force in interactive video over the next few years. More than 50,000 live-action images can be contained on each side.

Flight Simulator II

For Commodore 64™ Computers

Put yourself in the pilot's seat of a Piper 181 Cherokee Archer for an awe-inspiring flight over realistic scenery from New York to Los Angeles. High speed color-filled 3D graphics will give you a beautiful panoramic view as you practice takeoffs, landings, and aerobatics. Complete documentation will get you airborne quickly even if you've never flown before. When you think you're ready, you can play the World War I Ace aerial battle game. Flight Simulator II features include ■ animated color 3D graphics ■ day, dusk, and night flying modes ■ over 80 airports in four scenery areas: New York, Chicago, Los Angeles, Seattle, with additional scenery areas available ■ user-variable weather, from clear blue skies to grey cloudy conditions ■ complete flight instrumentation ■ VOR, ILS, ADF, and DME radio equipped ■ navigation facilities and course plotting ■ World War I Ace aerial battle game ■ complete information manual and flight handbook.

See your dealer . . .

or write or call for more information. For direct orders enclose $49.95 plus $2.00 for shipping and specify UPS or first class mail delivery. American Express, Diner's Club, MasterCard, and Visa accepted.

Order Line: 800 / 637-4983

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

• **Laser Printers:** The price for a good laser printer has already dropped from about $20,000 down to the $3,500–$7,000 range, and the decreases will continue as this technology gets cheaper. Much like a photocopying machine, a laser printer creates an image on a rotating drum that has been electrically charged. A powdered plastic, also charged, sticks to the portion of the drum that has been neutrally electrified by the laser. Then, using heat, the powder is transferred onto paper.

The $3495 HP LaserJet Printer (Hewlett-Packard) prints eight pages a minute, including graphics, by using lower cost laser technology.

Inexpensive plastic drums and cheaper laser technology are making these printers more popular. Manufacturers like Hewlett-Packard and Canon have made rapid advances in this field, although there are still problems to be overcome. The laser printers don't print in color, can't process multiple-copy forms, and are still more expensive than dot-matrix and daisy wheel printers to operate.

• **LCD screens:** New technology is making color liquid crystal displays (LCD) possible in everything from television screens to personal computers. While monochrome LCD displays have been around for years, and are found on many appliances, color has been a problem because of the way an LCD receives and responds to electrical signals.

Now, however, using silicon thin-film transistors (TFTs), color is becoming available on small screens. Epson has marketed a television with a two-inch color flat screen LCD, and several other firms are working on new applications in larger formats.

• **Microfloppies:** The fight is on among several manufacturers to market smaller computer disks with larger storage capacities. Sony is promoting its 3½-inch microdisk (adopted by Apple for the Macintosh); Hitachi has a 3-inch disk; and Tabor markets a 3¼-inch version. No matter which format prevails, expect to trade in your 5¼-inch disks eventually. It's something of a race: Will compact discs or these 3-inch disks capture the market first?

The new disks come in hard plastic housings, and can already store almost a megabyte of data per disk side. That, too, will increase as the technology improves.

• **Musical keyboards/sound sampling devices:** Synthesized music is another area where prices have been driven low enough to make sophisticated musical tools available to home computerists. Waveform, Sight & Sound, Roland, Sequential Circuits, and Sweet Micro Systems all make keyboard products available for as low as $50 on up to around $500. That's quite a bargain when you consider that similar devices retailed for thousands of dollars each in the not too distant past.

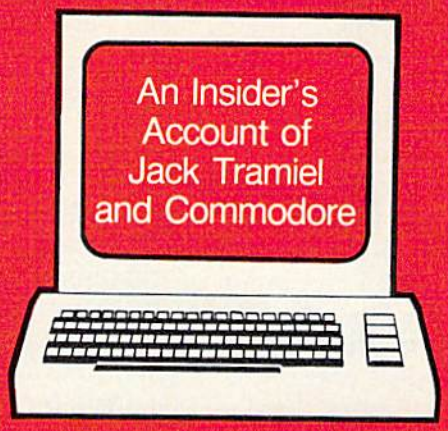
Another breakthrough has come in the area of audio sampling. CompuSonics, a Denver-based electronics firm, has introduced an audio system that allows users to make digital disc recordings at home—on a floppy disc. The company's machine, the DPS-1000, digitally records sounds as ones and zeros on the disc, resulting in the impressive fidelity of ordinary compact discs. The DPS-1000 can be plugged into any audio system. If attached to an IBM PC, the music can even be edited or synthesized.

Computerized musical devices are popping up everywhere, and some are truly astounding in their versatility and power. For example, Ensoniqs, a new company in Malvern, Pennsylvania, which includes engineers who invented the Commodore 64's SID sound chip, has announced an impressive digital sampling synthesizer, the Mirage, which sells for $1795. If you're interested in more details about this fast-growing area of home computing, see "Music In The Computer Age" in the January issue of COMPUTE!.

• **Invisible Modems:** These *mo*dulators-*demo*dulators, which transmit data between computers via telephone lines, are very popular peripherals among computerists. Advances are turning them from stand-alone units, however, to accessories built inside the computer itself.

A number of companies have introduced board modems that plug into a

THE HOME COMPUTER WARS



by Michael Tomczyk

$16.95 hardback ISBN 0-942386-75-2
$9.95 trade paperback ISBN 0-942386-78-7

COMPUTE! Publications, the leading home computer publisher, brings you the exciting story of the home computer industry. This book takes the reader into a vivid, dramatic world where a powerful, brilliant businessman almost single-handedly fashions the American consumer computer industry.

A survivor of the Nazi Holocaust, Jack Tramiel took a tiny typewriter parts company and built it into a major American corporation. In the process, he became a modern corporate legend. Some of his vice presidents thought he was a saint; some thought he had the world's hardest heart. But few deny the brilliance of this complex entrepreneur.

For the past four years, Michael Tomczyk has been Tramiel's right hand man. Throughout Commodore's explosive rise to leadership in the computer field, Tomczyk was a close insider. And, most importantly, Tomczyk is a keen observer and takes you where the action is.

To order your copy, send the attached card, with your payment, to COMPUTE! Books, P.O. Box 5406, Greensboro, NC 27403 or call toll-free **1-800-334-0868**.

Add $3.00 shipping and handling to hardback copy; add $2.00 shipping and handling to trade paperback.

computer's internal circuitry, and one firm, Code-A-Phone Corp. of Portland, Oregon, has developed a two-line telephone with a modem built inside. According to the market research firm International Resource Development, Inc. (IRD), digital telephones will build a significant market niche in the late 1980s, which could eventually mean the demise of the modem altogether.

• **Radio modems:** A device that can send software, text, articles, and photographs via an ordinary AM or FM radio to personal computers has been developed by The Microperipheral Corporation of Redmond, Washington. Called the Shuttle Communicator, it plugs into the receiver jack on a radio and the RS-232 port on the computer. It works essentially like the demodulator portion of a modem.

The company is negotiating with a national radio satellite network to syndicate a radio show which would offer computer news and free software, and hopes to have the system on-line near the end of February. Since a telephone is not involved in the process, the Communicator can download information at 4800 baud, much faster than most modems. At that speed, a 1K program could be downloaded in two seconds.

The Shuttle Communicator can download information from a radio station to any home computer, at speeds of up to 4800 baud.

The device is scheduled to retail for about $70, and will come with the necessary terminal software. Versions designed especially for the Commodore 64 and Atari computers are also planned.

• **Robots:** The prices range from $350 up to $5,000 or more for these programmable computer extensions. Their utility is still limited, but recent personal robots from such companies as RB Robot in Golden, Colorado; Androbot, Inc., of San Jose, California; and the Heath Company of Benton Harbor, Michigan, are making these super-peripherals both more practical and functional.

• **Vertical Recording:** Your present floppy disk stores information by rearranging magnetic particles which are aligned end to end, horizontally. But a significantly larger storage space is created on that same disk if the particles can be aligned vertically. Expect to see some vertical recording floppy systems, possibly with several megabytes per disk, in 1985, particularly from the Japanese company, Toshiba.

In general, growth in the computer peripherals market is predicted to increase almost 300 percent by 1994, to $17.6 billion, according to IRD. Total peripheral sales for the office and home computer markets in 1984 were $4.5 billion. IRD predicts that most of the sales by 1994 will be made to manufacturers, however, and not retailers, as computer firms move toward including peripherals with their basic systems.

"By and large, customers buy a single label computer system—keyboard, console, and disk drives—and don't care which supplier makes the various parts," states IRD. "There is little, if any, incentive for a customer to buy a different disk drive and display monitor when the original price of the computer already includes them."

The largest growth in the peripherals market will be in communications hardware, according to IRD analyst Maureen Fleming. By 1994, factory sales in that portion of the market will grow 1334 percent, from $230 million in 1984 to $3.3 billion, she says. The input device market, including voice recognition systems, mice, and optical scanners, should grow 424 percent, from $420 million to $2.2 billion.

While interest in modems and mice is expected to remain high over the next ten years, IRD is projecting that the printer market will have a somewhat slow growth rate of 82 percent during that same time span. Price wars among manufacturers will contribute to this lower growth rate. IRD figures show printer sales of $1.2 billion in 1984, and $2.2 billion by 1994.

Eventually, the very nature of peripherals themselves will probably change, as manufacturers increasingly make *intelligent* peripherals, equipped with their own microprocessor brains, much like many of today's cars, cash registers, and washer-dryers.

YOUR COMMODORE 64™ CAN NOW USE STANDARD APPLE™ II+ HARDWARE AND SOFTWARE

WITH THIS

At Mimic we believe that you and your computer should dictate the choices of hardware and software you can use.

The Spartan™ was developed to allow you to choose the hardware and software that best suits your needs.

Our goal in designing the Spartan™ was simple. To take what you already have and give you more.

Mimic Systems is proud to give you the Spartan™ The Apple™ II + emulator for the Commodore 64™

Spartan™ Suggested Retail Prices:

The Spartan™ (includes BUSS, CPU, and DOS cards) $599.00
BUSS card $299.00
CPU card (requires BUSS card) $199.00
DOS card (requires BUSS and CPU card) $199.00

(All prices in U.S. Funds. Freight not included.)
American Express, Visa and MasterCard accepted.

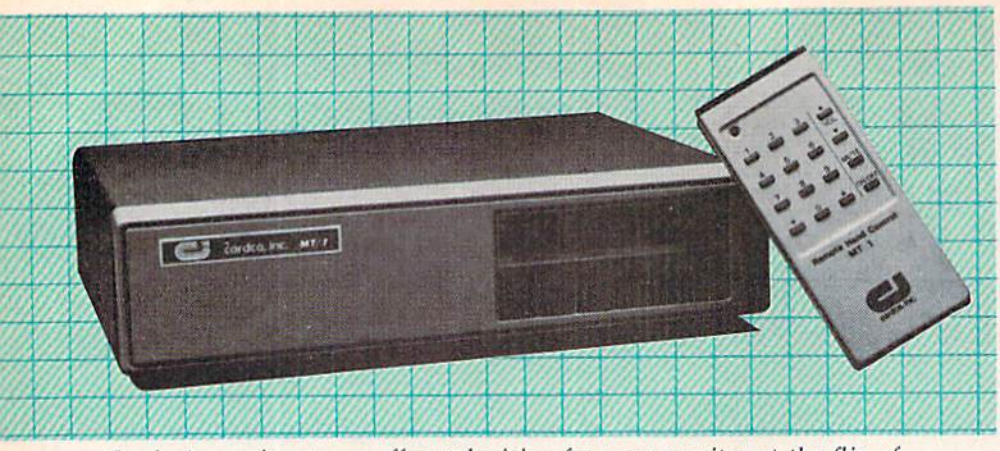
Commodore 64 and Commodore logo are trademarks of Commodore Electronics Ltd. and/or Commodore Business Machines, Inc. Apple® II+ is a trademark of Apple Computer, Inc. Spartan™ is a trademark of Mimic Systems Inc., and has no association with Commodore Electronics or Apple Computer, Inc. The Spartan is manufactured by Mimic Systems Inc. under license granted by ATG Electronics Inc. of Victoria, B.C., Canada.

MIMIC

FOR INFORMATION WRITE:

MIMIC SYSTEMS INC.
1112 FORT ST., FL. 6J
VICTORIA, B.C.
CANADA V8V 4V2

To Order Call:
1-800-MODULAR
(663-8527)



Cardco's monitor tuner offers television for your monitor at the flip of a switch.

While the choice between monitors and television sets is usually an easy one, no peripheral for your Commodore 64 is likely to be trickier to choose than a printer. The many different companies, the various types available (dot matrix, daisy wheel, thermal, thermal transfer, ink jet, etc.), and the continuing price cuts by manufacturers make this an exciting but potentially frustrating decision for the 64 owner. We'll discuss the ins and outs of buying and using a printer in an upcoming issue, but for now a few warnings should help you in your search.

Compatibility is the watchword here. Ignore it and you may wind up taking home a printer which at best doesn't fully use the power of the 64 and at worst is almost worthless. The built-in graphics characters which are directly accessible from the 64 keyboard, for example, can't be reproduced by some printers, at least without the addition of a ROM chip or some other modification. Before you begin to look for a printer, decide on what your uses are likely to be. That will make the tradeoffs on price, performance, compatibility, and other factors much easier to assess.

If you want to print program listings, an inexpensive printer will suit your needs. For letters or business applications, you'll need a printer that handles standard paper (single sheets or formfeed) and offers correspondence-quality characters. And make sure the software you own will work with the printer you choose.

Commodore currently offers three dot-matrix printers for the 64, the MPS-801, the MPS-802 (an enhanced version of Commodore's 1526 printer), and the new MPS-803. "Someone who is doing more in the business or productivity end of applications normally will buy the MPS-802," says Dow. "We're seeing the MPS-803 being bought by individuals interested in the educational and recreational aspects of the product itself—more of an all-purpose printer because it does standard text printing, but also has the capability to do dot-addressable graphics."

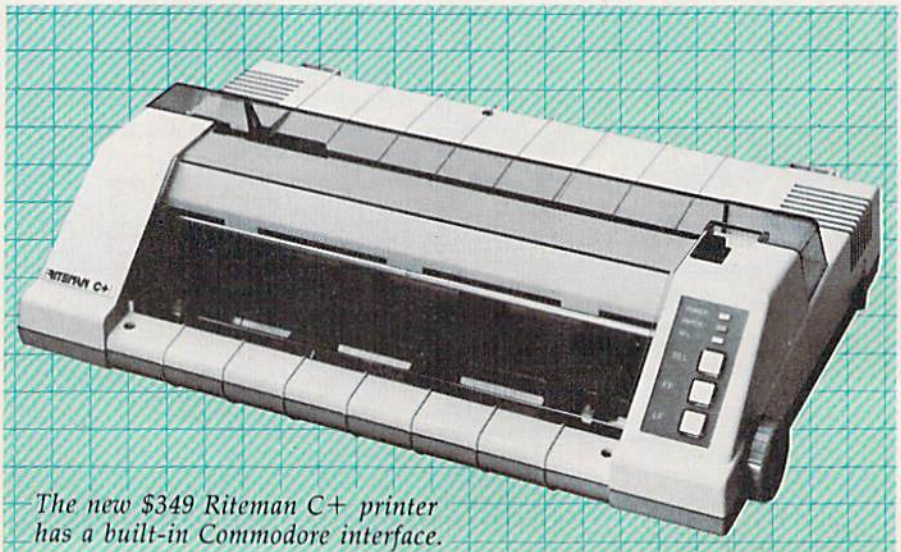
As the 64 became the clear leader among home computers in 1984, printer manufacturers raced to provide the best print quality at the lowest price for 64 owners. That is continuing, making your purchase of a printer a potentially formidable task. Companies such as Alphacom, Blue Chip Electronics, Cardco, C. Itoh, Epson, Ergo Systems, Leading Edge, Okidata, Star Micronics, and many others provide printers which you'll want to compare before deciding.

Joining the list are two new dot-matrix printers from Riteman: the R 64 and the Riteman C+. Both include a built-in Commodore interface and offer Commodore graphics characters.

The R 64 has both parallel and serial capacity, so it can be used with other computers as well as the 64. It prints at 120 cps and employs bit image graphics. It sells for $449. The Riteman C+, priced at $349, prints at 105 cps.

Perhaps the fastest growing area of home computing is telecommunications—the sending and receiving of data between computers.

"This is really becoming a very hot item, not just for Commodore, but for the industry in general," says Commodore's Dow. "And I think we're going to find more demand for

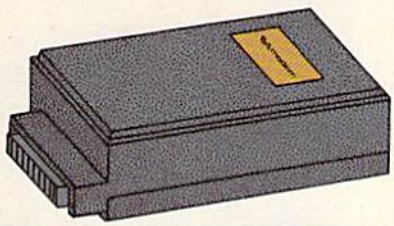


The new $349 Riteman C+ printer has a built-in Commodore interface.

Total Telecommunications™

4 Products in One Package

Modem

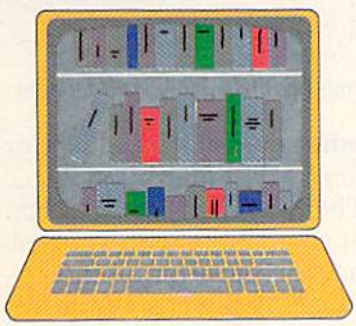


- 300 baud auto dial-auto answer modem

Communications Software

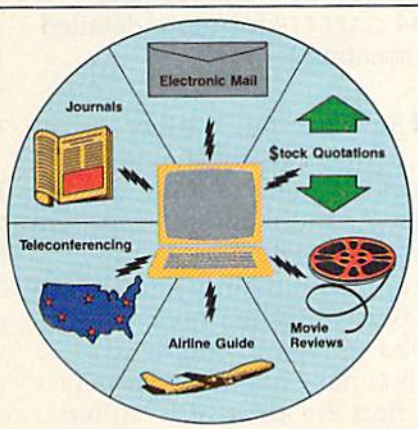
- Advanced telecommunications software
- Sends, receives and stores information
- Easy-to-use
- Automates connections and log-on sequences

Electronic Library



- 8,000,000 books in print
- Full encyclopedia
- Harvard Business Review
- Interactive lectures and seminars
- Microcomputer software directory

THE INFO CENTER™



- Electronic Mail
- Official Airline Guide
- Catalog Shopping
- Movie Reviews
- UPI world news and sports
- Stock quotations
- Journals and magazines in all career arenas
- Teleconferencing
- And much more!

Available at a computer store near you. Or call for more information:

800-22LEARN or **800-44LEARN** in California

For Commodore 64®

Total Telecommunications and The Info Center are trademarks of TeleLearning Systems, Inc.; Commodore 64 is a registered trademark of Commodore Electronics, Ltd.

TOTAL TELECOMMUNICATIONS
TeleLearning Systems, Inc.
505 Beach Street
San Francisco, California 94133
415/928-2800

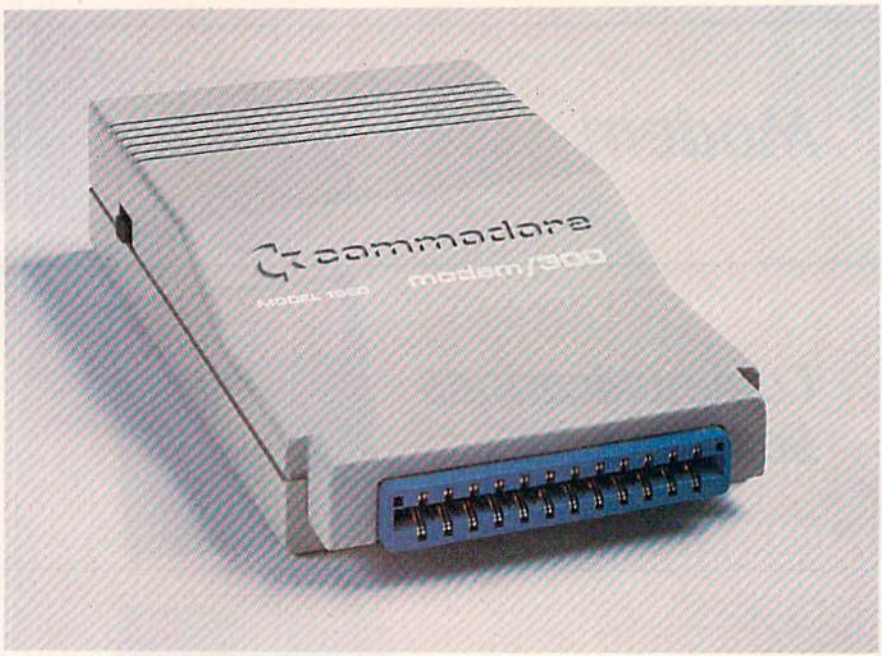
modems as we find more and more people offering different types of services. Modem sales for us have been strong, and it's going to get stronger as time goes on."

The modem is simply a device which modulates digital data from your computer into analog sound transmissions carried by the telephone lines, and then demodulates those same type of analog signals when your 64 receives data from another computer via the phone. There are two types of modems. An *acoustic* modem has rubber cups into which your telephone's handset fits and sends signals acoustically through the telephone; a *direct-connect* modem plugs directly into the phone lines, as its name implies. Acoustic modems are older and less reliable, and are therefore being superseded by the newer direct-connect devices.

You should be aware that the 64's RS-232 (a Recommended Standard, hence RS) serial port—through which your modem will communicate—is not compatible with the industry-accepted RS-232 port. Make sure that the modem you buy is compatible with the 64, or you'll have to buy an adapter to make it work.

Commodore now offers three different modems, each of which connects directly into the 64's user port, but offers different capabilities. The 1600 VICModem (about $50–$70) and the 1650 AutoModem (about $79–$100) have been joined by the 1660 AudoModem (about $100). The latter two allow your computer to automatically redial numbers when necessary and to automatically answer incoming calls from other computers. In addition, the 1660 has a speaker built into it so that you can monitor the audio status of the modem. It works with the Plus/4 as well as the 64 and VIC-20, notes Dow.

In addition to the Commodore modems, there are a variety of 64-compatible modems that have become available from other manufacturers. Human Engineered Software (HES) manufactures two HESmodems, one priced at $74.95 and the other at $109.95. Anchor Automation now offers the $99 Westridge 64-20 modem, Taroco is selling the $99.95 Mitey Mo, and other modems by Intec Corporation, MFJ Enterprises, Inc., and The Microperipheral Corp., are all compatible with your 64 without the need for an interface. (See "A Buyer's Guide To Modems" in the November 1984 GAZETTE for more detailed information.)



Commodore's new 1660 Automodem.

The expanding base of peripherals for the 64 includes a variety of input devices. As more and more people have been brought into the world of computing, an increasing percentage are unaccustomed to typing, and hence, keyboards. Children especially can find the array of 67 different keys on the Commodore 64 a daunting and frustrating means by which to learn about computers.

To combat this problem, a number of companies have come out with products aimed at easing a child's first exposure to computers. Simplified plastic keyboard overlays are now being used in many early learning programs, such as in CBS Software's Sesame Street series. Koala Technologies released the Muppet Learning Keys in 1984, a plug-in pad which features easy-to-use letters, numbers, colors, and other functions.

"Alternative input devices are becoming more and more important as time goes on in just about every segment of the marketplace, particularly the home," says Dow. "We're working on a variety of different forms of input devices."

At last year's Consumer Electronics Shows, for instance, Commodore displayed its Touch Screen, a plastic overlay which fits over the front of a monitor or television set. By touching the screen with your finger or a pointer you gain access to menus and other controls in a variety of programs. Although not yet released, the Touch Screen—in some form—is expected to be available soon,

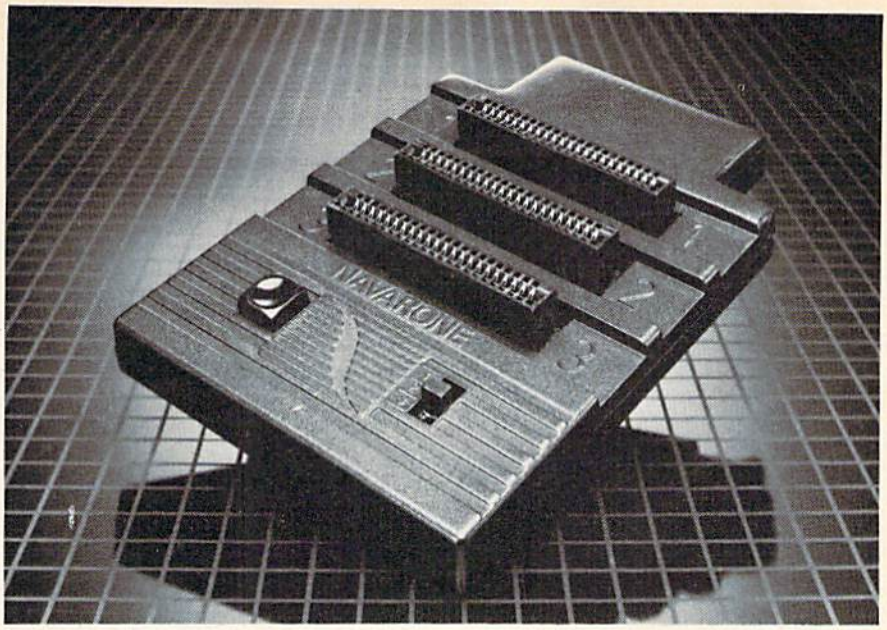
perhaps by the time you read this, notes Dow.

Even novice computer users are at least somewhat familiar with the joysticks, game paddles, touch tablets, keypads, and light pens which are the most familiar alternative input devices. Making decisions about these peripherals is usually not as difficult as is the case with printers, modems, or storage devices. But, as with all peripherals, what you plan to do with them can make the difference between wasted money and a genuinely useful addition to your 64 system.

Among the newer input devices are music keyboards which, with accompanying software, make use of the Commodore 64's Sound Interface Device (SID) chip. Companies like Passport, Sight & Sound, Tech Sketch, Sequential Circuits, Waveform, and others are selling a variety of these keyboards, with prices generally around $200 or less. (See "Commodore 64 Music For Non-Musicians" in the February GAZETTE.)

Over the past year or so, the *mouse*—a rolling desk-top device which controls the screen cursor and other onscreen functions—has become a very popular alternative input device for Apple, IBM, and some other computers. While Commodore reportedly has no plans to develop a mouse, a number of other companies are rumored to plan to produce them for the 64.

Beyond the five major peripheral categories mentioned here, there are still many more products which can make substantial differences in what you can do with your 64. Memory expansion devices, surge suppressors, reset switches, and cartridge slot expanders are among the peripherals you'll want to learn more about. Even an Apple II+ computer emulator for the 64 (from a Canadian company, Mimic Systems) should be available shortly. The complete package, called The Spartan, is expected to retail for just under $600 and allow your 64 to use standard Apple II+ hardware and software, according to a company official.



Navarone's $39.95 three-slot cartridge expander for the 64 lets you plug in up to three cartridges that are switch-selectable.

The U.S. home and office personal computer peripherals market will probably reach $26.4 billion in retail value by 1989, according to figures compiled by Future Computing, Inc., a respected computer market research firm. That's a $17.3 billion increase over the 1984 figure. The choices will continue to increase as manufacturers take advantage of the huge installed base of Commodore 64s.

With proper planning and a clear understanding of your needs, choosing peripherals can be another interesting aspect of computing rather than an expensive exercise in frustration.

While space limitations prohibit us from listing addresses for all of the companies mentioned in this article, the following should help you get started:

Anchor Automation, Inc.
6913 Valjean Avenue
Van Nuys, CA 91406

Cardco, Inc.
300 S. Topeka
Wichita, KS 67202

Commander Electronic Systems
P.O. Box 15485
Santa Ana, CA 92705

Commodore Business Machines, Inc.
Computer Systems Division
1200 Wilson Drive
Westchester, PA 19380

Electronic Components
P.O. Box 173
Elma, NY 14059

Human Engineered Software (HES)
150 North Hill Drive
Brisbane, CA 94005

Indus Systems
9304 Deering Avenue
Chatsworth, CA 91311

Inforunner Corporation
(Riteman Printers)
Airport Business Center
431 North Oak Street
Inglewood, CA 90302

Mimic Systems, Inc.
1112 Fort Street, FL. 6J
Victoria, B.C.
Canada V8V 4V2

MSD Systems, Inc.
10031 Monroe Drive
Suite 206
Dallas, TX 75229

Navarone Industries, Inc.
510 Lawrence Expressway
#800
Sunnyvale, CA 94086

Taroco
19 Rector Street
New York, NY 10006

Commodore Peripheral Ports

Ottis R. Cowper, Technical Editor

Commodore computers provide their users with a variety of methods for communicating with the outside world. The devices from which the computer receives input or to which it sends output (or both) are generically called peripherals, and the connectors where peripherals are attached to the computer are referred to as *ports*. Each of the several ports has distinctive characteristics that make it suitable for particular applications. For some, the computer's operating system—the ROM which controls the machine's functions—provides routines that handle much or all of the "dirty work" of communicating with devices attached to those ports. To use other ports, you must program all the necessary support routines yourself. That task can range from very easy (for example, reading a joystick) to quite complex (interfacing with a parallel printer through the user port, for example).

Here's a rundown of the features of all the ports:

The Serial Port

For most users, the serial port is the major data artery of the computer. As the connection point for disk drives and printers, it's the port through which most information exchanges take place. This is the one port that is the same on the VIC, 64, Plus/4, and 16. Well, almost the same—there are some signal timing differences. The VIC transfers data at a slightly faster rate than the others, which is one of the reasons the VIC is listed as incompatible with the 1526 printer, and why the original 1540 disk drive was only for the VIC. Obviously, this port is bidirectional—data can flow both in and out with equal ease.

The signal format used to exchange data over the six lines provided through this port is unique to Commodore. The format should not be confused with the more standard RS-232 serial communications format used by numerous peripherals; RS-232 communication is handled through the user port (see below). The serial port is essentially a stripped down version of the parallel IEEE-488 port used for most data communications in Commodore's earlier PET/CBM models. As the term *serial* implies, data can be transferred only one bit at a time (and in only one direction at a time, either in or out). Three of the other lines control the direction of data flow, and whether the signals on the data line are to be interpreted as data or as commands to the peripheral device. The computer's RESET line is also present at this port, which explains why the disk drive resets whenever the computer is turned on or off.

The operating system fully supports communications through this port. By addressing a peripheral attached to this port with a device number, and using OPEN, CLOSE, PRINT#, INPUT# and related routines provided by the operating system, you can avoid worrying with the details of controlling the individual signal lines. Any peripheral addressed with a device number between 4 and 31 (the highest device number allowed) is assumed by the computer to be connected to this port.

Commodore has established several standards for device numbers: Printers are usually device 4, although some can be changed to device 5, the 1520 Printer/Plotter is designed to be device 6, and device numbers 8 and above usually refer to disk drives. Device 8 is the default number for the disk drive, and almost all software assumes the disk drive will have this device number; device 9 is the most common choice for a second drive. Commodore 1541 drives allow you to select any device number via software, or numbers 8–11 via hardware.

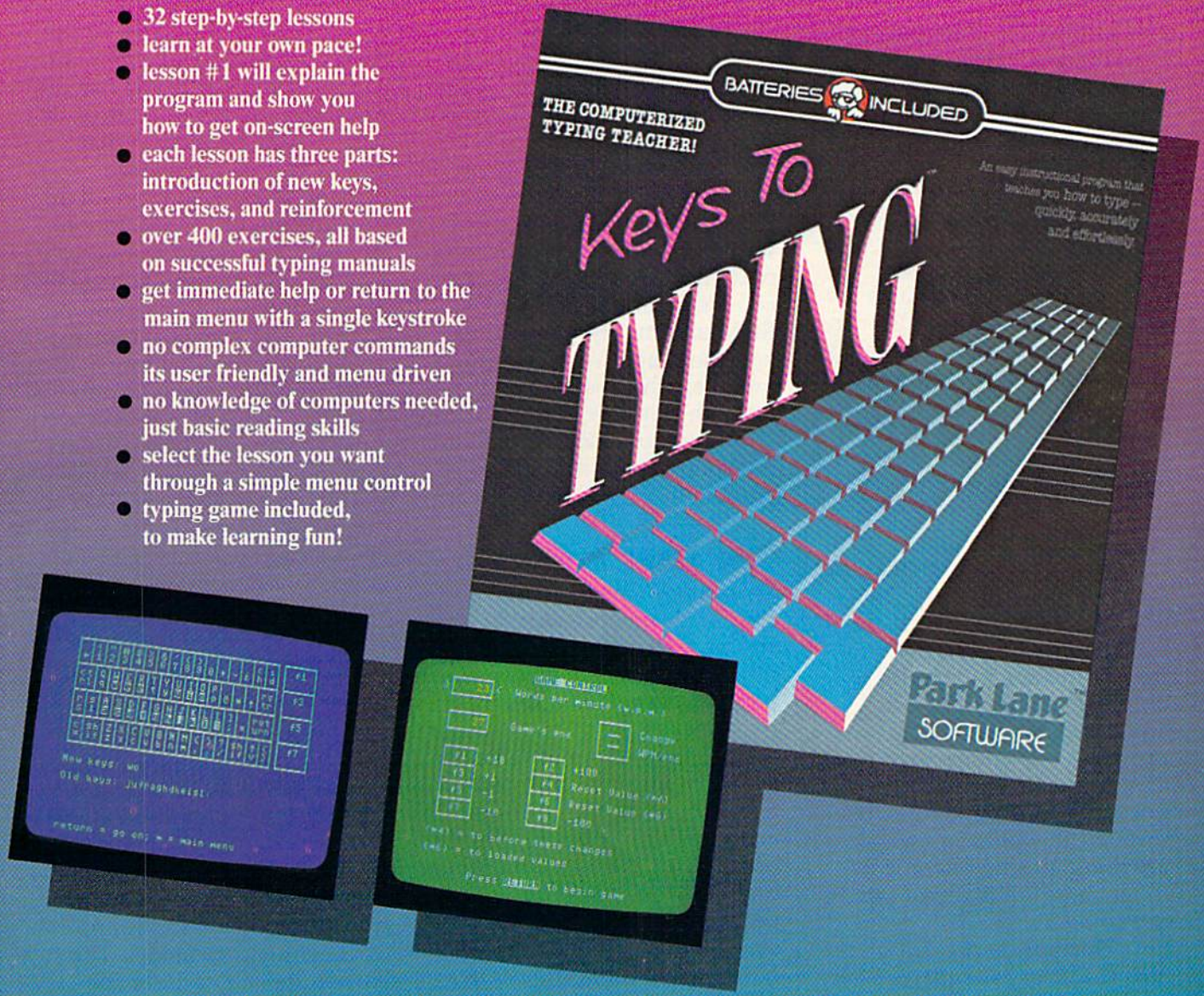
The use of a unique signal format for communication with the disk drive is not unusual; almost all computer manufacturers use a proprietary disk interface compatible only with their own products. What is unusual is that this same nonstandard format is also used for communications with printers. Since so much software assumes that printers will be connected through the serial port (as device 4), most third-party interfaces for non-Commodore printers also attach to this port. These interfaces act as interpret-

AT LAST... A TEACHER WHO IS JUST YOUR TYPE!

FOR COMMODORE 64

Turn your COMMODORE 64 into a personal typing tutor with KEYS TO TYPING software. ***Over 30 easy lessons,*** *all based on proven teaching techniques that typing teachers have been using for years. Combined with the speed and flexibility of computerized instruction—it's the fastest and easiest way yet to learn typing.*

- 32 step-by-step lessons
- learn at your own pace!
- lesson #1 will explain the program and show you how to get on-screen help
- each lesson has three parts: introduction of new keys, exercises, and reinforcement
- over 400 exercises, all based on successful typing manuals
- get immediate help or return to the main menu with a single keystroke
- no complex computer commands its user friendly and menu driven
- no knowledge of computers needed, just basic reading skills
- select the lesson you want through a simple menu control
- typing game included, to make learning fun!



The perfect learning program for students of any age. For businesspeople who need typing skills but are short on time. For people re-entering the workforce who need a fast refresher. Designed by educators and computer programmers working together, KEYS TO TYPING lets you learn quickly, easily and effortlessly. After 32 lessons, you'll be typing at speeds you never thought possible.

BATTERIES INCLUDED

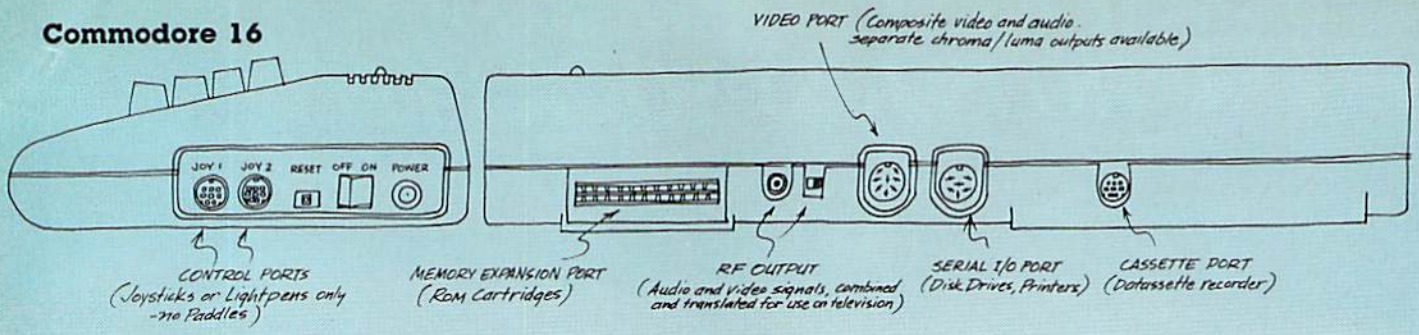
"The Energized Software Company!"

WRITE FOR A FULL COLOR BROCHURE

30 Mural St.
Richmond Hill, Ontario
L4B 1B5 Canada
(416) 596-1405

17875 Sky Park North,
Suite P, Irvine, California
USA 92714

© 1984 BATTERIES INCLUDED. ALL RIGHTS RESERVED COMMODORE IS A REGISTERED TRADE MARK OF COMMODORE BUSINESS MACHINES, INC.



ers, reading the Commodore-format serial signal from the port and converting it to the more standard parallel (eight bits at a time) format used by most printers.

The Memory Expansion Port

This is often referred to as the cartridge port, since ROM cartridges are the peripherals most often attached through this connector. In the VIC, this is also the port through which RAM memory expanders are added. The lines available at this port include most of the address, data, and control lines of the microprocessor chip that is the heart of the computer. Thus, any peripheral which needs to be intimately tied to the workings of the computer—for example, ROM that must be addressed by the microprocessor—is connected through this port. The operating system does not support any devices through this port; in essence, anything attached here is no longer a peripheral, but part of the computer itself.

This port is present on the VIC, 64, Plus/4, and 16. Many of the same lines are available on corresponding pins of the expansion port connectors used in the VIC and 64, but the connectors themselves are different sizes, so cartridges designed for the 64 cannot be used on the VIC, and vice versa. The Plus/4 and 16 have identical 50-pin connectors for this port (as opposed to the 44-pin connectors used in the VIC and 64), so presumably there will be some compatibility of cartridges for these models, although no VIC or 64 cartridges or memory port peripherals can be used.

Examples of other types of devices which attach through this port are the CP/M cartridge for the 64, which contains a second microprocessor that takes complete control of the 64's RAM and input/output chips, and the Magic Voice speech module, which is attached through this port because it contains additional ROM to allow the computer to support voice output.

The User Port

This port (sometimes called the RS-232 or modem port) was designed with the experimenter in mind. Just as the memory expansion port gives you access to a number of the microprocessor's control lines, this port gives you access to many of the control lines of one of the interface adapter chips (VIAs for the VIC or CIAs for the 64). Using these lines, a wide variety of peripherals could be connected, since both serial and eight-bit parallel communications are available.

Unfortunately, most of this flexibility goes unused since it isn't supported by the operating system. Most home computer users today are more interested in software than in tinkering with hardware projects, so this port is most frequently used for its one function supported by the operating system: RS-232 serial communications.

RS-232 is the name of the most common serial communications standard. If you use the operating system to address device 2, data directed to that device will be transferred through the user port in an approximation of RS-232 format. Actually, the signal format is true RS-232, but the voltage levels are different from those prescribed. The standard calls for voltage levels of −12 to +12 volts, and the user port only provides levels of 0 to +5 volts. Adapters are available—from Commodore and other sources—to convert the signal voltage to the proper levels. These adapters are not necessary if you're going to use Commodore's modems, but are required to use any standard RS-232 equipment.

The 24 pins of this port have a similar configuration on both the VIC and 64, so many devices designed to interface to this port can be used on either computer, although the software to run the devices will generally be different. The VICmodem and Automodem, for example, work with either model. The Plus/4 appears to have the same 24-pin connector, but the computer casing around the connector is smaller, so neither the VICmodem nor Automodem can be plugged into the Plus/4. (Commodore's new 1660 modem works with the VIC, 64, and Plus/4.) The Commodore 16 has no user port, so it is as yet unclear if or how a modem may be used with that computer.

FOR THE APPLE® & COMMODORE 64™

Presenting a new strategy arcade game — where the dark dungeon-maze of the Netherworld holds nightmarish adventure, nonstop action and heart-pounding excitement for you,

GEMSTONE WARRIOR™

Finely-honed combat skills may defeat the hordes of hellish monsters, but sharp wits are needed to map the torturous passages if you are to succeed in your quest for the Gemstone!

On 64K disk for the Apple II with Applesoft ROM: II+, IIe and IIc.
On 64K disk for the Commodore 64.
Uses keyboard/joystick controls.

Find and store treasures and magic items to help you along the way. Learn well the properties of each magic item: You may have only seconds to use one to save your life!

Search for this game at your local software/computer or game store today!

SSI™

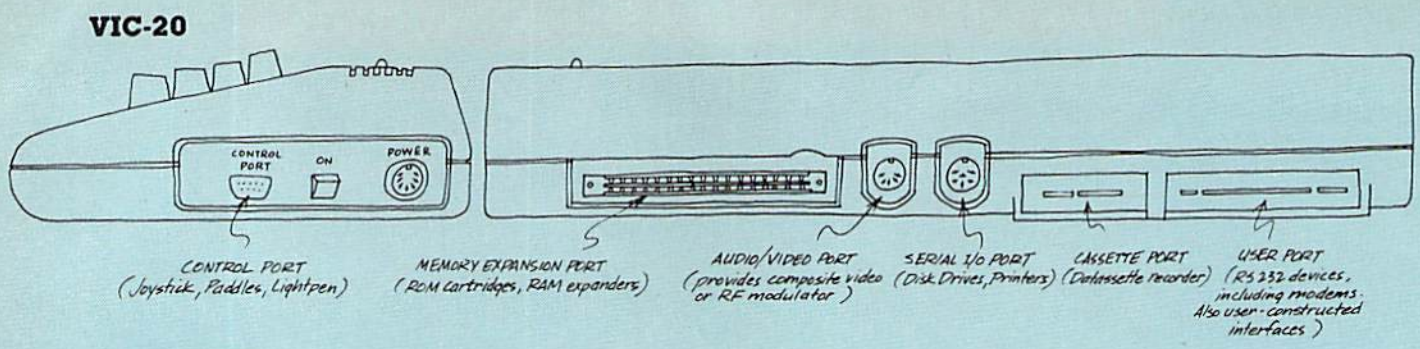
STRATEGIC SIMULATIONS, INC.

If there are no convenient stores near you, VISA & Mastercard holders can order this $34.95 game direct by calling 800-227-1617, ext. 335 (toll free). In California, call 800-772-3545, ext. 335. Please add $2.00 for shipping and handling.

To order by mail, send your check to: STRATEGIC SIMULATIONS, INC., 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043. (California residents, add 6.5% sales tax.) All our games carry a "14-day satisfaction or your money back" guarantee.

WRITE FOR A FREE COLOR CATALOG OF ALL OUR GAMES.

APPLE and COMMODORE 64 are trademarks of Apple Computer, Inc. and Commodore Electronics, Ltd., respectively. © 1984 by Strategic Simulations, Inc. All rights reserved.



Since eight-bit parallel data communications are available through this port, it might seem surprising that it's not commonly used for interfacing with printers. After all, it would appear on the surface to be simpler to write a machine language program to simulate the commonly used Centronics parallel format through this port, than to go to all the trouble of designing the hardware interface to convert the data from the serial port to the proper parallel format.

The reason this isn't often done is that almost all Commodore software expects the printer to be device 4 on the serial port, and in the long run it proves easier to seek a hardware solution to allow you to use the built-in operating system routines as provided in ROM. That way, you don't have to worry about having to load your printer handler routine into memory before you can use it, finding a safe place in RAM to store the handler routine, etc.

For more information on interfacing through the user port, see the article "Using the User Port" in *COMPUTE!'s First Book of Commodore 64*. VIC users might also be interested in two articles which show how to use the user port to provide a second joystick port: "Fighter Aces—Add A Second Joystick" (*COMPUTE!'s Second Book of VIC*) and "Tankmania: Adding A Second Joystick To The VIC" (COMPUTE!'s GAZETTE, April 1984).

The Control Ports

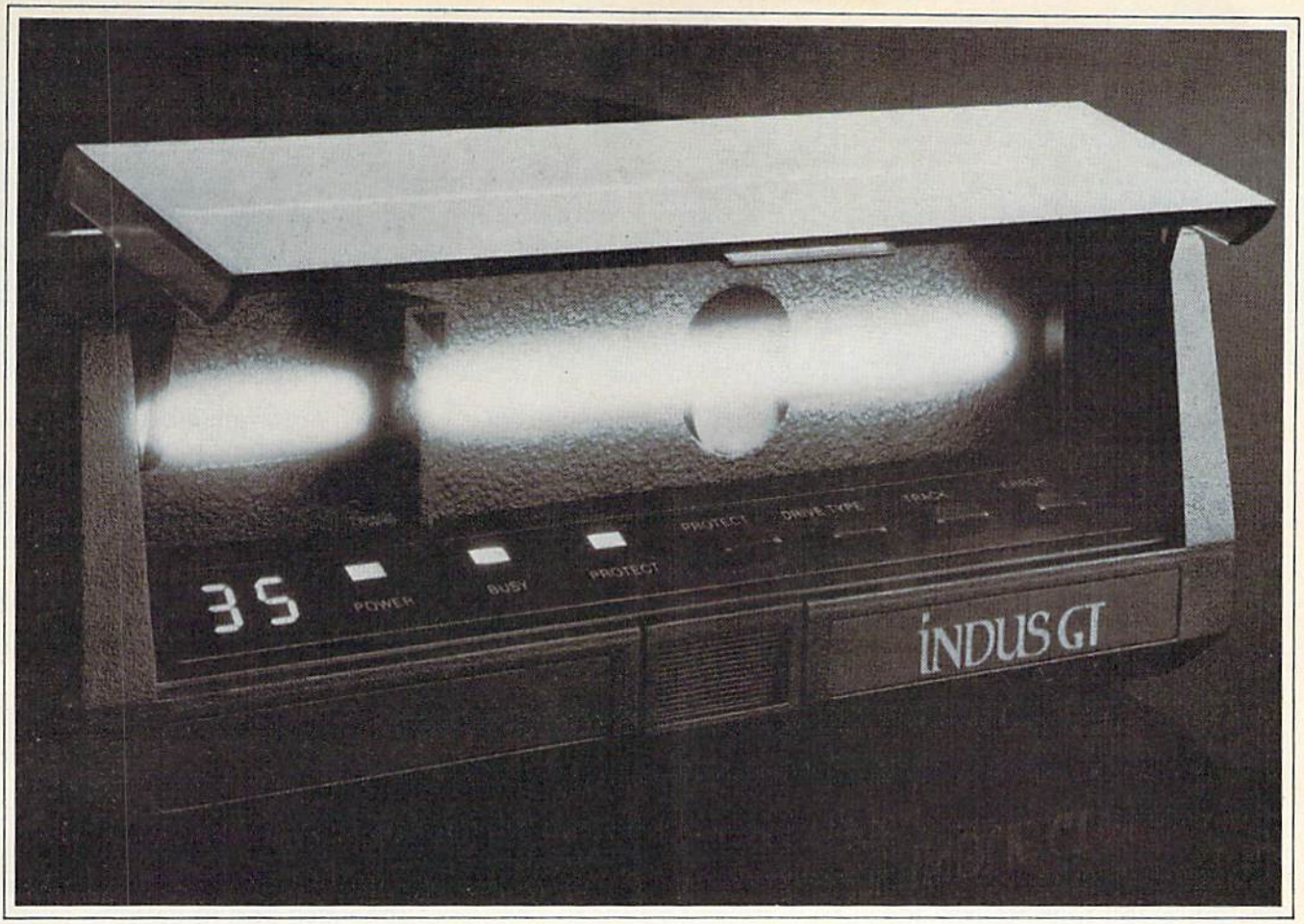
These ports (or port, in the case of the VIC, which has only one) are usually referred to as the joystick ports, since they are most commonly used for joysticks. In fact, on the Plus/4 and 16, these ports are labeled JOY1 and JOY2. The operating system ROM does not support any devices through these ports, so BASIC must communicate using PEEKs and POKEs.

In addition to joysticks, which are simple devices consisting of five switches—one for each of the four principal directions, plus one for the fire button—the ports can be used to read other devices that behave like joysticks, such as trackballs. Although the computer normally uses the five joystick lines strictly for input, it's possible to program them for output as well. We've never seen any peripherals for Commodore computers that attempt to output through this port, but there are printer interfaces for the Atari which use Atari's nearly identical joystick port. (Atari and Coleco joysticks are functionally identical to Commodore joysticks for the VIC and 64, and can be used interchangeably.)

A warning to those contemplating the purchase of a Plus/4 or Commodore 16: On those computers Commodore has abandoned the widely used DB-9 joystick connector in favor of a nonstandard connector, so existing joysticks cannot be used. Apparently, this was done to reduce radio frequency (RF) interference. The joystick mechanism is exactly the same, it's just the plug on the end of the cable that's been changed. And the new plug isn't one you'll be able to find easily, so—until someone comes out with an adapter plug—you'll be limited to buying only Commodore's joysticks. On the other hand, the improved BASIC in the Plus/4 and 16 includes a JOY function to read the joysticks, so the complicated PEEKs required to read joysticks on the VIC and 64 can be avoided.

In addition to the joystick, this port in the VIC and 64 can be used to read paddle controllers. (The Plus/4 and 16 have no circuitry for reading paddles.) Paddle controllers, which always come in pairs, are actually just variable resistors which provide variable voltage levels to two lines on the port. Circuitry within the computers (in the VIC chip in the VIC-20, and in the SID chip in the 64) calculates a digital value corresponding to the voltage level. The value ranges from 0 to 255 as the voltage on the lines changes from 0 to 5 volts. Other devices which operate like paddles—providing a varying voltage input—can also be read through this port; graphics tablets are a good example.

Each paddle usually also has a button, but instead of being read like the joystick buttons, the paddle buttons are connected to the lines for two of the joystick directional switches.



What you get if you cross a Commodore 64 with a Ferrari.

You get the incredible Indus GT™ disk drive.

You get brains. You get beauty.

But, that's not all you get.

You get a disk drive that can handle 100% of Commodore's software. Up to 400% faster.

You get the disk drive with the best service record around. With a one year warranty on parts and labor to prove it.

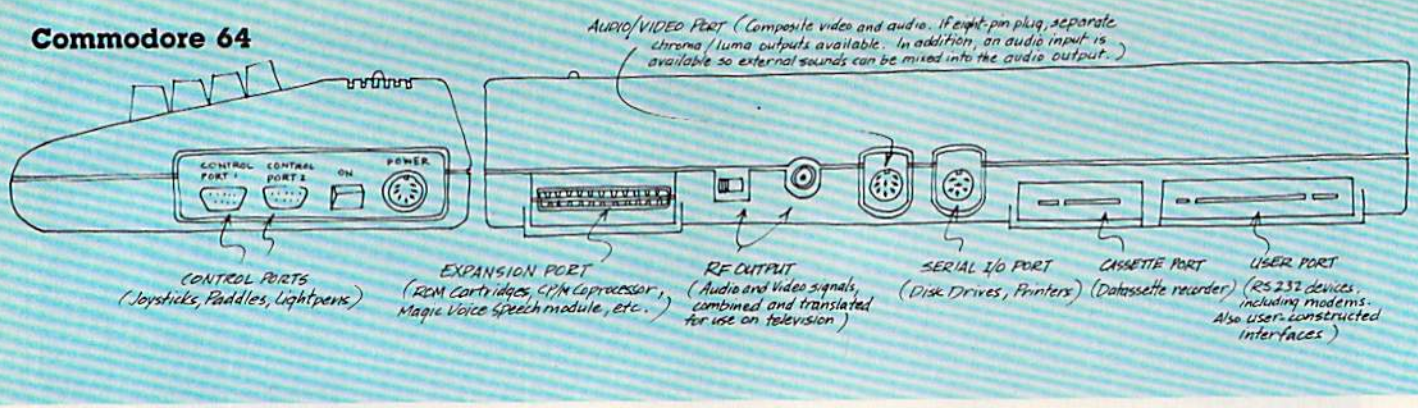
And, you get the only disk drive that comes with free software. Word processing. Spreadsheet. Database manager. Plus, a carrying case that doubles as an 80 disk storage file.

Most of all, you get luxury. From the sleek lines of its soundproofed chassis to the responsive AccuTouch™ controls at the Indus CommandPost.™ From the LED display that keeps you in control of your Commodore to the air-piston operated dust cover that protects your disks and drive.

So, you know what you really get if you cross a Commodore 64 with a Ferrari? You get the best.

INDUS™

©Indus Systems, 9304 Deering Avenue, Chatsworth, CA 91311 (818) 882-9600. The Indus GT is a product of Indus Systems. Commodore is a registered trademark of Commodore Business Machines, Inc. Ferrari is a registered trademark of Ferrari North America, Inc.



One paddle button corresponds to the joystick's right directional line, and the other to the line for reading joystick left. By convention, the paddle that uses the right directional line for its button is called the right paddle, and the one that uses the joystick-left line is the left paddle.

Unlike Atari joysticks, Atari paddles are not completely interchangeable with those made by Commodore. While Atari paddles can be used with the VIC and 64, they have a higher resistance and thus are less accurate for Commodore systems. (A half turn on Atari paddles corresponds roughly to a full turn on Commodore paddles.)

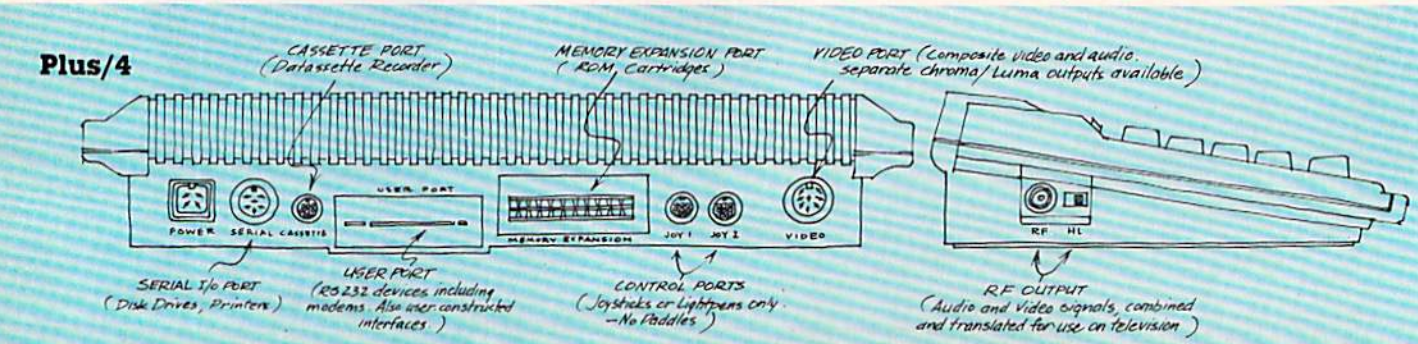
One additional type of peripheral—the light pen—can also be connected to this port. The pen contains a phototransistor that switches when it detects the electron beam of the video display sweeping past. A line is connected from the phototransistor through the port to the chip that generates the video signal (the VIC chip in the VIC, the VIC-II chip in the 64, and the TED chip in the Plus/4 and 16).

When the video chip receives the signal from the pen, it latches (stores) the current position of the raster (electron beam) in a set of registers (memory locations within the chip). The stored value can then be read, and the position where the pen is touching the screen can be calculated. (As with joysticks, Plus/4 and 16 owners will have to wait until someone manufactures a light pen with the proper plug to fit the unique socket used for this port by those computers.)

The Audio/Video Port

This connector is not really a port, since data cannot be transferred through it. Instead, it provides a connection point to the computer's video and audio signals. With the exception of an audio input line on the 64, all lines at this port are outputs only. Like the serial port, this port is compatible on the VIC, 64, Plus/4, and 16, but compatible doesn't mean identical. When attaching the computer to a video monitor, you need a cable that brings out two signals which are available at the same pins on all four models, a composite video signal and an audio signal. Corresponding video and audio inputs are found on most black and white or color monitors. The Commodore 1701/1702 color monitor also provides for the input of a luminance signal via the rear connections. Separating the luminance provides increased contrast, and drastically reduces color smearing.

Television users can attach a thin wire between the composite and luminance signals on the video port to improve television contrast, but some TVs can't take the extra luminance and produce a distorted screen. The more recent 64s use an eight-pin jack rather than the five pins used on the VIC and 64, but a five-pin monitor plug will still work. The eight-pin 64s have a purer color signal available for use with the rear connections of the 1701/1702, so you may want to use an eight-pin cable. The 64's audio input line attaches directly to the audio input on the SID chip. Be careful to feed in only low-level (unamplified) sound sources. There's no way to process the



PlayNET announces 19 exciting ways to bring people together.

Now there's a Home Computer Network that lets you communicate with all kinds of people—all over the country! Make new friends, play exciting games, barter—shop—trade, all from the comfort of your home.

The network operates 6PM–7AM every weeknight, and 24 hours on Saturday, Sunday and Holidays. All you need to access PlayNET™ is a COMMODORE 64,* DISK DRIVE and MODEM.

1 **TALK.**
By typing on-line you can *talk to anyone*, or everyone, on the system. Meet fascinating people and make new friends from coast to coast.

2 **ELECTRONIC MAIL.**
You can *send private messages* to people on the system, and the message will be waiting when they sign on!

3 **BULLETIN BOARDS.**
You can *post announcements*, or check the listings of other members. There are lots of boards for hobbies and special interests! If you don't find the one you're looking for—create your own!

4 **FILE TRANSFER.**
You can even *transfer non-commercial programs* to other members! There is a small extra fee for this service.

5-17 **GAMES! GAMES! GAMES!**
PlayNET lets you play exciting games with real people, not just a computer. All our games have *full color* graphics, and they're all *interactive!*

- Plus the added feature of being able to talk with your opponent while you play. Discuss strategy, comment on moves, even try and psych your opponent out!
- New games are added all the time, and there are tournaments for every skill level.

CURRENT GAMES INCLUDE:

- Backgammon
- Boxes
- Capture the Flag
- Checkers
- Chess
- Chinese Checkers
- Contract Bridge
- Four-In-A-Row
- Go
- Hangman
- Quad 64™
- Reversi
- Sea Strike™

18 **MORE! MORE! MORE!**
There's *on-line updating* of your PlayNET Software as games and services are added. You have access to PlayNET's *Shopping Center* and *Information Center*, and every month you'll get our *Newsletter.*

19 **YOUR SATISFACTION IS GUARANTEED** for 30 days (or your full subscription price will be refunded upon receipt of the package).

This is all you pay:

- $39.95 for the PlayNET Software Package (3 disks and a User Manual) Monthly Newsletter, and 90 MINUTES ON-LINE TIME FREE!
- $6 monthly service charge.
- $2 an hour on-line time (The $2 includes the telecommunication charges). That's much less than a long distance phone call.

Here's how you can become a member!
It's easy to join, simply call PlayNET on the toll-free number, **1-800-PLAYNET,** or send the coupon below and access all your Commodore 64 has to offer. The sooner you do, the sooner PlayNET can put the whole country at your fingertips!

PlayNET
The Network that has people talking

SEND TO PLAYNET, INC.
P.O. BOX 587
WYNANTSKILL, N.Y. 12198

OR CALL **1-800-PLAYNET**

YES! I WANT PlayNET TO PUT THE WHOLE COUNTRY AT MY FINGERTIPS. I UNDERSTAND THAT MY SATISFACTION IS GUARANTEED FOR 30 DAYS (or my full subscription price will be refunded upon return of the package) I may cancel my membership at any time by writing PlayNET.

Bill me on my charge card for $39.95. (Plus sales tax for New York State residents). No checks, cash or money orders accepted. Please send me the PlayNET Software, user manual, and 90 minutes of free on-line time.

Please print.

Name_____

Address_____

City_____ State_____ Zip_____

Phone ( )_____

Check one: ☐ MasterCard ☐ VISA

Card #_____ Exp. Date_____

Signature_____

™PlayNET, Quad 64 and Sea Strike are trademarks of PlayNET, Inc. *Commodore 64 is a trademark of Commodore Business Machines Inc. © 1985 PlayNET, Inc.

sound, but it can be mixed with the sound of the SID chip, and the SID chip's filters can be used as a programmable equalizer for the sound coming in.

The Cassette Port

This port is designed for one particular peripheral, the Commodore Datassette recorder. There are now two models of the Datassette, the 1530 (or equivalent C2N) for use with the VIC and 64, and the 1531, for use with the Plus/4 and 16. As with joysticks, the only difference between the two is the plug on the end of the connecting cable. Commodore has used a new and incompatible type of connector for this port on its new models.

Three of the six lines from this port are used for writing a signal to the tape, reading a signal from the tape, and testing whether a button is pushed. Note that since there is only one line (labeled Cassette Sense) to test the buttons, it's only possible to check whether *any* buttons are pressed, not which particular button or buttons are pressed. Thus, if you're supposed to press PLAY and RECORD and accidentally press only PLAY, the computer won't be able to detect the mistake. Other lines supply power to the tape motor (9 volts) and for the electronics in the Datassette (5 volts). Some other peripherals—for example, several brands of printer interfaces—also make use of the 5 volt power source available here.

Communication through this port is fully supported by the operating system, with the Datassette being designated as device 1. Device 1 is the default storage device; unless you specify otherwise, all your SAVEs and LOADs will be directed to the Datassette. In addition to SAVE, VERIFY, and LOAD, the OPEN, CLOSE, PRINT#, and INPUT# statements provide all the features necessary for storing and retrieving data on tape, so programmers rarely need to worry about the intimate details of interfacing to this port, such as what sort of magnetic pattern is actually used to represent a byte of data on tape. Nevertheless, it's possible to program several of the individual lines of this port to achieve special effects; for an example, refer to the "TurboTape" articles in the January and February issues of COMPUTE!, the GAZETTE's sister magazine.

COMPUTE!'s GAZETTE
TOLL FREE
Subscription
Order Line
800-334-0868
In NC 919-275-9809

RABBIT
For the 64 or VIC
~~$39.95~~ **$29.95**

Alternative to the 1541 Disk Drive!
Load or save 8K in 30 seconds! It's less expensive than disk and can even be used as a backup to the flaky 1541!

Yes, the RABBIT is that and much more. Uses the Commodore cassette deck but loads and saves much, much faster than regular Commodore load/save. Think about it — loads or saves an 8K program in almost 30 seconds, 16K in 1 minute, etc. That's nearly as fast as the 1541 disk. RABBIT is on cartridge so it's always there. Also has other useful commands. Specify for use on the 64, or on the VIC 20 —

"It was the best purchase for my computer that I have ever made!" "Congratulations on your 64 Rabbit. It's a super piece of work."

AutoLoad/ Directory
Cartridge for the 64.

This cartridge has a push-button switch on it that allows you to: 1) Load and then automatically run the first program on disk, and 2) Display the disk directory – either at the touch of a button! It may not sound like much but it is absolutely one of the most convenient accessories you can install on your 64. Housed in an attractive plastic cartridge complete with easy to install instructions, works with every software package (including menus and commercial software) we have tried and it doesn't take away any memory. Think about it the next time you type: **LOAD "*",8,1 RUN** or **LOAD "$",8 LIST.** Remember, it's only $19.95.

NEW LOW PRICES

MAE NOW THE BEST FOR LESS!

Please for your own protection consider the MAE first before you buy that other assembler. We've had numerous customers who wasted their money on some cheaper off brand assembler tell us how much better the MAE is.
The most powerful Macro Assembler/Editor available for the Commodore 64 and other CBM/PET computers, and also for the ATARI 800/XL and Apple II/IIE.
MAE includes an Assembler, Editor, Word Processor, Relocating Loader, and more all for just ~~$59.95~~ $39.95
We could go on and describe the MAE but we thought you would like to read our customers' comments. The following are actual unedited comments from correspondence about the MAE:

"Excellent Development Package" "I like MAE and wish that you had it on the Macintosh."
"Compares to DEC and INTEL." "It is a superb program."

TelStar 64™
by Eastern House
A Communications Cartridge for the Commodore 64.

Upload/Download, Status Line, etc. Works with your Commodore 1600 or 1650 Modem. Auto-dialing, etc. when used with the new CBM 1650 Modem.

Cartridge and Manual – ~~$48.95~~ $29.95

Eastern House
3239 Linda Dr.
Winston-Salem, N.C. 27106
(919) 748-8446
Send for free catalog!

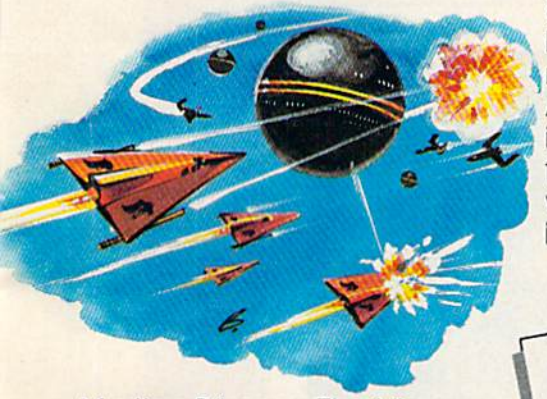
VISA MasterCard

Get more out of your Commodore with

COMPUTE!'s GAZETTE

For Owners And Users Of **Commodore VIC-20**™ And **64**™ Personal Computers

More fun



Martian Prisoner, The Viper, Skydiver, Snake Escape, Demon Star, Cyclon Zap, and Oil Tycoon are just a few of the ready-to-run games you'll find exclusively in *COMPUTE!'s Gazette* each month. Just type in the programs and watch your screen explode with colorful new computer game excitement.

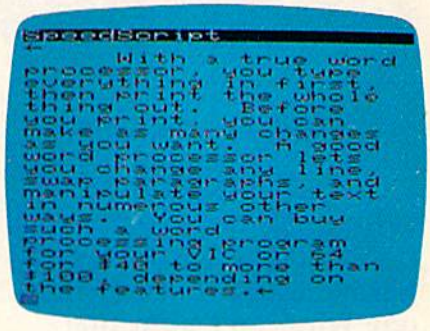
More challenge

Ready to tackle more advanced projects? In *COMPUTE's! Gazette*, you'll learn how to use tape and disk files, how to program the function keys, writing transportable BASIC, how to make custom graphics characters, new ways to enliven programs with sound, one-touch commands for the 64, how to use machine language, speeding up the VIC-20—and much more!

Children will learn and develop new skills with States & Capitals Tutor, Wordmatch, Munchmath, Wordspell, Connect the Dots, Aardvark Attack, and Alfabug. Computing for Kids, a regular monthly feature, will uncover new ways to involve your children in computing.

More programs

Programs to help you balance your checkbook, store your addresses, keep tax records, manage your personal business. You can create your own programs and games, improve your word processing, spreadsheets, and data base management, load and run faster with 64 Searcher, VIC/64 Program Lifesaver,



Quickfind, Word Hunt, Disk Menu, VIC Timepiece, The Automatic Proofreader and more.

$ $ $ $ $ $ $ $ $ $ $ $ $

More buying guidance

You'll profit from comprehensive reviews of everything from data-quality cassette tapes to software to graphics plotters and modems. Virtually anything that's compatible with your Commodore is reported on in *COMPUTE!'s Gazette*. With this kind of expert help, every computer purchase you make can be the right one!

Order now

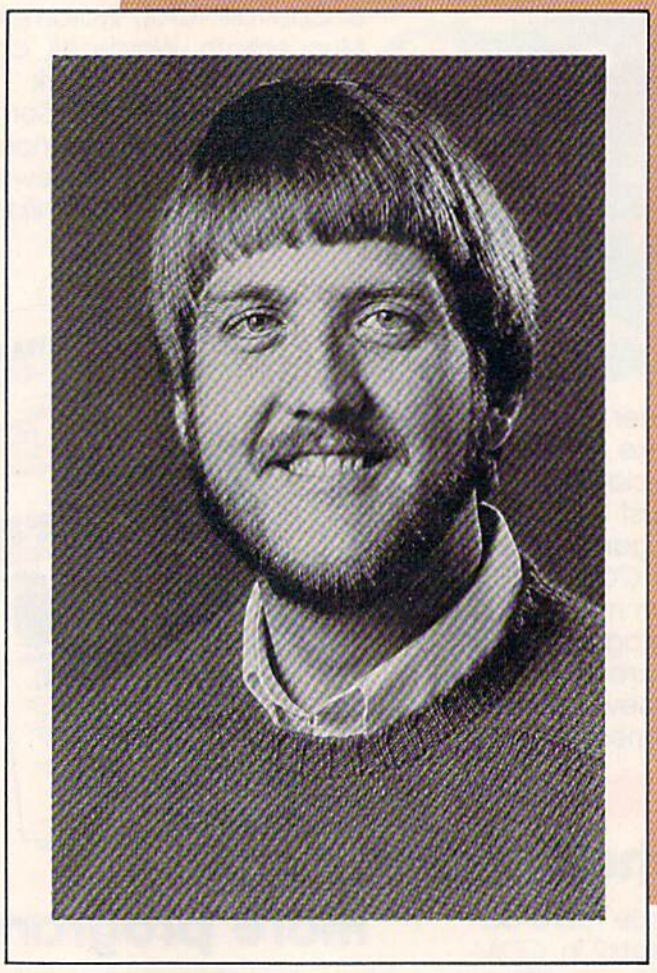
All you do is mail the postpaid card bound into this issue. But don't delay! Subscribe now to start receiving every issue of *COMPUTE!'s Gazette*.

For Faster Service
Call Toll-Free
1-800-334-0868

David Crane
The Designer Behind *Ghostbusters*

Kathy Yakal, Feature Writer

Who ya gonna call? GHOSTBUSTERS! You'd be hard-pressed to find someone who can't hum that tune. *Ghostbusters* was one of the top-grossing movies in 1984. Now there's a computer game based on the box office hit, designed by David Crane, one of the co-founders of Activision.



David Crane

How could the movie *Ghostbusters* have been anything but a smash hit? It had Bill Murray. It had a great theme song. It gave us heroes to cheer for. Its villains were not really very scary—one of the most ominous bad guys was a giant marshmallow man. And from the first ghost to the final fall of Zuul, its special effects were superb.

David Crane went to see *Ghostbusters* before it became *the* movie to see in the summer of '84. "I think I may have enjoyed it a lot more than some people because it was sprung on me," he says.

Crane, a program designer for and co-founder of Activision, was approached a few days later about doing a computer game based on *Ghostbusters*. Though he had really enjoyed the movie, he hesitated. "To do justice to any game takes no less than 500 hours of my time, and I was getting married in six weeks. So I had to think long and hard."

One of the reasons he finally agreed to do it was that he had already started writing the

GREAT NEWS FOR OWNERS OF COMMODORE, APPLE, & ATARI COMPUTERS!

Most printers don't work with Commodore or Atari. And to get one that does, costs too much. That's why the engineers at Blue Chip designed a new personal printer called the M120/10. If you own a computer read on:
Of the ten high speed dot matrix printers most often used with Commodore, Apple, and Atari, none is less expensive than the Blue Chip M120/10. Or more powerful.

Fully equipped, it's about $50 less expensive than a comparable, yet much slower Commodore printer. And in the vicinity of $300 less than an Epson* set-up to work with a Commodore.

Despite its low price, the Blue Chip M120/10 is not a stripped down, bargain basement printer.

In fact, when you judge it by the same stringent standards computer professionals use—by weighing total performance against cost—it's difficult to find a printer that compares to the Blue Chip M120/10.

Top speed with a Blue Chip M120/10 is 120 characters per second. To beat that in any other make of printer, you have to spend about $400 more.

Special print modes on an M120/10 include graphics; condensed, boldfaced and expanded characters; as well as superscripts and subscripts, and near letter quality characters. And to beat that in any other make of printer you have to spend nearly $300 more.

And since it also has the IBM-PC*, Apple MacIntosh* and IIC*, Serial, and Centronics interfaces**, you can use the Blue Chip M120/10 with just about any computer you may eventually own.

The Blue Chip Personal Printer costs a lot less than anything similar... without compromise in quality. Highly powerful and relentlessly practical.

See one today. Blue Chip printers are available at Best Products, LaBelle's, Jafco, Dolgin's, Miller Sales, Rogers, Great Western catalog showrooms, and other fine stores. Or call (800) 556-1234 Ext. 540. In California, call (800) 441-2345, Ext. 540, for more information and name of your closest Blue Chip dealer.

BLUE CHIP
ELECTRONICS

2 West Alameda Drive/Tempe, Arizona 85282/(602) 991-9833

*Commodore is a registered trademark of Commodore Business Machines Corp.
Epson is a registered trademark of Epson America, Inc.
IBM is a registered trademark of International Business Machines Corp.
Apple is a registered trademark of Apple Computer Inc.
**Replacement interfaces sold separately.

Outfitting the Ghostmobile.

game without realizing it. For the previous few months, he had been working on a game for the Commodore 64 that was going nowhere. It had something to do with equipping a car and driving it through city streets, but there was no story there. "It was a game concept in search of a theme," says Crane.

"It's an amazing coincidence that what I was doing followed the script of the movie. I was able to put the theme and game together in such a way that I could have what's really an original game concept that embodies the spirit of the movie."

David Crane grew up in Nappanee, Indiana, a very small town with a population of about 500 and not very much going on. In high school, he got involved with a local career center that helped provide students with vocational training. "Though their intention was to teach you a skill that would help you go out and get a job—programming for a bank or something—some of us just used it to learn how to program computers in three languages and then went on to college."

Crane attended the De Vry Institute of Technology in Phoenix, Arizona, to learn electronic engineering. He had already studied Fortran, RPG, and COBOL, so he decided not to take the fourth programming class, BASIC. "Computer skills are the kind of thing you learn once and you don't use," he says. "Once you know a couple of computer languages, all you need is about a one-page summary of what the instructions do."

Who ya gonna call?

After graduation, Crane felt he had a firm enough grasp of computer technology to get a good job in that field. "But instead of doing that, I asked myself, 'What *don't* I know enough about to work in that field?' So I took a job in that field to round out my expertise and experience."

So he started working at National Semiconductor in 1975, in a department that made chips for non-computer electronics. It was his job to introduce computers to the engineering department, and he built his own computer to do it.

"After two years at National, I felt I could do just about anything in electronics," says Crane. "So what did I do? I took a job as a game designer at Atari, where I didn't use any of my engineering skills whatsoever."

Crane had always been an avid game player, participating in national foosball tournaments in college and playing any mechanical games he could find—pinball, *Pong* when it came along, and later, videogames. As a student, he built a tic-tac-toe-playing computer using only discrete electronic components ("That was in the era before microprocessors.").

He had written programs to play games and built machines to play games through the years, so he knew game design was fun for him. "But it was questionable whether I wanted to do computer programming for a living. I had been doing engineering for the past two years, so it was kind of a leap off the deep end for me to be paid for doing computer programming."

Ghostbusters!

AVAILABLE SOON!

DriveSaver

with SpeedLoad™

LOADS SOFTWARE UP TO 500% FASTER AND PREVENTS DAMAGING DRIVE KNOCK!

INFO/TECHNICAL LINE — (805) 682-4000, ext. 95

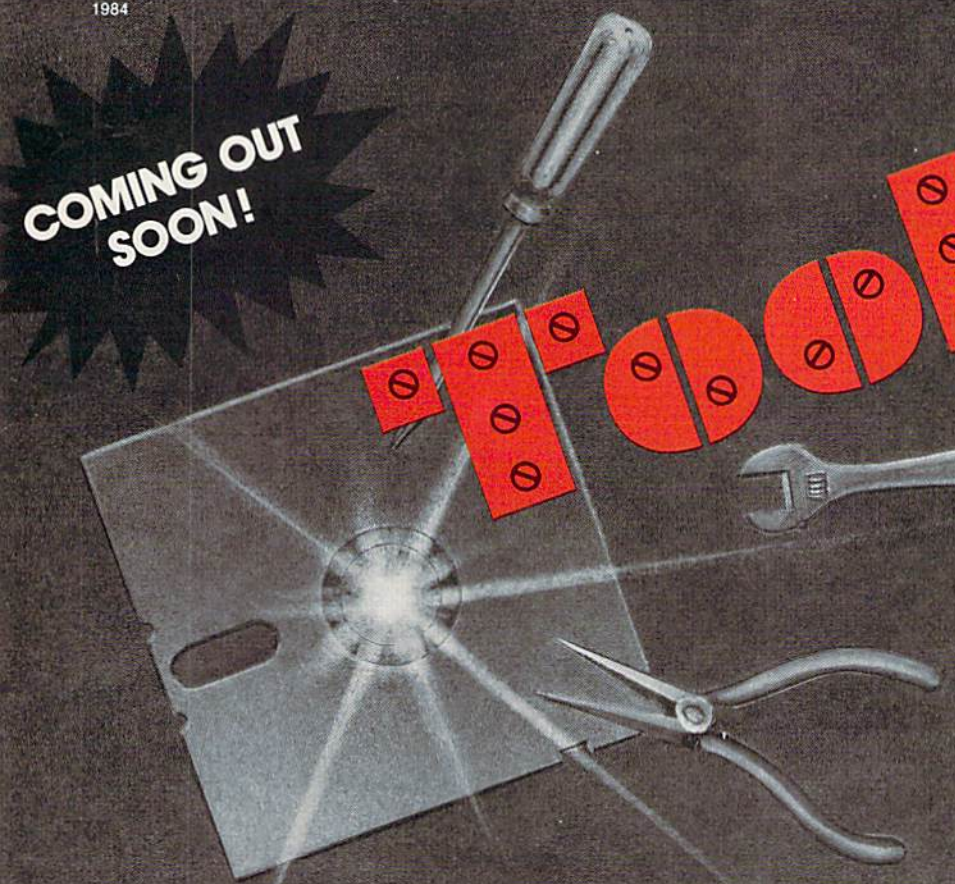
basix

1984

COMING OUT SOON!

ToolKit

with Hi-Track™



THE ADVANCED UTILITIES PACKAGE WITH MULTI-SECTOR AND ½ TRACK ANALYZERS.

INFO/TECHNICAL LINE — (805) 682-4000, ext. 96

After a couple years at Atari, Crane was ready to move again, as were some of his coworkers. "There was a group of us that knew we were good, so we set out to start a company," he says.

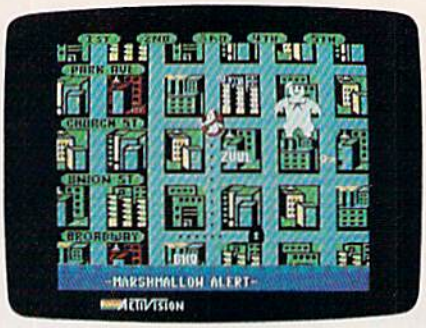
While consulting an attorney to find out whether they should be a corporation or a partnership, they were referred to Jim Levy, a friend of the attorney. "It was a very serendipitous meeting," says Crane. Levy became one of the original founders of Activision, where he remains president today.

Activision's corporate charter describes the company as a provider of entertainment software for computers—rather forward looking for 1979, when games were still being played on video cassette systems. Their first products were four videogames for the Atari VCS: *Dragster, Fishing Derby, Boxing,* and *Checkers.*

"We've always known that we would start with the simple form of home computer, which is the VCS, and move into the more elaborate home computers that we knew would exist about this time," says Crane.

Crane is rather an anomaly in today's software development industry, where many designers have gone independent and contract their programs to publishers. Activision is his employer, and he and the other game designers go in every day and work in an office.

But that's always been his plan. "We were all game designers and we knew that that was and is our strength. I would never have attempted nor desired to run the company."



Not such a bad-looking bad guy: the marshmallow man.

Which is not to say he punches a time clock. Though in his "off" times, he might put in 30 hours a week, he's working 80 when it's busy. "You basically work when you've got the inspiration.

"When you're programming, you have to maintain more than a thousand details in your mind at one time to make sure that when you're finally done, it all comes out the way you envisioned it in the beginning. It's pretty intense. I work until I can't see straight, which is quite often early in the afternoon."

The movie *Ghostbusters* was a hit because " . . . it was well done, funny, and treats a subject that may not be funny with humor. They managed to carry it off with only a few people being scared," says Crane. "It had that rousing sense of adventure of driving through the streets with a police escort and saving the world—all the things you might want to do as a hero. I tried to put those things into the game."

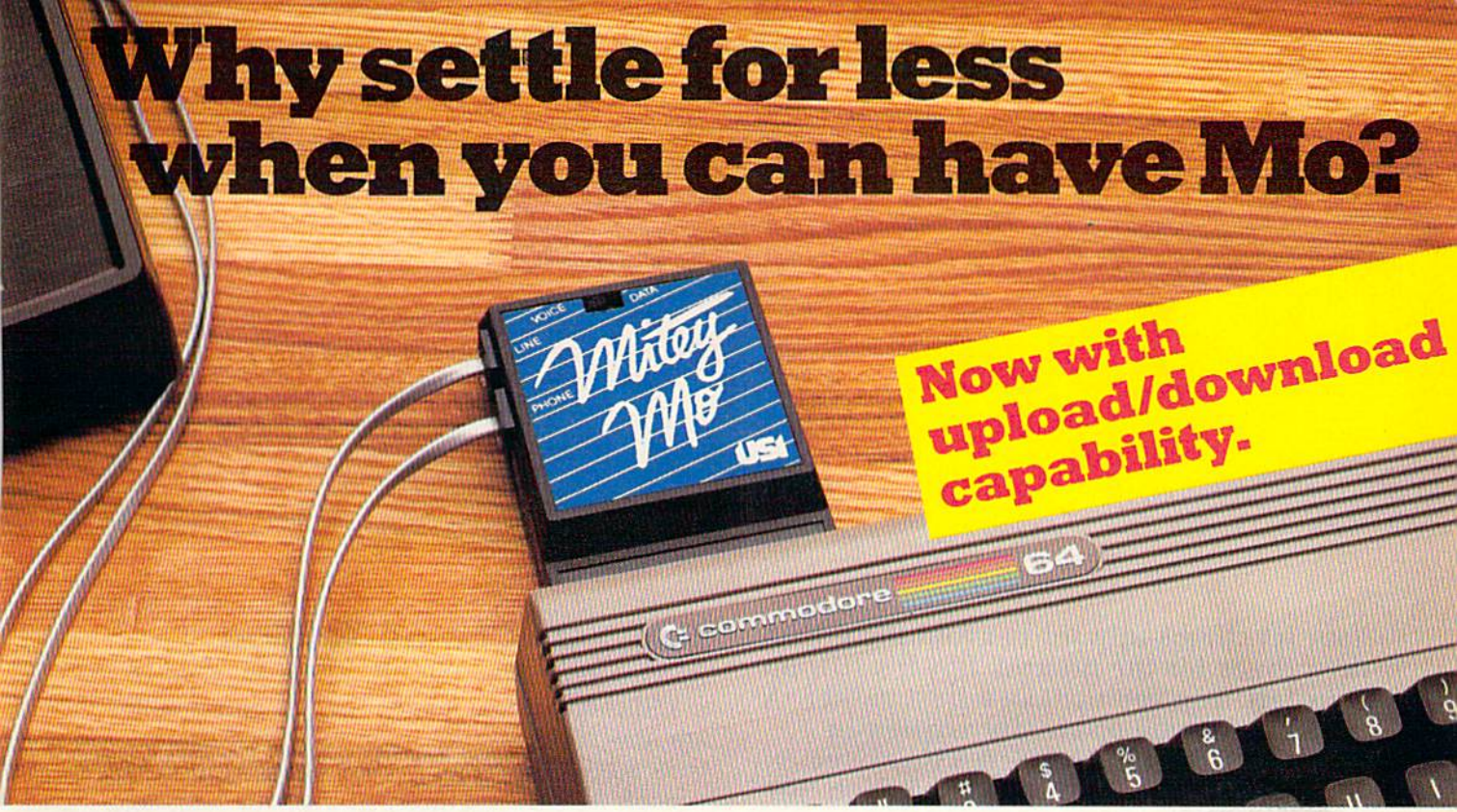
And many of the important images from the movie are, indeed, in Crane's computer version. At the game's start, you must buy a car and outfit it with equipment like ghost vacuums (to suck up ghosts), ghost bait (to lure the intrepid marshmallow man), and traps (to store the ghosts after you've nabbed them).

Once equipped, you're shown a map of the city; buildings flashing red are ghost-ridden. You drive to those buildings, aim your weapons at the elusive ghost, and fire (without crossing the streams). If you're successful, the little ghostbusters jump up and down and shout "Ghostbusters!" If you miss, you get "slimed." The game ends when you get past the marshmallow man and into Zuul. (Ray Parker Jr.'s funky theme song plays at the opening and throughout the game.)

It may be that David Crane will be on top of one of the next new technologies or game genres to come along, possibly before many people even envision it. "Back in the days when people were still playing space games, I had tired of space games," he says. "I've been successful because of that. I end up producing what people are ready for about the time they're ready for it.

"I will design computer games for as long as I find it fun, and I still foresee a few more."

Why settle for less when you can have Mo?



Introducing Mitey Mo, the ready-to-go modem that turns your Commodore 64® into a telecommunications giant.

Mitey Mo is the complete—and affordable—telecommunications system for your Commodore 64. It will open up a world of practical and exciting uses for your computer, and it will take you online faster and easier than anything else you can buy.

Now you'll be able to send and receive electronic mail, link up with community bulletin boards, play computer games with people in distant places, do electronic banking, and tap into library resources to find the material you need for your reports. All at your convenience.

Until Mitey Mo, Commodore's 1650 Automodem was the obvious choice when you went looking for a modem for the C-64. Like Mitey Mo, it has "auto-answer"— it receives data while unattended. And both modems are "auto dialers"—you dial right on the computer's keyboard. But that's about where their similarity ends.

Suppose you dial a number,

and you find that it's busy. Mitey Mo has "auto redial"—it hangs up and redials immediately until it gets through. With the other modem you have to redial each time—and somebody with auto redialing can slip in ahead of you.

Mitey Mo is menu-driven. It lists the things you can do on the screen. Select a number and you're on your way. Since Automodem isn't menu-driven, you'll be hunting through the manual a lot.

Mitey Mo has only one switch, the customized software does the rest. Every family member will find it easy to use. With the other modem you'll have to remember to check three switches, otherwise you may be answering when you mean to be originating.

Mitey Mo gives you access to 14 pages of memory (28,000 bytes), so you can store data and review or print it later. The other modem doesn't let you store or print anything.

Mitey Mo is half the size of the other modem. The very latest technology allows miniaturization and increased reliability, as well. Mitey Mo is so reliable, we gave it a full one-year warranty. The other modem gives 90 days, then you're on your own.

Not only will you find Mitey Mo mighty useful, you'll find it mighty reasonably priced. Call us at (415) 633-1899 and order your Mitey Mo today.

MODEM FEATURES	MITEY MO	COMMODORE AUTOMODEM
Auto Dial	YES	YES
Auto Answer	YES	YES
Auto Redial	YES	NO
Smart 64 Software Included	YES	YES
Upload/Download Capability	YES	NO
VT-52/VT-100 Emulation	YES	NO
Menu Driven	YES	NO
28K Software Buffer	YES	NO
Printing Capability	YES	NO
Easy-to-Use Manual	YES	NO
Bell 103 Compatible	YES	YES
Multiple Baud Rates	YES	YES
Cables Included	YES	YES
Single Switch Operation	YES	NO
Warranty	1 year	90 days

Some mighty interesting features—ours and theirs. Yours to decide.

USI

CDI/Computer Devices Int'l
1345-A2 Doolittle Drive
San Leandro, CA 94577
(415) 633-1899

Heat Seeker

Jeff Wolverton

Your jet climbs upward to avoid the missile, then dives for the ground. But it's still on your tail. You can't shake a heat seeker. A fast action game originally written in BASIC for the unexpanded VIC, we've added a machine language 64 version. Joystick required.

Heat seeking missiles are dangerous. They sense the heat from your jet engine and home in on you. They'll catch you, too—they're faster than a jet.

Your assignment: Eliminate the heat seeker base. It's easy enough to strafe the missiles on the ground, but if any are launched, you'll have to take evasive action. And air mines can get in your way.

Piloting The Jet

Use the joystick to control the movement of the plane. The controls may seem to be a little confusing at first. You pull back to loop upwards (counterclockwise) and push forward to loop down (clockwise), like a real airplane. The jet moves at a constant velocity—you can't speed up or slow down. Press the fire button to launch a missile at the heat seekers on the ground.

In the VIC version, you can also fire at the heat seeker pursuing you (see below for details about the 64 version). Also, you must avoid running into the air mines (VIC version only), which block your way. You can shoot the mines to score a few points. It's also possible to accidentally shoot yourself.

If you manage to eliminate all the heat seekers, you get to start all over again, with a new group of heat seekers. You have eight jets to work with—the number remaining is displayed on the screen, next to the score. To pause the game, press SHIFT/LOCK.

Notes On The 64 Version

In translating from the VIC to the 64, several modifications were made. The jets and missiles are now sprites (rather than redefined characters), so the movement is smoother. And the 64 version is written entirely in machine language, so it plays much faster.

You can fire at heat seekers on the ground. But it does no good to fire at a moving heat seeker. They're equipped with an Improved Electronic Evasion (IEE) circuit which makes them impossible to hit. The only way to get rid of a seeker is to make it crash into the ground. When you're being pursued, dive for the ground and pull up at the last second. Seekers are faster, but they can't turn as quickly.

Unlike the VIC version, the plane can't shoot itself. And there are no air mines. If your jet is destroyed, all missiles reappear. In VIC Heat Seeker, no bases are rebuilt until all of them have been destroyed.

A two-player mode has been added. It's not competitive: The players take turns flying the plane, trying for the highest possible score. The game reads both joystick ports, so if you're using two joysticks, the inactive player should put down the joystick to avoid interfering.

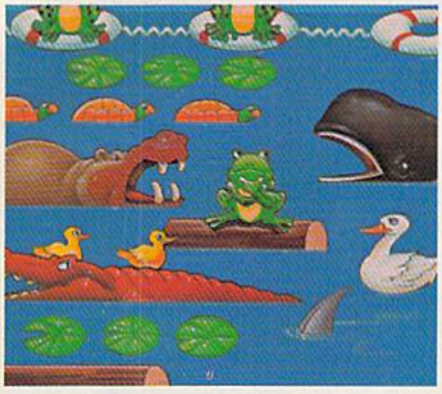
There are three levels of difficulty: Novice, Intermediate, and Expert. The higher levels have faster action and tighter curves. A flight-time bonus of ten points is awarded every few seconds, just for staying in the air.

Special Instructions

VIC Heat Seeker is written in BASIC for an unexpanded VIC. Remove or disable memory expansion, type it in, save to disk or tape, and type RUN.

The 64 version is written in machine language and loads into the area usually used by

SO YOU THINK YOU GOT THE BEST OF FROGGER AND ZAXXON? SORRY.



See, while you've been mastering them, we've been advancing them. Making them even more fun than before. So now we have two new mindblasters.

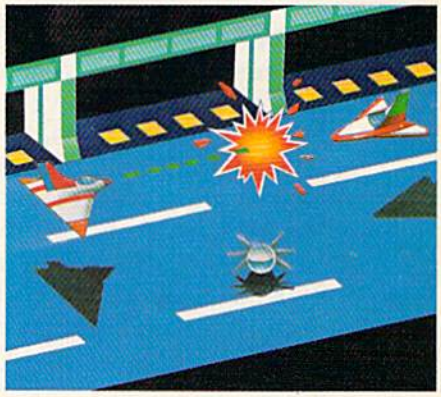
Frogger II Threee-Deep, a three-screen nightmare. Starting with an undersea battle against deadly creatures and the cruel undercurrent. If you do make it to the surface, it just gets worse. The only hope is to leap into the sky where even more frog-eating monsters lurk.

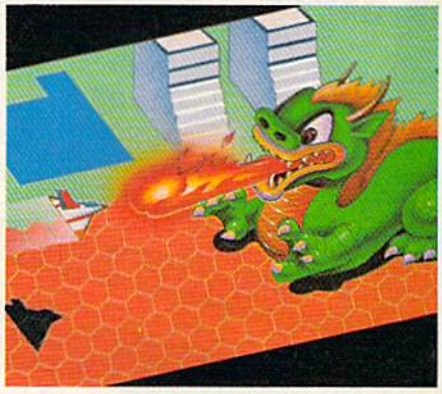
And Super Zaxxon, taking you beyond the outer limits in your space fighter. Tunneling through enemy attack, firing at Zaxxon's forces, dodging mine layers.

And beyond the last electron barrier, the ultimate test. Zaxxon is now a killer dragon hurtling heat-seeking fireballs.

Hope we haven't scared you. But if Sega doesn't keep you ahead of the game, who will?

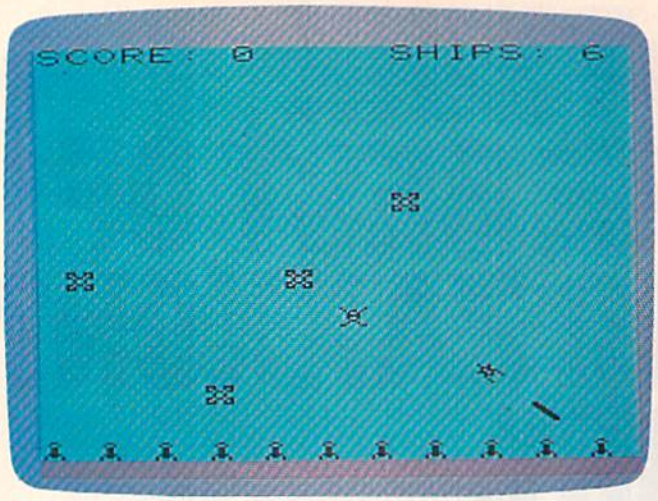
Atari 2600	Atari 5200	Atari Computers Cartridge	Atari Computers Diskette	Commodore 64 Cartridge	Commodore 64 Diskette	ColecoVision & ADAM	Apple II's	IBM PC	✓Sega Enterprises, Inc. ✓Parker Brothers ✓HesWare
✓NEW	✓NEW	✓NEW	✓NEW	✓NEW	✓NEW	✓NEW	✓NEW	✓NEW	FROGGER II
		✓NEW	✓NEW	✓NEW	✓NEW		✓NEW	✓NEW	SUPER ZAXXON



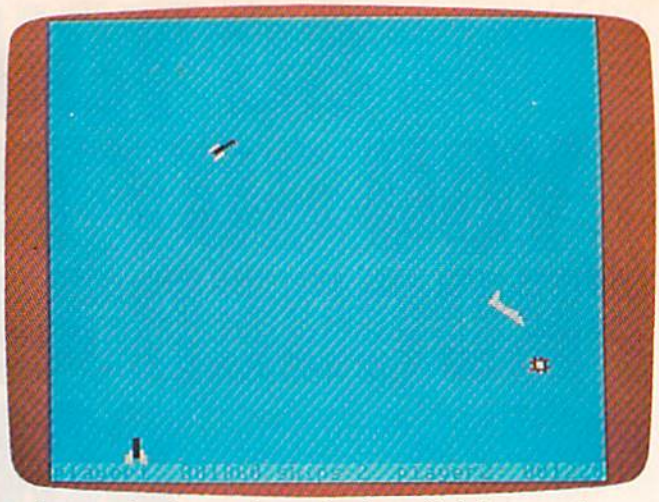


©1985 Sega Enterprises, Inc. FROGGER is a trademark of Sega Enterprises, Inc. THREEEDEEP is a trademark of Parker Brothers. ZAXXON is a trademark of Sega Enterprises, Inc. Game screens are illustrated.

INTRODUCING FROGGER II THREEEDEEP AND SUPER ZAXXON.



Unlaunched missiles are sitting ducks, but become deadly once they're airborne (VIC version).



A heat seeker homes in on the jet, which has nearly cleared the screen (64 version).

BASIC programs. You'll need the MLX machine language entry program to enter 64 Heat Seeker, but first you'll have to move the start of BASIC up. Follow these directions:

1. If you don't have a copy of MLX for the 64, type it in and save to tape or disk (MLX appears in alternate months of the Gazette).

2. Turn the computer off and then on and type: **POKE642,32:SYS58260**. If you omit this POKE and SYS, you'll get an error in line 550 of MLX.

3. Load MLX and type RUN.

4. Answer the prompts:
Starting Address: 2049
Ending Address: 6470

5. When you've finished typing in Heat Seeker—and have saved a copy to tape or disk—turn off the computer and turn it back on.

6. The enabling SYS is built into the program. After loading 64 Heat Seeker, type RUN.

See listings on page 131.

COMMODORE 64™
GETS AWAY FROM BASICs
with Oxford Pascal

FOR THE COMMODORE 64

From Limbic Systems, Inc. -- OXFORD PASCAL, developed by Oxford Computer Systems (Software), Ltd., creators of *PETSPEED -- the BASIC compiler recommended by Commodore.

OXFORD PASCAL OFFERS --

- Complete implementation of Standard Pascal
- This disk to disk compiler allows you to take full advantage of the Commodore 64's memory for Pascal programming
- Operates with either single or multiple drives
- Extensions to Pascal include: chain, border, examine, include, peek, poke, voice, volume and much more.
- A comprehensive tutorial manual with many examples

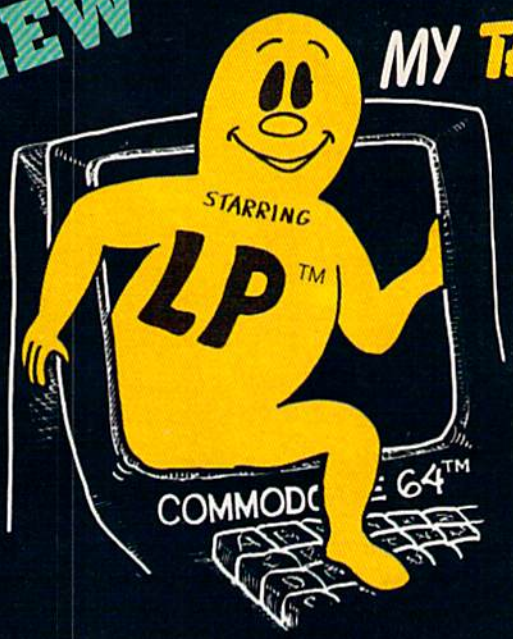
MORE FEATURES FOR LESS MONEY . . . OXFORD PASCAL

VISA & MasterCard accepted

Limbic Systems Inc.
560 San Antonio Road, Suite 202 Palo Alto, CA 94306
(415) 424-0168

Commodore 64 is a trademark of Commodore Electronics, Inc.
*PETSPEED is a trademark of Oxford Computer Systems (Software), Ltd.

NEW



MY TALKING SOFTWARE IS DIFFERENT!

NEW

I CALL YOU BY YOUR OWN NAME IN EVERY ONE OF MY PROGRAMS!

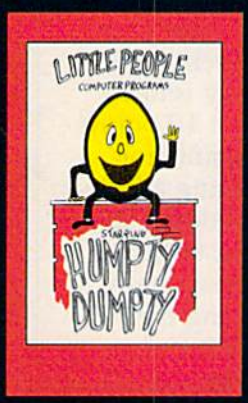
$19.95 EACH — ORDER NOW! 1-800-328-2050 OR IN WASHINGTON 1-800-221-2878. (YOU CAN PAY MORE BUT YOU CAN'T GET MORE!)

Little People Software

Developed by Parents and Educators

. . . Hearing . . . Seeing . . . Doing
In a way that makes LEARNING more fun and more effective

No Synthesizer Needed



Humpty Dumpty
Alphabet program
by Dave Paulsen
Put Humpty together again and learn: the Alphabet, the Computer Keyboard, how to spell your Name . . . and more.

Little Bo Peep
Number program by
Joe Sams and
Scott Barker
Bring Bo-Peep's sheep home and learn: to Count, to spell your Name, the Computer Keyboard . . . and more.

L. P. Money I by Aaron Grant Teaches money values — one cent to one dollar — using a gum ball machine. Encourages money saving.	**L.P. Money II by Tom Wanne** Teaches money values — one dollar to one hundred dollars — using an ice cream machine. Encourages money saving.	
L. P. Shapes by Doug Knapp Learn to recognize geometric shapes and how to spell their names.	**L. P. Traffic Signs by Tom Wanne** Teaches identification and meanings of traffic signs and signals. Increases safety awareness.	**L.P. Child Protection by Tom Wanne** Teaches children how to protect themselves against the possibility of being kidnapped. Excellent graphics.
L. P. Colors by Aaron Grant Teaches names and identification of colors and reinforces learning of colors and shapes.	**L. P.'s Farm by Aaron Grant** Teaches names and identification of farm animals.	**L.P. Addition by Doug Knapp** Teaches addition using numeric figures and objects. Nine levels of difficulty. Great introduction to math.
L.P. Subtraction by Doug Knapp Teaches subtraction using numeric figures and objects. Nine levels of difficulty. Great introduction to math.	**L.P. Opposites by Tom Wanne** Teaches opposites such as large, small; tall, short. Multiple choice quiz. Excellent graphics.	**L.P. Multiplication by Aaron Grant** Teaches multiplication using numeric figures and charts. Varying levels of difficulty.

CPSI

Computer Profit Systems, Inc.
9661 Firdale Avenue
Edmonds, Washington 98020

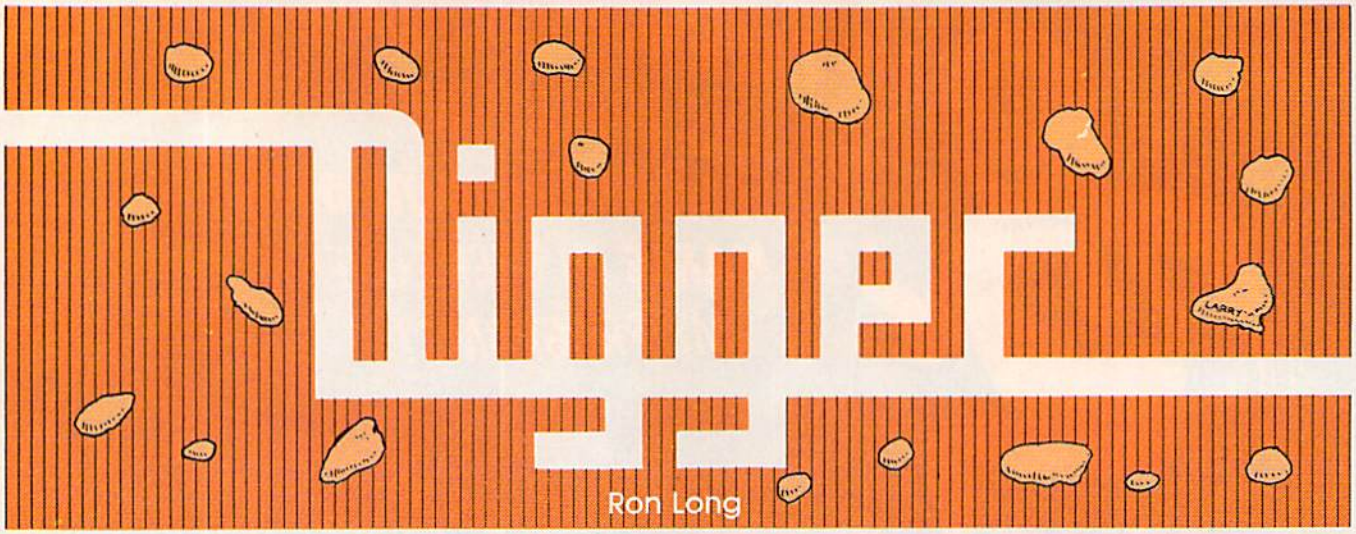
Creators of Data Deli,™ Comp-u-tutor, Home Learning Systems

S.A.M. licensed from Don't Ask, Inc.
*Commodore 64 is a trademark of Commodore Business Machines

Mastercard and Visa

Save $2.00 per program Shipping Charge by purchasing at your local software store.

DEALER INQUIRIES INVITED



The goats are in hot pursuit. They're almost invincible as they relentlessly munch their way through the underground world you call home. Your only defense is to strategically lure them under a falling boulder. A fast-action game originally written for the VIC, we've added a version for the 64.

The object of "Digger" is to avoid three billy goats who are pursuing you through underground terrain. Press f1 to start the game. You can make the goats vanish by digging the soil from under any of three rocks. Once the rocks are free, they fall until they hit soil again, removing any goats that may be in their way.

The goats can also be immobilized momentarily by inflating them with your trusty air pump. The air hose is fired by pressing the fire button while running toward the target. Once the hose has engaged a goat, press f7 to inflate the goat. You cannot disengage until the goat is completely inflated. Meanwhile, the other goats continue to hunt you down.

The action of the fire button may take some getting used to. You must be moving and pressing the fire button at the same time to activate the hose.

When all three goats are removed, a second screen is started by pressing the space bar, and play continues with increasing scores. For each screen completed, you are awarded a flower which appears at the top of the screen. If a goat touches you in any round, the score returns to zero and all flowers are removed.

The VIC version of Digger must be typed in using VIC MLX (published periodically in the GAZETTE) on a VIC with at least 8K expansion memory. Before doing so, however, turn your computer off, then back on and type the

64 Version Notes

Gregg Peele, Assistant Programming Supervisor

In the 64 version, Digger is a happy elf who survives in a subterranean world by eating her surroundings. Only one problem faces Digger. She is constantly pestered by three trolls who dig around her. Digger's only defense is to lure the trolls to dislodge underground rocks. These rocks may then fall on the unsuspecting troll causing it to vanish temporarily. Digger must be very careful not to touch any of the trolls or the rocks since all vanished trolls will immediately return.

As Digger's controller, you get 10 points for each vanished troll and 100 points for clearing the screen of all trolls. Using a joystick in port 2, you may move vertically or horizontally. Digger keeps moving until you stop her by moving the joystick diagonally. You can pause the game by pressing the SHIFT LOCK key. Note that the 64 version does *not* have the air pump feature.

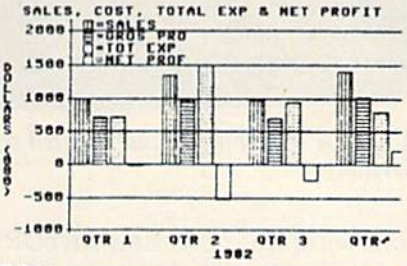
Digger uses hi-res graphics and sprites to represent the underground world and the characters which "eat" their way around within it. A raster interrupt separates this world from the text area used for the score. As the game progresses within a particular screen, fewer characters must "eat" their background. Thus, the game becomes substantially faster.

Digger must be typed in using 64 MLX (published periodically in the GAZETTE). Enter 49152 and 52187 for the starting and ending addresses, respectively. After typing in the program and saving to disk or tape, you can run Digger by typing SYS49152.

Make your '64 work fulltime

MAKE YOUR OWN CHARTS...

CHARTPAK-64

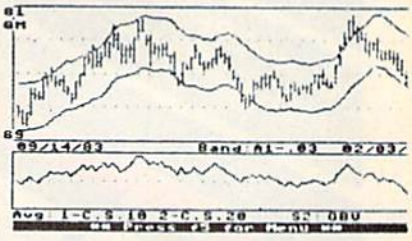


produces professional quality charts and graphs instantly from your data. 8 chart formats. Hardcopy in two sizes to popular dot matrix printers. **$39.95**
ISBN# 0-916439-19-4

Also Available **CHARTPLOT-64** for unsurpassed quality charts on plotters. **ISBN# 0-916439-20-8 $84.95**

CHART YOUR OWN STOCKS...

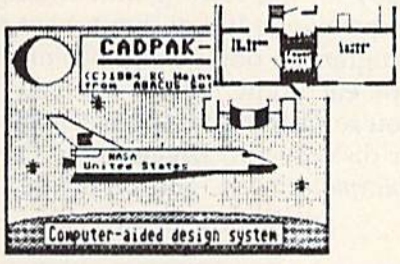
TAS-64



sophisticated technical analysis charting package for the serious stock market investor. Capture data from DJN/RS or Warner services or enter and edit data at keyboard. 7 moving averages, 3 oscillators, trading bands, least squares, 5 volume indicators, relative charts, much more. Hardcopy in two sizes, most printers. **ISBN# 0-916439-24-0 $84.95**

DETAIL YOUR DESIGNS...

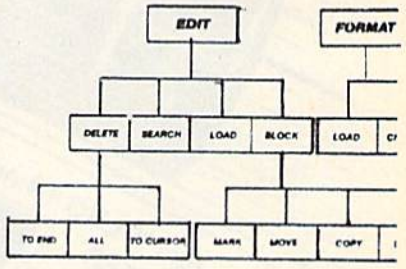
CADPAK-64



superb lightpen design tool. exact placement of object using our Accu-Point positioning. Has two complete screens. Draw LINEs, BOXes, CIRCLEs, ELLIPSEs; pattern FILLing; freehand DRAW; COPY sections of screen; ZOOM in and do detail work. Hard copy in two sizes to popular dot matrix printers. **ISBN# 0-916439-18-6 $49.95**

DO YOUR OWN WORD PROCESSING

TEXTOMAT-64

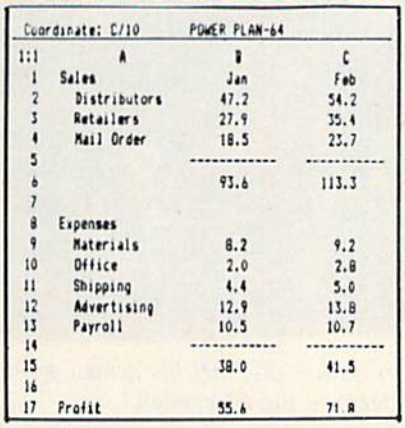


flexible worprocessing package supporting 40 or 80 columns with horizontal scrolling. Commands are clearly displayed on the screen awaiting your choice. Quickly move from editing to formatting to merging to utilities. Will work with virtually any printer.

ISBN# 0-916439-12-7 $39.95

CREATE SPREADSHEETS & GRAPHS...

POWER PLAN-64

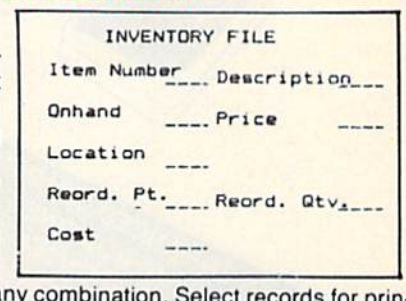


Coordinate: C/10		POWER PLAN-64	
1:1	A	B	C
1	Sales	Jan	Feb
2	Distributors	47.2	54.2
3	Retailers	27.9	35.4
4	Mail Order	18.5	23.7
5		---	---
6		93.6	113.3
7			
8	Expenses		
9	Materials	8.2	9.2
10	Office	2.0	2.8
11	Shipping	4.4	5.0
12	Advertising	12.9	13.8
13	Payroll	10.5	10.7
14		---	---
15		38.0	41.5
16			
17	Profit	55.6	71.8

not only a powerful spreadsheet packages available, but with built in graphics too. The 275 page manual has tutorial section ahd HELP screens are always available. Features field protection; text formatting, windowing; row and column copy, sort; duplicate and delete.
ISBN# 0-916439-22-4
$49.95

ORGANIZE YOUR DATA...

DATAMAT-64



powerful, yet easy-to-use data management package. Free form design of screen using up to 50 fields per record. Maximum of 2000 records per diskette. Complete and flexible reporting. Sorting on multiple fields in any combination. Select records for printing in desired format. **ISBN# 0-916439-16-X $39.95**

FREE PEEKS & POKES POSTER WITH SOFTWARE
For name & address of your nearest dealer call (616) 241-5510

Other titles available. For FREE CATALOG and name of nearest dealer, write or call (616) 241-5510. For postage and handling, include $4.00 ($6.00 foreign) per order. Money Order and checks in U.S. dollars only. Mastercard, VISA and American Express accepted. Michigan residents include 4% sales tax.

CANADA: Book Center, Montreal (514) 332-4154

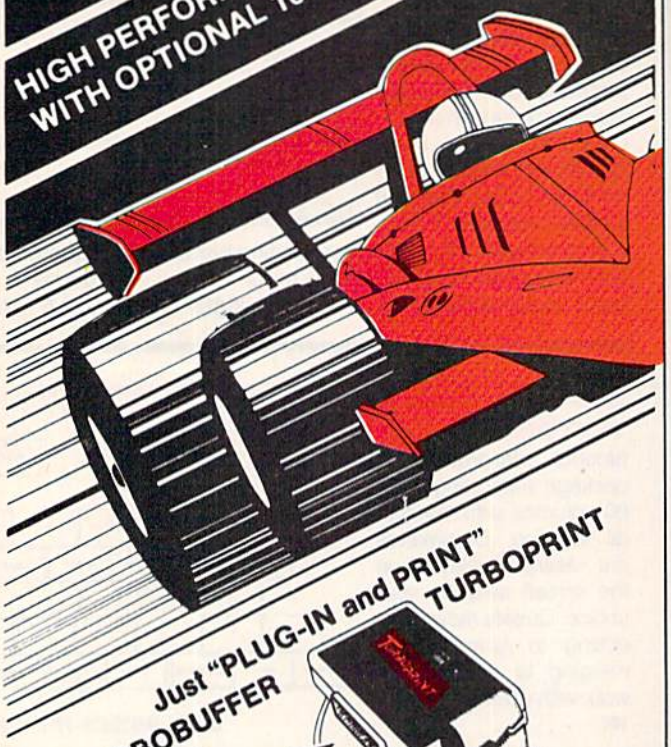
You Can Count On **Abacus Software**

P.O. Box 7211 Grand Rapids, MI 49510 - Telex 709-101 - Phone 616/241-5510

NEW FOR COMMODORE 64 PLUS/4 AND SX-64

TURBOPRINT/GT

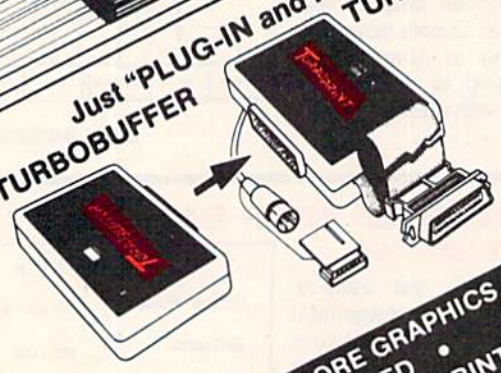
HIGH PERFORMANCE PRINTER INTERFACE WITH OPTIONAL 16K or 32K TURBOBUFFER



Just "PLUG-IN and PRINT"

TURBOPRINT

TURBOBUFFER



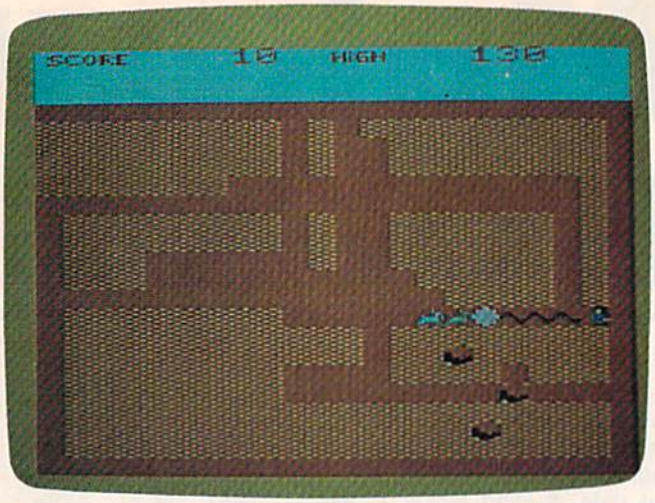
PRINTS ENHANCED COMMODORE GRAPHICS • GRAPHIC DUMP ROUTINES INCLUDED • OPTIONAL 16/32K PRINTER BUFFER • PRINTS 4 TYPE FACES • EXTERNAL DIP SWITCH SELECTION • TESTED BY MANUFACTURERS OF MOST POPULAR "CENTRONICS" TYPE PRINTERS AND TYPEWRITERS • POWER CABLE INCLUDED.

DEALER INQUIRIES INVITED

Telesys

415-651-2970

43334 BRYANT ST., FREMONT CA 94539 TELEX 4992029



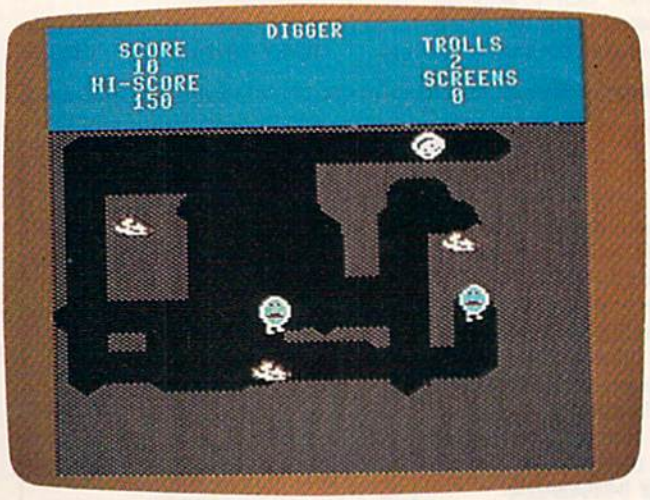
A goat is immobilized and inflated with the air hose (VIC version).

following line, pressing RETURN at the end:

```
POKE36869,240:POKE36866,PEEK(36866)OR1
28:POKE648,30:POKE44,32:POKE32*256,0:P
RINT"{CLR}"
```

Now load and run VIC MLX and enter 4097 and 7684 for the starting and ending addresses, respectively. If you don't want to enter the whole program in one sitting, be sure to enter the above line each time before you load MLX. When you're finished typing in Digger, save it to tape or disk. To run Digger, load the program into an *unexpanded* VIC and type RUN.

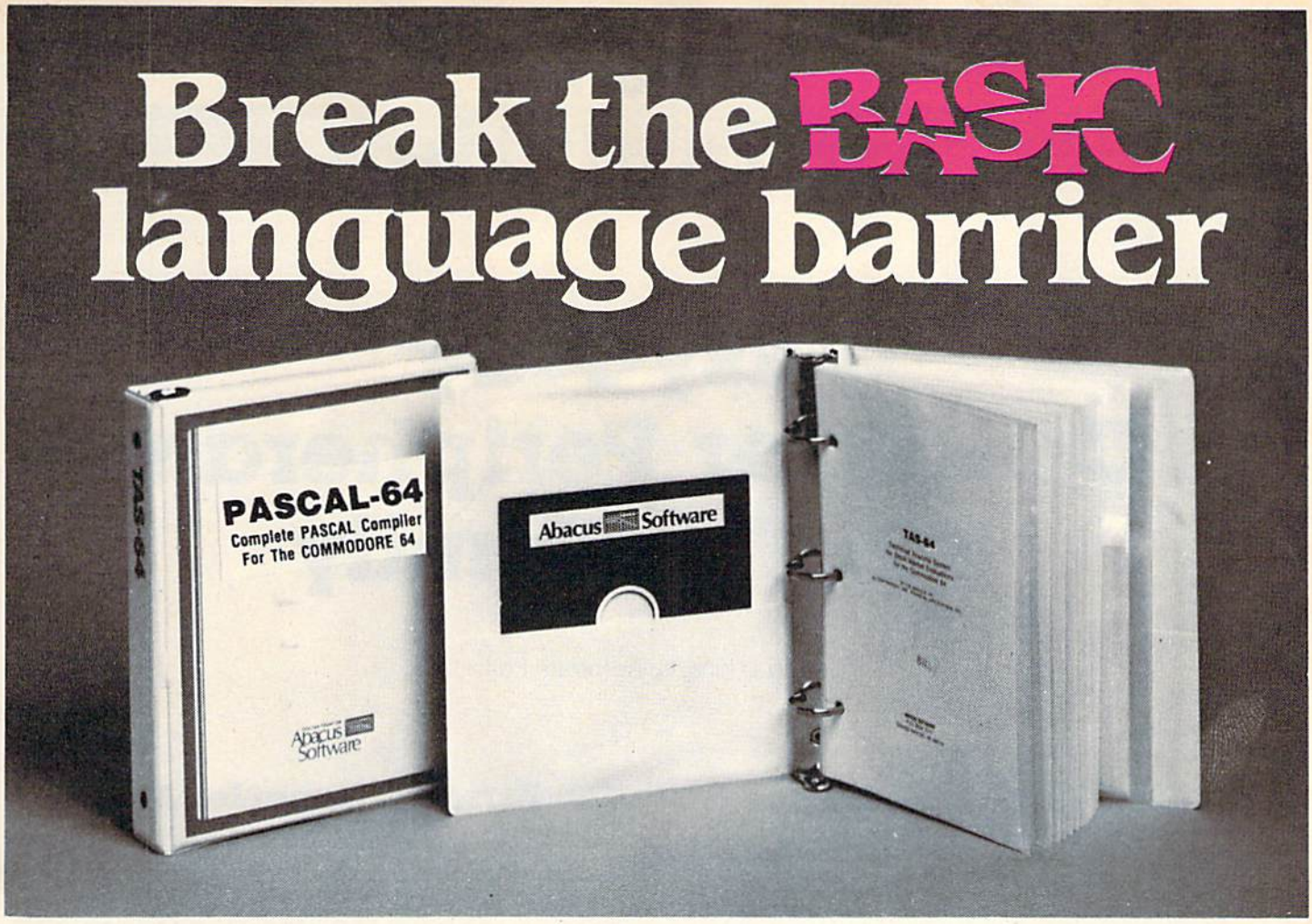
See listings on page 138.



A troll has just met his demise by the stone (bottom of screen) in the 64 version.

COMPUTE!'s Gazette
TOLL FREE
Subscription Order Line
800-334-0868
In NC 919-275-9808

Break the BASIC language barrier



VIDEO BASIC-64 - ADD 50+ graphic and sound commands to your programs with this super development package. You can distribute free RUN-TIME version without paying royalties!
ISBN# 0-916439-26-7 **$59.95**

BASIC COMPILER 64 - compiles the complete BASIC language into either fast 6510 machine language and/or compact speedcode. Get your programs into high gear and protect them by compiling.
ISBN# 0-916439-17-8 **$39.95**

MASTER-64 - professional development package for serious applications. Indexed file system, full screen management, programmer's aid, BASIC extensions, 100 commands.
ISBN# 0-916439-21-6 **$39.95**

PASCAL-64 - full Pascal with extensions for graphics, sprites, file management, more. Compiles to 6510 machine code and can link to Assembler/Monitor routines.
ISBN# 0-916439-10-0 **$39.95**

ADA TRAINING COURSE - teaches you the language of the future. Comprehensive subset of the language, editor, syntax checker/compiler, assembler, disassembler, 120+ page guide.
ISBN# 0-916439-15-1 **$59.95**

FORTRAN-64 - based on Fortran 77. Common, Data, Dimension, Equivalence, External, Implicit, Goto, Else If, Do, Continue, Stop, Subroutine, Call, Write, Read, Format, more.
ISBN# 0-916439-29-1 **$39.95**

C LANGUAGE COMPILER - a full C language compiler. Conforms to the Kernighan & Ritchie standard, but without bit fields. Package includes editor, compiler and linker.
ISBN# 0-916439-28-3 **$79.95**

ASSEMBLER MONITOR-64 - a macro assembler and extended monitor package. Assembler supports floating point constants. Monitor supports bank switching, quick trace, single step, more.
ISBN# 0-916439-11-9 **$39.95**

XREF-64 - indispensible tool for BASIC programmer cross-references all references to variable and line numbers.
ISBN# 0-916439-27-5 **$17.95**

OTHER TITLES ALSO AVAILABLE - WRITE OR CALL FOR A FREE COMPLETE CATALOG
Call today for the name and address of your nearest local dealer.

PHONE: (616) 241-5510

For postage and handling include $4.00 ($6.00 foreign) per order. Money order and checks in U.S. dollars only. Mastercard, VISA and American Express accepted. Michigan residents incl 4% sales tax.

FREE PEEKS & POKES WALL POSTER INCLUDED WITH EVERY SOFTWARE PURCHASE

You Can Count On

Abacus Software

P.O. Box 7211 Grand Rapids, MI 49510 - Telex 709-101 - Phone 616/241-5510

"Easy-Play" Computer Peripherals For The Family

Fred D'Ignazio, Associate Editor

My First Teaching Machine

Ever since I was little, I have been fascinated by the idea of self-directed learning—learning at home, learning on the job, learning outside classroom walls. Associated with this fascination has been the compelling belief that an average person could learn almost any subject if it was taught right.

Even the most complex subjects—computers, mathematics, astronomy, physics—can be exciting and understandable if they are introduced correctly to a beginner. What matters is *how* they are introduced.

When I was a kid, I sent away for a "teaching machine" advertised in the mail by Grolier, Inc. I had visions of the machine teaching me all sorts of exotic subjects like analytical geometry, nuclear physics, and molecular biology. I saw myself zooming ahead of the other kids in my class and skipping grades right on through college.

When the machine arrived, it was just a blue plastic box, and I was terribly disappointed. The machine let me take "courses" by placing a stack of lesson pages inside the box. The box was really just a "high-tech" textbook with multiple-choice questions at the end of each lesson. I rolled the pages through the machine, and the questions appeared in a little window at the top. When I had filled in my answer, I could open an adjoining window to peek and see if my answer was correct.

The Personal Computer As Teaching Machine

When personal computers began appearing on the scene in the late 1970s, my hope was revived that here, at last, was a teaching machine that I could use to learn all sorts of new things. Unfortunately, the early computers were such primitive devices that I spent most of my time trying to master the computer itself, and very little time learning anything else.

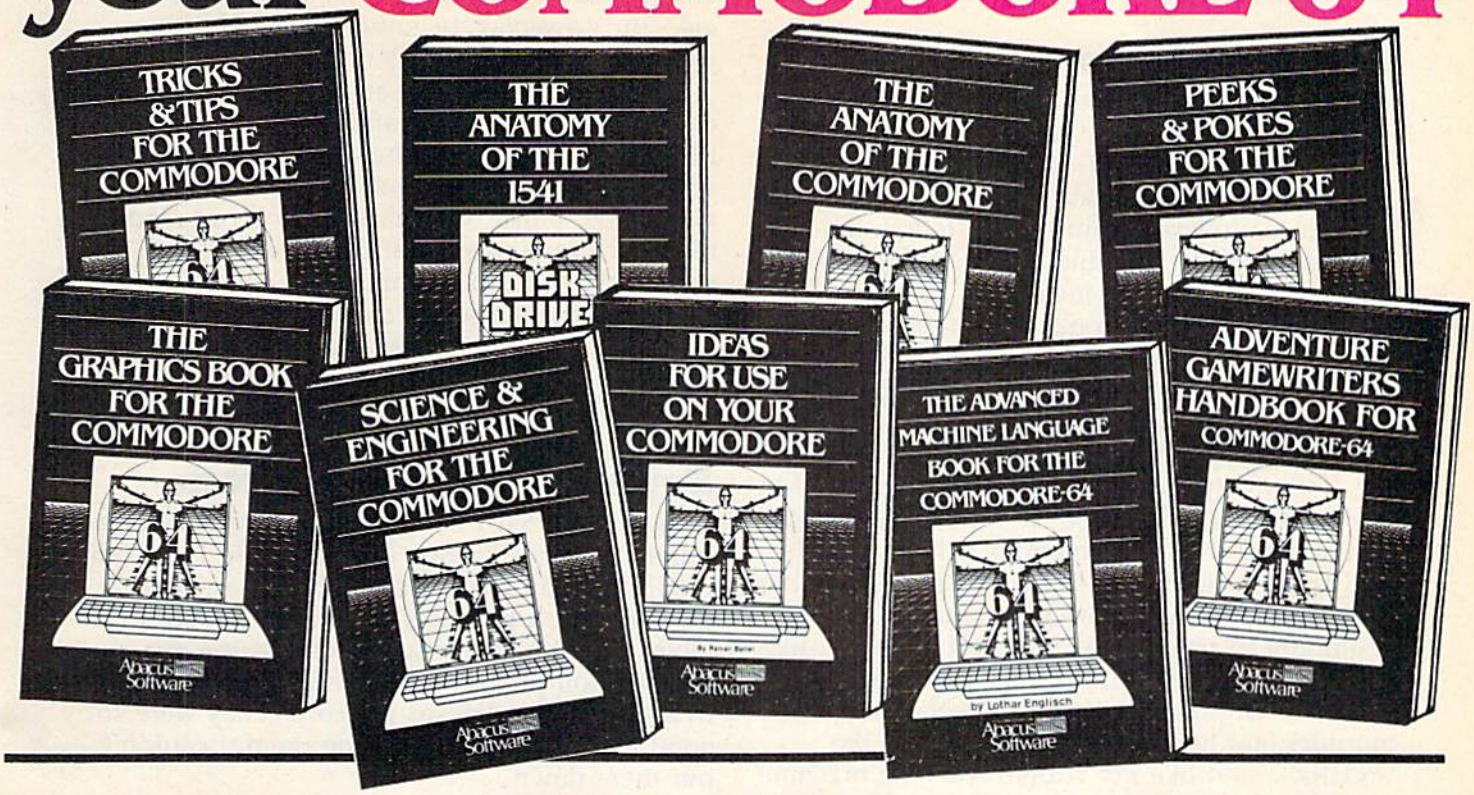
Turning Beginners Into Experts

As the personal-computer revolution advanced, I discovered that there were many other people who shared my interest in using computers as teaching machines. A couple of years ago, for example, I had a conversation with Alan Kay, one of our country's leading computer scientists. At the time he and I talked, Kay was working on the Smalltalk project at Xerox's Palo Alto Research Center.

Although Smalltalk was an extremely advanced "operating environment," Kay was frustrated because it did not measure up to his vision. Kay wanted personal computers to lead naive beginners efficiently and painlessly into any subject until they would be thinking and acting like experts.

Kay and his colleague Adele Goldberg tested Smalltalk by ushering a steady stream of children, musicians, artists, businesspeople, and homemakers through their labs at Xerox. Everyone played with Smalltalk while Kay and

Required Reading for your COMMODORE 64



TRICKS & TIPS FOR YOUR C-64 treasure chest of easy-to-use programming techniques. Advanced graphics, easy data input, enhanced BASIC, CP/M, character sets, transferring data between computers, more.
ISBN# 0-916439-03-8 275 pages $19.95

GRAPHICS BOOK FOR C-64 - fundamentals to advanced topics this is most complete reference available. Sprite animation, Hires, Multicolor, lightpen, IRQ, 3D graphics, projections. Dozens of samples.
ISBN# 0-916439-05-4 350 pages $19.95

SCIENCE & ENGINEERING ON THE C-64 - starts by discussing variable types, computational accuracy, sort algorithms, more. Topics from chemistry, physics, biology, astronomy, electronics. Many programs.
ISBN# 0-916439-09-7 250 pages $19.95

ANATOMY OF 1541 DISK DRIVE - bestselling handbook available on using the floppy disk. Clearly explains disk files with many examples and utilities. Includes complete commented 1541 ROM listings.
ISBN# 0-916439-01-1 320 pages $19.95

ANATOMY OF COMMODORE 64 - insider's guide to the '64 internals. Describes graphics, sound synthesis, I/O, kernal routines, more. Includes complete commented ROM listings. Fourth printing.
ISBN# 0-916439-003 300 pages $19.95

IDEAS FOR USE ON YOUR C-64 - Wonder what to do with your '64? Dozens of useful ideas including complete listings for auto expenses, electronic calculator, store window advertising, recipe file, more.
ISBN# 0-916439-07-0 200 pages $12.95

PEEKS & POKES FOR THE C-64 - programming quickies that will simply amaze you. This guide is packed full of techniques for the BASIC programmer.
ISBN# 0-916439-13-5 180 pages $14.95

ADVANCED MACHINE LANGUAGE FOR C-64 - covers topics such as video controller, timer and real time clock, serial and parallel I/O, extending BASIC commands, interrupts. Dozens of sample listings.
ISBN# 0-916439-06-2 210 pages $14.95

ADVENTURE GAMEWRITER'S HANDBOOK - is a step-by-step guide to designing and writing your own adventure games. Includes listing for an automated adventure game generator.
ISBN# 0-916439-14-3 200 pages $14.95

Call today for the name of your nearest local dealer Phone:(616) 241-5510

Other titles are available, call or write for a complete free catalog.

For postage and handling include $4.00 ($6.00 foreign) per order. Money order and checks in U.S. dollars only. Mastercard, VISA and American Express accepted. Michigan residents include 4% sales tax. CANADA: Book Center, Montreal Phone: (514) 332-4154

You Can Count On

Abacus Software

P.O. Box 7211 Grand Rapids, MI 49510 - Telex 709-101 - Phone 616/241-5510

Goldberg watched. They learned that Smalltalk was, indeed, a simple yet powerful personal-computer environment. Even little children could operate it at a superficial level. But Smalltalk did not, on its own, convert a beginner into an expert in any subject.

Pathways To Powerful Ideas

Another person fascinated with using the computer as a "self-directed learning machine" is Seymour Papert of MIT. In his work in MIT's Artificial Intelligence Lab, Papert has attempted to build pathways beginners can follow to learn more about new domains of knowledge—what Papert calls "powerful ideas."

In his landmark book, *Mindstorms: Children, Computers, and Powerful Ideas* (Basic Books, 1980), Papert wrote about how even young children can learn complex concepts and subjects by using the programming language Logo, and various "discovery learning" methods that Papert introduced during the 1970s in his AI Lab and in various Boston-area elementary schools.

Today Logo has become a major educational computer language. However, educators are just beginning to realize that Logo, on its own, cannot do all the wonderful things Papert envisioned. On its own, Logo is a rather simple graphics and list-processing language. Like Smalltalk, and like my Grolier teaching machine, Logo is not the vehicle that automatically whisks eager beginners into new realms of knowledge.

Easy Learn Vs. Easy Play

Today there's a flood of new software products and peripherals appearing on the market for personal computers like the Commodore 64. Recently I've noticed the use of the word "Easy" as a prefix to many product names—such as *Easy Key, Easy Type, Easy Play,* and so on. To read the manufacturer's claims for its products, you'd think that the age that Kay, Papert, I, and many others had hoped for had finally arrived. "With these simple yet powerful tools," claim the manufacturers, "you can learn to use your computer to ---------- (fill in the blank) like an expert in just a few minutes."

The age of "Easy Play" has indeed arrived. With the right software, your Commodore computer can now fit in the same category as your Easy-Click camera, your Easy-Roast microwave oven, your Easy-Music organ, and your Easy-Goal foam rubber football.

With "easy-play" software and peripherals, personal computers are on their way to becoming mass-market home appliances, because to be mass-market they must be an appliance that everyone can operate. But the question is this: When you operate your computer, are you learning anything?

So far, manufacturers have not converted computers into total black boxes with their "easy play" mass-market philosophy. They have created products that can be operated at two levels—the easy-play, beginner's level and the expert level—but there is nothing in between.

If you're a beginner and you just want to sit down at your computer and make fantastic doodles, then you can use the easy-play mode. Or, if you are an expert, and you are already trained in visual arts, music, or whatever, you can read the manufacturer's manual and do serious work (or serious play) on the computer.

But what if you are somewhere in between? How do you go from easy-play to the expert level? So far, there are no products that offer this feature—and make it work.

Beyond Computer Popcorn

In January 1984, I wrote an article called "Computer Popcorn" for my "World Inside The Computer" column in COMPUTE!. In that article I described new products like the KoalaPad touch tablet from Koala Technologies and the music-composition program, *Music Construction Set* from Electronic Arts, as popcorn: They were so good that once I started using them, I couldn't put them down.

But I have now.

For me, "computer toys" are still fun, but *they aren't taking me anywhere.* They're great for doodling and "fooling around," but I no longer learn when I use them. In fact, they have taught me very little. They are too diffuse, too open-ended, too undirected. They are super tools, but I have only the fuzziest idea about how to make them work.

Plus, they make me feel guilty. After all, they have such great learning potential. Why am I so dumb and so lazy that I can't pick them up and learn on my own? After all, Beethoven and Picasso never had a personal computer, and look how well they did.

Skating Along The Surface

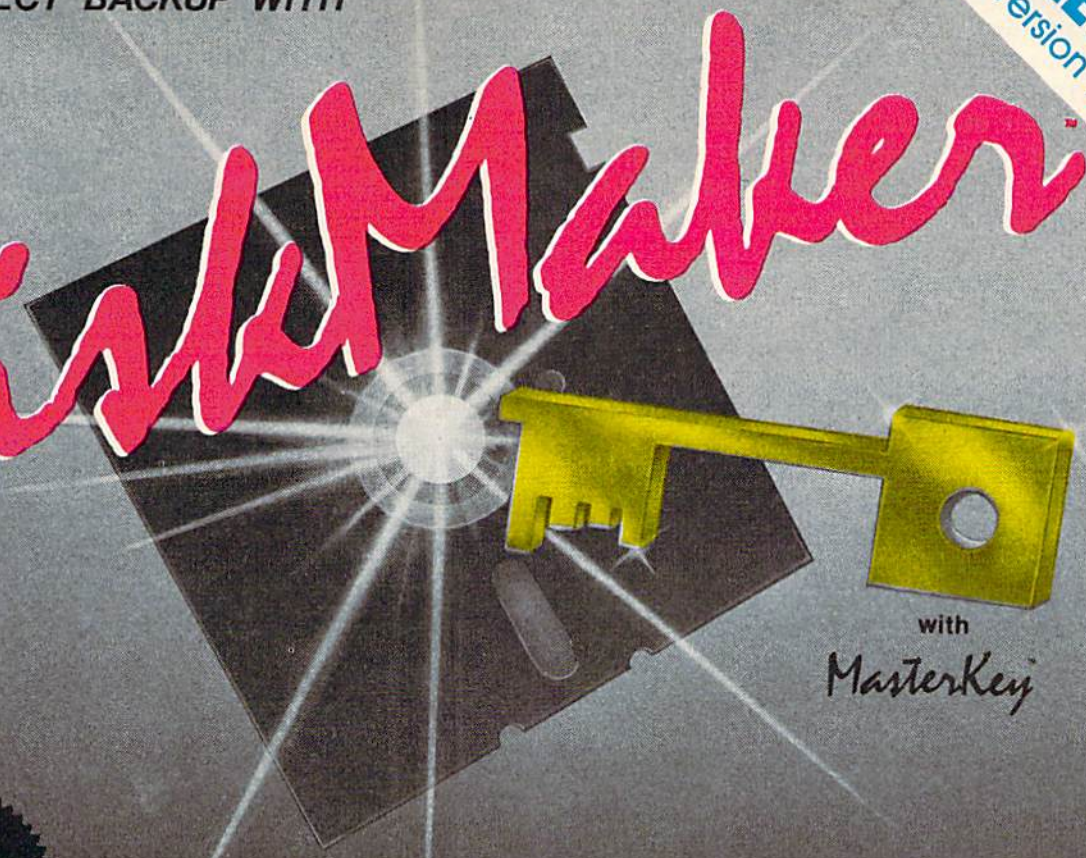
Last spring I moderated a panel at the Billboard Conference on Computer Software. Bill Budge, the designer of *Pinball Construction Set* and other marvels, spoke at that conference and said that he was worried that software designers were designing new products that might outstrip people's ability to use them. The products were getting so deep, so powerful, and so complex, that they were intimidating to the average user.

Today, after looking at some of the new fantasy games, some of the graphics and music-

BEFORE LOADING YOUR SOFTWARE
MAKE A PERFECT BACKUP WITH

NEW! Version 2.2

DiskMaker™



99% EFFECTIVE

THE AUTOMATIC DISK BACKUP SYSTEM FOR YOUR 64 & 1541 DRIVE!

- **Actually copies a FULL disk in only 4 MINUTES!**
- **Easiest to use – TOTALLY automatic copy utility**
- **State of the "ARTS" copy capability!**
- **UNLOCKS protected disks for backup copying**
- **Breaks through LATEST protection schemes**
- **Includes FAST copier, "ARTS" copier and TRUE Nibbler: you get 3 copiers for the price of 1**
- **HALF-TRACKING up to & including track 40!**
- **100% machine code for fast, RELIABLE operation**
- **4 min. copier AUTOMATICALLY puts "errors" on copy**
- **Fastest & most advanced copier you can buy**
- **Writes errors 20,21,22,23,27,& 29 WHILE COPYING!**
- **Transforms your 1541 into a SUPER-FAST copy drive!**
- **NO analysis required, just swap disks & NO damaging drive knock during errors or format**
- **Formats AS IT COPIES, detects & reproduces NON-STANDARD formats & I.D. mismatch, DOS flags**
- **PRODUCT SUPPORT tel. #, revisions, & upgrades**

OVER 500% FASTER THAN OTHER COPIERS!

MasterCard VISA

ONLY **$49.95** for entire system

To order CALL **805-687-1541 ext. 64**
Technical line 805-682-4000 ext. 99

AMERICAN EXPRESS

For rush service call 24 hr. order line or send cashiers check/money order. Visa, MasterCard, & American Express include card# and exp. date. CA residents add 6% tax. Allow 2 weeks for clearance of personal & co. checks. Add $3.50 shipping & handling for continental U.S./$5.50 for UPS air. AK, HI, APO, FPO, CANADA add $7.50. Other Foreign orders add $8.50. All APO, FPO, & orders outside 48 states must be paid by certified U.S. funds. C.O.D.'s shipped to U.S. addresses only, add $4.00. School orders welcome.

DISKMAKER PAYS FOR ITSELF THE FIRST TIME YOU USE IT!

basix

1984

3463 State Street • Suite 1541A • Santa Barbara • CA 93105

synthesizer products, and some of the new productivity tools like Lotus's *Symphony*, I agree.

And what a shame. The personal computer revolution is not succeeding if all we can do is create more and more powerful computer tools and make them off-limits to regular human beings. It's terribly frustrating to read about newer, more powerful computer tools and realize that if I used them I would spend all my time skating along the surface and never learn how to plumb their depths.

A Hidden Curriculum

Because the new computer tools are dazzlingly complex, many manufacturers have incorporated an "easy play" operating level for most of us, and they have thrown in the "expert level" commands to try to appeal to people who already know what they're doing in a particular area.

But how about something in between? How about a *hidden curriculum* for the thousands, or millions, of us who are eager—but very timid—learners, who want to learn some of the tricks of the experts but who want to remain in control and not just "play" the computer like a black box?

Unfortunately, a hidden curriculum does not translate into more user-friendly manuals, help screens, mice, or icons. These give us a firmer grip on the computer "lever," but they don't tell us how or where to direct the lever.

Likewise, onscreen tutorials and computer activity books are also not part of this curriculum. Tutorials teach us only the *mechanics* of the tools, not how to use them artfully, expertly, and creatively. And activities are things we do when we have reached a learning plateau, and when we need to practice skills we have already learned. But first we need someone—or something—to teach us the skills.

What we need are tools that teach us about themselves *and* about the powerful ideas that underly their existence. We need music products that give us a grounding in musical theory and composition; graphics products that teach us about art, drawing, and painting; flight simulators that teach us what all those controls on the dashboard are for; and astronomy programs that start with the sun, the moon, and the Big Dipper, and not some fictitious faraway galaxy.

We need the manufacturers to put us on some kind of learning path—the hidden curriculum—without shackling us to anything that would be too long, too technical, or too demanding for a home recreational environment. The curriculum should have as its goal, through *directed play*, the mastery of different techniques commonly associated with expertise in a given field.

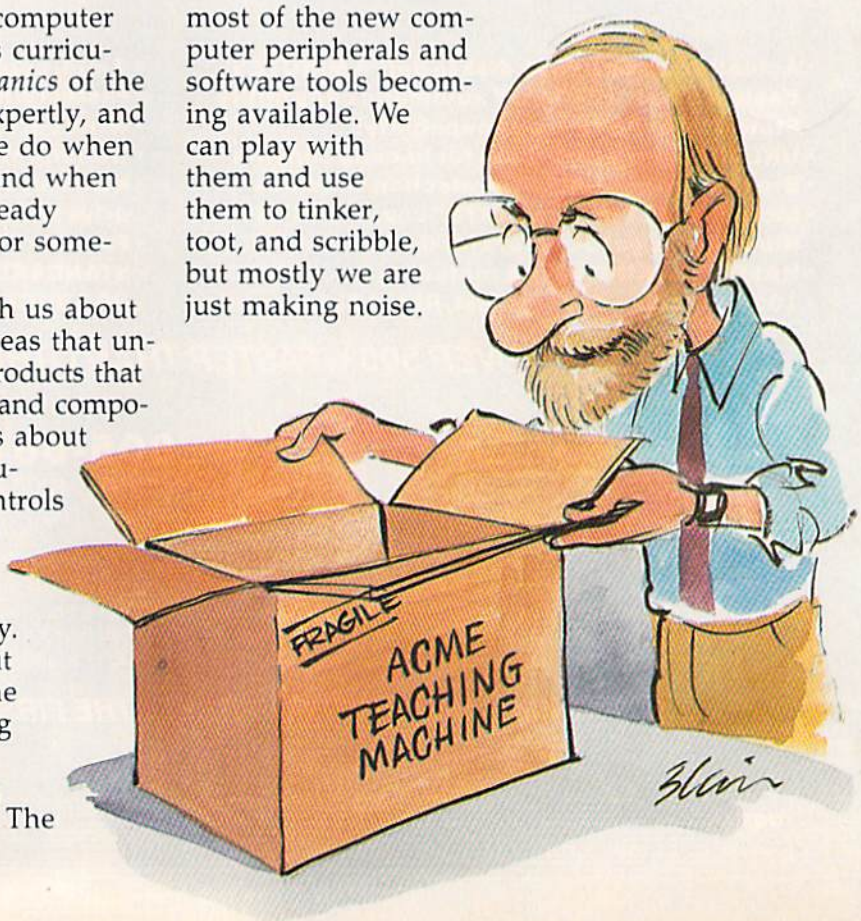
After a person learned a technique, he or she would be free to play with it on a word processor, music processor, art processor, or whatever. Then return to the curriculum and learn something new. A person could continue dipping into the curriculum as schedule and interest allowed. And the reward for following the curriculum would be the incremental mastery of all the features offered by the software tool. A beginner could take pleasure knowing that the result looked like it was done by an expert. And that the expertise acquired and the music or artwork created were not just computer sleight-of-hand.

Self-Teaching Tools

When I was a child, I had a fantasy that one day I would slip into an empty orchestra pit and be allowed to play with all the musical instruments the musicians had left behind. I saw myself playing violins, oboes, harps, and grand pianos. I tooted tubas, banged on drums, and strummed bass violins like a jazz virtuoso.

Now, as an adult, I realize the futility of this dream. Even if I had been left alone with a score of musical instruments, I wouldn't have been able to play them. No one had ever taught me how.

The same is true of most of the new computer peripherals and software tools becoming available. We can play with them and use them to tinker, toot, and scribble, but mostly we are just making noise.



But what if the tools taught us the powerful ideas embedded inside them? Then they might become the teaching machines I dreamed of as a child.

Some Easy-Play Toys For Your Commodore 64

The theme of this month's GAZETTE is "computer peripherals," so I'd like to mention a few peripherals that have the greatest potential to become self-teaching tools—if they are supplemented with the right print materials and software.

In fact, the major limitation with the products I'm going to mention is the scarcity of *any kind* of support materials. On the other hand, all the products mentioned below are "plug-and-go" products. You plug them into your 64, and at least you can do something.

Educational Keyboards

The Muppet Learning Keys keyboard from Koala Technologies (with Sunburst and Henson Associates) is intended for children ages 3 and up. It features colorful graphics, big letter keys arranged in alphabetical order, and all sorts of useful keys like Go, Stop, Oops, Zap, Eraser (which looks like a pink rubber eraser), and Help. One disk comes with the keyboard, but much more software and print materials are needed to turn this product into an entry-level keyboard and reading, writing, and arithmetic tutor.

Some software packages are appearing with their own keyboard overlays. Three CBS Software products, for example, come with EasyKey, a plastic keyboard overlay produced for CBS by Neosoft, Inc. One of these products is *Letter-Go-Round*, written by software designers at the Children's Television Workshop (CTW is the home of Sesame Street and Big Bird). *Letter-Go-Round* is a simple letter-matching and spelling game, but it is significantly enhanced by the EasyKey overlay. The overlay fits atop your Commodore 64 keyboard and "customizes" the keyboard for the *Letter-Go-Round* program. Instead of having to cope with dozens of keys arranged in a mysterious order, your child just has to search for pictures of Grover, Barclay the dog, Cookie Monster, and a big pink Stop button.

Touch Tablets

The two favorites around our house are Koala Technologies' KoalaPad and Suncom's Animation Station. Both pads come with lots of separate software packages and a drawing program (on disk). Animation Station also has helpful features like an Undo button (to undo mistakes), a holder for the plastic stylus you use in drawing on the tablet, and a pair of legs to prop up the tablet on the table where you are working. In addition, *DesignLab*, the drawing program that comes with Animation Station, has a wraparound menu that lets you view your picture and the drawing commands at the same time; a variety of character fonts for labeling and titling your drawings; and other color-selection and "cut-and-paste" commands.

However, both products lack self-teaching materials and a "hidden curriculum" that would make them much more educational than they are now.

Musical Keyboards

Many companies are beginning to make musical keyboards for the Commodore 64, including Waveform, Inc. and Sight & Sound Music Software, Inc. The Waveform keyboard is a flat, membrane keyboard with a cable that attaches to the Commodore 64 via user port 1. Sight & Sound's keyboard is a plastic overlay that slips over the top of the Commodore 64 keyboard. Each keyboard includes 25 keys spanning two octaves. Both companies back up their products with an impressive array of music-synthesizer software. However, my family has taken a liking to the Sight & Sound keyboard for three reasons: It has more musical games (such as "Tune Trivia," "Music Video Hits," and "Solid Gold") for the family to play; it has a disk (*3001 Sound Odyssey*—sold separately) that teaches you some of the fundamentals of operating a computer music synthesizer; and it has "real keys" that move up and down instead of flat, membrane keys.

Both products have great potential but lack a hidden curriculum or "courseware" to introduce the rank beginner to music's many powerful ideas.

Light Pens

Two fairly inexpensive light pens for the Commodore 64 are the Edumate light pen from Futurehouse, Inc. and the Tech Sketch light pen from Tech Sketch, Inc. The Tech Sketch pen comes with the *Micro Illustrator* graphics-and-drawing program. Futurehouse sells the *Peripheral Vision* drawing program for its Edumate pen, but you must buy it separately.

Both pens are easy to use, and the drawing programs are a lot of fun. Also, Futurehouse has a variety of educational and productivity programs for the Edumate pen that enable you to use it as an alternative to the computer keyboard. However, neither pen has materials that teach an unskilled beginner how to create any advanced art or graphics beyond making circles and boxes

and filling them in with pretty colors. Both pens have great potential as self-teaching tools once the right software and print materials are made available.

The Muppet Learning Keys (includes Sunburst disk)
Koala Technologies Corp.
3100 Patrick Henry Drive
Santa Clara, CA 95052-8100
(408) 986-8866
$79.95

Letter-Go-Round *(disk and EasyKey included)*
CBS Software
One Fawcett Place
Greenwich, CT 06836
(203) 622-2500
$34.95

Koalapad (drawing program included)
Koala Technologies Corp.
3100 Patrick Henry Drive
Santa Clara, CA 95052-8100
(408) 986-8866
$99

Animation Station (drawing program included)
Suncom Inc.
260 Holbrook Drive
Wheeling, IL 60090
(312) 459-8000
$89.95

Colortone Keyboard (music program included)
Waveform Corporation
1912 Bonita Way
Berkeley, CA 94704
(415) 841-9866
$79

The Incredible Musical Keyboard (disk/books included)
Sight & Sound Music Software, Inc.
3200 South 166th Street
New Berlin, WI 53151
(414) 784-5850
$49.95

Edumate Light Pen (pen and Peripheral Vision *drawing program)*
Futurehouse
P.O. Box 3470
Chapel Hill, NC 27514
(919) 967-0861
$59.95

Tech Sketch Light Pen (pen and Micro Illustrator *program)*
26 Just Road
Fairfield, NJ 07006
(800) 526-2514
(201) 227-7724
$39.95; deluxe version, $119.95

DI-SECTOR Version 2.0

EVERYTHING YOU EVER WANTED IN A DISK UTILITY . . . AND MORE!!
FOR THE COMMODORE 64*

★ Fully automatic back-up of almost any protected disk.
★ Copy files [PRG, SEQ, RND] with full screen editing.
★ Three minute back-up of standard disks [even many protected disks].
★ Format a disk in ten seconds. ★ View and alter sector headers.
★ Remove errors from any track/sector.
★ Edit sectors in HEX, ASCII — even assembler.
★ Create errors on any track/sector [20, 21, 22, 23, 27, 29] instantly.
★ Drive/64 MON, even lets you write programs inside your 1541.
★ All features are fully documented and easy to use.
★ None of our copy routines ever makes the drive head "kick."

Yes, you get all of this on one disk for this low price! $39.95

. . . Continuing Customer Support and Update Policy . . .

. . . WRITE OR PHONE . . .
STARPOINT SOFTWARE
Star Route 10 Gazelle, CA 96034 [916] 435-2371

All orders add $2.00 shipping/handling. California residents add 6% sales tax. COD orders add an add'l. $3.00 shipping. Check, Money Order, VISA, and Mastercard accepted.

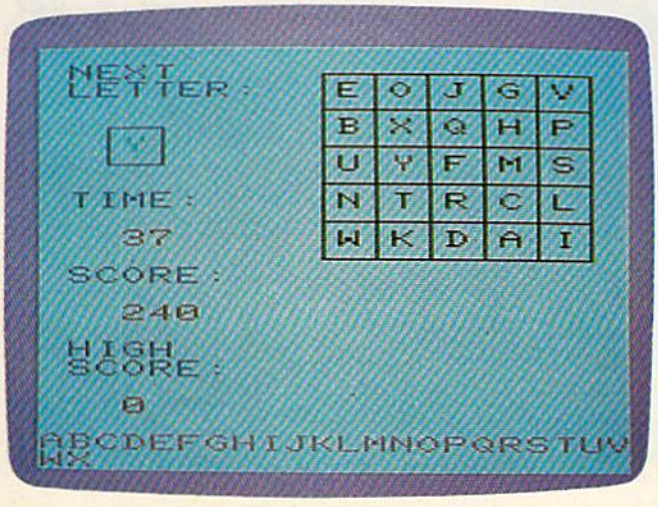
*Commodore 64 is a registered trademark of Commodore Business Machines

Alpha Anxiety

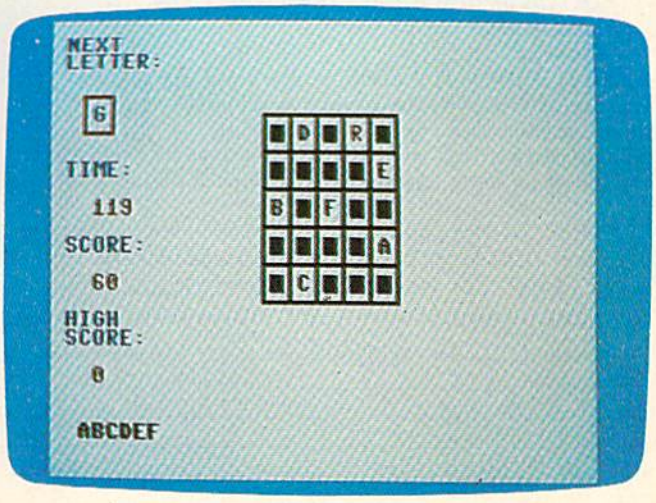
Craig Howarth

Sure, everyone knows the alphabet—but how well? You may go back to the ABC's after tackling this puzzle. It's a good example of a program that's educational for children, and entertaining for game players of all ages. The article includes simple program modifications to make the game playable for children. For the VIC and 64. A joystick is required.

You can probably recite the alphabet without even thinking, although some people have to hum the alphabet song to get it right. "Alpha Anxiety" makes the seemingly simple scenario of naming the letters of the alphabet a difficult challenge. The game displays a five-by-five grid (a total of 25 boxes) containing each of the letters of the alphabet except Z. The computer randomly places letters behind each of the boxes at the beginning of each round of play. Your job is to move to a square using a joystick (port 2 on the 64) to reveal the hidden letter. When you find the letter A, press the fire button and A is permanently displayed. Next, move to B, C, and so on. That's easy enough, but that's only the beginning.



The first round is nearly completed (VIC version).



Searching for a G in the 64 version of "Alpha Anxiety."

The Going Gets Tough

Finding the letters in the right order isn't so difficult, but finding them within the time limit is. You start with 150 seconds, plenty of time—or so it seems. The time allotted for any following rounds is based on how well you did in the previous round (time = previous time remaining × 2 + 40). So, even the first round cannot be taken lightly. You are penalized for slow play, and rewarded for speed.

To make matters worse, if in your hurry to beat the clock you choose a letter out of sequence, ten seconds are deducted from your current time. If you accidentally press the fire button while on a letter already chosen, there is no penalty (although in later rounds a penalty is given—see below). Ten points are awarded for each correct choice. Your score builds from round to round, but one bad round (not beating the clock) can wipe you out and end the game.

When you reach 1500 points, the rules change. You must find the letters in reverse sequence—Y to A. Be sure to keep an eye on the "Next Letter" indicator at the top left corner of the screen if you're having trouble with the sequence. At this level, any keypress other than the correct one costs ten seconds. If you reach 2500 points, the "Next Letter" indicator is no longer displayed, although the reverse sequence is still in effect (look at the bottom of the screen if you forget which letter is next).

If your score reaches 5000, your average time per round is computed and this becomes your time for all subsequent rounds. But, for every 1000-point increment up to 10,000, five seconds are subtracted from your starting time for each round. After 10,000 points, no changes are made to game play.

As the game gets increasingly difficult, you may want to use a "look ahead" strategy. For example, if you need the letter B, look also for C and D. Once you find B, you won't have to search for the next two.

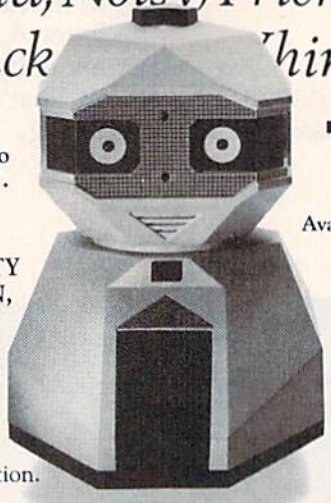
Modifying The Game

Alpha Anxiety is challenging for adults. Children who aren't dexterous with a joystick or haven't memorized the alphabet may find they don't have enough time to complete the first round.

To make the game more educational and practical, you can increase the allotted time. Change the value of DL in line 260 (VIC version) or line 220 (64 version). Also, you can make the game easier by changing the equation for computing time for the next round. To do this, change 40 to a higher number in line 970 (64 version) or line 1010 (VIC version).

See listings on page 125.

Mercurial, Angry, Sad, Noisy, Friendly, Musical, Rakish, Flirtatious, Laid-Back Whimsical, Unpredictable



- Andy is a unique electronic accessory that brings a new dimension of fun and learning to your Atari 800™ (48K) or Commodore 64™.
- Comes complete with the PERSONALITY EDITOR™ and sample BASIC program on disk. Control Andy with the PERSONALITY EDITOR or from BASIC, LOGO, ACTION, FORTH, etc.

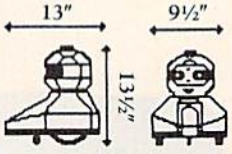
Andy's PERSONALITY EDITOR allows you and your family to explore the robotics world using simple English words. Once you get used to piloting Andy around one command at a time, you can group words together for more sophistication.

- Complete with built-in Sound Generator and Light, Sound, and Bump Sensors. Compose different moods and tasks for Andy.

Available only through AXLON

$119.00

Supplies are limited. So Act Now!



Andy can perform on virtually any surface—wood, vinyl, even the living room carpet. His 4 "D" cell batteries will keep him active in excess of 7 hours.

Meet Andy, he won't bring you breakfast in bed but he will give you food for thought.

A limited offer. $119.00 (plus $3.00 Shipping). CA residents add 6½% Sales Tax.
Mail to Axlon, P.O. Box 306, 125 Main St., Half Moon Bay, CA 94019 or call Toll Free 800-632-7979 (CA); 800-227-6703 (Outside CA). Allow 4 weeks for delivery.

Please send _____ Andy(s). Total _____ Payment Enclosed ☐ Charge to: VISA ☐ MC ☐ AMX ☐
Card Number _____ Exp. Date _____ Signature _____
Print Name _____
Address _____
City _____ State _____ Zip _____

AXLON®

Meet Andy, The World's First Robot with a Programmable Personality

©AXLON, 1984

ATARI 800 is a trademark of ATARI Corp. COMMODORE is a trademark of COMMODORE Inc.

SUPER PRINTER PACKAGES

Gemini 10X and Cardco + G 329
Prowriter and Cardco + G 414
No additional shipping charges on Printer Packages in Continental USA

PRINTERS

Alphacom 40C/Int. . 99.95
Alphacom 80C/Int. 189.95
Epson ..... Call
Silver Reed ..... Call
Prowriter 8510 ..... Call
Legend 239
Riteman 289
Toshiba 1351 ..... Call
Toshiba 1340 ..... Call
Axiom -CM-550 279

COMMODORE 64

star micronics · inc

THE POWER BEHIND THE PRINTED WORD.

Gemini 10X . 249
Gemini 15X . 389
Delta 10X . . . 369
Delta 15X . . . 499
Radix 10X . . 549
Radix 15X . . 629
Powertype . . 329

CBM 64 ..... Call
SX-64 ..... Call
1541 Disk Drive ..... Call
1526 Printer 279
1530 Datasette 66
1702 Monitor ..... Call
1650 AD/AA Modem 89
RS 232 Interface ..... Call

Call for Special Package 64 System Price

ANIMATION STATION TOUCH TABLET 59.95

Bring the trivia craze home with **P.Q. The Party-Quiz Game** for the CBM 64-D . Call

MODEMS

Hayes Smart Modem 300 ..... Call
Mark VII/Auto Ans/ Auto Dial ..... Call
Mark XII/1200 Baud . Call
Prometheus ..... Call
Westridge AA/AD . . Call

C O M M O D O R E 6 4 S O F T W A R E

ACCESS
Neutral Zone-D/T 23.95
Spritemaster-D/T 23.95
Beachhead-D/T 23.95
Master Composer-D . . . 27.95
Raid Over Moscow-D/T 27.95
Scrolls Of Abadon-D/T 23.95

ACCESSORIES
WICO Joystick . . . . . Call
Flip 'n' File-D 20.95
Flip 'n' File Cart 20.95
Joysensor 24.95
WICO Trakball 37.95
KRAFT Joystick 15.95
EIS Compuserve Kit . . . 64.95
VIDTEX 29.95
Big Foot 16K Buffer . . . . . Call
Big Foot 32K Buffer . . . . . Call
Big Foot 64K Buffer . . . . . Call
Gemini 10X 8K Upgrade . Call
Monitors . . . . . Call
Compuserve Starter . . . 27.95
Elephant SS/SD 17.00
Verbatim SS/DD 20.00
Elephant SS/DD 20.00
Ultra Magnetics SS/DD 18.00
Alien Voice Box II-D . . . 99.95

ACTIVISION
Hero-D 24.95
Pitfall II-D 24.95
River Raid-D 24.95
Decatholon-D 24.95
Star League Baseball-D/T 23.95
On-Field Tennis-D/T . 23.95

AVALON HILL
Call for Items and Prices

BATTERIES INCLUDED
Consultant-D 69.95
Paperclip w/Spellpak-D 84.95
Super Busscard II . . . . . Call
Home Inventory-D 23.95
Recipe-D 23.95
Audio/Video Cat-D 23.95
Mail List-D 23.95
Stamps-D 23.95
B.I. 80 Card . . . . . Call
Home Pak-D 37.95

BRODERBUND
AE-D 23.95
Bank Street Writer-D . . 49.95
Choplifter-D 23.95
Drol-D 23.95
Loderunner-D 23.95
Operation Whirlwind-D 27.95
Mask of the Sun-D . . . 27.95
Dr. Creep-D 20.95
Gumball-D 20.95
Bungeling Bay-D 20.95
Spelunker-D 20.95
Stealth-D 20.95
Whistler's Brother-D . . 20.95

CARDCO
Cardprint/B 47.95
Cardco + G 64.95
Cardboard/5 . . . . . 59.95
Cardkey 39.95
Cassette Recorder 37.95
Printer Utility-D/T 19.95
Write Now-Cart 34.95
Mail Now-D 27.95
File Now-D 27.95
Graph Now-D 27.95
Spell Now-D 27.95
LQ-1 Printer . . . . . Call
LQ-2 Printer . . . . . Call
LQ-3 Printer . . . . . Call

CBS SOFTWARE
Call for Items and Prices

COMMODORE
Assembler-D 39.95
Easy Finance I,II, III,IV-D 19.95
Easy Calc-D 34.95
Easy Mail-D 19.95
Easy Script-D 44.95
Easy Spell-D 19.95
Logo-D 57.95
The Manager-D 39.95
General Ledger-D 39.95
Accts. Rec.-D 39.95
Accts. Pay.-D 39.95
Magic Desk-Cart 39.95
Int. Soccer-Cart 22.95
Magic Voice 54.95
Suspect-D 24.95
Cutthroats-D 24.95
Simon's Basic-Cart . . . . Call

DYNATECH
Adventure Writer-D . . . 41.95
Codewriter-D 69.95
Dialog-D 41.95
Elf System-D 41.95
Home File Writer-D . . . 41.95
Reportwriter-D 41.95
Menuwriter-D 34.95
Speedwriter-D 49.95

ELECTRONIC ARTS
Archon-D 29.95
Pinball Construction-D . 29.95
M.U.L.E.-D 29.95
Murder/Zinderneuf-D . 29.95
One On One-D 29.95
Archon II-D 29.95
Financial Cookbook-D . 37.95
Music Construction-D . 29.95
7 Cities Of Gold-D 29.95
Standing Stones-D 29.95

EPYX
Dragons/Pern-D/T . . . 27.95

EPYX (cont'd)
Oil Barons-D 37.95
Pitstop II-Cart 27.95
Puzzlemania . . . . . Call
Robots Of Dawn-D 27.95
Summer Games 27.95
Breakdance-D 27.95
Barbie-D 27.95
G.I. Joe-D 27.95
Hot Wheels-D 27.95
Impossible Mission-D . 23.95
World's Grest BaseballD 23.95

FIRST STAR
Astrochase-D/T 20.95
Bristles-D/T 20.95
Flip-Flop-D/T 20.95
Spy Vs. Spy-D 20.95

HANDIC
64 Forth-Cart 29.95
64 Graf-Cart 23.95
Stat 64-Cart 23.95
Calc Result Easy-Cart . 34.95
Calc Result Adv.-Cart . 69.95
The Diary-Cart 23.95
The Tool-Cart 29.95
Bridge Cart 29.95

HESWARE
Hesware . . . . . Call

INSTA (CIMMARON)
Insta-Writer-Cart 39.95
Insta-Mail-D 24.95
Insta-File-D 49.95
Management Combo . . . 64.95
Insta-Calc-Cart/D 31.95
Insta-Graph-D 24.95
Insta-Vestor-D 31.95
Insta-Speed-D 99.95
Insta-Music-Cart/D . . . 79.95
Invest Combo 74.95
Word Craft-D 54.95

INFOCOM
Deadline-D 29.95
Enchanter-D 23.95
Infidel-D 34.95
Planetfall-D 24.95
Sorcerer-D 34.95
Starcross-D 29.95
Suspended-D 29.95
Witness-D 34.95
Sea Stalker-D 24.95

KOALA
Gibson Light Pen 69.95
Koala Touch Tablet-D . . 69.95
Koala Touch Tablet-C . . 74.95
Muppet Learn Keys-D . 54.95

D-Disk T-Cassette
Cart-Cartridge

MICROFUN
Death in the Caribbean-D 27.95
Dino Eggs-D 27.95
The Heist-D 23.95
Boulder Dash-D 23.95
Short Circuit-D 23.95

MICROPROSE
Floyd/Jungle-D 23.95
Hellcat Ace-D/T 23.95
NATO Commander-D . . 23.95
Solo Flight-D/T 23.95
Spitfire Ace-D/T 23.95
Air Rescue -D/T 23.95
Challenger-D/T 23.95
F-15 Strike Eagle-D . . 23.95

MISCELLANEOUS
Ken Uston's Blackjack-D 49.95
Quick Brown Fox-D/Cart . 34.95
Ultima III-D 41.95
Flight Simulator II-D . . 37.95
Night Mission/ Pinball-D/T 20.95
Home Accountant-D . . . 49.95
Step By Step-D/T 44.95
Barron's Sat.-D 67.95
Telestar 64-Cart 37.95
Castle Wolfenstein-D . . 20.95
Mastertype-D/Cart 27.95
Aztec-D 27.95
Miner 2049er-Cart 27.95
Strip Poker-D 23.95
Astro Chase-D/T 20.95
Flip Flop-D/T 20.95
Beyond Wolfenstein-D . 23.95
Sam-D 41.95
Mae Assembler-D 49.95
Jupiter Mission-D 34.95
Barron-D 37.95
Tycoon-D 37.95
Millionaire-D 27.95
Kwik-Load-D 16.95
Sargon III-D 34.95
Air Ralley-D 20.95
Graphics Basics-D 23.95
Hes Games-D 23.95
Multiplan-D 69.95
Omniwriter/Spell-D . . . 41.95
Bruce Lee-D/T 23.95
Mancopter-D 27.95
Meridian III-D 27.95
Mastering The Sat-D . 104.95
Hes Forth-Cart 31.95
Pogo Joe-D/T 20.95
Movie Maker-D 41.95
Typing Tutor III-D 34.95
Space Taxi-D 20.95
Vip Terminal-D 41.95
Doodle-D 27.95
Superbase-64D 69.95

PARKER BROTHERS
Forgger II-Cart 34.95
Gyruss-Cart 34.95
James Bond-Cart 34.95
Popeye-Cart 34.95
Q*Bert-Cart 34.95
Star Wars-Cart 34.95
Montezuma's Revenge-C 34.95

SCARBOROUGH
Mastertype-D/Cart 27.95
Net Worth-D 54.95
Songwriter-D 27.95
Run For the Money-D . . 27.95

SCHOLASTIC
Call for Items and Prices

SCREENPLAY
Call for Items and Prices

SEGA
Call for Items and Prices

SIERRA ON-LINE
Championship Boxing-D 20.95
Dark Crystal-D 27.95
Frogger-D/T 23.95
Homeword Speller-D . . . 34.95
Homeword-D 49.95
Mission Astroid-D 20.95
Oil's Well-D 23.95
Quest for Tires-D 23.95
Threshold-D 27.95
Time Zone-D 74.95
Ultima II-D 41.95
Ultima I-D 23.95
Ulysses-D 27.95
Wizard/Princess-D 22.95
Homeword w/Speller-D 69.95

SPINNAKER
Adventure Creator-Cart . 22.95
Aerobics-D 27.95
Alf in the Color Caves-C . 22.95
Alphabet Zoo-Cart 22.95
Delta Drawing-Cart 22.95
Facemaker-Cart 22.95
Fraction Fever-Cart . . . 22.95
Kids on Keys-Cart 22.95
Kidwriter-D 22.95
Snooper #1-D 22.95
Snooper #2-D 22.95
Story Machine-Cart . . . 22.95
Trains-D 22.95
Grandma's House-D . . . 19.95

Hundreds of items available for the CBM 64, please call

SSI
50 Million Crush-D . . . 27.95
Battle/Normandy-D/T . 27.95
Combat Leader-D/T . . . 27.95
Computer Baseball-D . . 27.95
Cosmic Balance-D 27.95
Eagles-D 27.95
Fortress-D 23.95
Germany 1985-D 41.95
Knight/Desert-D/T . . . 27.95
Professional Golf-D . . . 27.95
RFD 1985-D 23.95
Ringside Seat-D 27.95
Tigers in the Snow-D . . 27.95
Baltic 85-D 23.95
Broadsides-D 27.95
Computer Football-D . . 27.95
Questron-D 27.95

SYNAPSE
Blue Max-D/T 23.95
Drelbs-D/T 23.95
Fort Apocalypse-D/T . . 23.95
Necromancer-D/T 23.95
New York City-D/T . . . 23.95
Quasimodo-D/T 23.95
Relax Stress Reduction Sys. 79.95
Slam-Ball-D/T 23.95
Zaxxon-D/T 27.95
Zepplin-D/T 23.95

TIMEWORKS
Accounts Payable/ Checkwriter-D 41.95
Accounts Receivable/ Invoice-D 41.95
Cash Flow Management-D 41.95
Data Manager 2-D 34.95
Data Manager-D/T 19.95
Dietron-D/T 19.95
Dungeon Algebra Dragon-D/T 19.95
Electronic Checkbook-D/T 19.95
General Ledger-D 41.95
Inventory Management-D 41.95
Money Manager-D/T . . 19.95
Payroll Management-D . 41.95
Evelyn Woods-D 49.95

TRILLIUM
Amazon-D 22.95
Dragonworld-D 22.95
Farenheit 451-D 22.95
Rendezvouz w/Rama . . 22.95
Shadowkeep-D 22.95

WAVEFORM
Call for Items and Prices

WINDHAM CLASSICS
Below the Root-D 19.95
Gulliver's Travels-D . . . 19.95
Swiss Family-D 19.95
Wizard of Oz-D 19.95

To Order Call Toll Free
800-558-0003

For Technical Info, Order Inquiries, or for Wisc. Orders -
414-351-2007

NEW LOWER PRICES

ComputAbility™

NEW PRODUCTS

NO SURCHARGE FOR MASTERCARD OR VISA

Est. 1982

ORDERING INFORMATION. Please specify system. For fast delivery send cashier's check, money order or direct bank transfers. Personal and company checks allow 2 weeks to clear. Charges for COD are $3.00. School Purchase Orders welcome. In CONTINENTAL USA, include $3.00 shipping per software order. Include 3% shipping on all Hardware orders, minimum $3.00. Mastercard & Visa please include card # and expiration date. WI residents please add 5% sales tax. HI, AK, FPO, APO, Canadian orders — add 5% shipping, minimum $5.00. All other foreign orders, please add 15% shipping, minimum $10.00. All goods are new and include factory warranty. Due to our low prices, all sales are final. All defective returns must have a return authorization number. Please call 414-351-2007 to obtain an RA# or your return will NOT be accepted for replacement or repair. Prices and availability are subject to change without notice.

COMPUTABILITY
P.O. Box 17882
Milwaukee, WI 53217

ORDER LINES OPEN
Mon-Fri 11 AM - 7 PM CST
Sat 12 PM - 5 PM CST

AVAIL:
A Very Artificial Intelligence Lesson

Tom Prendergast

Give your Commodore a little personality with this short program. It demonstrates the basic principles involved in creating artificial intelligence. For the 64, VIC, Plus/4, and 16.

Do you ever get frustrated with your computer and all those SYNTAX ERRORs it throws at you when you're trying to program? It's not really the computer's fault, though. It's the way it was "hard wired," very businesslike and impersonal. In fact, it's downright inhuman.

So, how about plugging a little human warmth—you—into the computer? You can do that by feeding your Commodore computer this AVAIL program. Your computer's response may be so human that you'll be glad to get it back to its usual state.

First, though, let's talk a little about *artificial intelligence*. AI, as it's often abbreviated, is a term coined by John McCarthy back in 1956 B.C. (Before computers were on chips) for a summer symposium at Dartmouth College. They were very optimistic back in the dark ages of computers. Most people at the Dartmouth conference were sure somebody would be able to program a computer to think like a human being—not like an adding machine—in the next year or so. But they were much too optimistic, as it turns out, because it's almost 30 years later and nobody's succeeded in doing that.

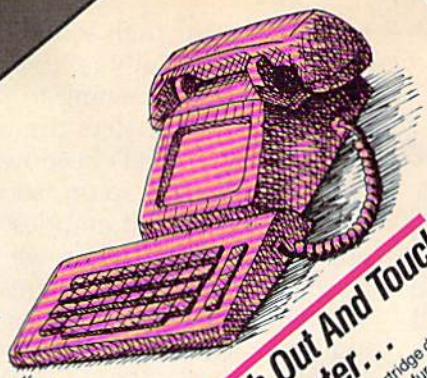
Not The Way We Think

A computer "thinks" in binary—yes/no, on/off, right/wrong—but the way a human being thinks is usually in very fuzzy logic, in "maybes" instead of rights or wrongs, correct or not correct.

There have been programs which can fool people into thinking that the computer is thinking. Probably the most famous is Weizenbaum's *Doctor*, or another version called *Eliza* after the beautiful Cockney girl who was taught to sing about the rains in Spain in very proper upper-class English. *Eliza* was originally programmed in COMIT, a pattern-matching language designed to match and "mask" patterns of English words and phrases. And this is what our AVAIL program does, except it does it in BASIC.

The trouble with a program like *Eliza* in BASIC is that your computer's BASIC "interpreter" has to translate every single byte and bit of your English into binary code, then put it through thousands of steps of processing, determine the right SYNTAX for the replies from "look-up tables," and then go through the whole business in reverse, retranslating from binary back into English for you. If you try an *Eliza*-type program on your home computer, you may find yourself waiting a while for a reply.

AVAIL, however, will give you snappy answers in just microseconds after you press RETURN. But there's a penalty for this speed. Sometimes the computer's English is so bad that it's pitiful. You can call this a "bug" if you will, but I think it gives the program a loveable human quality—almost as if you were talking to a precocious three-year-old. In fact, it might seem there's a little person back there behind the screen. And as you continue with the program and the computer "learns," it starts sounding more like a ten-year-old, an eleven-year-old, and then a fresh teenager. So be careful what you say. Your computer picks up things so fast that it



Let's Get Serious.

Well, if not serious at least organized. How? . . . Begin with BUSIDATA™.

You probably know that a data base lets you organize, analyze and print out lists of information for any number of applications—inventory, revenues and expenses, mailing lists, student grades and attendance. You use the data base for record keeping, alphabetizing and sorting information, and making calculations.

BUSIDATA features up to 1000 records per data disk, up to 254 characters per record, up to 20 keys of data of 79 characters per record. Up to 20 fields and 5 levels of sorting are available for maximum flexibility. Easy to use menu driven data selection and handling features along with output options and includes RS-232 printers.

A terrifically convenient program, in other words. Skyles Electric Works, gives you something that other data bases haven't. **BUSIDATA** lets you share your information with other programs. One standard problem with data base programs has always been that your information was locked into that data base. But Skyles's **BUSIDATA** takes care of all that. You can put information in or take it out of other data bases, word processors or spreadsheets. And it will save you a bunch of time and trouble in the process.

Of course, **BUSIDATA** has all the features of the best personal computer data bases. It's very fast and easy to use, and extremely powerful.

BUSIDATA, C-64 Disk **$49.95***

Reach Out And Touch A Computer . . .

and let a **BUSITERM™** cartridge do the dialing. With a **BUSITERM** cartridge furnishing the terminal program you can lean back, relax, and enjoy the world of telecommunications.

Using **BUSITERM** is as easy as one, two, three: Turn on your **Commodore 64** and press "1" and set the time, press "2" and dial your favorite computer friend, data base, bulletin board (the **BUSITERM** demo package gives you free access to CompuServe's Consumer or Executive menus); press "3" and you are on-line. The remaining numbers give the ability to transfer programs, datafiles, programs or datafiles to the disk or print them out on the printer. **BUSITERM** is the easiest to save programs we have worked with. **BUSI-TERM** will wow the most experienced telecommunicator. And all at an amazing low price.

BUSITERM C-64, Cart. **$34.95***

Need a Modem?

Get a BUSIMODEM™

from Skyles Electric Works. **BUSIMODEM** is a full function autodial modem found after searching the four corners of the United States. A perfect companion to **BUSITERM** offered above, **BUSIMODEM** offers the added feature of being permanently attached to your telephone. No more fumbling with handset cord and plug after dialing the access number and waiting for the tone. With **BUSIMODEM** you let your computer do the dialing to your favo..ite host computer, database, bulletin board, or friend. And all for an amazing low price made even lower with our **BUSITERM-BUSIMODEM** package.

BUSIMODEM C-64 modem **$99.00***

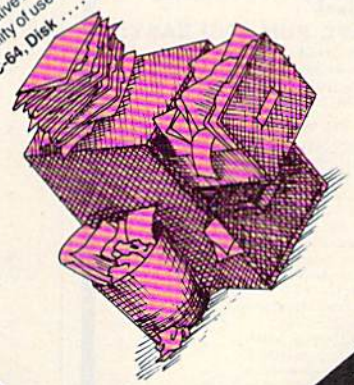
BUSITERM-BUSIMODEM Combo C-64, Cart. **$119.95***

*There is an additional $3.50 US and Canada, $10.00 Europe and Asia shipping charge per order. California residents add sales tax.

Flex File 2.1

A disk-base full feature database program offering records of 20 fields of 79 characters maximum for each field. Up to 1000 records can be stored on one diskette. The latest update of the perennial winner of comparative reviews. Menu driven for ease and versatility of use. This is one of the best.

Flex File 2.1 C-64, Disk **$49.95***



FOR COMMODORE 64 AND VIC-20 OWNERS ONLY:

This is just 1 of 15 pages of the newest and biggest Skyles catalog, hot off the press.

We know you'll want this page, in its full 7 x 10 splendor, and another 14 pages of peripherals, software and books that will make your Commodore 64 or VIC-20 computer even nicer to live with.

So, if we missed sending you your very own copy within the last few weeks, call us at (800) 227-9998, unless you live in California, in which case call (415) 965-1735.

From Skyles Electric Works, the oldest and largest professional specialists in the business.

Skyles Electric Works
231E South Whisman Road
Mountain View, CA 94041
(415) 965-1735

1541 FLASH! is a trademark of Skyles Electric Works.
Commodore 64 is a trademark of Commodore.

may tell you a lot you'd rather it didn't. At the very least, you'll find out how difficult our English syntax is for anyone not born to it.

Like Learning A New Language

Essentially your computer starts off with a blank memory slate, much like we did when first born. It doesn't know a word of non-BASIC English. Remember that it's learning English the way you learned BASIC when you first started out—word by word. So you have to teach it every word of its new vocabulary, and also how we put those words together in English. This won't take very long—several inputs on your part and the two of you are off and rolling. Lines 20–50 are the input module, which allows you to use commas without your getting those EXTRA IGNOREDs from regular INPUT. You could replace these four lines with a one-line INPUT IN$, but then you wouldn't be able to use commas or any other punctuation in your dialogue. It's also a nice routine to add to your bag of tricks.

Lines 60–120 and the subroutine at line 200 break up your input sentences into individual words so that the words of your IN$ sentence become substrings of IN$: Word no. 1 becomes W$(1), word no. 2 becomes W$(2), and so on. This is so the computer can rearrange and play the words back in the correct *order*—which, if you recall your high school grammar, is what SYNTAX essentially is. (Syntax is from the Greek syn + tassein, meaning to put in order.)

Line 130 transfers the words to another string array—W$(1) becomes X$(1), W$(2) becomes X$(2), and so on, so that they can be processed further, and empties the first array for another go-round when we return to line 20 for fresh input and an even fresher reply.

The subroutine in lines 210–400 is a pattern-matching syntax table that changes "you" to "I" and so on. Line 370 is a little tricky and you may want to change it later to "W$(I)=X$(I)" not X$(I+1), but it will give you a few surprises as it is.

Now we're at line 160. After you've seen the computer's reply, if you press RETURN you'll get another "?:" prompt. But if you type N (for "No—it's not OK") when the computer asks if it's OK, then the program performs a GOSUB to 410 for a more or less random response.

Here's what you can expect when you run AVAIL:

An input prompt "?:" will appear, signaling you to type in your first question. Type anything you wish and enter it by pressing RETURN. The computer will respond immediately (The computer's response is shown in CAPITAL LETTERS in the sample run below.)

?: (You) How are you, little buddy? [Hit RETURN]
(Computer) HOW ARE YOU, LITTLE BUDDY OK?

?: What's your name?
WHAT IS MY NAME, LITTLE BUDDY OK?

?: Is that your name? Little Buddy?
IS THAT MY NAME LITTLE BUDDY OK?

?: That's not what I meant!
THAT IS NOT WHAT YOU MEANT OK?

?: How can I explain this to you?
HOW CAN YOU EXPLAIN THIS TO I OK?

?: That's lousy English, you know!
THAT IS LOUSY ENGLISH, I KNOW TO I OK?

?: And that's even worse!
AND THAT IS EVEN WORSE KNOW TO OK?

[You type "N" for No, it's not OK]
NO? WHAT'D YOU EXPECT ME TO SAY?

?: Syntax error!
SYNTAX ERROR EVEN WORSE OK?

?: And you forgot the line number
AND I FORGOT THE LINE NUMBER OK?

?: I wonder if you'll ever learn English?
YOU WONDER IF YOU'LL EVER LEARN ENGLISH OK?

?: There's more truth to that than poetry!
THERE IS MORE TRUTH TO THAT THAN POETRY OK?

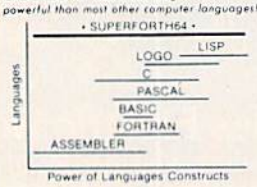
?: You can say that again!
I CAN SAY THAT AGAIN POETRY OK?

See listing on page 124.

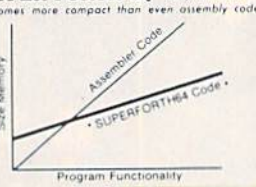
SUPER FORTH 64·+
By Errol B. Schwartz
TOTAL CONTROL OVER YOUR COMMODORE-64™
USING ONLY WORDS
MAKING PROGRAMMING FAST, FUN AND EASY!
MORE THAN JUST A LANGUAGE...
A complete, fully-integrated program development system.
Home Use, Fast Games, Graphics, Data Acquisition, Business, Music
Real Time Process Control, Communications, Robotics, Scientific, Artificial Intelligence
A Powerful Superset of MVPFORTH/FORTH 79 + Ext. for the beginner or professional

- 20 to 600 x faster than Basic
- 1/4 x the programming time
- Easy full control of all sound, hi res graphics, color, sprite, plotting line & circle
- Controllable SPLIT-SCREEN Display
- Includes interactive interpreter & compiler
- Forth virtual memory
- Full cursor Screen Editor
- Provision for application program distribution without licensing
- FORTH equivalent Kernal Routines
- Conditional Macro Assembler
- Meets all Forth 79 standards+
- Source screens provided
- Compatible with the book "Starting Forth" by Leo Brodie
- Access to all I/O ports RS232, IEEE, including memory & interrupts
- ROMABLE code generator
- MUSIC EDITOR
- TURTLE GRAPHICS
- SPRITE-EDITOR
- Access all C-64 peripherals including 4040 drive and EPROM Programmer.
- Single disk drive backup utility
- Disk & Cassette based. Disk included
- Full disk usage — 680 Sectors
- Supports all Commodore file types and Forth Virtual disk
- Access to 20K RAM underneath ROM areas
- Vectored kernal words
- TRACE facility
- DECOMPILER facility
- Full String Handling
- ASCII error messages
- FLOATING POINT MATH SIN/COS & SQRT
- Conversational user defined Commands
- Tutorial examples provided, in extensive 261 page cross referenced manual
- INTERRUPT routines provide easy control of hardware timers, alarms and devices
- USER Support

SUPER FORTH 64· *is more powerful than most other computer languages!*



SUPER FORTH 64· *compiled code becomes more compact than even assembly code!*



A SUPERIOR PRODUCT in every way! At a low price of only **$96**

Call: (415) 651-3160

PARSEC RESEARCH
Drawer 1776, Fremont, CA 94538

Take this ad to your local dealer.
Phone orders also accepted. Immediate delivery! Dealer inquiries invited. CA residents must include tax.

• PARSEC RESEARCH
Commodore 64 & VIC 20 TM of Commodore

1541 DISK DRIVE ALIGNMENT PROGRAM

Finally, a complete disk drive alignment program! No special equipment needed! See the review in the October 1984 Gazette.

$44.95 + 3.50 shipping (U.S.)

PROGRAM PROTECTION MANUAL FOR THE C-64

Covers the disk drive, bad tracks and sectors, modified directories, cartridges and much more. Covers both basic and machine language protection schemes. A complete memory map and a disk with many helpful programs are included.

$29.95 + 3.50 shipping (U.S.)

★★★★★★★★★★★

PROGRAM PROTECTION MANUAL FOR THE C-64 VOLUME II

★★★★★★★★★★★

This manual begins where the first left off. It will cover the most recent advances in program protection. It will discuss half-tracks, extra tracks and sectors, modified formats, nibble counting, track arcing, unimplemented opcodes and much, much more!!! It is written in that same 'easy to understand' style as the first volume. A disk will be included to help you fully understand all the principals.

$34.95 + 3.50 shipping (U.S.)

★★★★★★★★★★★

CARTRIDGE BACKER

★★★★★★★★★★★

This package includes an expansion board, user's manual and program disk. Cartridge Backer will backup over 190 of the most popular cartridges to disk. It includes software to backup Electronic Arts™ disks. Software for file copying and disk to tape copying is also included.

$54.95 + 3.50 shipping (U.S.)

C S M SOFTWARE, INC.

P.O. Box 563
Crown Point, IN 46307
(219) 663-4335

VISA AND MASTER CARDS ACCEPTED
DEALER INQUIRIES INVITED

dsi

ANNOUNCES A NEW PARALLEL PRINTER INTERFACE (WITH GRAPHICS)

WITH FEATURES OFFERED BY THE TOP RATED INTERFACES ON THE MARKET — AT A FRACTION OF THE PRICE!

$49.95*

(*Nationally advertised retail price)

There is nothing comparable on the market below $79.95. Some list up to $149.95. But there is absolutely no reason to pay more than $49.95. That price will buy the features, the quality, and the after-the-sale support that comes with the most expensive interfaces.

Here are some of the important features now available at an incredibly low price: True Commodore Graphics / Expanded Alpha, Numeric, and Graphic Characters / Expanded Reverse Alpha, Numeric, and Graphic Characters / Condensed Alpha, Numeric Characters / Total emulation of Commodore's Graphic, Character, and Command Set / Commodore Print Function Lock Controls / Combining of expanded and condensed print features / Combining of emulation and transparent modes / No confusing DIP switches / 15 page easy-to-follow User's Manual / Fully shielded from end to end.

DSI's Parallel Printer Interface comes complete with all necessary cabling for easy installation and a limited lifetime warranty. It is for use with the Commodore Vic 20, C64 and these printers: Epson / Star Micronics Gemini / Star Micronics Delta / BMC / Inforunner / Riteman / Panasonic KXP / Radix / Mannesman Tally MT-160 / Smith Corona DP series / Brother DM-40 / Brother DX-5 / Fujitsu / Citizen / Okidata (Alpha, numerics only).

This new breakthrough in a low price, high quality parallel printer interface is available now. For more information call 316-264-6118.

dsi

DATA SHARE, INC.

717 South Emporia • Wichita, KS 67211-2307
316-264-6118
Telex: 650 193 4977

DSI is a major OEM and private label manufacturer.
Call for complete information and quotations.

User Group Update

When writing to a user group for information, please remember to enclose a stamped, self-addressed envelope. When calling a user group, please don't forget to take time differences into account, and call during reasonable hours.

Send additions, corrections, and deletions to this list to:

COMPUTE! Publications
P.O. Box 5406
Greensboro, NC 27403
Attn: Commodore User Groups

Changes

The new address for the Tuesday User Group (T.U.G.) is Box 1787, Port Perry, Ontario, Canada L0B 1N0.

Correspondence for the Santa Rosa Commodore 64 Users Group (SRCUG) should now be sent to Rusty Stuart, P.O. Box 4512, Santa Rosa, CA 95402. The phone number is (707) 578-3481.

Mark Bender is no longer the contact person for the Logansport Commodore Club. Inquiries should be sent to the club in care of Howard C. Peoples, 2329 Myers Lane, Logansport, IN 46947. The phone number is (219) 753-9353.

Another user group with a new address is the Lane County Commodore 64 User Group (LCCUG). Information can be obtained by writing the group at P.O. Box 11316, Eugene, OR 97440.

Dr. M. H. McConeghy, former contact person for the Newport (RI) Computer Club, is no longer associated with that group, and asks that correspondence no longer be directed to him. Further information about the club is not available at this time.

The Commodore User Group of Clearfield, Utah, has a new name and contact person. The club can be contacted at the following address: Wasatch Commodore Users Group (WACUG), care of Mike Murphy, P.O. Box 4028, Ogden, UT 84402. The club's bulletin board can be reached at (801) 773-5512.

The Tri-State Commodore Users Group also has a new address. Write to it at P.O. Box 2501, Huntington, WV 25725-2501.

A user group is forming in Brooklyn, New York. Those interested should contact Malcolm J. Gottesman, 1735 East 13th Street, Brooklyn, NY 11229. The phone number is (718) 375-5278.

The listing for The Exchange, a Commodore 64 user group in Long Beach, CA, should be replaced with the following information: C64 Helpers, P.O. Box 9189, Long Beach, CA 90810. The phone number previously listed for the club should no longer be used.

The Central Florida Commodore Users Club has a new post office box number. For information, contact Thurman Lawson, P.O. Box 7326, Orlando, FL 32854, phone (305) 886-0390.

COMCOE, the Commodore Club of Evanston, Illinois, has disbanded.

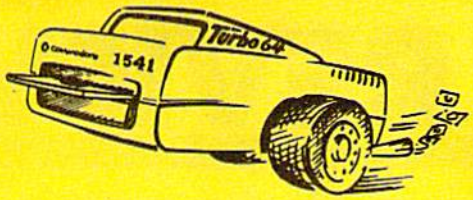
Commodore Owners of Lafayette (COOL), has a new address. Correspondence should be sent in care of Ross Indelicato, 3942 Kensington Drive, Lafayette, IN 47905. The phone number is (317) 447-1326.

The Commodore Computer Club, Evansville, Indiana charter, also has a new mailing address. Send inquiries to Commodore Computer Club, P.O. Box 2332, Evansville, IN 47714.

The Longview Users Group has a new address: c/o Dorothy Metzler, P.O. Box 9284, Longview, TX 75608. The phone number is (214) 759-0699.

TURBO 64

$19.95



Turbo 64 will turn your 1541 into a super fast and efficient disk drive. Loads programs five to eight times faster, works with 99% of your basic and machine language programs. The master disk allows you to put unlimited Turbo 64 boot copies on all your disks. This disk also includes:

Auto Run Boot Maker

Auto Run Boot Maker will load and auto run your basic or machine language programs.

$19.95

DMS-Errors 20,21,22,23,27 & 29
Format Single Tracks
Read Disk Errors

½ Track Reader-read and select ½ track.

½ Track Formatter-Format a disk with ½ tracks. This is where the next protection schemes are coming from.

Drive Mon-Disk Drive assembler/disassembler. For your 1541.

The Doc-Disk Doctor that reads code under errors.

Sync Maker-Place a sync mark on **any** track out to 41. Also used for protection.

Sync Reader-Check for Sync bits on **any** track out to 41.

Change Drive No.-Changes drive number (7-30).

Disk Logger-Finds starting track, sector; start and end addresses.

Disk Match-Compare any two diskettes. Byte for Byte.

New Wedge-Easier to use DOS wedge.

ID Check-Check ID's on **any** track.

Unscratch-Restore a scratched file.

View RAM-Visual display of the free and used sectors on a diskette.

Read/Write Test-1541 performance test.

Repair a track-Repair a track with checksum errors. Reads code under errors and restores track.

Fast Format-Format a disk in just 10 seconds (with verify!).

MSD Sure Copy

At last a complete utility package for the MSD Dual Drive. ***This is the first MSD utility program that does it all.*** *The main menu options include:*

- *Copy Protected Disk*
- *Copy Files*
- *Format a Disk*
- *Change Disk Name*
- *Quit*
- *Copy Unprotected Disk*
- *Scratch a File*
- *Rename a File*
- *View Directory*

$39.95

Sure Copy *will put all errors automatically on disk: 20, 21, 23, 27 and 29's.*

GEMINI BIT COPIER

99.9% Effective!

- **3 Minute** copy program
- Copies Bit by Bit
- Eliminates worries of all Commodore DOS errors
- Very simple to use
- Half tracks
- 100% machine language
- Will not knock disk drive
- Copies quickly
- Writes errors automatically 20,21,22,23,27 & 29
- Errors are automatically transferred to new disk
- Supports use of two disk drives
- Unlocks disks to make your actual copies
- No need to worry about extra sectors

$29.95

SOFTWARE PROTECTION HANDBOOK

This book uncovers the secrets of protected DISKS, CARTRIDGES, and TAPES for your own use only. Protection secrets are clearly explained along with essential information and procedures to follow for duplicating protected software. A kit of duplicating software is included with all listings, providing you with the tools needed! Programs include high speed error check/logging disk duplicator . . . disk picker . . . and more. Also, routine for checking and writing half-tracks, abnormal bit densities, as well as errors 20, 22, 23, 27 and 29. The tape duplicator has never been beaten! This manual is an invaluable reference aid including computer and disk maps, as well as useful tables and charts. (212 pages 11 programs). This manual does not condone piracy.

C64 Book only ..... $19.95 US
Book & Disk of all programs ..... $29.95 US
Vic 20 book . . . Cart. & Tapes only ..... $9.95 US

THIS MANUAL DOES NOT CONDONE PIRACY

*SHIPPING: $2.00

D-CODER

You no longer need to be an EGGHEAD to read Machine Language.

- Translates any machine language program into easy-to-read English descriptions with complete explanations of each command!
- Makes complete notations of all important memory locations accessed by the program! (SID, VIC, MOS, KERNAL, etc.)
- Gives you three ways of accessing programs:
  1) **Will read and list programs from DISK**
  2) **Will read and list programs from MEMORY!**
  3) **Direct user input** (from magazines, etc.)
- Can be used to locate and examine any machine language program's protection routines!
- Can be used to easily break apart machine language programs for study and examination!
- Printer option for complete hard copy listings!

$19.95

Enclose Cashiers Check, Money Order, or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders. Canada orders must be in U.S. Dollars. VISA — MASTER CARD — C.O.D.

Programs for C-64 $2.00 S & H on all orders.

Software Submissions Invited.

VISA

MegaSoft Limited

P.O. Box 1080, Battle Ground, Washington 98604

Phone (206) 687-5116 • BBS 687-5205 After Hours Computer to Computer

REVIEWS

Microsoft Multiplan

Harvey B. Herman, Associate Editor

Think back to the early days of personal computing, before the PC was a twinkle in Big Blue's eye. At that time, why would a business want to purchase a small computer? Surely, the cost could not be justified on the basis of all the neat games it would play or its ability to tutor basic number facts. No, there probably was no compelling reason for a commercial firm to buy one until early 1979, when the first spreadsheet program, *VisiCalc*, was introduced.

I am reminded of the now popular theory of evolution called "Punctuated Equilibrium." For the most part, evolutionary change is gradual, but on rare occasions a significant step occurs. Before 1979, small computers had made only a modest inroad into the business community. However, in 1979, the perception of the utility of personal computers for business applications underwent a radical change. Computers running *VisiCalc*, in a few short years, virtually replaced the hand calculated spreadsheets of the past. A milestone had been reached, and it was largely due to this one program and others of that ilk.

Procrastination

I too am in business, the education business, and for years I've envied colleagues who make good use of spreadsheet programs for calculating budgets or averaging grades, using *VisiCalc* or one of its clones. I have the same feelings watching my wife using *VisiCalc* to prepare reports which incorporate extensive calculations. Would I ever be able to do likewise? Well, you have to devote a little effort to learn any new applications software and there always seemed to be some excuse not to bother. However, when I was approached about a review of *Microsoft Multiplan*, it was just the stimulus needed for me to learn the technique that I envied others using and one I was certain I would put to good use immediately. I jumped at the chance.

Most readers know what a spreadsheet is, but just in case some don't, here's a brief explanation. An electronic worksheet, or spreadsheet, is a matrix of rows and columns called cells, containing data, headings, and formulas. Numeric data is entered into cells at the intersection of the grid of rows and columns. The headings are letters, numbers, or special characters, information which makes the sheet more understandable. The formulas, and they can be quite complicated, perform calculations on specified data taken from the matrix of cells.

The power of the spreadsheet depends largely on the way it handles formulas. Change the number in just one cell and any other cell dependent on the same formula will change. Think back to the last time you did your income tax. Wouldn't it be nice if when you refigure your adjusted gross income, all other related "cells" on the IRS form would also change? You might never have to file an amended return again.

Practical Applications

I had a favorable impression of *Microsoft Multiplan* even before I started the review. The opinion of people I trust was consistently favorable. My first impression was also positive. The program comes in a sturdy package with a 427-page looseleaf manual, cheatsheets, and a function key overlay. No preliminary, smudged, mimeographed instructions—a good sign.

I tore open the wrappings, remembrances of birthdays past, and jumped right in. My approach, a method I don't recommend for everyone, is to read a little, try something useful, and read a little more when I get stuck. Most people will prefer to go carefully through the fine tutorial in the manual before attempting a real problem.

The program was easy to load, but I found the initial chatter of the protected disk annoying. When the program begins to run, a blank sheet of

empty rows and columns faces you. What to do?

For review purposes, I set up two typical applications. First, I investigated the possibility of maintaining my grade book with *Multiplan*. Then, I looked at the preparation of a budget with the aid of this spreadsheet program.

For the grade book test, I began with a class of six having three grades each. I've learned that you save yourself a lot of grief if you use a small sample to begin with. In the first expanded column, I typed the student names (alphabetic data rather than numeric): Tom, Dick, Harry, Jean, Jane, and Josephine. In the second through fourth columns, I typed the student grades on each test. In the fifth column, I replicated a formula calculating the student's average grade. Later, I learned how to do this without the need to edit the replicated formula.

So far, so good, but there were a couple of minor problems. Josephine's name was clipped off, but I was assured by a more experienced user that all letters were saved and could be displayed if the cell was widened further. Also, the decimals in the calculated average weren't quite right. I corrected this easily with the FORMAT command.

Since my familiarity with the program had steadily improved, I had no trouble adding additional formulas which calculated the class average on each exam. The next step, however, gave me a little more trouble.

I decided to pretty things up by adding a two-column title to the sheet. I moved everything down two rows using the INSERT command. However, this messed up the average calculation, as the variables in the formula were absolute rather than relative. For example, you can use the formula AVERAGE using either absolute variables or relative variables. Both calculate the average, but the latter is preferred if the sheet needs to be moved up or down later for any reason. The minor mishap was easily corrected by making all variables relative.

After adding a few more headings, I was ready to print out. The final sheet looks like this:

	1984 Grades			Average
Tom	75	77	89	80.3
Dick	82	85	75	80.7
Harry	71	75	80	75.3
Jean	88	87	82	85.7
Jane	85	90	87	87.3
Josephin	90	87	92	89.7
	---	---	---	
Average	81.8	83.5	84.2	

Incidentally, I also saved the printer output on disk and incorporated the output file directly into the word processor which is being used to write this review.

For the other test application, I prepared a budget. Again, a simple example is best to start with. On occasion I receive fixed sums of money which are to be distributed to the members of the department on the basis of merit. For example, salary increments and research allocations are treated this way. It always takes me a long time fiddling with the numbers to make the sum come out right. Here was a perfect use for a spreadsheet.

I took research allocations as my example. As before, I used an expanded column for names. The second column represented relative merit—the larger the number, the more merit. The third and fourth columns held formulas which calculated the individual allocations for equipment and supplies, respectively. The amount budgeted is shown at the foot of columns three and four. The formula for each allocation divides the relative merit by the sum of merits and multiplies by the amount budgeted for that category. In mathematical terms: rel. merit / sum (rel. merit) * $4000 for supplies. The cells were formatted so only an integer result was displayed.

If this were a real situation, I would now have a template which could be used any time I need to distribute funds. The only figures which would probably change are the amount budgeted and the relative merit. *Multiplan* would then do the calculations in a fraction of the time I could and, more importantly, do them without error.

The final spreadsheet budget is shown below. Again, it came directly from a *Multiplan* file into my word processor.

1984/85 Allocations

	Rel. Mer.	Supp.	Equip.
Tom	5	714	357
Dick	2	286	143
Harry	6	857	429
Jean	8	1143	571
Jane	3	429	214
Josephin	4	571	286
	---	-----	-----
	28	4000	2000

An "Intuitive" Program

The cover of *Multiplan's* manual quotes *Computer Retail News*: "Microsoft's Multiplan may well be the best electronic spreadsheet product on the market." Hype aside, I think it's an excellent program and have no hesitation recommending it.

The program is chock full of features (427 pages worth); it has more functions than I probably will ever use. I particularly liked the instruction manual, the sorting feature (rows only), the help files, and screen read of directory names. The one feature that stands out is that, with just a little practice, the operation of the program becomes intuitive, with only occasional recourse to the manual or help files required.

There are a few negative points which many people won't object to, especially if they are new to spreadsheets. The notation for rows and columns is awkward compared to similar programs. *Multiplan* has no search and replace feature, and sorting, a very useful command, only works on columns. Also, it does not feature pagination on printouts.

Multiplan is protected and can't be copied in the ordinary manner. (However, the company will provide one backup for $10 with proof of purchase.) To avoid wear and tear on the source disk, the manual recommends that you store your worksheets on a separate disk which can be duplicated. Nevertheless, there is no way to avoid wear on your disk drive as the protection method causes the head to kick against its stop. To be fair, *Multiplan* is not the only commercial program that does this.

Other than those few negative points, I believe the program is a great value, considering its many features and relative low cost.

Microsoft Multiplan
Human Engineered Software
150 North Hill Drive
Brisbane, CA 94005
$100

NEW

CHORD-POWER
FOR GUITAR

THIS DELUXE REFERENCE FEATURES:

- Quick Access to Over 8,000 Chords With Sound
- Chords Displayed on Color Graphic Guitar Fretboard with Each Note Played
- Chord Formulas Displayed Showing Corresponding Notes
- For Beginner to Professional
- Easy and Fun to Use - Just Enter Chord Desired and it Will be Displayed and Played

In addition to being an excellent chord reference, **CHORD-POWER** will help unravel the mysteries of chord construction and advance your chord and solo playing!

- Program Runs on C-64* With Disk Drive -

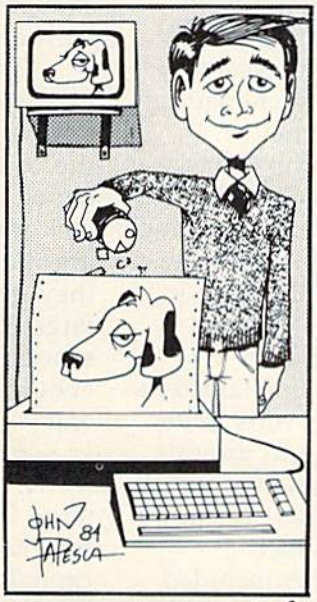
ORDER TODAY! Check, Money Order or C.O.D.
$39.95 Plus $2.00 Shipping and Handling.
CA residents add 6% Sales Tax.

NewArts Co.
P.O. BOX 2700, HUNTINGTON BEACH, CA 92647
(DEALER INQUIRIES INVITED)
*C-64 IS TRADEMARK OF COMMODORE BUSINESS MACHINES, INC.

SCREEN DUMPER 64™
COPYRIGHT 1984 BY MICRO-W DISTRIBUTING INC.

How would you like to have a copy of all of the text or graphics that appear on your monitor screen? Well SCREEN DUMPER 64™ may be what you are looking for. This program will transfer to your printer* a copy of what you see on your monitor screen including hi-resolution graphics, text, and multicolor sprite, etc. It even works with the KOALA PAD™. You can load this program into your computer in a hidden location so that it shouldn't interfere with your programs. This means that you can use your Commodore 64 normally and then call up this routine to dump what is on the screen. Colors are represented by 16 shades of gray for faithful reproductions.

ALL THIS FOR ONLY $29.95



Call: (201) 838-9027 To Order

MasterCard VISA

Micro-W. DISTRIBUTING, INC
1342 B Route 23
Butler, N.J. 07405

TRIVIA PLUS™

- Over 3,500 questions
- 8 fascinating categories
- No typing required
- Excellent graphics and sound (includes over 100 songs!)
- For 1 to 6 players
- In 'Trivia Plus' a good bluff may be the next best thing to the right answer

Commodore 64* Disk $24.95

TYPING TUTOR + WORD INVADERS

REVIEWERS SAY:
"This is the best typing tutor we have seen yet; ★★★★+" **INFO-64**

"Computer aided instruction at its best." **Commander**

"This is an excellent program that makes typing practice an enjoyable pastime instead of boring drudgery." **DILITHIUM PRESS**

Rated the BEST educational program for the VIC 20 **Creative Computing**

CUSTOMERS SAY:
". . . delighted with my son's progress . . . he is the only one in his second grade class who touch types at the computer."

"Your Typing Tutor is an excellent program . . . our 4 children literally wait in line to use it."

"Thoroughly satisfied, can't believe how fast I've learned to type. I've never typed before."

In daily use by schools across the USA.

NEW! Commodore Plus/4 or 16 . . . Tape $21.95 Disk $24.95
Commodore 64 . . . . . Tape $21.95 Disk $24.95
VIC-20 (unexpanded) . . . . . Tape $21.95

IFR (FLIGHT SIMULATOR)

REALISTIC AIRCRAFT RESPONSE

"Has a quality of realism which sets it apart from others, even those I've tested in flight school." **Compute's Gazette**

"Great program!" **INFO-64**

"It is tremendous fun." **Compute's Gazette**

"Flight tested by an air traffic controller, two skilled pilots and an elementary school class. Highly recommended by all." **Midnite Gazette**

"This is an unbelievably realistic simulation of the difficulties facing a pilot in instrument flying. I'm a 747 pilot and I think that this simulation could do a lot to improve the reactions and instrument scan habits of even very experienced pilots." **747 pilot**

NEW! Commodore Plus/4 or 16 . . . . Tape or Disk $29.95
Commodore 64 . . . . . Tape or Disk $29.95
VIC-20 (unexpanded) . . . . . Cartridge $39.95

ACADEMY SOFTWARE
Shipping and handling $1.00 per order. CA residents add 6% tax.
VISA MasterCard
P.O. Box 6277 San Rafael, CA 94903 (415) 499-0850

Also Worth Noting

MicroLeague Baseball

Pro baseball buffs will love this game. Arcade action players may not. In *MicroLeague Baseball*, for the Commodore 64 (Apple and Atari versions available also), you manage a team of your choice by calling the plays and controlling the lineup. On the disk are 25 teams complete with reserve fielders, relief pitchers, and pinch-hitters. Included are many recent World Series teams, the 1984 All Star teams, and several combinations, such as A.L. Greats and Philadelphia Greats. For nostalgia buffs, the '55 Senators are included.

Graphically, the game is so-so, but the audience for *MicroLeague Baseball* won't mind. The game's strength is in providing realistic probability based on real situations with real players. Complete statistics for every player are included for your perusal when you choose starting lineups or go to the bench or bullpen. Documentation is good and includes a rulebook, quick-reference cards for offense and defense, and a rosters and highlights book.

You can play against the computer, manage both teams, or watch the computer manage both teams. Offensive options include setting the lineup, choosing to swing away, sacrifice, surprise bunt, steal, hit and run, and run the bases aggressively or cautiously. Pinch hitters may be inserted at any time. Defensively, you can put any player at any position. (Original lineups are in place if you wish to use them, although in playing the '82 Brewers, the lineup put Ted Simmons at shortstop and Cecil Cooper at second base.) You also call the pitch—fastball, curve, slider, or off-speed/changeup—or opt to pitchout, intentionally walk, bring in the corners (first and third) or the whole infield. A pitching or fielding change can be made at any time.

Research for this game was extensive, as minor details such as fielding range and throwing arm were taken into consideration. Curiously, however, in our first test game, Steve Carlton, pitching in his Cy Young ('80) year, uncharacteristically gave up six runs, seven hits, hit a batter, and threw a wild pitch in just two innings—and we used his best pitches, the fastball and slider.

If the 25 teams included with the game aren't enough, the manufacturer offers other disks: 1982, '83, or '84 teams (American and National Leagues), AL and NL All Star teams, or 1960s, 70s, or 80s World Series teams. Each is $19.95.

MicroLeague Baseball is for serious baseball aficionados and would-be managers. It's sure to bring a lot of joy to Mudville.

MicroLeague Sports Association
28 E. Cleveland Ave.
Newark, DE 19711
$39.95

U. S. Adventure

When an educational computer package can bring a sense of adventure to enhance its instructional value, the result is often a much richer learning experience. First Star Software's *U. S. Adventure* (Commodore 64, Atari, Apple, and IBM PC versions available) is an example of just such a program.

Using the keyboard or a joystick, you move chronologically and geographically across the continent as states join the Union. At the same time, you pick up historical events, matching them to the dates on which they occurred. The program is targeted to preteens and high schoolers, but it's intriguing enough for the entire family to enjoy.

You score points by correctly targeting which states entered the Union and when. Information on the states, their capitals, historical events, and geography are all part of the game play. Enter a time tunnel, correctly identify the date of a certain event, and you accumulate more points.

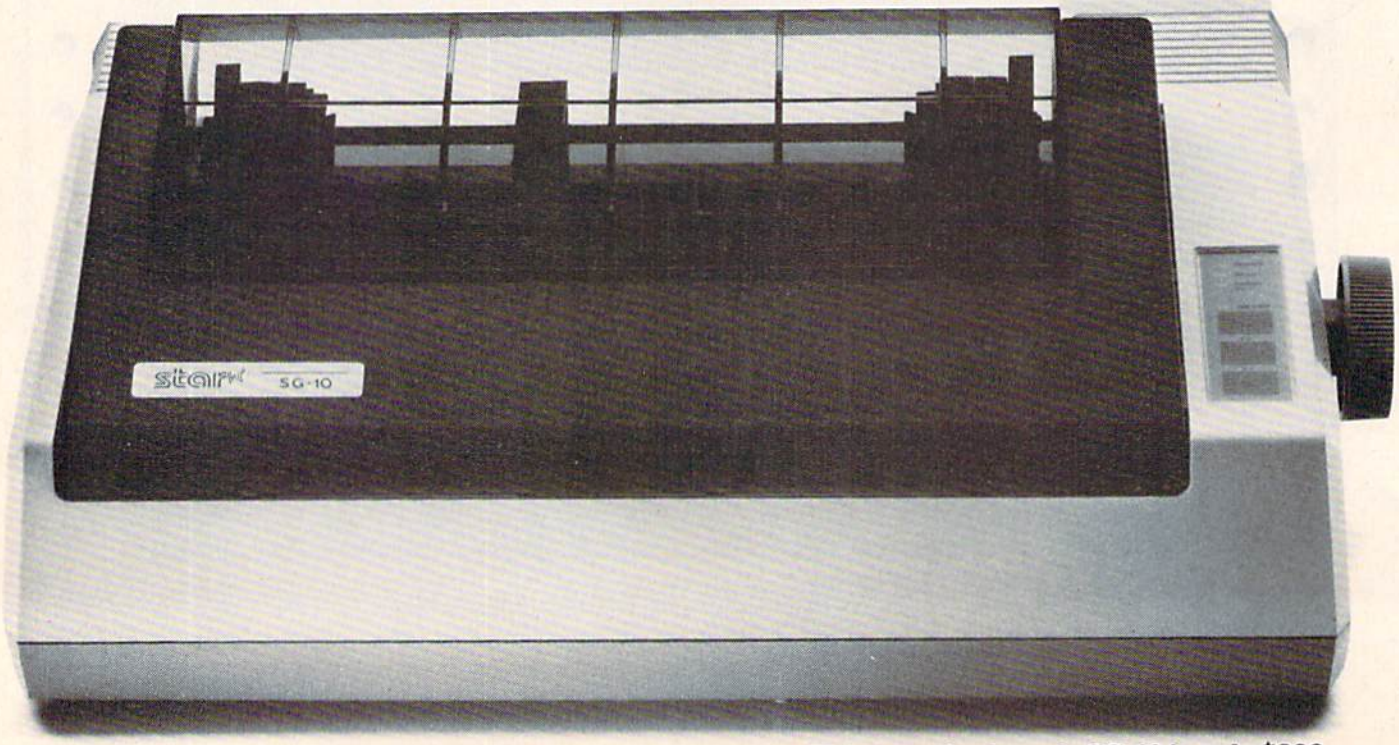
"Quality printers are too expensive."

"I've got different printing needs, but I don't want two printers."

"I'm tired of waiting around for my printer to finish."

STAR IS LISTENING.

STAR'S NEW PRINTERS WORK 20% FASTER. COST 20% LESS. ARE 100% CERTAIN TO CHANGE YOUR MIND ABOUT PRINTERS.



This new dual-mode SG-10 is only $299.

No printer could be more appealing than one you design yourself.

And, in effect, that's what you've done.

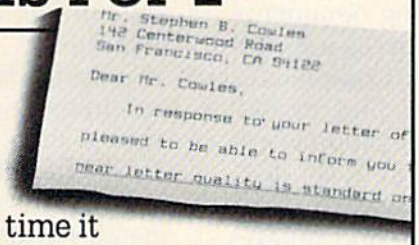
The new "S" series printers from Star Micronics have been designed not to our specifications, but to yours. With values that confound our accountants but will make great sense to you.

These printers are faster than ever. More compatible and reliable. With more added in and fewer add-ons.

And yet they cost *less*.

Don't try to figure it out. Just enjoy.

NLQ IS 1 OF 2



Because we've increased our printing throughput by 20%, you can now finish 6 pages in the time it used to take to print 5. And even though we've upped our speed, we've kept up our quality.

In fact, on three of our new models, both draft *and near-letter-quality* are standard (no extra charge). A fourth model, the SB-10, prints draft *and letter-quality* standard (again, not extra).

So now, with just *one* printer, you're ready for data processing and word processing. That's like owning two printers for the price of just one.

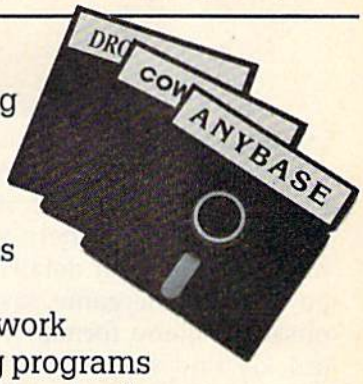
GET ON LINE BY JUST PLUGGING IN

The new Star "S" series printers are fully compatible with even the most fickle of personal computers.

And they're especially friendly with IBM® PC, Apple,® Commodore,® and all compatibles.

In most cases, hooking up is no more complicated than putting a square peg in a square hole. But it's a lot more rewarding.

READY FOR ANY SOFTWARE



The new "S" series printers make printing as easy as 1-2-3.™ Which is just one example of the many spreadsheet programs they're ready for.

The new Stars can work with word processing programs like WordStar.® Educational software like Dr. Logo.™ And even the new integrated formats like Framework™ and Symphony.™

So Star printers match hardware to software without disk-driving you crazy.

They handle many functions faster. They're more compatible. Less expensive. More reliable. And have a full year warranty. "S" series printers have been designed with so many of your needs in mind, it's as if you'd done it yourself.

And what a great job you did.

For a free demonstration, visit your local Star dealer.

SD-10 types draft and NLQ, just $449.

SR-10 prints 200 cps for only $649.

SR-15 includes 16K memory for spreadsheets, $799.

star™

THE POWER BEHIND THE PRINTED WORD®

200 Park Avenue, New York, NY 10166
Chicago, IL (312) 773-3717 • Boston, MA (617) 329-8560
Irvine, CA (714) 586-8850

Prices shown are manufacturer's suggested retail prices.

The high-resolution graphics are well done, as is the documentation. The user's guide includes game play information and worksheets to help you remember historical details as you go through the game. Using an onscreen menu format, you'll quickly find your way around. Although you must move slowly from one state to the next—rather than occasionally zipping across the country as you may wish to—the state-by-state movement reinforces much of the information about each state.

Importantly, the game includes three different levels: Beginner, High School, and Tournament. The first level has HELP options, as does the second level. However, in the High School mode, you must pay with some of your points for every bit of help you request. The Tournament mode lets you wing it on your own.

U. S. Adventure is an intriguing, informative educational package which doesn't sacrifice content to achieve playability.

First Star Software, Inc.
18 East 41st Street
New York, NY 10017
$29.95 (disk)

Up n' Down

A dune buggie, twisting roads, hills to climb, and flags to collect might be all you need for a good arcade game. *Up n' Down*, for the 64, has a bit more. Your buggie can jump, literally leap, from road to road. It can even pop over or crush other vehicles. That's important, for there's an endless stream of strange-looking things coming your way, or trying to run up your rear bumper.

The object of *Up n' Down* is fairly simple: Collect all the course flags (and other objects—ice cream cones, hats, and balloons) that you can find. Jump over the menacing opponents before you end up as a cloud of metal fragments. Complete each course before the time dwindles and your bonus evaporates. It's only the execution of those goals that gets to be a problem.

Coordination and reflexes are important in *Up n' Down*, just as in the video arcade version of this game. You have to press the joystick fire button (or the space bar if you're using keyboard controls) at just the right moment to leap an approaching truck. You have to be quick when you come to a fork in the road. Left or right? There may be an uncollected flag one way, a dead end another. Leaping is an art in itself. It takes practice, and just the right moment, to jump over a vehicle or soar from trail to trail.

The roads scroll beneath you as you drive north. Although you can back up, it's not usually a good idea; there may be something lurking behind you. If you miss a flag the first time, you can catch it the next. The roads wrap around, as if you were driving around the outside of a cylinder. The only thing that's wasted is time, which is important—you're given bonus points based on how long it took you to grab all the flags.

Hills are steep, sometimes you'll have to roll back down and get a running start. But you can pick up speed on the downhill stretches. Displays show how many flags you've already snapped up, and which colors are still left somewhere in the wilderness.

Up n' Down, graphically entertaining, is a frantic race against time and the computer. More often than not, your dune buggie ends up as a pile of metal. Fortunately, you don't have to pay the insurance.

Sega Enterprises, Inc.
Sega Consumer Products
360 N. Sepulveda
Suite 3000
El Segundo, CA 90245
disk or cartridge
(price unavailable)

Guitar Master

If you're a beginning guitar player and own a Commodore 64, you might do well to forego some formal lessons and try *Guitar Master* from MasterSoft. This package, which includes a disk and 78-page instruction manual, is a good introduction to the basics.

The software is menu-driven and simple to use. The main menu offers eight choices: Tuning, Chords, Chord Analyzer, Progressions, Pick and Strum, Transposing, Scales, and Fret Notes. The software teaches well by showing and playing

the exercises so you can see and hear how you should sound, and it lets you learn at the speed you choose. *Guitar Master*, however, can only take you up to a point. Techniques which can really make you sound good (like hammers, pull-offs, bends, and trills—best learned from close work with a teacher) are not—and probably could not be—considered in this package.

The manual is written well and full of clear, useful information. It also teaches timing and standard musical notation. In conjunction with the software, you can learn correct fingering, hundreds of chords, how (and why) they're constructed, major (only) scales, and the principles of transposition. At $49.95, the package is roughly equivalent in cost to five lessons from a private instructor, and it teaches more than any virtuoso could hope to teach you in that time.

MasterSoft
P.O. Box 1027
Bend, OR 97709
$49.95

Eliza

Eliza is not a new product, but many readers may be unaware of this fascinating and instructive "computer psychotherapist" program which traces its history back to a mainframe computer at MIT.

In 1965, computer pioneer Dr. Joseph Weizenbaum created *Eliza* as a spoof of nondirective psychotherapy. *Eliza* asks questions, responds to your answers in nonjudgmental ways, and gently probes your thoughts and feelings. It remains an interesting experiment in artificial intelligence simulation, even if the program routines soon become obvious to you.

The Commodore 64 version of *Eliza* produced by the Artificial Intelligence Research Group has two attributes which make it well worth the $45 purchase price. First, it's a full equivalent of the original MIT mainframe program, employing the same conversational power that makes *Eliza* seem so human. Some other versions available are reduced in power and therefore in function. Second, the BASIC source code is unprotected. You can break into the program anywhere and make all the changes you want. Add color and sound—even speech synthesis. Build the vocabulary. Personalize the program. It's also a good piece of work for beginning programmers to study.

Artificial Intelligence Research Group
921 North La Jolla Avenue
Los Angeles, CA 90046
$45 (disk)

SATISFACTION GUARANTEED
OR MONEY BACK

1984 TAX RETURN HELPER

Fast and easy
income tax preparation.

- Form 1040 and Schedules A,B,C, D,E,G,SE,W and Form 2441
- Plus TAX DBASE - a data base program for tax related records that can be directly used in any of the forms (disk only)
- Enter and modify data on a screen copy of the form.
- Works like a spreadsheet - all the lines affected by a change are instantly updated.
- Automatic tax computation.
- Forms can be printed or saved.
- Price is **tax deductible.** Tape $23 Disk $33 (+ $1.50 S&H). Specify **C64 or VIC 20 (16K RAM).**
- Previous users discount $11 (disk), $7 (tape).

KSOFT CO.
845 WELLNER RD.
NAPERVILLE, IL 60540
(312) 961-1250

Dealer inquiries welcome

COMPUTER AND SOFTWARE SALE

COMMODORE 64
(with $12.95 Bonus Pack Purchase)

$175.00*

- 170K Disk Drive $199.00 *
- Tractor Friction Printer $169.00*
- 13" Hi-Res Color Monitor $199.00 *

*less coupon discount

WE HAVE THE BEST SERVICE

WE HAVE THE LOWEST PRICES

SUPER AUTO DIAL MODEM 64
(Best communications package in USA)

$79.00

- Computer Learning Pad $39.95
- New Voice Synthesizer $59.00
- 12" Green or Amber Monitor $79.00
- 13" Daisy Wheel Printer $249.00

* COMMODORE 64 COMPUTER $175.00
You pay only $175.00 when you order the powerful 84K COMMODORE 64 COMPUTER! LESS the value of the SPECIAL SOFTWARE COUPON we pack with your computer that allows you to SAVE OVER $500 off software sale prices!! With only $100 of savings applied, your net computer cost is $75.00!!

*. 170K DISK DRIVE $199.00
You pay only $199.00 when you order the 170K Disk Drive! LESS the value of the SPECIAL SOFTWARE COUPON we pack with your disk drive that allows you to SAVE OVER $100 off software sale prices!! With only $500 of savings applied, your net disk drive cost is $99.00.

* 80 COLUMN 80CPS TRACTION FRICTION PRINTER $169.00
You pay only $169.00 when you order the Comstar T/F deluxe line printer that prints 8½x11 full size, single sheet, roll or fan fold paper, labels etc. Impact dot matrix, bidirectional, LESS the value of the SPECIAL SOFTWARE COUPON we pack with your printer that allows you to SAVE OVER $100 off software sale prices!! With only $500 of saving applied your net printer cost is only $69.00

* 13" HI-RES COLOR MONITOR $199.00
You pay only $199 when your order this 13" COLOR MONITOR with sharper and clearer resolution than any other color monitors we have tested! LESS value of the SPECIAL DISCOUNT COUPON we pack with your monitor that allows you to save over $500 off software sale prices With only $100 of savings applied, your net color monitor cost is only $99.00. (16 colors).

80 COLUMN BOARD $99.00
Now you program 80 COLUMNS on the screen at one time! Converts your Commodore 64 to 80 COLUMNS when you plug in the 80 COLUMN EXPANSION BOARD!! PLUS 4 slot expander! Can use with most existing software

80 COLUMNS IN COLOR EXECUTIVE WORD PROCESSOR $39.00
This EXECUTIVE WORD PROCESSOR is the finest available for the COMMODORE 64 computer! The ULTIMATE FOR PROFESSIONAL Word Processing DISPLAYS 40 or 80 COLUMNS IN COLOR or Black and White! Simple to operate, powerful text editing with 250 WORD DICTIONARY, complete cursor and insert/delete key controls line and paragraph insertion, automatic deletion, centering, margin settings and output to all printers! Includes a powerful mail merge

List 99.00 **SALE $39.00** Coupon $29.95

SPECIAL SOFTWARE COUPON

We pack a SPECIAL SOFTWARE DISCOUNT COUPON with every COMMODORE 64 COMPUTER DISK DRIVE-PRINTER-MONITOR we sell! This coupon allows you to SAVE OVER $500 OFF SALE PRICES!!

(Examples)
PROFESSIONAL SOFTWARE
COMMODORE 64

Name	List	Sale	Coupon
Executive Word Processor	$99.00	$39.00	$29.95
Executive Data Base	$69.00	$24.95	$19.95
20,000 Word Dictionary	$24.95	$14.95	$10.00
Electronic Spread Sheet	$59.95	$49.00	$39.00
Accounting Pack	$49.00	$39.00	$29.00
Practicalc	$59.95	$34.95	$29.95
Programmers Reference Guide	$20.95	$16.95	$12.50
Programmers Helper (Disk)	$59.95	$39.95	$29.95
80 Column Screen (Disk)	$59.95	$39.95	$29.95
Flip & File Disc Filer	$39.95	$16.95	$14.95
Deluxe Tape Cassette	$89.00	$39.00	$29.95
Pro Joy Stick	$24.95	$15.95	$12.00
Light Pen	$39.95	$14.95	$9.95
Dust cover	$8.95	$6.95	$4.60
Pogo Joe	$29.95	$19.95	$16.95
Pitstop II Epyx	$39.95	$29.95	$26.00 Plus One FREE
Music Calc	$59.95	$39.95	$34.95
Filewriter	$59.95	$39.95	$34.95

(See over 100 coupon items in our catalog)
Write or call for Sample SPECIAL SOFTWARE COUPON!

EXECUTIVE QUALITY PROFESSIONAL BUSINESS SOFTWARE

The Cadillac of Business Programs for Commodore 64 Computers

Item	List	SALE	Coupon
Inventory Management	$99.00	$39.00	$29.00
Accounts Receivable	$99.00	$39.00	$29.95
Accounts Payable	$99.00	$39.00	$29.95
Payroll	$99.00	$39.00	$29.95
General Ledger	$99.00	$39.00	$29.95

SUPER AUTO DIAL MODEM $79.00
Easy to use. Just plug into your Commodore 64 computer and you're ready to transmit and receive messages. Easier to use than dialing your telephone just push one key on your computer! Includes exclusive easy to use program for up and down loading to printer and disk drives. List $129.00 **SALE $79.00.**

NEW COMPUTER LEARNING PAD $39.95
makes other graphics tablet obsolete. This new TECH SCETCH LEARNING PAD allows you to draw on your T.V. or Monitor and then you can print whatever you draw on the screen on your printers. FANTASTIC!!! List $79.95 **SALE $39.95**

NEW VOICE SYNTHESIZER $59.00
For Com-64 or VIC 20 computers. Just plug it in and your can program words and sentences, adjust volume and pitch, make talking adventure games, sound action games and customized talkies!! FOR ONLY $19.95 you can add TEXT TO SPEECH, just type a word and hear your computer talk—ADD SOUND TO "ZORK", SCOTT ADAMS AND AARDVARK ADVENTURE GAMES!! (Disk or tape)

12" GREEN OR AMBER MONITOR $79.00
Your choice of green or amber monitor, top quality, 80 columns x 24 lines, easy to read anti glare, ***PLUS*** $9.95 for connecting cable commodore 64 or Vic 20

13" DAISY WHEEL PRINTER $249.00
"JUKI" Superb letter quality daisy wheel printer, 13" extra large carriage, up to 12 CPS bi-directional printing, drop in cassette ribbon, centronics parallel or R232 serial port built in! (specify)
List $399.00 **SALE $249.00**

COM-64 4 SLOT EXPANSION BOARD $29.95
Easy to use, switch selectable, reset button and LED indicator — saves your computer and cartridges
List $79.00 **Sale $29.95**

FLOPPY DISK SALE 98¢
Lowest prices in the U.S.A.!! Single sided single density, with hub rings, quality guaranteed! (100 bulkpack 98¢ ea.) (Box of 10 $12.00)

PHONE ORDERS
8AM - 8PM Weekdays
9AM - 12N Saturdays

• LOWEST PRICES • 15 DAY FREE TRIAL • 90 DAY FREE REPLACEMENT WARRANTY
• BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL • OVER 500 PROGRAMS • FREE CATALOGS

Add $10.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add $20.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery. 2 to 7 days for phone orders, 1 day express mail!

VISA — MASTER CARD — C.O.D.

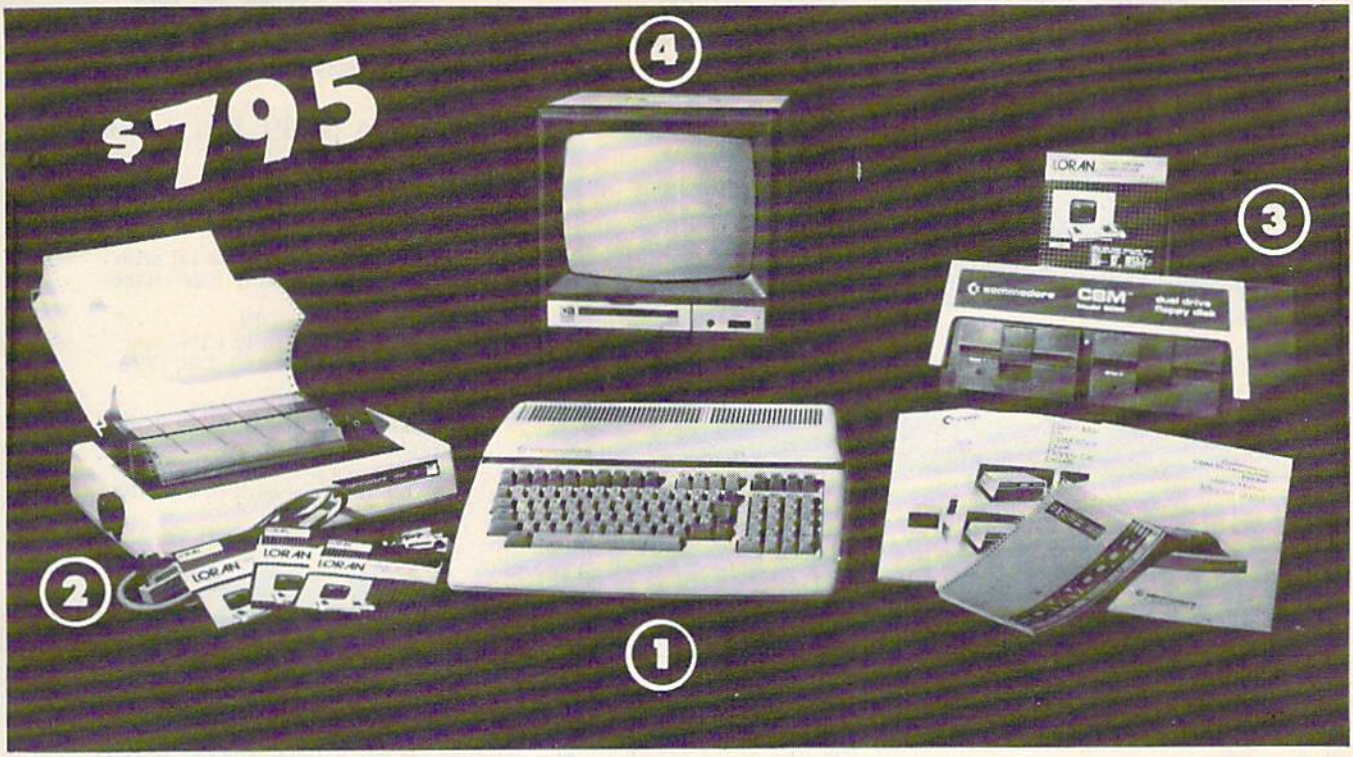
PROTECTO ENTERPRIZES
(WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

NEW 128K —MEGA BYTE DUAL DISK DRIVE—80 COLUMN

COMPUTER SYSTEM SALE!

HOME • BUSINESS • WORD PROCESSING



LOOK AT ALL YOU GET FOR ONLY **$795.**

	LIST PRICE
① B128 COMMODORE 128K 80 COLUMN COMPUTER	$ 995.00
② 4023 - 100 CPS - 80 COLUMN BIDIRECTIONAL PRINTER	499.00
③ 8050 DUAL DISK DRIVE (over 1 million bytes)	1795.00
④ 12" HI RESOLUTION 80 COLUMN MONITOR	249.00
• BOX OF 10 LORAN LIFETIME GUARANTEED DISKS	49.95
• 1100 SHEETS FANFOLD PAPER	19.95
• ALL CABLES NEEDED FOR INTERFACING	102.05
TOTAL LIST PRICE	**$3717.95**

$795 SALE PRICE

PLUS YOU CAN ORDER THESE BUSINESS PROGRAMS AT SALE PRICES

Programmers Reference Guide
List $29.95
Sale $24.95

	LIST	SALE	*SYSTEM PRICE*
Professional 80 Column Word Processor	$149.95	**$99.00**	***$49.00***
Professional Data Base	$149.95	**$99.00**	***$49.00***
Accounts Receivable	$149.95	**$99.00**	
Accounts Payable	$149.95	**$99.00**	
Payroll	$149.95	**$99.00**	
Inventory	$149.95	**$99.00**	
General Ledger	$149.95	**$99.00**	
Financial Spread Sheet	$149.95	**$99.00**	
Order Entry	$149.95	**$99.00**	

PRINTER REPLACEMENT OPTIONS

(replace the 4023 with the following at these sale prices)

	LIST	SALE
☆ Olympia Executive Letter Quality Printer	$699.00	**$379.00**
☆ Comstar Hi-Speed 160 CPS 15½" Business Printer	$779.00	**$469.00**
☆ Telecommunications Deluxe Modem Package	$199.00	**$139.00**
☆ IEEE to Centronics Parallel Printer Interface	$179.00	**$139.00**

15 DAY FREE TRIAL. We give you 15 days to try out this SUPER SYSTEM PACKAGE!! If it doesn't meet your expectations, just send it back to us prepaid and we will refund your purchase price!!
90 DAY IMMEDIATE REPLACEMENT WARRANTY. If any of the SUPER SYSTEM PACKAGE equipment or programs fail due to faulty workmanship or material we will replace it IMMEDIATELY at no charge!!

Add $50.00 for shipping and handling!!
WE DO NOT EXPORT TO OTHER COUNTRIES
Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery. 2 to 7 days for phone orders, 1 day express mail! We accept Visa and MasterCard. We ship C.O.D. to continental U.S. addresses only.

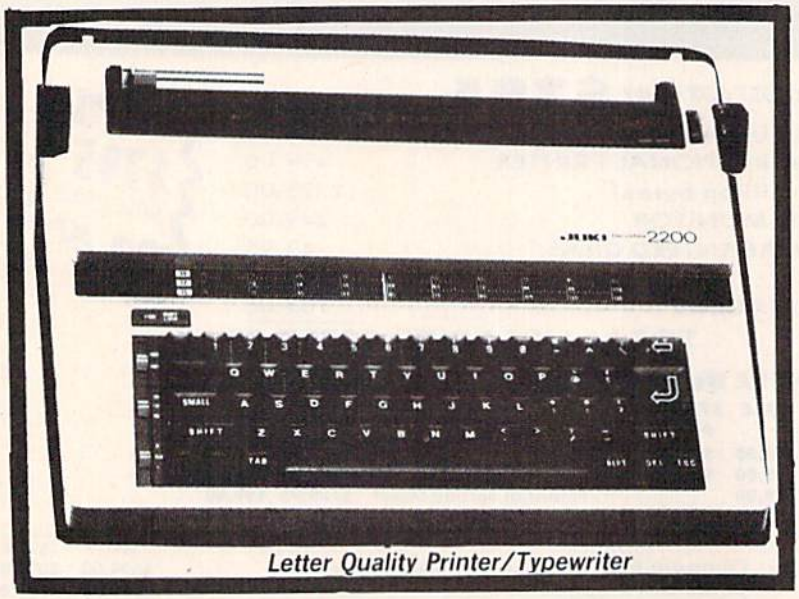
PROTECTO ENTERPRIZES (WE LOVE OUR CUSTOMERS)
BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

DAISY WHEEL PRINTER SALE!

JUKI®

(Japanese Highest Quality Award Winner)

Letter Quality Printer



Letter Quality Printer/Typewriter

DELUXE LETTER QUALITY "DAISY WHEEL PRINTERS"

JUKI®

DELUXE COMPUTER PRINTER

List Price $399 **SALE $249**

- Superb "Daisy Wheel" Computer Printer
- 100 Characters
- Bi-directional with special print enhancements-many type styles-$18.95
- Pitch 10, 12, 15 CPI
- Print Speed up to 12 CPS
- Print line width: 115, 138, 172 characters
- 13" Extra large carriage
- Drop in cassette ribbon (replacement $8.95)
- Centronics parallel RS 232 Serial interface built in (specify)

JUKI®

DELUXE "COMBINATION" PRINTER/TYPEWRITER

List Price $499 **SALE $299**

- Superb Computer Business printer combined with world's finest electronic typewriter!
- Two machines in one—just a flick of the switch!
- Superb letter quality correspondence—home, office, word processing!
- 13" Extra large carriage
- Drop in cassette ribbon—replacement $8.95
- Precision daisy wheel printing—many type styles! $18.95
- Pitch selector-10, 12, 15 CPS, Automatic relocate key!
- Automatic margin control and setting! Key in buffer!
- Centronics parallel or RS 232 Serial interface built-in (specify)

15 Day Free Trial - 90 Day Immediate Replacement Warranty

- COMMODORE 64 COMPUTER INTERFACE ONLY $49.00 - ATARI INTERFACE $79.00

ADD $10.00 for shipping and handling!!

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Canada orders must be in U.S. dollars. VISA — MASTER CARD ACCEPTED. We ship C.O.D.

PROTECTO ENTERPRIZES WE LOVE OUR CUSTOMERS

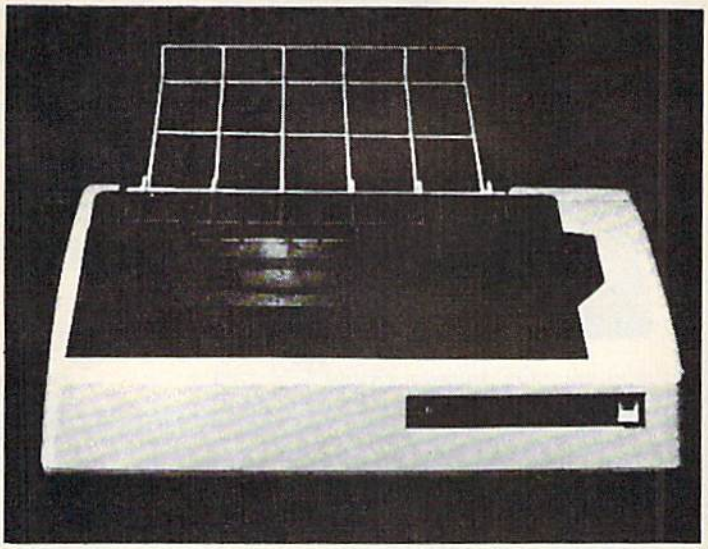
BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

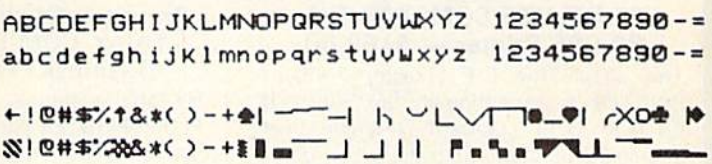
Commodore
Tractor/Friction PRINTER
No. 4023

List $499 **SALE $199**

(FREE: Script 64 Word Processor List $99.00)

- Includes interface for Com - 64 and VIC - 20
- 80 columns
- 100 characters per second
- Friction and Tractor feed
- Bi-directional
- Prints reverse characters
- Intelligent (Internal ROM and RAM)
- Programmable characters
- Enhanced Formatting included (automatic $ signs, tabbing, columns, etc.)





The 4023 is a highly advanced 80 column professional tractor/friction printer with full graphics capabilities for custom reports, and program listings. You have 64 programmable characters to define as well as full column and formatting controls. The characters are beautifully created in an 8 X 8 dot matrix. The paper feed is smooth and error free and even includes a paper rack for easier paper storage. The ribbon can be replaced with ease (no mess, easily available cartridge) and will last through 1.2 million characters. You can use single sheet standard paper or continuous forms to make up to 3 copies at one time (3 part forms). This is the best printer value in the U.S.A. For Commodore Computers!

SPECIFICATIONS

PRINTING METHOD
Serial Impact Dot Matrix

PRINT RATE
100 characters per second (CPS)

PRINT STYLE
Correspondence Quality

PRINT DIRECTION
Bi-directional

COLUMN CAPACITY
80

CHARACTER FONT
8 X 8

LINE SPACING
Programmable

CHARACTER SIZE
0.094" high, 0.08" wide

COPIES
3, including original

RIBBON TYPE
Cartridge

RIBBON LIFE
1.2 million characters

RIBBON CARTRIDGE
Commodore P/N613160550

PAPER WIDTH
3" to 10" tractor or single sheet friction

FORMS
7.5 plus (0.5 X 2 sprocket margins)
Pin-to-pin distance: .5" longitudinally
9.5" laterally
5/32" diameter

INTERFACE
IEEE protocol

GRAPHICS
64 Programmable graphics

15 Day Free Trial - 90 Day Immediate Replacement Warranty

Add $14.50 for shipping, handling, and insurance. Illinois residents please add 6% tax. Add $29.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES.

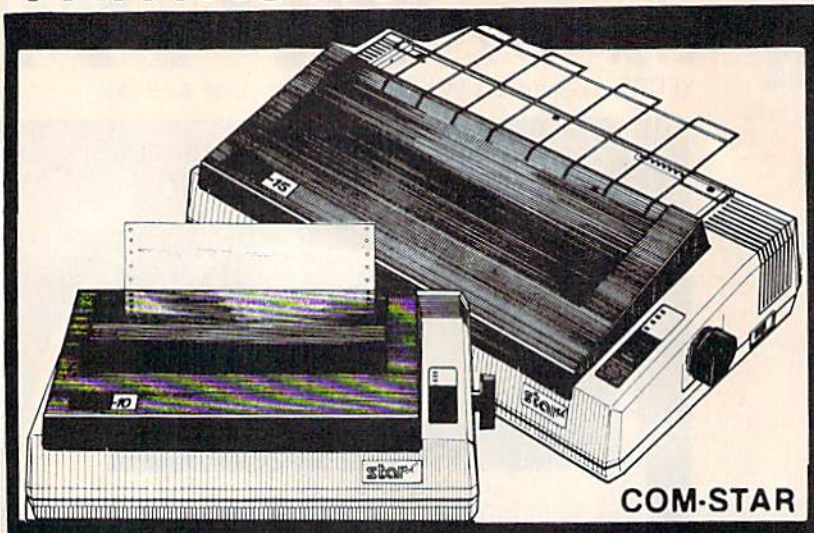
Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery. 2 to 7 days for phone orders. 1 day express mail!

VISA—MASTER CARD—We Ship C.O.D. to U.S. Addresses Only

PROTECTO ENTERPRIZES (WE LOVE OUR CUSTOMERS)

BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

FANTASTIC COMPUTER PRINTER SALE!!!



COM-STAR T/F

Tractor
Friction
Printer

only $ 169**

- Lowest Priced, Best Quality, Tractor-Friction Printers in the U.S.A.
- Fast 80-120-160 Characters Per Second • 40, 46, 66, 80, 96, 132 Characters Per Line Spacing
- Word Processing • Print Labels, Letters, Graphs and Tables • List Your Programs
- Print Out Data from Modem Services • "The Most Important Accessory for Your Computer"

** DELUXE COMSTAR T/F 80 CPS Printer — $169.00

This COMSTAR T/F (Tractor Friction) PRINTER is exceptionally versatile. It prints 8½" x 11" standard size single sheet stationary or continuous feed computer paper. Bi-directional, impact dot matrix, 80 CPS, 224 characters. (Centronics Parellel Interface).

Premium Quality 120-140 CPS 10X COM-STAR PLUS+ Printer $234.00

The COM-STAR PLUS+ gives you all the features of the COMSTAR T/F PRINTER plus a 10" carriage, 120-140 CPS, 9 x 9 dot matrix with double strike capability for 18 x 18 dot matrix (near letter quality), high resolution bit image (120 x 144 dot matrix), underlining, back spacing, left and right margin settings, true lower decenders with super and subscripts, prints standard, italic, block graphics and special characters. It gives you print quality and features found on printers costing twice as much!! (Centronics Parallel Interface) (Better than Epson FX80). List $499.00 **SALE $234.00**

Premium Quality 120-140 CPS 15½X COM-STAR PLUS+ Business Printer $339.00

Has all the features of the 10" COM-STAR PLUS +PRINTER plus 15½" carriage and more powerful electronics components to handle large ledger business forms! (Better than Epson FX 100) List $599

SALE $339.00

Superior Quality 10" COM-STAR+ H.S. HIGH SPEED 160-180 CPS Business Printer $359.00

This **Super High Speed Com-Star+ Business Printer** has all the features of the 10" COM-STAR+ PRINTER with HIGH SPEED BUSINESS PRINTING 160-180 CPS, 100% duty cycle, 8K Buffer, diverse character fonts, special symbols and true decenders, vertical and horizontal tabs. **A RED HOT BUSINESS PRINTER** at an unbelievable low price (Serial or Centronics Parallel Interface) List $699.00 **Sale $359.00**

Superior Quality 15½" COM-STAR PLUS+ H.S. High Speed 160 - 180 CPS Business Printer $459.00

15½" Carriage and more powerful electronic components to handle larger ledger business forms! (Serial Centronics Parallel Interface) List $799 **SALE $459**

13" DAISY WHEEL PRINTER $249.00

"JUKI" Superb letter quality daisy wheel printer, 13" extra large carriage, up to 12CPS bi-directional printing, drop-in cassette ribbon, (90 day warranty) centronics parallel or RS232 serial port built in! (Specify)
List $399.00 **SALE $249.00**

Printer/Typewriter Combination $299.00

"JUKI" Superb letter quality, daisy wheel printer/typewriter combination. Two machines in one-just a flick or the switch. 13" extra large carriage, typewriter keyboard, automatic margin control and relocate key drop in cassette ribbon! (90 day warranty) centronics parallel and RS232 serial port built in (Specify)
List $$499.00 **SALE $299.00**

• 15 Day Free Trial - 1 Year Immediate Replacement Warranty

PARALLEL INTERFACES

For VIC-20 and COM-64 — $49.00 For Apple computers — $79.00 Atari Interface—$79.00

Add $14.50 for shipping, handling and insurance. Illinois residents please add 6% tax. Add $29.00 for CANADA, PUERTO RICO, HAWAII, ALASKA, APO-FPO orders. Canadian orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail!
VISA—MASTER CARD—We Ship C.O.D. to U.S. Addresses Only

PROTECTO ENTERPRIZES (WE LOVE OUR CUSTOMERS)
BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

COM-STAR PLUS+ Print Example: ABCDEFGHIJKLMNOPQRSTUVWXYZ
ABCDEFGHIJKLMNOPQRSTUVWXYZ 1234567890

COLOR MONITOR SALE!!!

(Lowest price in USA)

- Built in speaker and audio
- Front Panel Controls
- For Video Recorders
- For Small Business/ Computers
- Apple-Commodore Atari-Franklin-etc.

13" Color Computer Monitor

16 COLORS

- Beautiful Color Contrast
- High Resolution
- Separated Video
- Sharp Clear Text
- Anti Glare Screen
- 40 Columns x 24 lines
- Supports 80 Columns
- List $399

SALE $199

15 Day Free Trial - 90 Day Immediate Replacement Warranty

12" XTRON SUPER HI-RESOLUTION "SWIVEL BASE" MONITOR

List $249 **SALE $119**

80 Columns x 24 lines, Super Hi-Resolution 1000 lines
Green or Amber super-clear "Easy to Read" text with special anti-glare screen!

12" ZENITH HI-RESOLUTION GREEN OR AMBER TEXT DISPLAY MONITOR

List $199 **SALE $99**

80 Columns x 24 lines, Hi-Resolution-crisp clear easy to read text with anti-glare screen! A MUST for word processing.

12" MONITOR GREEN OR AMBER TEXT

80 Columns x 24 lines, easy to read up front controls

List $159 **SALE $79.95**

• LOWEST PRICES • 15 DAY FREE TRIAL • 90 DAY FREE REPLACEMENT WARRANTY
• BEST SERVICE IN U.S.A. • ONE DAY EXPRESS MAIL • OVER 500 PROGRAMS • FREE CATALOGS

Add $10.00 for shipping, handling and insurance. Illinois residents please add 6% tax. Add $20.00 for CANADA, PUERTO RICO, HAWAII orders. WE DO NOT EXPORT TO OTHER COUNTRIES.

Enclose Cashiers Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail! Canada orders must be in U.S. dollars. Visa - MasterCard - C.O.D.

PROTECTO ENTERPRIZES (WE LOVE OUR CUSTOMERS)
BOX 550, BARRINGTON, ILLINOIS 60010
Phone 312/382-5244 to order

Michael S. Tomczyk

Computer Math For Beginners

Last month we presented a brief introduction to computer math. This month and next we'll look at some more computer math—as well as some important general programming concepts, with emphasis on using variables, our special focus area for 1985.

The heart of this month's lesson is a short little program called "A Simple Adding Machine." Actually, it's simple if you know how it works—but confusing if you don't.

Dissecting a program and understanding how it works is one of the hardest things to learn as a beginning programmer. That's why we're going to spend some extra time this month working with our first program example. We'll start by introducing an "adding machine" program, then we'll walk through it in detail and see how it works. Finally, we'll dress up our program by adding a pinch of this and a dash of that—and learn how to use the mysterious DEF FN command.

Let's first review computer math symbols.

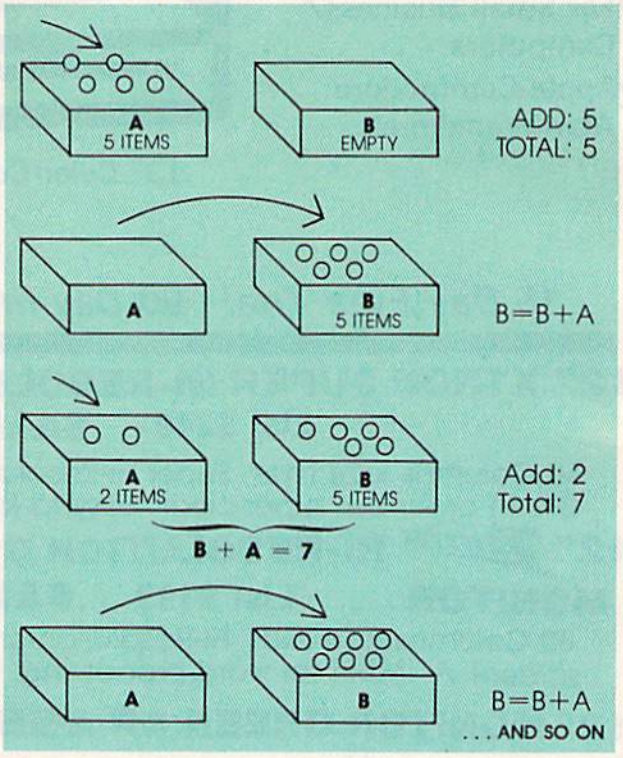
+ for addition (PRINT 4+4)
− for subtraction (PRINT 9−5)
*** for multiplication (PRINT 2*5)**
/ for division (PRINT 10/5)
/ for fractions (PRINT 1/2*1/3)
↑ for exponents (PRINT 2↑3)
. for percent (.12) or decimal (.99)
() for formulas (PRINT (2/5)*(12.5))—always use same number of left and right parentheses

A Simple Adding Machine

We'll start with a simple computerized adding machine. This short program lets you add numbers like a calculator. The program displays the current total, as well as the number you want to add. To see how it works, enter the program, then type RUN and press RETURN:

```
10 PRINT CHR$ (144) CHR$ (147)
20 PRINT "ADD";: INPUT A
30 PRINT SPC (9) "{RVS} TOTAL" B+A:PRINT
40 B=B+A
50 GOTO 20
```

This is a short program, but it contains some unusual BASIC concepts, and an interesting use of the variables A and B. Before analyzing the program line by line, let's take a very simplified look at what this program does, using the accompanying illustrations.



Imagine you have two storage boxes marked A and B. At the beginning, both boxes are empty, which means their value is zero. The computer asks us how many items we want to put in box A and we answer by typing our first number—let's say five—which is stored in the A box.

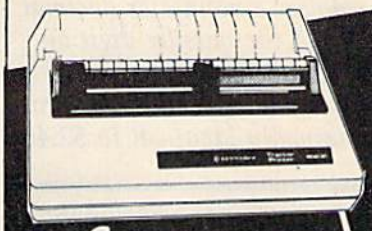
If we add the contents of both boxes (B+A), the *total* is five items because there are five items in the A box (but the B box is still empty).

Before we can put more items into the A box we have to move its contents (five items) into the B box to make room.

Now we put two items in the A box. This

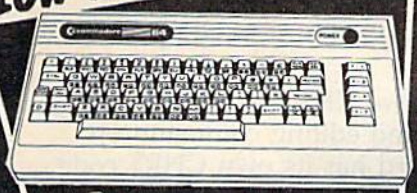
COMPUTER CENTERS of AMERICA

USER FRIENDLY PRICES!
(BELOW WHOLESALE)

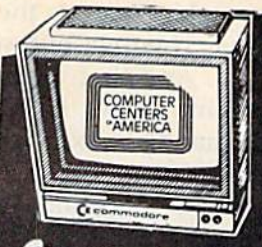


commodore
NEW 802 PRINTER
229.95

commodore
VIC 1541 DISC DRIVE
209.95



commodore
64
189.95
C-16 & C+4 IN STOCK!



commodore
1702 MONITOR
209.95

ALL CARDCO PRODUCTS IN STOCK & ON SALE!

New! MSD Super Disc II
Now On Sale
449.95
Single Drive 249.95

Monitors

BMC AU9191U	169.95
Pan 1300 RGB & Comp.	289.95
BMC Green	69.95

Printers

Gemini 10X	239.95
Gemini 15X	399.95
Silver Reed 400	249.95
Silver Reed 500	379.95
Brother 15X	379.95
Brother 25X	514.95
Juki 6100	399.95

Diskettes

BASF	13.95
Sentinel Color	16.95
Scotch	14.95
Maxell	14.95

Interfaces

Cardco G+	Call

Modems

Comm 1660	$99
Hayes-300	Call
Hayes-1200	Call
Hes II	Call

Cassette Recorders

Comm CN-2	59.95
Third Party	39.95

TO ORDER: CALL TOLL FREE—WE'RE PROUD OF OUR PRICES—SATISFACTION GUARANTEED

1-800-631-1003

IN NEW YORK STATE CALL TOLL FREE 1-800-221-2760 OR 516-249-2120

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.
All goods are new and include factory warranty. Dealers Welcome!
Prices and availability are subject to change without notice.
All factory fresh merchandise with manufacturer's warranty.
Prices & policy may vary in retail stores.

VISA
MasterCard

COMPUTER CENTERS AMERICA
Computer Centers of America
31 East Mall
Plainview, NY 11803

We're Reliable! 18 years of service at these locations: Plainview, Syosset, New Hyde Park, West Hempstead, Huntington, Patchogue

TOUCH TABLETS

Koala Touch Tablet-D	64.95
Koala Touch Tablet-Cart	69.95
Muppet Learning Keys	Call

ACCESS

Neutral Zone-D/T	20.95
Spritemaster-D/T	20.95
Beachhead-D/T	20.95
Master Composer-D	23.95

SPINNAKER

Adventure Creator-Cart	21.95
Aerobics-D	25.95
Aegean Voyage-Cart	21.95
Alf in the Color Caves-C	21.95
Alphabet Zoo-Cart	20.95
Bubble Burst-Cart	21.95
Cosmic Life-Cart	20.95
Delta Drawing-Cart	21.95
Facemaker-Cart	20.95
Fraction Fever-Cart	20.95
Grandma's House-D	20.95
Jukebox-Cart	20.95
Kids on Keys-Cart	20.95
Kidwriter-D	20.95
Kindercomp-Cart	17.95
Ranch-Cart	20.95
Rhymes/Riddles-D	17.95
Search/ Amazing Thing-D	24.95
Snooper #1-D	24.95
Snooper #2-D	24.95
Story Machine-Cart	20.95
Trains-D	24.95
Up For Grabs-Cart	20.95

HESWARE

Super Zaxxon	22.95
64 Forth-Cart	40.95
6502 Profess Dev Sys-T	19.95
Coco-D/T	26.95
Factory-D	16.95
Finance Manager-D	48.95
Ghost Manor/Spike Pk-D	18.95
Graphics Basic-D	23.95
HES Cat-D	18.95
HES Font-Cart	15.95
HES Games '84-D	23.95
HES Kit-Cart	33.95
HES Mon-Cart	25.95
HES Writer-Cart	29.95
Microsoft Multiplan-D	65.95
Minnesota Fats' Pool-Cart	19.95
Missing Links-D	19.95
Mr. TNT-Cart	19.95
Omniwriter/ Omnispell-D	49.95
Root n' Tootin-Cart	23.95
Synthesound-D	15.95
The Pit-Cart	19.95
Time Money Manager-D	48.95
Turtle Graphics II-Cart	40.95
Turtle Toyland Jr.-D/T	22.95
Type n' Writer-D	19.95
HES Modem I	49.95

COMMODORE

Program Ref. Guide	19.95
Assembler-D	17.95
Easy Finance I,II,III,IV,-D	19.95
Easy Calc-D	64.95
Easy Mail-D	17.95
Easy Script-D	39.95
Easy Spell-D	19.95
Logo-D	49.95
The Manager-D	37.95
General Ledger-D	37.95
Accts. Rec.-D	37.95
Accts. Pay.-D	37.95
Magic Desk-D	52.95
Zork I, II or III-D	29.95
Suspended-D	29.95
Starcross-D	29.95
Deadline-D	29.95

CBS SOFTWARE

Argos Expedition-D	29.95
Charles Goren's Bridge-D	49.95
Coco Notes-D	19.95
Ducks Ahoy-D	23.95
Ernie's Magic Shapes-D	23.95
Mastering the SAT-D	104.95
Movie Musical Madness-D	24.95
Murder by the Dozen-D	23.95
Peanut Butter Panic-D	24.95
Sea Horse Hide n Seek	24.95
Success Decimals (Add/Subt)-D/T	14.95
Success Decimals (Mult/Div)-D/T	14.95
Success Fractions (Add/Subt)-D/T	14.95
Success Fractions (Mult/Div)-D/T	14.95
Timebound-D	24.95
Webster Word Game-D	24.95

ACCESSORIES

WICO Joysticks	Call
Flip'n'File-D	20.95
Flip'n'File Cart	20.95
Joysensor	Call
WICO Trakball	37.95
KRAFT Joystick	15.95

ATARISOFT

Battlezone-Cart	24.95
Centipede-Cart	24.95
Defender-Cart	24.95
Dig Dug-Cart	24.95
Donkey Kong-Cart	24.95
Galaxian-Cart	24.95
Joust-Cart	24.95
Jungle Hunt-Cart	24.95
Moon Patrol-Cart	24.95
Ms. Pac-Man-Cart	24.95
Pac-Man-Cart	24.95
Pole Position-Cart	24.95
Robotron: 2084-Cart	24.95

Concorde Third Party Disk Drive for Commodore 64 parallel & serial models available 169.95

Price reductions may have been made since this ad was placed. Call us for our latest price quotes.

means the B box holds five items and the A box holds two items, so the total of B and A is seven.

Again, we move the contents of A into the B box, which means the B box now holds seven items. Then we put more items in the A box, and so on. And that, in general, is how our adding machine works. Let's take a look at the BASIC commands to examine the entire program in detail.

Line 10 contains two CHR$ (character string) codes. Every symbol and editing command on your computer keyboard has its own CHR$ code. These codes are listed in a special appendix in your owner's manual. CHR$ codes are used with the PRINT command, *without quotation marks.* You can "stack" or "line up" several CHR$ codes after one PRINT command—for instance, here we used two CHR$ codes on the same PRINT line. CHR$(144) sets the display color to black. CHR$(147) clears the screen.

Line 20 prints the word ADD on the screen (we'll skip the semicolon and colon for a moment). INPUT A automatically displays a question mark (?) and waits for a number to be entered. You might think of A as box A. To put a number in the "box," you have to type a number and press RETURN. Let's say you type the number 5. The variable A, no matter what value it held before, now stands for the number 5. From now on, when we use the variable A, it's the same as using the number 5 (until we decide to put another number in the box).

Incidentally, the semicolon (;) in line 20 is like "programming glue." It links things together. If we left it out, the question mark would appear by itself on the next line down instead of immediately after the word ADD. The colon (:) is used to separate commands whenever two or more BASIC commands are used on one program line.

Line 30 uses the SPC command to print nine blank spaces, then it displays—in reverse characters—the word TOTAL followed by the sum of the numbers represented by the variables A plus B. Since B is "empty" and equals zero, B+A is the same as 0+5 (or 5). The PRINT command all by itself inserts a blank line on the screen between the TOTAL and ADD lines.

Line 40 defines the variable B as the sum of B plus A. What it really does is add the value of A to the value of B so that B now equals (B+A). For example, if B is 0 and A is 5, B now equals 5+0, which is 5. For a moment, both B and A hold a 5, but not for long.

Line 50 recycles the program back to line 20 and asks for a new value for variable A—let's say, the number 2. This time when the program reaches B+A in line 30, B equals 5 and the new A equals 2 so the second total is 7. Line 40 redefines B as B+A which is the same as 5+2. So now B becomes 7 and A is ready to receive another number. The result is an "adding loop." To break out of the loop and stop the program, hold down RUN/STOP and press RESTORE (RUN/STOP-RESET on the Plus/4 and 16).

REM: *You can enter dollar amounts or decimal numbers such as 52.49, but if the outside digit on the right side of the decimal is a zero, as in the number 52.40, the computer will truncate the zero and display 52.4, mathematically identical to 52.40.*

Here's a variation you may want to try which adds a title at the top of the screen, and repeats the TOTAL and PLUS (ADD) lines in the same position every time. You may want to save the previous program on tape or disk, then type NEW and enter this version:

```
10 PRINT CHR$(144): GOSUB 100
20 B=B+A: A=0: GOTO 10
100 PRINT CHR$(147); "{RVS} ADDING MACHIN
    E ": PRINT
110 PRINT "{RVS} TOTAL " B+A
120 PRINT "PLUS";: INPUT A: RETURN
```

This program starts at line 10, uses a GOSUB command to jump down to lines 100–120, then uses a RETURN to jump back to line 20, and repeats the loop.

Line 10 uses PRINT and CHR$(144) to set the color to black, and GOSUB to go to lines 100–120 to display the title and total. GOSUB stands for GO to SUBroutine. It tells the computer to jump to the subroutine in the line specified (in this case line 100). The RETURN command at the end of the subroutine (line 120) tells the computer to jump *back* to the point where it left off in the program.

Line 100 uses CHR$(147) to clear the screen, then on the same PRINT line displays the words ADDING MACHINE in reverse (RVS) characters. The {RVS} means hold down the CTRL key and press the RVS ON key at the same time—you don't need a RVS OFF because the reverse feature is automatically turned off at the end of the line. The PRINT command by itself inserts a blank line.

Line 110 prints the word TOTAL in reverse letters, followed by the current total, which is the sum of variables B and A.

Line 120 prints the word PLUS in normal letters. The INPUT command displays a question mark and waits for the user to type a number, which becomes variable A. The RETURN command signals the end of the GOSUB routine and sends the computer back to where it left off, which was the end of line 10.

Line 20 is executed next. B=B+A is the

same as the previous version. Here, we really empty box A by letting A=0 before we GOTO line 10 and repeat the adding process.

You can modify the program we've been working with to display a running average of the numbers you enter. An average is obtained by adding together a group of numbers, then dividing the total by how many numbers there are in the group. For example, if you have two numbers, let's say 10 and 4, you add them up to get 14, then find the average by dividing the total (14) by how many numbers there are in the group (there are 2 numbers in this group). So 14/2 is 7 and we see that the average of 10 and 4 is 7.

But first we have to learn about something called a *program counter*, which helps us keep track of how many numbers we're adding so we can calculate their average.

Using A Program Counter

A program counter usually adds one to itself each time an action occurs in a program (you could also count by twos or by any other interval). Here's an example of a simple program using a program counter:

```
10 PRINT N
20 FOR T=1 TO 500: NEXT
30 N=N+1
40 GOTO 10
```

Type RUN and press RETURN. To stop the program, press RUN/STOP. The key to this counter is line 30: N=N+1.

Line 10 displays the value of N. But the variable N hasn't been given a value yet—it's still an "empty box"—so the value is zero and the computer displays a zero on the screen.

Line 20 is a *time delay loop*, which is an application of a FOR-NEXT loop. Time delay loops slow down your program. Changing the number 500 to a larger number causes a longer delay and slows down the program. Changing it to a smaller number makes the program run faster. We use a time delay loop here to make it easier to see what's happening. (Incidentally, the variable T in this line can be any numeric variable, but it's a good idea to use T wherever you have a time delay loop because FOR-NEXT loops are used for different purposes and using T helps you identify which loops are time delays.)

Line 30 increases the value of N by one. We say the N "is adding one to itself." One way to look at this line is to think of the first N as the *new* N you want to define, and the second N as the *old* or *current* N, like this: (*new* N)=(*old* N)+1. The first time through the loop, this is the same as saying N=0+1, which is the same as saying N=1.

Line 40 sends the program back to line 10 to repeat itself. This time the computer prints the new value of N, which is 1.

The next time the program goes around, N equals 1, so in line 30, N=N+1 is the same as N=1+1, which is 2. This is how we get N equal to 0, 1, 2—and so on, which gives us a counter.

Sometimes you may want to start the counter at 1 instead of 0. This is necessary if you want to divide the value of N into another number, because the computer will not divide by zero. If you try to divide by zero, an error message is returned. You can avoid this by starting N at a value of 1 by switching the sequence around a bit, like this:

```
10 N=N+1
20 PRINT N
30 FOR T=1 TO 500: NEXT
40 GOTO 10
```

In line 10, the *old* N equals zero because it hasn't been defined yet, so N=N+1 is the same as N=0+1, which is the same as N=1. Notice how this type of counter, beginning with N=1, is used in the averaging program which follows.

Adding Numbers With A Running Average

It's easy to adapt our adding machine program so it keeps track of how many numbers we're adding and gives us a running average. There are many uses for running averages—for example, a teacher might want to add up all the test scores in a class to find the average score. This technique can also be modified to calculate the "mean" and find other statistics as well.

```
10 PRINT CHR$(144): GOSUB 100
20 B=B+A: A=0: N=N+1: PRINT "{HOME}
   {5 DOWN}" "AVERAGE" B/N
30 FOR T=1 TO 750: NEXT: GOTO 10
100 PRINT CHR$(147); "{RVS} ADDING MACHIN
    E": PRINT
110 PRINT "{RVS} TOTAL" B+A
120 PRINT "PLUS";: INPUT A: RETURN
```

The key modifications are found in line 20. Line 10 begins with CHR$(144) which sets the color to black. The GOSUB sends the computer to lines 100–120. Line 100 clears the screen, sets up the title in reverse letters, and uses the PRINT command by itself to insert a blank line on the screen. Line 110 prints the word TOTAL in reverse letters along with the total of B+A. The opening total is 0 because B and A haven't been defined yet. They're still "empty boxes."

Line 120 prints the word PLUS, waits for the input of the variable A, then returns to the end of the GOSUB and moves to line 20.

Line 20 has B "adding A to itself." Then we find our counter. N=N+1 sets the value of N at 1, so we begin our counter at 1. We then use PRINT to go to the HOME position and move

down the screen with five "cursor downs," which gives us the position where we will display the word AVERAGE and the averaging formula.

The averaging formula is simple. As we noted earlier, an average is the total of the numbers being added together divided by how many numbers there are. The first TOTAL is 0 and there is no average yet. If you type the number 1 after the word PLUS, the TOTAL becomes 1 and the average becomes 1 also because the total (B) divided by the counter (N) is 1/1, which is 1. On the second go-round, the counter moves to 2. If the second number you add is 3, the second TOTAL becomes 4 (1+3=4) and the AVERAGE is 4/2, which is 2. This process continues because every time you go around through the program and add another number, the counter keeps track of how many numbers you added and divides the total by how many numbers you've added. The AVERAGE is flashed on the screen with a time delay of 750.

You may want to save this program on tape or disk before going on. Then type NEW and press RETURN to erase it and get ready for the next example.

The DEF FN Command

One of the best computer math tools is the DEF FN (DEFine FuNction) command. DEF FN lets you create a long calculation or formula and plug your own number(s) into the formula and display or use the result in your program.

This command can be confusing because it uses two or three different variables, but it really looks much more complicated than it is. It takes most people a little practice to understand how it works, but the result is worth the effort. Let's look at the *structure* of a DEF FN command:

DEF FN A(X)=(formula containing X)

The letter A is a variable which you insert; it's the "variable name" of the function. If you want to use this function in your program you'll refer to FN A (Function A). You can have several different functions in one program, each with a different variable name.

The X in parentheses determines the position of the *working number* in the formula. In a moment we'll see what a working number is. For now, just remember that we're going to plug in our own working number wherever the variable X appears in the formula. The use of X as a variable here is purely arbitrary. We could use other variables such as N1 or Y just as easily because the only purpose this variable serves is to designate the position of the working number we want to plug into the formula. Confused? OK, let's try a real example to try to clarify things. Here's a simple one:

```
10 DEF FN A(X)=(5+X)
20 PRINT FN A(4)
```

Line 10 contains the DEF FN (DEFine FuNction) command. What this says is that we're going to take a number represented by X and plug it into the formula (5+X). This formula will be called Function A, and from now on when we want to use this formula in our program we'll refer to it as FN A (Function A).

Line 20 is where we use the formula. FN A(4) tells the computer to replace the X with the number 4 in the formula in line 10. PRINT FN A(4) means "calculate and display the result of the formula using the number 4." Got it? Try this example using some other numbers. Try changing the formula from (5+X), for example, to (X/2) or some other formula.

We inserted the number 4 in our example, but you can use a numeric variable obtained from an INPUT statement, too. Type NEW and press RETURN, then enter this example:

```
10 DEF FN A(X) = (X*100)
20 PRINT "ENTER A NUMBER";: INPUT N
30 PRINT "100 TIMES" N "EQUALS" FN A(N)
```

Type RUN and press RETURN.

Line 10 contains the DEF FN command. What this says is that we're going to take a number represented by X and plug it into the formula (X*100).

Line 20 prints a prompt message and asks for an INPUT which is given the variable name N. From now on the variable N is the same as the number you typed in. For example, if you typed 6, then N stands for 6.

Line 30 prints the words "100 TIMES" and then goes outside quotation marks to print the number you typed in (represented by the variable N) and then prints the word EQUALS.

FN A(N) is the Function A formula from line 10 with your number (N) plugged into the formula. If your number is 6, then N equals 6 and FN A(N) is the same as saying FN A(6), which is the same as saying (6*100), which is the same as 600. The computer displays the result from the FN A(N) formula, which is 600.

A reminder if you're still confused: The X in the DEF FN line is *only used for this position.* It tells the computer where to plug in the number or variable. The part of the program that actually inserts the number and performs the calculation is: PRINT FN A(N) or PRINT FN A(6).

Here's a more practical example. Type NEW and press RETURN.

```
10 DEF FN A(F) = 5*(F-32)/9
20 PRINT "FARENHEIT TEMPERATURE": INPUT F
30 PRINT "DEGREES FARENHEIT EQUALS" FN A(
   F) "DEGREES CELSIUS"
40 GOTO 10
```

WE'LL BEAT IT OR EAT IT!

In the unlikely event anybody has a lower price than our's on the software and peripherals advertised below, we'll beat it by at least one dollar or eat the product. It's much easier to beat their prices than eat a disk, so guess what we're going to do! *

TUSSEY MOUNTAIN SOFTWARE

- **NEXT DAY SHIPPING** on in-stock items
- **ORDER WITH CONFIDENCE** we honor manufacturer's warranties
- **VISA** and **MASTERCARD ACCEPTED**
- **FREE 20 PAGE CATALOG**

Toll Free Order Line: **800-468-9044**
Information and PA Orders: 814-234-2236
Phone lines open 10-8 Mon-Fri, 10-5 Sat

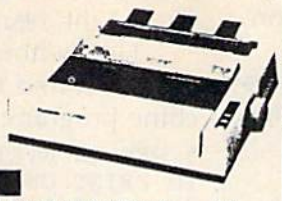
THE PANASONIC KXP 1091 PRINTER

Near letter quality at the flick of a switch

The 1091 zips along at 120 cps and has a 1k buffer. It also has all the print modes of the Gemini 10X and Epson RX-80, plus a BIG difference. The 1091 has a near letter quality switch. Flip it and you get a super tight 12 by 18 matrix with characters that rival a daisy wheel! The 1091 has both friction and tractor feed.

our price ..... **$299.00!**

Panasonic KXP 1090 ..... $239.00



PRINTERS

Gemini 10X	$249.00*
Gemini 15X	$377.00*
Delta 10, 160 cps, 8k buffer	$389.00*
Delta 15	$580.00*
Powertype, 18 cps, letter quality	$349.00*
Radix 10, Radix 15 from Star Micronics	Call*
Cardco LQI letter quality printer	$459.00
Riteman LQ	$279.00
Cardco LQIII	$349.00
Epson RX-80	$244.00
Epson Printers	Call
Okidata Printers	Call
Hush 80	$109.00

*Star Micronics printers come with a 1 year warranty!

PRINTER INTERFACES

Xetec GPI	$ 76.99
Xetec SPI/B	$ 59.99
Xetec SPI	$ 43.99
Cardco ?/+G	$ 67.00
Cardco ?/B	$ 44.00
Cardco PS Interface	Call

DATABASES

The Consultant	$ 63.99
Mirage Database Manager/ Report Generator	$ 69.99
Superbase 64(d)	$ 64.99
Data Manager II by Timeworks	$ 37.00
Practifile by MS(d)	$ 37.00

MODEMS

Total Telecom	$ 76.95
Commodore 1660	Call
Commodore 1650 autoanswer, autodial	Call
Hesmodem I	$ 49.00
Hesmodem II	$ 99.00
Compuserve starter kit	$ 26.95
Westridge modem	$ 76.95
Mighty Mo, new modem from USI	$ 89.95
VIP terminal package by Softlaw	$ 39.95
Vidtex Terminal	$ 30.00
Vidtex plus Compuserve Starter	$ 49.99

WORD PROCESSORS

Word Processor by Proline(d)	$ 39.99
Wordpro 3+/64 w/Spellright(d)	$ 59.00
Paperclip(d)	$ 59.00
Paperclip w/spellpack(d)	$ 76.99
Cardco Write Now/64 (cart)	$ 37.00
Mirage Professional W.P.(d)	$ 59.00
Mirage Personal W.P.(d)	$ 29.00
Omni Writer/Speller(d)	$ 45.00
Word Writer(d) by Timeworks	$ 37.00
Script 64	$ 55.00
Heswriter	$ 14.00

CARDCO

Light pen	$ 29.00
Numeric keypad	$ 35.00
5 slot exp. interface CB/5	$ 58.00
Mail Now/64	$ 32.00
Spell Now	Call
File Now	Call
Graph Now	Call

SPREADSHEETS

Calc Result Adv.(d, cart)	$ 67.00
Calc Result Easy (cart)	$ 33.99
Hesware Multiplan(d)	$ 65.00
P.S. (Prog. Spreadsheet)(d)	$ 49.99
Practicalc 64(d)	$ 36.00
Practicalc 64(t)	$ 34.00

HARDWARE

1541 Express by RTC	$ 73.99
Smart Cable	$ 49.95
BI 80 Batteries Included 80 column card with Basic 4.0 built in	$137.99
BusCard II by Batteries Included	Call

MONITORS

Zenith 12" Amber	$ 97.00
Zenith 12" Green	$ 92.00
Sakata SC 100 Color Monitor w/stand	$239.00
Amdek Color 1 Plus	$259.00
Cable for monitors	$ 9.95
1702	$239.00

UTILITIES

The Last One(d), a Basic program generator	$ 64.00
Pal 64 assembler by Proline(d)	$ 39.99
Power 64 Basic by Proline(d)	$ 39.99
Toolbox 64, both Pal 64 and Power 64(d)	$ 69.99
Supercopy 64 by Blue Sky(d)	$ 29.00
Superbasic 64 by Blue Sky(d)	$ 29.00
Add-on Basic by Blue Sky(d)	$ 29.00
Canada A/M backup program	$ 39.95
Simon's Basic	$ 39.95
CSM 1541 Alignment	$ 32.99

MISCELLANEOUS

Koalpad w/painter(d)	$ 65.00
Spellpro 64(d) by Proline	$ 39.99
Mailpro 64	39.99
Complete Personal Accountant(d)	$ 54.00
Vertatim Datalife ss/dd disks (10)	$ 23.99
Maxell MDI ss/dd disks (10)	$ 21.99
Musicalc 1	$ 37.95
Musicalc 2	$ 27.95
Musicalc 3	$ 27.95
SAM, Software Automatic Mouth	$ 47.95
The Home Accountant	$ 36.95
Timeworks Inventory, A/P, A/R, Cash Flow Management, General Ledger, Payroll Management	$ 40.95 each
64 Doctor	$ 24.95
FCM, First Class Mail	$ 36.95
Super Sketch	$ 39.99

DISK DRIVES

MSD SDI	**$297.00**
MSD SDII	Call
Indus GT Disk Drive	Call
1541	$239.00
MSD IEEE Interface	Call

To Order By Mail: Send personal check, money order, or certified check. Allow 2 weeks for personal checks to clear.

Shipping: Software and accessories: add $2.50 per order—COD order: add $6.00 (cod's not accepted on printers, monitors, and disk drives.)—Printers: add $10.00—Disk Drives and Monitors: add $8.00.

Terms: Orders shipped UPS unless noted otherwise. All prices reflect cash discount. Add 3% for Visa and Mastercard. Manufacturer's warranty honored with our invoice and original packaging. PA residents add 6% sales tax. Prices subject to change.

* **Terms of Offer:** Offer valid only against prices advertised in this magazine, this issue. We are not responsible for typographical errors or manufacturer's price changes. Have the following information ready for our operators: (1) magazine name, (2) month of issue, (3) advertiser with lower price, (4) price to beat.

"DEALER INQUIRIES INVITED"

Other product lines available! Call for prices.

BUY A BUNDLE— $AVE A BUNDLE

Order one of these popular packages of products by number for super savings!

Package #1
GEMINI 10X and XETEC GPI
Popular printer and a graphic printer interface with 2k buffers
$313.00

Package #2
GEMINI 10X and CARDCO GRAPHIC PRINTER INTERFACE
$309.00

Package #3
POWERTYPE and XETEC SPI/B
An 18 cps daisy wheel printer from Star Micronics and with the Xetec SPI/B, a serial printer interface with a 2k buffer
$399.00

Package #4
POWERTYPE and the CARDCO ?/B PRINTER INTERFACE
$385.00

Package #5
WORD PROCESSOR 64 and SPELLPRO 64
The word processor and spelling checker from Proline Software
$73.99

Package #6
1541 EXPRESS and the FAST CABLE
Everything you need to speed up your disk drive
$119.99

Package #7
CONSULTANT and PAPERCLIP W/SPELLPACK
These are the popular Database and Word Processor from Batteries Included
$129.99

Package #8
PRACTICALC 64(d) and PRACTIFILE(d)
You get real power from this Spreadsheet and Database from Practicorp. These two integrate together.
$69.99

Package #9
MIRAGE DATABASE/ADVANCED REPORT GENERATOR and MIRAGE PROFESSIONAL WORD PROCESSOR
A powerful package that integrates together
$124.95

Package #10
BI-80 and PAPERCLIP W/SPELLPACK
The 80 column card with the Basic 4.0 built in, and the Paperclip w/spellpack both from Batteries Included. Paperclip works with the 80 column card to give you a powerful word processor.
$209.95

Package #11
DATA MANAGER II and WORD WRITER
A Word Processor and Database that integrate together for real power, at an unbelievable price! Both by Timeworks.
$64.99

COMMODORE PRODUCTS NOW IN STOCK!
CALL FOR PRICE ON +4, C16, others

TUSSEY MT. SOFTWARE
and Peripherals
BOX 1006
STATE COLLEGE, PA 16804

Now type RUN and press RETURN.

Hold down RUN/STOP and press RESTORE (or RESET) to exit the program, then LIST it.

Line 10 defines the formula. In this case, the formula converts a Farenheit temperature to Celsius. The conversion formula is represented by 5*(F−32)/9 where F stands for any Farenheit temperature.

Line 20 requests a temperature INPUT and assigns the variable F to the temperature number which is typed in.

Line 30 prints the temperature you typed in (remember that variables are always printed *outside quotation marks*), then goes inside quotation marks to display the message DEGREES FARENHEIT EQUALS, then back outside quotes to display the result of Function A, and back inside quotes for the rest of the message.

When you PRINT FN A(F), you're really inserting the Farenheit temperature number represented by F into the formula where the F appears, and printing the result of the calculation which results.

Line 40 repeats the program.

See if you can rewrite this program to convert Celsius degrees into Farenheit. Incidentally, 100 degrees Celsius equals 212 degrees Farenheit, and vice versa—which is one INPUT you can use to test your program to make sure it's accurate.

A DEF FN Rounding Formula

Did you ever want to round off a number? You can use the DEF FN command to do it. Try this:

```
10 DEF FN R(X)=INT(X*100+.5)/100
20 A = 1.6666: PRINT A
30 PRINT FN R(A)
```

The Function R rounding formula in line 10 can be used to round any number to the nearest "penny." To show the difference, first we print the number 1.666 in line 20, then we insert this number into our formula using FN R(A) in line 30 and the result is 1.67.

Here's how the rounding formula would be used to round the averages in our adding machine program:

```
5 DEF FN R(X)=INT(X*100+.5)/100
10 PRINT CHR$(144): GOSUB 100
20 B=B+A:A=0: N=N+1: PRINT "{HOME}
   {5 DOWN}" "AVERAGE" FN R(B/N)
30 FOR T=1 TO 750: NEXT: GOTO 10
100 PRINT CHR$(147); "{RVS} ADDING MACHIN
    E": PRINT
110 PRINT "{RVS} TOTAL" B+A
120 PRINT "PLUS";: INPUT A: RETURN
```

Next month we'll conclude our computer math discussion with some practical programs for home, school, and business.

CARTRIDGE-MAKER-64™

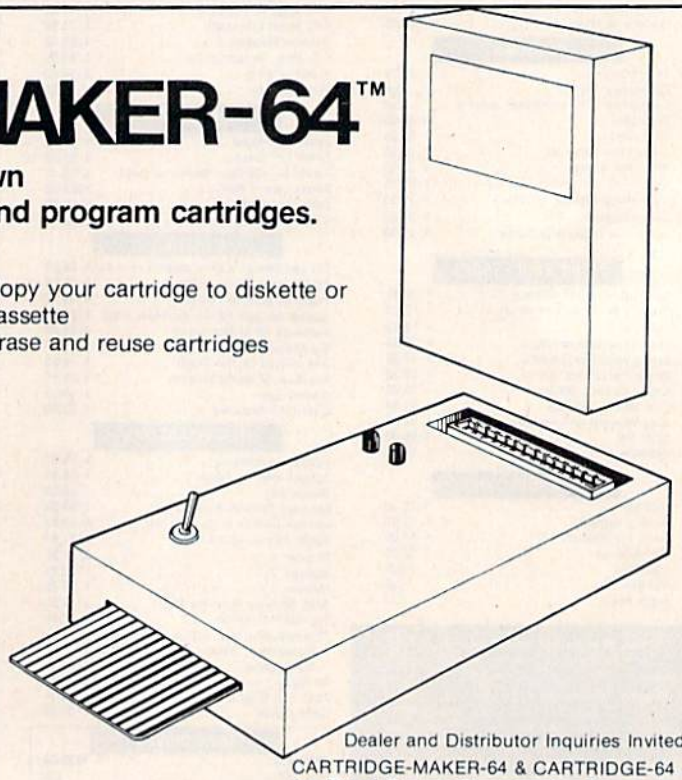
Create your own
COMMODORE-64™ video game and program cartridges.

Follow the simple and easy screen instructions to:

- Copy your BASIC or ASSEMBLER programs to cartridge
- Copy from cartridge to cartridge
- Copy your cartridge to diskette or cassette
- Erase and reuse cartridges

CARTRIDGE-MAKER-64	$129.00
CARTRIDGE-ERASER	$ 59.00
CARTRIDGE-64 (16K)	$ 25.00
CARTRIDGE-MAKER Kit	$189.00
Includes: CARTRIDGE-MAKER-64 CARTRIDGE-ERASER and 1 Blank CARTRIDGE-64 (16K each)	
Purchase of 5 Blank CARTRIDGE-64 (16K each)	$115.00

Shipping $3.00, if C.O.D. add $2.00
PA residents add 6% sales tax
VISA-MASTERCARD-C.O.D.-CHECK
Phone orders (215) 363-8840



Dealer and Distributor Inquiries Invited

CARTRIDGE-MAKER-64 & CARTRIDGE-64 are TM of Custom Programming Group, Inc.
COMMODORE-64 is a registered TM of Commodore Business Machines, Inc.
CARTRIDGE-MAKER-64 is not intended for piracy of copyright materials.

Custom Programming Group, Inc.
47-2A Marchwood Road • Exton, PA 19341

MACHINE LANGUAGE FOR BEGINNERS

Richard Mansfield, Senior Editor

Memory

Computer memory structure is worth taking a few minutes to learn. After you know the fundamentals, some machine language tasks become easier to accomplish.

The smallest quantity of computer memory is a *bit*. It is so small that it can only have two states: on or off. A bit is quite limited; it conveys very little information. It's like the candle in one of those stories where someone rides by at night looking for your signal: Either the candle is in the window, or it's not. Bits can only signal one of two possible pieces of information: yes or no, on or off, up or down, true or false, the British are coming or they're not.

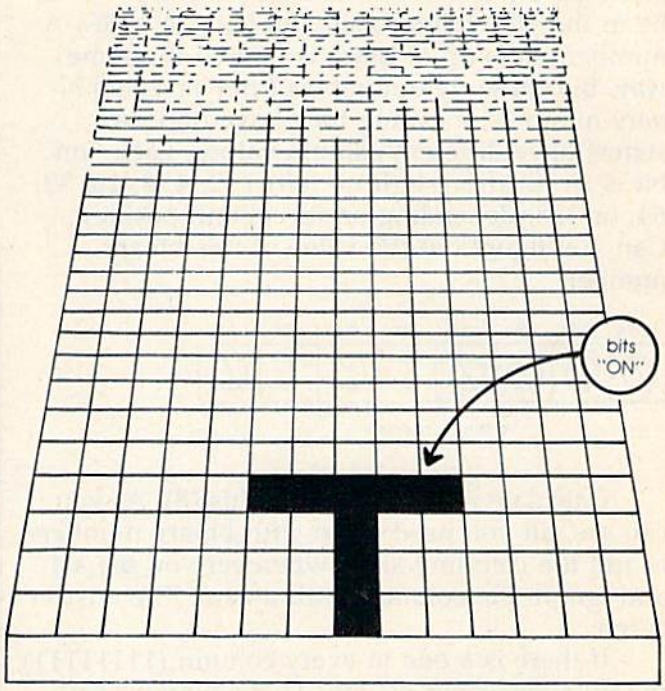
But when you gather many bits together—the Commodore 64 has over half a million bits inside it—you can store and manipulate a great deal of information.

An Immense Honeycomb

When working with computers, we think of a bit as holding either a 0 or a 1. These aren't really the *numbers* 0 and 1, they're just a convenient way of signifying whether a bit is "on" or "off." (The 0 means it's off.)

You can visualize a computer's RAM memory chip as a huge lattice, an immense honeycomb of bits. In the figure below, you can see that eight of the bits are "on" and that, by combining bits together, we've greatly increased our ability to express information. These eight bits are forming the letter *T*.

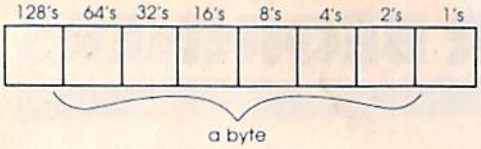
Humans see the letter T in this graphic representation, but the computer stores letters and numbers somewhat differently. Bits are ganged together in bundles, in groups of eight. When you put eight bits together, this new eight-bit unit is called a *byte*.



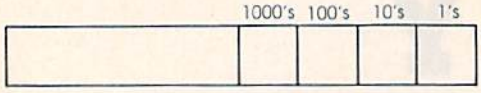
Here's an easy way to keep these ideas straight. Several centuries ago, there was a coin which was soft enough to be cut into eight segments. That's where we get the phrase *pieces of eight*. Each of these segments were themselves used as coins and were called *bits*. The bit coin couldn't be sliced down any further, just as there is no way to slice computer memory any smaller than a bit. We still use the word *bit* this way when we refer to a quarter as "two bits."

When Ganged Together

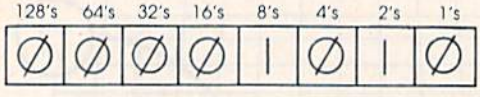
So, a byte is eight bits. Yet even within just eight bits we can store a considerable amount of information. For one thing, we can count up from zero to 255. Here's how:



When ganged together like this into a byte, the bits are each given a different value, depending on their position. The rightmost bit has a value of 1. It's the 1's column. Next comes the 2's column, then the 4's, 8's, and so on up to 128's. This might seem strange, but it's quite like the way we use ordinary decimal numbers:



Notice that a number in the rightmost cell would be in the 1's column, a number next to it would be in the 10's column, etc. But back to bytes: A number made up of bytes is figured the same way, but these byte-numbers (they're called *binary* numbers, meaning they have only two states) have different column values. Each "on" bit is worth (from right to left) 1, 2, 4, 8, 16, 32, 64, or 128, depending on its column position. Can you figure out the value of this binary number?



Calculate it by adding (2) plus (8). As you can see, all you need to do with binary numbers is add the column values wherever you see a 1 and ignore the columns with a zero. The answer is ten.

If there is a one in every column (11111111) the number would be 255. That's why we say that a byte can hold any number between 0 and 255. But how does a byte store a character like the letter A? It's just a code, an agreed upon convention called the ASCII code. All computers know that when they see a byte with this pattern of bits on (01000001) that it means the letter A. 01000010 is B and 01000011 is C.

How Does The Computer Know?

If we think of these bytes as holding binary numbers, they would be 65, 66, and 67. This leads to an interesting question: How does the computer know whether to think of the byte 01000011 as the letter C or the number 67?

It knows by the *context*. If it's doing word processing, it will see these as characters. If it's doing mathematics, they will be seen as pure numbers. There are other contexts, too, other codes. For example, you might write a program that turns your screen blue whenever you enter the number 65. In *that* context, 01000001 doesn't mean the letter A or the number 65 any more; it means the color blue. Bytes are wonderfully resilient—they can mean pretty much anything you and the computer want to agree on. They can even stand for instructions.

If you'd like to play around with binary numbers, type in Program 1. It's a quiz that will show you a binary number and ask you to figure it out. Actually, there's not much real value in knowing how to work with binary numbers, though. It's worth knowing about them, but you don't really need to use them much in most ML programming. You'll probably be using an Assembler program to enter your ML programs and Assemblers can use ordinary decimal numbers.

Nevertheless, there are ML instructions which operate on bits (ASL, ROR, etc.) and so you'll at least want to be able to visualize the bits within a byte. For a complete display of all the binary numbers between 0 and 255, type in Program 2.

See listings on page 125.

Program Your Own EPROMS

▶ VIC 20
▶ C 64

$99.50

PLUGS INTO USER PORT.
NOTHING ELSE NEEDED.
EASY TO USE. VERSATILE.

- Read or Program. One byte or 32K bytes!

OR Use like a disk drive. LOAD, SAVE, GET, INPUT, PRINT, CMD, OPEN, CLOSE—**EPROM FILES!**

Our software lets you use familiar BASIC commands to create, modify, scratch files on readily available EPROM chips. Adds a new dimension to your computing capability. Works with most ML Monitors too.

- Make Auto-Start Cartridges of your programs.
- The *promenade*™ C1 gives you 4 programming voltages, 2 EPROM supply voltages, 3 intelligent programming algorithms, 15 bit chip addressing, 3 LED's and NO switches. Your computer controls everything from software!
- Textool socket. Anti-static aluminum housing.
- EPROMS, cartridge PC boards, etc. at extra charge.
- Some EPROM types you can use with the *promenade*™

2758	2532	462732P	27128	5133	X2816A*
2516	2732	2564	27256	5143	52813*
2716	27C32	2764	68764	2815*	48016P*
27C16	2732A	27C64	68766	2816*	

▶ *Commodore Business Machines

*Denotes electrically eraseabl types

promenade™

Call Toll Free: 800-421-7731
In California: 800-421-7748

JASON-RANHEIM
580 Parrott St., San Jose, CA 95112

VISA MasterCard

Abbreviated Printer Codes

John Crookshank

If you've discovered a clever timesaving technique or a brief but effective programming shortcut, send it to "Hints & Tips," c/o COMPUTE!'s GAZETTE. If we use it, we'll pay you $35. Due to the volume of items submitted, we regret that we cannot always reply individually to submissions.

In order to make your printer do special things like expanded or italic printing, you have to sprinkle CHR$(xx) values throughout your program. That's seven or eight keystrokes, not counting the shifting and unshifting.

But did you know there are one-key abbreviations for many of these codes right on the 64's keyboard? The ASCII characters 1–27 are easily accessible by just holding down the CTRL key and pressing another key. It effectively subtracts 64 from the normal Commodore ASCII value for the key being pressed. In other words, the CHR$ value is the same as the position of the letter in the alphabet.

You can use these special codes even if you don't have a printer. As a simple example, CHR$(13) is a carriage return, and M is the thirteenth letter in the alphabet. So CTRL-M should be a carriage return. Sure enough, the combination works just like a carriage return (try it). And CTRL-S acts as a CHR$(19)—the cursor jumps to the home position at the top left of the screen. CTRL-Q is the equivalent of cursor down, and so on. Here's a list of the ASCII values available directly from the keyboard (unfortunately, they don't work on a VIC):

ASCII values (64, Plus/4, 16)

CTRL-E	CHR$(5)	white
CTRL-H	CHR$(8)	disable case change
CTRL-I	CHR$(9)	enable case change
CTRL-M	CHR$(13)	carriage return
CTRL-N	CHR$(14)	switch to lowercase
CTRL-Q	CHR$(17)	cursor down
CTRL-R	CHR$(18)	reverse on
CTRL-S	CHR$(19)	cursor home
CTRL-T	CHR$(20)	delete
CTRL-:	CHR$(27)	escape (Plus/4 and 16 only)

A few of these combinations are useful in programming. Others are not; why press two keys for delete when there's already a single key that does the same thing? The real advantage to using these equivalents comes when you need to send commands to your printer.

To print expanded characters, for example, you send a CHR$(14) to the printer. But first you must be in quote mode. So to print a wide hello, you would use OPEN4,4:PRINT#4,"**N** HELLO" (the **N** is a CTRL-N). If you're *not* in quote mode, something quite different will happen. The screen will suddenly switch to lowercase characters.

Printer Codes For Gemini

If you own a non-Commodore printer, check your manual for the various printer codes. With my particular setup, I use the following combinations:

ASCII Values (Gemini Printer)

CTRL-A	CHR$(1)	
CTRL-G	CHR$(7)	ring bell
CTRL-H	CHR$(8)	backspace
CTRL-I	CHR$(9)	printer tab
CTRL-J	CHR$(10)	line feed
CTRL-L	CHR$(12)	form feed
CTRL-N	CHR$(14)	expanded on
CTRL-O	CHR$(15)	expanded off
CTRL-R	CHR$(18)	reverse on
CTRL-T	CHR$(20)	compressed on
CTRL-:	CHR$(27)	escape

The most valuable of the above is escape, which prefaces dozens of additional Gemini commands.

Some interfaces may translate the numbers differently (some will switch 15 and 20, for example), depending on whether the DIP switches are set to emulate Commodore printers or to work transparently. It doesn't hurt to experiment. If your interface is set to emulate Commodore, some of the codes in the following table may also work.

Commodore Printers

The Commodore 1525 and MPS-801 are software-compatible printers. A program written for one

will work on the other. The 1526, however, is not completely compatible with other Commodore printers. For one thing, the 1526 lacks the built-in graphics commands of the 1525 and 801. It has a single custom character. To print in high-resolution, you must define the character, print it, define it again, print it, and so on.

The 1526 has its advantages, though: formatting commands (similar to PRINT USING), a paging feature (to skip over the perforations), and flexible line spacing.

Here are the Commodore printer codes (note that certain commands work only on certain printers):

ASCII Values (1525, MPS-801, 1526)

*	CTRL-H	CHR$(8)	set graphics mode
	CTRL-J	CHR$(10)	line feed
+	CTRL-L	CHR$(12)	form feed (new page)
	CTRL-N	CHR$(14)	enhanced/double-width on
	CTRL-O	CHR$(15)	enhance off
	CTRL-P	CHR$(16)	tab setting
	CTRL-Q	CHR$(17)	upper-/lowercase (cursor down mode)
	CTRL-R	CHR$(18)	reverse printing
+	CTRL-S	CHR$(19)	paging off
*	CTRL-Z	CHR$(26)	repeat graphics
*	CTRL-:	CHR$(27)	set graphics dot address

* *1525, MPS-801 only*
\+ *1526 only*

If you wanted the printer to tab to column 39 and print an enhanced "The End" you would type:

```
OPEN4,4:PRINT#4,"P39NTHE END":PRINT#4:
  CLOSE4
```

Type the characters in bold with the CTRL key held down. The CTRL-P (followed by 39) performs a tab to the 39th position, and the CTRL-N sets enhanced mode. Experiment with these abbreviations, and you'll find it much easier to control the many features available.

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

STEVE PUNTER'S NEWEST C-64 WORD PROCESSOR

FEATURING:

- 40 to 160 column video display
- Single pass double column output
- 100% proportional printing capability
- Double sided printing with margin offsets
- Over 30 printers fully supported
- "Bump free" loading – MSD – 2 compatible
- Automatic spelling corrections with Spellpro™

49.95

Toll Free Order Line
1-800-387-3208

PRO·LINE SOFTWARE

755 The Queensway East, Unit 8, Mississauga, Ontario, Canada L4Y 4C5 . Phone 416-273-6350

HORIZONS

Charles Brannon
Program Editor

SpeedScript 3.0, the latest revision of our popular all machine language word processor, premieres in the March 1985 issue of our sister publication COMPUTE!. The VIC-20 version will appear in April, to be followed in subsequent issues by an Atari and Apple version.

This new version significantly upgrades *SpeedScript*'s power and flexibility, yet retains compatibility with files created on earlier versions. We are indebted to you for your suggestions and criticisms, and many of the improvements were in response to your feedback.

The Blue Chip Printer

The low cost of the new Blue.Chip printer from Blue Chip Electronics, Inc., has attracted a lot of attention from GAZETTE readers. With most 80-column printers costing upwards of $250 to $300, Blue Chip Electronics has broken the $200 barrier, selling a full-featured printer for $189. The Blue Chip printer is not Commodore-specific; it can be used by any computer with a Centronics parallel printer interface. The VIC and 64 use their own proprietary serial interface, so you need a special interface module that converts Commodore's stream of bits into 8-bit chunks that are acceptable to the printer. Blue Chip sells a version of the Cardco Card/? G+ interface, customized for the Blue Chip printer, at $39.95. The Blue Chip printer can also be attached using most other Commodore parallel printer interfaces.

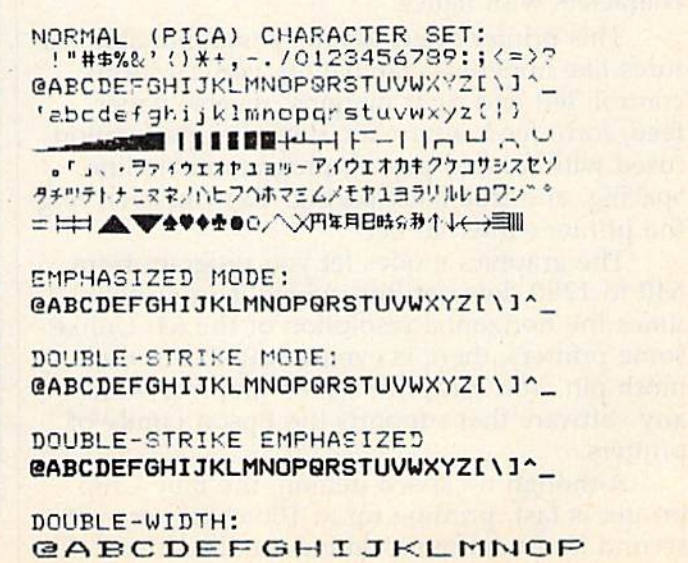
If you already have a Centronics parallel printer interface, chances are it will work with the Blue Chip. Some interfaces, however, are specific to a particular brand of printer. Since the Blue Chip is code-compatible with the Epson family of printers, you can use an Epson-specific interface or select the Epson option on your interface to make the most of the printer. Although the Blue Chip interface effectively makes the Blue Chip's price $228, the printer can be used with whatever computer you buy in the future, as long as it can communicate with a Centronics parallel printer. Even at the combined price of $228, this printer matches or exceeds the capabilities of the higher priced Gemini-10X and Epson MX-80.

Unlike some low-cost thermal printers, the Blue Chip is a dot-matrix printer. Although noisier than thermal printers, dot-matrix printers can print on any kind of paper and are generally faster. The Blue Chip printer can use either single sheet or fanfold paper by using either friction or tractor feed. Unlike many tractor feed units, the Blue Chip printer pushes the paper from behind the platen rather than pulling from in front. This can sometimes cause the paper to bunch up and tear loose from the tractor feed, and in day-to-day use I've suffered this problem periodically.

The Blue Chip printer uses a drop-in carbon film ribbon cartridge. Since there is no ink, there's no problem with messy fingers or smudges on the paper. Continuous cloth ribbons can be reused several times, but since a carbon film ribbon loses a bit of itself to paper when printed on, the second time the ribbon comes around, the print is significantly lighter. Carbon film gives a much sharper image, though. Incidentally, the Commodore 1526 printer uses the same ribbon cartridge.

Many Modes

This printer provides a plethora of printing modes and styles. Text can be printed in several sizes: pica (80 columns/line), elite (96 columns), condensed (142 columns), and double width (40 columns). Other printing modes include double strike, proportional spacing, true underlining and super/subscripts (see the accompanying figure for a sample of the character set and printing features). A removable panel on top of the printer gives access to 12 slide switches which let you customize the power-up state of the printer.



CONDENSED MODE
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'abcdefghijklmnopqrstuvwxyz{'}

DOUBLE-WIDTH CONDENSED
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'

ELITE CHARACTER SET
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_

ITALICS
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_'

PROPORTIONAL SPACING
@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]^_

MIXED MODES ON SAME LINE:
UNDERLINING DOUBLE STRIKE *ITALICS*
DOUBLE-WIDTH CONDENSED
SUPER AND SUB-SCRIPTS:
H_2O $2^{16}=65536$
CONDENSED SUPERSCRIPT PRODUCES VERY FINE PRINT

GRAPHICS MODE: 640 DOTS/LINE

GRAPHICS MODE: 1280 DOTS/LINE

The standard character set is very readable. Since the printhead produces square instead of round dots, the gaps between printed dots are not as easily visible, a step closer to letter-quality. An emphasized mode prints more slowly, overlapping dots to give a very dark, solid image, but disables the use of some printing features. The text is formed from 9 vertical pins, giving true descenders for lowercase characters.

Also built into the standard character set is a set of Japanese Katakana characters (evidencing the printer's country of origin) and several graphics characters like those used on the VIC or 64. Several international fonts are supported, giving the special characters needed in foreign languages. One of the sets replaces the special characters with italics.

This printer offers several programmable features like horizontal tabulation, vertical forms control, left and right margins, reverse paper feed, form feed, automatic skip-over-perforation (used with fanfold paper), programmable line spacing, and true backspacing. You can even ring the printer's internal bell.

The graphics modes let you program from 640 to 1280 dots per line, which is up to four times the horizontal resolution of the 64. Unlike some printers, there is even a way to fire the ninth pin. You can print screen graphics with any software that supports the Epson family of printers.

Although no speed demon, the Blue Chip printer is fast, printing up to 100 characters per second in the normal printing mode. Almost all other printing modes are significantly slower, though.

The Blue Chip's Achilles heel is in the documentation, poorly translated from Japanese. We are advised to be sure the printer "is in working properly," and told how to "install the ribbon cartridge in the manner of followings," and informed that "all datas following this code are printed out in the characters of selected character set specified by n." It's a shame that such a good value in a printer is handicapped by its manual, but if all you care to do is list programs or print out unembellished text, you may never need most of the manual. It's even fairly simple to figure out how to install the paper, ribbon cartridge, and interface on your own. But if you want to use the richness of type styles and modes available, you'll be better off if you know something about programming. By the way, the example programs in the manual need a minor modification to the OPEN command to work on Commodore computers. However, the manual does include a handy quick-reference table of all the printer codes.

Blue Chip Electronics, Inc.
Two West Alameda Drive
Tempe, AZ 85282
$189
Blue Chip Commodore Printer Interface, $39.95

Nobody copies better!!

You deserve to protect your software investment. You can with the first (and only) ***BIT-FOR-BIT DISK COPIER*** *for the C-64, 1541 Disk Drive and now MSD!*

Introducing...

MR. NIBBLE™

The next generation in archival methods is here today!

- *No better disk copier at any price*
- *Easy-to-use — no complicated instructions*
- *Totally automatic — no knowledge of DOS required*
- *You'll LOVE MR. NIBBLE™ — if not, return within 10 days for full refund*

Full Circle Software

FULL CIRCLE SOFTWARE, INC.
P.O. Box 1373
Dayton, Ohio 45401
Phone (513) 223-2102

$49.95 includes shipping & handling (Ohio residents add 6½ sales tax)

10 day return privilege

"When cloning and disecting fail, turn to MR. NIBBLE™"

Quick Character Transfer

Fabio Coronel

Setting up a custom character set can be painfully slow. This machine language routine will greatly speed up the process. For the VIC, 64, Plus/4, and 16.

Well-designed graphics can add a lot to almost any program. Sometimes pictures can communicate better than words. The easiest type of graphics to use is character graphics, those odd shapes shown on the front of the keys. Another type of graphics is achieved with redefined characters, which allow you to create shapes in much greater detail. But they're also more difficult to use.

First, you must reserve space for the new character set in RAM by lowering the top-of-BASIC pointer. Next, you change the character set pointer to point to the location of the new characters. You then transfer the character patterns from ROM to RAM and change selected characters to their new shapes.

The major drawback is the time it takes to transfer the character patterns. It may take BASIC almost a minute to PEEK the bytes from ROM and POKE them to RAM, depending on the number of characters transferred.

"Quick Character Transfer" creates a machine language routine to instantly transfer the character patterns from ROM to RAM. The ML routine is POKEd into the cassette buffer, but it's completely relocatable. You can put it elsewhere by setting variable AD in line 100 to the start of the new location.

Adding It To Your Programs

To use Quick Character Transfer, it must be added to your program. It can be placed at the end as a subroutine, or at the start as part of the initialization as long as it's executed before you redefine your characters. You may have to change the line numbers to make it fit.

It can also be used by itself as a demonstration. Type in the appropriate version for your computer and save it before running. The characters on the screen will momentarily appear as a random pattern of dots as the pointer to the start of the character set is changed to point to the random bytes in RAM. Then the characters quickly return to normal as the patterns in ROM are transferred to RAM.

Now you can change any character to look like a spaceship or a bird or a foreign language letter. Just POKE the character pattern into the RAM area used by the new character set. To show that the characters are indeed in RAM, lines 1000–1010 change the @ character into a happy face. Type the @ key to see it. To return to the normal character set, press RUN/STOP–RESTORE (RUN/STOP–RESET on the Plus/4 and 16).

The 64 Version

The 64 version transfers the entire uppercase/graphics character set (256 characters) from ROM to RAM. You can transfer the uppercase/lowercase character set instead by changing the 208 to 216 in line 170 (thus altering the checksum in line 120). The location of the character set in RAM is determined by the two 14s in line 90. These values represent the number of Kbytes from the start of the video bank.

When selecting a place for the character set on the 64, remember that it must be placed above your BASIC program on a 2K boundary in the same video bank as the screen. If you were frightened by that last sentence, just leave the values at 14. This puts the start of the character set at 14336, leaving 12K free for your BASIC program.

The VIC Version

The VIC version transfers the first 64 characters from ROM to the location specified by the POKE to 36869. POKEing 255 here puts the start of the

character set at 7168, room enough for 64 characters. You must also protect the characters from BASIC by POKEing 7168/256 = 28 into location 56 as in line 90. You'll have 3K left for your program.

If 64 characters aren't enough, just change line 90 to:

```
90 POKE56,24:CLR:POKE36869,254
```

Also, change the 2 to 6 in line 190. This gives you 192 characters starting at 6144, leaving 2K free for your program.

The value in line 160 determines which characters will be transferred from ROM. A value of 128 transfers the uppercase characters, 132 transfers reverse uppercase, 136 gives lowercase, and 140 gives reverse lowercase. If you make these changes, don't forget to also change the checksum in line 120. Or you can simply delete this line once you've saved a working copy of the program.

The Plus/4 And 16 Version

The Plus/4 and 16 version transfers the uppercase character set to the location specified by the high byte in lines 90, 150, and 220. To transfer the lowercase set, change the 208 to 212 in line 160.

See listings on page 137.

1541 DISK DRIVE ALIGNMENT PROGRAM

Finally, a complete disk drive alignment program! No special equipment needed! A two disk (program and calibration) program allows anyone with average mechanical skills to properly align the 1541 disk drive. Complete instruction manual. Don't be fooled by cheap imitations! This is the alignment program that works! See the review in the October 1984 Gazette.

"In less than two hours from the start of reading the accompanying manual, my disk drive was running as good as new — perhaps better."
D. D., North Carolina

"Your software was an enjoyable change from many programs I have bought. I recommend you to all I know."
K. J. P., Colorado

". . . with 1541 Disk Drive Alignment *from C S M 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."*
COMPUTE!'s Gazette, October 1984

$44.95 + 3.50 Shipping (U.S.)

C S M SOFTWARE, INC.
P.O. Box 563
Crown Point, IN 46307
(219) 663-4335

VISA AND MASTER CARDS ACCEPTED
DEALER INQUIRIES INVITED

ATTENTION COMMODORE 64 OWNERS
We'll pay for your mistake!

We know that it's difficult, especially since everyone is trying to come out with one. Now that error track protection is going the way of the dinasaour, you probably purchased an obsolete piece of software. Well we will give you $25.00 credit* for any original copy utility software disk that you would like to trade in for the "NEW REVISED CLONE MACHINE." Our program can now back up non-standard sectors with complete control, detect and reproduce density-frequency alterations, alter the number of sectors on a track, sync to particular reference sectors (including a single sync Bit copy) PLUS reformat a single track.

Other back up programs have only recently caught up with our ability to reproduce errors. Included is Fast Clone as well as all of the other standard Clone Features, we've even made it more user friendly too! THE CLONE MACHINE was the first utility of its kind and others followed. Well, we still feel that it's time for the others to try to play catch up again.

OUR SPECIAL MSD VERSION NOW AVAILABLE TOO!!

STILL ONLY $49.95

*NOTE: Micro-W reserves the right to cancel this offer at any time without notice

Available from:
Micro-W. DISTRIBUTING, INC.
1342B Route 23
Butler, N.J. 07405
CALL: (201) 838-9027

Baker's Dozen
Part 3

Lawrence Cotton

In this final installment, we'll see four more programs for the 64 which offer some interesting techniques—and results.

If you've been following this series, you'll recall that most of the programs we've seen include routines and techniques which may be used interchangeably with each other. If you're new to programming sound and graphics on the 64, you might study the listings—they're short and contain ideas you can use in your own programs.

Mondrian

This program, only seven lines, is a good example of how much we can get for as little typing as possible. Let's look at each of the lines:

Line 10 clears the screen (CHR($147)), prints white (CHR$(5)), and changes the border and background colors (53280 and 53281) to black. In line 20, R is the amount to be added to screen memory locations, and A is an increment of 1.

Lines 30 and 40 choose random sizes of blocks to be "painted." Both color and starting screen location are determined here. The maximum block size is ten by ten characters (line 30). Try your own dimensions here.

Lines 50 and 60 ensure that the block to be painted will appear on the screen; if not, another block size is selected.

Line 70 is where the blocks are painted; a loop within a loop paints a block of size N characters (reversed spaces) by P characters, in color Q, starting at location V. It then loops back to pick another block size, color, and starting location.

Rectangles

Another short program, "Rectangles" draws random size rectangles in random colors. They start at random locations, and are superimposed on each other. Here's the way the program works.

Line 5 defines increments, rectangle size, and the value added to screen memory locations to POKE a color (Q in line 20).

Line 10 clears the screen and changes border and background colors to black (as in line 10 of "Mondrian").

Lines 20 and 30 choose random screen locations, and color and rectangle dimensions (N by Z). Lines 40–75 check to be sure the rectangle is drawn on the screen.

The rectangles are created in lines 80–150.

Line 160 loops back to choose another size, color, and location.

Magix

Program 3, another short program, is fairly straightforward in programming technique and in execution. The key to the program is the subroutine beginning at line 200. This subroutine is what performs the hard work in the program. It paints a square block with a random color and increments it diagonally four times in four locations.

Lines 10, 40, 70, and 100 modify the values plugged into the subroutine, redefine starting positions, and choose another color.

Lines 30, 60, 90, and 120 erase unnecessary blocks by POKEing a space (32) to the appropriate locations.

Noodle Doodle

Probably the most interesting of the programs this month, "Noodle Doodle" integrates sound

and graphics. It doodles endlessly (press RUN/STOP–RESTORE to exit), in color, to the accompaniment of a double tone (two voices) synchronized with the doodle. If the doodle's random direction goes up or right, the tones climb; if it goes left or down, the tones lower. The effect is strange and hypnotic.

Let's see how the program works.

Lines 10–30 set up the screen, clear the sound chip, and set up parameters for musical voices one and two.

Variables are assigned in line 40: F increments the frequencies up or down, depending on the movement of the doodle as described earlier; G is a multiplier for voice two's frequency (G times voice one's); L is the low-byte value of the frequency POKEd into locations Z and ZZ; H and I are the high-byte starting values for frequencies POKEd into locations Y and YY; Z, Y, ZZ, and YY are the low and high locations for voices one and two, respectively; V is the screen location where the doodle starts, and C is the value added to the screen location to color a character.

Lines 100, 200, 300, 400, 500, 600, 700, and 800 generate a random number from 0 to 5 (controlling the length of the doodled line segments) and choose a random color (1–15). *Note: These lines can be entered by typing line 100, then typing a 2, 3, 4, 5, 6, 7, or 8 over the 1 in 100 (press RETURN each time).*

Lines 105, 205, 305, 405, 505, 605, 705, and 805 do most of the doodling by POKEing the horizontal and vertical lines (67 and 66) and their colors to the screen.

Lines 108, 208, 308, 408, 508, 608, 708, and 808 increment screen location V, and POKE frequencies H, I, and L to control the pitch of tones and increment them by F. Changing the value of F in line 40 can create some interesting effects.

Lines 110, 210, 310, 410, 510, 610, 710, and 810 check to make sure legal frequency values are POKEd into Y, Z, YY, and ZZ.

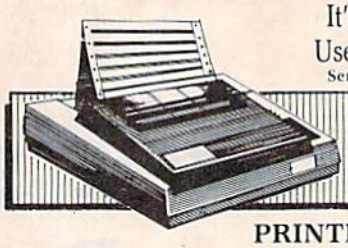
Last, lines 120, 220, 320, 420, 520, 620, 720, and 820 POKE the corners which connect the horizontal and vertical lines. A random number (X) is chosen (either 1 or 2) to determine which way the doodle is to go next. This is dependent on the the direction it came from and which corner was POKEd.

In all the programs of "Baker's Dozen," values can be changed to create different effects. Feel free to experiment. The real merit of this series, however, is in offering some effective techniques which don't require a lot of programming time or space.

See listings on page 123.

Our Customers Call Us The Commodore Consultants!

It's A Great Computer.
Use It for All It's Worth!
Send for Our Complete Catalog



GEMINI 10X
120 CPS with Cardco + G **$319.00**

PRINTERS

Powertype Daisywheel 18 CPS with Cardco B $369
Okidata 92 160 CPS with Tymac Connection 449
Epson RX 80 with Tymac Connection . . . $299
Commodore MPS 802 . 279
Call for prices on other models.

FREE STARTER KIT: Be ready to print with 150 sheets laser-perf paper, 50 mailing labels & replacement ribbon with every printer combo.

DISK DRIVES

MSD Super Drive . . . . . Call
Indus GT . . . . . Call
One Kay Data Drive . . . Call
Commodore 1541 . . . . Call
Phonemark Datasette $29

MONITORS

Teknika MJ10 . . . . . $239
Commodore 1702 . . . . Call
Zenith ZVM Gr/Amb . $89/99

COMPUSERVE STARTER KIT
with purchase of Westridge or Mighty Mo **$19.95**

MODEMS

Westridge 6420 . . . . . $79
Mighty Mo 79
VIP Terminal $44
Vidtex 27

DATABASE MANGERS

The Consultant $65
Super Base 64 55
The Manager 35
• *NEW* • *NEW* • *NEW* •
PFS:File $59
PFS:Report . . . . . Call

WORD PROCESSORS

Paper Clip $59
w/speller 79
Easy Script $35
Easy Spell 17

SPREADSHEETS

Calc Result Easy $35
Calc Result Advanced 65
MuiltiPlan 65

ACCOUNTING

Commodore G/L,A/P,A/R,INV,PR module $34
• *NEW:* Peachtree G/L,A/P,A/R . . . . . system 139

CHALKBOARD
*With Software Purchase **$29.00**

*One of more at $15: Leo's Links, BearJam, MusicMaestro, Leo's Paintbrush, LogicMaster, Programming

ACCESSORIES

Com Cool Drive Fan $49
Com Cool Plus w/ surge $69

BLACK NAUGAHYDE COVERS

C-64 or 1541 Drive . . . ea. $5
MSD Drives 1/2 . . . . . 5/6
Gemini 10X 9
1702 Monitor $10
1525/MPS 801 7
1526/MPS 802 8

MOST ORDERS SHIPPED WITHIN 48 HOURS! Advertised prices are for bank check or money order. VISA/MC orders add 3.5%. NO C.O.D ORDERS. Personal or company checks delay orders 21 days. All sales are final – defective merchandise exchanged for same product only. Add 3% for shipping ($2.50 min.) Please call for shipping on monitors. Ohio residents add 5.5% sales tax. Prices & availability subject to change.
HOURS: MON-FRI 10 AM to 10 PM • SAT 10 AM to 5 PM • SUN Noon to 5 PM

800-638-2617
INFORMATION & IN OHIO 216/758-0009

BIG BYTES
1301 BOARDMAN-POLAND ROAD POLAND, OHIO 44514

Disk Directory Sort

N. A. Marshall

This short program can help you better organize your disks by alphabetically sorting each of your disk directories. For the VIC, 64, Plus/4, and Commodore 16.

An alphabetized disk directory can be a timesaver, especially if you have a variety of disks. It's particularly helpful when you're looking for a filename in a long directory.

"Disk Directory Sort" is a short (35-line) BASIC program that works on the VIC (with or without expansion—see below for details), 64, Plus/4, or Commodore 16. Operation is simple. Load "Disk Directory Sort",8. Then insert the disk you wish to alphabetically sort. Type RUN, and the directory is read into memory and sorted. You see the sort happening on screen. Note that all deleted files are written to the end of the sort. After all files have been sorted, you're prompted to press the space bar to write the newly sorted directory (still sorted only in memory) back to disk. If you change your mind at this point, remove the disk before pressing the space bar. No damage is done, and your original directory remains intact.

A word of caution: The program reads the directory, alphabetizes it, and writes it back to disk. If you make any typing mistakes while entering it, the program could ruin the directories on your disks. There's a chance you would lose some programs. After entering and saving it, you should test it on an unimportant disk, in case you incorrectly typed a line.

The program works on any size directory (up to 144 filenames are allowed on 1540/1541 disk drives). Here's a brief summary of the program routines:

Lines	Description
20–140	the sort
150–210	read in the file entries
220–290	write the directory
300–310	process the directory header
320–330	read a block
340–350	initialize the program

Notes To VIC Users

If you're using an unexpanded VIC, change the value of X to 45 in line 340. A maximum of 45 filenames (including deleted filenames) is allowed. With 3K expansion, change X to 115. With 8K or more, no modification is necessary—up to 144 filenames can be sorted.

See listing on page 127.

Uni-Kool
DISK DRIVE FAN FOR COMMODORE

Designed to work with Commodore Disk Drive Models 1540, 1541, and 1542, the quiet C-100 fan enclosure moves cool, filtered air through the top vents of the disk drive cooling the drive and thereby reducing the misalignment problems caused by heat build-up. A custom filter keeps room dust from entering the disk loading opening. This greatly increases the life span of the disk drives, and decreases the maintenance required to keep the drive functioning properly. Only $39.95 plus $2.00 for shipping and insurance.

115 vac

Money Order, Checks or C.O.D. Only

6-month warranty

Uni-Kool (503) 476-1660
909 Williamson Loop, Grants Pass, OR 97526

(Commodore is a registered trademark of Commodore Business Systems)

Disk Handler

B. R. Carson

Are you curious about how your 1541 disk drive stores information on disk? This program helps you examine—and change—individual bytes on a disk. For the 64 or VIC with at least 3K expansion. Requires "Display T&S" program from the Test/Demo Disk packaged with the 1541.

Engineers and mathematicians use the term "black box" to describe a machine you can't open up and look inside. You don't talk about what it's made of or what parts are inside. It's explained according to its function—something goes in and something else comes out.

There are a lot of black boxes around. To use a television, you have to know how to turn it on and tune in a channel. You don't need to know about transistors and circuits, however. And a lot of people drive automobiles without knowing the first thing about pistons and carburetors.

Some computer owners treat their disk drive as a black box. They use it to save and load programs, never wondering how it works or why.

Delving Into Tracks And Sectors

If you're interested in how information goes onto the disk, load "Display T&S" from the Test/Demo Disk you received with the disk drive. Before you type RUN, insert a disk into the drive (or use the Test/Demo Disk). When the program asks for track and sector, answer 18 and 1, which is where the disk directory begins.

You should see a lot of hexadecimal numbers, along with the CHR$ characters represented by some of the numbers. You'll also see the names of the programs on the disk.

In Appendix D of the 1541 User's Manual (also packaged with the disk drive) is an explanation of what some of those numbers mean. If you're interested in learning more about how the drive works, there are several good reference books. Or see "Disk Tricks" (September 1984 GAZETTE).

Using Disk Handler

"Disk Handler" is a utility that must be appended to the Display T&S program (see the instructions below before you start typing it in).

It extends the value of Display T&S by allowing you not only to read the bytes from disk, but also write new bytes to the disk. It adds three new commands: Change, Rewrite, and End.

After appending Disk Handler and running it, you'll see 16 lines of four bytes each, a total of 64 bytes. Since each sector contains 256 bytes, it will take four screens to cover a sector.

Near the bottom of the screen will be four prompts:

```
CONTINUE (Y/N)
CHANGE (C)
REWRITE (W)
END (E)
```

To go to the next 64-byte section, type Y. If you type N, you'll return to the main menu.

The Change option allows you to change a byte on the disk. Enter the letter C and you'll be asked for a starting point. Type the number of the first byte you want to change (in hexadecimal, as it appears on the screen).

The changes will not be made directly to the disk (in case you change your mind later). They are written to a buffer inside the drive.

Let's say the byte you want to change contains a 64 (hex $40). You enter the location and the program responds:

```
40-
```

You can now do one of three things:

1. Press RETURN to end the change routine and return to the four prompts.

2. Type a new value (in hex), to replace the current value. The next byte will then be printed,

so you can change more than one byte at a time.

3. Press the comma key if you want to leave the value as is.

If you make a mistake, press RETURN and select the change option again (remember the change is not permanent yet).

Once you're satisfied with the changes, choose the rewrite option. This copies the information from the memory buffer onto the disk.

The final choice, End, allows you to exit the program. This feature is lacking from the original Display T&S program.

Entering The Program

Disk Handler will not work by itself; it's designed to be appended to Display T&S.

First, load Display T&S from the Test/Demo Disk. With that program in memory, type in Disk Handler and save it to one of your own disks.

I recommend that you first experiment with an unimportant disk in case you've made a typing mistake.

I've used Disk Handler for patching up scrambled disk directories, correcting errors in sequential files, and salvaging scratched programs. But note: *This is not a program for novices.* If you aren't careful, this program can do a lot of harm to programs and files.

See listing on page 128.

FREE

10 DISKETTES OR 20 C-20 CASSETTES

A subscription to the **'Cassette of the Month'** gets you a tape or disk full of 10 **quality Commodore 64 programs** delivered to you by first class mail every month. The documentation included will help you run great **utilities** like 'Word Processor,' and 'Budget Analyzer,' or enjoy great **games** like 'Frogjump' and 'Caterpillar Cave' **FOR AS LITTLE AS 50 CENTS EACH!**

★ **Limited offer** ★ Subscribe for a year on cassette and receive **20 Free C-20 cassettes** or subscribe for a year on disk and receive **10 Free 5¼ single sided double density diskettes!**

PRICES

	TAPE	DISK
1 YR (12 ISSUES)	60.00	75.00
6 MO (6 ISSUES)	35.00	45.00
Single Copies	7.00	9.00

★ We've been in business for over three years! acquiring
★ Over 4000 satisfied color computer owners
★ Commodore 64 required

Mich. Res. add 4%
Overseas ADD $10 to subscription and $1.00 to single issues.

PERSONAL CHECKS WELCOME!

T & D Subscription Software
P.O. BOX 256-C
HOLLAND, MI 49423
(616) 396-7577

Dreams CAN come true!

Back in June of 1983, Kelvin Lacy had a dream. He dreamed of creating one integrated program that would include a spreadsheet, business graphics *and* a database. A program with the power of Lotus 1-2-3. On the Commodore 64. People laughed! He had just finished OmniWriter/OmniSpell, to be marketed by HESWARE. Ignoring the skeptical, he began VIZASTAR.

Now, after 15 months, his dream has come true. VIZASTAR has a full-featured spreadsheet, as good as Multiplan. But much faster—faster than many spreadsheets on the IBM PC! It is written 100% in 6502 machine language code and is ALWAYS in memory. It is menu-driven, using the latest techniques in user-friendliness. It is compatible with virtually all printers and most word processors. Up to 9 windows can be open simultaneously, anywhere. Remarkably, 10K of memory is available for spreadsheet use.

The database is equally impressive. Create file layouts by simply painting a picture of the layout on up to 9 screens, showing where a field starts and ends; VIZASTAR does the rest.

Imagine the power of a spreadsheet integrated with a database. Now add graphics — bar, line, and multi-color pie and 3-D "skyscraper" graphs. You could access a customer's profile in the database, transfer the data to the worksheet, and let it calculate discounts, sales tax etc. and then transfer the updated data back to the database. Open up a window anywhere and display a graph of your data, instantly. This integration is the key to VIZASTAR's power—the **first and only** program of this kind on the C-64. All commands can be automated, so you can "program" your own applications and run them with one keystroke.

Trademarks: Lotus 1-2-3/Lotus Development. Commodore 64/Commodore Electronics Ltd. Multiplan/Microsoft.

Actual screen dump taken by VIZASTAR

VIZASTAR comes with a cartridge, a 1541 diskette with a backup, Reference and Tutorial manuals. VIZASTAR is normally $119.97 but at a Special Introductory Price, it's now only **$99.97**. We are so positive you will be delighted with VIZASTAR that we offer a **15 day money-back guarantee**. Try it risk-free! Compare VIZASTAR to any other spreadsheet or database.

So order today. Call or send a check or Money Order. Calif. residents add 6.5% sales tax. MC and VISA accepted. Add P&H: UPS—$3; COD, Canada—$5

SOLID STATE SOFTWARE
1253 Corsica Lane, Suite C
Foster City, CA 94404
(415) 341-5606 (24 Hours)
Dealer & Distributor Inquiries Welcome

COMPUTE!'s GAZETTE Back Issues

JULY 1983: Commodore 64 Video Update; Snake Escape; Alfabug; VIC Marquee; Word Hunt; Learning To Program In BASIC; Quickfind; 64 Paddle Reader; Machine Language For Beginners; Enlivening Programs With Sound; Using Joysticks On The 64.

OCTOBER 1983: The Anatomy of Computers; Telegaming Today And Tomorrow; Commodore's Public Domain Programs; Oil Tycoon; Re-Beep; Aardvark Attack; Word Match; Machine Language For Beginners; How To Use Tape And Disk Files; Understanding 64 Sound; Speeding Up The VIC; HOTWARE; Improving 64 Video Quality; Using The VIC's Clock.

MARCH 1984: The Electronic Castle: Managing Your Home With Your Computer; Getting Started With A Disk Drive, Part 5; CUT-OFF!; Poker; Tree Tutor For Tots; Guess America!; Sea Route To India.

APRIL 1984: Robots: The New Mobile Computers; How To Start A User Group; Bingo 64; Making Calendars; French Tutor; Hints & Tips: Adding A Second Joystick To The VIC; Power BASIC: Numeric Keypad.

MAY 1984: Exploring 64 Sound; SpeedScript Revisited; Sound Sculptor For The 64; Props; Mind Boggle; Memo Writer; The Beginner's Corner: Teaching Music With Computers.

JUNE 1984: The Future Of Computer Games: Software That Thinks For Itself; 3-D Tic-Tac-Toe; Castle Dungeon; Therapy; File Copier; Power BASIC: One-Touch Keywords; The Beginner's Corner: Planning A Game Program.

JULY 1984: In Touch With Your Computer: Graphics Tablets And Light Pens; Space Patrol; Robot Math; Ultrafont +; Machine Language For Beginners: What Is Machine Language?; The Beginner's Corner: Quilt Squares.

AUGUST 1984: A Survey Of Printers For The VIC And 64; Selecting A Printer Interface; Campaign Manager; Sprite Magic; Balloon Blitz; Disk Purge; The Beginner's Corner: Using A Printer.

Issues not listed are not available.

Back issues of COMPUTE!'s GAZETTE are $4 each. All prices include freight in the U.S. Outside the U.S. add $1 per magazine order for surface postage, $4 per magazine for air mail postage. ALL BACK ISSUES ARE SUBJECT TO AVAILABILITY.

In the continental U.S. call
TOLL FREE 800-334-0868
(in North Carolina call 919-275-9809)

Or write to:
COMPUTE!'s GAZETTE Back Issues
P.O. Box 5406
Greensboro, NC 27403

Prepayment required in U.S. Funds. MasterCard, VISA, and American Express accepted. North Carolina residents please add 4½% sales tax.

NEWS & PRODUCTS

64 Draw Poker Game

Silicon Slick's Lowball Draw Poker, a game, instructor, and analysis tool for the Commodore 64, has been released by Snake River Software.

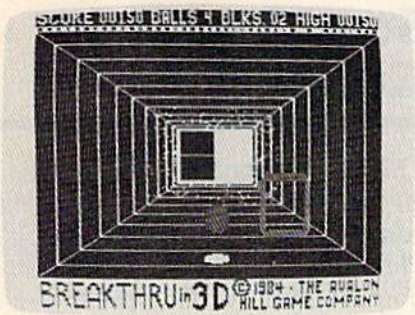
The program teaches the user to play California-style lowball draw poker using a game simulation. As a tutorial, the program comments on all facets of play, including before and after draw betting and drawing cards. Game options include ante size, before and after draw betting limits, size and number of blind bets, and skill level and number of opponents.

The game retails for $34.95.

Snake River Software
2100 Belmont Avenue
Idaho Falls, ID 83401
(208) 524-5464
Circle Reader Service Number 210.

64 Arcade, Strategy, Adventure Games

Among a number of games recently introduced by Microcomputer Games, Inc., a division of the Avalon Hill Game Co., are: *Fortress of the Witch King*, an adventure game; *London Blitz*, a World War II simulation in which you must defuse a series of bombs; and *Breakthru*, a three-dimensional arcade-style racquetball game.



A three-dimensional racquetball game screen from Breakthru, *one of the new games for the Commodore 64 from Microcomputer Games, Inc.*

Suggested retail prices are $25 each on disk. *Breakthru* and *London Blitz* are also available on cassette for $20 each.

Microcomputer Games, Inc.
The Avalon Hill Game Co.
4517 Harford Road
Baltimore, MD 21214
(301) 254-9200
Circle Reader Service Number 211.

Cassette Storage For 64, VIC-20

Entrepo, Inc. has introduced the Quick Cassette storage system for Commodore 64 and VIC-20 computers.

The drive is designed as a replacement for audio cassette storage systems. It plugs into the cassette port on Commodore computers, and can reportedly read data from the tape into the computer 15 times faster than an audio cassette.

The Quick Cassette has a slow speed read mode that emulates an audio cassette, and is fully compatible with Commodore BASIC and audio cassette commands. It also features a connector allowing programs to be copied from either a Commodore cassette or another Quick Cassette. A file management utility also is included.

Suggested retail price is around $85.

Entrepo Inc.
1294 Lawrence Station Road
Sunnyvale, CA 94086
(408) 734-3133
Circle Reader Service Number 212.

Strategy, Adventure, Sports Games

Strategic Simulations, Inc. has introduced a number of new games for the Commodore 64: *Broadsides*, a naval battle simulation set during the Napoleonic era; *President Elect*, an election simulation; *Computer Quarterback*, a football simulation; and *Breakthrough in the Ardennes*, a simulation of World War II's Battle of the Bulge.

Each of the games retails for $39.95, except *Breakthrough in the Ardennes*, which has a

suggested price of $59.95.

Strategic Simulations, Inc.
883 Stierlin Rd., Building A-200
Mountain View, CA 94043-1983
(415) 964-1353
Circle Reader Service Number 213.

Scrabble-Style Game For 64

The popular board game *Scrabble* has been converted into a computer game called *Monty Plays Scrabble* for the Commodore 64 by Epyx Computer Software.

Play can be either against the computer or against up to three human opponents. There are four skill levels, and a playing vocabulary of more than 12,000 words.

Suggested retail price is about $30.

Epyx Computer Software
1043 Kiel Court
Sunnyvale, CA 94089
(408) 745-0700
Circle Reader Service Number 214.

64 Home Control System

Proteus Electronics Inc. has released a series of interfaces which allow up to eight switches and eight loads to be connected to a Commodore 64,

FANTASTIC!
VIC-20 & C64 PRODUCTS

CASSETTE INTERFACE & DUPLICATOR #10-101 **$34.95**

Use any portable cassette recorder to load and save programs. Controls cassette motor to start and stop the tape. Allows you to connect two cassette recorders together to **make backup copies.**

PARALLEL PRINTER INTERFACE #10-108 **$39.95**

Connects to the User port. Allows you to **use any Centronics standard parallel printer** with a C64 or VIC-20. Translates PET to standard ASCII. Several printing modes allow you complete control over printer. Print PET graphics/control characters as mnemonics and CHR$ codes i.e. [CLR] or [174]. Virtually any printer with bitmap graphic ability can **print actual graphics characters.** Emulation of most all CBM printer functions. Software adds a PLIST command for BASIC program listing. Printer Driver software consumes no normal user memory space, and is compatible with most all popular software. Disk includes software for C64 and VIC-20.

RS232 INTERFACE #10-102 **$39.95**

Connects to the User port and provides full RS232 signals **for modems and printers.** 2 foot cable with male DB25 connector. Supports full complement of RS232 signals, including **Ring detect.** Comes with a type-in BASIC terminal program and printer hook up instructions.

COMPLETE SERIAL PRINTER DRIVER **$29.95**

For use with **any serial printer.** Gives you all the features of the Parallel Printer driver program described above. Prints data addressed to both device 2 and 4, allowing you to use programs which don't normally allow you to use a serial printer. Configuration program allows you to set up for **graphics printing on any serial printer** with bitmap capability. #10-109

VOLKSMODEM INTERFACE CABLE #10-103 **$22.95**

Connects a Volksmodem to a C64 or VIC-20. Cable housing contains **miniature circuitry** to handle all signals. No other interface needed. Includes Type-in BASIC **terminal program.** Volksmodem not included.

C64 & VIC-20™ Commodore
Volksmodem™ Anchor Automation

TO ORDER: See your local Dealer or call **(206) 236-2983** or mail to the address below. One year unconditional guarantee. If not delighted, return it within 30 days for a full refund (less shipping). **Phone orders mention this ad and get $1.00 discount.** Add $1.60 each for shipping. $1.65 extra for C.O.D. **VISA & Mastercard welcome.**

MasterCard VISA

If you like these products, and want to to see more, mark the reader's service card or send to get our **FREE CATALOG** containing dozens of **other exciting products.**

Omnitronix
P.O. BOX 43 — MERCER IS., WA 98040

CHF ™

CHECK & STATIONERY VINYL CARRIERS FOR ADJUSTABLE TRACTOR-TYPE PRINTERS

Allow quick computer processing of conventional checks, stationery, index cards, invoices, purchase orders etc.
Check Carrier comes with BASIC program.
Indicate carrier you wish to order:

- ☐ **S-100 Holds Eight 2-3/4" x 6" Personal Size Checks. 8" Wide Carrier.**
- ☐ **S-101 Same as above. 9-1/2" wide for Non-Adjustable Printers. ($1.00 extra).**
- ☐ **S-102 Holds Eight 2-3/4" x 6-1/4" Canadian Size Personal Checks. 8" Wide Carrier.**
- ☐ **S-200 Holds Six 3-1/8" x 8-1/4" Business Size Checks. 9-1/2" Wide Carrier.**
- ☐ **S-707 Holds Three 8-1/2" x 11" Letterheads. 10" Wide Carrier.**
- ☐ **S-303 Holds Five 3-5/8" x 6-1/2" Envelopes. 8" Wide Carrier.**
- ☐ **S-309 Holds Five 4-1/8" x 9-1/2" Envelopes. 10-1/2" Wide Carrier.**
- ☐ **S-505 Holds Five 3-1/2" x 5-1/2" Index or Post Cards. 8" Wide Carrier.**
- ☐ **S-515 Holds Five 3" x 5" Cards. 8" Wide Carrier.**
- ☐ **S-808 Holds Three 8-1/2" x 7-5/8" Vouchers, Invoices, or Quick Letters. 10" Wide Carrier.**
- ☐ **S-824 Holds Labels on 9" x 1/2" Wide Carrier.**

ONLY **$11.95** INCLUDES POSTAGE AND HANDLING

Carriers also available for other types and sizes of stationery!

Send check or money order. Ohio residents add 5-1/2% sales tax. Allow two weeks for delivery. Be certain to specify model. VISA & MasterCard accepted.

THE CHF COMPANY
P.O. BOX 185 • OBERLIN, OH 44074
216/775-7338
"CompuServe"—EMAIL" 74266,601"
DEALER INQUIRIES INVITED!

THE FINAL WORD
The ONLY Word Processor You Need for the Commodore 64
Presented by
THE 64 CLUB

- numerous print styles
- underlining
- bold face
- menu driven
- right justify text
- create your own print format
- copy blocks
- automatic page numbering
- unlimited line length
- manual included

Purchase "Final Word" for $9.95 + $2.00 shipping OR join THE 64 CLUB for $59.95 and its yours FREE.

A One Year Membership Includes:

- 10 exciting programs per month
- "The Final Word" - FREE
- a huge selection of discount software

To order or for more information write:

THE 64 CLUB
P.O. Box 90535
San Diego, CA 92109

CA residents add 6% sales tax please

including lamps and relays. Light displays, security systems, and energy controllers are three options available for system configurations.

The *Simple IF* card plugs into the expansion port on the 64, and comes with data and sample programs and diagrams. Operation can be achieved through BASIC commands or machine language.

Also available are conditioning boards which plug into the *Simple IF.* These boards include an eight-input and eight-output board, a barrier strip board, and a four-position relay board.

The *Simple IF* retails for $34.95. The conditioning boards retail for $24.95 each, and the terminal board costs $8.95.

Proteus Electronics Inc.
P.O. Box 693
Bellville, OH 44813
(419) 886-2296
Circle Reader Service Number 215.

Commodore 64 Tutorial

Progressive Peripherals & Software has introduced *The Professor,* a two-disk tutorial for the Commodore 64.

The disks explain the machine's graphics and sound capabilities, and provide instructions to the features of the Commodore 64, as well as an introduction to BASIC programming. A tutorial on the keyboard is also included.

Suggested retail price is $34.95.

Progressive Peripherals & Software
2186 South Holly, Suite #2
Denver, CO 80222
(303) 759-5713
Circle Reader Service Number 216.

New Product releases are selected from submissions for reasons of timeliness, uniqueness, available space, and general interest. Readers should be aware that News & Products often contains an edited version of material submitted by vendors. We are unable to vouch for its accuracy at time of publication.

New Technological Breakthrough !

ULTRABYTE DISK NIBBLER

The Ultimate Bit by Bit Disk Duplicator
For The Commodore 64 and 1541 Disk Drive

ULTRABYTE DISK NIBBLER COPIES ALL SOFTWARE EXCEPT ITSELF

SATISFACTION GUARANTEED

Return for refund within 10 days if not completely satisfied

$ 39.95
Introductory Price

plus $ 3.00 Shipping and Handling
MASTERCARD, VISA, CHECK, or M.O.,
Foreign Orders or COD Add $ 2.00
Calif. Add 6.5 % ($ 2.60) Sales Tax
BACKUP COPIES $ 20.00 PLUS $ 3.00 SHIPPING

Based on new proprietary Disk Operating System (DOS) that reads and writes bits on the disk independent of format. This process, called nibbling, treats disk errors, extra sectors, renumbered tracks and other protection schemes exactly the same as ordinary data.

- Simple to use. Just load and run
- Fast. Copies entire disk on single 1541 in 8 minutes
- One easy step. No separate analysis or error production
- Uses revolutionary Track Scan Technology to make an exact replica of the original disk.

Write or Call 24 Hour Order Line

ULTRABYTE (818) 796 - 0576
P.O. Box 789 La Canada, CA 91011

SOFTWARE AUTHORS PLEASE WRITE

Bug-Swatter:
Modifications And Corrections

• Readers who typed in "3-D Labyrinth" (December 1984) may have discovered that corridors leading to the right did not look like the left corridors. To fix this glitch, insert a space in line 54, just after {3 DOWN}. Also insert a space in line 57, just after {7 DOWN}.

• Music Patterns, Program 1 from "Baker's Dozen: Part 2" (February), contains a bug that occasionally causes POKEs outside of screen memory. These POKEs to the BASIC program area will garble the program and cause it to crash. Change line 20 as follows:

```
20 K=INT(959*RND(0))+1024:B=160:C=54272
```

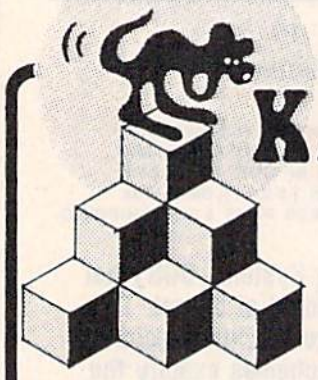
• In "VIC/64 Assembler" from the November 1984 "Machine Language For Beginners" column, it's necessary to change the 256 to a 255 in line 2005, because POKEs to memory must be within the range 0–255. If you try to enter an instruction such as LDA #256, the program stops with an ILLEGAL QUANTITY ERROR.

• Line 250 of "Supertank" (November 1984) was listed correctly, but not printed correctly. The fourth statement should be POKEV+3,X1. In some copies of the November issue, the bottom corner of the 1 was cut off, making it look like a right bracket.

We appreciate receiving both corrections and suggested modifications from readers. Address them to:

Bug-Swatter
c/o COMPUTE!'s GAZETTE
P.O. Box 5406
Greensboro, NC 27403

Please indicate the type of error you have found, as well as the line number.



Introducing

KANGA!

for Commodore 64™ Owners

only 9.95

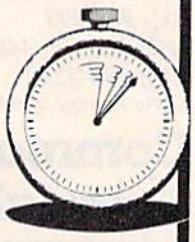
You'll hop right out of your chair playing this exciting new arcade-style video game! Challenging fun, seven treacherous levels of play, hours of fast, colorful entertainment!

• • •

Please specify disk or tape.
Send check or money order for $9.95 to
Future Computer Applications
P.O.Box 6140
Santa Fe, New Mexico 87502

We pay shipping. Kanga is in machine language, joystick reqd.

CAN YOU DO IT FASTER?



THE SUPER LOAD FASTER WILL LOAD YOUR COMMODORE 64™ IN ONLY 7 SECONDS!

GET THE MOST OUT OF YOUR COMMODORE 1541™

- Loading time: 20 TIMES FASTER THAN USUAL.
- Easy to use, no programming skills needed.
- Fast format included(10 sec.).
- Fast data transfer included.
- Programs put on load Faster are automatically protected.
- All programs transfered are still operational under 1541*.
- You can run it with your printer.
- Auto start of your programs included.
- SATISFACTION GUARANTEED OR YOUR MONEY BACK.

ONLY:
59.95 can.
49.95 U.S.

VISA and MASTER CARD accepted.
ORDER NOW
291 PRINCIPALE
LA SARRE, QUEBEC J9Z 1Z1
(819) 333-9973

INFORMAT RGM

How To Type In *COMPUTE!'s GAZETTE* Programs

Each month, COMPUTE!'s GAZETTE publishes programs for the VIC-20, Commodore 64, Plus/4, and 16. Each program is clearly marked by title and version. Be sure to type in the correct version for your machine. Also, carefully read the instructions in the corresponding article. This can save time and eliminate any questions which might arise after you begin typing.

We publish two programs, which appear periodically, designed to make your typing effort 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 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). To type {SHIFT-SPACE}, hold down the SHIFT key and press the space bar.

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

When You Read:	Press:	See:
⟦1⟧	C= + 1	
⟦2⟧	C= + 2	
⟦3⟧	C= + 3	
⟦4⟧	C= + 4	
⟦5⟧	C= + 5	
⟦6⟧	C= + 6	
⟦7⟧	C= + 7	
⟦8⟧	C= + 8	

MLX Machine Language Entry Program

For Commodore 64 And VIC-20

Charles Brannon, Program Editor

MLX is a labor-saving utility that allows almost fail-safe entry of machine language programs published in GAZETTE. You need to know nothing about machine language to use MLX—it was designed for everyone. There are separate versions for the Commodore 64 and expanded VIC-20 (at least 8K).

MLX is a new way to enter long machine language (ML) programs with a minimum of fuss. MLX lets you enter the numbers from a special list that looks similar to BASIC DATA statements. It checks your typing on a line-by-line basis. It won't let you enter illegal characters when you should be typing numbers. It won't let you enter numbers greater than 255 (forbidden in ML). It won't let you enter the wrong numbers on the wrong line. In addition, MLX creates a ready-to-use tape or disk file. You can then use the LOAD command to read the program into the computer, as with any program:

LOAD "filename",1,1 (for tape)
LOAD "filename",8,1 (for disk)

To start the program, you enter a SYS command that transfers control from BASIC to machine language. The starting SYS number always appears in the appropriate article.

Using MLX

Type in and save MLX (you'll want to use it in the future). When you're ready to type in an ML program, run MLX. MLX asks you for two numbers: the starting address and the ending address. These numbers are given in the article accompanying the ML program.

You'll see a prompt corresponding to the starting address. The prompt is the current line you are entering from the listing. It increases by six each time you enter a line. That's because each line has seven numbers—six actual data numbers plus a *checksum number*. The checksum verifies that you typed the previous six numbers correctly. If you enter any of the six numbers wrong, or enter the checksum wrong, the computer rings a buzzer and prompts you to reenter the line. If you enter it correctly, a bell tone sounds and you continue to the next line.

MLX accepts only numbers as input. If you make a typing error, press the INST/DEL key; the entire number is deleted. You can press it as many times as necessary back to the start of the line. If you enter three-digit numbers as listed, the computer automatically prints the comma and goes on to accept the next number. If you enter less than three digits, you can press either the SPACE bar or RETURN key to advance to the next number. The checksum automatically appears in inverse video for emphasis.

To simplify your typing, MLX redefines part of the keyboard as a numeric keypad:

```
  U I O              7 8 9
H J K L   become 0   4 5 6
  M , .              1 2 3
```

MLX Commands

When you finish typing an ML listing (assuming you type it all in one session) you can then save the completed program on tape or disk. Follow the screen instructions. If you get any errors while saving, you probably have a bad disk, or the disk is full, or you've made a typo when entering the MLX program itself.

You don't have to enter the whole ML program in one sitting. MLX lets you enter as much as you want, save it, and then reload the file from tape or disk later.

MLX recognizes these commands:

SHIFT-S: Save	**SHIFT-N: New Address**
SHIFT-S: Load	**SHIFT-D: Display**

When you enter a command, MLX jumps out of the line you've been typing, so we recommend you do it at a new prompt. Use the Save command to save what you've been working on. It will save on tape or disk, as if you've finished, but the tape or disk won't work, of course, until you finish the typing. Remember what address you stop at. The next time you run MLX, answer all the prompts as you did before, then insert the disk or tape. When you get to the entry prompt, press SHIFT-L to reload the partly completed file into memory. Then use the New Address command to resume typing.

To use the New Address command, press SHIFT-N and enter the address where you previously stopped. The prompt will change, and you can then continue typing. Always enter a New Address that matches up with one of the line numbers in the special listing, or else the checksum won't work. The Display command lets you display a section of your typing. After you press SHIFT-D, enter two addresses within the line number range of the listing. You can abort the listing by pressing any key.

What if you forgot where you stopped typing? Use the Display command to scan memory from the beginning to the end of the program. When you reach the end of your typing, the lines will contain a random pattern of numbers. When you see the end of your typing, press any key to stop the listing. Use the New Address command to continue typing from the proper location.

See listings on page 129.

Baker's Dozen

(Article on page 111.)

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1: Mondrian

```
10 PRINTCHR$(147)CHR$(5):POKE53280,0:POKE
   53281,0                              :rem 242
20 R=54272:A=1                          :rem 222
30 N=INT(10*RND(1))+1:P=INT(10*RND(1))+1:
   Q=INT(15*RND(1))+1                   :rem 29
40 V=INT(1000*RND(1))+1024              :rem 118
50 IFV+N>2023THENV=V-N:GOTO20           :rem 48
60 IFV+(40*P)>2023THENV=V-(40*P):GOTO20
                                        :rem 243
70 FORZ=1TOP:FORX=1TON:POKEV+A,160:POKEV+
   A+R,Q:V=V+A:NEXT:V=V+40-N:NEXTZ:GOTO30
                                        :rem 210
```

Program 2: Rectangles

```
5 A=1:B=-1:C=40:D=-40:E=10:P=54272:rem 77
10 PRINTCHR$(147):POKE53280,0:POKE53281,0
                                        :rem 107
20 V=INT(1000*RND(1))+1024::Q=INT(15*RND(
   1))+1                                :rem 4
30 N=INT(E*RND(1))+1:Z=INT(E*RND(1))+1
                                        :rem 153
40 IFV+N<1024THEN:V=V-N:GOTO20          :rem 103
45 IFV+N>2023THEN:V=V-N:GOTO20          :rem 110
50 IFV-N<1024THEN:V=V+N:GOTO20          :rem 104
55 IFV-N>2023THEN:V=V+N:GOTO20          :rem 111
60 IFV+(40*Z)<1024THEN:V=V-(40*Z):GOTO20
                                        :rem 63
65 IFV+(40*Z)>2023THEN:V=V-(40*Z):GOTO20
                                        :rem 70
70 IFV-(40*Z)<1024THEN:V=V+(40*Z):GOTO20
                                        :rem 64
75 IFV-(40*O)>2023THEN:V=V+(40*Z):GOTO20
                                        :rem 60
80 FORX=1TON:POKEV+A,67:POKEV+A+P,Q:V=V+A
   :NEXT                                :rem 245
90 POKEV,75:POKEV+P,Q                   :rem 61
100 FORX=1TOZ:POKEV+D,66:POKEV+D+P,Q:V=V+
    D:NEXT                              :rem 50
110 POKEV,73:POKEV+P,Q                  :rem 100
120 FORX=1TON:POKEV+B,67:POKEV+B+P,Q:V=V+
    B:NEXT                              :rem 35
130 POKEV,85:POKEV+P,Q                  :rem 105
140 FORX=1TOZ:POKEV+C,66:POKEV+C+P,Q:V=V+
    C:NEXT                              :rem 51
150 POKEV,74:POKEV+P,Q                  :rem 105
160 GOTO20                              :rem 50
```

Program 3: Magix

```
5 PRINTCHR$(147)CHR$(5):POKE53280,0:POKE5
  3281,0                                :rem 198
10 V=1873:A=1:B=-40:C=-1:D=40:Q=160:R=INT
   (15*RND(1))+1:S=54272                :rem 181
20 GOSUB200                             :rem 116
30 POKE1093,32                          :rem 240
40 V=1215:A=-1:B=40:C=1:D=-40:R=INT(15*RN
   D(1))+1                              :rem 129
50 GOSUB200                             :rem 119
60 POKE1995,32                          :rem 254
70 V=1893:A=-1:B=-40:C=1:D=40:R=INT(15*RN
   D(1))+1                              :rem 144
80 GOSUB200                             :rem 122
90 POKE1073,32                          :rem 244
100 V=1191:A=1:B=40:C=-1:D=-40:R=INT(15*R
    ND(1))+1                            :rem 177
110 GOSUB200                            :rem 164
120 POKE2011,32                          :rem 23
130 FORT=1TO1000:NEXT:GOTO5             :rem 194
200 FORP=1TO10:POKEV,Q:POKEV+S,R         :rem 50
210 N=1:FORX=1TON:POKEV+A,Q:POKEV+S,R:V=V
    +A:NEXT                             :rem 146
220 FORX=1TON:POKEV+B,Q:POKEV+S,R:V=V+B:N
    EXT                                 :rem 159
230 N=N+1:FORX=1TON:POKEV+C,Q:POKEV+S,R:V
    =V+C:NEXT                           :rem 17
240 FORX=1TON:POKEV+D,Q:POKEV+S,R:V=V+D:N
    EXT                                 :rem 165
250 N=N+1:FORX=1TON:POKEV+A,Q:POKEV+S,R:V
    =V+A:NEXT                           :rem 15
260 FORX=1TON:POKEV+B,Q:POKEV+S,R:V=V+B:N
    EXT                                 :rem 163
270 NEXTP                               :rem 40
280 RETURN                              :rem 122
```

Program 4: Noodle Doodle

```
10 PRINTCHR$(147)CHR$(28):POKE53280,1:POK
   E53281,1                             :rem 41
20 FORL=54272TO54295:POKEL,0:NEXT:POKE542
   96,15                                :rem 17
25 POKE54277,190:POKE54278,255:POKE54282,
   190                                  :rem 212
30 POKE54285,255:POKE54276,65:POKE54283,6
   5:POKE54275,8:POKE54282,8            :rem 22
40 F=1:G=1.5:L=10:H=10:I=H*G:Z=54272:Y=54
   273:ZZ=54279:YY=54280:V=1398:C=54272
                                        :rem 147
50 FORQ=1TO9:PRINT:NEXT:PRINTTAB(9)"PLEAS
   E TURN UP VOLUME"                    :rem 19
55 PRINT:PRINTTAB(5)"HIT RUN/STOP-RESTORE
    TO STOP"                            :rem 232
60 FORT=1TO2000:NEXT:PRINTCHR$(147)
                                        :rem 162
100 A=INT(5*RND(1)):B=INT(13*RND(1))+2
                                        :rem 86
105 FORN=1TOA:POKEV,67:POKEV+C,B         :rem 16
108 V=V+1:POKEY,H:POKEZ,L:POKEYY,I:POKEZZ
    ,L:H=H+F:I=I+F:NEXT                 :rem 223
110 IFH>243THENH=10:I=H*G               :rem 206
120 POKEV,73:POKEV+C,B:V=V+40:X=INT(2*RND
    (1))+1:ONXGOTO700,800               :rem 231
200 A=INT(5*RND(1)):B=INT(13*RND(1))+2
                                        :rem 87
205 FORN=1TOA:POKEV,67:POKEV+C,B         :rem 17
208 V=V+1:POKEY,H:POKEZ,L:POKEYY,I:POKEZZ
    ,L:H=H+F:I=I+F:NEXT                 :rem 224
210 IFH>243THENH=10:I=H*G               :rem 207
220 POKEV,75:POKEV+C,B:V=V-40:X=INT(2*RND
    (1))+1:ONXGOTO500,600               :rem 232
300 A=INT(5*RND(1)):B=INT(13*RND(1))+2
                                        :rem 88
305 FORN=1TOA:POKEV,67:POKEV+C,B         :rem 18
308 V=V-1:POKEY,H:POKEZ,L:POKEYY,I:POKEZZ
    ,L:H=H-F:I=I-F:NEXT                 :rem 231
310 IFH<12THENH=10:I=H*G                :rem 152
320 POKEV,85:POKEV+C,B:V=V+40:X=INT(2*RND
```

```
    (1))+1:ONXGOTO700,800          :rem 236
400 A=INT(5*RND(1)):B=INT(13*RND(1))+2
                                   :rem 89
405 FORN=1TOA:POKEV,67:POKEV+C,B   :rem 19
408 V=V-1:POKEY,H:POKEZ,L:POKEYY,I:POKEZZ
    ,L:H=H-F:I=I-F:NEXT            :rem 232
410 IFH<12THENH=10:I=H*G           :rem 153
420 POKEV,74:POKEV+C,B:V=V-40:X=INT(2*RND
    (1))+1:ONXGOTO500,600          :rem 233
500 A=INT(5*RND(1)):B=INT(13*RND(1))+2
                                   :rem 90
505 FORN=1TOA:POKEV,66:POKEV+C,B   :rem 19
508 V=V-40:POKEY,H:POKEZ,L:POKEYY,I:POKEZ
    Z,L:H=H+F:I=I+F:NEXT           :rem 24
510 IFH>243THENH=10:I=H*G          :rem 210
515 POKEV,73:POKEV+C,B:V=V-1:IFV<1384THEN
    300                            :rem 191
520 X=INT(2*RND(1))+1:ONXGOTO300,400
                                   :rem 65
600 A=INT(5*RND(1)):B=INT(13*RND(1))+2
                                   :rem 91
605 FORN=1TOA:POKEV,66:POKEV+C,B   :rem 20
608 V=V-40:POKEY,H:POKEZ,L:POKEYY,I:POKEZ
    Z,L:H=H+F:I=I+F:NEXT           :rem 25
610 IFH>243THENH=10:I=H*G          :rem 211
615 POKEV,85:POKEV+C,B:V=V+1:IFV<1384THEN
    100                            :rem 191
620 X=INT(2*RND(1))+1:ONXGOTO100,200
                                   :rem 62
700 A=INT(5*RND(1)):B=INT(13*RND(1))+2
                                   :rem 92
705 FORN=1TOA:POKEV,66:POKEV+C,B   :rem 21
708 V=V+40:POKEY,H:POKEZ,L:POKEYY,I:POKEZ
    Z,L:H=H-F:I=I-F:NEXT           :rem 28
710 IFH<12THENH=10:I=H*G           :rem 156
715 POKEV,75:POKEV+C,B:V=V-1:IFV>1683THEN
    400                            :rem 200
720 X=INT(2*RND(1))+1:ONXGOTO300,400
                                   :rem 67
800 A=INT(5*RND(1)):B=INT(13*RND(1))+2
                                   :rem 93
805 FORN=1TOA:POKEV,66:POKEV+C,B   :rem 22
808 V=V+40:POKEY,H:POKEZ,L:POKEYY,I:POKEZ
    Z,L:H=H-F:I=I-F:NEXT           :rem 29
810 IFH<12THENH=10:I=H*G           :rem 157
815 POKEV,74:POKEV+C,B:V=V+1:IFV>1683THEN
    200                            :rem 196
820 X=INT(2*RND(1))+1:ONXGOTO100,200
                                   :rem 64
```

AVAIL

(Article on page 74.)

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Note: The checksums (rems) in the program below are for use with "The Automatic Proofreader—VIC and 64 only.)

```
 1 A=40:REM ON VIC, SET A=22 COLUMNS
                                   :rem 203
 5 PRINT"{CLR}{9 DOWN}"TAB((A-8)/2)"{RVS}A
   VAIL":FORI=1TO2000:NEXT         :rem 43
10 DIMW$(20),X$(20),IN$(20):PRINT"{CLR}"
                                   :rem 252
20 PRINT:PRINT"?:";:GOSUB30:IN$=B$:B$="":
   GOTO60:REM MAIN PROGRAM STARTS @ 20
                                   :rem 59
30 GETC$:PRINTC$;:IFC$=CHR$(13)THENRETURN
                                   :rem 69
40 IFC$=CHR$(20)THENB$=LEFT$(B$,LEN(B$)-1
   ):GOTO30                        :rem 25
50 B$=B$+C$:GOTO30                 :rem 214
60 L=LEN(IN$):P=1:W=1              :rem 209
70 FORI=1TOL:IFMID$(IN$,I,1)=" "THENGOSUB
   200                             :rem 91
80 NEXT                            :rem 167
90 W$(W)=MID$(IN$,P)               :rem 79
100 E$=RIGHT$(W$(W),1):IFE$="."ORE$="?"OR
    E$="!"THEN120                  :rem 195
110 GOTO130                        :rem 95
120 W$(W)=LEFT$(W$(W),LEN(W$(W))-1)
                                   :rem 147
130 FORJ=1TOW:X$(J)=W$(J):NEXT     :rem 74
140 GOSUB210                       :rem 168
150 PRINT" OK?";                   :rem 123
160 GETOK$:IFOK$=""THEN160          :rem 3
170 IFOK$="N"THENGOSUB410          :rem 248
180 J=W:IN$(C)=IN$:C=C+1:IFC>19THENC=0
                                   :rem 228
190 IN$="":GOTO20                  :rem 171
200 W$(W)=MID$(IN$,P,I-P):P=I:W=W+1:RETUR
    N                              :rem 21
210 PRINT:PRINT:FORI=1TOW          :rem 185
220 IFX$(I)="WAS"ORX$(I)=" WAS"THENW$(I)=
    " WERE"                        :rem 192
230 IFX$(I)="I"ORX$(I)=" I"ORX$(I)=" ME"O
    RLEFT$(X$(I),2)="I'"THENW$(I)=" YOU"
                                   :rem 183
240 IFX$(I)=" WERE"THENW$(I)=" WAS"
                                   :rem 159
250 IFX$(I)=" MY"THENW$(I)=" YOUR"
                                   :rem 119
260 IFX$(I)=" AM"THENW$(I)=" ARE":rem 233
270 IFX$(I)="YOU"ORX$(I)=" YOU"THENW$(I)=
    " I"                           :rem 255
280 IFX$(I)="YOU'RE"ORX$(I)=" YOU'RE"THEN
    W$(I)=" I'M"                   :rem 240
290 IFX$(I)="YOUR"ORX$(I)=" YOUR"THENW$(I
    )=" MY"                         :rem 2
300 IFRIGHT$(X$(I),2)="'S"THENW$(I)=LEFT$
    (X$(I),LEN(X$(I))-2)+" IS"     :rem 151
310 IFRIGHT$(X$(I),3)="I'M"THENW$(I)=LEFT
    $(X$(I),LEN(X$(I))-3)+"YOU ARE"
                                   :rem 22
320 IFX$(I+1)=" ARE"ANDX$(I)+X$(I+1)="YOU
     ARE"THENW$(I+1)="'M"          :rem 96
330 IFRIGHT$(X$(I),3)="'VE"THENW$(I)=LEFT
    $(X$(I),LEN(X$(I))-3)+" HAVE":rem 108
340 IFRIGHT$(X$(I),2)="'D"THENW$(I)=LEFT$
    (X$(I),LEN(X$(I))-2)+" WOULD":rem 123
350 IFRIGHT$(X$(I),4)=" THE"THENW$(I)=LEF
    T$(X$(I),LEN(X$(I))-4):REM DELETE"THE
    "                              :rem 242
360 IFRIGHT$(X$(I),3)=" AN"THENW$(I)="":R
    EM DELETE"AN"                   :rem 9
370 IFRIGHT$(X$(I),2)=" A"THENW$(I)=X$(I+
    1)                             :rem 69
380 NEXT                           :rem 218
390 FORI=1TOJ+1:PRINTW$(I);:NEXT   :rem 19
400 RETURN                         :rem 116
410 X=INT(7*RND(0))+1:PRINT" NO? ";
                                   :rem 170
420 ONXGOTO430,440,450,460,470,480,490
                                   :rem 2
```

```
430 PRINT"WHAT'D YOU EXPECT ME TO SAY?
    {2 SPACES}";IN$(X):RETURN     :rem 231
440 PRINT"IN WHAT WAY? ";:RETURN :rem 185
450 PRINT"I DON'T UNDERSTAND ";:RETURN
                                  :rem 92
460 PRINT"REALLY? ";:RETURN       :rem 200
470 PRINT:RETURN                  :rem 66
480 PRINT"WHY? ";:RETURN          :rem 249
490 PRINT:RETURN                  :rem 68
```

Machine Language For Beginners

(Article on page 103.)

Program 1: Binary Quiz

```
130 C1=209:C0=215
140 X=INT(256*RND(1)): D=X: P=128
160 PRINT CHR$(147)
180 FOR I= 1 TO 8
190 IF INT(D/P) = 1 THEN PRINT CHR$(C1);:
    D=D-P: GOTO 210
200 PRINT CHR$(C0);
210 P=P/2: NEXT I: PRINT
220 PRINT"WHAT IS THIS DECIMAL?"
230 INPUT Q: IF Q=X THEN PRINT"CORRECT":
    {SPACE}GOTO 250
240 PRINT"SORRY, IT WAS";X
250 FOR T= 1 TO 1000: NEXT T
260 GOTO 140
```

Program 2: Binary Table

```
110 L=8:B=2:C=1
120 FORX=0TO255:PRINTX;
140 IFXAND1THENK(C)=49:GOTO160
150 K(C)=48
160 C=C+1:IFBANDXTHENK(C)=49:GOTO180
170 K(C)=48
180 B=B*2:IFC>8THEN200
190 GOTO160
200 FOR I=0TO7:PRINTSTR$(K(L)-48);:L=L-1
210 NEXT
220 C=0:PRINT
260 L=8:B=2:C=1:NEXTX
```

Alpha Anxiety

(Article on page 71.)

Program 1: Alpha Anxiety—VIC Version

```
100 IFPEEK(44)=18THEN120          :rem 102
110 SM=7735:CL=30720:Q1=8141:Q2=7793:GOTO
    130                           :rem 233
120 SM=4151:CL=33792:Q1=4557:Q2=4209
                                  :rem 224
130 JC=37154:J1=37151:J2=37152:S1=36874:S
    2=36876:HS=0                  :rem 157
140 CR$=CHR$(19):FORI=1TO23:CR$=CR$+CHR$(
    17):NEXT                      :rem 110
150 POKE36878,15:POKE36879,25     :rem 116
160 FOR I=1TO15                    :rem 62
170 PRINTCHR$(28)CHR$(147)LEFT$(CR$,9)SPC
    (8)"{BLU}{3 DOWN}ALPHA"       :rem 248
180 PRINTSPC(7)"{BLU}{2 DOWN}ANXIETY"
                                  :rem 59
190 FOR J=1TO100:NEXT             :rem 230
200 PRINTCHR$(28)CHR$(147)LEFT$(CR$,9)SPC
    (8)"{BLU}{2 DOWN}{RVS}ALPHA" :rem 243
210 PRINTSPC(7)"{BLU}{DOWN}{RVS}ANXIETY"
                                  :rem 54
220 FOR J=1TO100: NEXTI           :rem 41
230 DIMP%(25),RL%(5,5)            :rem 114
240 GOSUB1240                     :rem 221
250 RF=0:AT=0                     :rem 216
260 DL=150                        :rem 251
270 SC=0:MA=3:POKE36879,28        :rem 228
280 L1=1:L2=1:LC=1:FL=1:PO=SM:FG=0 :rem 6
290 IFRF=1THENLC=25               :rem 146
300 PRINTCHR$(147)                 :rem 14
310 PRINTTAB(10)CHR$(144)"{A}{R}*{R}*{R}*{R}
    *{R}*{S}"                     :rem 191
320 FOR I=1TO4:PRINTTAB(10)"-{+}-{+}-{+}-{+}-
    {+}-{+}-":PRINTTAB(10)"{Q}*+*+*+*+*+*
    {W}":NEXT                     :rem 161
330 PRINTTAB(10)"-{+}-{+}-{+}-{+}-{+}-{+}-"
                                  :rem 92
340 PRINT TAB(10) "{Z}*{E}*{E}*{E}*{E}*{E}*
    {X}"                          :rem 223
350 PRINT"{BLU}{HOME}{DOWN}{RIGHT}NEXT":P
    RINT"{RIGHT}LETTER:":PRINT"{DOWN}
    {2 RIGHT}{A}*{S}":PRINT"{2 RIGHT}- -"
    :PRINT"{2 RIGHT}{Z}*{X}"      :rem 28
360 PRINT"{DOWN}{RIGHT}TIME:":PRINT"
    {3 DOWN}{RIGHT}SCORE:":PRINT"{RED}
    {DOWN}{2 RIGHT}";SC:PRINT"{BLU}{DOWN}
    {RIGHT}HIGH":PRINT"{RIGHT}SCORE:"
                                  :rem 171
370 PRINT"{RED}{DOWN}{2 RIGHT}";HS
                                  :rem 168
380 IFSC<2499THENPOKEQ2+CL,5:POKEQ2,LC
                                  :rem 119
390 FORI=Q1+1TOQ1+43:POKEI+CL,4:NEXT
                                  :rem 227

400 TI$="000000":CS=102           :rem 150
410 GOSUB570                      :rem 177
420 IFFG=1THEN280                 :rem 233
430 IFMA=0THEN480                 :rem 236
440 POKES2,0                      :rem 168
450 TL=DL-INT(TI/60)              :rem 161
460 PRINTLEFT$(CR$,11)SPC(2)TL"{LEFT}
    {2 SPACES}"                   :rem 248
470 IFTL>0THEN410                 :rem 252
480 IFSC>HSTHENHS=SC               :rem 55
490 PRINTLEFT$(CR$,18)SPC(11)"GAME OVER!"
                                  :rem 108
500 POKES1,185:FORI=1TO300:NEXT:POKES1,0:
    GOSUB1240                      :rem 99
510 PRINTCHR$(147)"{10 DOWN}PRESS THE FIR
    E BUTTON"                     :rem 111
520 PRINT"{4 SPACES}TO PLAY AGAIN"
                                  :rem 161
530 WAIT37137,32                   :rem 99
540 WAIT37137,32,32               :rem 245
550 PRINTCHR$(147):FORT=1TO500:NEXT
                                  :rem 169
560 GOTO250                       :rem 107
570 POKEJC,127:P=PEEK(J2)AND128    :rem 69
580 JE=-(P=0)                     :rem 164
590 POKEJC,255:P=PEEK(J1)         :rem 218
600 JS=-((PAND8)=0)                 :rem 7
610 JW=-((PAND16)=0)               :rem 59
620 JN=-((PAND4)=0)                 :rem 0
```

```
630 JF=-((PAND32)=0)                    :rem 42
640 TH=PO:T1=L1:T2=L2                   :rem 6
650 IFJFTHENGOSUB790:GOTO720            :rem 21
660 IFJETHENPO=PO+2:L1=L1+1:FL=1        :rem 200
670 IFJSTHENPO=PO+44:L2=L2+1:FL=1       :rem 15
680 IFJWTHENPO=PO-2:L1=L1-1:FL=1        :rem 224
690 IFJNTHENPO=PO-44:L2=L2-1:FL=1       :rem 16
700 IFFL=0THEN780                       :rem 243
710 POKES2,175                          :rem 21
720 IFFG=1THEN780                       :rem 241
730 IFPO<SMORPO>SM+207THENPO=TH:L1=T1:L2=
    T2                                  :rem 33
740 IFPEEK(PO+1)=32ORPEEK(PO-1)=32THENPO=
    TH:L1=T1:L2=T2                      :rem 142
750 POKETH+CL,0:POKETH,CS:CS=PEEK(PO)
                                        :rem 102
760 POKEPO+CL,2:POKEPO,RL%(L1,L2):rem 242
770 FL=0                                :rem 157
780 RETURN                              :rem 127
790 IFRL%(L1,L2)=LCTHENSC=SC+10:GOTO830
                                        :rem 104
800 IFRF=1THEN910                       :rem 246
810 IFRL%(L1,L2)<LCTHEN940              :rem 250
820 GOTO910                             :rem 109
830 POKES2,245:FORT=1TO25:NEXT:POKES2,0
                                        :rem 198
840 IFRF=1THENPOKEQ1+26-LC,LC:GOTO860
                                        :rem 44
850 POKEQ1+LC,LC                        :rem 195
860 IFRF=1THENLC=LC-1:GOTO880           :rem 46
870 LC=LC+1                             :rem 86
880 IFSC>2500THEN900                    :rem 146
890 IFLC<>0THENPOKEQ2,LC                :rem 5
900 CS=RL%(L1,L2):GOTO930               :rem 182
910 POKES1,250:FORT=1TO30:NEXT:POKES1,0
                                        :rem 187
920 DL=DL-10:POKE36879,25+MA:GOTO1230
                                        :rem 133
930 PRINTLEFT$(CR$,15)SPC(2)SC"{LEFT}
    {2 SPACES}"                         :rem 244
940 IFRF=0THEN970                       :rem 0
950 IFLC<>0THEN1230                     :rem 91
960 GOTO980                             :rem 121
970 IFLC<>26THEN1230                    :rem 149
980 IFSC>5000THEN1040                   :rem 189
990 AT=AT+DL-TL                         :rem 145
1000 IFSC=5000THENDL=INT(AT/20):GOTO1090
                                        :rem 131
1010 IFTL<150THENDL=TL*2+40:GOTO1090
                                        :rem 135
1020 IFTL>300THENDL=TL*.5:GOTO1090:rem 41
1030 DL=TL                              :rem 49
1040 IFSC=6000THENDL=DL-5               :rem 219
1050 IFSC=7000THENDL=DL-5               :rem 221
1060 IFSC=8000THENDL=DL-5               :rem 223
1070 IFSC=9000THENDL=DL-5               :rem 225
1080 IFSC=10000THENDL=DL-5              :rem 10
1090 FORI=1TO3                          :rem 62
1100 POKES2,225:FORT=1TO250:NEXT        :rem 209
1110 POKES2,0:FORT=1TO25:NEXT           :rem 57
1120 NEXTI                              :rem 76
1130 FORI=1TO2                          :rem 56
1140 POKES2,231:FORT=1TO250:NEXT        :rem 210
1150 POKES2,0:FORT=1TO25:NEXT           :rem 61
1160 POKES2,225:FORT=1TO250:NEXT        :rem 215
1170 POKES2,0:FORT=1TO25:NEXT           :rem 63
1180 NEXTI                              :rem 82
1190 POKES2,240:FORT=1TO250:NEXT:POKES2,0
                                        :rem 33
1200 IFSC>1250THENRF=1                  :rem 35
1210 GOSUB1240                          :rem 11
1220 FG=1                               :rem 192
1230 RETURN                             :rem 166
1240 FORI=1TO25:P%(I)=I:NEXT            :rem 183
1250 FORI=1TO5                          :rem 62
1260 FORJ=1TO5                          :rem 64
1270 R=INT(RND(1)*25+1)                 :rem 232
1280 IFP%(R)=0THEN1270                  :rem 216
1290 RL%(I,J)=R                         :rem 46
1300 P%(R)=0                            :rem 73
1310 NEXTJ                              :rem 78
1320 NEXTI                              :rem 78
1330 RETURN                             :rem 167
```

Program 2: Alpha Anxiety—64 Version

```
100 SD=54272:FORI=SDTOSD+24:POKEI,0:NEXT:
    POKESD+5,26:POKESD+6,191:POKE54296,15
                                        :rem 26
110 SM=1280:CL=54272:Q1=1905:Q2=1227
                                        :rem 210
120 HS=0:JC=56320                       :rem 159
130 CR$=CHR$(19):FORI=1TO23:CR$=CR$+CHR$(
    17):NEXT:POKE53281,1                :rem 54
140 FORI=1TO7                           :rem 13
150 PRINTCHR$(31)CHR$(147)LEFT$(CR$,9)SPC
    (12)"{4 DOWN}ALPHA ANXIETY"         :rem 47
160 FOR J=1TO50:NEXT                    :rem 183
170 PRINTCHR$(31)CHR$(147)LEFT$(CR$,9)SPC
    (12)"{3 DOWN}{RVS}ALPHA ANXIETY"
                                        :rem 50
180 FOR J=1TO100:NEXTI                  :rem 46
190 DIMP%(25),RL%(5,5)                  :rem 119
200 GOSUB1150                           :rem 217
210 RF=0:AT=0                           :rem 212
220 DL=150                              :rem 247
230 SC=0:MA=3                           :rem 208
240 L1=1:L2=1:LC=1:FL=1:PO=SM:FG=0      :rem 2
250 IFRF=1THENLC=25                     :rem 142
260 PRINTCHR$(147)                      :rem 19
270 PRINT"{4 DOWN}"TAB(15)"{BLK}{A}*{R}*
    {R}*{R}*{R}*{S}"                    :rem 246
280 FOR I=1TO4:PRINTTAB(15)"-{RVS} {OFF}-
    {RVS} {OFF}-{RVS} {OFF}-{RVS} {OFF}-
    {RVS} {OFF}-":PRINTTAB(15)"{Q}*+*+*+*
    +*{W}"                              :rem 45
290 NEXT:PRINTTAB(15)"-{RVS} {OFF}-{RVS}
    {SPACE}{OFF}-{RVS} {OFF}-{RVS} {OFF}-
    {RVS} {OFF}-"                       :rem 213
300 PRINTTAB(15) "{Z}*{E}*{E}*{E}*{E}*{E}*{X}
    "                                   :rem 224
310 PRINT"{BLU}{HOME}{DOWN}{RIGHT}NEXT":P
    RINT"{RIGHT}LETTER:":PRINT"{RED}
    {DOWN}{2 RIGHT}{A}*{S}":PRINT"{RED}
    {2 RIGHT}- -":PRINT"{RED}{2 RIGHT}{Z}
    *{X}"                               :rem 108
320 PRINT"{BLU}{DOWN}{RIGHT}TIME:":PRINT"
    {BLU}{3 DOWN}{RIGHT}SCORE:":PRINT"
    {RED}{DOWN}{2 RIGHT}"SC:            :rem 142
330 PRINT"{BLU}{DOWN}{RIGHT}HIGH":PRINT"
    {RIGHT}SCORE:"                      :rem 178
340 PRINT"{RED}{DOWN}{2 RIGHT}";HS
                                        :rem 165
350 IFSC<2499THENPOKEQ2+CL,6:POKEQ2,LC
                                        :rem 117
360 FORI=Q1+CLTOQ1+CL+26:POKEI,0:NEXT
                                        :rem 59
370 TI$="000000":CS=160                 :rem 160
380 GOSUB530                            :rem 179
390 IFFG=1THEN240                       :rem 235
400 IFMA=0THEN450                       :rem 230
410 POKESD+4,17:POKESD+1,0              :rem 6
```

```
420 TL=DL-INT(TI/60)                    :rem 158
430 PRINTLEFT$(CR$,11)SPC(2)TL"{LEFT}
    {2 SPACES}"                         :rem 245
440 IFTL>0THEN380                       :rem 255
450 IFSC>HSTHENHS=SC                    :rem 52
460 PRINT"{CLR}{BLU}{9 DOWN}{15 SPACES}
    {RVS}GAME OVER"                     :rem 30
470 PRINT"{BLU}{3 DOWN}{9 SPACES}PRESS TH
    E FIRE BUTTON"                      :rem 46
480 PRINT"{DOWN}{13 SPACES}TO PLAY AGAIN"
                                        :rem 183
490 POKESD+1,85:FORI=1TO400:NEXT:POKESD+1
    ,0:GOSUB1150                        :rem 25
500 A=NOTPEEK(JC)AND16:IFA=0THEN500
                                        :rem 124
510 PRINTCHR$(147):FORT=1TO500:NEXT
                                        :rem 165
520 GOTO210                             :rem 99
530 P=NOTPEEK(JC)AND31                  :rem 80
540 JE=(P=8)                            :rem 123
550 JS=(P=2)                            :rem 132
560 JW=(P=4)                            :rem 139
570 JN=(P=1)                            :rem 128
580 JF=(P=16)                           :rem 175
590 TH=PO:T1=L1:T2=L2                   :rem 10
600 IFJFTHENGOSUB740:GOTO670            :rem 15
610 IFJETHENPO=PO+2:L1=L1+1:FL=1        :rem 195
620 IFJSTHENPO=PO+80:L2=L2+1:FL=1       :rem 10
630 IFJWTHENPO=PO-2:L1=L1-1:FL=1        :rem 219
640 IFJNTHENPO=PO-80:L2=L2-1:FL=1       :rem 11
650 IFFL=0THEN730                       :rem 242
660 POKESD+1,50                         :rem 79
670 IFFG=1THEN730                       :rem 240
680 IFPO<SMORPO>SM+376THENPO=TH:L1=T1:L2=
    T2                                  :rem 44
690 IFPEEK(PO+1)=32ORPEEK(PO-1)=32THENPO=
    TH:L1=T1:L2=T2                      :rem 146
700 POKETH+CL,0:POKETH,CS:CS=PEEK(PO)
                                        :rem 97
710 POKEPO+CL,2:POKEPO,RL%(L1,L2):rem 237
720 FL=0                                :rem 152
730 RETURN                              :rem 122
740 IFRL%(L1,L2)=LCTHENSC=SC+10:GOTO780
                                        :rem 103
750 IFRF=1THEN860                       :rem 254
760 IFRL%(L1,L2)<LCTHEN900              :rem 250
770 GOTO860                             :rem 117
780 POKESD+1,100:FORT=1TO25:NEXT:POKESD+1
    ,0                                  :rem 156
790 IFRF=1THENPOKEQ1+26-LC,LC:GOTO810
                                        :rem 43
800 POKEQ1+LC,LC                        :rem 190
810 IFRF=1THENLC=LC-1:GOTO830           :rem 36
820 LC=LC+1                             :rem 81
830 IFSC>2500THEN850                    :rem 145
840 IFLC<>0THENPOKEQ2,LC                :rem 0
850 CS=RL%(L1,L2):GOTO890               :rem 191
860 POKESD+1,20:FORT=1TO30:NEXT:POKESD+1,
    0                                   :rem 104
870 DL=DL-10:IFDL<=0THENGOTO460         :rem 142
880 RETURN                              :rem 128
890 PRINTLEFT$(CR$,15)SPC(2)SC"{LEFT}
    {2 SPACES}"                         :rem 249
900 IFRF=0THEN930                       :rem 248
910 IFLC<>0THEN1140                     :rem 87
920 GOTO940                             :rem 113
930 IFLC<>26THEN1140                    :rem 145
940 IFSC>5000THEN1000                   :rem 181
950 AT=AT+DL-TL                         :rem 141
960 IFSC=5000THENDL=INT(AT/20):GOTO1050
                                        :rem 93
970 IFTL<150THENDL=40+TL*2:GOTO1050
                                        :rem 97
980 IFTL>300THENDL=TL*.5:GOTO1050       :rem 3
990 DL=TL                               :rem 15
1000 IFSC=6000THENDL=DL-5               :rem 215
1010 IFSC=7000THENDL=DL-5               :rem 217
1020 IFSC=8000THENDL=DL-5               :rem 219
1030 IFSC=9000THENDL=DL-5               :rem 221
1040 IFSC=10000THENDL=DL-5              :rem 6
1050 H=SD+1:L=SD:POKEH,8:POKEL,97:GOSUB10
     80                                 :rem 129
1060 POKEH,12:POKEL,143:GOSUB1080:POKEH,1
     4:POKEL,24:GOSUB1080               :rem 213
1070 POKEH,12:POKEL,143:POKESD+4,17:FORI=
     1TO800:NEXTI:POKEH,0:POKEL,0:GOTO111
     0                                  :rem 99
1080 POKESD+4,17:FORI=1TO200:NEXT:POKESD+
     4,16:FORI=1TO100:NEXT              :rem 127
1090 POKESD+4,17:FORI=1TO200:NEXT:POKESD+
     4,16:FORI=1TO100:NEXT              :rem 128
1100 RETURN                             :rem 162
1110 IFSC>1250THENRF=1                  :rem 35
1120 GOSUB1150                          :rem 11
1130 FG=1                               :rem 192
1140 RETURN                             :rem 166
1150 FORI=1TO25:P%(I)=I:NEXT            :rem 183
1160 FORI=1TO5                          :rem 62
1170 FORJ=1TO5                          :rem 64
1180 R=INT(RND(1)*25+1)                 :rem 232
1190 IFP%(R)=0THEN1180                  :rem 216
1200 RL%(I,J)=R                         :rem 37
1210 P%(R)=0                            :rem 73
1220 NEXTJ                              :rem 78
1230 NEXTI                              :rem 78
1240 RETURN                             :rem 167
```

Disk Directory Sort

(Article on page 113.)

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

```
10 GOSUB340:GOTO150                     :rem 129
20 PRINT"{DOWN}SORTING":SK=K1:L%(K1)=K1:R
   %(1)=NF                              :rem 176
30 L1=L%(SK):R1=R%(SK):SK=SK-1          :rem 238
40 L2=L1:R2=R1:KE$=NS$(INT((L1+R1)/2))
                                        :rem 116
50 KE$=MID$(KE$,31)+MID$(KE$,4,M%(INT((L1
   +R1)/2)))                            :rem 127
60 IFMID$(NS$(L2),31)+MID$(NS$(L2),4,M%(L
   2))<KE$THENL2=L2+K1:GOTO60           :rem 27
70 IFKE$<MID$(NS$(R2),31)+MID$(NS$(R2),4,
   M%(R2))THENR2=R2-K1:GOTO70           :rem 61
80 IFL2>R2THEN110                       :rem 248
90 N$=NS$(R2):H=M%(R2):NS$(R2)=NS$(L2):M%
   (R2)=M%(L2)                          :rem 92
100 NS$(L2)=N$:M%(L2)=H:L2=L2+1:R2=R2-1:G
    OTO60                               :rem 89
110 IFL2<R1THENSK=SK+1:L%(SK)=L2:R%(SK)=R
    1                                   :rem 23
120 R1=R2:IFL1<R1THEN40                 :rem 111
130 IFSKTHEN30                          :rem 83
140 RETURN                              :rem 117
150 NF=0:GOSUB300                       :rem 228
```

```
160 GOSUB320:FORPP=1TO8:R$="":FL=0:M%(NF+
    1)=16:FORX=1TO30:GET#5,I$     :rem 169
170 IFI$=CHR$(160)ANDFL=0THENM%(NF+1)=X-4
    :FL=1                         :rem 158
180 R$=R$+LEFT$(I$+C0$,1):NEXT:IFPP<>8THE
    NGET#5,I$,I$                  :rem 70
190 X$=C0$:IFMID$(R$,1,1)=C0$THENX$=CHR$(
    255):PRINTDD$;                :rem 138
200 NF=NF+1:NS$(NF)=R$+X$:PRINTMID$(R$,4,
    16):NEXTPP:IFYS<>255THEN160   :rem 122
210 CLOSE5:GOSUB20                :rem 90
220 PRINT"{DOWN}PRESS SPACE BAR TO REWRIT
    E DIRECTORY"                  :rem 62
230 GETA$:IFA$<>" "THEN230        :rem 138
240 GOSUB300:NN=0                 :rem 236
250 GOSUB320:FORPP=1TO8:NN=NN+1   :rem 193
260 PRINT#5,MID$(NS$(NN),1,30);:IFMID$(NS
    $(NN),31)=CHR$(255)THENPRINTDD$;
                                  :rem 249
270 PRINTMID$(NS$(NN),4,16):IFPP<>8THENPR
    INT#5,C0$;C0$;                :rem 25
280 NEXTPP:PRINT#15,"U2";5;0;LT;LS:IFYS<>
    255THEN250                    :rem 161
290 CLOSE5:END                    :rem 87
300 OPEN5,8,5,"#":YT=18:YS=0:GOSUB320:PRI
    NT#15,"B-P";5;143:PRINTCHR$(14)
                                  :rem 193
310 PRINTRN$;:FORX=1TO24:GET#5,I$:PRINTI$
    ;:NEXT:PRINTRF$:RETURN        :rem 160
320 PRINT#15,"U1";5;0;YT;YS:LT=YT:LS=YS:G
    ET#5,T$,S$:YT=ASC(T$+C0$)     :rem 16
330 YS=ASC(S$+C0$):RETURN         :rem 250
340 X=150:DIM L%(X),M%(X),R%(X),NS$(X):K1
    =1:OPEN15,8,15,"I":C0$=CHR$(0):NF=0
                                  :rem 141
350 DD$="::::::::::::::DELETED[+3]":RN$=CH
    R$(18):RF$=CHR$(146):RETURN   :rem 190
```

Disk Handler

(Article on page 114.)

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Note: See special instructions in article. Requires at least 3K expansion to work on a VIC (8K or more is also acceptable).

```
340 IF JJ$="S" THEN GOSUB 780       :rem 0
438 K=0:FORJ=0TO63:IFJ=16ORJ=32ORJ=48THEN
    GOSUB710:IFZ$="N"THENJ=80:GOTO458
                                  :rem 162
439 PRINT#15,"B-P:2"+STR$(J*4)    :rem 146
458 NEXT J:IF J<80 THEN GOSUB710  :rem 40
459 GOTO 571                      :rem 120
575 PRINT"{CLR}NEXT TRACK AND SECTOR"NB(1
    )NB(2) "{DOWN}"               :rem 214
580 PRINT"DO YOU WANT NEXT TRACK AND SECT
    OR(Y/N)","{2 SPACES}OR{2 SPACES}END
    {2 SPACES}(E)                 :rem 18
615 IF Z$="E" THEN 9999{20 SPACES}: REM E
    ND PROGRAM                    :rem 143
710 REM*****************************
                                  :rem 104
720 REM* SCREEN CONTINUE MESSAGE
    {4 SPACES}*                   :rem 251
730 REM*****************************
                                  :rem 106
740 PRINT"{4 RIGHT}CONTINUE(Y/N)","
    {RIGHT}{3 SPACES}CHANGE{2 SPACES}(C)"
    ,"{4 SPACES}REWRITE (W)",     :rem 153
741 PRINT"{4 SPACES}END{5 SPACES}(E)"
                                  :rem 218
750 GETZ$:IF Z$="" THEN 750       :rem 141
755 IF Z$="C" THEN 950{21 SPACES}: REM CH
    ANGE DATA IN{2 SPACES}BUFFER :rem 110
760 IF Z$="N" THEN RETURN{18 SPACES}: REM
     DON'T CONTINUE               :rem 103
765 IF Z$="W"{2 SPACES}THEN 1100
    {19 SPACES}: REM REWRITE BLOCK:rem 35
767 IF Z$="E" THEN 9999{20 SPACES}: REM E
    ND                            :rem 127
770 IF Z$<>"Y" THEN 750{20 SPACES}: REM I
    NVALID OPTION                 :rem 139
780 PRINT"{CLR}{RVS}TRACK ";T;"{LEFT} SEC
    TOR"S"{OFF}":RETURN            :rem 72
950 REM**********************      :rem 30
951 REM*{20 SPACES}*              :rem 215
952 REM* CHANGE DATA ON DISK*      :rem 96
953 REM*{20 SPACES}*              :rem 217
954 REM**********************      :rem 34
955 Z9$=""                        :rem 219
960 PRINT"ENTER STARTING POINT{2 SPACES}F
    OR CHANGE 0-FF":INPUT CS$     :rem 222
961 FORZ=0 TO LEN(HX$):IF MID$(HX$,Z+1,1)
    =LEFT$(CS$,1)THENTX=Z*16      :rem 247
962 IF MID$(HX$,Z+1,1)=RIGHT$(CS$,1)THENT
    Y=Z                           :rem 60
963 NEXT:CS=TY+TX                 :rem 114
970 PRINT#15,"B-P:2",CSTART{16 SPACES}: R
    EM POSITION TO START           :rem 18
990 GET#2,A$(0)                   :rem 233
995 IF A$(0)=""THEN A$(0)=NL$     :rem 173
1000 N=ASC(A$(0))                 :rem 90
1010 A$="":GOSUB 790:GOSUB2000: PRINT"-";
     {2 SPACES}: REM DISPLAY BYTE IN HEX
                                  :rem 213
1015 N1=0                         :rem 179
1017 FOR J1=1TO0 STEP-1            :rem 6
1020 GET Z$:IF Z$=""THEN 1020{14 SPACES}:
      REM GET 2 CHARACTERS        :rem 235
1022 IFZ$=","THENN1=N:J1=-1:GOTO1040
     {7 SPACES}: REM HANDLE COMMA KEY
                                  :rem 96
1024 IF Z$=CHR$(13)THENJ1=-1:GOTO1040
     {6 SPACES}: REM HANDLE RETURN KEY
                                  :rem 215
1025 REM CONVERT HEX ENTRY TO DECIMAL EQU
     IVALENT                      :rem 212
1030 FORI=1TO16:IF Z$=MID$(HX$,I,1)THEN N
     1=N1+(I-1)*(16↑J1)           :rem 29
1032 NEXT I                       :rem 78
1040 NEXTJ1:IFZ$=CHR$(13)THENPRINTZ$:PRIN
     T#15,"B-P:2",CS:PRINT#2,Z9$;:GOTO740
                                  :rem 232
1041 REM IF RETURN KEY HIT MAKE CHANGES I
     N DISK BUFFER                :rem 122
1045 N=N1:A$="":GOSUB790:GOSUB2000:PRINT"
     ,";                          :rem 60
1050 REM ADD NEWLY CHANGED BYTE TO PREV C
     HANGES IN Z9$                :rem 71
1052 Z9$=Z9$+CHR$(N):GOTO 990     :rem 83
1100 REM**********************     :rem 66
```

```
1101 REM*{20 SPACES}*                    :rem 251
1102 REM* REWRITE BLOCK{6 SPACES}*
                                         :rem 137
1103 REM*{20 SPACES}*                    :rem 253
1105 REM**********************           :rem 71
1110 PRINT#15,"U2:2,"D$;T;S:GOSUB650
                                         :rem 66
1120 PRINT"TRACK ";T;" SECTOR ";S,"HAS BE
     EN REWRITTEN"                       :rem 160
1130 GOTO 740                            :rem 153
2000 PRINTLEFT$(A$,2);:RETURN             :rem 7
9999 CLOSE2:CLOSE15:CLOSE4               :rem 134
```

MLX

(Article on page 122.)

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

64 MLX

```
10 REM LINES CHANGED FROM MLX VERSION 2.0
   0 ARE 750,765,770 AND 860             :rem 50
20 REM LINE CHANGED FROM MLX VERSION 2.01
    IS 300                               :rem 147
100 PRINT"{CLR}{6}";CHR$(142);CHR$(8);:PO
    KE53281,1:POKE53280,1                :rem 67
101 POKE 788,52:REM DISABLE RUN/STOP
                                         :rem 119
110 PRINT"{RVS}{39 SPACES}";             :rem 176
120 PRINT"{RVS}{14 SPACES}{RIGHT}{OFF}{*}
    £{RVS}{RIGHT} {RIGHT}{2 SPACES}{*}
    {OFF}{*}£{RVS}£{RVS}{14 SPACES}";
                                         :rem 250
130 PRINT"{RVS}{14 SPACES}{RIGHT} {G}
    {RIGHT} {2 RIGHT} {OFF}£{RVS}£{*}
    {OFF}{*}{RVS}{14 SPACES}";           :rem 35
140 PRINT"{RVS}{41 SPACES}"              :rem 120
200 PRINT"{2 DOWN}{PUR}{BLK} MACHINE LANG
    UAGE EDITOR VERSION 2.02{5 DOWN}"
                                         :rem 238
210 PRINT"{5}{2 UP}STARTING ADDRESS?
    {8 SPACES}{9 LEFT}";                 :rem 143
215 INPUTS:F=1-F:C$=CHR$(31+119*F)
                                         :rem 166
220 IFS<256OR(S>40960ANDS<49152)ORS>53247
    THENGOSUB3000:GOTO210                :rem 235
225 PRINT:PRINT:PRINT                    :rem 180
230 PRINT"{5}{2 UP}ENDING ADDRESS?
    {8 SPACES}{9 LEFT}";:INPUTE:F=1-F:C$=
    CHR$(31+119*F)                       :rem 20
240 IFE<256OR(E>40960ANDE<49152)ORE>53247
    THENGOSUB3000:GOTO230                :rem 183
250 IFE<STHENPRINTC$;"{RVS}ENDING < START
    {2 SPACES}":GOSUB1000:GOTO 230
                                         :rem 176
260 PRINT:PRINT:PRINT                    :rem 179
300 PRINT"{CLR}";CHR$(14):AD=S           :rem 56
310 A=1:PRINTRIGHT$("0000"+MID$(STR$(AD),
    2),5);":";                           :rem 33
315 FORJ=ATO6                            :rem 33
320 GOSUB570:IFN=-1THENJ=J+N:GOTO320
                                         :rem 228
390 IFN=-211THEN 710                      :rem 62
400 IFN=-204THEN 790                      :rem 64
410 IFN=-206THENPRINT:INPUT"{DOWN}ENTER N
    EW ADDRESS";ZZ                       :rem 44
415 IFN=-206THENIFZZ<SORZZ>ETHENPRINT"
    {RVS}OUT OF RANGE":GOSUB1000:GOTO410
                                         :rem 225
417 IFN=-206THENAD=ZZ:PRINT:GOTO310
                                         :rem 238
420 IF N<>-196 THEN 480                  :rem 133
430 PRINT:INPUT"DISPLAY:FROM";F:PRINT,"TO
    ";:INPUTT                            :rem 234
440 IFF<SORF>EORT<SORT>ETHENPRINT"AT LEAS
    T";S;"{LEFT}, NOT MORE THAN";E:GOTO43
    0                                    :rem 159
450 FORI=FTOTSTEP6:PRINT:PRINTRIGHT$("000
    0"+MID$(STR$(I),2),5);":";           :rem 30
451 FORK=0TO5:N=PEEK(I+K):PRINTRIGHT$("00
    "+MID$(STR$(N),2),3);",";            :rem 66
460 GETA$:IFA$>""THENPRINT:PRINT:GOTO310
                                         :rem 25
470 NEXTK:PRINTCHR$(20);:NEXTI:PRINT:PRIN
    T:GOTO310                            :rem 50
480 IFN<0 THEN PRINT:GOTO310             :rem 168
490 A(J)=N:NEXTJ                         :rem 199
500 CKSUM=AD-INT(AD/256)*256:FORI=1TO6:CK
    SUM=(CKSUM+A(I))AND255:NEXT          :rem 200
510 PRINTCHR$(18);:GOSUB570:PRINTCHR$(146
    );                                   :rem 94
511 IFN=-1THENA=6:GOTO315                :rem 254
515 PRINTCHR$(20):IFN=CKSUMTHEN530
                                         :rem 122
520 PRINT:PRINT"LINE ENTERED WRONG : RE-E
    NTER":PRINT:GOSUB1000:GOTO310:rem 176
530 GOSUB2000                            :rem 218
540 FORI=1TO6:POKEAD+I-1,A(I):NEXT:POKE54
    272,0:POKE54273,0                    :rem 227
550 AD=AD+6:IF AD<E THEN 310             :rem 212
560 GOTO 710                             :rem 108
570 N=0:Z=0                               :rem 88
580 PRINT"{£}";                          :rem 81
581 GETA$:IFA$=""THEN581                 :rem 95
582 AV=-(A$="M")-2*(A$=",")-3*(A$=".")-4*
    (A$="J")-5*(A$="K")-6*(A$="L"):rem 41
583 AV=AV-7*(A$="U")-8*(A$="I")-9*(A$="O"
    ):IFA$="H"THENA$="0"                 :rem 134
584 IFAV>0THENA$=CHR$(48+AV)             :rem 134
585 PRINTCHR$(20);:A=ASC(A$):IFA=13ORA=44
    ORA=32THEN670                        :rem 229
590 IFA>128THENN=-A:RETURN               :rem 137
600 IFA<>20 THEN 630                      :rem 10
610 GOSUB690:IFI=1ANDT=44THENN=-1:PRINT"
    {OFF}{LEFT} {LEFT}";:GOTO690         :rem 62
620 GOTO570                              :rem 109
630 IFA<48ORA>57THEN580                  :rem 105
640 PRINTA$;:N=N*10+A-48                 :rem 106
650 IFN>255 THEN A=20:GOSUB1000:GOTO600
                                         :rem 229
660 Z=Z+1:IFZ<3THEN580                    :rem 71
670 IFZ=0THENGOSUB1000:GOTO570           :rem 114
680 PRINT",";:RETURN                     :rem 240
690 S%=PEEK(209)+256*PEEK(210)+PEEK(211)
                                         :rem 149
691 FORI=1TO3:T=PEEK(S%-I)                :rem 67
695 IFT<>44ANDT<>58THENPOKES%-I,32:NEXT
                                         :rem 205
700 PRINTLEFT$("{3 LEFT}",I-1);:RETURN
                                          :rem 7
710 PRINT"{CLR}{RVS}*** SAVE ***{3 DOWN}"
                                         :rem 236
715 PRINT"{2 DOWN}(PRESS {RVS}RETURN{OFF}
    ALONE TO CANCEL SAVE){DOWN}":rem 106
720 F$="":INPUT"{DOWN} FILENAME";F$:IFF$=
    ""THENPRINT:PRINT:GOTO310            :rem 71
```

```
730 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
    {RVS}D{OFF}ISK: (T/D)"        :rem 228
740 GETA$:IFA$<>"T"ANDA$<>"D"THEN740
                                  :rem 36
750 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$:
    OPEN15,8,15,"S"+F$:CLOSE15    :rem 212
760 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256              :rem 3
762 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                  :rem 109
763 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                            :rem 69
765 K=S:POKE254,K/256:POKE253,K-PEEK(254)
    *256:POKE780,253              :rem 17
766 K=E+1:POKE782,K/256:POKE781,K-PEEK(78
    2)*256:SYS65496               :rem 235
770 IF(PEEK(783)AND1)OR(191ANDST)THEN780
                                  :rem 111
775 PRINT"{DOWN}DONE.{DOWN}":GOTO310
                                  :rem 113
780 PRINT"{DOWN}ERROR ON SAVE.{2 SPACES}T
    RY AGAIN.":IFDV=1THEN720      :rem 171
781 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO720          :rem 103
790 PRINT"{CLR}{RVS}*** LOAD ***{2 DOWN}"
                                  :rem 212
795 PRINT"{2 DOWN}(PRESS {RVS}RETURN{OFF}
     ALONE TO CANCEL LOAD)"       :rem 82
800 F$="":INPUT"{2 DOWN} FILENAME";F$:IFF
    $=""THENPRINT:GOTO310         :rem 144
810 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
    {RVS}D{OFF}ISK: (T/D)"        :rem 227
820 GETA$:IFA$<>"T"ANDA$<>"D"THEN820
                                  :rem 34
830 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$
                                  :rem 157
840 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256              :rem 2
841 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                  :rem 107
845 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                            :rem 70
850 POKE780,0:SYS65493            :rem 11
860 IF(PEEK(783)AND1)OR(191ANDST)THEN870
                                  :rem 111
865 PRINT"{DOWN}DONE.":GOTO310    :rem 96
870 PRINT"{DOWN}ERROR ON LOAD.{2 SPACES}T
    RY AGAIN.{DOWN}":IFDV=1THEN800
                                  :rem 172
880 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO800          :rem 102
1000 REM BUZZER                   :rem 135
1001 POKE54296,15:POKE54277,45:POKE54278,
     165                          :rem 207
1002 POKE54276,33:POKE 54273,6:POKE54272,
     5                            :rem 42
1003 FORT=1TO200:NEXT:POKE54276,32:POKE54
     273,0:POKE54272,0:RETURN     :rem 202
2000 REM BELL SOUND               :rem 78
2001 POKE54296,15:POKE54277,0:POKE54278,2
     47                           :rem 152
2002 POKE 54276,17:POKE54273,40:POKE54272
     ,0                           :rem 86
2003 FORT=1TO100:NEXT:POKE54276,16:RETURN
                                  :rem 57
3000 PRINTC$;"{RVS}NOT ZERO PAGE OR ROM":
     GOTO1000                     :rem 89
```

VIC MLX

```
100 PRINT"{CLR}{PUR}";CHR$(142);CHR$(8);
                                  :rem 181
101 POKE 788,194:REM DISABLE RUN/STOP
                                  :rem 174
110 PRINT"{RVS}{14 SPACES}"       :rem 117
120 PRINT"{RVS} {RIGHT}{OFF}[*3]£{RVS}
    {RIGHT} {RIGHT}{2 SPACES}[*3]{OFF}[*3]
    £{RVS}£{RVS} "                :rem 191
130 PRINT"{RVS} {RIGHT} [G3]{RIGHT}
    {2 RIGHT} {OFF}£{RVS}£[*3]{OFF}[*3]
    {RVS} "                       :rem 232
140 PRINT"{RVS}{14 SPACES}"       :rem 120
200 PRINT"{2 DOWN}{PUR}{BLK}A FAILSAFE MA
    CHINE":PRINT"LANGUAGE EDITOR{5 DOWN}"
                                  :rem 141
210 PRINT"{BLK}{3 UP}STARTING ADDRESS":IN
    PUTS:F=1-F:C$=CHR$(31+119*F)  :rem 97
220 IFS<256ORS>32767THENGOSUB3000:GOTO210
                                  :rem 2
225 PRINT:PRINT:PRINT:PRINT       :rem 123
230 PRINT"{BLK}{3 UP}ENDING ADDRESS":INPU
    TE:F=1-F:C$=CHR$(31+119*F)    :rem 158
240 IFE<256ORE>32767THENGOSUB3000:GOTO230
                                  :rem 234
250 IFE<STHENPRINTC$;"{RVS}ENDING < START
    {2 SPACES}":GOSUB1000:GOTO 230
                                  :rem 176
260 PRINT:PRINT:PRINT             :rem 179
300 PRINT"{CLR}";CHR$(14):AD=S    :rem 56
310 PRINTRIGHT$("0000"+MID$(STR$(AD),2),5
    );":";:FORJ=1TO6              :rem 234
320 GOSUB570:IFN=-1THENJ=J+N:GOTO320
                                  :rem 228
390 IFN=-211THEN 710              :rem 62
400 IFN=-204THEN 790              :rem 64
410 IFN=-206THENPRINT:INPUT"{DOWN}ENTER N
    EW ADDRESS";ZZ                :rem 44
415 IFN=-206THENIFZZ<SORZZ>ETHENPRINT"
    {RVS}OUT OF RANGE":GOSUB1000:GOTO410
                                  :rem 225
417 IFN=-206THENAD=ZZ:PRINT:GOTO310
                                  :rem 238
420 IF N<>-196 THEN 480           :rem 133
430 PRINT:INPUT"DISPLAY:FROM";F:PRINT,"TO
    ";:INPUTT                     :rem 234
440 IFF<SORF>EORT<SORT>ETHENPRINT"AT LEAS
    T";S;"{LEFT}, NOT MORE THAN";E:GOTO43
    0                             :rem 159
450 FORI=FTOTSTEP6:PRINT:PRINTRIGHT$("000
    0"+MID$(STR$(I),2),5);":";    :rem 30
455 FORK=0TO5:N=PEEK(I+K):IFK=3THENPRINTS
    PC(10);                       :rem 34
457 PRINTRIGHT$("00"+MID$(STR$(N),2),3);"
    ,";                           :rem 157
460 GETA$:IFA$>""THENPRINT:PRINT:GOTO310
                                  :rem 25
470 NEXTK:PRINTCHR$(20);:NEXTI:PRINT:PRIN
    T:GOTO310                     :rem 50
480 IFN<0 THEN PRINT:GOTO310      :rem 168
490 A(J)=N:NEXTJ                  :rem 199
500 CKSUM=AD-INT(AD/256)*256:FORI=1TO6:CK
    SUM=(CKSUM+A(I))AND255:NEXT   :rem 200
510 PRINTCHR$(18);:GOSUB570:PRINTCHR$(20)
                                  :rem 234
515 IFN=CKSUMTHEN530              :rem 255
520 PRINT:PRINT"LINE ENTERED WRONG":PRINT
    "RE-ENTER":PRINT:GOSUB1000:GOTO310
                                  :rem 129
530 GOSUB2000                     :rem 218
540 FORI=1TO6:POKEAD+I-1,A(I):NEXT:rem 80
550 AD=AD+6:IF AD<E THEN 310      :rem 212
560 GOTO 710                      :rem 108
570 N=0:Z=0                       :rem 88
```

```
580 PRINT"[E+3]";                          :rem 79
581 GETA$:IFA$=""THEN581                   :rem 95
585 PRINTCHR$(20);:A=ASC(A$):IFA=13ORA=44
    ORA=32THEN670                          :rem 229
590 IFA>128THENN=-A:RETURN                 :rem 137
600 IFA<>20 THEN 630                       :rem 10
610 GOSUB690:IFI=1ANDT=44THENN=-1:PRINT"
    {LEFT} {LEFT}";:GOTO690                :rem 172
620 GOTO570                                :rem 109
630 IFA<48ORA>57THEN580                    :rem 105
640 PRINTA$;:N=N*10+A-48                   :rem 106
650 IFN>255 THEN A=20:GOSUB1000:GOTO600
                                           :rem 229
660 Z=Z+1:IFZ<3THEN580                     :rem 71
670 IFZ=0THENGOSUB1000:GOTO570             :rem 114
680 PRINT",";:RETURN                       :rem 240
690 S%=PEEK(209)+256*PEEK(210)+PEEK(211)
                                           :rem 149
692 FORI=1TO3:T=PEEK(S%-I)                 :rem 68
695 IFT<>44ANDT<>58THENPOKES%-I,32:NEXT
                                           :rem 205
700 PRINTLEFT$("{3 LEFT}",I-1);:RETURN
                                           :rem 7
710 PRINT"{CLR}{RVS}*** SAVE ***{3 DOWN}"
                                           :rem 236
720 INPUT"{DOWN} FILENAME";F$              :rem 228
730 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
    {RVS}D{OFF}ISK: (T/D)"                 :rem 228
740 GETA$:IFA$<>"T"ANDA$<>"D"THEN740
                                           :rem 36
750 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$
                                           :rem 158
760 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256                       :rem 3
762 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                           :rem 109
763 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                                     :rem 69
765 POKE254,S/256:POKE253,S-PEEK(254)*256
    :POKE780,253                           :rem 12
766 POKE782,E/256:POKE781,E-PEEK(782)*256
    :SYS65496                              :rem 124
770 IF(PEEK(783)AND1)OR(ST AND191)THEN780
                                           :rem 111
775 PRINT"{DOWN}DONE.":END                 :rem 106
780 PRINT"{DOWN}ERROR ON SAVE.{2 SPACES}T
    RY AGAIN.":IFDV=1THEN720               :rem 171
781 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO720                   :rem 103
782 GOTO720                                :rem 115
790 PRINT"{CLR}{RVS}*** LOAD ***{2 DOWN}"
                                           :rem 212
800 INPUT"{2 DOWN} FILENAME";F$            :rem 244
810 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
    {RVS}D{OFF}ISK: (T/D)"                 :rem 227
820 GETA$:IFA$<>"T"ANDA$<>"D"THEN820
                                           :rem 34
830 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$
                                           :rem 157
840 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256                       :rem 2
841 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                           :rem 107
845 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                                     :rem 70
850 POKE780,0:SYS65493                     :rem 11
860 IF(PEEK(783)AND1)OR(ST AND191)THEN870
                                           :rem 111
865 PRINT"{DOWN}DONE.":GOTO310             :rem 96
870 PRINT"{DOWN}ERROR ON LOAD.{2 SPACES}T
    RY AGAIN.{DOWN}":IFDV=1THEN800
                                           :rem 172
880 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO800                   :rem 102
1000 REM BUZZER                            :rem 135
1001 POKE36878,15:POKE36874,190            :rem 206
1002 FORW=1TO300:NEXTW                     :rem 117
1003 POKE36878,0:POKE36874,0:RETURN
                                           :rem 74
2000 REM BELL SOUND                        :rem 78
2001 FORW=15TO0STEP-1:POKE36878,W:POKE368
    76,240:NEXTW                           :rem 22
2002 POKE36876,0:RETURN                    :rem 119
3000 PRINTC$;"{RVS}NOT ZERO PAGE OR ROM":
    GOTO1000                               :rem 89
```

Heat Seeker

(Article on page 56.)

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1: Heat Seeker—VIC Version

```
100 GOTO500                                :rem 95
110 GOSUB650:IFPEEK(653)=1THEN110:rem 185
120 FORR=0TO7:J=PEEK(37137)AND44:IFJ<>44T
    HEN380                                 :rem 73
130 IFC=7679THEN180                        :rem 72
140 POKEC,32:C=C+C1                        :rem 52
150 IFC>8163ORC<7724THENC=7679:GOTO180
                                           :rem 4
160 GE=PEEK(C):IFGE<>32THEN450             :rem 21
170 POKEC,G                                :rem 125
180 IFR=2ORR=6THENNEXT:GOTO110             :rem 194
190 POKEB,32                               :rem 156
200 B=B+D(B1):IFB=ATHEN300                 :rem 209
210 IFPEEK(B)=160RB<7724THENB1=B1+4+(B1>4
    )*8:GOTO200                            :rem 234
220 IFPEEK(B)=0THEN430                     :rem 14
230 POKEB,17:IFR=INT(R/2)*2THEN260 :rem 4
240 Y=INT(D(B1)/21+.5):X=D(B1)-22*Y
                                           :rem 123
250 V=INT((A-B)/21+.5):H=A-B-V*22:B1=B1+S
    GN(X*V-Y*H):B1=B1+((B1>8)-(B1<1))*8
                                           :rem 107
260 IFR=0THENNEXT:GOTO110                  :rem 89
270 POKEA,32:A=A+D(A1):IFPEEK(A)<>32THEN3
    00                                     :rem 230
280 IFA<7724THENA1=A1+4+8*(A1>4):GOTO270
                                           :rem 247
290 POKEA,A1+7:NEXT:GOTO110                :rem 137
300 AE=PEEK(A):POKEA,18:GOSUB620:POKEB,32
    :POKEC,32:IFA<8164THENPOKEA,32:GOTO32
    0                                      :rem 104
310 POKEA,16                               :rem 151
320 IFAE=0THENK=K+1:IFK=11THEN560:rem 242
330 L=L-1:IFL>0THEN600                     :rem 17
340 GOSUB650:POKE198,0:PRINT"{HOME}
    {10 DOWN}{3 RIGHT}{RVS}PLAY AGAIN?(Y/
    N)"                                    :rem 70
350 GETA$:IFA$="Y"THEN500                  :rem 169
360 IFA$="N"THENSYS58648:END               :rem 170
370 GOTO350                                :rem 107
380 IF(JAND8)=0THENA1=A1-1-8*(A1=1)
                                           :rem 171
```

```
390 IF(JAND4)=0THENA1=A1+1+8*(A1=8)
                                    :rem 171
400 IFJAND32THEN130                 :rem 104
410 POKEC,32:C1=D(A1):C=A+C1+C1:G=A1:IFG=
    8THENG=4                        :rem 95
420 POKEVO,15:POKES2,190:POKES4,180:FORT=
    1TO20:NEXT:POKEVO,0:GOTO150     :rem 57
430 SC=SC+50:K=K+1:IFK=11THEN560    :rem 118
440 POKEB,18:GOSUB620:GOTO230       :rem 248
450 POKEC,18:GOSUB620:IFGE=0THENSC=SC+50:
    K=K+1:IFK=11THENGOTO560         :rem 251
460 IFGE=17THENSC=SC+100:POKEB,32:B=7905:
    B1=3                            :rem 149
470 IFGE=19THENSC=SC+10             :rem 129
480 IFA=CTHENSC=SC-100:A=7910:A1=3:POKEA,
    32                              :rem 34
490 POKEC,32:C=7679:GOTO180         :rem 67
500 POKE52,28:POKE56,28:POKE36879,236:POK
    E36869,240:CLR                  :rem 194
510 GOSUB630:PRINT"{10 DOWN}{5 SPACES}
    {RVS}HEAT SEEKER"               :rem 87
520 FORA=7168TO7327:READJ:POKEA,J:NEXT
                                    :rem 129
530 FORI=7336TOI+7:POKEI,PEEK(I-16):POKEI
    +88,0:NEXT:POKE36869,255        :rem 186
540 VO=36878:S2=36876:S4=36877:FORT=1TO8:
    READD(T):NEXT                   :rem 24
550 L=8:SC=0:K=0                    :rem 138
560 IFK=11THENL=L+1:K=0:SC=SC+1000
                                    :rem 245
570 GOSUB630:FORT=8142TO8163STEP2:POKET,0
    :NEXT                           :rem 171
580 FORT=8164TO8185:POKET,16:NEXT   :rem 42
590 FORT=1TORND(1)*4:POKE7724+INT(RND(1)*
    400),19:NEXT                    :rem 133
600 IFA<8164THENPOKEA,19            :rem 170
610 A=7910:A1=3:C=7679:B=7905:B1=3:POKEA,
    A1+7:GOTO110                    :rem 243
620 POKES4,190:FORT=100TO1STEP-5:POKEVO,T
    /7:NEXT:RETURN                  :rem 80
630 PRINT"{CLR}{BLK}";:FORI=0TO483:PRINT"
     ";:NEXT:PRINT"{RED}";:FORI=0TO20:PRI
    NT" ";:NEXT                     :rem 157
640 POKE38905,2:PRINT"{HOME}{BLK}";:RETUR
    N                               :rem 51
650 PRINT"{HOME}{RVS}SCORE:";SC;"{HOME}";
    SPC(13);"SHIPS:";L:RETURN       :rem 97
660 DATA 24,36,24,24,24,60,90,66    :rem 38
670 DATA 24,24,24,24,24,24,24,24    :rem 27
680 DATA 3,7,14,28,56,112,224,192   :rem 88
690 DATA 0,0,0,255,255,0,0,0        :rem 69
700 DATA 192,224,112,56,28,14,7,3   :rem 81
710 DATA 24,24,24,24,24,24,24,24    :rem 22
720 DATA 3,7,14,28,56,112,224,192   :rem 83
730 DATA 0,0,0,255,255,0,0,0        :rem 64
740 DATA 68,68,84,40,16,40,84,16    :rem 51
750 DATA 8,16,32,57,234,92,112,144
                                    :rem 139
760 DATA 0,0,71,40,212,40,71,0      :rem 168
770 DATA 144,112,92,234,57,32,16,8
                                    :rem 141
780 DATA 16,84,40,16,40,84,68,68    :rem 55
790 DATA 9,14,58,87,156,4,8,16      :rem 215
800 DATA 0,0,226,20,43,20,226,0     :rem 213
810 DATA 16,8,4,156,87,58,14,9      :rem 208
820 DATA 255,255,255,255,255,255,255,255
                                    :rem 200
830 DATA 129,90,36,60,36,24,36,195
                                    :rem 148
840 DATA 99,140,34,74,66,36,145,194
                                    :rem 208
850 DATA 231,165,219,36,36,219,165,231
                                    :rem 89
860 DATA -22,-21,1,23,22,21,-1,-23:rem 90
```

Program 2: Heat Seeker—64 Version

See instructions in article before entering program.

```
2049 :011,008,001,000,158,050,229
2055 :048,054,049,000,000,000,158
2061 :076,027,008,000,000,000,124
2067 :000,000,000,000,000,000,019
2073 :000,000,169,014,141,033,126
2079 :208,169,002,141,032,208,023
2085 :160,024,169,000,153,255,030
2091 :211,136,208,250,169,002,251
2097 :141,023,212,169,031,141,254
2103 :024,212,169,008,141,022,119
2109 :212,169,003,141,008,212,038
2115 :169,061,141,012,212,169,063
2121 :000,141,015,212,141,014,084
2127 :212,169,032,141,019,212,096
2133 :169,127,141,020,212,169,155
2139 :129,141,018,212,169,001,249
2145 :141,003,212,169,025,141,020
2151 :005,212,169,000,141,025,143
2157 :008,032,244,020,032,108,041
2163 :019,169,048,160,006,153,158
2169 :200,007,136,208,250,140,038
2175 :021,008,172,248,020,048,132
2181 :018,160,006,153,225,007,190
2187 :136,208,250,169,050,141,069
2193 :198,007,169,049,141,223,164
2199 :007,169,252,141,017,008,233
2205 :169,011,162,004,157,050,198
2211 :017,232,232,224,016,208,068
2217 :247,032,141,013,169,008,011
2223 :141,022,008,141,023,008,006
2229 :076,075,011,169,000,141,141
2235 :066,017,141,067,017,032,015
2241 :111,013,173,084,017,201,024
2247 :255,208,034,032,074,013,047
2253 :173,212,014,201,008,144,189
2259 :004,201,248,144,020,173,233
2265 :213,014,201,008,144,004,033
2271 :201,248,144,009,032,084,173
2277 :013,032,135,013,076,034,020
2283 :011,173,066,017,240,003,233
2289 :032,145,010,120,169,253,202
2295 :141,000,220,173,001,220,234
2301 :041,128,240,243,169,247,041
2307 :141,000,220,088,169,004,113
2313 :141,018,008,162,000,189,015
2319 :068,017,201,127,144,006,066
2325 :173,018,008,032,122,010,128
2331 :014,018,008,232,224,006,017
2337 :208,235,165,161,205,020,003
2343 :008,240,006,141,020,008,206
2349 :032,127,012,173,084,017,234
2355 :016,033,201,192,240,029,250
2361 :201,255,240,025,032,002,044
2367 :012,144,007,169,192,141,216
2373 :084,017,208,013,169,255,047
2379 :141,084,017,169,128,141,243
2385 :212,014,141,213,014,160,067
2391 :009,169,255,217,074,017,060
2397 :240,013,136,208,248,173,087
2403 :084,017,201,192,208,003,036
2409 :076,018,011,173,031,208,110
2415 :141,016,008,041,001,240,046
2421 :009,032,071,010,032,084,099
2427 :013,076,075,011,173,016,231
```

```
2433 :008,041,002,240,003,032,199
2439 :033,010,173,016,008,041,160
2445 :252,208,003,076,192,008,112
2451 :141,016,008,169,004,141,114
2457 :019,008,170,173,019,008,038
2463 :045,016,008,240,003,032,247
2469 :179,009,014,019,008,232,114
2475 :232,224,016,208,236,076,139
2481 :192,008,045,016,208,240,118
2487 :002,056,036,024,189,000,234
2493 :208,106,056,233,008,176,208
2499 :002,169,000,201,160,144,103
2505 :002,169,144,074,074,074,226
2511 :074,168,185,074,017,201,158
2517 :255,208,072,169,192,153,238
2523 :074,017,169,000,157,034,158
2529 :017,157,035,017,169,226,078
2535 :157,001,208,189,000,208,226
2541 :056,233,016,041,224,024,063
2547 :105,028,157,000,208,032,005
2553 :154,012,138,074,170,169,198
2559 :064,157,066,017,169,255,215
2565 :157,248,007,138,010,170,223
2571 :032,063,013,152,010,010,035
2577 :168,169,096,153,113,007,211
2583 :153,114,007,153,153,007,098
2589 :153,154,007,096,173,084,184
2595 :017,201,255,208,030,032,010
2601 :181,012,032,063,013,169,255
2607 :000,141,036,017,141,037,163
2613 :017,141,084,017,169,226,195
2619 :141,003,208,169,002,141,211
2625 :040,208,032,084,013,096,026
2631 :169,000,141,034,017,141,061
2637 :035,017,169,226,141,001,154
2643 :208,169,002,141,039,208,082
2649 :169,001,013,028,208,141,137
2655 :028,208,032,135,013,032,031
2661 :063,013,160,192,132,162,055
2667 :173,031,208,041,002,240,034
2673 :003,032,033,010,164,162,005
2679 :208,242,096,013,017,008,191
2685 :141,017,008,173,018,008,234
2691 :073,255,045,021,208,141,106
2697 :021,208,169,254,157,250,172

2703 :007,096,173,067,017,201,192
2709 :028,176,006,169,000,141,157
2715 :066,017,096,173,017,008,020
2721 :208,001,096,169,000,141,008
2727 :066,017,141,067,017,169,132
2733 :004,170,168,045,017,008,073
2739 :208,010,152,010,168,232,191
2745 :232,224,016,208,242,096,179
2751 :141,018,008,013,021,208,088
2757 :141,021,208,173,018,008,254
2763 :073,255,168,045,017,008,001
2769 :141,017,008,173,016,208,004
2775 :041,001,240,012,173,018,188
2781 :008,013,016,208,141,016,111
2787 :208,076,238,010,152,045,188
2793 :016,208,141,016,208,173,227
2799 :034,017,157,034,017,173,159
2805 :035,017,157,035,017,173,167
2811 :000,208,157,000,208,173,229
2817 :001,208,157,001,208,138,202
2823 :074,168,169,000,153,066,125
2829 :017,088,076,090,013,174,215
2835 :021,008,254,022,008,160,236
2841 :010,032,181,012,136,208,092
2847 :250,240,041,169,000,141,104
2853 :034,017,141,036,017,141,167
2859 :035,017,141,037,017,032,066
2865 :063,013,173,028,208,009,031
2871 :001,141,028,208,169,002,092
2877 :141,039,208,141,040,208,070
2883 :169,192,133,162,165,162,026
2889 :208,252,120,169,100,141,039
2895 :000,208,169,100,141,001,186
2901 :208,169,000,141,016,208,059
2907 :169,001,141,021,208,169,032
2913 :240,141,248,007,169,015,149
2919 :141,039,208,169,254,045,191
2925 :028,208,141,028,208,169,123
2931 :000,133,160,133,161,133,067
2937 :162,141,020,008,032,111,083
2943 :019,162,009,169,255,157,130
2949 :074,017,202,016,250,169,093
2955 :000,141,084,017,173,031,073
2961 :208,173,030,208,044,248,032
2967 :020,048,028,160,009,185,089
2973 :197,007,170,185,222,007,177
2979 :153,197,007,138,153,222,009
2985 :007,136,208,239,169,001,161
2991 :056,237,021,008,141,021,147
2997 :008,174,021,008,189,022,091
3003 :008,208,019,160,000,044,114
3009 :248,020,048,001,200,185,127
3015 :022,008,208,202,136,016,023
3021 :248,076,188,012,222,022,205
3027 :008,189,022,008,024,105,055

3033 :049,141,214,007,173,001,034
3039 :220,045,000,220,041,016,253
3045 :208,246,173,001,220,045,098
3051 :000,220,041,016,240,246,230
3057 :169,000,141,035,017,141,232
3063 :036,017,169,085,141,034,217
3069 :017,088,076,184,008,160,018
3075 :009,185,074,017,201,255,232
3081 :240,013,136,016,246,169,061
3087 :253,045,021,208,141,021,192
3093 :208,056,096,169,192,153,127
3099 :074,017,152,010,010,168,202
3105 :169,096,153,113,007,153,212
3111 :114,007,153,153,007,153,114
3117 :154,007,152,010,010,010,132
3123 :072,144,010,169,002,013,205
3129 :016,208,141,016,208,208,086
3135 :008,169,253,045,016,208,250
3141 :141,016,208,104,024,105,155
3147 :028,141,002,208,169,226,081
3153 :141,003,208,169,247,141,222
3159 :249,007,169,171,141,037,093
3165 :017,173,031,208,044,017,071
3171 :208,048,251,173,018,208,237
3177 :201,242,208,244,169,007,152
3183 :141,040,208,169,002,013,172
3189 :021,208,141,021,208,173,121
3195 :031,208,024,096,072,138,180
3201 :072,162,005,254,200,007,061
3207 :169,058,221,200,007,208,230
3213 :008,169,048,157,200,007,218
3219 :202,208,238,104,170,104,149
3225 :096,072,138,072,173,205,141
3231 :007,024,105,005,201,058,047
3237 :176,005,141,205,007,208,139
3243 :234,233,010,141,205,007,233
3249 :162,004,208,207,072,138,200
3255 :072,162,004,208,200,120,181
3261 :169,049,141,020,003,169,228
3267 :234,141,021,003,088,169,083
3273 :048,141,214,007,032,132,007
3279 :255,160,016,185,046,013,114
```

```
3285 :201,064,144,003,056,233,146
3291 :064,153,011,004,169,003,111
3297 :153,011,216,136,208,235,160
3303 :200,140,026,008,173,026,036
3309 :008,208,012,169,045,141,052
3315 :025,004,169,062,141,026,158
3321 :004,208,010,169,060,141,073
3327 :025,004,169,045,141,026,153
3333 :004,173,000,220,045,001,192
3339 :220,074,074,074,176,005,122
3345 :160,001,140,026,008,074,170
3351 :176,005,160,000,140,026,018
3357 :008,074,176,202,032,129,138
3363 :255,173,026,008,240,003,228
3369 :076,027,008,133,198,000,227
3375 :080,076,065,089,032,065,198
3381 :071,065,073,078,063,032,179
3387 :089,032,032,078,169,128,075
3393 :141,011,212,169,129,141,100
3399 :011,212,096,169,255,056,102
3405 :237,003,208,141,015,212,125
3411 :096,169,000,141,015,212,204
3417 :096,169,024,141,025,008,040
3423 :165,162,141,024,008,169,252
3429 :064,141,004,212,169,065,244
3435 :141,004,212,096,165,162,119
3441 :205,024,008,240,016,141,235
3447 :024,008,173,025,008,201,046
3453 :048,176,007,141,001,212,198
3459 :238,025,008,096,169,000,155
3465 :141,001,212,096,076,153,048
3471 :013,011,000,000,000,000,167
3477 :000,000,000,000,120,169,182
3483 :171,141,020,003,169,013,160
3489 :141,021,003,169,014,141,138
3495 :005,220,088,096,173,000,237
3501 :220,045,001,220,141,146,178
3507 :013,173,034,017,013,035,208
3513 :017,208,003,076,195,014,186
3519 :173,146,013,041,016,208,020
3525 :003,238,066,017,173,146,072
3531 :013,041,003,201,003,208,160
3537 :003,076,195,014,173,144,046
3543 :013,141,145,013,173,034,222
3549 :017,141,149,013,048,003,080
3555 :169,000,044,169,255,141,237
3561 :150,013,160,008,136,014,202
3567 :145,013,144,250,192,000,215
3573 :240,037,014,149,013,046,232
3579 :150,013,014,145,013,144,218
3585 :023,024,173,149,013,109,236
3591 :034,017,141,149,013,144,249
3597 :003,238,150,013,173,034,112
3603 :017,016,003,206,150,013,168
3609 :136,208,219,173,146,013,152
3615 :041,002,208,022,056,173,021
3621 :148,013,237,149,013,141,226
3627 :148,013,173,035,017,237,154
3633 :150,013,141,035,017,076,225
3639 :076,014,024,173,148,013,247
3645 :109,149,013,141,148,013,122
3651 :173,035,017,109,150,013,052
3657 :141,035,017,173,144,013,084
3663 :141,145,013,173,035,017,091
3669 :141,151,013,048,003,169,098
3675 :000,044,169,255,141,152,084
3681 :013,160,008,136,014,145,061
3687 :013,144,250,192,000,240,174
3693 :037,014,151,013,046,152,010
3699 :013,014,145,013,144,023,211
3705 :024,173,151,013,109,035,114
3711 :017,141,151,013,144,003,084
3717 :238,152,013,173,035,017,249
3723 :016,003,206,152,013,136,153
3729 :208,219,173,146,013,041,177
3735 :002,208,022,024,173,147,215
3741 :013,109,151,013,141,147,219
3747 :013,173,034,017,109,152,149
3753 :013,141,034,017,076,195,133
3759 :014,056,173,147,013,237,047
3765 :151,013,141,147,013,173,051
3771 :034,017,237,152,013,141,013
3777 :034,017,076,198,014,076,096
3783 :216,014,008,000,000,000,181
3789 :000,000,000,000,000,000,205
3795 :000,000,000,000,000,173,128
3801 :000,208,056,237,002,208,160
3807 :144,002,024,036,056,106,079
3813 :141,212,014,173,001,208,210
3819 :056,237,003,208,144,002,117
3825 :024,036,056,106,141,213,049
3831 :014,169,003,045,016,208,190
3837 :240,046,201,003,240,042,001
3843 :201,001,240,019,173,212,081
3849 :014,056,233,128,201,165,038
3855 :176,003,024,105,172,141,124
3861 :212,014,076,069,015,173,068
3867 :212,014,024,105,128,201,199
3873 :085,144,003,056,233,172,214
3879 :141,212,014,076,069,015,054
3885 :173,212,014,048,009,201,190
3891 :085,048,012,056,233,172,145
3897 :144,007,201,165,016,003,081
3903 :024,105,172,141,212,014,219
3909 :173,084,017,048,003,076,214
3915 :012,017,169,000,044,037,098
3921 :017,048,009,044,036,017,252
3927 :016,014,169,001,208,010,249
3933 :044,036,017,016,003,169,122
3939 :002,044,169,003,141,210,156
3945 :014,169,000,044,213,014,047
3951 :048,009,044,212,014,016,198
3957 :014,169,001,208,010,044,051
3963 :212,014,016,003,169,002,027
3969 :044,169,003,141,211,014,199
3975 :173,210,014,056,237,211,012
3981 :014,074,144,008,041,001,167
3987 :141,203,014,076,034,016,119
3993 :240,018,169,000,056,237,105
3999 :212,014,141,212,014,169,153
4005 :000,056,237,213,014,141,058
4011 :213,014,169,000,141,214,154
4017 :014,141,215,014,173,212,178
4023 :014,013,213,014,208,003,136
4029 :076,012,017,173,214,014,183
4035 :024,109,212,014,141,214,141
4041 :014,173,215,014,024,109,238
4047 :213,014,141,215,014,173,209
4053 :214,014,056,237,036,017,019
4059 :077,036,017,016,014,173,040
4065 :215,014,056,237,037,017,033
4071 :077,037,017,048,212,016,126
4077 :023,173,215,014,056,077,027
4083 :037,017,048,011,172,210,226
4089 :014,204,211,014,208,003,135
4095 :076,012,017,169,000,044,061
4101 :169,001,044,212,014,016,205
4107 :002,073,001,044,213,014,102
4113 :016,002,073,001,172,210,235
4119 :014,204,211,014,240,005,199
4125 :073,001,141,203,014,173,122
4131 :201,014,141,202,014,173,012
```

```
4137 :036,017,141,206,014,048,247
4143 :003,169,000,044,169,255,175
4149 :141,207,014,160,008,136,207
4155 :014,202,014,144,250,192,107
4161 :000,240,037,014,206,014,064
4167 :046,207,014,014,202,014,056
4173 :144,023,024,173,206,014,149
4179 :109,036,017,141,206,014,094
4185 :144,003,238,207,014,173,100
4191 :036,017,016,003,206,207,068
4197 :014,136,208,219,173,203,030
4203 :014,208,022,056,173,205,017
4209 :014,237,206,014,141,205,162
4215 :014,173,037,017,237,207,036
4221 :014,141,037,017,076,151,049
4227 :016,024,173,205,014,109,160
4233 :206,014,141,205,014,173,122
4239 :037,017,109,207,014,141,156
4245 :037,017,173,201,014,141,220
4251 :202,014,173,037,017,141,227
4257 :208,014,048,003,169,000,091
4263 :044,169,255,141,209,014,231
4269 :160,008,136,014,202,014,195
4275 :144,250,192,000,240,037,018
4281 :014,208,014,046,209,014,178
4287 :014,202,014,144,023,024,100
4293 :173,208,014,109,037,017,243
4299 :141,208,014,144,003,238,183
4305 :209,014,173,037,017,016,163
4311 :003,206,209,014,136,208,223
4317 :219,173,203,014,208,022,036
4323 :024,173,204,014,109,208,191
4329 :014,141,204,014,173,036,047
4335 :017,109,209,014,141,036,253
4341 :017,076,012,017,056,173,084
4347 :204,014,237,208,014,141,045
4353 :204,014,173,036,017,237,170
4359 :209,014,141,036,017,076,244
4365 :015,017,076,108,017,000,246

4371 :000,000,000,000,000,000,019
4377 :000,000,000,000,000,000,025
4383 :000,000,000,000,000,000,031
4389 :000,000,000,000,000,000,037
4395 :000,000,000,000,000,000,043
4401 :000,000,000,000,000,000,049
4407 :000,000,000,000,000,000,055
4413 :000,000,000,000,000,000,061
4419 :000,000,000,000,000,000,067
4425 :000,000,000,000,000,000,073
4431 :000,000,000,000,000,000,079
4437 :001,254,002,253,004,251,082
4443 :008,247,016,239,032,223,088
4449 :064,191,128,127,000,000,095
4455 :000,000,000,000,000,162,009
4461 :000,189,050,017,141,101,095
4467 :017,189,034,017,141,102,103
4473 :017,048,003,169,000,044,146
4479 :169,255,141,103,017,189,233
4485 :035,017,141,104,017,048,239
4491 :003,169,000,044,169,255,011
4497 :141,105,017,160,008,136,200
4503 :014,101,017,144,250,192,101
4509 :000,240,066,014,102,017,084
4515 :046,103,017,014,104,017,208
4521 :046,105,017,014,101,017,213
4527 :144,046,024,173,102,017,169
4533 :125,034,017,141,102,017,105
4539 :144,003,238,103,017,189,113
4545 :034,017,016,003,206,103,060
4551 :017,024,173,104,017,125,147
4557 :035,017,141,104,017,144,151

4563 :003,238,105,017,189,035,030
4569 :017,016,003,206,105,017,069
4575 :136,208,190,169,000,141,043
4581 :106,017,189,085,017,045,176
4587 :016,208,240,003,238,106,022
4593 :017,024,189,018,017,109,103
4599 :102,017,157,018,017,189,235
4605 :000,208,109,103,017,157,079
4611 :000,208,144,003,238,106,190
4617 :017,044,103,017,016,003,209
4623 :206,106,017,044,106,017,255
4629 :016,014,169,001,141,106,212
4635 :017,024,189,000,208,105,058
4641 :088,157,000,208,169,001,144
4647 :205,106,017,208,019,189,015
4653 :000,208,201,088,144,012,186
4659 :206,106,017,056,189,000,113
4665 :208,233,088,157,000,208,183
4671 :173,106,017,208,012,189,000
4677 :086,017,045,016,208,141,070
4683 :016,208,076,089,018,189,159
4689 :085,017,013,016,208,141,049
4695 :016,208,024,189,019,017,048
4701 :109,104,017,157,019,017,004
4707 :189,001,208,109,105,017,216
4713 :201,029,176,002,169,029,199
4719 :201,250,144,002,169,250,103

4725 :157,001,208,232,232,224,147
4731 :016,240,003,076,110,017,073
4737 :044,067,017,048,003,238,034
4743 :067,017,162,005,254,068,196
4749 :017,202,016,250,173,084,115
4755 :017,048,003,238,084,017,042
4761 :173,036,017,208,013,173,005
4767 :037,017,208,008,169,255,085
4773 :141,249,007,076,001,019,146
4779 :169,000,141,107,017,173,010
4785 :036,017,048,012,201,032,011
4791 :144,017,169,004,141,107,253
4797 :017,076,202,018,201,224,159
4803 :176,005,169,006,141,107,031
4809 :017,173,037,017,048,016,253
4815 :201,032,144,025,024,169,034
4821 :008,109,107,017,141,107,190
4827 :017,076,236,018,201,224,223
4833 :176,009,024,169,009,109,209
4839 :107,017,141,107,017,173,025
4845 :107,017,201,004,208,002,008
4851 :169,010,201,006,208,002,071
4857 :169,011,024,105,238,141,169
4863 :249,007,173,034,017,208,175
4869 :013,173,035,017,208,008,203
4875 :169,255,141,248,007,076,139
4881 :105,019,169,000,141,107,046
4887 :017,173,034,017,048,012,068
4893 :201,035,144,017,169,004,087
4899 :141,107,017,076,050,019,189
4905 :201,224,176,005,169,006,054
4911 :141,107,017,173,035,017,025
4917 :048,016,201,032,144,025,007
4923 :024,169,008,109,107,017,237
4929 :141,107,017,076,084,019,253
4935 :201,224,176,009,024,169,106
4941 :009,109,107,017,141,107,055
4947 :017,173,107,017,201,004,090
4953 :208,002,169,010,201,006,173
4959 :208,002,169,011,024,105,102
4965 :230,141,248,007,076,049,084
4971 :234,076,114,019,076,219,077
4977 :020,032,181,255,120,173,126
4983 :022,208,009,016,141,022,025
```

```
4989 :208,169,029,141,024,208,136
4995 :169,007,141,035,208,169,092
5001 :000,141,037,208,169,007,187
5007 :141,038,208,169,015,141,087
5013 :039,208,169,147,133,254,075
5019 :169,022,133,255,169,128,007
5025 :133,252,169,059,133,253,136
5031 :160,000,177,254,208,024,222
5037 :230,254,208,002,230,255,072
5043 :177,254,170,169,000,145,070
5049 :252,230,252,208,002,230,079
5055 :253,202,208,243,240,008,065
5061 :145,252,230,252,208,002,006
5067 :230,253,230,254,208,002,100
5073 :230,255,165,252,201,064,096
5079 :208,208,169,254,141,028,199
5085 :208,165,001,041,251,133,252
5091 :001,160,000,185,000,220,025
5097 :153,000,048,185,000,221,072
5103 :153,000,049,200,208,241,066
5109 :165,001,009,004,133,001,046
5115 :160,000,185,154,020,153,155
5121 :000,050,200,192,032,208,171
5127 :245,160,000,152,153,000,205
5133 :051,200,192,008,208,248,152
5139 :169,004,133,255,169,216,197
5145 :133,253,169,000,133,254,199
5151 :133,252,168,169,096,145,226
5157 :254,169,008,145,252,200,041
5163 :208,245,230,255,230,253,184
5169 :165,255,201,007,208,235,096
5175 :169,096,153,000,007,169,137
5181 :008,153,000,219,200,192,065
5187 :192,208,241,032,219,020,211
5193 :160,000,169,254,153,250,035
5199 :007,169,002,153,041,208,147
5205 :200,192,006,208,241,169,077
5211 :255,141,248,007,141,249,108
5217 :007,160,000,185,186,020,143
5223 :201,064,144,003,056,233,036
5229 :064,153,192,007,169,003,185
5235 :153,192,219,200,044,248,147
5241 :020,016,006,192,024,208,075
5247 :228,240,004,192,033,208,008
5253 :222,169,003,153,192,219,067
5259 :200,192,040,208,248,088,091
5265 :096,096,066,064,096,096,147
5271 :067,065,096,000,000,000,123
5277 :000,000,003,003,003,003,169
5283 :003,011,011,043,043,040,058
5289 :040,000,000,000,000,000,209
5295 :192,192,192,192,192,224,079
5301 :224,232,232,040,040,080,005
5307 :076,065,089,069,082,049,105
5313 :058,032,032,032,032,032,155
5319 :032,032,032,083,072,073,011
5325 :080,083,058,032,032,032,010
5331 :080,076,065,089,069,082,160
5337 :050,058,160,000,162,004,139
5343 :189,145,020,153,112,007,081
5349 :189,149,020,153,152,007,131
5355 :200,202,208,240,192,040,037

5361 :208,234,096,076,249,020,100
5367 :000,000,169,000,141,247,036
5373 :020,160,110,162,172,169,022
5379 :021,032,073,022,173,247,059
5385 :020,010,170,189,231,004,121
5391 :073,128,157,231,004,032,128
5397 :086,022,240,030,189,231,051
5403 :004,073,128,157,231,004,112
5409 :152,024,109,247,020,201,018

5415 :255,208,002,169,000,201,106
5421 :003,208,002,169,001,141,057
5427 :247,020,208,208,173,247,130
5433 :020,024,105,004,141,050,145
5439 :017,105,002,141,052,017,141
5445 :105,003,141,201,014,105,126
5451 :001,141,144,013,169,002,033
5457 :205,247,020,208,003,238,234
5463 :144,013,169,255,141,248,033
5469 :020,160,025,162,026,169,143
5475 :022,032,073,022,173,248,157
5481 :020,010,170,232,232,189,190
5487 :044,005,073,128,157,044,050
5493 :005,032,086,022,240,035,025
5499 :024,109,248,020,189,044,245
5505 :005,073,128,157,044,005,029
5511 :152,024,109,248,020,201,121
5517 :254,208,002,169,255,201,206
5523 :001,208,002,169,000,141,156
5529 :248,020,076,103,021,160,013
5535 :021,162,051,169,022,032,104
5541 :073,022,032,086,022,208,096
5547 :251,096,197,032,201,032,212
5553 :206,032,058,084,082,069,196
5559 :080,088,069,032,044,069,053
5565 :084,065,073,068,069,077,113
5571 :082,069,084,078,073,032,101
5577 :044,069,067,073,086,079,107
5583 :078,032,017,013,045,084,220
5589 :067,069,076,069,083,032,097
5595 :079,084,032,078,079,084,143

5601 :084,085,066,032,068,078,126
5607 :065,032,075,067,073,084,115
5613 :083,089,079,074,032,069,151
5619 :083,085,032,017,013,053,014
5625 :056,057,049,032,033,069,033
5631 :084,085,080,077,079,195,087
5637 :032,044,210,197,203,197,120
5643 :197,211,032,212,193,197,029
5649 :200,032,032,032,032,032,121
5655 :155,017,147,014,050,032,182
5661 :049,032,058,083,082,069,146
5667 :089,065,076,080,032,070,191
5673 :079,032,082,069,066,077,190
5679 :085,078,032,017,013,078,094
5685 :073,071,069,066,032,079,187
5691 :084,032,069,082,073,070,213
5697 :032,083,083,069,082,080,238
5703 :017,013,134,254,133,255,109
5709 :177,254,032,210,255,136,117
5715 :208,248,096,173,000,220,004
5721 :045,001,220,041,028,201,113
5727 :028,208,244,169,000,133,109
5733 :162,169,028,197,162,208,003
5739 :252,173,000,220,045,001,030
5745 :220,041,004,208,003,160,237
5751 :255,096,173,000,220,045,140
5757 :001,220,041,008,208,003,094
5763 :160,001,096,173,000,220,013
5769 :045,001,220,041,016,208,156
5775 :220,160,000,096,000,008,115
5781 :192,000,001,027,192,000,049
5787 :001,063,192,000,001,063,219
5793 :128,000,001,062,000,002,098
5799 :060,000,002,060,000,002,035
5805 :060,000,002,062,000,002,043
5811 :063,000,002,063,000,002,053
5817 :063,000,002,062,000,002,058
5823 :062,000,002,060,000,002,061
5829 :060,000,002,056,000,002,061
5835 :048,000,009,012,000,002,018
```

```
5841 :028,000,002,060,000,002,045
5847 :060,000,002,124,000,002,147
5853 :124,000,002,252,000,002,089
5859 :252,000,002,252,000,002,223
5865 :124,000,002,060,000,002,165
5871 :060,000,002,060,000,002,107
5877 :124,000,001,001,252,000,111
5883 :001,003,252,000,001,003,255
5889 :216,000,001,003,000,027,248
5895 :224,000,002,248,000,002,227
5901 :126,003,224,063,255,252,168
5907 :127,255,255,063,255,255,205
5913 :000,055,255,255,252,255,073
5919 :255,254,063,255,252,007,093
5925 :192,126,000,002,031,000,132
5931 :002,007,000,022,003,000,077
5937 :002,007,000,002,015,000,075
5943 :002,015,000,002,063,000,137
5949 :002,063,128,000,001,015,014
5955 :224,000,001,003,248,000,031
5961 :002,255,128,000,001,063,010
5967 :224,000,001,015,224,000,031
5973 :001,003,248,000,002,248,075
5979 :000,002,060,000,002,012,167
5985 :000,032,003,252,000,001,129
5991 :015,252,000,001,031,240,130
5997 :000,001,031,192,224,127,172
6003 :000,001,249,252,000,001,106
6009 :127,240,000,001,127,192,040
6015 :000,001,063,000,002,060,253
6021 :000,002,016,000,035,008,194
6027 :000,002,060,000,002,252,199
6033 :000,001,003,254,000,001,148
6039 :015,254,000,001,063,159,131
6045 :000,001,254,007,003,248,158
6051 :000,001,015,248,000,001,172
6057 :063,240,000,001,063,192,216
6063 :000,032,048,000,002,060,061
6069 :000,002,031,000,002,031,247
6075 :192,000,001,007,240,000,115
6081 :001,007,252,000,001,001,199
6087 :255,000,002,031,192,000,167
6093 :001,007,240,000,001,001,199
6099 :252,000,002,252,000,002,207
6105 :240,000,002,240,000,002,189
6111 :224,000,002,192,000,019,148
6117 :040,040,000,001,040,040,134
6123 :000,001,041,104,000,001,126
6129 :041,104,000,001,009,096,236
6135 :000,001,009,096,000,001,098
6141 :001,064,000,001,001,064,128
6147 :000,001,001,064,000,001,070
6153 :001,064,000,001,001,064,140
6159 :000,032,001,064,000,001,113
6165 :001,064,000,001,001,064,152
6171 :000,001,001,064,000,001,094
6177 :001,064,000,001,009,096,204
6183 :000,001,009,096,000,001,146
6189 :041,104,000,001,041,104,080
6195 :000,001,040,040,000,001,133
6201 :040,040,000,035,170,000,086
6207 :002,170,128,000,001,021,129
6213 :085,000,001,021,085,000,005
6219 :001,021,085,000,001,170,097
6225 :128,000,001,170,000,046,170
6231 :170,000,001,002,170,000,174
6237 :001,085,084,000,001,085,093
6243 :084,000,001,085,084,000,097
6249 :001,002,170,000,002,170,194
6255 :000,044,008,000,002,010,175
6261 :000,002,006,128,000,001,254
6267 :021,128,000,001,165,064,246
6273 :000,001,041,080,000,001,252
6279 :010,084,000,002,021,000,252
6285 :002,005,000,039,005,000,192
6291 :002,021,000,001,010,084,009
6297 :000,001,041,080,000,001,020
6303 :165,064,000,001,021,128,026
6309 :000,001,006,128,000,001,045
6315 :010,000,002,008,000,040,231
6321 :032,000,002,160,000,001,116
6327 :002,144,000,001,002,084,160
6333 :000,001,001,090,000,001,026
6339 :005,104,000,001,021,160,230
6345 :000,001,084,000,002,080,112
6351 :000,039,080,000,002,084,156
6357 :000,002,021,160,000,001,141
6363 :005,104,000,001,001,090,164
6369 :000,001,002,084,000,001,057
6375 :002,144,000,002,160,000,027
6381 :002,032,000,026,008,128,177
6387 :000,001,010,168,000,001,167
6393 :043,224,000,001,011,224,240
6399 :000,001,011,232,000,001,244
6405 :042,160,000,001,002,032,242
6411 :000,051,136,000,001,002,201
6417 :170,000,001,002,174,000,108
6423 :001,002,238,128,010,255,145
6429 :160,010,255,224,011,254,175
6435 :168,011,255,224,042,255,222
6441 :168,043,255,224,043,255,005
6447 :232,011,255,224,047,255,047
6453 :160,042,255,224,047,255,012
6459 :248,043,187,224,010,170,173
6465 :168,255,013,013,013,013,028
```

Power BASIC: Quick Character Transfer

(Article on page 109.)

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1: Quick Character Transfer—64 Version

```
90 POKE56,14*4:CLR:POKE53272,(PEEK(53272)
   AND240)OR14                          :rem 222
100 AD=828:REM STARTING ADDRESS         :rem 133
110 FORI=ADTOAD+81:READA:X=X+A:POKEI,A:NE
    XTI                                 :rem 75
120 IFX<>9923THENPRINT"ERROR IN DATA STAT
    EMENTS.":STOP                       :rem 188
130 SYSAD                               :rem 24
140 DATA 173,14,220,41,254,141,14       :rem 70
150 DATA 220,173,24,208,41,14,10        :rem 18
160 DATA 10,133,167,169                 :rem 107
170 DATA 208:REM CHANGE TO 216 TO MOVE LO
    WER CASE                            :rem 203
180 DATA 133,252,173,0,221,41,3,73,3
                                        :rem 216
```

```
190 DATA 10,10,10,10,10,10,5        :rem 55
200 DATA 167,133,254,165,1,41,251 :rem 78
210 DATA 133,1,169,0,133,251,133  :rem 19
220 DATA 253,168,162,8,177,251,145
                                    :rem 145
230 DATA 253,200,208,249,230,252,230
                                    :rem 223
240 DATA 254,202,208,242,165,1,9   :rem 31
250 DATA 4,133,1,173,14,220,9      :rem 130
260 DATA 1,141,14,220,96           :rem 145
1000 FORI=14336TO14343:READA:POKEI,A:NEXT
                                     :rem 0
1010 DATA 60,66,165,129,165,153,66,60
                                    :rem 33
```

Program 2: Quick Character Transfer—VIC Version

```
90 POKE56,28:CLR:POKE36869,255    :rem 245
100 AD=828:REM STARTING ADDRESS   :rem 133
110 FORI=ADTOAD+38:READA:POKEI,A:X=X+A:NE
    XT                              :rem 4
120 IFX<>6044THENPRINT"ERROR IN DATA STAT
    EMENTS.":STOP                 :rem 179
130 SYSAD                          :rem 24
140 DATA 173,5,144,41,3,10,10      :rem 122
150 DATA 105,16,133,254,169        :rem 47
160 DATA 128:REM 132,136, OR 140 FOR OTHE
    R CHAR SETS                   :rem 238
170 DATA 133,252,169,0,133,251,133
                                    :rem 128
180 DATA 253,168,162               :rem 221
190 DATA 2:REM CHANGE TO 6 TO MOVE 192 CH
    ARS                           :rem 106
200 DATA 177,251,145,253           :rem 155
210 DATA 200,208,249,230,252,230,254
                                    :rem 222
220 DATA 202,208,242,96            :rem 103
1000 FORI=7168TO7175:READA:POKEI,A:NEXT
                                    :rem 170
1010 DATA 60,66,165,129,165,153,66,60
                                    :rem 33
```

Program 3: Quick Character Transfer—Plus/4 and 16 Version

```
90 POKE56,60:CLR
100 AD=819:REM STARTING ADDRESS
110 FORI=ADTOAD+31:READ A:POKEI,A:X=X+A:N
    EXT
120 IFX<>5848THENPRINT"ERROR IN DATA STAT
    EMENTS.":STOP
130 SYSAD
140 DATA 169
150 DATA 60:REM HIGH BYTE OF CHAR SET DES
    TINATION
160 DATA 133,254,169,208:REM CHANGE 208 T
    O 212 TO MOVE LOWER CASE
170 DATA 133,252,169,0,133,251,133
180 DATA 253,168,162,4,177,251,145
190 DATA 253,200,208,249,230,252,230
200 DATA 254,202,208,242,96
210 POKE65298,PEEK(65298)AND251
220 POKE65299,PEEK(65299)AND3OR60
1000 FORI=15360TO15367:READA:POKEI,A:NEXT
1010 DATA 60,66,165,129,165,153,66,60
```

Digger

(Article on page 60.)

BEFORE TYPING . . .

Before typing in programs, please refer to "How To Type In COMPUTE!'s GAZETTE Programs," which appears before the Program Listings.

Program 1: Digger—VIC Version

```
4097 :011,016,001,000,158,052,239
4103 :049,049,048,000,000,000,153
4109 :000,076,228,025,169,143,142
4115 :141,015,144,169,255,141,116
4121 :005,144,169,111,141,014,097
4127 :144,162,000,169,031,157,182
4133 :000,030,169,003,157,000,140
4139 :150,232,224,066,208,241,140
4145 :162,000,169,030,157,066,121
4151 :030,157,000,031,169,008,194
4157 :157,066,150,157,000,151,230
4163 :232,208,237,234,162,000,116
4169 :173,040,145,201,022,176,062
4175 :249,160,000,217,060,003,000
4181 :240,242,200,192,007,208,150
4187 :246,157,060,003,232,224,245
4193 :006,208,229,162,000,173,107
4199 :040,145,201,019,176,249,165
4205 :160,000,217,067,003,240,028
4211 :242,200,192,007,208,246,186
4217 :157,067,003,232,224,006,042
4223 :208,229,096,234,234,234,082
4229 :162,000,188,067,003,185,226
4235 :000,017,133,001,185,020,239
4241 :017,133,002,188,060,003,036
4247 :169,000,145,001,165,002,121
4253 :024,105,120,133,002,169,198
4259 :008,145,001,232,224,003,008
4265 :208,220,230,247,165,247,206
4271 :201,002,144,004,169,000,183
4277 :133,247,162,000,189,046,190
4283 :017,208,036,188,070,003,197
4289 :185,000,017,133,001,185,202
4295 :020,017,133,002,188,063,110
4301 :003,189,043,017,024,101,070
4307 :247,145,001,165,002,024,027
4313 :105,120,133,002,189,040,038
4319 :017,145,001,232,224,003,077
4325 :208,210,173,049,017,208,070
4331 :010,169,010,133,000,032,077
4337 :000,018,032,133,018,076,006
4343 :179,018,169,224,141,049,003
4349 :017,096,234,066,088,110,096
4355 :132,154,176,198,220,242,101
4361 :008,030,052,074,096,118,131
4367 :140,162,184,206,228,030,197
4373 :030,030,030,030,030,030,201
4379 :030,030,031,031,031,031,211
4385 :031,031,031,031,031,031,219
4391 :031,001,003,005,003,003,085
4397 :003,000,000,000,000,000,048
4403 :251,251,251,016,016,016,084
4409 :000,000,000,000,000,000,057
4415 :032,032,032,032,032,032,255
```

```
4421 :032,033,035,032,000,051,252
4427 :018,051,179,059,247,204,065
4433 :238,212,206,174,197,172,000
4439 :204,237,092,204,202,172,174
4445 :204,180,232,204,236,093,218
4451 :072,192,205,076,146,104,126
4457 :196,200,206,092,198,216,189
4463 :204,050,134,053,171,118,073
4469 :119,051,224,051,005,019,074
4475 :011,051,243,050,195,179,084
4481 :031,187,059,162,242,049,091
4487 :010,034,030,055,145,113,010
4493 :083,058,049,094,207,196,060
4499 :139,076,076,140,200,105,115
4505 :132,236,196,143,220,085,141
4511 :076,206,204,140,076,140,233
4517 :207,238,235,204,140,220,129
4523 :205,204,206,140,072,115,089
4529 :023,147,053,049,131,055,123
4535 :205,050,193,114,066,177,220
4541 :101,019,179,063,133,051,223
4547 :122,098,181,115,002,051,252
4553 :169,055,063,091,107,035,209
4559 :042,196,036,079,204,201,197
4565 :200,204,140,236,204,092,009
4571 :209,204,204,204,204,204,168
4577 :233,205,220,205,136,234,178
4583 :232,094,132,204,194,140,203
4589 :236,204,206,050,115,050,074
4595 :023,035,019,119,147,039,113
4601 :179,058,059,049,230,243,043
4607 :240,173,066,003,141,080,190
4613 :003,173,073,003,141,081,223
4619 :003,169,127,141,034,145,118
4625 :173,032,145,041,128,208,232
4631 :025,169,014,133,000,238,090
4637 :080,003,173,080,003,201,057
4643 :022,208,003,206,080,003,045
4649 :169,255,141,034,145,076,093
4655 :132,018,169,255,141,034,028
4661 :145,173,017,145,041,016,078
4667 :208,020,169,012,133,000,089
4673 :206,080,003,173,080,003,098
4679 :201,255,208,003,238,080,032
4685 :003,076,132,018,173,017,240
4691 :145,041,008,208,020,169,162
4697 :016,133,000,238,081,003,048
4703 :173,081,003,201,020,208,013
4709 :003,206,081,003,076,132,090
4715 :018,173,017,145,041,004,249
4721 :208,017,169,018,133,000,146
4727 :206,081,003,173,081,003,154
4733 :201,255,208,003,238,081,087
4739 :003,096,238,050,017,173,196
4745 :050,017,201,002,144,005,044
4751 :169,000,141,050,017,172,180
4757 :081,003,185,000,017,133,056
4763 :001,185,020,017,133,002,001
4769 :172,080,003,177,001,201,027
4775 :028,176,005,096,234,234,172

4781 :234,234,032,217,018,096,236
4787 :172,073,003,185,000,017,117
4793 :133,001,185,020,017,133,162
4799 :002,172,066,003,165,000,087
4805 :024,109,050,017,145,001,031
4811 :165,002,024,105,120,133,240
4817 :002,169,008,145,001,076,098
4823 :250,018,172,073,003,185,148
4829 :000,017,133,001,185,020,065
4835 :017,133,002,172,066,003,108
4841 :169,029,145,001,173,080,062
4847 :003,141,066,003,173,081,194
4853 :003,141,073,003,096,160,209
4859 :000,162,000,232,208,253,082
4865 :200,192,064,208,246,162,049
4871 :000,188,067,003,200,192,145
4877 :020,240,042,185,000,017,005
4883 :133,001,185,020,017,133,252
4889 :002,188,060,003,177,001,200
4895 :201,030,208,018,169,251,140
4901 :157,051,017,076,058,019,159
4907 :068,073,071,071,069,082,221
4913 :234,076,058,019,169,255,092
4919 :157,057,017,232,224,003,233
4925 :208,201,162,000,189,057,110
4931 :017,240,088,189,054,017,160
4937 :240,006,234,222,054,017,078
4943 :208,077,188,067,003,200,054
4949 :192,020,240,054,185,000,008
4955 :017,133,001,185,020,017,208
4961 :133,002,188,060,003,177,148
4967 :001,201,030,240,035,188,030
4973 :067,003,185,000,017,133,002
4979 :001,185,020,017,133,002,217
4985 :188,060,003,169,029,145,203
4991 :001,254,067,003,189,051,180
4997 :017,141,012,144,222,051,208
5003 :017,076,158,019,169,000,066
5009 :157,057,017,169,016,157,206
5015 :054,017,169,255,141,060,079
5021 :017,232,224,003,208,158,231
5027 :162,000,189,057,017,201,021
5033 :255,240,010,232,224,003,109

5039 :208,244,169,000,141,012,181
5045 :144,032,074,022,076,223,240
5051 :019,169,005,157,043,017,085
5057 :076,223,020,169,003,157,073
5063 :043,017,076,223,020,234,044
5069 :234,234,234,234,234,234,073
5075 :234,234,234,234,234,234,079
5081 :234,234,234,234,234,234,085
5087 :162,000,189,060,003,205,074
5093 :066,003,208,011,189,067,005
5099 :003,205,073,003,208,003,218
5105 :076,189,023,232,224,003,220
5111 :208,232,076,025,020,152,192
5117 :072,138,072,162,004,254,187
5123 :062,017,189,062,017,201,039
5129 :042,208,008,169,032,157,113
5135 :062,017,202,208,238,104,078
5141 :170,104,168,096,173,060,024
5147 :017,240,026,206,060,017,081
5153 :173,060,017,201,252,240,208
5159 :008,169,224,141,013,144,226
5165 :076,056,020,169,000,141,251
5171 :013,144,141,060,017,234,148
5177 :234,234,230,248,165,248,136
5183 :201,003,144,004,169,000,072
5189 :133,248,166,248,189,046,075
5195 :017,240,003,076,253,020,172
5201 :189,063,003,133,249,189,139
5207 :070,003,133,250,165,162,102
5213 :041,001,240,063,165,249,084
5219 :205,066,003,240,056,176,077
5225 :027,230,249,164,250,185,186
5231 :000,017,133,001,185,020,211
5237 :017,133,002,164,249,177,091
5243 :001,201,010,176,002,198,199
```

```
5249 :249,076,188,019,198,249,084
5255 :164,250,185,000,017,133,116
5261 :001,185,020,017,133,002,243
5267 :164,249,177,001,201,010,181
5273 :176,002,230,249,076,196,058
5279 :019,165,250,205,073,003,106
5285 :240,086,144,027,198,250,086
5291 :164,250,185,000,017,133,152
5297 :001,185,020,017,133,002,023
5303 :164,249,177,001,201,010,217
5309 :176,002,230,250,076,223,122
5315 :020,230,250,164,250,185,014
5321 :000,017,133,001,185,020,045
5327 :017,133,002,164,249,177,181
5333 :001,201,010,176,002,198,033
5339 :250,076,223,020,188,070,022
5345 :003,185,000,017,133,001,052
5351 :185,020,017,133,002,188,008
5357 :063,003,169,029,145,001,135
5363 :165,250,157,070,003,165,029
5369 :249,157,063,003,032,150,135
5375 :023,162,000,189,046,017,180
5381 :208,019,189,063,003,205,180
5387 :066,003,208,011,189,070,046
5393 :003,205,073,003,208,003,000
5399 :076,189,023,232,224,003,002
5405 :208,227,173,049,017,240,175
5411 :004,076,019,022,234,173,051
5417 :017,145,041,032,240,003,007
5423 :076,019,022,173,066,003,150
5429 :141,080,003,173,073,003,014
5435 :141,081,003,165,000,201,138
5441 :010,240,235,165,000,201,148
5447 :012,208,013,169,001,141,103
5453 :082,003,169,255,141,083,042
5459 :003,076,133,021,201,014,019
5465 :208,011,169,001,141,082,189
5471 :003,141,083,003,076,133,022
5477 :021,201,016,208,013,169,217
5483 :002,141,082,003,169,001,249
5489 :141,083,003,076,133,021,058
5495 :201,018,208,007,169,002,212
5501 :141,082,003,169,255,141,148
5507 :083,003,173,082,003,201,164
5513 :001,240,003,076,209,021,175
5519 :162,005,173,080,003,024,078
5525 :109,083,003,201,022,144,199
5531 :003,076,019,022,141,080,240
5537 :003,172,081,003,185,000,093
5543 :017,133,001,185,020,017,028
5549 :133,002,172,080,003,177,228
5555 :001,201,029,240,003,076,217
5561 :121,022,173,082,003,145,219
5567 :001,165,002,024,105,120,096
5573 :133,002,169,000,145,001,135
5579 :202,208,195,076,016,022,154
5585 :162,005,173,081,003,024,145
5591 :109,083,003,201,020,144,007
5597 :003,076,019,022,141,081,051
5603 :003,172,081,003,185,000,159
5609 :017,133,001,185,020,017,094
5615 :133,002,172,080,003,177,038
5621 :001,201,029,240,003,076,027
5627 :121,022,173,082,003,145,029
5633 :001,165,002,024,105,120,162
5639 :133,002,169,000,145,001,201
5645 :202,208,195,032,249,016,147
5651 :076,130,022,165,002,024,182
5657 :105,120,133,002,162,000,035
5663 :189,046,017,208,026,177,182
5669 :001,221,040,017,208,019,031
5675 :169,003,157,046,017,142,065
5681 :084,003,169,255,141,049,238
5687 :017,032,252,019,076,072,011
5693 :022,232,224,003,208,220,202
5699 :169,255,141,084,003,096,047
5705 :234,162,000,160,000,185,046
5711 :046,017,208,027,189,060,114
5717 :003,217,063,003,208,019,086
5723 :189,067,003,217,070,003,128
5729 :208,011,169,255,141,060,173
5735 :017,153,046,017,032,252,108
5741 :019,200,192,003,208,219,182
5747 :232,224,003,208,212,096,066
5753 :032,249,016,032,022,022,238
5759 :234,234,234,234,234,234,251
5765 :173,049,017,240,055,165,064
5771 :197,201,063,208,026,169,235
5777 :253,141,013,144,206,049,183
5783 :017,173,049,017,041,004,196
5789 :208,016,174,084,003,048,178
5795 :011,254,046,017,076,175,230
5801 :022,169,000,141,013,144,146
5807 :173,049,017,201,239,208,038
5813 :011,169,000,141,049,017,056
5819 :141,013,144,032,196,022,223
5825 :076,234,022,164,000,185,106
5831 :044,030,201,001,240,004,207
5837 :201,002,208,005,169,029,051
5843 :153,044,030,185,000,031,142
5849 :201,001,240,004,201,002,098
5855 :208,005,169,029,153,000,019
5861 :031,200,208,221,096,162,123
5867 :000,189,046,017,240,032,247
5873 :201,255,240,028,234,188,107
5879 :070,003,185,000,017,133,143
5885 :001,185,020,017,133,002,099
5891 :188,063,003,189,046,017,253
5897 :074,074,234,024,105,007,015
5903 :145,001,232,224,003,208,060
5909 :214,173,049,017,240,025,227
5915 :173,049,017,201,225,176,100
5921 :018,206,049,017,173,049,033
5927 :017,201,222,208,008,032,215
5933 :196,022,169,000,141,049,110
5939 :017,234,173,049,017,208,237
5945 :021,162,000,189,046,017,236
5951 :240,013,201,255,240,009,253
5957 :165,162,197,161,176,003,165
5963 :222,046,017,232,224,003,051
5969 :208,233,162,000,189,046,151
5975 :017,201,255,208,008,232,240
5981 :224,003,208,244,076,233,057
5987 :023,162,000,189,063,017,041
5993 :201,032,240,003,076,117,006
5999 :023,232,224,004,208,241,019
6005 :157,004,030,232,189,063,024
6011 :017,224,005,208,245,162,216
6017 :000,189,046,017,201,255,069
6023 :208,005,169,026,157,022,210
6029 :030,232,224,003,208,239,053
6035 :076,236,025,189,046,017,224
6041 :208,033,188,070,003,185,072
6047 :000,017,133,001,185,020,003
6053 :017,133,002,188,063,003,059
6059 :189,043,017,145,001,165,219
6065 :002,024,105,120,133,002,051
6071 :189,040,017,145,001,096,159
6077 :169,000,141,012,144,141,028
6083 :013,144,169,255,141,011,160
```

```
6089 :144,162,016,160,000,136,051
6095 :208,253,202,208,248,206,252
6101 :011,144,173,011,144,201,129
6107 :144,208,236,169,000,141,093
6113 :011,144,076,014,016,234,208
6119 :234,234,169,000,141,012,253
6125 :144,141,013,144,162,000,073
6131 :188,067,003,185,000,017,191
6137 :133,001,185,020,017,133,226
6143 :002,188,060,003,169,000,165
6149 :145,001,165,002,024,105,191
6155 :120,133,002,169,008,145,076
6161 :001,234,234,234,234,234,164
6167 :232,224,003,208,215,160,041
6173 :000,169,026,153,022,030,173
6179 :200,192,003,208,248,169,031
6185 :240,141,010,144,169,207,184
6191 :141,011,144,169,175,141,060
6197 :012,144,162,010,032,252,153
6203 :019,202,208,250,162,000,132
6209 :160,000,136,208,253,202,000
6215 :208,248,162,000,169,000,090
6221 :157,046,017,232,224,003,244
6227 :208,248,173,073,017,201,235
6233 :021,240,003,238,073,017,169
6239 :169,000,141,010,144,141,188
6245 :011,144,141,012,144,234,019
6251 :234,234,234,234,234,234,231
6257 :169,000,141,060,017,032,020
6263 :017,016,032,163,024,076,191
6269 :133,016,002,187,071,227,249
6275 :169,000,141,073,017,162,181
6281 :000,169,032,157,063,017,063
6287 :232,224,005,208,246,169,203
6293 :000,141,049,017,162,000,006
6299 :157,046,017,232,224,003,066
6305 :208,248,169,020,141,000,179
6311 :030,169,021,141,001,030,047
6317 :169,022,141,002,030,169,194
6323 :023,141,003,030,169,024,057
6329 :141,011,030,169,025,141,190
6335 :012,030,169,000,141,073,104
6341 :003,169,011,141,066,003,078
6347 :162,000,189,063,017,221,087
6353 :068,017,240,005,144,024,195
6359 :076,226,024,232,224,005,234
6365 :208,238,076,239,024,162,144
6371 :000,189,063,017,157,068,209
6377 :017,232,224,005,208,245,140
6383 :162,000,189,068,017,201,108
6389 :032,240,003,076,000,025,109
6395 :232,224,004,208,241,157,037
6401 :014,030,232,189,068,017,039
6407 :224,005,208,245,174,073,168
6413 :017,240,009,169,027,157,120
6419 :043,030,202,076,014,025,153
6425 :096,162,000,169,032,141,113
6431 :042,025,169,027,157,043,238
6437 :030,202,076,006,025,096,216
6443 :032,017,016,032,131,024,039
6449 :076,133,016,032,017,016,083
6455 :076,130,025,071,025,168,038
6461 :169,029,153,066,030,202,198
6467 :208,244,076,130,025,000,238
6473 :001,004,006,007,008,010,109
6479 :011,012,014,015,016,002,149
6485 :019,020,022,024,026,028,224
6491 :032,036,040,042,044,046,075
6497 :048,050,052,054,056,058,159
6503 :059,062,063,066,068,070,235
6509 :072,074,076,078,080,084,061
6515 :086,088,089,092,094,095,147
6521 :096,098,099,100,102,103,207
6527 :104,106,109,169,000,141,244
6533 :155,002,174,155,002,189,042
6539 :000,026,141,012,144,189,139
6545 :065,026,141,011,144,032,052
6551 :000,027,234,234,234,234,090
6557 :234,234,234,238,155,002,230
6563 :169,064,205,155,002,208,198
6569 :221,141,011,144,141,012,071
6575 :144,076,050,027,041,032,033
6581 :208,203,076,043,025,002,226
6587 :053,160,057,019,049,169,182
6593 :001,162,001,160,255,032,036
6599 :186,255,169,006,162,043,252
6605 :160,019,032,189,255,169,005
6611 :000,133,001,169,016,133,151
6617 :002,169,001,162,000,160,199
6623 :030,032,216,255,096,169,253
6629 :127,141,030,145,076,052,032
6635 :025,162,000,189,067,003,169
6641 :201,019,208,008,232,224,109
6647 :003,208,244,076,014,016,040
6653 :076,133,016,002,235,237,184
6659 :235,231,235,237,235,231,127
6665 :235,237,235,231,228,227,122
6671 :223,219,231,235,231,228,102
6677 :235,231,228,223,228,235,121
6683 :231,235,235,231,000,231,166
6689 :235,237,235,231,235,237,163
6695 :235,231,235,237,235,231,163
6701 :228,227,223,219,000,215,133
6707 :212,215,219,223,219,215,074
6713 :223,219,000,219,000,219,169
6719 :219,000,000,000,235,000,005
6725 :207,000,235,000,207,000,206
6731 :235,000,207,000,235,000,240
6737 :207,235,215,000,201,000,171
6743 :215,000,201,000,215,000,206
6749 :201,000,215,000,201,215,157
6755 :235,000,207,000,183,000,212
6761 :207,000,183,000,207,000,190
6767 :183,000,207,000,215,000,204
6773 :201,000,215,000,201,000,222
6779 :183,000,207,000,235,000,236
6785 :001,023,045,067,089,090,188
6791 :069,047,025,002,007,029,058
6797 :051,073,095,096,097,075,116
6803 :053,008,009,011,033,055,060
6809 :077,099,100,101,079,057,154
6815 :012,013,015,037,059,060,099
6821 :081,103,104,105,016,017,079
6827 :019,041,063,085,107,109,083
6833 :087,064,043,021,020,005,161
6839 :027,049,071,093,115,115,141
6845 :115,115,115,115,234,234,093
6851 :234,234,234,234,234,234,063
6857 :234,234,234,234,234,234,069
6863 :234,234,234,234,234,234,075
6869 :234,234,234,234,234,234,081
6875 :234,234,234,234,234,234,087
6881 :234,234,234,234,234,234,093
6887 :234,234,234,234,234,234,099
6893 :234,234,234,234,234,234,105
6899 :234,234,234,234,234,234,111
6905 :234,234,234,234,234,234,117
6911 :234,189,129,026,168,169,146
6917 :048,133,148,169,016,153,160
6923 :066,030,162,000,202,208,167
```

```
6929 :253,198,148,165,148,208,113
6935 :245,169,017,153,066,030,191
6941 :169,048,133,148,162,000,177
6947 :202,208,253,198,148,165,185
6953 :148,208,245,169,029,153,225
6959 :066,030,096,169,016,141,053
6965 :181,030,162,000,189,182,029
6971 :026,168,169,000,153,066,129
6977 :030,169,048,133,148,160,241
6983 :000,136,208,253,198,148,246
6989 :165,148,208,245,189,182,190
6995 :026,168,169,029,153,066,182
7001 :030,232,224,006,208,218,239
7007 :169,000,141,181,030,169,017
7013 :200,141,013,144,162,000,249
7019 :160,000,200,208,253,232,136
7025 :208,248,169,000,141,013,124
7031 :144,076,043,025,063,002,216
7037 :049,183,121,051,042,179,238
7043 :114,049,101,201,052,075,211
7049 :176,055,005,235,157,154,151
7055 :048,204,109,204,206,206,096
7061 :236,199,140,194,160,204,002
7067 :138,204,234,207,010,207,131
7073 :221,199,077,206,206,204,250
7079 :103,237,110,200,254,204,251
7085 :240,216,110,115,254,125,209
7091 :061,119,038,226,056,049,216
7097 :049,021,191,004,058,187,183
7103 :051,003,147,150,056,043,129
7109 :177,179,079,215,182,083,088
7115 :190,161,123,135,143,223,154
7121 :044,204,095,204,096,204,032
7127 :216,196,207,206,156,199,115
7133 :204,235,156,204,106,197,043
7139 :184,069,222,204,142,222,246
7145 :230,206,205,204,028,224,050
7151 :245,031,054,251,051,243,090
7157 :043,019,104,225,056,033,213
7163 :050,088,050,055,099,065,146
7169 :000,000,128,128,162,170,077
7175 :105,000,000,032,080,136,104
7181 :005,002,000,008,004,002,034
7187 :004,008,016,032,016,000,095
7193 :016,096,226,188,062,067,168
7199 :129,000,016,096,226,188,174
7205 :062,034,036,000,008,006,183
7211 :069,061,124,194,129,000,108
7217 :008,006,069,061,124,068,129
7223 :036,000,008,006,015,029,149
7229 :060,242,121,000,024,060,056
7235 :126,126,060,024,000,024,171
7241 :126,126,255,255,126,126,063
7247 :024,040,020,020,255,255,181
7253 :125,060,040,040,020,020,134
7259 :255,255,125,060,040,010,068
7265 :006,006,015,015,013,003,155
7271 :010,010,006,006,015,063,213
7277 :055,163,010,160,144,144,017
7283 :240,240,112,192,160,160,195
7289 :144,144,240,252,220,202,043
7295 :160,040,020,020,255,255,109
7301 :125,056,032,040,020,020,170
7307 :255,255,125,044,008,040,098
7313 :040,040,255,255,125,044,136
7319 :008,040,040,040,255,255,021
7325 :125,056,032,255,255,248,104
7331 :247,249,254,241,255,255,128
7337 :255,198,189,189,189,198,107
7343 :255,255,255,099,173,163,095
7349 :171,109,255,255,255,031,233
7355 :127,063,127,031,255,255,021
7361 :255,107,106,010,106,107,116
7367 :255,255,255,022,246,144,096
7373 :214,022,255,255,247,249,167
7379 :240,226,195,013,134,243,238
7385 :224,204,224,211,191,127,118
7391 :127,040,040,040,040,040,038
7397 :040,040,040,000,000,000,093
7403 :000,000,000,000,000,068,047
7409 :017,068,017,068,017,068,240
7415 :017,255,255,255,255,255,003
7421 :255,255,255,195,189,185,051
7427 :165,157,189,195,255,247,187
7433 :231,215,247,247,247,193,109
7439 :255,195,189,253,243,207,077
7445 :191,129,255,195,189,253,209
7451 :227,253,189,195,255,251,117
7457 :243,235,219,129,251,251,081
7463 :255,129,191,135,251,253,229
7469 :187,199,255,227,223,191,047
7475 :131,189,189,195,255,129,115
7481 :189,251,247,239,239,239,181
7487 :255,195,189,189,195,189,251
7493 :189,195,255,195,189,189,001
7499 :193,253,251,199,255,255,201
7505 :000,000,003,076,000,000,160
7511 :000,011,015,001,015,000,129
7517 :000,000,000,000,143,000,236
7523 :000,096,000,000,000,000,195
7529 :141,128,000,000,000,000,118
7535 :000,000,012,195,230,122,158
7541 :208,002,230,123,173,008,093
7547 :002,201,058,176,010,201,003
7553 :032,240,239,056,233,048,209
7559 :056,233,208,096,128,079,167
7565 :199,082,088,000,255,000,253
7571 :000,000,000,000,016,000,163
7577 :000,003,000,000,128,000,028
7583 :000,000,105,135,000,000,143
7589 :000,000,000,000,000,000,165
7595 :000,000,000,000,000,000,171
7601 :000,060,003,000,000,000,240
7607 :000,000,000,000,000,000,183
7613 :000,000,000,000,124,108,165
7619 :000,029,015,000,000,007,246
7625 :007,006,015,001,002,032,008
7631 :000,021,154,030,007,000,163
7637 :021,007,048,000,158,158,093
7643 :158,158,158,158,158,158,143
7649 :158,158,158,158,159,159,151
7655 :159,159,159,159,159,159,161
7661 :159,159,159,159,255,000,104
7667 :154,150,094,236,000,000,109
7673 :014,014,000,000,000,029,050
7679 :032,013,013,013,013,013,096
```

Program 2: Digger—64 Version

```
49152 :076,080,194,169,127,141,019
49158 :013,220,173,017,208,041,166
49164 :127,141,017,208,169,035,197
49170 :141,020,003,169,192,141,172
49176 :021,003,173,026,208,009,208
49182 :001,141,026,208,096,169,159
49188 :001,141,025,208,162,093,154
49194 :160,000,173,018,208,201,034
49200 :093,144,004,162,001,160,100
49206 :032,140,041,204,142,018,119
```

```
49212 :208,173,041,204,240,022,180
49218 :162,061,202,208,253,013,197
49224 :017,208,141,017,208,169,064
49230 :008,013,024,208,141,024,240
49236 :208,076,101,192,173,017,083
49242 :208,041,223,141,017,208,160
49248 :169,021,141,024,208,169,060
49254 :001,141,026,208,173,013,152
49260 :220,041,001,240,003,076,177
49266 :049,234,076,188,254,169,060
49272 :000,141,131,205,173,030,032
49278 :208,141,119,205,041,001,073
49284 :240,005,169,001,141,131,051
49290 :205,162,000,189,009,208,143
49296 :201,235,208,011,232,232,239
49302 :224,007,144,243,169,001,170
49308 :141,131,205,173,021,208,011
49314 :041,014,208,005,169,002,089
49320 :141,131,205,174,130,205,130
49326 :189,008,208,157,067,205,240
49332 :173,016,208,061,196,192,002
49338 :240,013,169,001,157,068,066
49344 :205,076,206,192,016,000,119
49350 :032,000,064,169,000,157,108
49356 :068,205,056,189,067,205,226
49362 :233,016,157,067,205,189,053
49368 :068,205,233,000,157,068,179
49374 :205,056,189,009,208,233,098
49380 :035,157,083,205,173,217,074
49386 :203,072,173,218,203,072,151
49392 :173,233,203,072,173,189,003
49398 :204,072,173,249,203,072,195
49404 :165,253,072,165,254,072,209
49410 :189,083,205,141,233,203,032
49416 :189,067,205,141,217,203,006
49422 :189,068,205,141,218,203,014
49428 :138,072,032,167,199,104,220
49434 :170,172,189,204,177,253,167
49440 :208,031,200,177,253,208,085
49446 :026,173,008,208,201,235,121
49452 :176,019,222,109,205,208,215
49458 :019,169,001,157,109,205,198
49464 :254,009,208,032,118,193,102
49470 :076,070,193,169,050,157,009
49476 :109,205,104,133,254,104,209
49482 :133,253,104,141,249,203,133
49488 :104,141,189,204,104,141,195
49494 :233,203,104,141,218,203,164
49500 :104,141,217,203,238,130,101
49506 :205,238,130,205,173,130,155
49512 :205,201,007,176,003,076,004
49518 :171,192,169,000,141,130,145
49524 :205,096,173,021,208,141,192
49530 :171,204,173,119,205,041,011
49536 :112,240,065,169,000,141,087
49542 :155,204,141,136,205,160,111
49548 :001,189,196,192,141,064,155
49554 :205,185,249,197,013,064,035
49560 :205,045,171,204,141,021,171
49566 :208,032,239,193,173,030,009
49572 :208,041,014,072,013,155,155
49578 :204,141,155,204,104,240,194
49584 :003,238,136,205,200,192,126
49590 :004,144,212,173,155,204,050
49596 :073,255,045,171,204,141,053
49602 :021,208,173,119,205,041,193
49608 :001,141,131,205,173,171,254
49614 :204,205,021,208,240,026,086
49620 :174,136,205,024,173,134,034
49626 :205,105,010,141,134,205,250
49632 :173,135,205,105,000,141,215
49638 :135,205,202,208,236,032,224
49644 :187,194,096,173,018,208,088
49650 :208,251,173,017,208,016,091
49656 :246,096,169,128,133,251,247
49662 :169,039,133,252,169,204,196
49668 :141,128,039,160,000,177,137
49674 :251,073,255,200,145,251,161
49680 :056,165,251,233,063,141,157
49686 :041,204,165,252,233,063,212
49692 :013,041,204,240,009,230,253
49698 :251,208,226,230,252,076,253
49704 :007,194,096,162,000,160,147
49710 :016,024,032,240,255,160,005
49716 :000,185,074,194,032,210,235
49722 :255,200,192,006,208,245,140
49728 :165,162,024,105,100,197,049
49734 :162,208,252,096,068,073,161
49740 :071,071,069,082,169,147,173
49746 :032,210,255,169,000,141,121
49752 :139,205,141,140,205,032,182
49758 :003,192,169,000,141,057,144
49764 :204,141,134,205,141,135,036
49770 :205,032,250,193,032,113,163
49776 :196,032,091,195,173,030,061
49782 :208,032,043,194,032,119,234
49788 :192,032,136,197,032,069,014
49794 :196,173,131,205,201,002,014
49800 :240,007,201,001,240,210,011
49806 :076,176,194,238,057,204,063
49812 :024,169,100,109,134,205,121
49818 :141,134,205,173,135,205,123
49824 :105,000,141,135,205,032,010
49830 :187,194,169,000,141,131,220
49836 :205,076,107,194,173,141,044
49842 :002,208,251,076,184,194,069
49848 :076,122,194,169,000,141,118
49854 :132,205,173,021,208,074,235
49860 :041,007,141,133,205,160,115
49866 :002,024,078,133,205,169,045
49872 :000,109,132,205,141,132,159
49878 :205,136,016,241,160,030,234
49884 :162,002,024,032,240,255,167
49890 :169,000,174,132,205,208,090
49896 :000,032,205,189,056,173,119
49902 :134,205,237,139,205,141,019
49908 :064,205,173,135,205,237,239
49914 :140,205,013,064,205,144,253
49920 :012,173,134,205,141,139,036
49926 :205,173,135,205,141,140,237
49932 :205,160,006,162,004,024,061
49938 :032,240,255,173,140,205,039
49944 :174,139,205,032,205,189,200
49950 :160,006,162,002,024,032,160
49956 :240,255,173,135,205,174,194
49962 :134,205,032,205,189,160,199
49968 :030,162,004,024,032,240,028
49974 :255,169,000,174,057,204,145
49980 :032,205,189,096,083,067,220
49986 :079,082,069,058,084,082,008
49992 :079,076,076,083,083,067,024
49998 :082,069,069,078,083,072,019
50004 :073,045,083,067,079,082,001
50010 :069,160,024,169,000,153,153
50016 :000,212,136,016,250,169,111
50022 :015,141,024,212,169,017,168
50028 :141,005,212,141,012,212,063
50034 :169,241,141,006,212,141,000
50040 :013,212,160,000,140,137,014
50046 :205,162,000,165,162,024,076
```

```
50052 :105,002,197,162,208,252,034
50058 :238,137,205,185,222,195,040
50064 :205,137,205,208,020,200,095
50070 :185,222,195,141,000,212,081
50076 :200,185,222,195,141,001,076
50082 :212,200,169,033,141,004,153
50088 :212,189,032,196,205,137,115
50094 :205,208,020,232,189,032,036
50100 :196,141,007,212,232,189,133
50106 :032,196,141,008,212,232,239
50112 :169,033,141,011,212,165,155
50118 :162,024,105,006,197,162,086
50124 :208,252,169,032,141,004,242
50130 :212,141,011,212,173,137,072
50136 :205,201,030,144,164,096,032
50142 :002,135,033,003,135,033,051
50148 :004,135,033,005,135,033,061
50154 :006,030,025,008,030,025,102
50160 :010,049,028,011,030,025,137
50166 :012,096,022,013,031,021,185
50172 :015,096,022,017,030,025,201
50178 :018,135,033,019,135,033,119
50184 :020,135,033,021,135,033,129
50190 :022,030,025,024,030,025,170
50196 :026,049,028,027,030,025,205
50202 :028,096,022,029,031,021,253
50208 :001,097,008,010,071,006,225
50214 :011,012,007,012,233,007,064
50220 :013,097,008,015,233,007,161
50226 :017,012,007,018,071,006,181
50232 :026,071,006,027,012,007,205
50238 :028,233,007,029,097,008,208
50244 :255,173,063,205,201,005,202
50250 :144,033,160,002,185,249,079
50256 :007,073,001,153,249,007,058
50262 :136,016,245,173,248,007,143
50268 :201,135,144,005,169,128,106
50274 :141,248,007,238,248,007,219
50280 :169,000,141,063,205,238,152
50286 :063,205,096,032,102,197,037
50292 :169,147,032,210,255,160,065
50298 :005,162,001,024,032,240,074
50304 :255,160,000,185,064,195,219
50310 :032,210,255,200,192,005,004
50316 :208,245,160,028,162,001,176
50322 :024,032,240,255,160,000,089
50328 :185,070,195,032,210,255,075
50334 :200,192,006,208,245,160,145
50340 :028,162,003,024,032,240,141
50346 :255,160,000,185,076,195,017
50352 :032,210,255,200,192,007,048
50358 :208,245,160,003,162,003,195
50364 :024,032,240,255,160,000,131
50370 :185,083,195,032,210,255,130
50376 :200,192,009,208,245,160,190
50382 :013,185,088,197,153,000,074
50388 :208,170,152,041,001,208,224
50394 :007,138,153,058,204,076,086
50400 :231,196,169,000,153,058,007
50406 :204,136,016,229,169,128,088
50412 :141,248,007,169,136,141,054
50418 :249,007,141,250,007,141,013
50424 :251,007,169,138,141,252,182
50430 :007,141,253,007,141,254,033
50436 :007,160,004,185,084,197,129
50442 :153,039,208,136,016,247,041
50448 :160,003,169,007,153,043,039
50454 :208,136,016,248,169,001,032
50460 :141,037,208,169,002,141,214
50466 :038,208,169,127,141,028,233
50472 :208,141,021,208,160,015,025
50478 :169,000,153,173,204,153,130
50484 :075,204,169,015,153,031,187
50490 :205,136,016,240,169,000,056
50496 :141,065,205,141,016,208,072
50502 :169,003,141,074,204,169,062
50508 :009,141,032,208,032,187,173
50514 :194,096,001,014,005,007,143
50520 :173,173,255,130,239,120,154
50526 :100,190,060,131,255,140,202
50532 :140,140,160,000,185,025,238
50538 :201,153,000,032,200,208,132
50544 :247,160,000,185,025,202,163
50550 :153,000,033,200,208,247,191
50556 :160,000,185,025,203,153,082
50562 :000,034,200,208,247,096,147
50568 :174,065,205,189,245,197,187
50574 :141,066,205,189,249,197,165
50580 :141,064,003,173,000,220,237
50586 :072,173,064,003,201,002,157
50592 :144,031,104,032,002,199,160
50598 :152,032,231,197,032,064,106
50604 :199,152,032,231,197,238,197
50610 :065,205,173,065,205,201,068
50616 :004,144,005,169,000,141,135
50622 :065,205,096,032,241,199,004
50628 :238,065,205,104,041,015,096
50634 :073,015,240,006,141,074,239
50640 :204,076,215,197,173,074,123
50646 :204,072,032,231,197,032,214
50652 :241,199,104,072,032,231,075
50658 :197,032,241,199,104,010,241
50664 :168,185,254,197,072,185,013
50670 :253,197,072,174,066,205,181
50676 :096,000,002,004,006,001,097
50682 :002,004,008,221,198,020,191
50688 :198,031,198,221,198,127,205
50694 :198,221,198,221,198,221,239
50700 :198,042,198,221,198,221,066
50706 :198,221,198,169,099,221,100
50712 :001,208,176,003,222,001,123
50718 :208,096,169,232,221,001,189
50724 :208,144,003,254,001,208,086
50730 :096,056,189,058,204,233,110
50736 :064,141,091,204,189,059,028
50742 :204,233,001,013,091,204,032
50748 :144,013,169,064,157,058,153
50754 :204,169,001,157,059,204,092
50760 :076,083,198,254,058,204,177
50766 :208,003,254,059,204,056,094
50772 :189,058,204,233,000,141,141
50778 :091,204,189,059,204,233,046
50784 :001,013,091,204,144,012,049
50790 :173,064,003,013,016,208,067
50796 :141,016,208,076,215,198,194
50802 :173,064,003,073,255,045,215
50808 :016,208,141,016,208,076,017
50814 :215,198,056,189,058,204,022
50820 :233,025,141,091,204,189,247
50826 :059,204,233,000,013,091,226
50832 :204,176,013,169,024,157,119
50838 :058,204,169,000,157,059,029
50844 :204,076,173,198,222,058,063
50850 :204,189,058,204,201,255,249
50856 :208,003,222,059,204,056,152
50862 :189,058,204,233,000,141,231
50868 :091,204,189,059,204,233,136
50874 :001,013,091,204,144,012,139
50880 :173,064,003,013,016,208,157
50886 :141,016,208,076,215,198,028
```

```
50892 :173,064,003,073,255,045,049
50898 :016,208,141,016,208,189,220
50904 :058,204,157,000,208,096,171
50910 :076,215,198,174,066,205,132
50916 :222,031,205,240,008,169,079
50922 :000,141,030,205,076,001,175
50928 :199,173,004,220,041,031,140
50934 :056,105,001,157,031,205,033
50940 :169,001,141,030,205,096,126
50946 :032,225,198,173,030,205,097
50952 :240,046,056,189,058,204,033
50958 :237,058,204,157,107,204,213
50964 :189,059,204,237,059,204,204
50970 :157,108,204,029,107,204,067
50976 :240,012,176,005,160,008,121
50982 :076,048,199,160,004,076,089
50988 :048,199,160,000,152,157,248
50994 :075,204,032,114,199,096,002
51000 :189,075,204,168,032,114,070
51006 :199,096,032,225,198,173,217
51012 :030,205,240,034,056,189,054
51018 :001,208,237,001,208,157,118
51024 :123,204,240,012,176,005,072
51030 :160,002,076,098,199,160,013
51036 :001,076,098,199,160,000,114
51042 :152,157,173,204,032,114,162
51048 :199,096,189,173,204,168,109
51054 :032,114,199,096,056,189,028
51060 :107,204,253,123,204,141,124
51066 :064,205,189,108,204,233,101
51072 :000,013,064,205,176,007,081
51078 :189,173,204,168,076,145,065
51084 :199,189,075,204,168,152,103
51090 :072,174,065,205,173,021,088
51096 :208,061,249,197,240,003,086
51102 :032,241,199,174,066,205,051
51108 :104,168,096,173,233,203,117
51114 :041,007,072,173,233,203,131
51120 :074,074,074,168,185,229,212
51126 :200,133,253,185,255,200,128
51132 :133,254,024,104,101,253,033
51138 :133,253,165,254,105,000,080
51144 :133,254,173,217,203,041,197
51150 :007,073,007,168,185,233,111
51156 :199,141,249,203,024,173,177
51162 :218,203,101,254,133,254,101
51168 :173,217,203,041,248,141,223
51174 :189,204,096,001,002,004,214
51180 :008,016,032,064,128,174,146
51186 :066,205,056,189,058,204,252
51192 :233,024,141,217,203,189,231
51198 :059,204,233,000,141,218,085
51204 :203,056,189,001,208,233,126
51210 :050,141,233,203,141,172,182
51216 :204,169,000,170,168,024,239
51222 :185,087,200,109,172,204,211
51228 :141,233,203,200,185,087,053
51234 :200,141,237,204,162,000,210
51240 :032,075,200,238,233,203,253
51246 :232,236,237,204,208,244,127
51252 :200,185,087,200,016,004,232
51258 :200,076,021,200,238,217,242
51264 :203,208,003,238,218,203,113
51270 :200,192,124,144,202,138,046
51276 :072,152,072,032,213,200,049
51282 :104,168,104,170,096,007,219
51288 :004,000,007,001,255,010,109
51294 :001,000,005,002,255,011,112
51300 :002,000,005,001,255,012,119
51306 :001,000,005,001,255,012,124
51312 :001,000,004,001,255,013,130
51318 :001,000,004,001,255,013,136
51324 :001,000,003,001,255,014,142
51330 :001,000,003,001,255,014,148
51336 :001,000,002,001,255,015,154
51342 :001,000,002,001,255,015,160
51348 :001,000,002,001,255,015,166
51354 :001,000,002,001,255,015,172
51360 :001,000,002,001,255,015,178
51366 :001,000,003,001,255,014,184
51372 :001,000,003,001,255,014,190
51378 :001,000,004,001,255,013,196
51384 :001,000,004,001,255,013,202
51390 :001,000,005,001,255,012,208
51396 :001,000,005,002,255,011,214
51402 :002,000,007,001,000,010,222
51408 :001,000,007,004,000,032,252
51414 :167,199,172,189,204,173,038
51420 :249,203,073,255,049,253,022
51426 :145,253,096,000,064,128,144
51432 :192,000,064,128,192,000,040
51438 :064,128,192,000,064,128,046
51444 :192,000,064,128,192,000,052
51450 :064,128,192,000,064,002,188
51456 :033,034,035,037,038,039,216
51462 :040,042,043,044,045,047,011
51468 :048,049,050,052,053,054,062
51474 :055,057,058,059,060,062,113
51480 :063,000,000,000,000,000,087
51486 :000,000,252,000,003,087,116
51492 :000,013,085,192,052,016,138
51498 :112,053,085,112,213,017,122
51504 :092,213,085,092,209,085,056
51510 :028,052,000,112,053,001,044
51516 :112,013,085,192,003,087,040
51522 :000,000,252,000,000,000,062
51528 :000,000,000,000,000,000,072
51534 :000,000,000,000,000,000,078
51540 :000,000,000,000,000,000,084
51546 :000,000,000,000,000,000,090
51552 :252,000,003,087,000,013,195
51558 :005,192,053,085,112,053,090
51564 :020,112,209,085,028,209,003
51570 :081,092,208,085,092,052,212
51576 :021,092,053,001,112,013,156
51582 :085,192,003,087,000,000,237
51588 :252,000,000,000,000,000,128
51594 :000,000,000,000,000,000,138
51600 :000,000,000,000,000,000,144
51606 :000,000,000,000,000,000,150
51612 :000,000,000,000,252,000,152
51618 :003,087,000,013,085,192,030
51624 :053,021,112,052,084,112,090
51630 :208,068,092,208,085,092,159
51636 :208,068,092,052,084,112,028
51642 :053,021,112,013,085,192,150
51648 :003,087,000,000,252,000,022
51654 :000,000,000,000,000,000,198
51660 :000,000,000,000,000,000,204
51666 :000,000,000,000,000,000,210
51672 :000,000,000,000,000,000,216
51678 :000,000,252,000,003,087,052
51684 :000,013,085,192,053,001,060
51690 :112,052,021,092,208,085,036
51696 :092,209,081,092,209,085,240
51702 :028,053,020,112,053,085,085
51708 :112,013,005,192,003,087,152
51714 :000,000,252,000,000,000,254
51720 :000,000,000,000,000,000,008
51726 :000,000,000,000,000,000,014
```

```
51732 :000,000,000,000,000,000,020
51738 :000,000,000,000,000,000,026
51744 :252,000,003,087,000,013,131
51750 :085,192,053,001,112,052,021
51756 :000,112,209,085,028,213,179
51762 :085,092,213,017,092,053,090
51768 :085,112,052,016,112,013,190
51774 :085,192,003,087,000,000,173
51780 :252,000,000,000,000,000,064
51786 :000,000,000,000,000,000,074
51792 :000,000,000,000,000,000,080
51798 :000,000,000,000,000,000,086
51804 :000,000,000,000,252,000,088
51810 :003,087,000,013,085,192,222
51816 :053,001,112,213,080,112,163
51822 :213,084,028,213,021,028,185
51828 :209,085,028,052,081,112,171
51834 :053,085,112,013,065,192,130
51840 :003,087,000,000,252,000,214
51846 :000,000,000,000,000,000,134
51852 :000,000,000,000,000,000,140
51858 :000,000,000,000,000,000,146
51864 :000,000,000,000,000,000,152
51870 :000,000,252,000,003,087,244
51876 :000,013,085,192,053,081,076
51882 :112,052,084,112,212,068,042
51888 :028,213,084,028,212,068,041
51894 :028,052,084,112,053,081,080
51900 :112,013,085,192,003,087,168
51906 :000,000,252,000,000,000,190
51912 :000,000,000,000,000,000,200
51918 :000,000,000,000,000,000,206
51924 :000,000,000,000,000,000,212
51930 :000,000,000,000,000,000,218
51936 :252,000,003,087,000,013,067
51942 :065,192,053,085,112,052,021
51948 :081,112,209,085,028,213,196
51954 :021,028,213,084,028,213,061
51960 :080,112,053,001,112,013,107
51966 :085,192,003,087,000,000,109
51972 :252,000,000,000,000,000,000
51978 :000,000,000,000,000,000,010
51984 :000,000,000,000,000,000,016
51990 :000,000,000,000,000,000,022
51996 :000,084,000,001,169,000,026
52002 :006,170,064,006,238,064,070
52008 :026,170,144,026,170,144,208
52014 :026,170,144,026,254,144,042
52020 :027,255,144,006,170,064,206
52026 :006,170,064,001,169,000,212
52032 :001,084,000,001,004,000,154
52038 :001,005,000,001,064,000,141
52044 :000,000,000,000,000,000,076
52050 :000,000,000,000,000,000,082
52056 :255,000,000,000,000,084,171
52062 :000,001,169,000,006,170,184
52068 :064,006,238,064,026,170,156
52074 :144,026,170,144,026,170,018
52080 :144,026,254,144,027,171,110
52086 :144,006,254,064,006,170,250
52092 :064,001,169,000,001,084,187
52098 :000,001,004,000,001,068,204
52104 :000,000,005,000,000,000,141
52110 :000,000,000,000,000,000,142
52116 :000,000,000,000,255,000,147
52122 :000,000,000,000,000,000,154
52128 :000,000,000,000,000,000,160
52134 :000,000,003,252,000,003,168
52140 :172,000,014,175,192,254,211
52146 :178,240,239,170,176,234,135
52152 :186,175,250,175,191,063,200
52158 :170,172,000,255,240,000,003
52164 :000,000,000,000,000,000,196
52170 :000,000,000,000,000,000,202
52176 :000,000,000,000,000,000,208
52182 :000,000,255,013,013,013,252
```


This Publication is available in Microform.

University Microfilms International

Please send additional information

for _____
(name of publication)

Name_____

Institution_____

Street_____

City_____

State_____ Zip_____

300 North Zeeb Road
Dept. P.R.
Ann Arbor, Mi. 48106

PRODUCT MART

Software Shack

C= commodore

GAMES

Trivia Fever	$28.57	Summer Games (D)	$27.57	Grtst Baseball (D)	$25.57
StandingStns (D)	$29.57	Word Challenge (D)	$27.57	F-15 StrikeEag (D)	$25.57
Imp. Mission (D)	$25.57	Pitstop II. (R)	$27.57	Questron (D)	$27.57
TRILLIUM (D)	$23.57	Bungeling Bay (D)	$22.57	Castle Dr. Creep (D)	$22.57
Archon (D)	$31.57	Music Const. (D)	$31.57	M.U.L.E. (D)	$31.57
One on One (D)	$29.57	DeBug (D)	$26.57	ARCHON II (D)	$31.57
Realm of Imp. (D)	$27.57	Pitfall II (D)	$24.57	Zeppelin (D-T)	$24.57
Zaxxon (D-T)	$28.57	Space Shuttle (D)	$24.57	Millionaire (D)	$28.57
Flight Sim. II (D)	$38.57	Solo Flight (D)	$27.57	Wizard (D)	$29.57
Lode Runner (R)	$26.57	Op. Whirlwind (D)	$28.57	Spy vs Spy (D)	$23.57
Boulder Dash (D)	$27.57	Flip Flop (D)	$17.57	Rails West (D)	$28.57
Suspect (D)	$30.57	Witness (D)	$27.57	Seastalker (D)	$27.57
Beachhead (D-T)	$24.57	Raid on Moscow (D)	$24.57	Miner 2049r (R)	$26.57
Congo Bongo (D)	$32.57	Tapper (D)	$32.57	Spy Hunter (D)	$32.57
Cstl Wolfstn (D)	$24.57	Beynd Wolfstn (D)	$24.57	Carrier Force (D)	$45.57
Pro Tour Golf (D)	$26.57	Ringside Seat (D)	$26.57	Tigers in Snow (D)	$26.57
Spelunker (D)	$25.57	Ultima III (D)	$39.57	MusiCalc 1 (D)	$36.57
Serpent Star (D)	$27.57	Pro Blackjack (D)	$48.57	Dallas Quest (D)	$23.57

BUSINESS

Superbase 64 (D)	$68.57	Practicalc (D)	$38.57	MultiPlan (D)	$68.57
Practifile (D)	$38.57	Cut & Paste WP (D)	$36.57	Abacus PASCAL (D)	$29.57
Easy Script (D)	$36.57	WriteNow WP (R)	$36.57	PaperClip WP (D)	$66.57
Net Worth (D)	$49.57	Chartpac (D)	$33.57	PhiBetaFiler (D)	$37.57
Micro Cookbk (D)	$23.57	Super Text (D)	$62.57	Exec.Script64 (D)	$65.57

EDUCATIONAL

Step by Step (D)	$48.57	Basic Tutor. (D)	$36.57	Rocky's Boots (D)	$38.57
Wiztype (D)	$25.57	Mastertype (D)	$27.57	SAT English (D)	$28.57
Word Wizard (D)	$25.57	SAT Math (D)	$28.57	SampleSATtest (D)	$28.57
Evelyn Wood (D)	$52.57	Anim. Station (D)	$62.57	The Ranch (R)	$24.57
TechSketch LP (D)	$38.57	Total Health (D)	$21.57	Doodle (D)	$27.57

If it's for the C-64 we have it!!

If you don't see what you want—Call and ask for it! You Will Be Glad You Did!!!

SOFTWARE SHACK

449 EAST 146th STREET
CLEVELAND, OHIO 44110

216/953-9141

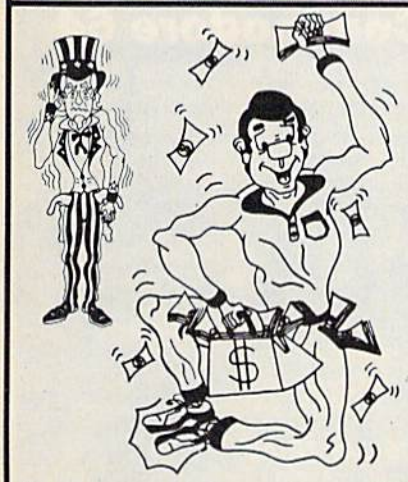
SHIPPING AND TERMS: Add $3.00 per order. No COD. Cash, certified check or money order (personal checks allow 3 wks. to clear). Ohio residents add 5.5% sales tax. Visa or MasterCard phone orders only.

Even If You Never Prepared a Tax Return Before...

MANY HAPPY RETURN$ T.M.

Guides the Beginner or Expert C-64* or VIC-20* Owner to Tax Savings

Prepares Individual or Small Business I.R.S. and State Tax Returns



"I Got Many Happy Return$!"

A Message from the Program Author:

Taxes are frequently Over-Paid. Regardless of who prepares your tax return . . . you, a brother, an uncle or spouse . . . even a professional tax preparer can unintentionally miss a credit, a deduction or choose a method of filing that costs you extra tax dollars.

Using "Many Happy Return$" can mean KNOWING you won't OVER-PAY your tax again! This program uses I.R.S.-approved strategies included in each program I've written since 1978. These strategies combine with the computer to eliminate costly human error and can result in Maximum Tax Savings for you.

Even if you've NEVER prepared a tax return or aren't familiar with computers, with "Many Happy Return$" guidance you can complete your tax return quickly and correctly. As when sitting down with a good professional tax preparer, the program presents a dialog of simple Yes/No questions, then analyzes the answers to determine the correct forms/schedules to file. Previous tax or programming experience is not required.

I feel this program can save you more than its cost, and, it comes with a MONEY-BACK GUARANTEE. You can enjoy KNOWING you paid the least tax this year.

ORDER YOUR COPY TODAY! Thanks and . . .
MANY HAPPY RETURN$
Bill Novak

Pathfinder Edition

Accomodates the needs of most taxpayers. Does 16 forms/schedules/credits including 1040, A, B, D, E, G, W, Child Care Credit, Alimony Payments, Minimum Tax, Marriage Credit, Income Averaging, and Political Contribution Credits. Does all Tax Table calculations (no need to look up tax as required with some programs). Itemized deductions, and more . . . **$69.95**

Pathfinder/Pro Edition

All above PLUS schedules C and SE for small Business, 2106 Employee Business Expense Credits, 2119 Sale/Exchange of Residence Credit. **$99.95**

State Tax Edition

Simultaneously performs with above editions to complete NY, CA, or OH State Tax Return. **$14.95**

- Designed for Beginner or Expert Users
- Compares filing Joint/Separately
- Swaps dependents to find lowest tax
- Print to screen or I.R.S. forms
- Performs all math calculations
- Normal shipment within 24 hours
- Help a phone call away
- 1/2-Price on Enhanced Annual Updates
- Available for Commodore-64* or 8k-plus VIC-20* on Disc or Cassette
- Other forms/schedules available on request
- Disc Save of Info for Future Use
- Toll-free order hot line
- MONEY-BACK GUARANTEE

COST IS TAX-DEDUCTIBLE

*Trademark of Commodore Business Machines

When Mailing Check or Money Order
Please State Machine Type and Memory
OPTIONAL PRINT TO STANDARD I.R.S. FORMS
(FRICTION-FEED PRINTER IS REQUIRED)
Add $3.00 Shipping and Handling
C.O.D. $5 Extra FOB Cleveland
3% Surcharge on Credit Card Orders
DEALER INQUIRIES INVITED

Vertical Horizons, Inc.

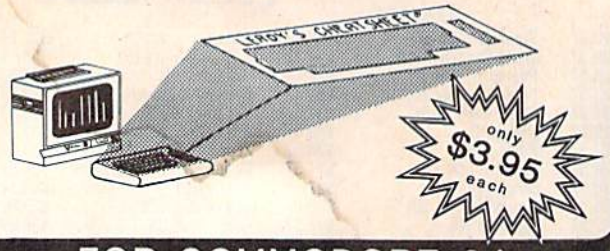
2299 West Eleventh Street
Cleveland, Ohio 44113
(216) 696-5093

VISA* MasterCard

To Order or for More Information
CALL TOLL-FREE
1-800-547-3000
ASK FOR TAX DEPT. B

LEROY'S CHEATSHEET®

KEYBOARD OVERLAYS



FOR COMMODORE 64

(VIC-20 also available)

LEROY'S CHEATSHEETS® are plastic laminated keyboard overlays designed for use with popular software and hardware for Commodore's VIC-20 & C-64 computers.

These cut-it-out yourself overlays are designed to fit over the keyboard surrounding the keys with commands and controls grouped together for easy references.

LEROY'S CHEATSHEETS™

make life easier for you

WORD PROCESSORS
- ☐ EASY SCRIPT[1]
- ☐ HES WRITER
- ☐ PAPER CLIP
- ☐ QUICK BROWN FOX
- ☐ SCRIPT 64
- ☐ SPEEDSCRIPT (GAZETTE)
- ☐ WORDPRO 3/PLUS

MISCELLANEOUS
- ☐ BLANKS (3 ea-NOT laminated)
- ☐ FOR THE BEGINNER
- ☐ SPRITES ONLY
- ☐ FLIGHT SIMULATOR II
- ☐ DOODLE
- ☐ 1541 DISK

SPREADSHEETS
- ☐ CALC RESULT (ADVANCED)
- ☐ CALC RESULT (EASY)
- ☐ EASY CALC[1]
- ☐ MULTIPLAN (HES/MICROSOFT)
- ☐ PRACTICALC 64 (OR PLUS)

LANGUAGES & UTILITIES
- ☐ BASIC
- ☐ HESMON 64
- ☐ LOGO (CBM-sheet 1)[1]
- ☐ LOGO (CBM-sheet 2)[1]
- ☐ PILOT (CBM)[1]
- ☐ COMAL .14 (DISK)

DATA BASES
- ☐ THE CONSULTANT (Delphi's Oracle)
- ☐ MANAGER (CBM)[1]
- ☐ SUPER BASE 64

TERMINALS
- ☐ TERM 64
- ☐ THE SMART 64 Terminal
- ☐ VIDTEX
- ☐ VIP TERMINAL

PRINTERS
- ☐ COMMODORE 1525, MPS-801
- ☐ COMMODORE 1526[1]
- ☐ EPSON RX-80
- ☐ GEMINI 10X
- ☐ OKIDATA 92/93

GAZ 3

Dealer inquiries welcome

Qty.___ X $3.95 $ _____

Shipping & handling $ 1.00

6% sales tax (PA residents only) $ _____

TOTAL U.S. FUNDS $ _____

Name _____

Address _____

City _____ State _____ Zip _____

(1) Products of Commodore Business Machines.

CHEATSHEET PRODUCTS™
P.O. Box 8299 Pittsburgh PA. 15218

VISA master charge

(412)731-9806

. . . OR SEE YOUR LOCAL DEALER !

Your 1,2,3 choice

CP Numeric Keypad for Commodore 64 and VIC-20, Model: NKP Deluxe

Yes, you have the choice. Different jobs require different tools. That's why we provide you with three models of Numeric Keypads for your Commodore 64. These Numeric Keypads are designed with top quality, low profile key switches for smooth, reliable and low-cost data entry. They easily connect in parallel with the computer keyboard. No software is required. They are 100% compatible with all the programs. The setup is simple, the usage is comfortable, and the price is very affordable.

NKP $59.95

NKP Plus $69.95

NKP Deluxe $79.95

Computer Place **(213) 325-4754**

23914 Crenshaw Blvd. Torrance, CA 90505

VISA, MC and AE cards accepted. No C.O.D.
Add $3.00 shipping. Ca. residents add 6.5% sales tax.

Dealer Inquiries Welcome.
Commodore 64 and VIC-20 are trademarks of Commodore Business Machines, Inc.

kyan PASCAL for the Commodore 64

kyan pascal is a full implementation. With a single disk drive and C64, you can learn Pascal and develop sophisticated programs.

kyan pascal is perfect for classroom or home use. It's Menu-Driven, User-Friendly operating environment helps students learn quickly and lets advanced programmers develop programs 4 to 40 times faster than Commodore Basic.

kyan pascal features:

- Full Screen Editor with Powerful Text Editing Functions.
- MERGE and Other Convenient File Management Functions.
- Fully Resident Software to Eliminate Disk Swapping.
- HELP Screens to Speed Learning.
- Stand-Alone Runtime Environment.
- AND, A Comprehensive Tutorial Manual with Sample Programs.

15 DAY TRIAL

Try ***kyan pascal.*** If you are not completely satisfied, return diskette and manual in 15 days for a full refund.

kyan pascal with tutorial manual ***$49.95***

(Add $4.50/copy for postage and handling. $9.50 outside North America; California residents add 6.5% sales tax)

Call: (415) 775-2923

VISA Accepted

Send Check/Money Order to:
kyan software, Dept. B
1850 Union St., Ste. 183
San Francisco, CA 94123

ALL THE BEST PRICES

commodore

M-801 Dot Matrix Parallel	$219.00
MCS 801 Color Printer	$499.00
1520 Color Printer/Plotter	$129.00
1530 Datasette	$59.99
1541 Disk Drive	$249.00
1600 Vic Modem	$59.99
1610 Vic Term 40	$89.99
1650 Auto Modem	$89.99
1702 Color Monitor	$249.00
DPS Daisywheel Printer	$459.00
Desk Organizer Lock	$49.99
1311 Joystick...each	$5.99
1312 Paddles	$11.99
1110 VIC 8K	$42.99
1111 VIC 16K	$69.99
1211 Super Expander	$53.99

MSD

SD 1 Disk Drive	$349.00
SD 2 Disk Drive	$589.00

INDUS

GT-C64 Drive	$279.00

CARDCO

Light Pen	$32.99
3 Slot VIC Expansion Interface	$32.00
6 Slot Expansion Interface	$79.99
Cassette Interface	$29.99
Parallel Printer Interface	$44.99
Parallel Interface w/Graphics	$69.99
Cassette Deck	$39.99

AXIOM

C64 Parallel Int.	$69.99

ORANGE MICRO

Grappler CD Interface	$109.00

TYMAC

C64 Printer Interface	$99.99

PERSONAL PERIPHERALS

Super Sketch Graphics Pad	$39.99

KOALA

C64 Koala Pad ROM	$79.99

Call for CBM 4 Plus

PRINTERS

AXIOM

GP-100 Parallel	$189.00
GP 550 Dual Mode	$269.00

COMREX

ComWriter II Letter Quality	$449.00

EPSON

RX-80, RX-Soft, RX-100, FX-80, FX-100 CALL

JUKI

6100	$449.00

MANNESMAN TALLY

160L	$589.00
180L	$749.00
Spirit 80	$259.00

NEC

8027 Dot Matrix	$339.00

OKIDATA

82, 83, 84, 92, 2350, 2410	CALL
Okimate 64	$209.00

OLYMPIA

Compact 2	$469.00
Compact RO	$499.00
Needlepoint Dot Matrix	$329.00

PANASONIC

Panasonic 1090	$219.00
Panisonic 1091	$309.00

SILVER REED

400 Letter Quality	$279.00
500 Letter Quality	$349.00
550 Letter Quality	$459.00
770 Letter Quality	$799.00

TOSHIBA

1340	$769.00
1351	$1349.00

SX-64 Portable.....$499.00
Commodore 64.....$189.00
CBM 4 Plus.....$289.00

MONITORS

AMDEK

300 Green	$129.00
300 Amber	$149.00
New Color 300/Audio	$259.00

BMC

1201 (12" Hi-Res Green)	$88.99
9191 Color +	$229.00

NAP

12" Amber	$69.99

NEC

JB 1201 Green	$139.99
JB 1205 Amber	$149.99
JB 1215 Color	$239.00

SAKATA

SC-100 Color	$249.00
SG-1000 Green	$129.00
SG-1000 Amber	$139.00

TAXAN

100 12" Green	$125.00
105 12" Amber	$119.00
210 Color	$249.00

ZENITH

ZVM122 Amber	$89.99
ZVM123 Green	$84.99

SOFTWARE

PFS (64)

File	$59.99
Report	$59.99

PRECISION SOFTWARE

Superbase 64 w/Audio	$59.99

BATTERIES INCLUDED

Paperclip	$59.99
Paperclip w/Spell Pack	$79.99
SpellPak	$39.99
The Consultant	$69.99
Buscard II	$149.99
B.I. 80 Display	$149.99

COMMODORE

C-64 Reference Guide	$18.99
Easy Calc	$59.99
Easy Finance I, II, III, IV	$19.99
Easy Mail	$19.99

CONTINENTAL SOFTWARE (64)

The Home Accountant	$49.99

CBS (64)

Addition & Subtraction	$16.99
Linear Equation	$16.99
Multiplication & Division	$16.99
Quadratic Equations	$16.99

ELECTRONIC ARTS (64)

Pinball Construction	$29.99
Cut & Paste	$39.99
Hard Hat Mack	$75.99

HES (64)

Games' 84	$19.99
Type 'N' Writer	$19.99
Graphics	$19.99
Cell Defense	$19.99
Hes Writer 64	$22.99

DISKETTES

maxell.

5¼ MD-1	$19.99

Dennison

5¼ Elephant SS/SD EM-1	$15.99

DESIGNWARE (64)

Cryto Club	$29.99
Trap-a-Zoid	$29.99

INFOCOM (64)

Zork I, II, III	$27.99
Deadline	$29.99
Witness	$29.99

PROFESSIONAL SOFTWARE (64)

Trivia Fever	$29.99
Fleet System II	$59.99

SPINNAKER (64)

Snooper Troops 1 or 2	$24.99
Delta Drawing	$29.99
Kids on Keys	$29.99

SUB LOGIC (64)

Flight Simulator II	$39.99

SYNAPSE (64)

Zaxxon	$19.99
Protector II	$19.99
Sentinel	$19.99

VISA MasterCard

COMPUTER MAIL ORDER

AMERICAN EXPRESS DINERS CLUB

TOLL FREE ORDER LINE **1-800-233-8950**
In PA Call: (717) 327-9575

WEST
P.O. Box 6689, **Dept. A403**
Stateline, NV 89449

EAST
477 E. 3rd St., **Dept. A403**
Williamsport, PA 17701

CANADIAN ORDERS
Ontario/Quebec: **1-800-268-3974**
Other Provinces: **1-800-268-4559**
In Toronto: (416) 828-0866 Telex: 06-218960
2505 Dunwin Drive, Unit 3
Mississauga, Ontario, Canada L5L1T1

Order Status Number: (717) 327-9576 Customer Service Number: (717) 327-1450

No risk, no deposit on C.O.D. orders and no waiting period for certified checks or money orders. Add 3% (minimum $5) shipping and handling on all orders. Larger shipments may require additional charges. NV and PA residents add sales tax. All items subject to availability and price change. Call today for our catalog.

COMPUTER T'SHIRTS

FOR HOME, SCHOOL, AND OFFICE!

Made in U.S.A.

The **ULTIMATE** Software!
Command instant attention!
A **MUST** for all computer lovers!
BRIGHT GREEN (L.C.D.) LETTERS
CUSTOM SILKSCREENED ON 50/50 BLEND
— HIGH TECH DESIGN! —
Five popular styles to choose from
Order Today! Only $8.95 ppd
Simply select Shirt#, and Color# below

LET'S SEEK, PEEK & POKE (#1)	White #1	Pink #2	Blue #3
TAKE A BYTE OUT OF ME (#2)	Green #4	Grey #5	Red #6
I'M USER FRIENDLY (#3)	Black #7		
HAPPINESS IS A PROGRAM THAT WORKS (#4)			
I ♥ COMPUTERS (#5)	SIZES S—M—L—XL		

CUT

Please send me
Shirt# ____ Color# ____ Size ____ / Shirt# ____ Color# ____ Size ____
Use additional sheet if necessary

COMPUTER NOVELTY CORP.
P.O. BOX 2964
FREEPORT, TEXAS 77541
Enclose $8.95 ppd each TX Res. 6% tax

or (409) 233-4933

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

819 ©cnc

THE BANNER MACHINE™ for the Commodore 64

Makes signs up to 10" tall by any length.
Borders are variable, up to ¾" wide.
Eight sizes of letters are available from ⅛" to 6½" high.
Proportional spacing, automatic centering, right and left justification.
Standard, emphasized and compressed modes of print.
Save and print banners from disk.
Format banner and review before printing.
Choice of 15 textured backgrounds.
Included FONT DISK 2 optional FONT DISKS

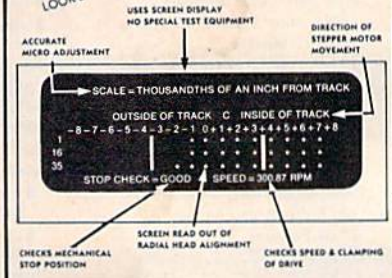
Works only with: Epson MX 80 (with Graftrax), RX, FX, JX, LQ; Gemini 10, 10X and 15; Commodore MPS 801, 1525E; Banana; Panasonic P1090; Seikosha GP100A; Riteman II, Plus, 15; Mannesmann Tally, Spirit 80, Okidata 82A, 83A with Okigraph, 92A and 93A; Prowriter 8510, C. Itoh 8510.

THE BANNER MACHINE	$49.95	Available on DISK only.
FONT DISKS (optional) each	$39.95	

1541 PHYSICAL EXAM

$39.95

IS YOUR 1541 HEALTHY?
OR WOULD ITS PHYSICAL EXAM
LOOK LIKE THIS ONE?



Package includes:
- True digital alignment disk with offset tracks
- Quiet Drive stops to reduce need for continued realignment

ditto

COPY DISKS AUTOMATICALLY

$39.95

- Copies 99% of currently available Commodore 64 disks.
- Supports 1 or 2 1541 drives.
- Easy to use—menu driven.
- Future updates $17.

FLEX FILE

$59.95

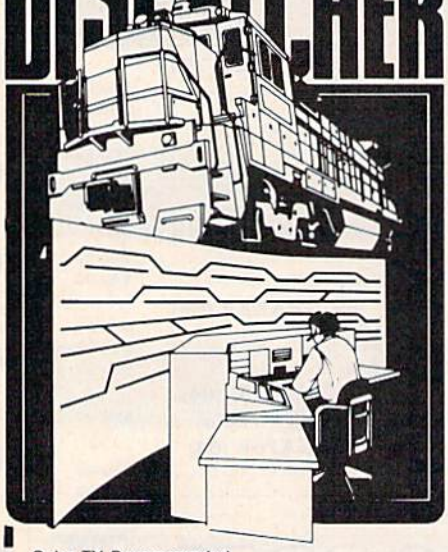
DATA BASE
with Report Writer and Mail Labels

• Easy to learn (takes about 2 hours) • save up to 1500 typical records on a 1541 disk drive. • Sort on multiple keys & select records 9 ways. • Print information on labels or in report format. • Calculate report columns. • Flexible structure, change record size, field number, ways the file can be ordered, etc. with ease. • Compatible with many popular word processors to create form letters or reports. 1541 • 4040 • 9031 Disk $59.95.

ORDER TOLL FREE 10-6 MON-SAT
800-762-5645
Cardinal Software
13646 Jeff Davis Hwy.
Woodbridge, VA 22191
Info. Call (703) 491-6502

VISA
MASTERCARD
AM EXPRESS

Be the TRAIN DISPATCHER



Play this fast-paced computer video game that's so true-to-life that a major railroad indicated they use it in dispatcher training.

TRAIN DISPATCHER's 24 displays help you make crucial decisions, RAPIDLY. You're under pressure, but in control — throwing switches, clearing and cancelling signals, constantly maneuvering both east and westbound trains. Keep the tracks clear ahead of all your trains and watch your score go up!

Action packed, yet non-violent, TRAIN DISPATCHER's 5 levels of play challenge players from age 8 to 80. Work your way up from "Cub Dispatcher" to Chief Dispatcher" or even "Trainmaster."

Created by designers of computerized traffic control systems for operating railroads, TRAIN DISPATCHER will increase your appreciation for actual railroad operations.

TRAIN DISPATCHER comes complete with Instruction Manual and keyboard template.

Color TV Recommended

CHECK ONE:

Vic 20* Tape ☐ or Disk ☐
(Requires 16 K Memory Expander) . . . ($24.95)
Atari* 800 Tape ☐ or Disk ☐
(Requires Basic) . . . . . ($24.95)
Atari* 400 Tape ☐
(Requires Basic) . . . . . ($24.95)
Commodore* 64 Tape ☐ or Disk ☐ . . . ($24.95)
Apple II* Disk ☐ . . . . . ($29.95)
Manual Only ☐ ($4.00 if purchased separately)

11D

Name _____

Street _____

City _____ State _____ Zip _____

USA & CANADA add $2.50 postage & handling ($4.00 foreign) for each game ordered. All payments must be in USA funds, all foreign payments must be against USA banks. PA residents add 6% state sales tax. Or charge to:

☐ Master Card ☐ VISA Exp. Date _____

Card No. _____

Signature _____

SEND TO: SIGNAL COMPUTER CONSULTANTS, LTD. • P.O. Box 18222 • Pittsburgh, PA 15236 • (412) 655-7727

COMPUTEREYES™

VIDEO IMAGES ON YOUR COMMODORE!

Finally ... an inexpensive way to capture real-world images on your Commodore's Hi-Res display! COMPUTEREYES™ is an innovative slow-scan device that connects between any standard video source (video tape recorder, video camera, videodisk, etc.) and the Commodore's User I/O Port. Under simple software control, a b/w image is acquired in less than five seconds. A unique multi-scan mode also provides realistic grey-scale images. Hundreds of applications!

Package includes interface module, complete easy-to-use software support on disk or tape (specify), owner's manual, and one year warranty. COMPUTEREYES is available from your dealer or direct from DIGITAL VISION for just $129.95 plus $4.00 S&H (USA).

Also available as a complete package including:
- COMPUTEREYES™
- Quality b/w video camera
- Connecting cable

for only $349.95 plus $9.00 S&H.

Demo disk available for only $10.00 postpaid.

Mass. residents add 5% sales tax. Mastercard, Visa accepted. To order, or for more information, write or call:

Screen dumps of actual COMPUTEREYES™ images.

Also available for Apple II series.

DIGITAL VISION

DIGITAL VISION, INC.
14 Oak Street — Suite 2
Needham, MA 02192
(617) 444-9040

MICRO-SYS DISTRIBUTORS.

commodore

SOFTWARE FOR C-64

Business

Multiplan (Spreadsheet)	$ 63.00
Calc Result (Advanced)	$ 79.95
Superbase 64	$ 75.00
Mirage Concepts (Data Base)	$ 89.00
Mirage Concepts (Word Processor) (40/80 column & 30K Dictionary)	$ 89.00
B.I. Paperclip W/Spellpac (W/P)	$ 85.00
Home Accountant (Continental)	$ 45.00
Tax Advantage (Continental)	$ 35.00
Info Designs G/L	$ 19.95
Southern Solutions Accounting G/L, A/R, A/P, P/R, I/M ....each	$ 49.95
Tri Micro Accounting C64 & Plus 4 G/L, A/R, A/P, P/R, I/M ..each	$ 49.95
Smart64 Term +3	$ 39.95
Hellcat Ace (game)	$ 25.00
Solo Flight (game)	$ 25.00

Utilities

Printer Utility Program (Cardco)	$ 19.95
Disk Utility Program (Fast copy, File copy, Disassembler, For 1541)	$ 49.95
Bits and Pieces (Backup & Utility, Screen Dump & More for MSD Drive)	$ 49.95
Simon's Basic	$ 39.95
80 Column Expander (Cartridge)	$ 60.00
64 Relay Cartridge	$ 45.00
Oxford Pascal	$ 69.95
Tool 64 (Handic)	$ 39.95
Graf 64 (Handic)	$ 39.95
Stat 64 (Handic)	$ 39.95
Forth 64 (Handic)	$ 39.95

ACCESSORIES

MSD Super Disk Drive (single)	$ 349.00
MSD Super Disk Drive (dual)	$ 575.00
Hayes Smart 300 Modem	$ 229.00
Vic 1530 Datasette	$ 65.00
Cardco Datasette	$ 55.00
Cardco Numeric Key Pad	$ 39.95
Alien Voice Box	$ 95.00
When I'm 64 (Voice Box Sings)	$ 25.00
Voice Box Dictionary	$ 25.00
B.I. 80 Column Display	$ 159.95
1541/Flash	$ 89.95
Sock It To Me (For 8032)	$ 29.00
6420 Westridge Modem (Auto Answer/Auto Dial)	$ 89.95
Telearning (Auto Answer/Auto Dial) Modem With software	$ 95.00
CBM 4023 Ribbons	$ 10.95
CBM 1526 Ribbons	$ 10.95
CBM 8023P Ribbons	$ 8.75
CBM 6400 Ribbons	$ 8.75
LQ1 Ribbons	$ 8.75
Diablo Daisy Wheel	$ 13.95
Abati Daisy Wheel	$ 13.95
Flip N' File 10, 15, 25, 50	Call
Power Strips (Surge Protector)	$ 49.95
Computer Glow Care Kit	$ 10.95
Disk Drive Cleaning Kit	$ 10.95

MONITORS

Panasonic TR120 (Amber) For Apple or IBM Computers	$ 156.00
Green & Amber (For Apple & IBM)	$ 85.00
RGB Monitor Cable: ET-101C (Apple)	$ 33.80

INTERFACES

BussCard II (Batteries Included) IEEE, Cartridge Slot, Basic 4.0	$ 159.95
BussCard Printer Cable	$ 29.95
SuperBox 64 (Handic) IEEE, Reset, 3-Slot	$ 139.95
Interpod (Intelligent IEEE & RS-232)	$ 139.95
Cardco +G Parallel Interface	$ 79.95
Cardco B Parallel Interface	$ 49.95
The Connection (by Tymac) (Commodore Graphics + 2K Buffer) Epson, Gemini, Okidata, Panasonic	$ 95.00
Turbo/GT (Telesys) With optional 16K or 32K Buffer	$ 89.95
Vic Switch (Handic)	$ 149.95
ADA1800 IEEE to Centronics	$ 149.95
Pet to IEEE Cable	$ 39.00
IEEE to IEEE Cable	$ 49.00
Networking For C-64 & CBM	Call

LETTER QUALITY PRINTERS

Abati (20 CPS) W/Interface	$ 475.00

DOT MATRIX PRINTERS

Smith Corona Fastex 80 (80 CPS)	$ 259.00
Smith Corona 100 (120 CPS)	$ 315.00
Smith Corona 200 (140 CPS)	$ 456.00
Smith Corona 300 (140 CPS, 15in)	$ 589.00

BUSINESS SOFTWARE — B128

Superscript II (40K Dictionary)	$ 199.00
Superbase (Data Base)	$ 199.00
Calc Result	$ 199.00
Complete Accounting System From Software Design (G/L, A/R, A/P, P/R, I/M) .....each	$ 375.00

BUSINESS SOFTWARE — 8032/8096

WordPro 4 + or 5 +	$ 225.00
Calc Result	$ 199.95
SuperBase (8096 only)	$ 225.00
Complete Accounting System From Software Design (G/L, A/R, A/P, P/R, I/M) .....each	$ 375.00

TERMS

Orders under 50.00 add 10.00 Handling fee
MasterCard, VISA, Money Order, Bank Check
COD (add 5.00)
Add 3% For Credit Cards

All Products In Stock Shipped Within 24 Hours

F.O.B. Dallas, Texas
All Products Shipped With Manufacturers
90 Day Warranty

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE.

AUTHORIZED WHOLESALE DISTRIBUTOR FOR ALL COMMODORE BUSINESS MACHINE PRODUCTS.

BECOME A COMMODORE DEALER. AND SEE WHY IT'S THE BEST DEAL IN NEW COMPUTER PRODUCTS.

FOR PRODUCT CATALOG & PRICE LIST WRITE OR CALL MICRO-SYS DISTRIBUTORS.

ORDERS ONLY CALL
1-800-527-1738

INQUIRIES & INFORMATION PLEASE CALL
1-214-231-2645

Micro-Sys
DISTRIBUTORS

641 Presidential Drive • Richardson, Texas 75081 • 9:30 a.m.-6:30 p.m. (Mon.-Fri.) • 10:30 a.m.-2:30 p.m. (Sat.)

HAVE YOU GOT THE 1541 BLUES?

WE'VE GOT THE PERMANENT FIX!!

Send us your sick 1541 and a check for $69.95 plus 5.00 shipping and we'll not only align your drive, we'll fix it so it will STAY THAT WAY.

We guarantee it for 6 months.

We also service the complete COMMODORE COMPUTER LINE with a 48-hour turn-around time.

C-64	50.00
1541	65.00
1702	85.00
DATASETTE	35.00
1525	50.00
1526	75.00
MPS801	50.00

CALL FOR REPAIR PRICES ON ALL OTHER COMMODORE EQUIPMENT

We also repair OKIDATA PRINTERS and TELEVIDEO COMPUTERS

Please send $5.00 for S/H
Our BBS No. is 1-919-765-3892

TRIAD COMPUTERS
3068 Trenwest Dr.
Winston-Salem, NC 27103 (919)765-0433

E MART

900 "N" AVE.
P.O. BOX 454
PLANO, TEXAS 75074

COMPARE OUR LOW PRICES ON POPULAR COMPUTER ACCESSORIES, MONITORS AND PERIPHERALS by MTR

8401 UHF/VHF TV MONITOR TUNER ***$85.85***

EV-2114 COMPOSITE COLOR MONITOR Green Screen Switchable. 6 Front Controls. 13" Diag. picture ***$199.95***

EV-1251C 11" 80 Col. Composite Green or Amber. Swivel included ***$134.95***

SWIVEL BASES FOR MONITORS. Tilt, Turn & Lock. Standard ***$19.95,*** Large ***$25.95***

DATA CASSETTE for C-64 and VIC-20. Ready to connect ***$29.95***

CABLES - 6' PRINTER/DRIVE for Commodore. 6 pin DIN each end ***$9.95***

3' UNIVERSAL MONITOR CABLE. 5 pin DIN to 4 RCA plugs & adapter ***$7.95***

DUST COVERS. Brown vinyl with cloth backing
For Commodore Computers ***$3.95***
For Commodore Disk Drives ***$3.95***

$2.00 BRINGS YOU OUR FULLY ILLUSTRATED BROCHURE BY FIRST CLASS MAIL, WITH $2.00 REFUND CERTIFICATE—GOOD ON ANY ORDER. *SEND TODAY!*

Prices do not include shipping, handling or insurance. Ask for complete copy of order terms.

E MART, INC. Dept. "G", P.O. Box 454 Plano, Texas 75074

ORDER TOLL FREE ***1-800-631-1112***

IN TEXAS CALL 214-423-4199

VISA MasterCard

C-64 MUSIC DISKS

* Want to experience the power of the SID chip?
* Tired of laser guns and space ships?
* Want authentic background music for your adventure games?
* All our music is programmed in 100% machine language by a professional musician.
* Informative music-historical notes are built into each program.
* Additional titles in preparation!

Titles Now Available:

1. An Elizabethan Concert . $14.95
2. A J.S. Bach Recital 14.95
3. A Baroque Recital 14.95
4. Lute Music of Olden Times . 14.95
5. Sampler (includes selections from above titles, plus more) . . 12.95

DISK ONLY

Payment in U.S. funds only! Add $2.00 per order for shipping and handling.

Orders shipped via speedy UPS whenever possible!

ANTIGUA SOFTWARE
P.O. Box 5386
Lake Station, IN
46405-9998

DOUBLES DISK CAPACITY!

Cuts Your Cost 50%!

Now! The back of 5¼" diskettes can be used for data storage even with single head disk drives.

- ***NIBBLE NOTCH*** makes it easy
- Adds the notch needed.
- SATISFACTION OR MONEY BACK.

NIBBLE NOTCH I

Cuts square notch for Apple, II, II+, IIe, IIc, III, Franklin and Commodore.

only **$14.95***

*add $2.00 each order ($5.00 foreign) For Postage and Handling
Florida Residents Add 5% Sales Tax

ORDER TODAY!

Toll Free 1-800-642-2536
FLORIDA: 1-305-493-8355
OR SEND CHECK OR MONEY ORDER TO:

VISA MasterCard

NIBBLE NOTCH® COMPUTER PRODUCTS

4211 NW 75th TERRACE, • DEPT. 1 4 LAUDERHILL, FL 33319

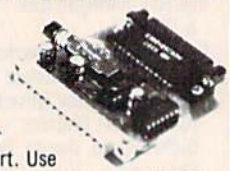
PATENTED ALL TRADEMARKS ARE ACKNOWLEDGED

C-64 /VIC-20 **RS-232**

INTERFACE

$ 39 95

MFJ-1238



Provides RS-232 voltage conversion for C-64/VIC-20 serial port. Use RS-232 printers, modems, speech synthesizers, other peripherals. Switch reverses transmit/receive lines. Use as null modem. 25 pin RS-232 connector. Plugs into user's port. 2¼x2¼ inches.

C-64/VIC-20

MODEM

$ 49 95

MFJ-1237

High performance Texas Instrument single chip design. For C-64/VIC-20. Plug into user port. For single or multiline phones. Plugs into phone base. 300 baud, Direct connect, Originate/Answer Full duplex,Carrier detect LED,Crystal controlled Includes Basic listing of Terminal Program.

Order from MFJ and try it. If not delighted, return within 30 days for refund (less shipping).

One year unconditional guarantee.

Order yours today. Call toll free 800-647-1800. Charge VISA, MC. Or mail check, money order.

CALL TOLL FREE . . . 800-647-1800

Call 601-323-5869 in MS, outside continental USA.

MFJ ENTERPRISES INCORPORATED

921 Louisville Road, Starkville, MS 39759

AA COMPUTER EXCHANGE

"SOUTH'S LARGEST COMMODORE 64 DEALER"

OVER 2000 ITEMS IN STOCK

COMPLETE REPAIR SERVICE FOR COMMODORE 64 AND C-64 PERIPHERALS

ORDER LINE: 1-800-447-0088
INQUIRIES & FL: 904-388-0018

REQUEST OUR FULL CATALOG TODAY

HERE ARE A FEW OF OUR MAIL ORDER PRICES

HARDWARE & ACC.		**PRACTICORP**	
Plus/4	Call	64-Doctor	$20
C-64 Computer	Call	Practicalc 64	37
1541 Disk Drive	Call	Practifile	37
1702 Color Monitor	Call	PS: Spreadsheet	54
MSD Dual Drive	$537	Wordpro 3+ w/Speller	58
Indus GT Disk Drive	283	**MIRAGE CONCEPTS**	
1660 Auto Modem	Call	Data Base Manager	61
Total Comm. Auto Modem	75	W.P. Prof. Version	61
Westridge Auto Modem	76	W.P. Pers. Version	28
C-64 Power Supply	29	**SIGHT N' SOUND**	
Omnitronix Deluxe RS-232	30	Keyboard	34
Graphic Printer Intrfce	30	Synthesizer	34
ACCESS SOFTWARE		Processor	24
Beach Head	24	Rhythm Rocker	27
Raid Over Moscow	24	Music Video (Thriller)	17
Master Composer	28	On Stage	17
COMPUSERVE		Tune Trivia	24
Starter Kit (5 hr)	23	**SKYLES ELECTRIC**	
Executive Kit (2 hr)	52	"1541 Flash" Disk Drive Speed-Up Kit	69
Vidtex	28	**SUBLOGIC**	
KOALA		Flight Simulator II	39
Koala Pad	60	**MISC.**	
Koala Printer	17	Doodle	28
PRECISION SOFTWARE		Inkwell's Flexdraw	129
Superbase	59	Smart 64 Term	29
BATTERIES INC.		Telstar 64 Term (Cart)	34
Paper Clip w/Spellpack	82	Auto Load (Cart)	15
The Consultant	68	Super Clone	39
Home Pak	34		

2726 PARK ST., JACKSONVILLE, FL 32205

Orders with cashiers check, money order and VISA/MC shipped promptly • For personal/company checks allow 3 weeks for clearance • No CODs • For VISA/MC add 3% • Shipping charges extra, $3.00 minimum • Prices may differ in AA stores • Florida residents add 5% tax • Prices subject to change without notice.

FAST DELIVERY

Call Us For
Fast Service, Experience
and Affordable Prices

Software

HOLIDAY SPECIAL

SUBLOGIC
Flight Simulator
$31.95
MICROPROSE
Solo Flight
$21.95
F-15 EAGLE
$21.95

INFOCOM

Zork I, II, III...ea. $25
Suspended $25
Starcross $25
Deadline $25
Sea Stalker $25

WORD PROCESSING

Special of the Month
PAPERCLIP
with SPELLER $59

Easy Script $45
Word Pro 64 & Speller $58
EZ Spell $17

PROGRAMMING SERIES

Assembler 64 ..... $36
Logo $52
Simon Basic $29
Borland Pascal $42
Nevada Fortran $39
Nevada Cobol $39

ACCOUNTING

Home Accountant $45
Tax Advantage $45
General Ledger $35
A/R, A/P, Payroll $35
The Manager $35

DATA BASES

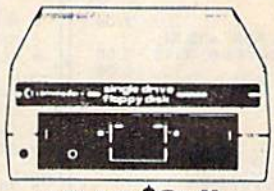
Code Writer $64
Mirage Database Mgr. $79
Super Base 64 ..... $67

Special of the Month
The Consultant
$59.00

SPREAD SHEET

Multiplan $63
Practicalc $38

Hardware



1541 $Call

Special of the Month
MSD DISK DRIVE
SD1 Disk Drive $288
SD2 Disk Drive $488

Introductory Offer
INDUS GT
DISK DRIVE
$CALL$

ELEPHANT DISK
SS/SD $15.50 SS/DD $16.50

Verbatim, Datalife $19.95
Maxell SS/DD $19.95
Westridge 64 Modem .. $77

NEW.....FAST
MODEM / 300
$84

SX-64 Computer $549
MPS 802 ..... $CALL
Buscard II $149
Magic Voice Speech $49.95
1011 RS 232 Interface..... $49

1702 Monitor
$CALL
ZENITH MONITORS
122 Amber $84
123 Green $84

COMPUTER COVERS

Features heavy duty canvas with vinyl interior waterproof.

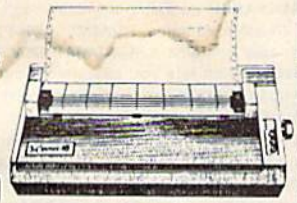
Reg. $15.95
$6.99

CMD 64 ..... $6.99
VIC 20 ..... $6.99
Disk Drive $6.99
Espon MX 80 ..... $7.99
Espon MX 80 FT $7.99
Okidata 92 ..... $7.99

Printers

GEMINI 10X

LOWEST
$PRICE$



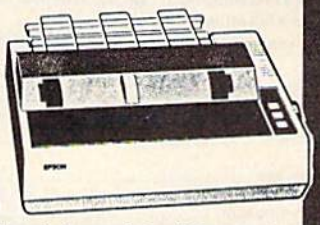
15X $339

Number one selling dot matrix printer, Gemini 10X, prints 120 cps bi-directionally, with logic-seeking printerhead control. There's both friction and tractor paper feed. Prints high resolution graphics.

RADIX 10X $499.00
RADIX 10X $555.00
POWERTYPE.... $325.00
DELTA 10 ..... $359.00
DELTA 15 ..... $495.00

EPSON RX80

$234

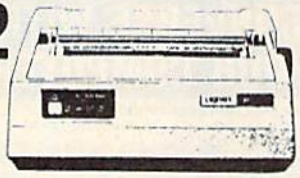


RX 80 FT..... $274

The most compatible dot matrix printer, prints 100 cps, bi-directionally. Call for RX-100, FX-80 and FX-100 prices.

OKIDATA 182

$249



OKIDATA 192 ..... $CALL

The most advanced dot matrix printer, prints 160cps, bi-directionally. Correspondence quality at 40 cps.

OKIDATA 93 .... $599.00
OKIDATA 84 .... $699.00

PRINTER INTERFACES

Micrografix MW350 ..... $69
Tymac Connection $79
Cardco + G Interface $66
Cardco B Interface $39
Grappler CD $102

SURGE PROTECTORS

1 Outlet $14
4 Outlet $38
6 Outlet $69
6 Outlet &
Noise Filter $88

Ordering & Payment Policy

Prices reflect a cash discount. For C.O.D., Visa, and Mastercard add 3% Immediate delivery with certified check or wired funds. N.J. resident add 6%. Prices subject to change.

Shipping

For shipping and handling add 3%. ($3 minimum) Larger shipments require additional charge.

PANASONIC

1090 ..... $199
1091 ..... $269
1092 ..... $Call

Printer Specials

Doddle..... $26
Print Shop..... $29
16K Buffer..... $99
64K Buffer..... $149

FOR INFORMATION CALL (609) 596-1944

ORDER TOLL FREE (800) 992-3300

PC GALLERY

P.O. Box 3354
Cherry Hill, N.J. 08034

COMPUTER ROAD ATLAS

TAKE TRIPS WITH COMPUTER LISTINGS SHOWING THE BEST ROUTE

Enter the departing city and the destination city. **ROADSEARCH** computes and prints the shortest route.

ROADSEARCH contains 406 cities/road junctions and 70,000 road miles. **ROADSEARCH-PLUS** (extra cost) also contains a **ROADMAP DEVELOPMENT SYSTEM** which lets you customize your roadmap with up to 50 towns/road junctions anywhere in North America.

EASY TO USE. Back-up copies allowed. Specify Commodore-64/disk or Apple II. **15 DAY MONEY-BACK GUARANTEE.**

ROADSEARCH-PLUS is $74.95 and **ROADSEARCH** is only $34.95. MD residents add 5% state tax. Ask your dealer or:

__ __ __ MAIL COUPON OR CALL TODAY __ __ __

Columbia Software (301) 997-3100
Box 2235E, Columbia, MD 21045

Please send me:

( )**ROADSEARCH-PLUS** for $74.95 for ( )Apple II/IIe/IIc
( )**ROADSEARCH** for $34.95 ( )C-64 disk

Add $1.50 shipping. If I am not satisfied, I may return it for a full refund.

( ) check ( ) Master Charge ( ) VISA

Card Number Expiration Date

Name

Address

City/State/Zip

ORDERS: 1-800-835-2246, EXT. 172

DUST COVERS

★ **CUSTOM MADE TO FIT**
★ **Heavy 32-oz. VINYL ANTI-STATIC**
★ **EXTENDS EQUIPMENT LIFE**
★ **Choice of Colors Lt. Tan or Brown**

COMPUTERS:	
C-64/VIC20	7.00
KEYBOARD COVERS FOR ATARI; APPLE IIe; IBM; KAYPRO; TI99	8.00
DATASETTE (OLD)	5.00
DATASETTE (NEW, C2N)	5.00
DISK DRIVES:	
C-1541	8.00
MSD S/D; APPLE S/D	8.00
MSD D/D; APPLE D/D UNIT	10.00
PRINTERS (DOT MATRIX):	
C-1525; MPS801	10.00
C-1526; BMC BX80; BMC BX80F/T	13.00
GEMINI 10/10X; DELTA 10	13.00
GEMINI 15/15X; DELTA 15	16.00
EPSON MX80; RX80; RX80F/T	13.00
EPSON FX80; FX80F/T	13.00
EPSON MX100; FX100	16.00
PANASONIC KX-P1090; CARDCO	13.00
MONITORS:	
C-1702 COLOR	16.00
BMC COLOR	16.00
SANYO CRT 36 (GREEN)	14.00
AMDEK COLOR I	16.00
VIDEO RECORDERS:	
FOR MOST RECORDERS (CUT-OUT FOR CLOCK)	13.00

Order by stating NAME and MODEL and COLOR CHOICE TAN or BROWN. Enclose check or M.O. + 1.50 Ship & Hdlg. California Res. Include 6.5% Sales Tax.

SPECIAL COVERS WILL BE MADE TO YOUR DIMENSIONED SKETCH. SEND YOUR REQUIREMENTS FOR OUR LOW PRICE QUOTES.

CROWN CUSTOM COVERS
9606 SHELLYFIELD ROAD
DOWNEY, CA 90240
(213) 862-8391

WE WON'T PAY YOUR TAXES!

But **TAX MASTER** will help you compute them more **QUICKLY** and **EASILY.**

Be the Master of your Income Taxes with
TAX MASTER
now available for your **1984** Federal Income Taxes for the Commodore 64 with single, twin, or dual disk drive and optional printer.

Features of **TAX MASTER:**

- **GUIDES** you in the **PROPER ORDER** through forms 1040, 4562 & Sched. A,B,C,D,E, and F.
- **PERFORMS ALL** arithmetic, **CORRECTLY!** You enter only the original data.
- **EASY CHANGE** of any entry, with instant **RECALCULATION** of the entire form.
- **TRANSFERS** numbers between forms.
- **CALCULATES** your taxes and **REFUND.** (Tax tables are included!)
- **SAVES** all your data to disk for future changes, re-use, or reference.
- **PRINTS** the data from each form.
- **MULTIPLE SCHEDULES** (for more than one business, farm, etc.) are supported.
- Data from **MANY DIFFERENT TAX RETURNS** may be stored on the same disk.

TAX MASTER . . . . .(DISK ONLY) . . . . . ONLY $24.00

If you don't need all the schedules, get
TAX MASTER JR

- For VIC-20 with 24K expansion or Commodore 64, disk or tape.
- Form 1040, Schedules A and B.
- Disk or tape data storage & retrieval.

TAX MASTER JR . . . . . ONLY $19.00
SPECIFY DISK OR TAPE

INCLUDED WITH EACH PROGRAM:

- ***COMPLETE INSTRUCTION MANUAL.***
- ***DISCOUNT COUPON TOWARD THE PURCHASE OF NEXT YEAR'S UPDATED PROGRAMS***

Cost of these programs is TAX DEDUCTIBLE.

Add $2.00 per order shipping & handling
Maryland residents add 5% sales tax
Send check or money order to

MASTER SOFTWARE
6 Hillery Court
Randallstown, MD 21133

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 6½% 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

FOR COMMODORE 64™

TRACKMIMIC™

- Disk Back-up System for all disks including latest protection schemes.
- Used in conjunction with Diskmimic 5+™.
- Unique "Comparatrak" Method insures accurate reproduction.
- Fully Automatic Back-up.
- No Formatting necessary (formats as it writes the copy).
- Installs in 1541 drives.

Software & Hardware Included

Only $89.95

DISKMIMIC 5+™

- **Copy Disks Automatically**
- Backs up virtually all existing disks for Commodore 64™ including Copy Protected Versions, ALL AUTOMATICALLY.
- Supports 1541™ Drives.
- Don't be without back-up!
- Formats disk in less than 20 seconds.

Now 3 Times as Fast!
BACKS UP ENTIRE COPY PROTECTED DISKS IN LESS THAN 8 MINUTES!!

ONLY $49.95

A.I.D. CORP.
4020 HEMPSTEAD TURNPIKE
BETHPAGE, NEW YORK 11714
(516) 731-7100

Diskmimic 5™ is a trademark of A.I.D. Corporation
Commodore 64™ & 1541™ is a trademark of Commodore Electronics Ltd.
Shipping & Handling — $1.50 each

NEW!
Universal Parallel Graphics Interface

- Built-in self-test with status report
- Optional RAM printer buffer
- Provides virtually total emulation of Commodore printers for compatibility with popular software
- ASCII conversion, total test, Emulate & transparent mode
- Fully intelligent interface that plugs into standard Commodore printer socket
- Exclusive graphic key-match function
- Switch selectable Commodore graphics mode for Epson, StarMicronics, C.Itoh, Prowriter, Okidata, Seikosha, Banana, BMC, Panasonic, Mannesman Talley & others.

Micrografix MW-350 . . . . . $129.00
MW-302C Printer Interface also available at $79.95

Dealer inquiries invited.

Micro World Electronix, Inc.
3333 S. Wadsworth Blvd., #C105,
Lakewood, CO 80227
(303) 987-9532 or 987-2671

Lyco Computer Marketing & Consultants

"PEOPLE WHO KNOW WHAT THEY WANT AND KNOW HOW TO USE IT RECEIVE THE LOWEST PRICES AT LYCO"

MONITORS

TAXAN

210 Color RGB	255
100 Green	115
105 Amber	125
400 Color RGB	295
410 Color RGB	349
420 Color IBM	449
121 Green IBM	145
122 Amber IBM	149

ZENITH

ZVM 122A Amber	86
ZVM 1236 Green	82
ZVM 124 Amber - IBM	129
ZVM 131 Color	275
ZVM 133 RGB	389
ZVM 135 Composite	449
ZVM 136 Hi Res Color	589

GORILLA

12" Green	$ 82.00
12" Amber	$ 88.00

AMDEK

300 Green	125
300 Amber	145
310 Amber - IBM	159
Color 300-Audio	265
Color 500-Composite	379
Color 600	545
Color 700	635
Color 710	675

NEC

JB 1260 Green	99.00
JB 1201 Green	135.00
JB 1205 Amber	145.00
JC 1215 Color	255.00
JC 1216 RGB	399.00
JC 460 Color	349.00

SAKATA

SC-100 Color	229
STSI Tinstand	29
SG 1000 Green	99
SA 1000 Amber	109

★★★★★ DISK DRIVES ★★★★★

INDUS

Commodore ..... CALL

MSD

SD1 DRIVE	$259.00
SD2 DRIVE	$475.00

MODEMS

Total Telecommunications C-64 ..... Call

Westridge C-64 ... Call

Mitey Mo C-64 ... Call

DISKETTES

SKC (Box 10)

SKC-SSSD	$12.99
SKC-SSDD	$15.99
SKC-DSDD	$18.99

ELEPHANT (Box 10)

5¼" SSSD	$14.99
5¼" SSDD	$16.99
5¼" DSDD	$21.99

MAXELL (Box 10)

5¼" MD-1	$17.95
5¼" MD-2	$23.95

SAVE ON THESE IN-STOCK PRINTERS

MANNESMANN TALLY

SPIRIT 80	$255.00
MTL-160L	$549.00
MTL-180L	$739.00

JUKI

Juki 6100	$389
Tractor kit	$119

Epson

RX80	$229.00
RX80FT	$269.00
RX100	$369.00
FX80	$369.00
FX100	$555.00
JX80	$1089.00
LQ1500P	includes Kit $1149.00
LQ1500S	$529.00

Citoh

Prowiter 8510A	$289.00
8510BC2	$399.00
8510BP1	$349.00
8510SP	$399.00
8510SR	$409.00
8510SCP	$419.00
8510SCR	$499.00
1550P	$489.00
1550BCD	$539.00
A10-20P	$469.00
F1040PU or RDU	$899.00
F1055PU or RDU	$1099.00

PANASONIC

1090	$219.00
1091	$279.00
1092	$415.00
1093	$599.00
3151	$469.00

BLUE CHIPS

M12010	$275.00
M12010 C-64	$275.00
D4015	$1389.00

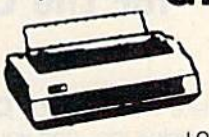
OKIDATA

80	$159
82A	$229.00
83A	$549.00
84	$649.00
92	$359.00
93	$569.00

LEGEND

880	$259.00
1000	$279.00
1200	CALL
1500	CALL
1081	CALL

PRINTER INTERFACING Available



NEC

NEC 8025	$699.00
NEC 8027	$359.00

STAR MICRONICS

Gemini 10x	$229.00
Gemini 15x	$345.00
Delta 10	$339.00
Delta 15	$449.00
Radix 10	$499.00
Radix 15	$589.00
Powertype	$309.00
Sweet p 100	$549.00

GEMINI 10X

$229 ★

CARDCO

LQ1	$449.00
LQ3	$339.00
PRINTER INTERFACE	$39.75
PRINTER INTERFACE W/ FULL GRAPHICS	$65.75

COMMODORE

C64 COMPUTER	CALL
SX 64 COMPUTER	CALL
C1541 DISK DRIVE	$239.00
C1526 PRINTER	$269.00
MPS801 PRINTER	$215.00
C1702 MONITOR	$249.00
C64105 LOGO 64	$45.00
C64106 PILOT 64	$35.00
SIMON'S BASIC	$29.00

SSI

Baseball	$22.75
Germany 1984	$32.75
50 Missions	$21.75

Timeworks

Inventory	$32.75
Sales	$32.75
Accts. Rec	$32.75
Accts. Rec	$32.75
G. Ledger	$39.75
Data Mgr	$14.75
Checkbook	$14.75
Star Battle	$14.75
Cave of Word	$18.75

Microprose

Solo Flight	$22.75
NATO	$22.75
Spitfire	$19.95
F-15 Strike	$22.75
Air Rescue	$22.75

Batteries Included

Paper Clip	$59.95
Spell Pak	$34.95
Consultant	$64.95
Paper Clip with Spell Pak	$79.95
Home Pak	$34.95
BUS CARD	$139.95
80 Column Board	$139.95

PERSONAL PERIPHERALS-64

Super Sketch-C-64 ..... 37.95

SUB LOGIC

Flight Simulator II C-64 .... 32.75

CARDCO

LIGHT PEN	$29.75
5 SLOT EXPAN. 64	$54.00
64 WRITE NOW	$39.00
64 MAIL NOW	$29.00
20 WRITE NOW	$29.00
64 KEYPAD	$64.00
UNIV CASS INT PRINTER UTILITY	$29.75
6 SLOT EXPAN	$79.96
3 SLOT EXPAN	$24.95

Scarborough

Songwriter	$24.75
Picturewrit	$24.75
Phi Beta F	$24.75

INNOVATIVE CONCEPTS

FLIP-N-FILE 10	$3.75
FLIP-N-FILE 15	$8.95
FLIP-N-FILE 25	$18.95
FLIP-N-FILE 50	$17.75
FLIP-N-FILE (ROM HOLDER)	$17.75

BIB

DISK DRIVE CLEANER	$12.75
COMPUTER CARE KIT	$19.75

TOLL FREE 1-800-233-8760

MasterCard VISA

TO ORDER

CALL TOLL FREE

800-233-8760

Customer Service 1-717-327-1825

or send order to

Lyco Computer

P O Box 5088

Jersey Shore PA 17740

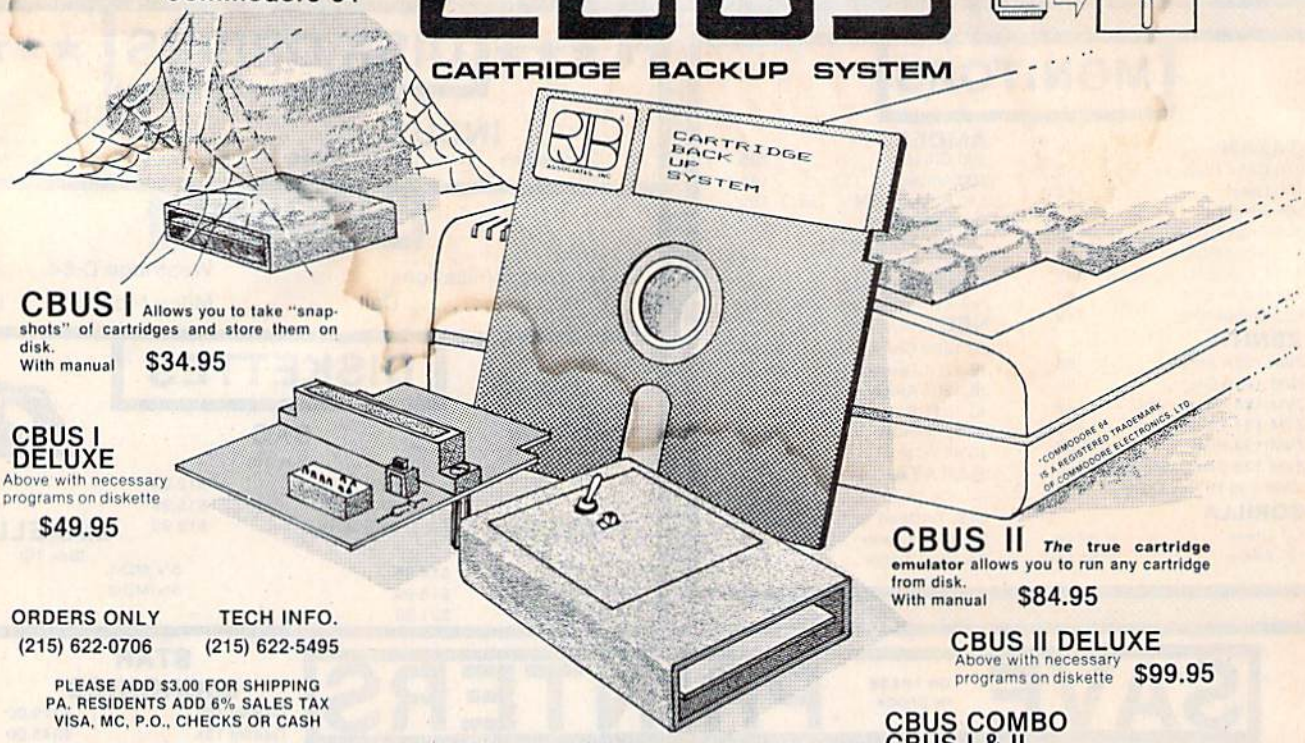
RISK FREE POLICY

In-stock item shipped within 24 hours of order. No deposit on C.O.D. orders. Free shipping on prepaid cash orders within the Continental U.S. 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 Master Card or Visa. Personal checks require 4 weeks clearance before shipping. All items subject to change without notice.

CBUS™

For The Commodore 64*

CARTRIDGE BACKUP SYSTEM



CBUS I Allows you to take "snapshots" of cartridges and store them on disk.
With manual **$34.95**

CBUS I DELUXE
Above with necessary programs on diskette
$49.95

CBUS II *The* **true cartridge emulator** allows you to run any cartridge from disk.
With manual **$84.95**

CBUS II DELUXE
Above with necessary programs on diskette **$99.95**

CBUS COMBO
CBUS I & II
With programs on diskette **$119.95**

ORDERS ONLY (215) 622-0706

TECH INFO. (215) 622-5495

PLEASE ADD $3.00 FOR SHIPPING
PA. RESIDENTS ADD 6% SALES TAX
VISA, MC, P.O., CHECKS OR CASH

R. J. BRACHMAN ASSOCIATES, INC. P. O. BOX 1077 • HAVERTOWN, PA. 19083

An integrated business software package for the C-64™ for $1.59 a Program? Yes.

The Intelligent Software Package for **C-64™**, **VIC™**, **SX-64™**, **Plus 4™**, **16™**, **'B'-Series™**, and **PET/CBM™**. No games, no fancy packaging, and you can't buy it anywhere but here. But: 22 powerful, useful programs that will put your Commodore to work right now, in your home or office; all on one disk at the ridiculous price of **$35.** Includes:

Database: A complete multi-keyed fixed-record-length data base manager. Sort or select (using all relational operators:, = >, <2, AND, OR, NOT, wild card) on any field, perform computations on numeric fields. Any operation can be performed on all, or only selected records. All fields completely user-definable. Can be used for any number of tasks, including accounting, mailing lists, inventory control, record, tape, or book cataloging, expense account manintenance, or as an electronic rolodex. Even if you use your Commodore for nothing else, this program alone might justify its expense.

Word Processor: The orginal word processor for the VIC-20, W/P is now available for all CBM models. A full-featured menu-driven word processor including very fast file commands (including a disk catalog), screen editing, text locating and full control over margins, spacing, paging, indentation, and justification. *" . . . well done and highly functional . . . Provides an excellent alternative to the high priced word processors . . . this is an excellent buy. Highly recommended."* — Midnite Software Gazette. *"Provides good basic features."* — Compute's Gazette.

Copycalc: An electronic spreadsheet. Turns your Commodore into a visible balance sheet; includes screen editor. *"Excellent program for budgeting, estimating, or any math-oriented use . . . well worth the money. Highly recommended."* — Midnite Software Gazette.

Also Included: **ReportGen, ReportMerge** (interface W/P with Database to create form letters, statements, invoices, mailing labels, other reports.); **Baseball Statistician** (compiles batting statistics for a baseball league); several W/P utilities, including **Index** (indexes W/P's text files); several Database utilities, including **DBmerge** (facilitates multi-file database applications.), AND **DBStat** (analyzes D/B files); a programming utility, **ASCII,** which converts text files (program listings) into program files; also **Checkbook**; **Inventory**; **Paper Route**; **Loan Analysis**; **Breakeven Analysis**; **Depreciation**; **Labeler**; more.

Versions of the package are available for any and every Commodore computer having a minimum of 10k RAM (does it say 'Commodore' on it? How about on the box it came in?) Add $3 if you have an 8050 disk drive. All programs will fully support tape, disk, and printer. The package is available only on disk; however, you may order any two programs on cassette for $20. Price includes documentation and shipping within USA and Canada; all other countries, add $5 (no personal checks from outside USA). No charge cards. For C.O.D., enclose $5 fee; Calif. residents add 6%. This ad is the catalog.

Box A Dept. G
San Anselmo, CA 94960

Intelligent Software
Quality Software since 1982

ABBY'S

DISCOUNT SOFTWARE

ABBY'S CARRIES A FULL SELECTION OF SOFTWARE FOR YOUR COMMODORE, PLUS-4 AND C-16. CALL FOR CURRENT PRICES. ASK FOR FREE CATALOG.

VIP TERMINAL $38

- ★ Powerful communications program
- ★ 40, 64, 80, 106 columns without hardware modification
- ★ Auto dial and re-dial with appropriate modem
- ★ 16-entry phone book
- ★ 20-entry message file for frequently sent messages
- ★ Save message to send later
- ★ Uses color, graphics (icons), sound
- ★ Optional joystick controllability

WE CARRY ALL POPULAR MODEMS

SPINNAKER

Trains (D) $29
Fraction Fever (R) $26
Up For Grabs (R) $29
Snooper Troops I, II (D) ..... ea. $29
Facemaker (R) $26
Jukebox (R) $29
In Search of The Most Amazing Thing (D) $29
Aerobics (D) $33

ALL OTHER TITLES AVAILABLE. CALL FOR PRICE. ASK ABOUT SPINNAKER'S TRILLIUM, FISHER-PRICE, AND WYNDHAM CLASSICS TITLES

SIGHT & SOUND Music Software, Inc.

INCREDIBLE MUSIC KEYBOARD. . . .$35
TURNS THE C-64 INTO A MUSICAL INSTRUMENT

Software to work with the Incredible Music Keyboard:

- Kawasaki Synthesizer $36
- Kawasaki Rhythm Rocker $29
- Music Processor $26
- 3001 Sound Odyssey $29

Koala Technologies Corporation

KOALA PAD WITH GRAPHICS SOFTWARE $59

Software Available for use with the Koala Pad:

COLORING SERIES I
KOALAGRAMS SPELLING
INSTANT PROGRAMMER'S GUIDE
LOGO DESIGN MASTER
SPIDER EATER
PAINT-A-RHYME
THE GRAPHICS EXHIBITOR

CALL FOR LOW PRICES

EPYX

FAST LOAD (R) $30

- Load Programs 5 Times Faster
- Copy Your Own Programs and Back Up Some Protected Software

Pitstop II (D) $29
World's Greatest Baseball Game $29

CALL FOR PRICES ON OTHER EPYX TITLES

PARTIAL LISTING OF OUR COMPLETE SOFTWARE LINE

ACCESS
Raid Over Moscow (D) (C) $26
Scrolls of Abadon (D) (C) $26
Beachhead (D) (C) $26

ELECTRONIC ARTS
Archon (D) $29
Archon II - Adept (D) ..... CALL
One On One (D) $29
Music Construction Set (D) $29
Pinball Construction Set (D) $29
The Realm of Impossibility (D) $29
Seven Cities of Gold (D) $29

MICROPROSE
F-15 Strike Eagle (D) (C) $27
Hellcat Ace (D) (C) $24
Mig Alley Ace (D) (C) $27
NATO Commander (D) (C) $27
Solo Flight (D) (C) $27

INFOCOM
Hitchhiker's Guide to the Galaxy (D) $35
Zork I, II, III (D) ..... ea. $29
Cutthroats (D) $35
Sea Stalker (D) $35
Star Cross (D) $35

SSI
Battle of Normandy (D) $28
Broadsides (D) $28
Carrier Force (D) $43
Combat Leader (D) (C) $28
Questron (D) $47
War in Russia (D) $54

SUBLOGIC
Flight Simulator II (D) $39

RESTON
Movie Maker (D) $39

CBS
Murder by the Dozen (R) $27

DATAMOST
Quick Load $19

PFS
PFS Report (D) $59

MR. NIBBLE
Software Copy Program (D) $34

INDUS GT DISK DRIVE FOR C-64 ..... $299

THE INCREDIBLE INDUS GT DRIVE INCLUDES:

- SSDD
- WORD PROCESSOR
- DATA BASE
- SPREADSHEET

Scotch SSDD Disks, Box of 10 ..... **$13.95**

SPECIAL SALE PRICES

LIMITED QUANTITIES ON SOME ITEMS

Atarisoft Titles for C-64 .... Choose from: Pac Man, Centipede, Defender, Dig Dug, Donkey Kong, Robotron: 2084, Pole Position, and Galaxian. Also, Ms. Pac-Man and Battlezone $10.00
Atarisoft Titles for VIC-20 .. .. $ 3.00
Demon Attack (R) for VIC-20 ..... $ 2.00
Close Encounters of the Worst Kind (R) for C-64 ..... $ 1.00

AD #G-35

(C) CASSETTE TAPE (D) DISK (R) ROM CARTRIDGE

CALL TOLL FREE

Order Line 1-800-282-0333 M-F 10 a.m.-7 p.m. Eastern Time Customer Service 1-513-879-9699

610 Middle Street, Fairborn, OH. 45324

VISA

Prepaid orders over $30 receive free shipping, UPS, continental US. No waiting period when paid by credit card, certified check or money order. Add $2 shipping and handling on orders under $30. Add $5 for COD orders. Hardware requires additional freight charges. Ohio residents add 5.5% sales tax. All items subject to availability and price change.

MasterCard

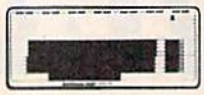
PLEASE CITE AD NUMBER WHEN ORDERING.

AD #G-35

BETTER KEYBOARD UTILITY.

A simply elegant solution—blank "Cheat Sheets" give you the keyboard commands you need, instantly, for any program.

You've got the best personal computer in the world and lots of software to run on it. But unless you work with each of these programs every day, how do you keep the commands straight? "F5" in one program means something else in another. Our solution? Simple. A pack of 12 cards die cut to fit your keyboard. Ready for YOU TO FILL IN. Have all of your program commands right where you want them . . . on your keyboard. Order a couple of packs today.



$12.95 set of 12 custom die cut sheets **$19.95** set of 24 custom die cut sheets

BETTER DUST PROTECTION FOR VIC & COMMODORE

Choose an attractive static-free cover for your keyboard, monitor or complete system.

Don't confuse these attractive covers with cheap static-filled clear plastic covers. These deluxe covers are custom-fitted to each element of your Commodore, and are sewn, not glued. The interior of the supple leather-like material is lined with a special soft fabric liner to prevent scratching. Soft camel color fits beautifully in any office or home. Available: computer cover ($9.95), monitor cover ($12.95), 1541 disk drive cover ($8.95), datasett cover ($7.95). Printer covers (specify type) $12.95.

$7.95 to **$12.95**

We Can Solve All Your Commodore Color Problems

Unique Problem Solvers for Older Commodores (with 5 Pin Monitor Din Plug).

The Interference Stopper. . . A new kit that installs in minutes with two simple solder connections. Best results when combined with items below. Absolutely stops 90% of the RF interference.

$15.95

The Color Sharpener. . . Use if your "old 64" is hooked up to a TV. Just plug into the monitor plug, and the color and contrast immediately improve. Dramatically crisp letters. Great graphics.

$18.95

The NEW Color Sharpener CABLE. . . Use if your "old 64" is hooked up to a monitor. A new 2 prong cable, with a Color Sharpener built in for your monitor.

$24.95

The Monitor "Improver". . . If you have a Commodore 1701 monitor, this cable (3 prong) gives you a picture you won't believe. Better than the cable Commodore built. (Also hooks your "old 64" to the 1702.)

$24.95

RESET SWITCHES

2 Versions for Every Need

At last, the "needed" switch for Vic-20 and Commodore. Commodore left out a reset switch. Our switches will return control to you every time.

Version 1—Install it Yourself. Requires two simple solder connections, and drill a small hole. Works great. Saves money.

A steal at **$9.95**

Version 2—Use in any Commodore Application. A special **buffered** flow-thru version, that plugs in, gives a "Y" connection that provides your computer with another serial port **and** a reset switch. The ultimate in versatility, convenience and simple installation. No soldering.

Introductory priced at **$19.95**

Is Your Commodore Disk Drive Hot and Bothered?

Most of them are, you know. They suffer from read and write problems frequently. We've been told that most of these problems occur because the drive has overheated, throwing the head out of alignment.

Our inexpensive muffin fan sits on top of the disk drive and blows cooling air through it.

We went one step further. We built a surge protector into a second fan model.

$79.95 Fan with Surge protector **$54.95** Muffin fan

Order Today!

Please send me the following:
(Please describe fully. Send U.S. funds only.)

Your satisfaction guaranteed or your purchase price refunded.

Qty.	Item	Price
		$
		$
		$
Total for Merchandise		$
Shipping and Handling (foreign orders add $5.00)		$ 2.00
5% State Tax (WI Residents only)		$
TOTAL ENCLOSED		$

Please charge to: ☐ MasterCard ☐ VISA

Number _____

Expires _____

SHIP TO:

Name _____

Address _____

City _____

State/Zip _____

Mail to: Bytes & Pieces, Inc. 550 N. 68th St. Wauwatosa, WI 53213/(414) 257-1214

Dealer Inquiries Invited

Software Discounters of America

For Orders Only 1-800-225-SOFT*

Inquiries and PA 412-361-5291

Open Saturday

- Free shipping on orders over $100 in continental USA
- No surcharge for VISA/MASTERCARD

Commodore 64 Software

ACCESS
Beach Head (TorD) . . $21
Beach Head II . . . . . Call
Raid Over Moscow (TorD) . . . $25
Scrolls of Abadon (D) $23

ACTIVISION
Decathalon (D) $25
Designers Pencil (D) . $25
Ghostbusters (D) . . . $25
Mindshadow (D) $25
Pastfinder (D) $25
Pitfall II (D) $25
Space Shuttle (D) . . . $25
Zenji (D) $25

ARTWORX
Bridge 4.0 (TorD) $16
Ghost Chasers (D) . . . $16
Grand Master Chess (D) $18
Strip Poker (D) $21
Female Data Disk . . . $18
Male Data Disk $18

BATTERIES INCLUDED
Audio/Video Catalog (D) $21
Buscard II $135
Calc-Kit (D) $33
Checkbook (D) $21
80 Column Board . . $115
Elect. Address Book (D) $21
Home Inventory (D) . . $21
Home Pak (D) $33
Mail List (D) $21
Paperclip (D) $59
Paperclip w/ Spell (D) $79
Photos/Slides (D) . . . $21
Recipes (D) $21
Spellpak (D) $33
Stamps (D) $21
The Consultant (D) . . $65
*bonus w/ purchase of three B.I. titles

BRODERBUND
Bank St. Writer (D) . . $33
Castles Dr. Creep (D) $21
Champ. Loderunner (D) $23
Karateka (D) $21
Mask of the Sun (D) . . $25
Music Shop (D) $29
Operation Whirlwind (D) $25
Print Shop (D) $29
Raid on Bungeling Bay (D) $21
Serpent's Star (D) . . . $25
Spelunker (D) $21
Stealth (D) $21
Whistler's Brother (D) $19

CBS
Adventure Master (D) $29
Astro Grover (R) $25
Big Bird Funhouse(R) $25
Coast to Coast America (D) $33
Dinosaur Dig (D) $33
Ernie's Magic Shapes (R) $19
Forecast! (D) $33
Letter Go Round (R) . $25
Math Series . . . . . Call
Mastering the SAT . . $95
Murder by Dozen (D) . $23
Timebound (D) $19

CONTINENTAL
Book of Adv. Games . $16
FCM (D) $33
Get Rich Series . . . . Call
Home Accountant (D) $47
Home Cataloger (D) . $33
Tax Advantage (D) . . $47

DATASOFT
Bruce Lee (T/D) $23
Conan the Barbarian (T/D) . . $25
Dallas Quest (D) . . . $21
Dig Dug (T/D) $19
Letter/Spell Wizard (D) $47
Mancopter (T/D) . . . $19
Pac Man (T/D) $19
Pole Position (T/D) . . $19

DAVIDSON
Math Blaster (D) . . . $33
Speed Reader II (D) . $47
Spell It (D) $33
Word Attack (D) . . . $33

EPYX
Dragonriders Pern (D) $25
Fast Load (R) $25
Gateway Apshai (R) . $25
Impossible Mission(D) $23
Monty's Scrabble (D) $25
Pitstop II (D) $25
Summer Games (D) . . $25
Temple Apshai (TorD) $25
World's Greatest Baseball (D) . . . $23

FIRST STAR
Astro Chase (D) $17
Bristles (D) $13
Flip Flop (D) $13
Spy vs. Spy (D) $19

FISHER PRICE
Alpha Build (R) $17
Hop Along Counting (R) $17
Number Tumbler (R) . $17
Sea Speller (R) $17

FUTUREHOUSE
CPA (D) $47
Light Pen (D) $19
Light Pen w/ Peripheral Vision (D) $39

HBJ
Computer SAT (D) . . $59

HES
Graphics Basic (D) . . $23
Hes Games 84 (D) . . . $21
Hes Modem I (only 50) $39
Hes Mon 64 (R) $25
Millionaire (D) $25
Multiplan (D) $59
Omniwriter/Speller (D) $39

INFOCOM
Cut Throats (D) $23
Enchanter (D) $23
Hitchhiker's Guide to the Galaxy (D) . . . $23
Infidel (D) $26
Planetfall (D) $23
Seastalker (D) $23
Sorcerer (D) $26
Starcross (D) $29
Suspended (D) $29
Zork I (D) $23
Zork II or III (D) $27

KOALA
Light Pen w/ Painter (D) $65
Muppet Learning Keys(D) $49
T. Tablet w/ Painter (D) $65
T. Tablet w/ Painter (R) $75
Koala Printer (D) . . . $21

MICROLAB
Boulder Dash (D) . . . $21
Death Caribbean (D) . $23
Dino Eggs (D) $23
Heist (D) $21
Miner 2049er II (D) . . $23

MICROPROSE
Air Rescue I (D) $23
F-15 Strike Eagle (D) $23
Hellcat Ace (TorD) . . $19
Nato Commander (TorD) $23
Solo Flight (TorD) . . $23
Spitfire Ace (TorD) . . $19

MUSE
Beyond Castle Wolfenstein (D) . . $23
Castle Wolfenstein (D) $16
Super Text (D) $59

ORIGIN
Ultima III (D) $39

PRACTICORP
Practicalc (D) $35

PRECISION SOFTWARE
Superbase 64 (D) . . . $57

RESTON
Miner 2049er (R) . . . $19
Movie Maker (D) . . . $33

SCARBOROUGH
Mastertype (DorR) . . $25
Net Worth (D) $49
Songwriter (D) $25

SIERRA ON LINE
Donald Duck's Playground (D) . . . $25
Goofy's Word Factory (D) $25
Grog's Revenge (D) . . $23
Homeword (D) $43
Mickey's Space Adv (D) $25
Ultima II (D) $39
Winnie the Pooh (D) . $25
Wizard & Princess (D) $19
Wiz Type (D) $23

SPINNAKER
Adventure Creator (R) $21
Aegean Voyage (R) . . $21
Alphabet Zoo (R) . . . $21
Delta Drawing (R) . . . $21
Facemaker (R) $21
Fraction Fever (R) . . $21
Kids on Keys (R) . . . $21
Kidwriter (D) $21
Kindercomp (R) $21
Most Amazing Thing (D) $23
Ranch (R) $21
Snooper Troops 1 (D) $23
Snooper Troops 2 (D) $23
Story Machine (R) . . $21
Trains (D) $23

SSI
Baltic '85 (D) $25
Battle Normandy (D) . $25
Breakthrough Ardennes (D) $39
Broadsides (D) $25
Carrier Force (D) . . . $39
Combat Leader (D) . . $25
Comp. Baseball (D) . . $25
Computer QB (D) . . . $25
Cosmic Balance (D) . $25
Field of Fire (D) . . . $25
50 Mission Crush (D) . $25
Fortress (D) $23
Geopolitique 1990 (D) $25
Germany 1985 (D) . . . $39
Knights in Desert (D) $25
Pro Tour Golf (D) . . . $25
Questron (D) $25
RDF 1985 (D) $23
Rails West (D) $25
Ringside Seat (D) . . . $25

SUBLOGIC
Flight Simulator II (D) $35
Night Mission Pinball (TorD) $21

SYNAPSE
Blue Max (TorD) $21
Encounter (TorD) . . . $17
Necromancer (TorD) . $21
Pharoah's Curse (TorD) $21
Slamball (TorD) $21
Syn-Calc (D) . . . . . Call
Zaxxon (TorD) $25
Zeppelin (TorD) $21

TIMEWORKS
Acct Payable (D) . . . $39
Acct Receivable (D) . $39
Cave Word Wizard (D) $23
Data Manager (TorD) . $16
Data Manager 2 (D) . . $33
Elect. Checkbook (TorD) $16
Evelyn Wood Reader (D) $47
General Ledger (D) . . $39
Money Manager (TorD) $16
Sales Analysis (D) . . . $39
Word Writer (D) $39

TRILLIUM
Amazon (D) $23
Dragonworld (D) . . . $23
Fahrenheit 451 (D) . . $23
Rendezvous Rama (D) $23
Shadowkeep (D) . . . $23

TRONIX
Chatterbee (D) $25
Pokersam (D) $19
S.A.M. (D) $39

WAVEFORM
Musicalc I (D) $35
Musicalc 2 or 3 (D) . . $23
Colortone Keyboard . $59

WINDHAM CLASSICS
Below the Root (D) . . $19
Gulliver's Travels (D) $19
Swiss Family Robinson (D) $19
Wizard of Oz (D) . . . $19

ACCESSORIES
BASF SS. DD . . . . $14 Bx
BASF DS. DD . . . . $19 Bx
Cardco Access. . . . . Call
Compuserve Starter Kit (5hrs) $23
Compuserve Vidtex . $25
Disk Case (Holds 50) . $9
Disk Case (Holds 100) $19
Disk Drive Cleaner . . $9
Indus GT Disk Drive . Call
Modem Special . . . . Call
Panasonic KXP 1090 Call
Sakata 13" Color Monitor $225
Super Sketch Graphics Tablet $39
Wico Boss $12
Wico Bat Handle . . . $19
Wico Three-Way $23

P.O. BOX 278—DEPT CG—WILDWOOD, PA 15091

***Ordering and Terms:** Orders with cashier 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.** PA residents add 6% sales tax. **AK, HI, FPO-APO**—add $5 on all orders. **International Order Policy**—No Credit Cards—add $15 or 15% of order whichever is greatest. Defective merchandise will be replaced with same merchandise—NO CREDITS! Return must have authorization number (412) 361-5291. Prices subject to change without notice. **Order today, get it tomorrow. Overnight delivery is just $17.50—software orders only in Continental U.S.A.**

FILE YOUR DIRECTORIES
(...and everything else)

- AUTOMATIC DISK FILING
- FAST AND EASY TO USE
- ONE or TWO DRIVE USAGE
- CREATE YOUR OWN FILES UP TO 20 DATA FIELDS
- SORT, SEARCH, EDIT, Etc..Ultra Fast
- ORGANIZE YOUR TAPES, DISKS, MAGAZINES, Etc.
- MANY OTHER FEATURES

YOU'LL ENJOY THE FILER

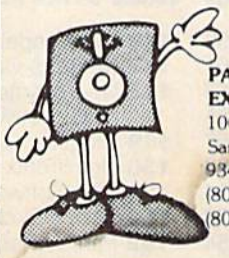
POSSIBLY THE BEST UTILITY YOU'VE EVER NEEDED!

$29.95 + $2.00 shipping
C.O.D. Phone (503) 773-3608
SUNSHINE COMPUTER
930 Summit, Medford, OR 97501
Check, Money Order, Visa and MasterCharge Accepted

MEMOREX
FLEXIBLE DISCS

WE WILL NOT BE UNDERSOLD!! Call Free **(800)235-4137** for prices and information. Dealer inquiries invited and C.O.D.'s accepted.

VISA



PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA 93401 In Cal. call (800)592-5935 or (805)543-1037

C-64

LOOK OUT FOR
PIRATES!
LEARN
SOFTWARE PROTECTION

- These utilities let you easily protect your valuable programs just as professionally as commercially bought software.
- Simple & easy to understand instructions take you through step by step.
- Includes brand new never before released secrets.
- For protecting Basic and Machine language programs on diskette.

$29.95 - Disk
Please send check or money order to:
O.P. SOFTWARE
3731 COLBY AVE.
EVERETT, WA 98201

FREEDOM ASSEMBLER

The FREEDOM ASSEMBLER/MONITOR is 3 powerful programs working together for the 6502/6510 microprocessor.

SYMBOLIC ASSEMBLER

Written in assembly code -- multi-pass -- FAST ASSEMBLIES.
NINE SPECIFIC ERROR MESSAGES
PRINT UTILITY--full listing with alphabetical cross-reference
LIST COMMAND--shows symbol values and references on screen
SAVE UTILITY--disk or tape
Three ALTERNATE INSTRUCTION SET MODES--including 2 versions of the 65C02, (with new instructions)

POWERFUL MONITOR

DISASSEMBLER
MEMORY DISPLAY/EDIT
RAM/ROM BANKING (C-64)
RENUMBER
FILL
COMPARE
TRANSFER
HUNT

CODE DEBUGGER

SET/CLEAR BREAKPOINT
EXECUTION
REGISTER DISPLAY/EDIT
FULL SPEED EXECUTION
SINGLE-STEP
QUICKTRACE

CARTRIDGE becomes a part of your machine. No time wasting loads, give the SYS and you are ready to go. C-64 version banked out on powerup. May be left plugged in. Activated by SYS at any time.

MANUAL with 60 pages of instruction and sample program included.

C-64 $39.95 VIC-20

FREE SHIPPING IN CONTINENTAL U.S and CANADA
ALL OTHERS ADD $3.00 S/H COD'S add $3.00
MICH. RESIDENTS ADD 4% SALES TAX
BE SURE TO INCLUDE: NAME, ADDRESS, ZIP, AND VERSION (C-64/VIC-20)
SEND CHECK OR MONEY ORDER (U.S.) FOR $39.95 TO:

HUGHES ASSOCIATES
Dept. G2
45341 HAMMONY LANE
BELLEVILLE, MI 48111

A J BLACKJACK SYSTEM TESTER

Find out if your system is really a winner before you spend time learning and risk money playing.

Define your system, then simulate a lifetime of full-time playing (9-10 million hand range) in one day computer run on your Commodore 64™. Pick the best system from among alternatives. One-page printout (or screen display) clearly indicates best levels for increasing bets and for insuring.

You control: No. of players (1-3); No. of decks (1-4); Double, Surrender, Double-After-Split Options; Hard-Stand, Soft-Stand, Split, Hard-Double, Soft-Double and Surrender Criteria.

Commodore 64™ — Cassette Only — $39.95. Check, Money Order, C.O.D. (Add $3). VISA or MC. Include Name, Card Number, Exp. Date. Idaho Res. Add 4% Sales Tax.

NOVO SOFTWARE
Box 6423, Boise, ID 83707
(208) 375-7435

CASTLE OF DOOM

CAN YOU SURVIVE THE PERILS OF THE CASTLE OF DOOM ? MAGIC, DEMONS, AND THE EXTREME BIZARRE AWAITS YOU AS YOU EXPLORE. THIS IS NOT JUST A ORDINARY ADVENTURE GAME. THIS IS A GAME SO REAL YOU ALMOST FEEL AS IF YOU ARE THERE. I DARE YOU TO SURVIVE !

CASTLE OF DOOM IS AVAILABLE ON TAPE FOR A COMMODORE 64 FOR ONLY 19.95 AND WE COVER THE POSTAGE.

ZAP SOFTWARE
314 McKEE
GALLUP, N.M. 87301

NEW!!

FOR COMMADORE 1541 DISK DRIVE OWNERS!
DISKETTE STORAGE DOUBLED ELECTRONICALLY!
NEVER AGAIN notch another diskette.
NEVER AGAIN remove another write-protect tab (or jam your drive due to constant tab removal).

NOW with just a flip of a switch, you can write to either side of your diskettes and directly **THRU** your write-protect tabs!! When you have finished writing to your diskette, simply flip the switch off and return to "Read Only" mode. It's that simple!

Installation will not harm your Drive System! Complete Rite-Thru© Instructions (including temporary installation so you will not void your warranty) just **$21.95.** Includes shipping and handling. Illinois residents add sales tax, Canada add $2.00 U.S. Send to: **PHASE III Electronics, RITE-THRU Dept. 4-01, P.O. Box 417, Gurnee, IL 60031.**

Certified Checks and Money Orders Processed immediately. Personal checks allow 4-6 weeks.

Coming soon for other popular Disk drive systems.

Rite-Thru is a copyright of Phase III Electronics.
Commadore is a trademark of Commadore Business Machines Inc.

Advertise your program or product for the VIC-20 or 64 here and reach hundreds of thousands of readers.

COMPUCAT

The Online Catalog of Computers and Software
Our Prices are **WHOLESALE + 10%**

SAMPLES!!!
Gemini 10X Printer — $282
Westridge Auto Modem — $72
Indus GT Disk Drive — $285
Olympia RO Daisy Wheel Printer — $332
MSD Dual Disk Drive — $525
Batteries Included Home Pak — $36

ASK ABOUT OUR FREE PRICE LIST
FREE SOFTWARE - FREE BULLETIN BOARD SERVICE

(408) 353-1836
We Support the Complete Commodore Product Line

Instant Shipping (or as fast as we can). *Mastercard & Visa accepted* (no extra charge). Shipping & handling add 6%. California customers add 6.5% sales tax. Order by phone Mon.-Fri. - 10 a.m.-5 p.m. PST). Order by *modem* daily 6 p.m.-9 a.m.) from our online Telecatalog.

Prices subject to change without notice.

COMPUCAT
24500 Glenwood Hwy., Los Gatos, CA 95030

Advertisers Index

Reader Service Number/Advertiser	Page
102 AA Computer Exchange	152
103 Abacus Software	61
104 Abacus Software	63
105 Abacus Software	65
106 Abby's Discount Software	157
107 Academy Software	83
A.I.D. Corp.	154
Antiqua Software	152
108 Artificial Intelligence Research Group	154
Axlon	72
109 Basix	53
110 Basix	67
Batteries Included	41
111 Baudville	21
112 Big Bytes	112
113 Blue Chip Electronics	51
114 Bytes & Pieces, Inc.	158
115 Cardco, Inc.	IBC
Cardinal Software	150
116 Cheatsheet Products	148
117 The CHF Company	118
118 Columbia Software	154
Commodore	BC
Compucat	159
119 CompuServe	19
120 ComputAbility	73
Computer Centers of America	97
121 Computer Mail Order	149
122 Computer Novelty Corp.	150
Computer Place	148
123 Computer Profit Systems, Inc.	59
124 Creative Software	4
125 Crown Custom Covers	154
126 CSM Software, Inc.	77
127 CSM Software, Inc.	110
128 Custom Programming Group, Inc.	102
129 Data Share, Inc.	77
130 Digital Vision, Inc.	150
131 Dow Jones News/Retrieval	27
132 Eastern House	48
133 E Mart, Inc.	152
Epyx	23
134 Full Circle Software, Inc.	108
135 Future Computer Applications	120
Hughes Associates	159
136 Indus Systems	45
137 Inforunner	IFC & 1
Intelligent Software	156
Jason-Ranheim	104
KSOFT Co.	89
Kyan Software	148
138 Limbic Systems Inc.	58
139 Lyco Computer Marketing and Consultants	155
Master Software	154
140 MegaSoft Limited	79
141 MFJ Enterprises Incorporated	152
Micro-Sys Distributors	151
142 Micro-W Distributing, Inc.	83
143 Micro-W Distributing, Inc.	110
144 Micro World Electronix	154
145 Mimic Systems Inc.	35

Reader Service Number/Advertiser	Page
146 Mindscape, Inc.	29
147 NewArts Co.	83
148 Nibble Notch Computer Products	152
Nova Software	159
149 Okidata	15
150 Omnitronix	118
O.P. Software	159
151 Pacific Exchanges	159
152 Parsec Research	76
PC Gallery	153
153 Phase III Electronics	159
Playnet, Inc.	47
154 Professional Software, Inc.	9
155 Professional Software, Inc.	13
Pro-Line Software	106
156 Protecto Enterprizes	90,91
156 Protecto Enterprizes	92,93
156 Protecto Enterprizes	94,95
157 RGM	120
158 R. J. Brachman Associates, Inc.	156
159 Scarborough Systems, Inc.	7
160 Sega Enterprises, Inc.	57
161 Signal Computer Consultant, Ltd.	150
162 The 64 Club	118
163 Skyles Electric Works	75
164 Software Design, Inc.	81
165 Software Discounters of America	158
166 Software Shack	147
167 Solid State Software	115
168 Star Micronics, Inc.	85
169 Star Micronics, Inc.	86,87
170 Starpoint Software	70
171 Strategic Simulations, Inc.	43
172 subLOGIC Corporation	31
Sunshine Computer	159
190 T & D Subscription Software	115
173 TeleLearning Systems, Inc.	37
174 Telesys	62
175 Timeworks, Inc.	11
176 Triad Computers	152
177 Tussey Mt. Software	101
Ultrabyte	119
Uni-Kool	113
178 USI/CDI, Computer Devices International	55
Vertical Horizons, Inc.	147
Zap Software	159

COMPUTE!'s Commodore Collection	2
COMPUTE!'s Gazette Disk	16–17
COMPUTE!'s Machine Language	3
COMPUTE!'s Gazette Subscription	49

You asked for them . . . CARDCO has them!

LQ/1 & LQ/3 LETTER QUALITY PRINTERS
In response to your demand and need, CARDCO now has available "Commodore-ready "LETTER QUALITY PRINTERS". Just plug them in and print.

Offering standard friction-feed and optional tractor-feed, the CARDCO PRINTERS come complete with built-in interfacing for all Commodore Personal Computers, as well as compatible input for PC, PC jr., TRS-80 and other personal computers.

LQ/1 13" carriage, 15 CPS

LQ/3 11" carriage, 13 CPS

"CARDPRINT" C/?+G PRINTER INTERFACE with Graphics
For printers that are not Commodore-ready, Cardco offers the C/?+G PRINTER INTERFACE including all cables and connectors for the following printers: all new Epson MX, RX and FX series, Star Gemini 10X and Delta 10, Prowriter, C.-Itoh 8510, NEC 8023, Okidata 82, 83, 84, 92, 93 and 94, Mannesman Tally Spirit and MT-160, Seikosha GX-100, BMC BX-80 and the Gorilla Banana. Prints the full Commodore character set; graphics, characters, reversed characters and reversed graphics characters.

"WRITE NOW" WORD PROCESSOR SOFTWARE
An excellent time saver, CARDCO OFFERS THE CØ2 "Write Now" program with built-in 80 column display. You see exactly what will print. All special codes can be transmitted to printers maintaining justification. Easy full-screen editing; works with any printer.

"MAIL NOW" MAILING LIST SOFTWARE
CARDCO DØ1 quickly (in memory) sorts by zip, category, name and state; fully compatible with "WRITE NOW". Other fine features include: User-oriented; menu-driven operation; each disk supports 600 entries. Format can print single, double or triple labels across.

All Cardco Products are available at your local dealers. Write for illustrated literature.

cardco, inc.

300 S. Topeka Wichita, Kansas 67202 (316) 267-6525
"The world's largest manufacturer of Commodore accessories."

Commodore™ is a registered trademark of Commodore Business Systems, Inc.

LOOK WHAT'S ON TELEVISION TONIGHT.

6:00

THE HULK

The first comic attraction in the QUESTPROBE™ Adventure Series. You become a super hero. A joint (ad)venture of Scott Adams, Inc. and Marvel Comics Group. (Diskette)

6:30

MATH FACTS

(Ages 5 to 10) (Micro School) Educational TV. Practice in basic math facts. Several levels. (Easy to hard) (Diskette)

7:00

FRENZY/ FLIP FLOP

(Ages 6 to 14) (Milliken Edufun) FRENZY (subtraction and division) The hungry gator arrives... save the fish... play the BONUS game... FLIP FLOP (transformed geometry) look at the two figures... do they need to flip, turn or slide? (Diskette)

7:30

SOLAR FOX

It's erase or be erased as you navigate spaceship over a grid of colorful pulsating entities, armed with laser. Unlimited levels. A BALLY MIDWAY original. (Cartridge)

8:00

EASY SCRIPT

Our best wordprocessor. Displays 764 lines by 40 characters. Prints over 130 columns. Global/local search/replace/hunt/find. Super/subscripts. Insert/delete characters, lines, sentences, paragraphs. (Diskette)

8:30

THE MANAGER

A powerful database management system. For business, educational or personal files. Not for Rockford's files. With four built-in applications. Or design your own. (Diskette)

9:00

MAGIC DESK I

The scene opens on an office desk, complete with digital clock, typewriter, wastebasket and file cabinet. Select functions (typing, filing, editing) by pointing animated finger (Cartridge)

9:30

INTER-NATIONAL SOCCER

(Gold Medallion Game) Sports highlight. With passing, kicking, diving goalies, even trophies! Great color, 3-D realism. No locker room interviews. (Cartridge)

10:00

SIMONS' BASIC

Rated PG. Expands Commodore BASIC by an additional 114 commands. Convenient programming commands such as RE-NUMBER and TRACE plus graphics plotting command. (Cartridge)

Announcing the most exciting variety show on television.

Featuring many of the stars of arcade games, education and the business world.

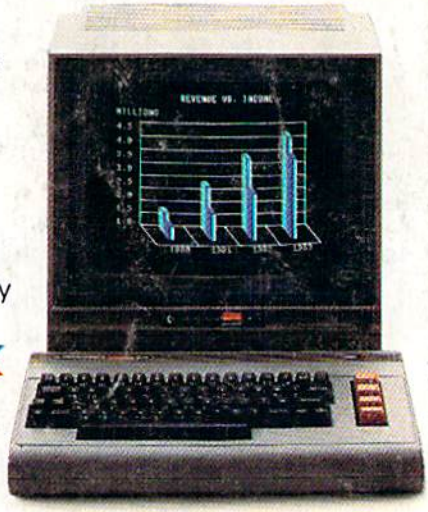
Produced by (and for) Commodore, the people who bring you the Commodore 64™ a 64K computer that would be a value at three times its price. In fact, many of its competitors are three times its price.

Produced in living high resolution graphics with 16 available colors and with eight 3-dimensional sprites.

With a real high fidelity sound that covers a 9-octave range.

And a supporting cast of low-price, high capacity disk drives, printers, monitors (a better way to watch Commodore 64) and modems.

So, if you're not pleased with what's on your tv set tonight, simply turn on your Commodore 64.

COMMODORE 64

IT'S NOT HOW LITTLE IT COSTS, IT'S HOW MUCH YOU GET.