

IBM Compatibles: The Universe Expands

COMPUTE!

\$3.00
July
1987
Issue 86
Vol. 9, No. 7
\$4.25 Canada
02193
ISSN 0194-357X



The Leading Magazine Of Home, Educational, And Recreational Computing

PFkey 64

Add powerful BASIC 7.0 commands and functions to the 64

P/M Magic For Atari

Complete control over arcade-quality graphics and animation

IBM Printer Control

Customize printer control codes easily from DOS

Telecomputing With The Online Services

Sprite Designer

An easy-to-use, full-featured sprite editor for Commodore 64

Weather Wizard

A forecaster for IBM PC/PCjr and compatibles, Commodore 64, Amiga, Atari ST, Apple II, and Atari 400/800/XL/XE

Converter

Apple graphics conversion utility for *Print Shop*

Using Your Printer With The Amiga

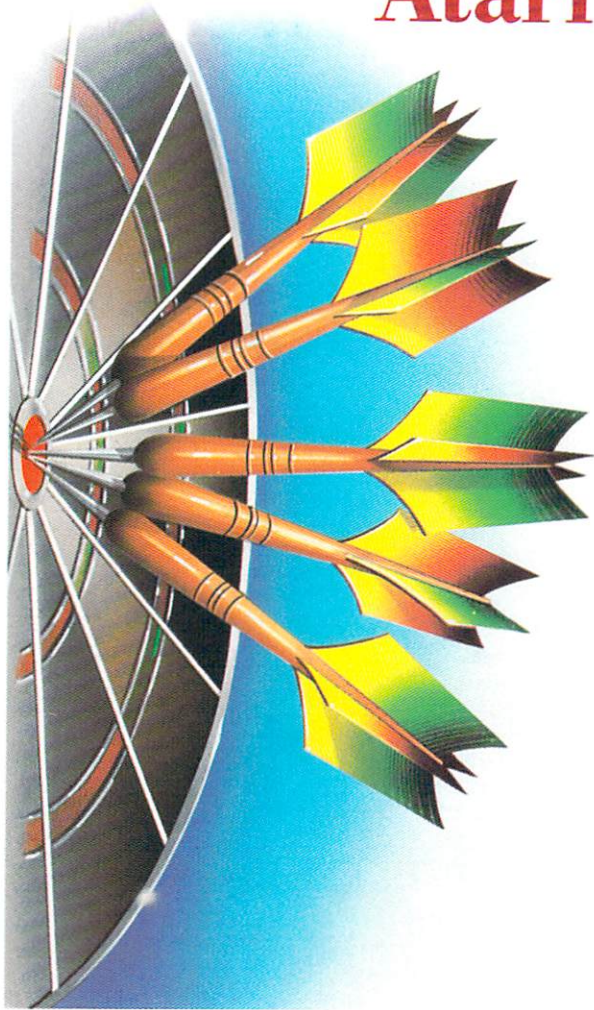
Medium-Resolution Autorun For Atari ST

Disk Expander For Apple II

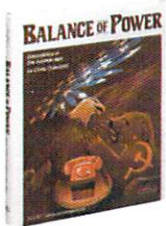


0 71486 02193 3

Mindscape Aims To Please With New Hits For the Atari XE™/XL™ and ST™.



BALANCE OF POWER



by Chris Crawford. You are the President of the United States. Tension always escalates in this global geopolitical simulation of the cold war's cruel reality. Test your savvy with what the *New York Times* called one of the most sophisticated strategic simulations in America. Available on the **Atari ST** only.

INFILTRATOR



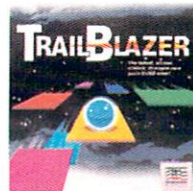
Fasten your shoulder harness and seat-belt. *Infiltrator* by Chris Gray puts you at the controls of a powerful gunship ready for action. You are Johnny "Jimbo Baby" McGibbits with miles of enemy airspace to clear. You'll then convert to covert ground action, behind enemy lines, to destroy the mad leader and his hostile troops. Available on the **Atari XE/XL** only.

BOP 'N WRESTLE



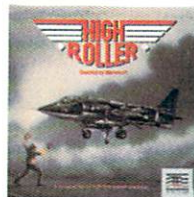
Pow! Sock! Slammo! *Bop 'N Wrestle* is as close as you can get to professional wrestling without drawing blood. Put yourself into the ring with 10 of the biggest, baddest bruisers ever to perfect the turn-buckle fly. Available on the **Atari XE/XL** only.

TRAILBLAZER



Push yourself to the limit in this hyper-spatial spherical grand prix. Leave your opponent in a cloud of dust as you leap over black holes, purple walls, blue bouncers, and the terrible cyan nasty zone. Not for the faint at heart. But surely an action arcade adventure in which you can have a ball. Available on the **Atari XE/XL and the Atari ST.**

HIGH ROLLER



Strap yourself into a Harrier jet and enter the dangerous world of vertical takeoffs, barrel roll attacks, and heat-seeking sidewinders. Learn to fly the most sophisticated combat aircraft in this flight simulation software. Your mission is to destroy the enemy headquarters 500 miles away. Good luck! Available on the **Atari ST** only.

Mindscape 
Software that challenges the mind. MINDSCAPE

Infiltrator is available on Apple II family, IBM & compatibles, C64 & C128 and Atari XE/XL. *Bop 'N Wrestle* is available on Apple II family, IBM & compatibles, C64 & C128 and Atari XE/XL (128K recommended). *Trailblazer* is available on C64 & C128, Atari XE/XL and Atari ST. *Balance of Power* is available on IBM & compatibles, Atari ST, Macintosh, and Amiga. *High Roller* is available on C64 & C128 and Atari ST.

Visit your retailer or call 1-800-221-9884 (in Illinois 1-800-942-7315) for Visa or MasterCard orders. To purchase by mail, send Visa or MasterCard number with expiration date, check or money order to Mindscape, Inc., P.O. Box 1167, Northbrook, IL 60065. Add \$3.00 for shipping and handling. Allow 3-5 weeks for delivery.

If you're an attorney read this: Apple, IBM, PC Jr., Commodore, Atari and Amiga are registered trademarks of Apple Computer, Inc., International Business Machines, Commodore Electronics Ltd., Atari, Inc. and Commodore Amiga, Inc. respectively. Mindscape is a trademark of Mindscape, Inc.

AIM HIGH



PRESENTING TECHNOLOGY THAT LETS YOU PROGRAM YOUR OWN DESTINY.

Electronics and computer equipment can be state-of-the-art today. And ready for the garbage can tomorrow.

Demand for technology is changing that fast. And the people who can stay on top of it can write their own ticket in this world.

That's the beauty of the Air Force.

We can put you to work with technology that you may not read about in magazines for years.

We can teach you how to make sense of the

most intimidating circuitry in existence anywhere.

If you attend college, we'll pick up 75% of your tuition. You can even earn an associate degree from the Community College of the Air Force.

What does all that mean?

It means there's no telling where technology is going in the future.

But with Air Force training, you've always got a future to look forward to. For more information, call an Air Force recruiter at 1-800-423-USAF.

**AIR
FORCE**

Nobody's Perfect...

Game	Winner	Time to Move
1	SARGON III	5 seconds
2	SARGON III	5 seconds
3	SARGON III	15 seconds
4	SARGON III	15 seconds
5	SARGON III	30 seconds
6	Chessmaster	30 seconds
7	SARGON III	3 min
8	SARGON III	3 min

YOU CAN'T WIN THEM ALL.

We pitted Sargon III, the world champion, against the challenger. Head to head, with no punches pulled. And believe it or not, the champ lost one game to the challenger. But Sargon III beats Chessmaster 2000 almost everytime.

Sargon III is the result of more than twenty one man years of development. Sargon III will play at precisely the level of difficulty you desire. Ask Sargon III for a hint, take back a move you've already made, replay a sequence, change sides, or set up your own board for customized learning. Sargon III lets you study in detail more than 100 great games of history or review 45 classic chess problems,

all on screen. Sargon III also includes the largest library of opening moves available on any chess program.

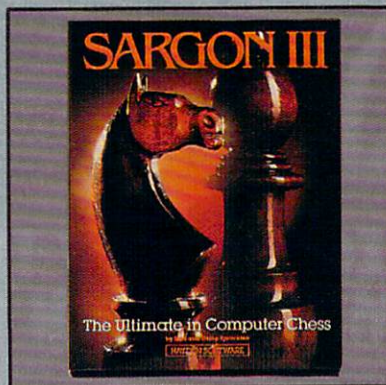
SARGON III WRITES CHESS HISTORY

In a tournament sanctioned by the U.S. Chess Federation, Sargon III beat

a master rated 2209. That makes Sargon III the only microcomputer program ever to defeat a player at that level.

Sargon III has no trouble wiping Chessmaster 2000 off the globe. Someday, maybe a chess playing program will be able to beat Sargon III. Until then, which chess program do you want to own: the world champion or the runner-up?

(Note: The test was run on two Apple II computers. Each program played once as white and once as black at each level. Send us \$5.00 for handling, along with a postage paid return envelope and we'll send you a copy of the moves each side played.)



Sargon III is available for: Apple II series, Apple Macintosh, IBM PC and Commodore 64/128 computers. You can find Sargon III at your local retailer or call 1-800-826-0706. Illinois residents call 1-800-826-1330. Only MasterCard, VISA and American Express accepted for phone orders.

HAYDEN
SOFTWARE
A division of Spinnaker Software

COMPUTE!

JULY 1987
VOLUME 9
NUMBER 7
ISSUE 86

FEATURES

- 14** IBM Compatibles: The Universe Expands Keith Ferrell
26 Telecomputing with the Online Services Selby Bateman
36 Weather Wizard John R. Wetsch

GUIDE TO ARTICLES AND PROGRAMS

AP/AT/ST/AM/
64/PC/PCjr

REVIEWS

- 30** *Ring Quest* Michael B. Williams
32 Two Views of Outer Space: *S.D.I.* and *Wanderer* Neil Randall
34 *Moonmist* Neil Randall

34 *Partner* Kathy Yakal
35 *Realm of Impossibility* Michael B. Williams

AP
GS/ST/AM/64/PC
AP/Mac/AT/ST/AM/
64/128/PC
64/128/PC
AP/AT/64

COLUMNS AND DEPARTMENTS

- 4** The Editor's Notes Richard Mansfield
8 Readers' Feedback The Editors and Readers of COMPUTE!
42 Computers and Society: Advancing Technology David D. Thornburg
44 Microscope Sheldon Leemon
47 The World Inside the Computer:
 Sandbox Fred Rides the Wild Electrons Fred D'Ignazio
52 INSIGHT: Atari—Three Questions Bill Wilkinson
54 The Beginner's Page: Using Variables C. Regena
55 Telecomputing Today: Computer III—The Verdict Arlan R. Levitan
56 AmigaView: Using Your Printer with the Amiga Sheldon Leemon
57 ST Outlook: Journey from the Center of the ST—Part 2 Phillip I. Nelson
58 IBM Personal Computing: Fishing in *The Washington Post* Donald B. Trivette

•
•
•
•
•
AT
•
•
AM
ST
PC

THE JOURNAL

- 60** P/M Magic Gary Costanza
67 PFkey 64 Jeffrey D. Partch
74 Zookeeper for the Amiga Michael Barron
76 Sprite Designer André Corbin
81 Disk Expander for Apple II Boris Troyanovsky
82 1571 Utility Package Dick Smit
89 Medium-Resolution Autorun for Atari ST Brian McCorkle
91 Text File Splitter for Atari Frank P. Walters
93 Converter: Graphics Conversion Utility for *The Print Shop* Lee Swoboda
98 IBM Printer Control Ronald Dorchester
100 Auto-Display Hi-Res Picture Maker Jaideep Vijan
103 Autoload: A Streamlined 130XE RAMdisk Loader Mark Slagell
105 Smooth-Scrolling Billboard for Commodore 64 Paul W. Carlson
107 Vanishing Directory Paul W. Carlson
109 Relative Files on the 1571 Disk Drive Myron Achtman

AT
64
AM
64
AP
128
ST
AT
AP
PC/PCjr
AP
AT
64
PC/PCjr
128

- 53** **CAPUTE!**: Modifications or Corrections to Previous Articles
118 News & Products
121 **COMPUTE!**'s Author's Guide
122 **COMPUTE!**'s Guide to Typing In Programs
125 **MLX**: Machine Language Entry Program for Commodore 64 and 128
129 **MLX**: Machine Language Entry Program for Apple
132 Advertisers Index

NOTE: See page 122 before typing in programs.

AP Apple, GS Apple IIGS Mac
Macintosh, AT Atari, ST Atari ST,
AM Amiga, 64 Commodore 64,
128 Commodore 128, PC IBM PC,
PCjr IBM PCjr, • General Interest.

COMPUTE! Publications, Inc.

Part of ABC Consumer Magazines, Inc.
One of the ABC Publishing Companies
ABC Publishing, President, Robert G. Burton
1330 Avenue of the Americas, New York, New York 10019

COMPUTE! The Journal for Progressive Computing (USPS: 537250) is published monthly by COMPUTE! Publications, Inc., 825 7th Ave., New York, NY 10019 USA. Phone: (212) 265-8360. Editorial Offices are located at 324 West Wendover Avenue, Greensboro, NC 27408. Domestic Subscriptions: 12 issues, \$24. POSTMASTER: Send address changes to: **COMPUTE!** Magazine, P.O. Box 10955, Des Moines, IA 50950. Second class postage paid at Greensboro, NC 27403 and additional mailing offices. Entire contents copyright ©1987 by COMPUTE! Publications, Inc. All rights reserved, ISSN 0194-357X.

This month's guest editorial is written by Selby Bateman, COMPUTE!'s associate publisher and a long-time Commodore watcher.

The Commodore Shake Up

T. S. Eliot wrote that April is the cruelest month, and for the senior management of Commodore International's U.S. group—including Chief Executive Officer Thomas Rattigan—this past April seems to have lived up to its billing.

Rattigan and a group of high-level Commodore executives were unexpectedly relieved of their duties in April by Commodore International Chairman Irving Gould and the company's board of directors. Coming on the heels of three consecutive profitable quarters (after more than a year in the red), the ouster seemed to shock just about everyone.

Among those purged were several top Rattigan people, including Nigel Shepherd, general manager of Commodore's North American operations, and Alan Gauthier, vice president of finance. Rattigan promptly filed a \$9 million lawsuit against Commodore for allegedly breaching his contract, a charge the company denied.

What caused the rift and abrupt firings? Rumors seem to vary depending on whether they come from Rattigan loyalists or Gould supporters. Members of the former group say that it was Rattigan's policies that turned the company around during the past year and a half through stringent cost controls that saved Commodore from bankruptcy. Some in the Gould camp maintain that Commodore's bankers largely charted the austerity budgeting that helped return Commodore to profitability, and that Rattigan and his team had done little to boost lagging U.S. sales which have been outstripped by European sales.

Both sides seem to agree that there were personality conflicts aplenty between Rattigan and Gould. And some saw the infighting as reminiscent of the John Sculley—Steve Jobs clash that resulted in Apple cofounder Jobs leaving the company when Sculley reportedly convinced the board of directors that he represented the future of the company. In the Commodore case, Gould—who

has been in charge at Commodore for a quarter of a century—proved once again that when push comes to shove, he's the boss. Remember, it was Gould who stayed at Commodore and Jack Tramiel who left the company after the two were said to have fought several years ago.

Gould and the Commodore board have named Alfred Duncan as the new general manager of U.S. operations and Richard McIntyre as general sales manager in the U.S. Both have considerable experience: Duncan has previously served in managerial positions with Commodore's Canadian and Italian subsidiaries, and McIntyre was manager of the Canadian subsidiary. Their mandate, first and foremost, is sure to be this one thing: Increase U.S. sales. As long-time supporters of Commodore, we wish the new management team well.

What's of particular concern, of course, is whether this corporate upheaval will retard or destroy the chances for success of the new Amiga 500 and 2000 computers, and its potential negative impact on the continued success of the Commodore 64, 128, and PC10 systems. The life cycle of a personal computer can be a delicate one, and more than one machine's chances have been dramatically altered by market factors having nothing to do with the computer's inherent quality or value to the consumer.

We're confident that Commodore has the talent and the computers to remain a key player in the personal computer field. However, the next months are likely to be bumpy at best. Even with renewed growth in the industry, this remains a period of transition and volatility for most of the major hardware companies.

What's next as Commodore and its rivals jockey for position and market share? Some hints are bound to surface at the Summer Consumer Electronics Show (CES) in Chicago, May 30–June 2, and the Computer Dealers' Exposition (COMDEX) in Atlanta, June 1–4. In many ways, these two shows—very different in nature—are bellwethers of the computer industry for the all-important latter half of the year, the third

and fourth business quarters of 1987.

COMDEX is a huge all-computer show that focuses primarily on the business computing environment. CES, a massive consumer electronics showcase, has a computer component of 15–25 percent.

The new products, industry announcements, and general mood of these shows will all help to determine the direction of the computer industry for the remainder of 1987 and well into 1988. COMPUTE!'s editors will be at both shows, and next month we'll give you an overview of what we've seen and what we think it all will mean.

Until then, enjoy this issue of COMPUTE!.

Selby Bateman

Selby Bateman
Associate Publisher

COMPUTE! Publications, Inc. is seeking to fill the following in-house editorial positions:

Assistant Book Editor—Requires knowledge of computer programming. Undergraduate degree in English or related field. Two years writing and editing experience.

Assistant Technical Editor—Requires extensive experience with microcomputers, knowledge of machine language. Experience or training in editing or writing. Undergraduate degree preferred; experience in lieu of degree considered.

Microcomputer Programmer—Requires proficiency on one or more of the following computers: IBM PC, Apple, Commodore, Atari. College degree preferable with coursework in BASIC. Proficiency in BASIC programming. Extensive machine language experience a plus.

Send résumé and salary history in complete confidence to:

Personnel Director
COMPUTE! Publications, Inc.
P.O. Box 5406
Greensboro, NC 27403

**"Ordinary
online
services
left me flat..."**

**"With GENIE™
I discovered
vast new
horizons."**



\$10.00+ per hour

There's only so far you can go with most ordinary online information networks. But with GENIE—the General Electric Network for Information Exchange—there's virtually no end to the exciting new interests you can explore. Discover the value of GENIE's vast range of services and explore new territory with guides from our Special Interest Groups.

Join the friendly crew with GENIE's **RoundTable™ Special Interest Groups** for exciting and informative discussions. Benefit from the expertise of experienced individuals. Compare notes on hardware, software, games or any other topic you choose. And, for the simple cost of downloading, collect thousands of valuable public domain software programs for your personal computer. Over 1000 new programs are added to our libraries every month. And remember, **UPLOADS ARE FREE** on GENIE!

No extra charge for 1200 Baud.

Make new friends, schedule meetings, gather facts and figures, set up travel plans, get the news, be entertained and even shop online for a fraction of what other information services charge, because GENIE's non-prime rate for 300 or 1200 baud is only \$5 an hour. GENIE always comes out ahead of the competition in savings, in some cases by as much as 60%.

You get even more for your money.

In addition to user support groups, you can meet new people with **GENIE's Live Wire™ CB Simulator**. Exchange messages with **electronic mail** service. Find the best vacation



\$5 per hour

deals and make your reservations with **American Airlines travel service**. Shop at home with **American Express Merchandise Shop**. Learn the fun way with a subscription to **Grolier's electronic encyclopedia**. Play classic and

Backed in the GE Tradition

GENIE is brought to you by General Electric, whose reputation is built on attention to detail and customer satisfaction. We're continuing that tradition with GENIE.

Compare & Save*	Services						Pricing			
	Travel & Shopping	SIGs/User Groups	CB & Mail	Financial Services	News	Games	Registration Fee	Monthly Minimum	Non-prime time rates	
									300 baud	1200 baud
The Source	X	X	X	X	X	X	\$49.95	\$10.00	\$8.40	\$10.80
CompuServe	X	X	X	X	X	X	\$39.95	none	\$6.00	\$12.50
GENIE†	X	X	X	X	X	X	\$18.00	none	\$5.00	\$5.00

*Basic rates and services shown in effect 2/87. †Non-prime time applies Mon.-Fri., 6pm-8am local time, all day Sat., Sun., and nat'l holidays. Subject to service availability. Additional charges apply for 2400 baud and financial services.

multiplayer games. Use GENIE's **Financial Services** to track stock market quotes, check market indicators and maintain an automatically updated personal portfolio online. All this **plus** new services added each and every month!

Map out your own voyage of discovery with GENIE as your guide...enrich your tomorrows by signing on with GENIE today.

Sign up from your keyboard today.

4 Easy Steps:

1. Have your major credit card or checking account number ready.
2. Set your modem for local echo (half duplex)—300 or 1200 baud.
3. Dial **1-800-638-8369**. When connected, enter HHH
4. At the U# = prompt enter **XJM11865, GENIE** then RETURN.

Need help or more information? No modem yet? We can help. In U.S. or Canada call **1-800-638-9636**.

GENIE™
Stay online longer, for less.



General Electric Information Services Company, USA

GENIE rates and services subject to change. Uploads are free during non-prime hours at 300 or 1200 baud. Some services offered on GENIE may include additional charges.

Publisher James A. Casella
Editorial Director Richard Mansfield
Managing Editor Kathleen Martinek
Associate Publisher Selby Bateman

Editor, COMPUTE! & COMPUTE!'s GAZETTE Lance Elko
Assistant Editor, COMPUTE! Philip I. Nelson
Production Director Tony Roberts

Editor, COMPUTE!'s Atari ST Disk & Magazine Tom R. Halfhill

Editor, COMPUTE!'s Apple Applications Magazine Gregg Keizer
Features Editor Keith Ferrell
Technical Editor Ottis R. Cowper
Assistant Technical Editors George Miller, Dale McBane

Assistant Editor, COMPUTE!'s Atari ST Disk & Magazine Todd Heimark
Assistant Editor, COMPUTE!'s GAZETTE Rhett Anderson
Assistant Editor John Shade
Assistant Features Editor Kathy Yakal
Programming Supervisor Patrick Parrish
Editorial Programmers Tim Victor, Tim Midkiff, William Chin

Copy Editors Karen Uhlenhof, Karen Siepak
Editorial Assistant Caroline Hanlon
Submissions Reviewer David Hensley
Programming Assistant Troy Tucker
Executive Assistant Debi Nash
Administrative Assistants Julia Fleming, Iris Brooks, Mary Hunt, Sybil Agee

Receptionist Anita Armfield
Associate Editors Jim Butterfield
 Toronto, Canada
 Fred D'Ignazio
 Birmingham, AL
 David Thornburg
 Los Altos, CA
 Bill Wilkinson

Contributing Editor

COMPUTE!'s Book Division
Editor Stephen Levy
Assistant Editors Tammie Taylor, Robert Bixby
Programming Assistant David Florance
Director of National Sales Joseph W. Hatcher

Production Manager Irma Swain
Art Director Janice R. Fary
Assistant Art Director Lee Noel

Assistant Production Manager De Potter
Artists Robin Case, Kim Potts, Scotty Billings
Typesetting Terry Cash, Carole Dunton
Illustrator Harry Blair

Director of Advertising Sales Peter Johnsmeyer
Advertising Director Bernard J. Theobald, Jr.
Production Coordinator Kathleen Hanlon

Customer Service Manager Diane Longo
Dealer Sales Supervisor Jose Cruz
Individual Order Supervisor Cassandra Green

James A. Casella, President
 Richard Mansfield, Vice President, Editorial Director
 Richard J. Marino, Vice President, Advertising Sales
 Christopher M. Savine, Vice President, Finance & Planning

Editorial Board
 Richard Mansfield, Kathleen Martinek, Selby Bateman,
 Lance Elko, Tom R. Halfhill, Stephen Levy
 Robert Lock, Founder and Editorial Consultant

COMPUTE! Publications, Inc. publishes:

COMPUTE!
COMPUTE!'s Gazette
COMPUTE!'s Gazette Disk
COMPUTE!'s
Apple Applications Special
COMPUTE!'s
Atari ST Disk & Magazine

Editorial offices: 324 West Wendover Avenue
 Suite 200
 Greensboro, NC 27408 USA

Corporate offices: 825 7th Avenue
 New York, NY 10019
 212-265-8360

Customer Service: 800-346-6767
 (In NY 212-887-8525)

Hours: 9:30 A.M.-4:30 P.M.
 Monday-Friday

Coming In Future Issues

The Summer Consumer Electronics Show—A Complete Report

BASIC Batch Files With Atari DOS

XPressCard Filing System For The 64

Chaining Programs In AppleSoft

Pop-Up ASCII For The IBM PC

Atari ST Math Graphics

Fractal Mountains On The Amiga

SoftSprite For The Atari

Subscription Orders & Inquiries

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

TOLL FREE
Subscription Order Line
800-247-5470
 In IA 800-532-1272

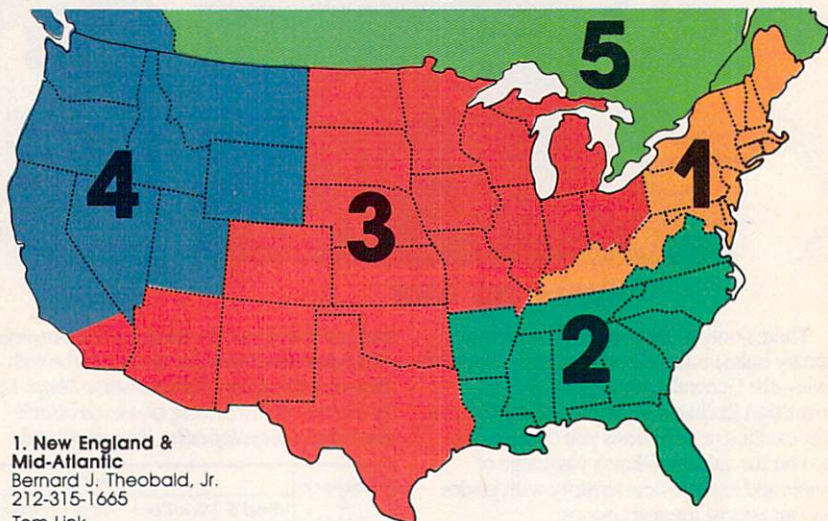
COMPUTE! Subscription Rates (12 Issue Year):

US	Canada & Foreign
(one yr.) \$24	Surface Mail \$30
(two yrs.) \$45	Foreign Air \$65
(three yrs.) \$65	Delivery \$65



Magazine Publishers Association

Advertising Sales



1. New England & Mid-Atlantic
 Bernard J. Theobald, Jr.
 212-315-1665
 Tom Link
 212-315-1665

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

3. Midwest & Southwest
 Jerry Thompson
 312-726-6047 (Chicago)
 713-731-2605 (Texas)
 303-595-9299 (Colorado)
 415-348-8222 (California)
 Lucille Dennis
 415-348-8222

4. West, Northwest & British Columbia
 Jerry Thompson
 415-348-8222
 Lucille Dennis
 415-348-8222

5. Canada
 Harry Blair
 919-275-9809

Director of Advertising Sales:
 Peter Johnsmeyer

Associate Advertising Director:
 Bernard J. Theobald, Jr.

COMPUTE! Sales Office 212-315-1665

Address all advertising materials to:
 Kathleen Hanlon
 Advertising Production Coordinator
COMPUTE! Magazine
 324 West Wendover Avenue
 Suite 200
 Greensboro, NC 27408

The COMPUTE! subscriber list is made available to carefully screened organizations with a product or service which may be of interest to our readers. If you prefer not to receive such mailings, please send an exact copy of your subscription label to: COMPUTE! P.O. Box 10955, Des Moines, IA 50950. Include a note indicating your preference to receive only your subscription.

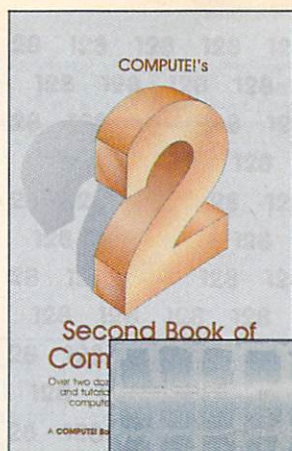
Authors of manuscripts warrant that all materials submitted to COMPUTE! are original materials with full ownership rights resident in said authors. By submitting articles to COMPUTE!, authors acknowledge that such materials, upon acceptance for publication, become the exclusive property of COMPUTE! Publications, Inc. No portion of this magazine may be reproduced in any form without written permission from the publisher. Entire contents copyright © 1987, COMPUTE! Publications, Inc. Rights to programs developed and submitted by authors are explained in our author contract. Unsolicited materials not accepted for publication in COMPUTE! will be returned if author provides a self-addressed, stamped envelope. Programs (on tape or disk) must accompany each submission. Printed listings are optional, but helpful. Articles should be furnished as typed copy (upper- and lower-case, please) with double spacing. Each page of your article should bear the title of the article, date and name of the author. COMPUTE! assumes no liability for errors in articles or advertisements. Opinions expressed by authors are not necessarily those of COMPUTE!.

PET, CBM, VIC-20 and Commodore 64 are trademarks of Commodore Business Machines, Inc. and/or Commodore Electronics Limited. Apple, Apple II, and Apple Iles are trademarks of Apple Computer Company IBM PC and PCjr are trademarks of International Business Machines, Inc.

ATARI is a trademark of Atari, Inc. TI-99/4A is a trademark of Texas Instruments, Inc. Radio Shack Color Computer is a trademark of Tandy, Inc.

New books from COMPUTE!

COMPUTE! Books is bringing you a brand new line up of books for your Commodore 64 and 128. These recent releases offer you everything from programming hints to exciting games, from educational to home and business applications.



COMPUTE!'s

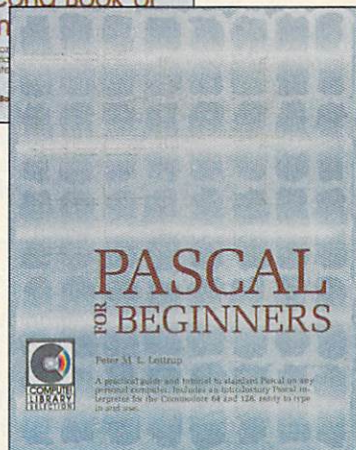
Second Book of

Com

Over two and a half

computer

A COMPUTE! Book



PASCAL
FOR
BEGINNERS



Peter M. L. Leitzup

A practical guide and tutorial to standard Pascal on any personal computer. Includes a 5.25-inch floppy diskette for the Commodore 64 and 128, ready to type in and use.

Pascal for Beginners

\$14.95

0-87455-068-8

Book/disk combination for the Commodore 64

\$29.95

ISBN 0-87455-069-6

This introductory text to standard Pascal on any computer is an ideal tutorial for anyone who wants to learn this powerful computer language. It includes everything you need, including an introductory Pascal interpreter* for the Commodore 64 and 128 in 64 mode, ready to type in and use. Written in plain English and offering numerous program examples, it gently and clearly explains standard Pascal and structured programming. Latter sections include discussions of advanced topics such as files and dynamic data storage. *There is also an optional disk available for \$12.95 for the Commodore 64 which includes most of the programs in the book. 688BDSK.*

*The Commodore 64 Pascal interpreter is not full-featured, but still a powerful implementation of Pascal which suits the needs of most beginners.

COMPUTE!'s Music System for the Commodore 64 and 128

Book/disk combination only

\$24.95

ISBN 0-87455-074-2

Sidplayer, the feature-packed, popular music player and editor program, is now more versatile and more impressive than before. *Enhanced Sidplayer* for the Commodore 128 and 64 includes two new versions—one for the Commodore 128 running in 128 mode and another for the Commodore 64. Take advantage of every feature the SID chip (the sound chip in the 128 and 64) has to offer. Just like the original, *Enhanced Sidplayer* is easy to learn and use, with many powerful new features. The accompanying disk contains the editor, player programs (including a Singalong program), utilities, and sample music that you can enjoy immediately or change. The new *Sidplayer* plays any songs created by the original *Sidplayer* for the Commodore 64.

User's Guide to GEOS: geoPaint and geoWrite

\$18.95

ISBN 0-87455-080-7

Learn the ins and outs of GEOS, the new icon-based operating system for the new Commodore 64C and the 64, with this step-by-step guide. Everything from creating simple letters with *geoWrite* and pictures with *geoPaint* to merging text and graphics and using desk accessories is clearly and concisely explained.

COMPUTE!'s Second Book of the Commodore 128

\$16.95

ISBN 0-87455-077-7

The editors at COMPUTE! Publications have collected some of the best games, programs, and tutorials for the Commodore 128 (in 128 mode) from *COMPUTE!* magazine and *COMPUTE!'s Gazette*. Like *COMPUTE!'s First Book of the Commodore 128*, this book offers a variety of programs and articles for every 128 user. Each program has been fully tested and is ready to type in and use on the Commodore 128 running in 128 mode. *There is also a disk available for \$12.95 which includes the programs in the book. 777BDSK.*

Mapping the Commodore 64, Revised

\$16.95

ISBN 0-87455-082-3

An update of the bestselling memory map and programming guide. It's a necessity for intermediate and advanced programmers. This definitive sourcebook has been expanded and now covers the new icon-based GEOS (Graphics Environment Operating System) with clear descriptions of how to make it work for you. For BASIC and machine language programmers of both the Commodore 64 and 64C.

Look for COMPUTE! Books at your local computer or book store.
Or, to order directly from COMPUTE!, call toll free 1-800-346-6767 (in NY 212-887-8525) or
write COMPUTE! Books, P.O. Box 5038, F.D.R. Station, New York, NY 10150.

Please include shipping and handling: \$2.00 per book in U.S. and surface mail; \$5.00 airmail.
NC residents add 5 percent sales tax and NY residents add 8.25 percent sales tax.
Please allow 4-6 weeks for delivery.

COMPUTE! Publications, Inc. 

Part of ABC Consumer Magazines, Inc.
One of the ABC Publishing Companies

COMPUTE! Books are available outside the United States from
subsidiaries of McGraw-Hill International Book Company.



Readers Feedback

The Editors and Readers of COMPUTE!

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

The Logic Of Lines

How do you turn off the automatic scroll of text in Atari's graphics mode 0? My program puts a menu at the top of the screen and prints text on the next 18 lines. I delete the sixth line when the screen gets full, but everything scrolls up from one to three lines, instead of just one.

John Pilge

The problem you are having is common on eight-bit computers with text mode. Although the screen display always contains the same number of physical lines—23 lines, in the case you mention—it may contain a different number of logical lines at any given time. A logical line is a collection of one or more linked physical screen lines. When you clear the screen, every logical line is set to the corresponding physical line. But if printing overlaps from one line to another, the computer links the two physical lines into a single logical line. On the Atari, a logical line may contain as many as three physical lines. When you enter a program line, the computer rings a bell to warn you when you near the end of the third logical line; it's a warning to indicate that you're almost at the end of the legal size of a logical line.

Whether you're typing a program, running it, or entering direct commands, the logical line system is always enabled. That's why BASIC program lines or a typed response to an INPUT statement can be only three lines long. When the computer scrolls the screen, it scrolls an entire logical line, creating the effect you describe.

The easiest way to solve your problem is to limit the length of everything that's printed on the screen so that each logical line is only one physical line. If this is impractical, here's another solution:

```
POKE 690,255:POKE 691,255:POKE
692,255
```

Execute these statements in the program immediately before you delete a line.

They reset every logical line to one physical line. Although you might be tempted to experiment, it's better to avoid typing these POKes in direct mode when you're editing a BASIC program. These statements split up all the lines on the screen that are longer than one logical line. If you then press RETURN over any of those partial lines, you may lose some of the program.

The Commodore 64 has a similar system of logical lines, except that its logical lines consist of either one or two physical lines. Here's an equivalent for the 64 to the three POKes above:

```
FOR J=217 TO 242:POKE J,PEEK(J) OR
128: NEXT
```

On the Commodore 128, logical lines can normally be up to four physical lines long. However, the 128 allows you to disable line linking so that all logical lines are just one physical line long. Turn this feature on with

```
POKE 248, PEEK(248) OR 64
```

To restore normal line linking, use

```
POKE 248, PEEK(248) AND 191
```

Mismatched Monitor

I have a Tandy 1000 computer with monochrome monitor, and I would like to get a monitor with higher resolution. The Tandy VM-3 high-resolution monitor has a 720 × 350 screen for text and a 640 × 350 screen for graphics, but I have been told that I can't use that monitor. What's the reason for this? I thought you could use any monitor as long as you have the right cable to hook it up.

Robert Estrada, Sr.

For computer graphics and text, the computer's display capabilities should match those of the monitor. For instance, if your computer generates a screen that's 320 dots wide and 200 dots high, any video monitor able to display a 320 × 200 screen can be used. A monitor capable of a higher resolution won't increase the computer's resolution. Check the specifications for your computer's video hardware; buying an expensive high-resolution monitor will be a waste of money if your system can't generate equivalent high-resolution displays. The important factor is whether the computer and monitor can

display the same number of dots vertically and horizontally, using the same number of colors. If the two devices don't match in that way, it doesn't matter whether you can hook them up physically. If you connect a computer to a mismatched monitor, the picture may look garbled, or perhaps simply blank.

For the IBM PC and compatible computers like your Tandy 1000, it's often possible to upgrade the video hardware to get higher resolution. You may be able to replace the existing video hardware with a different graphics adapter card. Before investing in such a card, you should make sure that it is compatible with your computer and with the software you use most often.

Disabling Control-Break On IBM PC And Clones

I have an IBM PCjr and I want to turn off the Fn-Break key combination so the machine ignores a break. Can you provide an assembly language routine to do this?

Kevin Neil

Like most IBM PC operating system functions, the Control-Break function (Fn-Break on the PCjr) is controlled by an interrupt service routine. Briefly, an interrupt occurs when a special pin on the microprocessor receives a signal. At this point, the computer ceases execution of the program it is running, and a support chip feeds it the ROM address of the appropriate machine language subroutine which it then executes. This routine ends with an IRET (RETurn from Interrupt) instruction. After it performs IRET, the processor returns to running the original program.

Every keypress on an IBM PC causes such an interrupt. Normally, the computer decodes the keypress and places its ASCII value in the keyboard buffer for use by the program currently running. However, an interrupt caused by Control-Break executes a special interrupt service routine—the effects of which are known to anyone who has ever pressed the Control-Break key combination.

One advantage of using interrupts is that you can change the address of the service routine. This allows a program to divert the address of a service routine to

**FREE
ACCESS!**

VISIT OUR OPEN HOUSE *FREE* AND ENTER TO WIN A \$1,000 SHOPPING SPREE!

SATURDAY AND SUNDAY, JULY 18-19, 1987!

For two days only, you can sign onto America's largest electronic shopping service, Comp-u-store OnLine, during our OPEN HOUSE!

Take advantage of *FREE* membership access (a \$25 value), one hour *FREE* connect time (a \$5 value), and up to 50% guaranteed savings* on over 250,000 quality name-brand products.

And that's not all — while you're there, be sure to enter our OPEN HOUSE DRAWING and you could win a *FREE* one year membership and a \$1,000 shopping spree in Comp-u-store OnLine!

To find your way to our OPEN HOUSE, please follow the directions printed on the invitation below.

Have you ever been to a party that didn't have to end?

Once you visit our OPEN HOUSE, we think you'll want to stay, so for a limited time you can join Comp-u-store OnLine at a special low rate. When you sign up by August 30, 1987 and indicate that you saw this ad, you'll receive 6 months of membership for only \$1* (that's a \$12.50 value)! Just call 1-800-843-7777!

A Personal Invitation

*To Visit Our Open House July 18-19, 1987
Begins And Ends At Midnight*

Directions:

1. Set your modem to dial the local CIS, Telnet, or Tymnet number for your area.
2. Once connected, press the CONTROL and C keys at the same time.
3. At HOST NAME prompt, enter CPS.
4. At USER ID prompt, enter 34101,3000.
5. At PASSWORD prompt, enter CUS.
6. At MEMBERSHIP # prompt, enter 2570.
7. At ACCESS CODE prompt, enter 771956.

One Hour Free Connect Time

Plus \$1,000 Shopping Spree To Our Lucky Winner

**compustore[®]
On Line**

*For price policy and billing information, see Terms And Conditions when you log on.

ONLSA46

its own, custom-tailored routine. If you replace the address of the Control-Break service routine with the address of another routine, that routine executes every time Control-Break is pressed. The BASIC interpreter itself makes such a change when it loads, changing the Control-Break routine to a routine which breaks the operation of a BASIC program.

The easiest way to disable Control-Break is to divert the address of the Control-Break routine to a do-nothing routine that contains nothing but an IRET instruction. While IRETs abound in the ROM, the exact addresses where they may be found vary depending on the ROM and DOS version and the make of the computer. It is safest to put an IRET in memory, and to point Control-Break to this instruction. The following BASIC program changes the address of the service routine (located at \$006C-\$006F) to point to an IRET instruction which it places at address \$0180, a normally unused location.

```

Ø DEF SEG=Ø          *SET TO Ø
SEGMENT
1Ø POKE &H18Ø,&HCF  *POKE 18Ø
WITH MACHINE INSTRUCTION FO
R IRET
2Ø POKE &H6C,&H8Ø  *LOW BYTE
OF 18Ø
3Ø POKE &H6D,&H1   *HIGH BYTE
OF 18Ø
4Ø POKE &H6E,Ø    *Ø'S FOR
SEGMENT
5Ø POKE &H6F,Ø
6Ø FOR I=1 TO 1ØØØ:PRINT I:NEXT
*TRY AND BREAK IT

```

Here is an assembly language routine that does the same thing. It uses DOS service call \$25 to change the address of the Control-Break interrupt \$1B:

```

MOV AX,Ø
MOV DS,AX          ; SET DATA SEG READ-WRITE TO Ø
MOV BX,Ø18Øh      ; CHANGE LOCATION 18Øh
MOV AX,ØCFh       ; TO OPCODE FOR IRET
MOV [BX],AX
XCHG BX,DX        ; DOS NEEDS LOCATION FOR IRET IN DX
MOV AH,Ø25h       ; SETUP FOR DOS INTERRUPT CHANGING SERVICE 25h
MOV AL,Ø1Bh       ; INTERRUPT NUMBER TO BE CHANGED
INT 21h           ; DOS INTERRUPT
INT 2Ø            ; RETURN TO DOS

```

Typing Proofreader Correctly

I have typed in the Commodore "Automatic Proofreader" program that appears in the back of your magazine. When I run the program, it stops at line 70 with an ILLEGAL QUANTITY ERROR message. Is this line printed correctly? I would appreciate any information that you can provide.

Stephen A. Kuhn

There are no mistakes in the Commodore "Automatic Proofreader" program or in the listing which appears in the magazine. The message you mention is due to a fairly common typing error which is tricky to

interpret if you're not familiar with BASIC.

First, you need to know where to look for the error. In line 70, the computer reads a series of numbers from DATA statements elsewhere in the program and POKES those numbers into memory. This is a common method of transferring information (in this case, a machine language program) from BASIC program lines into the computer's memory. When line 70 is executed, the computer is actually looking at the DATA values that occur in later program lines. The READ statement begins with the first DATA value in the program and retrieves each DATA value in order. To track down the source of this error, you must carefully proofread every number in the lines that begin with DATA.

You also need to know what kind of mistake to look for. Because 255 is the largest value that a single memory location can hold, the POKE command can only store numbers in the range 0-255. The message ILLEGAL QUANTITY usually indicates that you are trying to POKE a number which falls outside that range—for instance, a negative number, or one that's greater than 255. Thus, you should look for numbers in the DATA lines that are outside the range 0-255.

In your case, BASIC correctly indicates that the error occurred while it was performing line 70. The POKE command that triggers the error is in line 70. But the illegal quantity that POKE can't handle was pulled from a different line of the program.

Perhaps the most common cause of ILLEGAL QUANTITY errors is leaving

a memory address, the Commodore 64 doesn't contain a location 65537 (the highest memory address is location 65535). This sort of error might occur if you mistype lines 10-60, which detect the computer you are using and calculate addresses used by the Proofreader.

Typing mistakes also can trigger an OUT OF DATA error message. For instance, if you omit a comma between two small numbers, the wrong number that results may not be large enough to cause an ILLEGAL QUANTITY error, but the computer will run out of DATA items to read before it finishes the loop. For example, say that you omit the comma between the numbers 4 and 3 in line 160 of the Proofreader program. The computer dutifully POKES the legal value 43, but now the program doesn't contain enough DATA items to complete the FOR-NEXT loop in line 70. Again, though the error message points to line 70, the mistake itself is found in a DATA line.

Similar errors occur if you omit a number entirely or type a period instead of a comma. If you type DATA 120.169 in line 160, for instance, the READ command in line 70 reads the fractional value 120.169 from that DATA line. However, the program doesn't stop with an ILLEGAL QUANTITY error, as you might expect. Since it's impossible to POKE a fractional value, BASIC automatically strips the fraction from the number and uses 120, which is in the legal range for POKE. The effect is the same as if you leave out a number; the program stops and warns you that it is OUT OF DATA.

Another mistake involves typing an extra comma where no comma should appear. For instance, look at line 160 of the listing in the magazine. Because that line is too long to be listed in one column, the listing breaks at the right margin; as it happens, the break occurs in the middle of the number 169. A few readers have made the mistake of inserting a comma at the break, which changes the number 169 into two numbers: 16 and 9. Since the program now contains one DATA item too many, it won't generate an OUT OF DATA message. However, to help you find typing errors, the program also calculates a checksum based on the value of each DATA item and its position in the DATA list. If you add an extra comma, the program itself detects a mistake and warns you to check your typing. The same message appears if you simply mistype a number in a way that doesn't create an illegal quantity. For instance, typing 102 instead of 120 doesn't cause an ILLEGAL QUANTITY error, but the program detects that you made a typing error.

Typing mistakes in DATA statements can be difficult to spot. One useful debugging technique is to get a friend to read the magazine listing aloud while you compare

out a comma between two DATA values. The first DATA line of the Proofreader program, for instance, begins with these two numbers:

```
DATA 120,169
```

If you forget to type the comma between 120 and 169, the READ statement interprets the number as 120169, which is much too big to be stored by POKE and triggers an ILLEGAL QUANTITY error.

The message ILLEGAL QUANTITY can also indicate that you're trying to POKE a value into some location that doesn't exist in the computer's memory. For instance, the statement POKE 65537, 12 causes an ILLEGAL QUANTITY error because, while 12 is small enough to fit in

the listing on your screen. Another trick is to check each DATA value in reverse order, beginning with the last DATA value and working backwards to the beginning.

Other typing errors can be more difficult to spot, but just as insidious. If you scramble any of the variable names in the program, it probably won't work at all. For instance, if you type POKE AR instead of POKE ADR, or type SYS SS instead of SYS SA, don't be surprised if the computer crashes. (No real harm is done when the computer locks up; simply turn the machine off and on to regain control.) Likewise, the Proofreader can't possibly work if you leave out a program line altogether. There's no way to check for every conceivable typing error without writing a second Proofreader program to check the first Proofreader program—which goes beyond the point of diminishing returns.

If the Proofreader stops with an error message, it's important to reload it from disk or tape for editing, rather than trying to edit the lines that remain in memory. To simplify the process of running on five different computers, the Proofreader installs its machine language in the same memory area used by the first few lines of the BASIC program (which are no longer needed by the time the computer reaches line 70). For this reason, it's important that you not delete any of the lines in the program, even if you're certain that they don't apply to your computer.

Sprites On The 64

I have a question about the Commodore 64. How do you display two different sprites at the same time? Also, how do you use multicolor sprites?

Ty Neyedli

All the Commodore 64's sprite features are generated by the computer's VIC-II video chip. That chip is controlled by registers that appear at memory locations 53248-53294. You manipulate sprites by POKEing values into these registers. For example, memory location 53269 is used to turn any of the 64's eight sprites on or off. Here is the general formula for turning on a sprite:

POKE 53269, 2↑SN

In this case, SN represents the number of the sprite you wish to turn on. The sprites are usually numbered 0-7. Thus, POKE 53269,1 turns on sprite 0. POKE 53269,4 turns on sprite 2, and so forth. To turn on more than one sprite, you simply add the POKE values together. Thus, POKE 53269,5 turns on both sprite 0 and sprite 2. To turn on sprites 3, 5, and 7, you would use POKE 53269, 168 (2↑3 + 2↑5 + 2↑7 = 8 + 32 + 128 = 168).

Even after you turn on a sprite, it won't be visible until you position it somewhere on the active portion of the

screen. Memory locations 53248-53264 control the sprite vertical and horizontal positions. The even-numbered addresses (53248, 53250, and so on) control horizontal positioning, while odd-numbered addresses (53249, 53251, and so on) are for vertical positions. Each sprite uses a pair of adjacent addresses. For instance, the horizontal position of sprite 0 is controlled by location 53248 and the vertical position by location 53249. If you don't care to memorize these locations, you can calculate the position location address for a given sprite with the formula 53248 + SN * 2, where SN is the sprite number.

These program lines display sprites 0 and 1 in the middle of the screen:

```
10 POKE 53269, 3: REM 3 = 2↑0 + 2↑1
20 POKE 53248,90: POKE 53249, 150
30 POKE 53250, 130: POKE 53251, 150
```

Making things more complicated is the horizontal "seam" that runs down the right side of the screen. The active screen area is 320 pixels wide—more possible horizontal positions than can be specified with a single memory location (one byte can only hold values 0-255). Thus, it's necessary to use a second location that indicates whether a sprite is on the right or left side of the seam. Location 53264 works like the one that turns sprites on and off. To position a sprite on the right side of the seam, use

POKE 53264, 2↑SN

where SN represents the sprite number. For example, you can display sprite 0 near the right border by substituting this line in the example program:

```
20 POKE 53248, 90: POKE 53249, 90: POKE
53264, 1
```

If you type in and run this program, you'll notice that the sprites have a random, disorganized form, because we haven't yet defined their shapes. Locations 2040-2047 contain pointers that tell the computer where each sprite's shape data is located. By POKEing different values in these registers, you can change a sprite's shape. While the sprites are on the screen, type in the following line and press RETURN:

FOR J=0 TO 255:POKE 2040,J:NEXT

This line makes sprite 0 flip rapidly from one shape to another. Again, because we're pointing to memory areas that don't contain sprite shapes, these shapes will look random. Each sprite pattern contains 63 bytes of data. The easiest way to design sprites is with a sprite editor program such as "Sprite Designer," found elsewhere in this issue.

Sprite colors are controlled by locations 53287-53294. The color numbers for sprites are the same numbers used for screen and text colors. Thus, POKE 53287,0 turns sprite 0 black. POKE 53288,7 changes sprite 1 to yellow, and so on.

Multicolor sprites have four different colors, but only half the resolution of normal sprites, making them more colorful, but chunkier in appearance. Location 53276 controls sprite multicolor mode. This register works like locations 53269 and 53264. To set a sprite to multicolor mode, use POKE 53276, 2↑SN, where SN represents the number of the sprite you wish to change.

In multicolor mode, locations 53285 and 53286 determine the third and fourth colors for all the multicolor sprites. The first and second colors of the sprite are set by the screen background color register (53280) and the individual sprite color locations (53287-53294).

The following program displays and animates three multicolor sprites:

```
EB 10 REM POKE IN SOLID SPRITE
PATTERN
HS 20 FOR I=832 TO 1023:POKE I
,170:NEXT
QH 30 REM PUT IN STRIPE
HJ 40 FOR I=0 TO 5
XA 50 POKE 832+I+12,255:POKE 8
96+I+36,255:POKE 960+I+5
7,255
HH 60 NEXT I
JA 70 REM PUT IN SECOND MULTIC
OLOR STRIPE
CX 80 FOR I=0 TO 8
PH 90 POKE 832+I+18,85:POKE 89
6+I+42,85:POKE 960+I,85
AP 100 NEXT I
KA 110 REM P() IS POINTER
SJ 120 P(1)=13:P(5)=14:P(6)=14
CQ 130 REM X() IS HORIZONTAL P
OSITION
FF 140 X(1)=90:X(5)=200:X(6)=2
80
RX 150 REM Y() IS VERTICAL POS
ITION
XC 160 Y(1)=99:Y(5)=88:Y(6)=77
RE 170 REM TURN ON SPRITES 98=
2↑1+2↑5+2↑6
HE 180 POKE 53269,98
SA 190 REM MAKE THEM ALL MULTI
COLOR
DF 200 POKE 53276,98
XP 210 REM SET MULTICOLORS TO
{SPACE}YELLOW,BLACK
HM 220 POKE 53285,7:POKE 53286
,0
DH 230 REM SET SPRITE PRIMARY
{SPACE}COLOR
EQ 240 POKE 53288,1:POKE 53292
,2:POKE 53293,3
DK 250 FOR SN=0 TO 7
GH 260 IF P(SN)=0 THEN360
JE 270 P(SN)=P(SN)+1:IF P(SN)=
16 THEN P(SN)=13
CK 280 POKE 2040 + SN,P(SN)
CR 290 Y(SN)=Y(SN)+2
SS 300 IF Y(SN)>255 THEN Y(SN)
=32
MR 310 IF X(SN)>256 THEN340
AK 320 POKE 53248 + SN * 2,X(S
N):POKE 53264,PEEK(5326
4) AND (255-2↑SN):GOTO3
50
SP 330 REM FAR RIGHT
FQ 340 T=X(SN)-256:POKE 53264,
PEEK(53264) OR 2↑SN
SQ 350 POKE 53249 + SN * 2,Y(S
N)
MQ 360 NEXT SN:GOTO250
```

©

\$15,000.00 Programming Contest!

COMPUTE!'s PC Magazine For IBM PCs & Compatibles

First Prize \$7,500.00

Second Prize \$2,500.00

Five Honorable Mentions \$1,000.00 each

COMPUTE! Publications, Inc., a longtime leader in personal computer publishing, is launching a new magazine this summer: COMPUTE!'s PC Magazine for IBM PCs & Compatibles. Each bimonthly issue will include a floppy disk filled with programs, source code, and other useful information. We're looking for the very best original software for IBM PCs, XT's, and compatibles, and are sponsoring a programming contest with a total of \$15,000.00 in prize money for the top six winners. That's \$7,500.00 for First Prize; \$2,500.00 for Second Prize; and five Honorable Mentions at \$1,000.00 each. In addition, the winners will receive our standard purchase fees for publication in our magazine and royalties if republished in COMPUTE! books.

Even if your contest entry doesn't win a prize, you will still earn purchase fees if we accept your program for publication.

Interested? If so, read these rules:

1. Entries must be your original work, previously unpublished in any form. All those whose programs are accepted will be required to affirm this in writing.

2. You can submit as many entries as you want, but we cannot consider programs which have been either entered in other contests or submitted for publication elsewhere at the same time.

3. The contest deadline is October 31, 1987. All entries must be received at our offices by this date. Programs submitted after this date will still be considered for publication, but will not be entered in the contest. If we purchase an entry for publication before the deadline, the entry is still eligible to win.

4. Entries are allowed (and encouraged) in virtually all software categories: home and business applications, education, recreation, telecommunications, graphics, sound and music, and utilities.

5. Entries may be written in any programming language—including BASIC, C, machine language, Pascal, and Modula-2—as long as they meet two requirements. First, if you're using a compiled language, the compiled object or runtime code must be a self-standing program that can be run by someone who doesn't own a copy of the language. (Interpreted BASIC is an exception. It can be assumed that nearly everyone owns a copy of BASICA or GW-BASIC.) Second, we must be able to legally distribute the program without incurring licensing fees or other obligations to the maker of the language. If you're not sure whether a certain language qualifies, contact its maker for clarification.

6. Entries must be submitted on 5¼-inch floppy disks. If your program is written in a compiled language, you must submit both the runtime code and all of the source code required to compile the program.

7. Entries must be accompanied by an article which explains how to use the program and what it does. If your program employs any new or unusual techniques that you think will be of interest to other programmers, you can also describe how the program works. (If you feel that writing is not your strong point, please do not hesitate to enter; this is a programming contest and the entries will be judged solely on the basis of the programs submitted.)

8. Submissions which do not win a prize and are not accepted for publication will be returned only if accompanied by a self-addressed, stamped mailer.

9. The staff of COMPUTE! Publications, Inc., will judge the contest, and all decisions regarding contest entries and acceptances will be solely at the discretion of COMPUTE! Publications, Inc. All decisions are final. This includes decisions regarding creativity, similarity among entries, and general suitability.

10. Winners will be announced by COMPUTE! Publications, Inc., in early 1988.

11. This contest is void where prohibited by law. Full-time, part-time, and previous employees of COMPUTE! Publications, Inc. and Capital Cities/American Broadcasting Corporation are ineligible for the contest, but may still submit work for publication at standard rates.

Every contest entry must include this signed form:

I warrant that the program presently entitled _____ is my own original work and that the work has not been submitted for consideration elsewhere, nor has it been previously published in any form. If my work is accepted by you, I understand that your decision as to the selection of winners and awarding of prizes is final and without recourse on my part. Should you select my submission, I understand that I will receive no payments until I sign your standard contract, which includes assignment of the copyright of the program to COMPUTE! Publications, Inc., and that you may use my name and image in promotional materials and other forms. (If you are under age 18, your parent or legal guardian must sign for you.)

Signature: _____

Address entries to: PC Programming Contest
COMPUTE! Publications, Inc.
P.O. Box 5406
Greensboro, NC 27403

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

An extraordinary new publication for users of IBM PCs and compatibles:

COMPUTE!'s PC magazine

Special
BONUS
First Issue
FREE
With Subscription

FOR IBM PCs AND COMPATIBLES

A bimonthly magazine devoted exclusively to PC enthusiasts. It includes a disk containing all of the programs found in each issue.

The IBM PC has long been a recognized standard in the business community. But recently, something amazing has been happening: Low-priced PC/MS-DOS compatibles and clones are moving into homes, schools, and small businesses as never before. According to surveys, they're being used for just about everything: taking work home from the office, running small businesses, word processing, spreadsheet budgeting, telecommunications, education, and entertainment.

That's why COMPUTE! Publications is announcing a new magazine specially designed for PC users: COMPUTE!'s PC Magazine. It's a magazine for everyone—not just corporate data-processing managers or Fortune 500 executives. Whether you've got an IBM PC, XT, AT, or Model 30, a mid-priced compatible, or a low-cost imported clone, you'll find many valuable applications, ideas, and entertaining programs in every issue of COMPUTE!'s PC Magazine:

- **Top-quality programs.** First and foremost, COMPUTE!'s PC Magazine will bring you a disk full of original, previously unpublished software. Application programs for home and business. Educational programs for youngsters. Utilities. Games. And since all of the programs are on disk, there are few limitations on length or language.
- **The best of the boards.** In addition to original software, each disk also includes an outstanding program picked from the thousands of files available on bulletin board systems all over the nation. We make sure you get the latest available revision, fully tested and verified, with improved, easy-to-understand documentation.
- **Source code.** If you're a programmer—or would like to be one—you'll appreciate the source code for our programs included on every disk. You can examine valuable routines in a variety of languages, and even customize our programs for your own use.
- **Regular columns.** Take a look at our "PC News & Notes" section to learn about the major events throughout the PC community. Hear all the inside gossip and rumors with "The Ear." Use your PC more efficiently with help from our "Getting Down To Business" column. And send your questions and hints to "Readers' Feedback."
- **Reviews.** You'll see honest evaluations of the most interesting software and hardware for PCs and compatibles.

- **New Products.** Highlights of hundreds of new programs, peripherals, expansion boards, and other products that are released for PCs every month.
- **And more.** Interviews with newsmakers, reports from industry trade shows, and overviews of significant new product introductions. Plus, in 1988, COMPUTE!'s PC Magazine will begin publishing the winning programs from our \$15,000 PC Programming Contest!



Starting with the September 1987 issue (available August 1), COMPUTE!'s PC Magazine will be on newsstands nationwide for only \$12.95 per copy, including a 5¼-inch disk bound right into the magazine. Or it can be delivered directly to your mailbox six times a year for only \$59.95—a savings of over 20 percent. Subscribers even get a choice of receiving a standard 5¼-inch disk or the new 3½-inch disk with their magazine.

As a special bonus, if you order a prepaid subscription before October 1, you'll get the first issue absolutely free! That's seven issues for \$59.95!

To order, call TOLL FREE 1-800-247-5470. (In Iowa 1-800-532-1272.) Or send check or money order to:

COMPUTE!'s PC Magazine
P.O. Box 10767
Des Moines, IA 50340

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

IBM Compatibles

The Universe Expands

Keith Ferrell, Features Editor

The compatibles are here. Offering options including large amounts of memory, bright colors and graphics, speeds sometimes in excess of the IBMs', and various software bundles, clone manufacturers are targeting American consumers with PCs that do more for less money. Will the PC become this year's hot electronic commodity? More than one manufacturer is betting on it.

Over the six years since IBM introduced its first PC, third-party manufacturers have cloned just about every part of it, including the name.

PC by now has come to stand for a computer capable of running programs that are managed by MS-DOS—Microsoft Disk Operating System. And in the PC universe, MS-DOS—thanks to the dozens of manufacturers and hundreds of software developers and publishers who have made it the standard—could almost be an acronym for Microsoft's *Dominant Operating System*.

Today, with MS-DOS and PCs the most widely accepted operating and hardware systems in American business, a large segment of the public has been exposed to computers that combine extravagant amounts of mass storage, spacious RAM, high operating speeds, and a number of sophisticated software applications.

From the office PC, consumers have taken home terms such as spreadsheet, database, word processing, and desktop publishing. Now, as a result of sharp and ongoing declines in the prices of both memory and hardware, they are beginning to take home their own PCs. The Personal Computer is on the verge of acquiring a personal market.

By the end of this year, consumers will be able to select from a large number of low-priced, high-power machines produced and distributed by established, healthy players such as Tandy/Radio Shack; young and aggressive companies such as Leading Edge, PC's Limited, Franklin, Victor, and Blue Chip; plus companies new to the American market, such as Vendex and Amstrad. Of the companies already established among consumers, both Atari and Commodore have announced MS-DOS PC compatibles.

In large part, the spread of MS-DOS machines to the home and personal market is being powered by inexpensive offshore manufacture, either of the entire system or of components that would be far more expensive from domestic sources. Some companies achieve additional cost savings—and consequently lower retail prices—by substituting plastic for metal housings, and by providing lower-cost keyboards, mice, and other peripherals.

Some firms—PC's Limited, for example—use higher-end components, but deliver lower prices through direct-to-customer marketing, eliminating the overhead that an in-place retail distribution system entails.

PC manufacturers will face their most severe test, though, in the retail marketplace—computer stores or mass market merchandisers—and discover whether or not there really is a wide consumer demand for MS-DOS PCs.

That Commodore and Atari, the two veterans of the home market, are scrambling to establish themselves as compatibles contenders, is an indication of the seriousness with which MS-DOS computers are being taken.

Commodore already has its MS-DOS machines on the market. The computers have found solid consumer response in Europe and Canada for several years, although at \$999 for the single 360K disk drive, 512K RAM (expandable to 640K) PC10-1, and at \$1,999 for the twin-drive, 640K RAM PC10-2 (monitors extra for either system), Commodore is priced higher than most of the newcomers to the market. Atari, on the other hand, has promised a package that undercuts even the lowest-priced compatibles.

Announced at last January's Consumer Electronics Show (CES), Atari's PCs come in two versions. For \$499, the company hopes to

deliver 512K RAM (expandable to 640K on the motherboard), a separate 256K RAM for video control, a single 5¼-inch disk drive, and a built-in color graphics adapter. In its announced \$699 package, Atari will include a monitor and an enhanced graphics adapter (EGA), for a package more than competitive with any compatible on the market.

To compete, however, the machines must *reach* the market, and Atari has been plagued by delays in getting its hardware ready. Scheduled to appear on the market this spring, the roll-out date for Atari's PCs has been pushed back at least to late summer. And once the hardware is complete, there is a built-in 90-day delay as the machine awaits FCC approval. If those delays pile up too much longer, Atari runs the risk of missing the all-too-crucial fourth quarter, with what is expected to be a high consumer demand for Christmas PCs.

Both Commodore and Atari are aware as well that there are literally hundreds of compatibles-makers already on the market with low prices and increasingly aggressive marketing strategies. If this is the year of the PC, companies that don't get early exposure and shelf space, or are perceived as pricey, may find that a well-established name is not enough.

Pricing And Personality

The main PC competition is found in the \$500-\$2,000 price range, with many manufacturers discovering the greatest action among feature-loaded machines at the upper end.

PCs costing less than \$1,000 tend to offer a single disk drive, 512K RAM, room for expansion both on the motherboard and through slots, and a monochrome monitor, along with software packages that usually include a version of MS-DOS, but otherwise vary from manufacturer to manufacturer.

The look and feel of the machines vary as well. Shoppers who take the time to learn their way around the various machines will discover that each PC has a personality of its own, reflective sometimes of manufacturing decisions, but also of the parent company's approach to the market.

Amstrad, for example, is an



Amstrad has already sold many PCs in Europe. Its 1512 series offers a small footprint, and two operating systems, including Digital Research's GEM.

English electronics company entering the American computer market this year after finding phenomenal success throughout Europe. Its PC 1512 series includes three 512K RAM configurations priced below \$1,000: the DM, with a single 360K drive and monochrome monitor for \$799; the DD, with a dual drive and a monochrome monitor for \$899; and the SDC, with one disk drive and a color monitor for \$999. The company breaks the \$1,000 price point with a dual drive (and color monitor) for \$1,099. All Amstrad computers come with a large bundle of software, as well as a mouse.

One of the first things consumers will notice about Amstrad's PC 1512 series is the lightness of the computer's compact plastic box.

Weight and size reductions were achieved not only with plastic housing, but also by moving the computer's power source and fan into the monitor, which fits into a recess on top of the computer box. Design can have marketing ramifications as well—Amstrad buyers are locked into Amstrad monitors, and the company does not sell any of its components individually.

"Amstrad has a system not unlike racked stereo equipment," says Wally Amstutz, vice president of marketing. "Everything comes in two boxes—connect the system and plug it in, and you're ready to go."

The self-contained approach has paid off for Amstrad elsewhere. In England alone, Amstrad has achieved a PC market share comparable to IBM's, without shrinking IBM's share.

"There is a wide consumer base that IBM and the other high-priced manufacturers haven't tapped yet," says Amstutz.

Amstrad will be seeking to tap that market through a network of independent dealers that will include computer stores and specialty electronics retailers.

Some manufacturers feel that if the PC is to find a mass market measured in millions of units sold each year, PCs need to be sold through leading retail chains. That's the strategy being put to the test by Blue Chip Electronics, whose Blue Chip PC XT is currently sold in chains including Target and Caldor, with tests planned for marketing through Toys "R" Us and the nearly 1,000-store Walmart chain.

Because it is seeking exposure through mass market retailers, Blue Chip hews more closely to lower-end price points than some of the other compatibles makers.

With 512K RAM (expandable to 640K on the motherboard) and a single 360K 5¼-inch disk drive, the Hyundai-built Blue Chip XT currently retails for \$699, with a green monochrome monitor available for

an additional \$99. The XT can also be used with a television set serving as its monitor.

Aware that the market is broadening and that price is a key factor, Blue Chip is planning some product changes for later this year. At press time, the nature of those changes had not been made final, but it is believed that they will include a price cut of at least \$100, enhancements of the hardware, and a bundled package of software.

Even the packaging will be designed with mass market retailers in mind, states Blue Chip founder and president John Rossi.

"It comes in a four-color box with a handle," Rossi says, "and, since it can be run on a television, is pretty much self-contained." Rossi's hopes are that, since the box contains DOS and a large bundle of applications software as well, the Blue Chip will be seen as a one-stop computer purchase.

Leading Edge has established itself over the past year as a contender with its \$1,075 Model D. Delivering 512K RAM (expandable to 768K), two 5¼-inch disk drives, a Selectric-style keyboard, and a monochrome monitor, the Model D also comes complete with MS-DOS 3.1 and Leading Edge's proprietary software bundle. The Model D is available in a color monitor configuration, although the company is planning to introduce a proprietary EGA monitor, with an anticipated retail price below \$500. John Sullivan, vice president of Leading Edge hardware products, notes that the company is marketing its computer through a combination of computer retailers, value-added resellers (VAR), specialty stores, and office products stores.

"Leading Edge has always based its marketing strategy on including in the basic package items that other manufacturers offer only as options," Sullivan states.

There is already one major player involved in the mass market retailing of PCs. That, of course, is Tandy; through its Radio Shack chain of electronics and computer stores, it offers potentially more than 7,000 outlets for Tandy's



Tandy feels confident that its PCs will find a large market through the company's huge Radio Shack chain of retail operations. The Tandy 1000 SX offers 384K RAM (expandable to 640K), two 360K disk drives, and is bundled with DeskMate II software.

computers.

Tandy's under-\$1,000 PCs include the 1000 EX, which delivers 256K RAM (expandable to 640K through Tandy's Memory PLUS Expansion Adapter) and a single 360K 5¼-inch disk drive for \$599, and the SX, with two 360K disk drives and 384K (also expandable to 640K) for \$999. Monitors are sold separately, in monochrome at \$150, and in color at \$250. A software bundle is included with the computers.

A marketing advantage that Tandy may enjoy in addition to its large retail presence is its existing penetration of the business community. Ed Juge, director of market planning, estimates that Tandy sold more than a quarter-million MS-DOS computers in 1986, and anticipates even higher figures this year. Of those 1986 sales, a substantial percentage was to small and medium-sized businesses.

"We sold more MS-DOS business computers last year than anybody except IBM," Juge maintains.

Exposure to Tandy computers in the workplace will go a long way toward persuading consumers to shop Radio Shack for their home computer, the company feels.

While many of the compatibles manufacturers and marketers are

busy seeking or shoring up their retail outlets, PC's Limited, of Austin, Texas, has found success with a wholly different approach.

The company eschews retail altogether, pursuing an aggressive direct-to-consumer marketing program based upon a heavy advertising presence in computer publications. The direct-response ads provide a toll-free phone number, putting the consumer in contact with the manufacturer—and the manufacturer in contact with the actual end user—allowing for custom configuration of each system, if desired.

In the under-\$1,000 market, PC's Limited offers its Turbo PC, which includes 640K on the motherboard, two 360K floppy disk drives, an AT-style keyboard, and a monochrome monitor.

Elimination of the overhead that accompanies distribution through traditional retail outlets has enabled PC's Limited to retain metal housings and full-sized keyboards, two features that many compatibles manufacturers compromise in order to keep prices low.

"Our philosophy is to make the best computers with the best components, and make them affordable," says the company's founder, chairman, and chief executive officer Michael Dell.

While PC's Limited's primary market is the medium-sized business, the company has found some success among individual consumers as well.

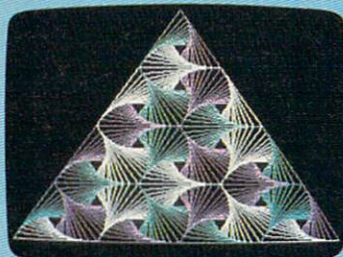
A new player in the American market is Vendex Pacific, whose Turbo-888-XT was expected to be on sale in mid-May.

Harry Fox, Vendex's vice president in charge of U.S. operations, notes that the dilemma facing manufacturers seeking to tap the consumer market is that market's diversity.

"To succeed," Fox says, "a company has to have a machine that will serve the first-time user, but also meet the needs of the more experienced computer user."

Priced at \$995, Vendex's Turbo-888-XT is configured with 512K RAM, two 360K floppy disk drives, a full-size AT keyboard, MS-DOS

GET UP TO 200 FUN-FILLED PROGRAMS EACH YEAR— when you subscribe now to COMPUTE!



Subscribe to COMPUTE! today through this special introductory money-saving offer, and you'll be getting a lot more than just another computer magazine. That's because each issue of COMPUTE! comes complete with up to 20 all-new, action-packed programs.

Subscribe now and you can depend on a steady supply of high quality, fun-filled programs like Hickory Dickory Dock, Switchbox, TurboDisk, Home Financial Calculator, Turbo Tape, SpeedScript, SpeedCalc, and hundreds of other educational, home finance, and game programs the entire family can use all year long.

The superb programs you'll find in each issue are worth much, much more than the low subscription price.

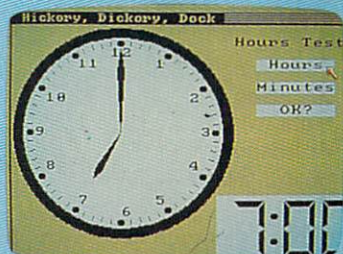
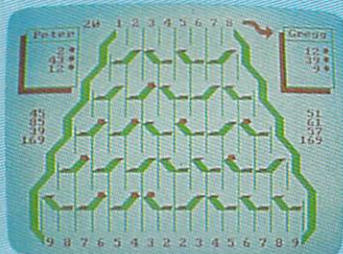
And there's more to COMPUTE! than just exciting new programs. Month after month, COMPUTE!'s superb articles deliver the latest inside word on everything from languages to interfaces...from programming to disk drives.

Whether you're a novice or an experienced user, COMPUTE! is the magazine for you. So subscribe today. Return the enclosed card or call 1-800-247-5470. (in Iowa, 1-800-532-1272).

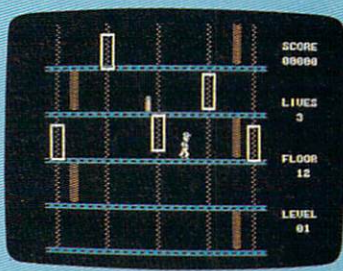
Do it now.

SpeedCalc

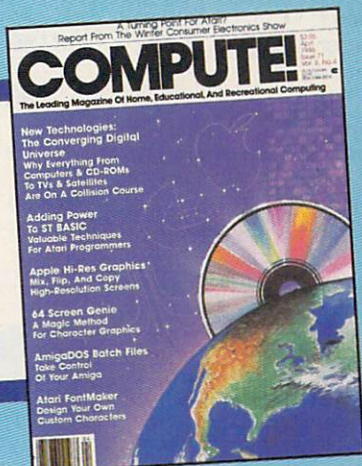
MO	EXP	INC	PROF
Jan	1812.22	582.22	-429.99
Feb	422.22	1842.22	628.88
Mar	582.08	429.77	-32.78
Apr	1456.22	7928.22	6477.81
May	512.22	2424.22	1311.99
Jun	1722.11	2484.22	181.11
July	343.45	7888.88	1626.55
Aug	617.88	1922.88	1185.88
Sept	1992.88	1258.88	-743.88
Oct	412.44	8888.88	7532.56
Nov	622.82	7888.88	8122.11
Dec	2128.88	7888.88	-128.88
TOTAL	15620.88	41448.55	26773.56
AVERAGE	1427.14	1876.17	7467.85



SpeedScript
 Writing a machine language program that works on five different computers is no small task. The first hurdle is finding a safe place to put the code. Though the cassette buffer is an obvious choice, it's located in different places on various machines, and putting HL there creates problems for tape users. Instead, the Proofreader uses 256 bytes of BASIC programming space.
 Before it installs the routine in memory, the Proofreader checks to see which computer you're using. Then it stores the HL at the bottom of BASIC MEMORY and protects itself by moving the computer's start-of-BASIC pointer to a spot 256 bytes higher in memory. Once that's done, the Proofreader activates the HL routine and erases itself with NEH. Note that because the Proofreader overwrites its first few BASIC lines, it's critical not to delete anything from the first portion



ACT NOW AND SAVE!



COMPUTE! Publications, Inc. 

One of the ABC Publishing Companies
 If attached order card is missing, write: COMPUTE! P.O. Box 10955, Des Moines, IA 50950

When you want to talk computers..

ATARI COMPUTERS

Atari Computers

800 XL 64K Computer.....	\$63.99
65XE 64K Computer.....	94.99
130XE 132K Computer.....	129.00
520ST Monochrome System.....	519.00
520ST Color System.....	749.00



Atari 1040 Color System **\$879**

Includes: 1040ST, 1 mb RAM with 3 1/2" drive built-in, 192K ROM with TOS, Basic, Logo, ST language, power supply and color monitor.

ATARI SOFTWARE

Access	
Leaderboard Golf.....	26.99
Accolade	
Fight Night.....	19.99
Activision	
Music Studio.....	34.99
Antic	
Cad 3-D.....	32.99
Batteries Included	
Paperclip w/Spellpack.....	39.99
Degas Elite.....	48.99
Epyx	
World Karate Championship.....	24.99
Infocom	
Zork Trilogy.....	44.99
Microprose	
Top Gunner.....	19.99
F-15 Strike Eagle.....	24.99
Origin Systems	
Ultima 4.....	39.99
Paradox	
Wanderer (3-D).....	27.99
Psygnosis	
Deep Space.....	34.99
Timeworks	
Wordwriter ST.....	51.99
VIP	
Professional (GEM).....	144.00

COMMODORE COMPUTERS



Amiga 2000 System

Includes: A2000, 1Mb RAM, 3 1/2" Floppy, A1080 Monitor, Mouse, DOS, A2088, Bridge Board **\$1999**

Commodore-64C 64K Computer	179.00
Commodore-64C Sys. w/1802C	519.00
Commodore-128 128K Computer	249.00
Commodore-128 System Pkg	739.00
Amiga 1000 Computer.....	899.00
Amiga 500.....	Call for pricing

COMMODORE SOFTWARE

Activision	
Hacker.....	32.99
Broderbund	
The Print Shop.....	29.99
The Toy Shop.....	39.99
Commodore	
Textcraft w/Graphic Craft.....	59.99
Assembler.....	79.99
Enhancer DOS 1.2.....	14.99
Discovery Software	
Marauder Back-up.....	32.99
Electronic Arts	
Deluxe Paint.....	69.99
Deluxe Print.....	74.99
Instant Music.....	34.99
Deluxe Video.....	69.99
Infocom	
Hitchhiker's Guide.....	31.99
Micro Illusions	
Dynamic-Cad.....	349.00
Mindscape	
Halley Project.....	31.99
Deja Vu.....	34.99
Micro Systems	
Analyze Version 2.0.....	119.00
Scribble.....	64.99
On-Line/Comm.....	49.99
Sublogic	
Flight Simulator.....	37.99
V.I.P.	
V.I.P. Professional.....	139.00

MS/DOS SYSTEMS

AT&T 6300.....	from \$1299.00
Compaq.....	from 1699.0
IBM-XT.....	from 1099.00
IBM-AT.....	from 2499.00
Leading Edge.....	from 999.00
NEC Multispeed.....	from 1499.00
Panasonic Business Partner	from 799.00
Toshiba 1100 Plus.....	from 1699.00



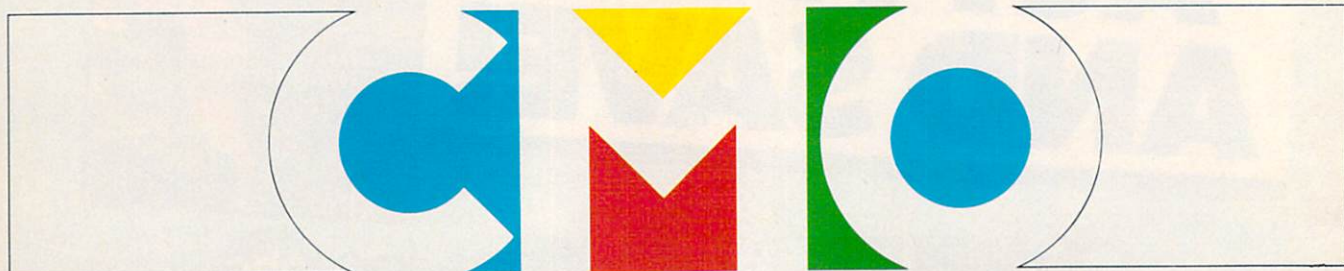
PC-T00 20 Meg XT-Compatible **\$999**

MULTIFUNCTION CARDS

AST	
Six Pak Plus PC/XT.....	169.00
Hercules	
Color Card.....	159.00
Graphics Card Plus.....	209.00
Fifth Generation	
Logical Connection 256K.....	329.00
Quadram	
Expanded Quadboard.....	119.00
Video 7	
EGA Video Deluxe.....	389.00
Zuckerboard	
Color Card w/Parallel.....	89.99

MS/DOS SOFTWARE

Ashton-Tate	
d-Base III +.....	399.00
5th Generation	
Fastback Utility.....	89.99
IMSI	
Optimouse w/Dr. Halo.....	99.99
Lotus	
Lotus 1-2-3.....	329.00
MicroPro	
Professional 4.0 w/GL Demo.....	239.00
Microstuf	
Crosstalk XVI.....	89.99
P.F.S.	
First Choice.....	119.00
Word Perfect Corp.	
Word Perfect 4.2.....	209.00



COMPUTER MAIL ORDER

.....When you want to talk price.

MODEMS

Anchor
6480 C64/128 1200 Baud.....\$119.00
VM520 ST520/1040 1200 Baud.129.00
Atari
XM301 300 Baud.....44.99
Commodore
Amiga 1680-1200 BPS.....169.00
CBM 1670 &C-128).....99.99
Everex
Evercom 1200 Baud Internal....109.00
Hayes
Smartmodem 300 External.....139.00
Smartmodem 1200 External.....389.00
Practical Peripherals
1200 BPS External.....159.00
Quadram
Quadmodem II 1200 Baud.....299.00
Supra
MPP-1064 AD/AA C64.....69.99
1200AT 1200 Baud Atari.....139.00



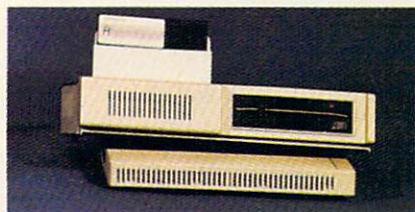
U.S. Robotics
1200 Baud. \$109.00
 2400 Baud Internal.....\$189.00

MONITORS

Amdek
410 12" TTL Monitor.....149.00
Video 310A Amber TTL.....139.00
Commodore
Commodore 1902.....299.00
Amiga 1080 Hi-Res Color.....269.00
Magnavox
8505 RGB/Composite.....199.00
515 RGB/Composite.....289.00
NEC
12" TTL Green or Amber.....109.00
JC-1401P3A Multi-Sync.....579.00
Princeton Graphics
MAX-12 12" Amber TTL.....169.00
Taxan
Model 124 12" Amber.....119.00
Zenith
ZVM 1220/1230.....(ea.) 99.99

DRIVES

Atari
1050 SS/DD (XL/XE).....\$139.00
AA354 SS/DD Disk (ST).....\$119.00
SHD204 20 Meg ST Hard Drive579.00
Allied Technology
Apple Half-Heights.....109.00
Commodore
Amiga 1010 3 1/2".....219.00
Amiga 1020 5 1/4".....189.00
1541C.....179.00
1571.....239.00
CSI
10 mb (64-128).....1099.00
Indus
GT Disk Drive.....179.00
Microbotics
20 mb Hard Drive (Amiga).....1299.00



Racore Jr. Expansion \$299

Seagate
20 MB ST-225 Hard Drive Kit...379.00
Supra
30 Meg Hard Drive (ST).....799.00
20 Meg Hard Drive (ST).....569.00
Xebec
20 mb (Amiga).....899.00

DISKETTES

Maxell
MD1-M SS/DD 5 1/4".....\$9.99
MD2-DM DS/DD 5 1/4".....10.99
MF1-DDM SS/DD 3 1/2".....12.99
MF2-DDM DS/DD 3 1/2".....21.99
Sony
MD1D SS/DD 5 1/4".....8.99
MD2D DS/DD 5 1/4".....10.99
MFD-100 SS/DD 3 1/2".....13.99
MFD-200 DS/DD 3 1/2".....20.99
Hewlett-Packard Calculators
28C Scientific Pro.....199.99
18C Business Consultant.....139.95
12C Slim Financial.....74.99

PRINTERS

Atari
1020 XL/XE Plotter.....\$30.99
1025 XL/XE Dot Matrix.....129.00
XDM121 Letter Quality.....209.00
XMM801 XL/XE Dot Matrix.....199.00
XMM804ST Dot Matrix.....189.00
Brother
M-1109 100 cps, 9 pin.....209.00
Citizen
MSP-10 160 cps, 80-Column.....299.00
Premier 35 cps Daisywheel.....499.00
C. Itoh
8510-SP 180 cps, 80-Column.....Call



Epson FX-86E
240 cps Dot Matrix \$349

Epson
LX-86 120 cps, Dot Matrix.....199.00
FX-286E 240 cps, 132-column.....Call
EX-800 300 cps, 80-column.....429.00
LQ-800 180 cps, 24-Wire Head.....Call
Hewlett Packard
Thinkjet.....399.00
Juki
6300 40 cps Daisywheel.....659.00
6100 10 cps Daisywheel.....389.00
5510C Color Dot Matrix.....349.00
NEC
Pinwriter 660 24 Wire.....489.00
Pinwriter 760 24 Wire.....689.00
Okidata
Okimate 20 Color Printer.....129.00
ML-182 120 cps, 80-column.....239.00
ML-192+ 200 cps, 80-column...369.00
Panasonic
KX-1080i 120 cps, 80-column...219.00
KX-1091i 180 cps, 80-column...299.00
KX-1592 180 cps, 132-column...439.00
Star Micronics
NX-10 120 cps, 80-column.....209.00
NX-10C 120 cps, C64 Interface.219.00
NX-15 120 cps, 132-column.....369.00
Toshiba
P321 216 cps, 24-Pin Head.....479.00

In the U.S.A. and in Canada

Call toll-free: 1-800-233-8950.

Outside the U.S.A. call 717-327-9575 Telex 5106017898

Educational, Governmental and Corporate Organizations call toll-free 1-800-221-4283
 CMO. 477 East Third Street, Dept. A207, Williamsport, PA 17701

ALL MAJOR CREDIT CARDS ACCEPTED.

POLICY: Add 3% (minimum \$7.00) shipping and handling. Larger shipments may require additional charges. Personal and company checks require 3 weeks to clear. For faster delivery use your credit card or send cashier's check or bank money order. Pennsylvania residents add 6% sales tax. All prices are U.S.A. prices and are subject to change and all items are subject to availability. Defective software will be replaced with the same item only. Hardware will be replaced or repaired at our discretion within the terms and limits of the manufacturer's warranty. We cannot guarantee compatibility. All sales are final and returned shipments are subject to a restocking fee.



Through direct-to-consumer marketing, PC's Limited has carved out a solid, primarily business market for its compatibles. PC's Limited model 286 includes "SmartView," a digital display that reports computing speed and diagnostics.



Vendex's computers, manufactured by Samsung of Korea, come complete with an on-screen manual, aimed at teaching the user while the computer is in use. The Turbo-888-XT features a full-size AT keyboard, 512K RAM, two 360K floppy disk drives, and MS-DOS 3.2.

3.2, and a monochrome monitor. The system is available with an RGB color monitor at \$1,295.

Franklin Computer has been perhaps best known for its ACE series of Apple compatibles. With its \$799.95 PC-8000, Franklin Computer is now positioning itself for the PC consumer. Offering two disk drives, 512K RAM (expandable to 640K), and MS-DOS 3.1, the system is configured to support a monochrome monitor, available for \$139.95. Franklin also offers a single disk drive system, the PC-6000, for \$699.95.

Having achieved substantial success in the cash-register, adding-machine, and calculator markets, Victor Technologies is entering the PC field. Victor's under-\$1,000 PC, called Champion, offers 640K RAM, DOS 3.1, and a single disk drive for \$799. A monochrome monitor is available for \$119.

Bundles Of Software

Like many of the manufacturers pursuing the PC market, Vendex has added a bundle of software to its system including a tutorial aimed at assisting the first-time computer user.

Called *Headstart*, the proprietary software was designed for Vendex by Executive Systems, and includes popular applications such as word processing, spreadsheets, RAM-resident pop-up features, and a program designed to train the new computer user in the Turbo-888-XT's operation.

"Essentially," Fox states, "we've put the manual onscreen, letting the consumer guide himself through the tutorial using only the cursor and enter keys. The program lets consumers learn to use their computer by actually *using* their computer." Vendex hopes that the package will live up to its description as "user seductive."

Once acquainted with the operation, users can extend the "point-and-shoot" approach to utilities customized by Vendex for the Turbo-888-XT. Experienced computer users, of course, need not employ the tutorial.

Amstrad's approach to software includes bundling two operating systems—the traditional MS-DOS 3.2, and Digital Research's DOS Plus and GEM (Graphics En-

vironment Manager), which together form a mouse-driven graphics package. Included in Amstrad's GEM are applications such as GEM Paint for creating pictures, and GEM Desktop, with pop-up applications including a calculator and a clock.

"We think the public will be very excited about the GEM environment," notes Wally Amstutz. "And Amstrad will also be offering a window-driven BASIC that should find a good consumer response."

Blue Chip is currently in negotiation for its software package, which, according to John Rossi, will provide a word processor and a database manager. MS-DOS is included. Through arrangements with software manufacturers, Blue Chip's customers will be able to use coupons toward the purchase of more complete manuals and support from the software vendors themselves.

Leading Edge includes DOS 3.1 and a proprietary word processing program in its Model D package.

At Tandy, the bundled software is called *Deskmate II* and comes complete with a word processor, spreadsheet, database, telecommunications program, calendar, and an electronic mail program. MS-DOS 3.2 is also included with Tandy computers.

PC's Limited, because of its targeting of the business market, includes only system software with its package.

Victor is providing word processing and spreadsheet software with its Champion computer.

Whether or not software bundles will contribute to increased sales remains to be seen, but the variety of bundles shows that each manufacturer is developing its own software, as well as hardware, profile.

Consumer response will finally determine what the public actually wants or will come to expect in terms of bundled software accompanying their computers.

Memory

One thing that consumers do already seem to want from their PC is a lot of memory.

The PC industry standard now

is the 512K RAM motherboard, but more and more companies are either offering initial 640K motherboards, or are designing their machines to make them easily expandable to 640K and higher RAM levels. That much memory is required to run large spreadsheet and text-processing operations along with RAM-resident programs which offer keystroke access to notepads, alarm clocks, calendars, and other conveniences without leaving the program being run.

If large amounts of RAM are vital to successful competition in the PC marketplace, vast amounts of storage are increasingly important. Many of the most popular PCs come with built-in hard disks capable of storing 10, 20, or more megabytes of programs and information.

Amstrad, for example, has already found the greatest consumer response to be for its 20-megabyte PC 1512 HDC with a color monitor, a configuration retailing for a still-competitive \$1,799.

Wally Amstutz notes that Amstrad has been pleasantly surprised by the enthusiasm for its larger configuration.

"Buyers are becoming more knowledgeable about what they want in a computer," he says, "and their awareness of the options a hard disk offers are coloring their decisions." Among those options are fast loading of programs directly from hard disk storage to RAM, and easy internal storage of both applications programs and their own work.

PC's Limited has found its greatest success with its 286 line of compatibles carrying an internal 30 megabytes of storage.

Franklin's PC-8000 is complete with a power supply able to support 10- and 20-megabyte hard disks.

As Vendex prepares for the debut of its Turbo-888-XT, its emphasis is focused upon the introductory, floppy-disk-drive-only configuration.

"We are definitely planning to offer a hard disk configuration before the year is out," notes Vendex's Harry Fox. "And the system is set up now with five full expansion slots available for consumers who want to go ahead and install a hard card."

Leading Edge is taking mass storage one step further than hard cards or hard disks. Having upped its hard-disk option from 10 to 20 and again to 30 megabytes, the company is now offering what it calls the "Leading Edge Infinite Memory System." Rather than a hard disk, the Infinite Memory configuration employs a Bernoulli Box.

Developed by Iomega, and named for the eighteenth-century Swiss physicist and mathematician Daniel Bernoulli, the Bernoulli Box utilizes a fixed cartridge reader and removable mass-storage cartridges rather than fixed disks.

"Each Bernoulli cartridge holds 20 megabytes of memory," observes John Sullivan. Leading Edge provides two cartridges with the Infinite Memory System, which is an upgrade of the Model D PC. Additional 20-megabyte cartridges are available for \$49.95. The Infinite Memory System itself sells for \$1,995.

Also entering the removable mass-storage market is Victor, whose VPC III 286 carries a removable 30-megabyte fixed disk drive, with 640K RAM expandable to a megabyte. Victor anticipates marketing the VPC III 286 for \$2,395.

Expandability

Another question addressed by the PC manufacturers is expandability. While few manufacturers as yet see the general public as eager to take screwdrivers in hand, open their computers, and begin swapping cards and chips, all are aware that a portion of their market is interested in performing its own upgrades.

Expansion slots, serial and parallel ports, and peripheral connectors are becoming important features emphasized in product literature.

"We took a lot of care," says Harry Fox of Vendex, "to offer every essential expansion option, and some extras."

Fully configured, the Vendex Turbo-888-XT leaves five standard IBM card slots open, allowing consumers to custom-configure their own upgrades.

Amstrad has eliminated the need for removing the computer housing. An access port is built into the top of the machine, enabling owners to add cards easily. The PC

1512 provides three expansion slots.

With the Leading Edge Model D, consumers have the option of upgrading with four IBM slots. Leading Edge will also be offering a proprietary EGA (Enhanced Graphics Adapter) within the next year.

Tandy expandability varies with the model purchased. Their model 1000 EX can be expanded only with Tandy's proprietary One PLUS and Two PLUS expansion boards, while the 1000 SX has five 10-inch expansion boards available.

Service

Manufacturers are increasingly aware of the premium consumers place upon service. This is especially true with electronic products, and manufacturers are responding to consumer expectations.

While PC's Limited, as a direct-to-consumer seller, has relied previously on telephone technical support for customer problems, the company is in the process of introducing an optional on-site service contract.

"For \$35 the first year, our customers will be able to have a service technician come to their site should there be a hardware problem," states Michael Dell.

Dell feels that service is essential for manufacturers who intend to grow with their market. "Customers have to be aware that there is more to your company than just 'Here's your box,'" he says.

Leading Edge dealers function as service centers for that company.

At Vendex, the on-site approach has been extended to the initial installation of the machines.

"We're aware of the trepidation that some consumers feel even after they've bought their computer," says Harry Fox. "And while we've addressed this with our onscreen training program, we're also offering on-site installation.

"For \$49.95, the customer can have a bonded installer come to his home or office and set up the computer, including an initial orientation to our configuration." Vendex will provide a toll-free number through which customers can arrange for further service.

Tandy customers have access to 166 service locations in the Radio Shack chain, Ed Juge notes. If one of those service centers is not nearby, the local Radio Shack can forward the computer to a service center.

Proud of this capability, Ed Juge says, "Tandy has the strongest support and service network of any PC manufacturer, even IBM."

Amstrad will be arranging service and support through its network of independent dealers.

At Blue Chip, service is currently accomplished at the company, but a service network will soon be in place nationwide.

PC warranties and guarantees vary from manufacturer to manufacturer, with most of them offering a one-year warranty on parts.

Add-On Markets

As Vendex's Harry Fox has noted, personal computers serve a disparate market. While the immediate focus is tapping the large consumer audience, manufacturers are also aware of the potential for sales that can be found in schools and small businesses.

Tandy's Juge observes, "We have had a stronger presence in the schools than a lot of people realize." Stressing Tandy's ongoing commitment to the educational market, Juge points out that the company is offering the same 20-percent school discount offered by

Apple, widely recognized as the leading supplier of educational computers.

Amstrad, too, hopes to penetrate the school market, although Wally Amstutz notes that this may have to wait until the company's network of dealers is more firm. The company's preference is to permit its distributors to market to their local educational systems and institutions.

PC's Limited has always seen the non-Fortune 500 business market as among its prime customers, and will continue to do so, says Michael Dell, although he sees his company increasingly going head-to-head with IBM and Compaq for the upper-end business market as well. At present, the company's advanced 386 line of computers is seen as offering business customers a cost-effective alternative to IBM and Compaq machines.

At Leading Edge, schools are seen as a natural market, especially as consumer awareness of MS-DOS widens. The feeling is that parents are going to want their children to learn computers that use the same operating system that they will face in the business environment.

Whither IBM?

It was IBM that gave the Personal Computer its name in the first place. With the company's announcement of its new Personal System/2 and the Microsoft

Operating System/2 that is being developed for it, many feel that IBM is ceding the personal computer market to the compatibles and clones.

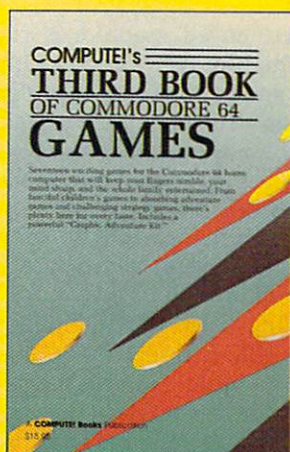
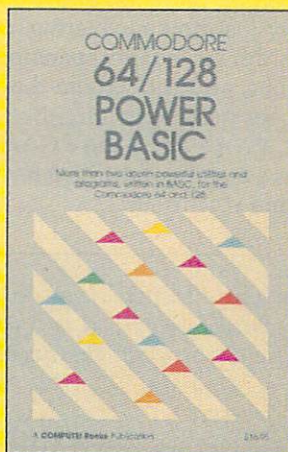
IBM's twin 3½-inch, 720K disk drive Model 30 provides 640K RAM and is priced at \$1,695; with one disk drive and a 20-megabyte hard disk, it lists for \$2,295. Other System/2 models offer a megabyte or more of RAM, 3½-inch disk drives carrying 1.44 megabytes, and fixed-disk storage devices with as much as 115 megabytes of memory. Prices for the various IBM configurations climb quickly and steeply, reaching a whopping \$10,995 for the 2-megabyte RAM (expandable to 16 megabytes), 115-megabyte hard disk Model 8580-111.



IBM's new System/2 computers are seen by some as an attempt to seal off the high-end business market, and by others as an invitation to create the next generation of clones and compatibles. The new Model 30 offers 640K RAM, color graphics, and three slots.

Exciting & New!

Commodore 64/128 Books from COMPUTE!



Get more power, education, and relaxation from your Commodore 64 or 128 with these new books from COMPUTE!. And, as always, the programs are thoroughly tested and easy to enter using our special program entry system. (Disks are available, too.)

COMPUTE!'s Commodore 64/128 Power BASIC

Edited

Collected in this one volume are more than two dozen short BASIC programs from *COMPUTE!'s Gazette's* popular monthly column, "Power BASIC." Included are utilities that add an 8K RAM disk; read and write to disk sectors; make programs read joysticks more quickly; and automatically generate line numbers. There are also programs such as "Stop and Go," which creates a pause button to temporarily halt a program, and "Time Clock," which puts a digital clock on your screen. *There is a companion disk available for \$12.95 which includes all the programs from the book.* (998BDSK)

\$16.95 ISBN 0-87455-099-8

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

Edited

Seven of the best machine language games for the 64 have been gathered into one volume in this follow-up to the popular *COMPUTE!'s Machine Language Games for the Commodore 64*. Selected from recent issues of *COMPUTE!* and *COMPUTE!'s Gazette*, the games range from the frantic "Prisonball" to the delightful "Biker Dave." This is more than just a collection of exciting fast-action games, though, because complete and commented source code for each program is included in the book. Machine language programmers can see exactly how each game is written and what design techniques are used. *A disk is available for \$12.95 which includes all the programs in the book, including source code.* (947BDSK).

\$16.95 ISBN 0-87455-094-7

COMPUTE!'s Third Book of Commodore 64 Games

Edited

COMPUTE! Publications, the leading publisher of programs for the Commodore 64, has brought together another exciting collection of nerve-tingling games that will delight the whole family—from preschoolers to teenage arcade fans to those who enjoy games of logic. Clearly written, with non-technical instructions, this book contains hours of challenging entertainment for beginning computer fans as well as experienced programmers. *There is a companion disk available for \$12.95 that includes all the programs in the book.* (955BDSK).

\$15.95 ISBN 0-87455-095-5

These books are now available at your local book or computer store. You can also order directly from COMPUTE! by calling toll free 800-346-6767 (in NY call 212-887-8525) or mailing your order to COMPUTE! Books, P.O. Box 5038, F.D.R. Station, New York, NY 10150.

Please include \$2.00 postage and handling per book or disk. NC residents add 5 percent sales tax and NY residents add 8.25 percent sales tax. Please allow 4-6 weeks for delivery.

COMPUTE! Publications, Inc. 

Part of ABC Consumer Magazines, Inc.
One of the ABC Publishing Companies

COMPUTE! books are available outside the United States from subsidiaries of McGraw-Hill International Book Company.

One of the things IBM is offering for these prices is enhanced graphics, enabling both color and monochrome users to achieve sharper monitor images.

At the higher end as well, IBM is betting on business interest in increased speed, with the Intel 80386 microprocessor delivering operations at rates up to 350 percent faster than the current AT processor.

But enhanced graphics is currently a high-priority item among the clone and compatibles manufacturers, many of whom are already delivering low-priced machines that accomplish their processing tasks faster than do IBM ATs.

What prompted IBM to move its marketing away from the MS-DOS standard?

Leading Edge's John Sullivan notes that IBM had seen its PC market share dwindle. "I think the new IBM machines are signs of the company taking a definite move to protect the market they have, and to buy some time to regroup and regain ground," Sullivan states.

Ed Juge of Tandy sees IBM in the process of circling its wagons and attempting to seal off the Fortune 500 market, which after all, has been the company's prime market throughout its history. Tandy sees IBM's new machines and operating systems exerting little effect on the broad consumer market for PCs.

"I don't see the new machines having much impact on the general consumer," Juge says. "For one thing, they're expensive. For another, it represents a departure from an existing standard in which people have a large vested interest in software and hardware."

One reason many compatibles manufacturers are sanguine about the new machines is that Microsoft is still refining the OS/2 software. Delivery of the finished software is expected to take at least another nine months, with some observers speculating that actual completion of the system could require years.

Michael Dell views IBM's announcement of its new machines as less a company marketing decision than a response to the latest advances at Microsoft. The software developer is now serving as the driving force in the PC environ-

ment, Dell feels.

Since his company is already a Microsoft OEM (Original Equipment Manufacturer), Dell does not feel threatened by IBM's announcement.

Among the advances being touted by IBM is the higher capacity 3½-inch disk. Do compatibles manufacturers feel obliged to follow IBM's lead with such disks?

PC's Limited already offers 3½-inch drives as an option, as will Vendex. John Sullivan of Blue Chip notes that his company has 3½-inch drives, and is enthusiastic because the manufacturing cost of such drives is less than that for traditional 5¼-inch drives.

Sullivan also observes that before the 3½-inch drive becomes a feature demanded by the general consumer, the amount of software available for such drives will have to increase.

Amstrad is taking a wait-and-see attitude at the moment, although 3½-inch drives are an option it is considering. Wally Amstutz notes that as personal computer upgrades become more common, it should be easy for the consumer or his or her service center to enhance the system to meet new demands.

"If 3½ becomes something everybody wants," Amstutz states, "you can bet that there will be an upgrade kit on the market for a couple of hundred dollars."

Should the consumer be concerned that IBM is going to lead the industry away from MS-DOS machines?

"Not at all," says Michael Dell, adding that the OS/2 operating system is an evolution of the industry standard operating system rather than an abandonment of it.

At present, in fact, OS/2 is expected to accommodate most MS-DOS software without difficulty.

Clones II

If IBM does succeed in creating a new generation of machines and prompting a new generation of software, will the clone and compatibles manufacturers be able to follow its lead?

The attitude on the part of most manufacturers is a resounding yes. The feeling is that if the public should want the new system, then

the manufacturers will respond by making it affordable.

For the present, though, the emphasis is on establishing once and for all a market for the personal computer in the home.

"I think everybody needs to remember that this has been tried before," says Harry Fox, invoking Coleco's Adam and IBM's own PCjr. "Those failures set the industry back a couple of years, and we're really only just now recovering. But if we can deliver quality machines to the public, and show them that they no longer need to be afraid of computers, then I think the PC will be the success story of the next few years in home electronics."

For more information about the machines discussed in this article, the manufacturers may be contacted at the following addresses:

Amstrad
c/o Vidco
1915 Harrison Rd.
Longview, TX 75604

Atari
1196 Borregas Ave.
Sunnyvale, CA 94086

Blue Chip Electronics
7305 West Boston Ave.
Chandler, AZ 85226

Commodore Business Machines
1200 Wilson Dr.
West Chester, PA 19380

Franklin Computer
Route 73 / Haddonfield Rd.
Pennsauken, NJ 08110

International Business Machines
Information Systems Group
900 King St.
Rye Brook, NY 10573

Leading Edge
21 Highland Cir.
Needham Heights, MA 02194

PC's Limited
1611 Headway Cir., Building 3
Austin, TX 78754

Tandy / Radio Shack
1800 One Tandy Center
Fort Worth, TX 76102

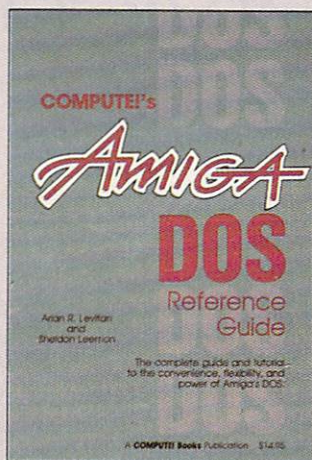
Vendex Pacific
40 Cutter Mill Rd., Suite 438
Great Neck, NY 11021

Victor Technologies
380 El Pueblo Rd.
Scotts Valley, CA 95066

AMIGA

SUPPORT FROM COMPUTE! BOOKS

Everything for the Amiga. From BASIC beginner's guides to advanced programming handbooks, COMPUTE! offers you information-packed tutorials, reference guides, programming examples, ready-to-enter applications, and games to help you develop your computing skills on Commodore's Amiga.



COMPUTE!'s AmigaDOS Reference Guide

Arlan R. Levitan and Sheldon Leemon
A comprehensive tutorial and reference guide to the powerful AmigaDOS—the operating system underlying the Workbench and Intuition—this book offers information useful to every Amiga owner. It defines and illustrates all DOS commands, and shows you how to create file directories, access peripherals, run batch file programs, and avoid "disk shuffle." The screen- and line-oriented text editors are explained in detail. Numerous examples and techniques explain how to use AmigaDOS to make operating your Amiga both convenient and efficient.

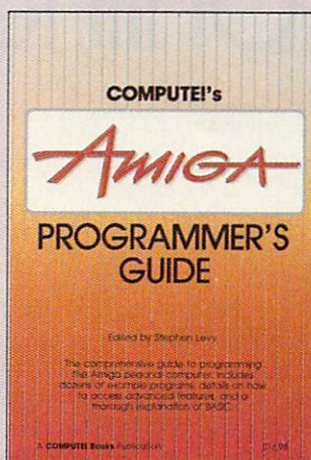
\$16.95 ISBN 0-87455-047-5

Elementary Amiga BASIC

C. Regena
Here's your introduction to the new and powerful BASIC on the Amiga personal computer. The Amiga's impressive graphics, animation, and sound can be unlocked with the right commands, and BASIC is the place to start. Complete descriptions of Amiga BASIC's commands, syntax, and organization take you from the beginner level to a full-fledged programmer. Plus, the book offers you ready-to-type-in programs and subroutines while showing you how to write your own programs. *There is a disk available which includes the programs in the book, \$12.95. This title is also available as a book/disk combination for \$29.95 (057-2).*

\$14.95 ISBN 0-87455-041-6

Look for these books at your local book or computer store.
Or order directly from COMPUTE!.
Call toll-free 1-800-346-6767 (in NY 212-887-8525).



COMPUTE!'s Amiga Programmer's Guide

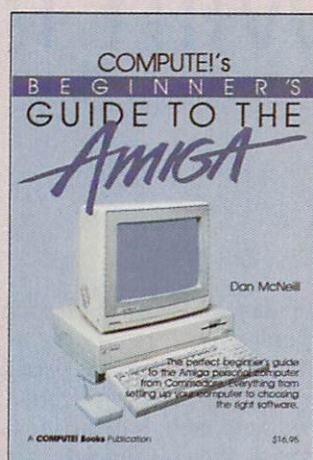
Edited
Your tutorial and reference manual to AmigaDOS, BASIC, Intuition, and other important software tools which accompany the new Amiga, *COMPUTE!'s Amiga Programmer's Guide* is a clear and thorough guide to the inner workings of this fascinating new-generation computer. The great speed of its 68000 microprocessor, coupled with the versatility of the Amiga-specific graphics and sound, makes the Amiga one of the most powerful computers available today. This book is the key to accessing the Amiga's speed and power.

\$17.95 ISBN 0-87455-028-9

Advanced Amiga BASIC

Tom R. Halfhill and Charles Brannon
This guide to applications programming on Commodore's new Amiga contains everything an intermediate programmer requires to begin creating sophisticated software on this powerful machine, including several ready-to-type-in programs. Clear, yet comprehensive documentation and examples cover advanced BASIC commands, designing graphic applications, generating sound and music, using the Amiga's built-in speech synthesizer, creating a user interface, and programming the computer's peripherals. *There is a disk available which includes the programs in the book, \$15.95. (June release)*

\$17.95 ISBN 0-87455-045-9



COMPUTE!'s Beginners Guide to the Amiga

Dan McNeill
Written in a lively and entertaining style, this book teaches you everything a beginner needs to know to get started quickly with the Amiga from Commodore. You will learn about setting up the system, all the most popular types of software, and details about the hardware.

\$16.95 ISBN 0-87455-025-4

Inside Amiga Graphics

Sheldon Leemon
The Amiga, Commodore's powerful new computer, is an extraordinarily impressive graphics machine. Easy to use, the Amiga can produce color graphics and excellent animation. You'll find thorough descriptions of the computer's abilities and the hardware required to create a complete graphics system. Software, too, is central to the Amiga's power, and complete tutorials show you how to get the most from the machine. (June release)

\$17.95 ISBN 0-87455-040-8

COMPUTE!'s Kids and the Amiga

Edward H. Carlson
The latest in this bestselling series written by Edward Carlson, *COMPUTE!'s Kids and the Amiga*, will acquaint you with BASIC. Over 30 sections—all with instructor notes, lessons, assignments, and lively illustrations—entertain and amuse you as you learn to program your new computer. Clear writing and concise examples make it easy for anyone—children and adults alike—to painlessly learn BASIC. (May release)

\$14.95 ISBN 0-87455-048-3

Please allow 4-6 weeks for delivery after your order is received.

COMPUTE! Publications, Inc.

Part of ABC Consumer Magazines, Inc.
One of the ABC Publishing Companies
825 7th Avenue, 6th Floor, New York, NY 10019

Publishers of COMPUTE!'s Gazette, COMPUTE!'s Gazette Disk, COMPUTE!'s Books, and COMPUTE!'s Apple Applications

COMPUTE! books are available outside the United States from subsidiaries of McGraw-Hill International Book Company.

TELECOMPUTING

With The Online Services

Selby Bateman, Associate Publisher

Every day and night, thousands of computer users log on to one or more of a variety of major telecommunications services to get information, play games, send mail, buy airline tickets, chat with friends, and take part in a host of other activities. These national and international online systems have shown they're here to stay. Now they want to prove that they can attract—and keep—an ever growing membership of computerists.

What will it take to get you to regularly log on to a telecommunications service with your computer? What combination of price, ease of use, services, features, and other attractions will bring the great majority of computer users into the online fold?

That's the big question that every telecommunications service would like to have answered. So far, there are many thousands of computer owners who regularly go online with services such as American People/Link, CompuServe, Delphi, Dow Jones, GENie, PlayNet, QuantumLink, The Source, and others. But people who run those systems all know that they've just begun to tap the potential market out there.

What are the main stumbling blocks?

"There is a real fear of the whole process: of modems, of getting around in these services, and especially of getting a big bill at the

end of the month," says Steve Case, a vice president at Quantum, the company that runs Quantum-Link, a Commodore-only telecommunications service.

But Case and officials at other major services are confident that they can solve these problems, that the future of online computing is bright. "The way these things tend to work is that there's a gradual building process, and then it takes off," he says.

"As with home video, videocassettes initially got a mixed reception. And then the machines got better and easier to use, and the prices came down, and it took off. There are increasing signs that this is going to happen in telecommunications. We're pretty bullish on the future of it," says Case.

In order to make their services ever more palatable, online systems are continually altering the mixture of ingredients to discover just the right recipe. While some of the systems stress the multitude of different features they offer, others are trying to find certain niches of interest in which they can build electronic forums, marketplaces, and information centers.

Each service offers its own variation on a common group of features: special interest groups (SIGs) on a variety of topics, online gaming, travel information and scheduling capabilities, public domain software that can be downloaded and used by members, computer industry and technical

information, news and sports information, and many other items.

As the number of features offered is growing, telecommunications service prices—usually figured in terms of cost-per-minute—are generally coming down, either directly or indirectly, through alternate-pricing strategies. And the emergence of faster data transfer—through both improved software and modem speeds of 1200, 2400, and even 9600 baud—is changing the nature of working online.

Fine-Tuning The System

For the newcomer, trying to understand just how an online service works and what it offers can be an intimidating experience. It's not that the systems are so difficult to use or that there is a scarcity of information on how to use them. On the contrary—virtually all of the systems are regularly covered in books and magazines, and there are even free demos offered by some services. The early intimidation seems to stem from the same problem facing people who've never touched a computer: You really have to use it a few times before you understand just how useful, entertaining, and versatile it is.

At the same time, however, the various services realize that in order to appeal to the broadest possible audience, they must construct systems that are both simple for beginners and yet flexible for experienced members. That equation is a diffi-

cult one, and almost all of the services are constantly trying to streamline procedures, simplify the commands used, and offer just the right mixture of help screens, menus, and keyboard shortcuts.

The end result of having a fine-tuned online structure should ultimately be to have the user able to achieve something specific rather than wandering around from menu to menu or getting lost in a succession of submenus, says John Gibney, national sales director for General Videotex Corporation's Delphi service.

"I see in that a very high-perceived value for the user that is what this industry is all about," he says. "Get them on, get them to the information they want as fast as possible, and then if they want to get off, they can. We don't ever try to force-feed information that they have no interest in."

Many telecommunications services can be accessed via any of a number of terminal software programs. However, in certain cases, as with systems like QuantumLink that are dedicated to one computer, separate software is usually required to allow the user to include system-specific features.

The large online services are also accessed by members through a local phone call to one of the major telecomputing carriers, such as Tymnet, Telenet, and Uninet. Rather than placing a long distance call, as you might to contact a remote bulletin board system (BBS), these local access lines substantially reduce your online charges.

Bit By Bit By Bit

One of the biggest changes occurring now in telecommunications is the arrival of relatively low-cost modems capable of transmitting data at faster speeds. Many people who began using a modem at home, in school, or in a small business probably started with 300 baud, or bits per second (bps), transmission rate. Now, however, many people are using much faster speeds.

To understand the differences, consider that each character (for example, a letter or numeral) you send is normally composed of eight to ten bits of data, depending on your computer. If we start with the

assumption that there are ten bits per character you're sending or receiving, then 300 bps roughly equals 30 characters a second. At that rate, you can actually watch—and even read—characters as they appear on your screen. But figures show that over the past year or so 300 bps has been giving way to 1200, 2400, and even 9600 bps. At that rate, information is transmitted much faster, and that can add up to considerable savings if you're paying by the minute to access material on an online service.

"There has been an impressive leap in 1200-baud usage during 1986 and the first half of 1987," says Bill Loudon, general manager of General Electric's GENie telecommunications service. "In January 1986, over 60 percent of our subscribers used 300 baud," he says. "By the end of 1986, over 90 percent used 1200 baud." Although 2400-baud usage on GENie is so far quite limited, Loudon says that the company already has the capability to handle that speed in more than 70 major metropolitan areas.

Delphi's Gibney goes even further: "I think you're going to see 1200 baud disappear rather quickly. Right now, better than 60 percent of Delphi users are coming in at 1200 baud. About 30 percent are coming in at 2400 baud, and we're right now working on speeds higher than 2400 baud. We've been beta testing 9600 baud for some time."

External modems, and internally-mounted modem cards, have dropped in price dramatically. A 1200-baud modem that might have cost several hundred dollars just a year or so ago sells for about a hundred now. And these modems often come with a free membership to one or more of the major services, including a specified amount of free access time on the system to get you started.

Most of the services have been modifying their price structures to allow 1200-baud usage at or near the same price per minute as 300 baud. Since online services will collect more revenue for material received at 300 baud than at 1200, the services have in the past tried to make up for the difference by charging higher prices for the faster service. But, as noted, several of the major systems are now minimizing

the price differences on the theory that the lower prices and faster speeds will eventually make online membership far more popular—and more profitable.

The Flat-Rate Alternative

For computer users, one of the developments with dramatic long-term possibilities is the idea of flat-rate online computing. In other words, rather than running up charges by the minute or hour of usage—like a taxi meter that's always on—the company would charge a flat monthly rate for its basic services, with an additional surcharge for premium services. Most cable television systems work that way, helping to take the sting out of the final bill and promoting wider usage.

QuantumLink has been using this system since it came into being. Members pay an initial fee of \$9.95 to purchase the system software and then a monthly fee of \$9.95 for basic services. The system's Plus Services carry a per-minute cost. This structure is one that Steve Case thinks is far more popular with users and is less inhibiting since there's no invisible clock ticking away money while the user is logged onto the system.

"I think it's very important, and will be increasingly used by other people," he says. "It allows you to provide a club of active members. People tend to want to keep coming back."

In a related area, GTE Telenet has been offering its PC Pursuit flat-fee system now in a growing number of metropolitan areas. With PC Pursuit, the computer user pays a monthly fee of \$25 to Telenet and has access without further charges to bulletin boards, other computer users, and noncommercial databases. This does not apply to the commercial online services, however.

Although there are literally hundreds of commercial online services, a half-dozen or so have developed that are used extensively by computer users in the home, in schools, and in small businesses. Without in any way attempting to cover all of what these services offer, here's a taste of how each approaches its market and what they have added recently.

American PeopleLink

American Home Network has always stressed the social aspect of its online service, American PeopleLink. And the primary areas of focus include machine-specific and general-interest SIGs, message boards, a data library, and online chatting.

PeopleLink users, called P-Linkers, were recently given access to several new services, an online travel agency, and the TWA online airline reservations service as well as an online shopping area.

The service offers a variety of rate structures, including a new frequent-use rate for those who are most active on PeopleLink. Super-saver (frequent-use) rates (Monday-Friday, 6 p.m.-8 a.m.; weekends, 8 a.m.-8 p.m.) are \$3.95 per hour for 300 baud, \$4.95 per hour for 1200 baud, and \$11.95 per hour for 2400 baud. Leisure-time rates (M-F, 8 p.m.-7 a.m.; weekends, 8 p.m.-8 a.m.) are \$4.95 per hour for 300 or 1200 baud, and \$11.95 per hour for 2400 baud. And prime time rates (M-F, 7 a.m.-6 p.m.) are \$11.95 per hour for 300 baud, \$12.95 per hour for 1200 baud, and \$14.95 for 2400 baud. (Illinois residents pay no prime time rates.)

The frequent-user rate system lets you pay a \$10 monthly fee that saves 25 percent on all per-hour rates. To become a "Frequent P-Linker," there's a one-time \$12.50 signup charge unless you join when first registering to use PeopleLink. The service now offers both voice and modem signup procedures.

American PeopleLink, American Home Network, 350 N. Clark St., Chicago, IL 60610

CompuServe

Online since 1979, CompuServe's main focus over the past year—as with many of the other services—has been centered on enhancing existing features rather than adding new ones. CompuServe calls itself the largest commercially available online information service in the world, with more than 350,000 subscribers split fairly evenly between business and consumer use.

Because of that broad base, electronic mail has always been an important feature of the system. CompuServe's own electronic mail,

called EasyPlex, has established ties with several other large communications companies—including MCI and Telex—allowing two-way messaging across these systems.

In addition to its many other services, CompuServe, in association with Addison-Wesley's Information Services Division, recently placed online Einstein, a gateway to some 90 databases selected for their usefulness to secondary school students and faculty. The databases include newspaper and wire services, articles, book reviews, and an online version of the *Reader's Guide To Periodical Literature*.

CompuServe has also been expanding its services for the at-home financial investor. One new feature, for example, lets users look at specific stocks through a detailed group of 24 analytical filters, including market/book ratio, cash flow, and four-year growth. Further tracking and analysis functions are available; and the information can be downloaded directly into a variety of software packages, including *Lotus 1-2-3* and *Symphony*.

There is a \$39.95 registration fee to join CompuServe. Non-prime time rates are \$6 per hour at 300 baud and \$12.50 per hour at 1200 or 2400 baud. Prime time access is \$12.50 per hour at 300 baud and \$15 per hour at 1200 or 2400 baud. CompuServe recently reduced its 2400-baud rates to the same level as that for 1200 baud.

CompuServe, P.O. Box 20212, Columbus, OH 43220

Delphi

General Videotex's Delphi service has recently added several enhancements to its system, in addition to the electronic mail, teleconferencing, bulletin boards, and other features that have been a part of its offerings.

First, the company is issuing a revised and illustrated handbook, published by Simon & Schuster. With purchase of the manual, a new user doesn't have to pay the service's \$24.95 registration fee.

Delphi officials expect to add the one-hundred-thousandth member to its service before the end of the year. Recent additions to the service include a personalized astrology service that has proven to be very popular and new auction

software that allows users to bid on products. Delphi hosted an online fund-raising auction for public television station WGBH in Boston that netted the nonprofit PBS station \$25,000.

New "Advantage" rates are available for as little as nine cents a minute, or \$5.40 per hour. To take advantage of those rates, a user simply agrees to use a minimum of \$24 a month in log-on time. The \$24 charge is applied toward your monthly usage, and there is a one-time fee of \$19 to use the Advantage rate. Prime time standard rates are \$17.40 per hour, while non-prime time rates are \$7.20 per hour.

General Videotex Corporation, 3 Blackstone St., Cambridge, MA 02139

Dow Jones News/Retrieval

Dow Jones emphasizes its news and information for the business and financial community. There are more than 40 business and financial databases, and selected stories from the *Wall Street Journal*, *Barron's*, and the *Dow Jones News Service*.

You'll find a wealth of data on all areas of business, such as excerpts from SEC records, ownership information on more than 10,000 public companies, company profiles from *Standard & Poor's*, research reports from brokerage houses, and 15-minute delayed stock quotes with a special news alert feature.

The company recently introduced an enhanced version of the Dow Jones Tracking Service for automatic tracking and analysis by members through their own computers. The service lets them automatically retrieve stock prices from the Dow Jones Current Quotes Service and late-breaking news from the Dow Jones News Service for each company in the profile.

New stock analysis programs have also been recently made available for Macintosh computers, similar to those already offered for IBM PCs and compatibles, and the Apple II-family of computers.

The Dow Jones registration fee is \$29.95, with an annual \$12 fee (waived the first year). Non-prime time access ranges from 10 cents to 80 cents a minute at 300 baud, depending on which services are used. Prime time access ranges from 30 cents to \$1.20 a minute at

300 baud. The fee for 1200 or 2400 baud is 2.2 times the 300-baud rate.

Dow Jones News/Retrieval, P.O. Box 300, Princeton, NJ 08543

GENie

GENie's round-table SIGs continue to be one of the most popular areas on the service. More than 40 of them are offered, focusing on all major brands of home computers and operating systems. GENie has also added non-computer-related SIGs for photography, genealogy, scuba diving, and a host of other hobbies and interests.

The service, responding to requests for more online access to financial information, has begun offering GENie Quote\$, a stock market utility that gives information on over 67,000 securities. Users can also put their personal portfolios online.

The company charges no additional fee for 1200 baud, and now offers 2400 baud in over 70 cities. Prime time access is \$35 an hour, but non-prime time access is only \$5 an hour. A one-time registration fee of \$18 is also required.

General Electric Information Services, 401 N. Washington St., Rockville, MD 20850

PlayNet

PlayNet began operation in October 1984 with a primary audience of Commodore 64 owners who wanted to meet others online and to play games that incorporated color and sound. The non-prime time rate is a mere \$2.75 per hour, with a monthly maintenance fee of \$12 required. The registration fee is \$19.95.

PlayNet has recently undergone a streamlining of its system, remodeling the menus, bulletin boards, and other areas of the service. Improvements were made in the online conversation section, which continues to be the most popular area on PlayNet. There are 14 online games incorporating color and graphics, as well as three text-only games: bingo, poker, and blackjack.

The most recent addition to the service is the online shopping center. This shopping area focuses on small merchants, crafts people, and artisans, unlike most of the other services. There is also a new dis-

count shopping area in which nothing is priced higher than \$9.99.

PlayNet, 105 Jordan Rd., Troy, NY 12180

QuantumLink

QuantumLink has become a focal point for a great deal of Commodore 64 telecommunications activity during the past year or two. Commodore itself has provided marketing and some funding for the service in trying to build a major Commodore forum.

The QuantumLink software that comes with membership means that the 64's excellent color graphics and sound can be included in all of the areas of the service. And QuantumLink follows a busy schedule with guest speakers and topical forums—all aimed at helping Commodore 64 users get more out of their machines.

QuantumLink has expanded its regular service to include online forums hosted by such major software companies as Electronic Arts, Timeworks, and other publishers; Commodore enhancement areas such as the GEOS forum developed in conjunction with Berkeley Softworks; and the recently added casino area in which you can play interactive, multiplayer blackjack and poker, as well as slot machines and other games of chance.

One of QuantumLink's most ambitious projects is called *Habitat*, a completely interactive world developed in association with Lucas-Film. Users first log into *Habitat* and then can move throughout the world with their cartoon character personas, meeting others and building an alternate life. After considerable development delays, *Habitat* is still not ready for full use. But QuantumLink officials believe that, when all of the problems are worked out of the complex project, it will be a breakthrough in online gaming.

Quantum, the parent company, is now experimenting with the beta version of a similar service for Apple II owners. Apple owners who would like to apply to become beta testers for the planned service can log in through their modems at 1-800-833-9400. Note, however, that this service is not yet ready for full public use.

There's no registration fee to

join QuantumLink other than the \$9.95 software. Users pay \$9.95 a month for unlimited use of basic service, plus additional per-minute fees for some extra services they may want.

QuantumLink, 8620 Westwood Center Dr., Vienna, VA 22180

The Source

The Source offers a wide variety of online information to both home and business users. In the consumer area, a games SIG has been added to other SIGs on personal computing, PC software, professions, and arts and entertainment. Two of the system's realtime conferencing capabilities, involving both public and private conferencing, have also been enhanced.

Several financial services have been added. The home investor may want to make use of Risk/Reward Analysis, a decision-making support tool that provides analysis for stocks, bonds, warrants, and convertibles. Volatility data is drawn automatically from *Standard & Poor's*.

A new tax service that's offered is a compilation of tax information and a tax question-and-answer service. A mutual fund analysis feature provides performance histories for more than 800 mutual funds and 40 different market indices.

The Source has also added MEDSIG for the discussion of chronic illnesses; COOKSIG for communication about cooking, recipes, and dietary concerns (part of these revenues go to the American Cancer Society); and Educators' Exchange, a professional exchange for teachers and administrators to share information, learn about educational software, and stay informed on educational issues.

A registration fee of \$49.95 is required to join The Source. A monthly fee of \$10 is also charged, although this is credited against the user's online time. Prime time access is 36 cents a minute at 300 baud, 43 cents a minute at 1200 baud, and 46 cents a minute at 2400 baud. Non-prime time access is 14 cents a minute for 300 baud, 18 cents a minute for 1200 baud, and 20 cents a minute for 2400 baud.

The Source, 1616 Anderson Rd., McLean, VA 22102 ©

Ring Quest

Michael B. Williams

Requirements: Apple II-series computer.

It's a beautiful day. You decide to stroll along the oceanfront, where you encounter a frail old man with a fascinating story to tell. He speaks of another land, a land where the Ring of Chaos and the lost Ring of Order rule supreme. But there is no order in this land, and you listen curiously to the old man's plea for you to find the Ring of Order and bring peace to this faraway world.

As you nod your head in consent; a feeling of drowsiness overwhelms you; and you lapse into an uncontrollable dream. When you awaken, you find yourself staring upward at purple skies decorated with red streaks. You realize that you are indeed in the land of which the old man spoke. You stagger to your feet and, accompanied by a native from the land, embark on your Ring Quest.

That's the story behind *Ring Quest*, a graphics adventure game from Origin Systems. In this adventure, *you* are the main character of the story. You don't just helplessly observe while the story unfolds in front of you. You actually make the decisions that determine the course of your character's life—or death.

You use simple English sentences to indicate what you want to do. If you see something interesting to the north, you simply type "Go north." If you need to get to the other side of a river, just type "Cross the bridge." But *Ring Quest* can also accept complex commands, such as "Get the sword, rope, and ring; then run north."

What's A Manticora Look Like?

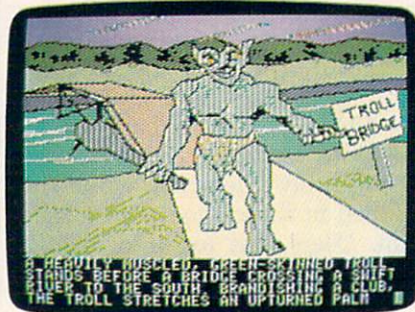
Ring Quest also has lively graphics—full-color pictures that enrich the scene with animation. Eyes bulge, claws clamp, hands grasp, and fire flickers, even as you ponder your next action.

Although the graphics are very good, *Ring Quest* is not just a graphics adventure. Its text descriptions, though not as descriptive as Infocom's all-text adventures, are vivid and interesting

enough to stand on their own. For those so inclined, the graphics can easily be turned off (and just as easily turned on again—you'll *definitely* want to see what a manticora looks like).

An unusual feature of *Ring Quest* is its inclusion of arcade sequences as a part of the adventure. It's rare for a text-based adventure game to contain any type of action-oriented challenge. And since diehard adventurers are likely to cringe at the thought of having to play an arcade game, the games can be bypassed altogether with one simple command.

The first game, *Cliff Climber*, requires you to dodge falling boulders, snakes, and rock slides while scaling the side of a chasm. In the second game, *Flyer*, you try to guide yourself down to a platform surrounded by a sea of flames.



Ring Quest for the Apple II has something for everyone: text and graphics adventure, animation, arcade action, and challenging puzzles.

Most of the time, though, you and your sidekick, Gorn, will try to pick up clues that will lead you to the Ring of Order. To win the game, you must first locate and nullify all the sources of an impenetrable force that prevents your access to the castle, where the formidable enchantress Lisa holds the Ring of Chaos.

Along the way, you'll have to deal with a greedy troll, an unforgiving werewolf, a wise old man (whose services do not come cheap), and a manticora (a cross between a man, lion, bat, and scorpion) who absolutely refuses to let you cross the bridge over a deep chasm.

Charming Lisa

Those are but the least of your worries. The holder of the Ring of Chaos, the beautiful, but evil, enchantress Lisa, has a nasty habit of appearing out of nowhere and casting spells that make life difficult for you. She can instantly deplete your water supply, suddenly reverse your internal compass, or temporarily afflict Gorn with the intellect of a three-year old. But when she *really* means business, she'll utter "Teletrans!", and you'll suddenly find yourself randomly transported to some location usually miles away from where you were.

Ring Quest comes with a clever introductory adventure booklet, which interactively tells the story behind your quest. At the end of each passage, you have two or more options. Each leads to a different passage in the booklet and a slightly different story line. Origin Systems also provides a laminated, erasable map of the strange world. Some of the major landmarks are already drawn on the map; you can easily add others with the felt pen provided.

Despite the enchantress Lisa's unorthodox tactics, *Ring Quest* is not difficult to solve. It should make a good first-time adventure because of its pleasant, colorful graphics and its straightforward story line.

This game has something for everyone: vivid, descriptive prose for those who like reading, and colorful, animated graphics for those who don't; arcade sequences for those who like action, and engaging puzzles for those who don't. If you're looking for a little adventure, or action, you just might want to make a *Ring Quest*.

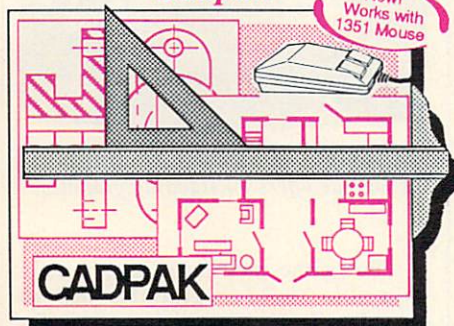
Ring Quest
Origin Systems
340 Harvey Rd.
Manchester, NH 03103
Distributed by Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
\$19.95



Hop to it! check out this Great Software

Cadpak

New!
Works with
1351 Mouse



Design pictures and graphics quickly and precisely. Unlike other drawing programs, you can produce exact scaled output on your printer. Design in the units of your drawing problem (feet, miles, meters, etc.) and send hardcopy to most printers. Uses either the keyboard, lightpen or 1351 mouse. Two separate work screens—transfer artwork from one screen to the other. Place text in four sizes anywhere in the picture—three extra fonts included: Old English, 3-D and Tech. "Try Again" allows you to undo mistakes. Draw solid or dashed lines, circles, ellipses at any angle, rays and boxes. Design fill patterns, fonts and objects. **Cadpak** is the full-featured design and graphics package for your computer. for C-64 \$39.95 for C-128 \$59.95

Super C

C is one of today's most popular languages. It's easy to transport C source code from one computer to another. With **Super C** you can develop software or just learn C on your Commodore. **Super C** is easy to use and takes full advantage of this versatile language. Produces 6502 machine code and is many times faster than BASIC. Includes full-screen editor (search, replace and block



"...easy to use package with more power than most users should need...ultra-fast compile and link times make program development effortless." Adam Herst, Transactor

operations), compiler, linker and handbook. Combine up to seven modules with the linker. Besides the standard I/O library, a graphic library (plot points, lines, fill) and a math library (sin, cos, tan, log, arctan, more) are included. Whether you want to learn C, or program in a serious C environment for your Commodore, **Super C** is the one to buy. for C-64 \$59.95 for C-128 \$59.95

BASIC Compiler

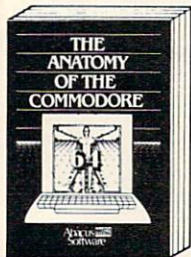
Now anyone can speed up their BASIC programs by 3 to 35 times! Basic-64 and Basic-128 easily convert your programs into fast machine language or speedcode (takes up less space yet protects your programs from prying eyes) or a mixture of both. You can even compile programs written with extensions—Simon's Basic, VICTREE, BASIC 4.0, VideoBasic and others. When the compiler finds an error, it just doesn't stop, but continues to find any other errors as well. Supports overlays and has many other options. 128 version works in FAST mode and allows you to use all 128K of memory. If your program walks or crawls, give it the speed to **RUN!** for C-64 \$39.95 for C-128 \$59.95

"...everything a good compiler should be...easy to use...efficient...offers a good range of optional features...excellent documentation...inexpensive." Tom Benford, Commodore Magazine

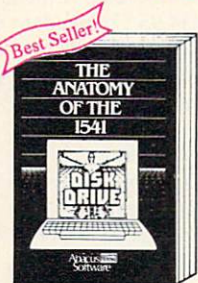
Give your BASIC programs a boost!



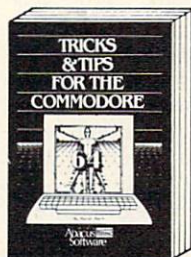
... and SUPER BOOKS!



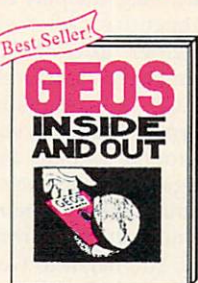
Anatomy of the C-64
Insider's guide to '64 internals. Graphics, sound, I/O, kernel, memory maps, and much more. Complete commented ROM listings. 300pp \$19.95



Anatomy of the 1541 Drive
Best handbook on this drive, explains all. Filled with many examples programs, utilities. Fully commented 1541 ROM listings. 500pp \$19.95



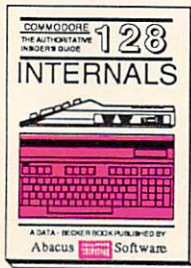
Tricks & Tips for the C-64
Collection of easy-to-use techniques: advanced graphics, improved data input, CP/M, enhanced BASIC, data handling and more. 275pp \$19.95



GEOS Inside and Out
Detailed info on GEOS. Add your own applications to GEOS. Edit icons. Constant display clock. Single-step through memory. \$19.95



GEOS Tricks and Tips
Collection of helpful techniques for all GEOS users. Includes font editor, machine language monitor, quick backup, more. \$19.95



C-128 INTERNALS
Important C-128 information. Covers graphic chips, MMU, I/O, 80 column graphics and fully commented ROM listings, more. 500pp \$19.95



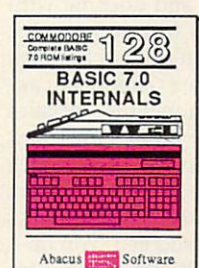
1571 INTERNALS
Essential reference. Internal drive functions. Explains various disk and file formats. Fully-commented ROM listings. 450pp \$19.95



C-128 TRICKS & TIPS
Fascinating and practical info on the C-128. 80-col hires graphics, bank switching. 300 pages of useful information for everyone. \$19.95



C-128 PEEKS & POKES
Dozens of programming quick-hitters, techniques on the operating system, stacks, zero page, pointers, and BASIC. 240pp \$16.95



C-128 BASIC 7.0 Internals
Get all the inside info on BASIC 7.0. This exhaustive handbook is complete with fully commented BASIC 7.0 ROM listings. \$24.95

Call now for the name of your nearest dealer. Or order direct with your credit card by calling 616/241-5510. Add \$4.00 per order for S&H. Foreign add \$12.00 per item. Other books and software also available. Call or write for your free catalog. Dealers inquires welcome—2000 nationwide.

Abacus

P.O. Box 7219
Dept. C7

Grand Rapids, MI 49510

Telex 709-101 • Fax 616/241-5021

Phone 616/241-5510

Commodore 64 and Commodore 128 are trademarks of Commodore Ltd.

Two Views Of Outer Space: *S.D.I.* And *Wanderer*

Neil Randall

Requirements: S.D.I.: Atari ST (reviewed here), IBM PC, Amiga, Apple IIGS, and Commodore 64. Wanderer: Atari ST.

S.D.I. and *Wanderer* place you in the captain's seat of a space fighter. In *S.D.I.*, your mission is to defend the United States against KGB rebel fighters and missiles, all for a chance to rescue your own true love, the commander of the Soviet space station. *Wanderer* presents another rescue mission, but this one is far more obscure. Here, you battle your enemies for the right to bring home your caretaker's cat. It seems she can't live without it, so until she gets it back, your apartment won't get cleaned. (And it's such an awful mess.)

The plots may be contrived, but the fact that the games in fact *have* plots marks them as something special in the arcade game field. Since the days of *Space Invaders* and *Donkey Kong*, arcade games have provided considerable excitement, but few have offered players an interactive story. *S.D.I.* and *Wanderer* go a good way toward filling this gap. Both are arcade games, and both use the now-classic cockpit display, but—unlike most arcade games—you can complete them.

Dazzling Graphics

Graphically, both games have much to offer. *S.D.I.*, a new offering in Mindscape's Cinemaware line of interactive fiction, uses some of the best graphics I've seen in any game. The display screens range from a control panel showing several global maps to the interior of the Soviet space station, as well as a silhouetted embrace with the gorgeous Soviet commander (your own true love, remember). The most frequent display, though, is the view from the cockpit of your fighter. You guide the fighter around the world, shooting down rebel KGB fighters, repairing your *S.D.I.* satellites, and docking with your space station for fuel and repairs. When you shoot down several fighters, the rebels will declare American aggression and start launching missiles from Russia. At this point, you dock with the space station (no mean feat), race into the Missile Defense screen, and prepare to knock the Soviet missiles out of the sky. If you succeed, you do it all over again, until at last you are informed that the Soviet space station has been captured by the KGB rebels. When

that happens, you attempt the rescue.

Wanderer's display also places you in the cockpit of a fighter, but the similarities pretty well end there. The reason is simple: *Wanderer* is in 3-D. Included in the package is a pair of red-blue 3-D glasses, the kind used for such classic 3-D movies as *The Creature From the Black Lagoon*. When you put them on, the ST's screen appears three-dimensional. After a few minutes of focusing, the stars recede into the background, and the display seems to achieve true perspective. When you enter warp drive, and the stars race past you in a swirling spiral, the effect is quite spectacular.

Surely one of the most unusual games I've seen, *Wanderer* has you move from planet to planet, offering the ruler of each planet a playing card to strengthen that planet's poker hand. (There's this galactic poker game going on, in progress now for centuries, and if you offer a helping card they will respond by paying you in cats. Yes, cats. If you collect enough cats, or if you manage to get one specific card, you can penetrate to the central sector and try to rescue your caretaker's cat.) It's all very complicated, but it's also a great deal of fun.

More fun, in fact, than *S.D.I.*, which offers superb graphics, but in actual game play suffers from being too repetitive. After shooting down KGB fighter after KGB fighter, repairing damaged satellites, and intercepting KGB missiles with your strategic defense weapons, you are asked to turn around and do the same things over again. By the time you've hit the third round, the excitement begins to pale; once into the fourth, you begin to tire of it. You begin to wonder, in fact, if your own true love is really worth the effort.

What makes this strange is that arcade games, by their very nature, are repetitive. The good old ones, like *Asteroids* and *Missile Command*, had no conclusion, your goal being simply to chalk up hundreds of thousands of points. *S.D.I.*, by offering a finish, ironically loses the appeal of racking up the points. The impetus behind shooting down KGB fighters is not acquiring points, but rather reaching the end of the plot. *Wanderer*, which also has a conclusion, suffers similarly, but *Wanderer's* conclusion is more difficult to reach. Its game play is somewhat more challenging, and getting killed is far easier.



The Atari ST version of *S.D.I.* from Mindscape offers outstanding graphics.

But game play itself is extremely enjoyable. *S.D.I.'s* graphics are so splendid that they more than atone for whatever the game play lacks, and you will find yourself booting up the game simply to see what your ST can do. *Wanderer*, with its workable 3-D display, is unique, and, like *S.D.I.*, it is an excellent product with which to show off your ST to your friends. Played obsessively to a conclusion, both games will eventually become worn out, but if played as I think they are meant to be played, 30 minutes here and 30 minutes there, they will continue to draw your attention. Were I asked to recommend one over the other, I would suggest *S.D.I.*, because graphically it is one of the best ST products on the market. But both games are worth a look, and both point toward an exciting ST future.

S.D.I.

Mindscape, Inc.

3444 Dundee Rd.

Northbrook, IL 60062

\$34.95 Commodore 64 version

\$39.95 IBM PC version

\$49.95 Macintosh, Amiga, ST, IIGS versions

Wanderer

EiderSoft USA

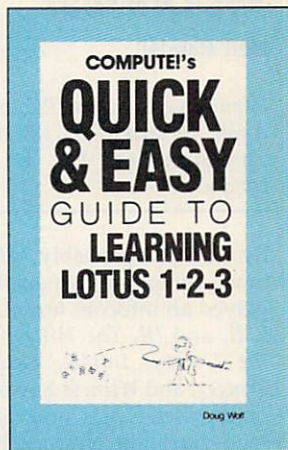
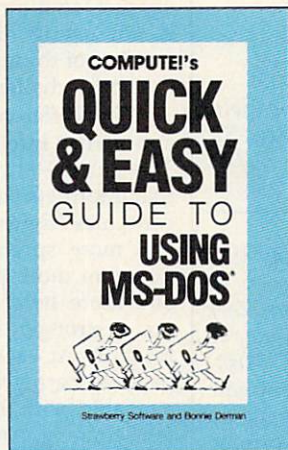
P.O. Box 288

Burgettstown, PA 15021

\$39.95

COMPUTE! Books introduces a new line of easy-to-use computer books.

COMPUTE!'s Quick and Easy Guides are effective, dependable reference guides to using applications on your personal computer. From command summaries and quick-reference charts to tips for power users, you'll have the information you need right at your fingertips. Each book is specially designed to be convenient and easy to understand.



COMPUTE!'s Quick and Easy Guide to Using MS-DOS

Bonnie Derman and Strawberry Software
ISBN 0-87455-105-6 \$12.95
Whether you're an experienced MS-DOS user or just starting out, this book is your easy-to-use reference to this powerful and flexible operating system for IBM and compatible computers. No longer will you need to wade through hundreds of pages to find just the right DOS command. *COMPUTE!'s Quick and Easy Guide to Using MS-DOS* puts the information right at your fingertips. With two indices and an expanded table of contents, simply look up the task you want to accomplish or the DOS command you need—and you'll find an explanation of exactly what to do.

COMPUTE!'s Quick and Easy Guide to Learning Lotus 1-2-3

Doug Wolf
ISBN 0-87455-106-4 \$12.95
The perfect guide for the novice user of the popular and powerful *Lotus 1-2-3*, this book assumes no previous computer experience whatsoever. *COMPUTE!'s Quick and Easy Guide to Learning Lotus 1-2-3* covers everything from building a spreadsheet model, setting up a database, and using 1-2-3 for word processing, to creating graphs and powerful macros. Also included are discussions on how to start 1-2-3 and available add-on software that can be used with *Lotus 1-2-3*.

COMPUTE!'s Quick and Easy Guide to AppleWorks

Tom and Ellen Dougher
ISBN 0-87455-109-9 \$10.95
AppleWorks, the unchallenged leader in personal productivity software on the Apple II series, is an integrated package combining a word processor, database, and spreadsheet. It's a complete program that lets you do everything from writing letters and reports to keeping extensive files and projecting financial earnings. With *COMPUTE!'s Quick and Easy Guide to Appleworks*, you'll see how to get started with *AppleWorks*, and how to use each of the three major applications. A Command Summary, Keyboard Template, and Quick-Reference Chart provide information in one-stop locations. Numerous ideas offer practical examples on new ways to use *AppleWorks*. And there's even all the latest information on *AppleWorks'* add-ons and enhancements. Clearly defined sections apply to novices and power users alike.

COMPUTE!'s Quick and Easy Guide to dBase III Plus

Chuck Doherty
ISBN 0-87455-107-2 \$10.95
For the beginning or experienced user of this popular database management program. Ashton-Tate has sold more than a million copies of *dBase*, and *COMPUTE!'s Quick and Easy Guide to dBase III Plus* is the guide and reference to help you tap all the power and flexibility that *dBase III Plus* has

to offer. This is not a manual for *dBase*, rather, it's a guide that makes getting started with *dBase* easy and finding specific information quick. For all users of *dBase III Plus* on the IBM PC, PC XT, PC AT, or compatible computer.

COMPUTE!'s Quick and Easy Guide to WordPerfect

Patricia Farrell
ISBN 0-87455-011-4 \$10.95
Write, edit, format, and print with *WordPerfect* your first day, using this simple-to-use guide to the most popular word processor for the IBM and IBM compatibles. Organized so that you can immediately begin to use this impressive software, this book covers all the basics and many of the program's advanced features. Read what you need and then start to work with *WordPerfect*. Learn how to enter, edit, shift, and print text. Use the more advanced techniques when you're ready. See how to prepare a complete report, set text columns, merge information to create form letters, and create special forms.

COMPUTE!'s Quick and Easy Guide to Desktop Publishing

Dan McNeill
ISBN 0-87455-112-9 \$10.95
With a computer, a printer, and the right software, you can turn out documents, flyers, brochures, and more—all of the highest quality available outside a professional print shop. This

easy-to-use reference guide explains the ins and outs of desktop publishing, shows what you can do with the variety of available software, and even helps you select your system. If you're tired of wading through long and technical manuals, this guide and tutorial will get you started today with desktop publishing.

COMPUTE!'s Quick and Easy Guide to Dow Jones News/Retrieval

Donald B. Trivette
ISBN 0-87455-113-7 \$10.95
Learn how to more efficiently use the Dow Jones Information Service, a powerful business and stock information database. Access up-to-date stock quotations, financial information, company background data, and more—all with Dow Jones. Using a personal computer, a modem, the phone, and the right software, you can search through back issues of publications like *The Wall Street Journal* or directly place orders. This simplified guide to the pre-eminent business information service puts everything within easy reach, and gets you started faster and more easily than any manual.

Look for COMPUTE!'s Quick and Easy Guides at your local book or computer store.
To order any COMPUTE! book, call toll free 1-800-346-6767 (in NY call 212-887-8525)
or write COMPUTE! Books, Customer Service, G.P.O. Lockbox 5044, New York, NY 10087-5044.

Moonmist

Neil Randall

Requirements: IBM-PC or compatible, Apple II series, Macintosh, Amiga, ST, Commodore 64, 128, or Atari XL/XE computer.

By now it's probably safe to say that most computer owners have seen or played an Infocom text adventure. *Zork I, II, and III*, *The Hitchhiker's Guide to the Galaxy*, *Infidel*, *Enchanter*, *Wishbringer*, and *Witness* have all spent time on best-seller lists, and high-circulation magazines like *Newsweek* have printed articles about the company. Infocom has become famous for its interactive fiction, and its customers look to it not for new kinds of products but for variations to the old.

As pioneers of the sophisticated text adventure, Infocom is expected to set the standard for future text adventures. To this end, Infocom has introduced Interactive Fiction Plus, a line of text adventures designed especially to take advantage of machines with 128K of memory (though they're also available for 48K and 64K machines). The differences are certainly not dramatic, and in many ways the games look the same as they always have, but Infocom's newest adventures are different from the old in several important ways.

Moonmist demonstrates the differences. Like all Infocom games of the past two years, it is superbly packaged, but unlike the earlier games, the packaging is needed to play the game. Infocom does not copy-protect its disks (and has certainly suffered its share of software piracy), so this reliance on the packaging is perfectly justified. Inside *Moonmist's* package are two letters from your acquaintance, Tamara, the latter of which suggests a murder plot against her. Also included is a brochure about Tresyllian Castle in Cornwall, where Tamara is staying, which provides many descriptions necessary to play the game. The documentation introduces the "Legendary Ghosts of Cornwall," and a *Moonmist* iron-on transfer is included for those who still own T-shirts with no writing on them.

In The Castle

Your task is to uncover the murder plot, in the meantime dealing with some very interesting characters inside a well-described medieval castle complete with torture devices and a wandering ghost. You must collect clues, talk with the characters, survive an encounter with the ghost, and even figure out what outfit to wear at certain times.

Moonmist is an introductory-level adventure, so it moves along quickly and is not overly difficult; but the sheer number of things you have to do make it a long, challenging game.

The differences between *Moonmist* and earlier Infocom games are subtle. The parser—the part of the program that interprets your typed commands—continues to grow more sophisticated, and more specialized. Room descriptions are more precise, more detailed, and more helpful, all of which gives you a stronger sense of your physical location. At each stage, too, there appears to be a greater choice of actions available, with fewer actions being blatantly wrong. And the characters in the story are, for the most part, genuinely interesting, even if they don't do as much as perhaps they should.

The most subtle change, though, and the most important, is in the role taken by the reader. In *Moonmist*, as in most of the newer Infocom games, you feel that a story is actually taking place, and that you are a part of it. In the earlier adventures, your actions forced the story from one point to the next, but unless you did something, nothing happened. While this is technically true of *Moonmist*, the authors, Stu Galley and Jim Lawrence, manage to make you feel that you are caught up in a story beyond your own actions. The time limit helps, of course, but somehow the castle seems far more "alive" than the caverns in *Zork* or even the spaceship in *Starcross*. The people in the castle all know more about it than you do, and the result is that you feel like an intruder. This effect is a good one.

For those who have not yet tried an Infocom adventure, *Moonmist* is a good introduction. It is challenging without being frustrating, and it offers what interactive fiction is supposed to offer: a chance to participate in an interesting story. For Infocom veterans, *Moonmist* demonstrates how text adventures have changed since the heyday of *Zork*.

Moonmist

Infocom

125 Cambridge Park Dr.

Cambridge, MA 02140

\$39.95 IBM-PC and compatibles, Apple II, Macintosh, Amiga, and Atari ST versions

\$34.95 Commodore 64, 128, and Atari XL/XE versions

Partner

Kathy Yakal

Requirements: Commodore 64 (reviewed here), 128, or IBM-PC or compatible (256K recommended but not required on MS-DOS machines).

Throw away your card file. Toss out that old calculator you bought in 1975 when the price came down to \$5.95. Stop trying to decide which size paper you're going to write a memo on, and end the frustration of having to line up each mailing label when you're typing a bunch of them.

You can replace all these things with a single cartridge that does them all, and more: *Partner*, from Timeworks. *Partner* is one example of a genre of productivity software that offers several desktop accessories like a notepad, appointment calendar, calculator, and address/phone file in an invisible program that runs concurrently with other programs; that is, it remains in memory while you're using your word processor or sweating out cells in a spreadsheet or landing in San Francisco in *Flight Simulator*, and it pops up ready for use at the touch of a cartridge button.

Installing *Partner*, depending on which version you're using, involves little more than plugging it into an expansion port. Although you may not need to use all of its functions immediately, it's a good idea to run through the manual to make sure you know how to use all of them, saving time later.

Partner offers nine functions:

Appointment Calendar: *Partner* contains graphic calendar displays for every month from January 1987 through December 2099; by pressing a few function keys, you can enter, edit, and save information for any day in three areas—*Key Tasks*, a *To Do* list, and *Appointments*. Though the first two headings might seem to duplicate each other, they actually point out a very important time-management tool: separating goals from objectives. In the midst of doing all of the little tasks that make up your day, it's wise to keep the larger picture in mind.

If there are tasks you haven't completed when 5:00 rolls around, *Partner* lets you transfer them to the next day. The snafu here is that it erases any items you've already entered for that next day. Another minor gripe in this area: When you're printing out a week or month's worth of days, the skeleton format (including headings and numbers) is printed for every day, whether or not you've entered anything there, wasting space and printer paper.

Memo Pad: Using simple text-editing commands, you can dash off memos without losing your current program. The *Typewriter* feature here will print out one line at a time as you hit the return key if you like; you can also print out the whole thing when it's done.

Address List: Using the same text-editing features from Memo Pad, this section is an electronic card file for storing, alphabetizing, displaying, and printing names, addresses, and telephone numbers. You can also print mailing labels within this section. This may involve playing around with the margin settings to zero in on the right spacing.

Phone List: This is an abbreviated version of the Address List. Since it contains autodialing capabilities, it's especially helpful for telecommunications applications. You can store phone numbers for often-called online services and let the program dial for you.

Calculator: When the boss drops a paycheck on your desk, you can break into this area and do a quick calculation of your checkbook balance. The program displays a graphic representation of a calculator with its standard functions, and includes a printout option.

Print Screen: Lets you print one screen from the program you're running, with the exception of graphics displays.

SwiftDOS: This section offers access to a variety of housekeeping commands for your disk operating system, like formatting, cleaning, and erasing.

SwiftLock: Data protection schemes like this insure that no one can peek at your work when you walk away from your desk to get coffee. Enter this section before leaving your terminal, and it freezes all active data until you enter your secret code.

Setup: Though it's listed last, this is probably the first area you'll want to dive into. It asks eight questions about your hardware configuration, letting you set addresses and margin spacing.

Partner also offers Swiftload, a fast-loading feature.

Partner is an excellent addition to any software library. It offers an uncomplicated command structure and clear, simple documentation. It provides quick, easy access to features often used during the business day; any of the program's functions is only a keypress away, and a display of the purpose of each function key runs along the bottom of the screen in each section. And *Partner* doesn't take up space with a lot of extras that often aren't necessary.

But the main advantage here lies in the fact that it runs concurrently with whatever software you're using: no need to save a document, power down, reboot, and so on. It's not meant to be used as a full word processor or database manager. It's an accessory—a *partner*, as its name states—and a good one.

Partner

Timeworks

444 Lake Cook Rd.

Deerfield, IL 60015

\$59.95 Commodore 64 and IBM-PC/

PC-compatible versions

\$69.95 Commodore 128 version

Realm Of Impossibility

Michael B. Williams

Requirements: Commodore 64, Apple II series, or Atari 8-bit computer.

Realm of Impossibility is a decidedly classic, run-as-fast-as-you-can, three-dimensional arcade game with a goal: Enter the network of 13 dungeons and retrieve the seven crowns hidden within them. That would be a cinch were it not for the team of zombies, orbs, and spiders whose goal it is to prevent you from completing yours.

About the only things going for you in this *Realm* are your faster speed, the ability to fend off the creatures by throwing holy crosses in their path, and scrolls that give you spells to temporarily freeze or confuse your adversaries, or to protect you from them.

Otherwise, life is definitely not fair to you here. You can't kill the creatures of the *Realm*, although they can kill you. You only have one life to live, and each brush with a zombie, orb, or spider will cost you more of the precious hit points you need to stay alive.

Fortunately, you can enter the dungeons in any order, so you can build up hit points by tackling the easier dungeons first. Some of the dungeons are locked; these will need keys that are located in the other dungeons. In all, there are 129 different rooms to explore. Chances are you'll get to see all of them, since the prize in each dungeon is almost always at the end.

Realm of Impossibility has a three-dimensional effect (like the three-quarters perspective in *Zaxxon*) that is a pleasure to behold. You move up, down, and around three-dimensional structures that look more like a futuristic cityscape than an ancient dungeon. Unfortunately, what *looks* good is not

necessarily what *plays* well, as kamikaze *Zaxxon* players will attest.

A Little Help From A Friend

What distinguishes *Realm of Impossibility* from the run-of-the-mill chase game is not the three dimensions, but one element: cooperation. In the typical arcade game, you are one person doing a job that would normally require an entire army to accomplish. At about the 1000th level, you start wishing you *were* an army—or at least that you had someone to help you play the game.

With *Realm of Impossibility*, you still won't have an army, but you can have a friend help you through each dungeon. Having two players on the field at once gives the zombies and his friends two targets instead of one, but it also gives you a chance to divert the menaces while your buddy safely snatches the key (or, preferably, you swipe the key while *he* acts as zombie bait).

An additional advantage of the two-player game is the ability to resurrect your partner whenever the little buggers finish him off. Of course, you've got to get over to him before they knock *you* off. In the one-player mode, once you're finished, so is the game.

When you play *Realm* (which, according to the developer, Origin Systems, can run in the Apple IIGS's emulation mode), you must use a joystick; a second player may use either the keyboard or a second joystick. Learning to navigate the 3-D rooms is a bit tricky no matter which you use. Until you become proficient at it, don't worry too much about running into walls—it's the zombies, spiders, and orbs you need to avoid.

You'll enjoy the four difficulty levels (from easy to severe), the online instructions (no more lost manuals), and the cute touches (the player waves "Hello!" at the entrance to each dungeon), but the game's musical score will cause you to reach for the sound toggle after a bar or two. A single keypress will cut off the sound (or turn it back on).

By far the best thing about *Realm of Impossibility* is its two-player mode. Forget its wonderful three-dimensional color graphics. The ability to work together with a friend, instead of competing against one, makes this a game even an arcade-game hater could love.

Realm of Impossibility

Origin Systems

340 Harvey Rd.

Manchester, NH 03103

Distributed by Electronic Arts

1820 Gateway Dr.

San Mateo, CA 94404

\$14.95

©

Weather Wizard

John R. Wetsch

This weather forecasting program is written entirely in BASIC and can be adapted to run on virtually any computer with BASIC. The original version is written for the IBM PC/PCjr. We have added translations for the Commodore 64, Amiga, Atari ST, Apple II, and Atari 400, 800, XL, and XE.

"Weather Wizard" is a simple, easily modified BASIC program for forecasting the weather. Because every version is similar, we've published one main program and provided line changes and modifications for each individual machine. Begin by typing in the main program (Program 1). When that's done, add or modify the lines listed for your specific computer. After you have typed the complete program for your computer, save a copy to tape or disk before you run it.

Atari ST users should note that several lines must be deleted from the main program to produce a proper display. See the REM statement in line 1 of Program 6 for details. Amiga users should remember that Amiga BASIC does not automatically arrange numbered program lines in numerical order. Be careful to type the lines of the main program in the order shown. The extra line in Program 7 must be added as the first line of the program.

Entering Data

Weather Wizard is largely self-prompting, so you will not need

extensive instructions to use it. The program begins by asking you to enter several items of information about current weather conditions, beginning with the current month, day, and year. Enter a number from 1 to 12 for the month, a number from 1 to 31 for the day, and so on.

The program then displays instructions for entering the next item of information, the wind direction. This is done by typing a number according to the categories shown on the screen.

Next, you must enter the current barometric pressure, expressed in inches of mercury. This will be a number in the range 27-33.

After the barometric pressure, you must enter the barometric activity (whether the barometer is steady, rising fast, and so forth). Again, the computer displays a menu indicating which number to type.

The next item of information is the prevailing cloud type. As prompted by the computer, enter a 1 for cirrus clouds, a 2 for cumulus, and so on. If you are not familiar with the various cloud types, refer to the brief explanations at the end of this article.

Finally, enter the current humidity and temperature when prompted. When you are finished entering data, the computer prints a complete forecast for a 6- to 36-hour period. The period of the forecast depends on what sort of weather is expected. To calculate another forecast, answer Y at the final prompt.

Cloud Types

Cumulus clouds are puffy, white, and cottonlike in appearance with a clearly defined outline. Perhaps the most familiar cloud type, these are usually found at lower altitudes, with cloud tops seldom exceeding 5,000 feet.

Altostratus clouds are small, semitransparent, cumulus-type cloudlets that appear in layers. This type of cloud evolves from the lifting of lower clouds. They often appear connected, and you can see the sky through them. Rounded and regularly arranged, they are usually found at an altitude of 10,000-17,000 feet.

When a cumulus cloud develops both extreme height and mass, it evolves into a *cumulonimbus* cloud. Although it makes up the most beautiful cloud mass, sweeping up into a towering column, these are the most dangerous clouds. Capable of producing heavy rain, hail, lightning, and strong, gusty winds, these clouds occasionally mask a tornado. These clouds may be easily identified by their massive appearance, vertical development (often in excess of 20,000 feet), anvil-shaped top, and thunder and lightning. Occasionally the tops of extremely powerful cumulonimbus clouds will exceed 30,000 feet.

Stratus clouds are gray, featureless sheets, sometimes layered in appearance. This type of cloud produces only light precipitation, if any, and may reveal the sun through its thinnest parts. When in

contact with the earth (at an altitude of 50 feet or less) this cloud type is called *fog*. The tops of stratus clouds rarely exceed 10,000 feet, although one variety, *nimbostratus*, may have cloud tops reaching to 15,000 feet.

The word *nimbus* is a Latin word which means *violent rain* or *black rain cloud*. Nimbostratus clouds produce continuous precipitation. This cloud type is often gray and is always thick enough to obscure the sun. Nimbostratus clouds are usually found near weather fronts, and although classified as a middle-altitude cloud, with tops ranging to 15,000 feet, the cloud base may be quite low.

Altostratus clouds are a smooth, uniform, gray sheet of cloud cover, and consist mostly of ice crystals, although the lowest portion may be water droplets. The sun may appear as though seen through ground glass, and objects on the ground will not cast a shadow. Any precipitation associated with this cloud type is continuous. Altostratus clouds are considered middle-level clouds, and generally occur between 6,500 and 23,000 feet in altitude.

Cirrostratus clouds are thin, white clouds that appear in sheets. The sun and moon are hardly ever obscured by these clouds which often indicate severe weather to come. They are typically found high in the atmosphere, usually above 25,000 feet.

Cirrus clouds are wispy and white, generally occurring between 16,500 feet and 45,000 feet. A buildup of cirrus clouds may indicate an approaching warm front.

Before entering this program, carefully read the typing instructions in the article.

Program 1: Weather Wizard— Main Program

For instructions on entering these programs, please refer to "COMPUTE!'s Guide to Typing in Programs" elsewhere in this issue.

```
10 REM Copyright 1987 COMPUTE!
Publications, Inc. All rights
reserved
20 GOSUB 1520
30 PRINT "The Weather Wizard"
40 PRINT
50 PRINT "Copyright 1987 COMPUTE!
Publications":PRINT"All R
ights Reserved
60 FOR J=1 TO 3000:NEXT J
70 GOSUB 1520
80 PRINT "Enter month (use numb
```

```
er)":MIN=1:MAX=12:GOSUB 139
0:M = E
90 PRINT "Enter Day":MIN=1:MAX
=31:GOSUB 1390:D = E
100 PRINT "Enter the Year":MIN
=0:MAX=2100:GOSUB 1390:Y =
E
110 GOSUB 1520
120 PRINT "Please input numbers
when prompted by ?"
130 PRINT
140 PRINT " From the menu enter
the number corres-"
150 PRINT "ponding to the wind
direction
160 PRINT
170 PRINT "N= North, S= South,
E= East, W= West"
180 PRINT "(Note: The direction
s are where the"
190 PRINT "wind comes from, not
where it is going."
200 PRINT "So, 'NE' means a win
d blowing out of"
210 PRINT "the northeast.)"
220 PRINT
230 PRINT "----- WIND DIREC
TION MENU -----"
240 PRINT
250 PRINT "1. N"SPC(4)"2. NE"SP
C(3)"3. E"
260 PRINT
270 PRINT "4. SE"SPC(3)"5. S"SP
C(4)"6. SW"
280 PRINT
290 PRINT "7. W"SPC(4)"8. NW"SP
C(3)"9. NO WIND"
300 PRINT
310 PRINT
320 MIN=1:MAX=9:GOSUB 1390:W =
E
330 GOSUB 1520
340 PRINT "Enter barometric pre
ssure":PRINT"in inches of H
g (ex. 29.95) ";
350 MIN=27:MAX=33:GOSUB 1480:BP
= E
360 GOSUB 1520
370 PRINT "Please enter the num
ber that describes"
380 PRINT "current barometric a
ctivity."
390 PRINT "Barometer is: 1. ste
ady"
400 PRINT SPC(14)"2. rising fas
t"
410 PRINT SPC(14)"3. slowly ris
ing"
420 PRINT SPC(14)"4. falling fa
st"
430 PRINT SPC(14)"5. slowly fal
ling"
440 PRINT
450 MIN=1:MAX=5:GOSUB 1390:BD =
E
460 GOSUB 1520
470 PRINT "Please enter the num
ber for the main"
480 PRINT "cloud type for your
location."
490 PRINT
500 PRINT "1. Cirrus":PRINT"2.
Cumulonimbus":PRINT"3. Stra
tus"
510 PRINT "4. Nimbostratus":PRI
NT"5. Altostratus":PRINT"6.
Alto cumulus"
520 PRINT "7. Cirrostratus":PRI
NT"8. Cumulus":PRINT"9. No
clouds":PRINT
530 MIN=1:MAX=9:GOSUB 1390:C =
E
540 GOSUB 1520
550 PRINT "Input Humidity":PRIN
```

```
T"(ex. input 50 for 50% hum
idity)";
560 MIN=0:MAX=100:GOSUB 1480:H
= E
570 GOSUB 1520
580 PRINT "Input Temperature in
Fahrenheit":PRINT"(ex. 63
= 63 deg. F)";
590 MIN=-130:MAX=130:GOSUB 1480
:T = E
600 GOSUB 1520
610 REM FORECASTS
620 IF BP > 29.9 THEN 710
630 IF (W)=1 AND W<=5) AND BD=4
AND BP>29.7 THEN 860
640 IF (W)=6 AND W<=8) AND (BD>
=1 AND BD<=3) AND T>75 AND
H>68 THEN 910
650 IF (W)=6 AND W<=8) AND (BD=
2 OR BD=3) THEN 930
660 IF BP > 29.7 THEN 810
670 IF (BD=2 OR BD=3) THEN 1040
680 IF (W)=1 AND W<=5) AND BD=4
THEN 1110
690 IF (W=2 OR W=3) AND BD=5 TH
EN 1120
700 GOTO 810
710 IF (W)=6 AND W<=8) AND (BD=
1 OR BD=3) AND T>75 AND H>7
0 THEN 950
720 IF (W)=6 AND W<=8) AND (BD=
1 OR BD=3) THEN 970
730 IF W=4 AND BD=5 THEN 1000
740 IF W=4 AND BP>30.5 AND (BD=
4 OR BD=5) THEN 1020
750 IF (W=4 OR W=5) AND BD=4 TH
EN 1060
760 IF (W=4 OR W=5) AND BD=5 TH
EN 1080
770 IF (W=3 OR W=4) AND BD=4 TH
EN 1090
780 IF W=5 AND (BD=4 OR BD=5) T
HEN 860
790 IF (W=1 OR W=2) AND BD=4 TH
EN 1140
800 IF (W=1 OR W=2) AND BD=5 TH
EN 1160
810 ON C GOTO 1180, 1210, 1260,
1280, 1300, 820, 1310, 840
, 840
820 IF T>75 AND H>68 THEN 950
830 GOTO 1310
840 IF T>75 AND H>68 THEN 1330
850 GOTO 1340
860 PRINT "FORECAST: STRONG WIN
DS and HEAVY"
870 PRINT "PRECIPITATION CAN BE
EXPECTED within"
880 PRINT "the next 6-24 hours.
Lower tempera-"
890 PRINT "tures are also forec
ast."
900 GOTO 1530
910 PRINT "[SMALL CHANCE OF THU
NDERSTORMS TODAY]"
920 PRINT
930 PRINT "FORECAST: FAIR weath
er can be expected"
940 PRINT "for the next 24 to 3
6 hours":GOTO 1530
950 PRINT "[SLIGHT CHANCE OF TH
UNDERSTORMS TODAY]"
960 PRINT
970 PRINT "FORECAST: Continued
FAIR weather for"
980 PRINT "the next 24 hours.
Temperatures will"
990 PRINT "remain nearly consta
nt.":GOTO 1530
1000 PRINT "FORECAST: PRECIPITA
TION can be expected"
1010 PRINT "in 24 - 48 hrs.":G0
TO 1530
1020 PRINT "FORECAST: WARMER te
```

SALE •

Famous National Brand

• SAVE

NLQ 180

Hi-Speed Printer Sale

• 160 - 180 CPS • Near Letter Quality •

Lifetime Warranty*



Sale \$ 199⁰⁰

Below Wholesale Cost Prices!

List \$499.95

NLQ-180

60% OFF LIST PRICE



NLQ-180 Premium Quality Printer

Near Letter Quality Selectable From Front Panel Controls • High Speed Dot Matrix • Letter Quality Modes • 8K Buffer frees up computer 4-times faster • Pica, Elite, Italics, Condensed • Super Graphics • Business or Personal • Tractor/Friction • 15 Day Free Trial • Lifetime Warranty on Print Head* • 6 Month Immediate Replacement Policy •

Lifetime Warranty*

Fantastic Graphics

Fantastic Price



NLQ-180 Print Samples

This is an example of *ITALICS*
Enhanced Boldface
Condensed Text Double-strike
example of Near Letter Quality

APPLE — ATARI — EPSON — NLQ180 SPECIFICATIONS — IBM — COMMODORE — ETC. —

Print Buffer

8K bytes utility buffer

Printing Direction

Text Mode — Bi-directional
Graphic Mode — Uni-directional

Interface

Centronics Parallel Port

Paper

Plain paper, Roll paper, Single sheet
Fanfold, Multipart paper: max. 3 sheets
(original plus 2 copies)

Character Fonts

Pica, Elite, Italics, Condensed

Printing Method

Impact dot matrix

Printing Speed

160-180 CPS at standard character printing

Printing Characters

Standard 9 x 9 dot matrix
NLQ 12 x 18 dot matrix (33cps)
Character size: 2.12 x 2.8 mm (standard)
Character sets: Full ASCII character set (96)
32 International characters

Ink Ribbon Cartridge

Ribbon Life: 3 million characters/cartridge

Physical Dimensions

Size: 15" x 12" x 5"
Weight: 12.7 lbs.

Maximum Number of Characters

Standard:	10 cpi	80 cpl
Standard enlarged:	5 cpi	40 cpl
Elite:	12 cpi	96 cpl
Elite enlarged:	6 cpi	48 cpl
Condensed:	17 cpi	132 cpl
Condensed enlarged:	8.5 cpi	66 cpl
Condensed elite:	20 cpi	160 cpl

INTERFACES

Atari \$39.95 Apple II \$44.95 Commodore \$29.95 IBM \$24.95 Laser 128 \$19.95 Macintosh \$49.95

Shipping, Handling & Insurance Charges

Add \$10.00 for shipping, handling, and insurance. Illinois residents please add 6 1/2% sales tax. Add \$20.00 for ALASKA, CANADA, HAWAII, PUERTO RICO & APO-FPO orders. All orders must be in U.S. Dollars. WE DO NOT EXPORT TO OTHER COUNTRIES EXCEPT CANADA & PUERTO RICO. Enclose cashier check, money order or personal check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail. Prices & Availability subject to change without notice.

VISA — MASTER CARD — C.O.D.

Call For C.O.D. Charges.



To Order Call
COMPUTER DIRECT

A Division of PROTECTO

(312) 382-5050

For Apple • IBM etc.

(312) 382-5244

For Atari • Commodore

We Love Our Customers

Twice the speed*
at just a fraction
of the cost!
* Computes over two times
faster than the IBM® XT

10 MHz Super Turbo IBM® XT Compatible Computer System

Run thousands of IBM® software programs available.

512K • MS DOS 3.2 • GW BASIC

512K • MS DOS 3.2 • GW BASIC



Look at all you get for only \$599⁰⁰ Home & Business

This computer system is sold as a complete unit, NO SUBSTITUTIONS are allowed.

The complete system

10 MHz Super Turbo XT Computer

- * 512K Memory
- * Single floppy disk drive
- * Parallel printer port
- * Serial printer port
- * Mouse/joystick port
- * RGB color graphics port
- * Hercules compatible monochrome port

MS DOS 3.2 & GW Basic

12" Hi-Res 35 MHz Green Screen Monitor

(TTL & EGA compatible)

Monitor interface cable

Big Blue Printer

RS 232 IBM to Big Blue cable

2 rolls of heat transfer paper

Word First • Word Processor

Data First • Data Base

Calc First • Spreadsheet

List Price

Sale Price

\$1295⁰⁰

\$499⁰⁰

\$99⁹⁵

No extra cost

\$129⁹⁵

No extra cost

\$59⁹⁵

No extra cost

\$59⁹⁵

No extra cost

\$59⁹⁵

No extra cost

\$99⁹⁵

No extra cost

\$79⁹⁵

No extra cost

\$199⁰⁰

\$99⁰⁰

\$249⁰⁰

\$99⁰⁰

\$24⁹⁵

\$19⁹⁵

\$199⁰⁰

\$39⁹⁵

\$19⁹⁵

\$9⁹⁵

\$19⁹⁵

\$5⁹⁵

\$99⁰⁰

\$39⁹⁵

\$99⁰⁰

\$39⁹⁵

\$99⁰⁰

\$39⁹⁵

Total price when bought separately

\$2893⁸⁵

\$892⁶⁵

Complete System only \$599

* Built-in the Super Turbo XT

IBM® is the trademark of International Business Machines Inc.

Extra Disk Drive \$99.95

Shipping, Handling & Insurance Charges and Information

Add \$35.00 for shipping, handling and insurance. Illinois residents please add 6 1/2% sales tax. Add \$70.00 for CANADA, PUERTO RICO, HAWAII, ALASKA and APO-FPO. All orders must be in U.S. dollars. WE DO NOT EXPORT TO OTHER COUNTRIES EXCEPT CANADA & PUERTO RICO. Enclose Cashier Check, Money Order or Personal Check. Allow 14 days for delivery, 2 to 7 days for phone orders, 1 day express mail. Prices & Availability subject to change without notice. VISA - MASTERCARD - C.O.D. Please call for C.O.D. charges.



To Order Call (312) 382-5050
COMPUTER DIRECT
For Apple • IBM etc.
(312) 382-5244
For Atari • Commodore

A Division of PROTECTO We Love Our Customers

```

emperatures for the"
1030 PRINT "next 24 hours.":GOTO
0 1530
1040 PRINT "FORECAST: Clear wea
ther ahead with"
1050 PRINT "cooler temperatures
.":GOTO 1530
1060 PRINT "FORECAST: HIGH WIND
S and PRECIPITATION"
1070 PRINT "within 12 hours.":G
OTO 1530
1080 PRINT "FORECAST: PRECIPITA
TION within 24 hours.":GOTO
0 1530
1090 PRINT "FORECAST: HIGH WIND
S and PRECIPITATION"
1100 PRINT "within 24 hours.":G
OTO 1530
1110 PRINT "FORECAST: SEVERE we
ather: stormy with":PRINT"
high winds.":GOTO 1530
1120 PRINT "FORECAST: Continuin
g precipitation can"
1130 PRINT "be expected for the
next 12 to 24 hours.":GOTO
0 1530
1140 PRINT "FORECAST: STORMS wi
th HIGH WINDS within"
1150 PRINT "24 hours. Cooler t
emperatures as well.":GOTO
1530
1160 PRINT "FORECAST: Precipita
tion within 24-36"
1170 PRINT "hours, slightly coo
ler temperatures.":GOTO 15
30
1180 PRINT "FORECAST: If cirrus
clouds are"
1190 PRINT "increasing and beco
ming more dominant"
1200 PRINT "we can expect warme
r weather.":GOTO 1530
1210 PRINT "FORECAST: 50-80% ch
ance of preci-"
1220 PRINT "pitation within the
next 24-36 hours."
1230 PRINT "Chance of precipita
tion will increase"
1240 PRINT "with the accumulati
on of more cumulo-"
1250 PRINT "nimbus type clouds.
":GOTO 1530
1260 PRINT "FORECAST: 10-20% ch
ance of ";IF T>35 THEN PR
INT"showers":GOTO 1530
1270 PRINT "snow flurries":GOTO
1530
1280 PRINT "FORECAST: 90% chanc
e of HEAVY precipi-"
1290 PRINT "tation within 12-24
hours.":GOTO 1530
1300 PRINT "FORECAST: Chance of
light precipitation":GOTO
1530
1310 PRINT "FORECAST: PRECIPITA
TION with HEAVY"
1320 PRINT "winds in 24-48 hour
s.":GOTO 1530
1330 PRINT "[POSSIBILITY OF THU
NDERSTORMS TODAY]"
1340 PRINT "FORECAST: FAIR weat
her today with light"
1350 PRINT "to moderate winds.":
GOTO 1530
1360 REM integer input routine
1370 PRINT "enter an integer be
tween";MIN;" and";MAX
1380 PRINT ", try again"
1390 INPUT E$:E = VAL(E$)
1400 IF E=0 AND LEFT$(E$,1)<>"0
" THEN 1370
1410 IF E<>INT(E) THEN PRINT "p
lease enter an integer":G
OTO 1380

```

```

1420 IF MIN>E THEN PRINT "too 1
ow":GOTO 1380
1430 IF E>MAX THEN PRINT "too h
igh":GOTO 1380
1440 RETURN
1450 REM real number input rout
ine
1460 PRINT "enter a number betw
een";MIN;" and";MAX
1470 PRINT ", try again"
1480 INPUT E$:E = VAL(E$):IF E=
0 AND LEFT$(E$,1)<>"0" THE
N 1460
1490 IF MIN>E THEN PRINT "too 1
ow":GOTO 1470
1500 IF E>MAX THEN PRINT "too h
igh":GOTO 1470
1510 RETURN
1520 CLS:RETURN
1530 PRINT:PRINT M;"/";D;"/";Y:
PRINT
1540 PRINT "Temperature is: ";T
;" deg. F":PRINT
1550 PRINT "Humidity is: ";H;"%
":PRINT
1560 PRINT "Barometric Pressure
is: ";BP;" in. Hg"
1570 FOR J=1 TO 3500:NEXT J
1580 PRINT:PRINT:PRINT:PRINT
:PRINT
1590 PRINT "PRESS <RETURN> to m
ake another forecast
1600 INPUT P$
1610 GOSUB 1520
1620 GOTO 120

```

Program 2: IBM PC/PCjr Line Changes

```

5 KEY OFF:DEF SEG=0:POKE 1047,P
EEK(1047) OR 64:WIDTH 40:LOCA
TE ,,0

```

Program 3: Commodore 64 Line Changes

```

1390 E$="":INPUT E$:E = VAL(E$
)
1480 E$="":INPUT E$:E = VAL(E$
):IF E=0 AND LEFT$(E$,1)<>"
0" THEN 1460
1520 PRINT CHR$(147);:RETURN

```

Program 4: Atari 400, 800, XL, and XE Line Changes

```

EJ 5 DIM E$(10),T$(14),P$(9)
:POKE 82,0:POKE 83,39
88 60 FOR J=1 TO 999:NEXT J
K0 250 PRINT "1. N
(4 SPACES)2. NE
(3 SPACES)3. E"
CI 270 PRINT "4. SE
(3 SPACES)5. S
(4 SPACES)6. SW"
6J 290 PRINT "7. W
(4 SPACES)8. NW
(3 SPACES)9. NO WIND"
NH 395 T$="(14 SPACES)":REM 1
4 SPACES
HC 400 PRINT T$;"2. RISING F
AST"
DA 410 PRINT T$;"3. SLOWLY R
ISING"
KH 420 PRINT T$;"4. FALLING
FAST"
6F 430 PRINT T$;"5. SLOWLY F
ALLING"
IL 1390 E$="":INPUT E$:IF E$
>"9" OR E$<"0" THEN
1370

```

```

DE 1400 E=VAL(E$)
IL 1480 E$="":INPUT E$:IF E$
>"9" OR E$<"0" THEN
1460
PB 1485 E=VAL(E$)
AL 1520 ? CHR$(125):RETURN
HN 1570 FOR J=1 TO 999:NEXT
J

```

Program 5: Apple II Line Changes

```

1520 HOME : RETURN

```

Program 6: Atari ST Line Changes

```

1 rem delete 160,240,260,28
0,300
5 fullw 2
120 ?"Input numbers when prom
pted by?"
130 ?
1520 clearw 2:gotoxy 0,0:retur
n
1580 ?::?:?

```

Program 7: Amiga Line Changes

```

5 SCREEN 1,320,200,4,1:WINDOW 3,
"",(0,0)-(311,186),16,1:WINDOW 0
UTPUT 34
4
4

```

COMPUTE!

Subscriber Services

Please help us serve you better. If you need to contact us for any of the reasons listed below, write to us at:

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

or call the Toll Free number listed below.

Change Of Address. Please allow us 6-8 weeks to effect the change; send your current mailing label along with your new address.

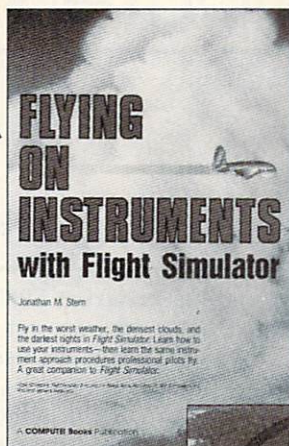
Renewal. Should you wish to renew your **COMPUTE!** subscription before we remind you to, send your current mailing label with payment or charge number or call the Toll Free number listed below.

New Subscription. A one year (12 month) US subscription to **COMPUTE!** is \$24.00 (2 years, \$45.00; 3 years, \$65.00. For subscription rates outside the US, see staff page). Send us your name and address or call the Toll Free number listed below.

Delivery Problems. If you receive duplicate issues of **COMPUTE!**, if you experience late delivery or if you have problems with your subscription, please call the Toll Free number listed below.

COMPUTE!
1-800-247-5470
In IA 1-800-532-1272

SOAR to new heights with flight simulation books from COMPUTE!



This collection of flight guidebooks helps you get the most out of flight simulation software. Designed to be used with Flight Simulator, Flight Simulator II, F-15 Strike Eagle, and other fighter-jet simulations, these books contain scores of scenarios that lead you across the U.S., around the world, into battle, and back to your favorite landing strips.

Flying on Instruments with Flight Simulator

Jonathan M. Stern 251 pages
Here's fascinating hands-on instruction on flying with instruments in *Flight Simulator* and *Flight Simulator II*. How to fly in all kinds of weather—when the cloud ceiling is low or the visibility is reduced. How to read and fly the instrument approach charts that instrument-rated pilots use. How to take off, fly to another airport, and land—all while the clouds are a mere 200 feet off the ground. And how to navigate by using the impressive instruments available in *Flight Simulator* and *Flight Simulator II*. More than 130 actual instrument approach procedure charts. For all versions of *Flight Simulator* and *Flight Simulator II* (Apple, Amiga, Atari, Atari ST, Commodore, IBM PC and compatibles, Macintosh). *Flight Simulator* or *Flight Simulator II* required. Perfect-bound edition:

\$9.95 ISBN 0-87455-091-2

Split-wire-bound edition:

\$12.95 ISBN 0-87455-103-X

COMPUTE!'s Flight Simulator Adventures for the Macintosh, Amiga, and Atari ST

David Florence, Tom R. Halfhill, and Philip J. Nelson 227 pages
Fly through mists into mystery. This collection of 48 exciting, new, customized simulator scenarios for the Macintosh, Commodore Amiga, and Atari ST personal computers puts you in the pilot's seat. The new generation of *Flight Simulator* and *Flight Simulator II* offers better graphics, easier-to-use controls, and

more airports. With this book, you'll experience hair-raising rescue missions, dangerous night landings, sightseeing side trips, and one-of-a-kind flights of fancy. Make *COMPUTE!'s Flight Simulator Adventures* your copilot and thrill to hours of flight.

Flight Simulator or *Flight Simulator II* required.

\$12.95 ISBN 0-87455-100-5

Learning to Fly with Flight Simulator

John Rafferty
Learn to fly like a simulator expert in the imaginary world of *Flight Simulator* and *Flight Simulator II*. You'll learn all the fundamentals—from takeoffs to landings—in a single, detailed flight. Then you'll develop those flying skills by practicing standard rate turns, executing a flight plan, navigating from point A to point B, and more. Learn how to make precision landings and use the more advanced instruments in your aircraft. To cap your training—and turn you into a professional simulator pilot—you'll learn how to read and use the actual FAA approach charts commercial pilots fly with. This complete flight-instruction tutorial was written by a professional pilot.

\$12.95 ISBN 0-87455-115-3

40 Great Flight Simulator Adventures

Charles Gulick 152 pages
This bestselling volume offers 40 exciting, customized flight simulator scenarios for *Flight Simulator* and *Flight Simulator II* on the Apple II, IBM, Commodore 64, and Atari personal computers.

\$10.95 ISBN 0-87455-022-X



40 More Great Flight Simulator Adventures

Charles Gulick 236 pages
Forty more challenging flight simulator scenarios for Microsoft's *Flight Simulator* and SubLOGIC's *Flight Simulator II*. Explore the world from the air. For the Apple II, IBM, Commodore 64, and Atari personal computers.

\$12.95 ISBN 0-87455-043-2

Jet Fighter School: Air Combat Simulator Tactics and Maneuvers

Richard G. Sheffield 177 pages
Learn actual combat maneuvers and much more with this hands-on book for popular jet-combat simulators like *F-15 Strike Eagle*, *Jet*, and *Ace*. Information about jet fighter pilots and their aircraft, especially the F-15, provides an excellent introduction to the subject. There's even detailed data about the weapons available to jet-combat simulator pilots. The heart of the book demonstrates, step-by-step, numerous offensive and defensive combat flight maneuvers, from the Hi Yo-Yo to the Defensive Spiral Drive. Tactical tips on *F-15 Strike Eagle* scenarios round out the book. *F-15 Strike Eagle* or other jet-combat flight simulator required.

Perfect-bound edition:

\$9.95 ISBN 0-87455-092-0

Split-wire-bound edition:

\$12.95 ISBN 0-87455-104-8

Ask for *COMPUTE!* Books at your local book or computer store.
To order direct, call toll free **800-346-6767** (in N.Y. call 212-887-8525) or write *COMPUTE!* Books, P.O. Box 5038, F.D.R. Station, New York, NY 10019.

Please include \$2.00 shipping and handling in the U.S. or \$5.00 airmail. NC residents add 5 percent sales tax and NY residents add 8.25 percent sales tax. Please allow 4-6 weeks for delivery.

COMPUTE! Publications, Inc. 

Part of ABC Consumer Magazines, Inc.
One of the ABC Publishing Companies

COMPUTE! books are available outside the United States from subsidiaries of McGraw-Hill International Book Company.



Advancing Technology

Several years ago I finally bought a color television set. Prior to that time I had been content to watch TV on an old black-and-white model that had served me well. My reluctance to purchase a color TV didn't come from a lack of money; it came from a much more debilitating source—fear of obsolescence by advancing technology.

It seemed that every time I turned around, televisions were getting better. I was afraid that, as soon as I bought a TV, there would be another quantum leap in technology and I would be stuck with an "old" model. Of course, by procrastinating, I was missing out on the enjoyment that would have come from seeing my favorite shows in color. But still my fear of being stuck with old technology kept me from making a purchase.

By the time I finally bought a color TV, it had become apparent to me that electronic technology was in a continuous state of refinement and improvement, and no amount of time would be sufficient to insure that the technology had matured. I also discovered that, no matter what technology was in vogue at the time, color TV was pretty good!

What About Computers?

I was reminded of my color-TV experience when I heard a presentation by David Moursund from Oregon State University at a conference I attended a few months ago. David's point was that computer technology is advancing at such a rapid pace that, in a mere seven years, the price one has to pay for a given amount of computing power decreases by a factor of ten.

The accompanying figure shows what I mean. Let's suppose that we can define six classes of computer technology ranging from the \$10 million super computer to the \$100 calculator. If we start our

chart at 1980, we find that in 1987 we can get mainframe power for what we use to spend for a mini-computer, a personal workstation for the price of a mini, and so on down to the ubiquitous calculator. It doesn't matter if the number is exactly seven years for all classes of machine, the point David made is well taken—computer technology is not standing still, and it probably never will.

The recent announcement of the Macintosh II—a workstation for the price of a microcomputer—merely adds one more data point to the graph to help confirm the observation that we are getting more and more for less and less.

Protecting Your Investment

While it is nice to be able to stand back and look at the tremendous rate of technological advancement, the consequences of this rapid development are less than benign for many personal computer purchasers. Many people who invested in 8-bit micros a few years ago are now finding that 32-bit machines are available for the same price they paid for a fraction of the power. Because computers are thought of as long-term investments, many computer users have invested as much in their hardware as they have in their cars. It is easy to see why many people get frustrated when a new computer hits the streets. After all, at the time of the original purchase, we each bought the best technology we could afford, and it is frustrating to see that our neighbor down the block can now spend the same amount of money for ten times the technology.

I have talked with some people who "knew this would happen" and who chose to sit out the computer revolution until "things settled down." If I thought that things were going to settle down, I would

sympathize with their plight. But, just as I missed years of enjoyment from color television, those who would continue to sit out the computer revolution are missing many opportunities for benefitting from whatever technology they can afford at the time.

If It Isn't Broken, Don't Fix It

If you have ever felt frustrated by finding the latest technological wonder a few months after purchasing last year's model, ask yourself this question: Does the computer you bought meet your needs? If it does, then it will continue to meet them no matter what new technology appears on the scene. If your original computer doesn't do what you wanted it to do, then you probably shouldn't have bought it in the first place.

I continue to use my old Apple II for some tasks, even though I have many other more powerful computers at my disposal. For the tasks I had in mind when I bought it, my Apple II still performs well. The same can be said for my Atari 800 and my Commodore 64. Just because these machines aren't glamorous any more doesn't mean that they should be junked.

Software developers bow in front of the deity of the "installed base." The massive number of Commodore 64s and Apple IIs insures that software will continue to be available for these machines long after they have faded from the marketplace.

The Jalopy Of The Future

I envision an entire software industry springing up around the older computer technologies just as an industry has been created to meet the needs of those who collect old cars. By the year 2000, tinkering with eight-bit computers will be as popular as working with old Che-

	1980	1987	1994	2001
\$10 million Super Computer				
\$1 million Mainframe				
\$100 thousand Minicomputer				
\$10 thousand Workstation				
\$1,000 Microcomputer				
\$100 Calculator				

vies is today. And, unlike classic cars, the low maintenance requirements of computers will guarantee that there will be enough of them around to support this industry quite well.

Planned Obsolescence?

There are still some who subscribe to the "conspiracy" theory in which they see a bunch of greedy manufacturers who have conspired to parcel out technology piecemeal just to take perverse pleasure in yanking the public around.

This isn't what is happening at all. The simple fact is that the underlying technology behind today's computers is continuing to advance at a rapid pace, and the computer manufacturers are racing each other to bring the best possible products to the market. For example, I have wanted an AI workstation for years. Prior to the introduction of the Macintosh II, the only workstations that did what I wanted had price tags of \$40,000 or more—far outside my modest budget. As a result of new technology, I am now able to get the workstation I wanted for one-fifth of this price.

Whenever an advance of this magnitude appears, it has several consequences. One of the most important consequences is that it brings computing power into the price range of those who couldn't afford it before. This continuing downward migration of cost has long-term consequences of great value to society.

PC's Of The Future

To take one example, let's look at the field of artificial intelligence and

expert systems. Computer science researchers have spent many years developing computer programs that are able to assist people in making complex decisions by modeling the behavior of human experts in various fields.

One characteristic of these programs is that they tend to require fast computers with a lot of memory. When AI workstations had \$40,000 price tags, the only people who could afford high-quality expert systems were the universities and large corporations. Now that the price for this type of technology has been slashed (and it will be slashed again), small companies are able to have access to the same computer power as their larger counterparts.

Education

The one market that seems to be hit the hardest by the advance of technology is education. Our schools have to scrimp and save to purchase what few computers they have, and it is easy to see why schools are frustrated by the rapid rate of advancement in computers. It would be one thing if computers just burned out every few years, but they don't. As a result, it is very hard for administrators to get funding for new computer labs when the old computers are still working.

At the same time, there is another problem lurking in the background. Today's second grader will be finishing college in 14 years—the same amount of time it takes for two of Dr. Moursund's technology leaps to occur. This means that today's second grader will be entering a work force where micro-

computers will have the power of today's \$100,000 minicomputers like the DEC VAX. Will today's children be exposed to new technology as it becomes available, or will they still be using outdated computers and thus be ill-prepared for the reality into which they will be graduating?

I once asked Andy diSessa (from UC Berkeley's School of Education) why he was developing computer languages for children on \$60,000 computers. "Because," he said, "this class of machine will be priced properly for the school market by the time we finish."

He is right, of course. The key question is simply this: Would you want it any other way?

Dr. Thornburg's most recent product is Calliope™, a "nonlinear" idea processor for the Apple IIe, c, GS, and Macintosh computers. He welcomes letters from readers and can be reached in care of this magazine.

©

Attention Programmers

COMPUTE! magazine is currently looking for quality articles on Commodore, Atari, Apple, and IBM computers (including the Commodore Amiga and Atari ST). If you have an interesting home application, educational program, programming utility, or game, submit it to COMPUTE!, P.O. Box 5406, Greensboro, NC 27403. Or write for a copy of our "Writer's Guidelines."



Microscope

Sheldon Leemon

You've probably already heard this from Radar O'Reilly—IBM has recently announced a new line of personal computers, completely replacing the first-generation PCs. Our unabashed dictionary defines an IBM product announcement as the event which officially marks the end of the six-month period of wondering what IBM is going to announce, and the beginning of the six-month period of wondering what exactly those announcements mean. So once again, it's time to drag out the crystal ball, and explain the true meaning of the IBM Personal System/2.

First of all, let's make it clear that none of the new computers that IBM announced—with the possible exception of the 80386 models that cost as much as a new car—do anything that the current generation of PC clones can't. Not yet, at any rate. The low-end Model 30 is an 8 MHz 8086 machine, just like the under-\$1,000 Amstrad and dozens of other clones. The AT replacements, Models 50 and 60, are 10 MHz 80286 computers, like most of the current AT clones. They all still run Microsoft's MS-DOS (now up to version 3.3 to accommodate yet another raft of minor changes). They use exactly the same software as the current PCs.

IBM has magnified the few changes made in the machines to industry-shaking proportions:

- **Hot New Technology.** The new computers use a lot of custom IBM parts (as opposed to the off-the-shelf PCs). These parts are put on the circuit boards using surface-mount technology, rather than sticking the components through holes in the board. This means that the new computers will be more reliable, and can be built by robots in an automated factory. All of the subsystems are on boards that plug

together like Lego™ blocks. But even though the new IBM systems will be cheaper to build, they're still priced much higher than clones made the old way.

- **A New System Bus.** The 80286 and 80386 machines include new 16/32 bit expansion slots. This expansion architecture is extremely fast, and will provide a lot of unspecified benefits, as soon as a new line of peripherals arrives in support of it. It will even be able to configure itself for use with expansion cards so users won't need to set switches—just as they don't with a Macintosh or Amiga.

- **IBM Invents The 3½-Inch Disk Drive.** All of the new computers come with 3½-inch floppies as standard equipment. Of course, the Macintosh used them first, then the Atari ST, the Amiga, and even the Commodore 64.

- **IBM Invents The Analog Color Monitor.** The new IBMs all have built-in display adapters that support a brand-new display standard, VGA. They'll be able to display 256 colors at once in 320 × 200 mode, and 16 colors at once in 640 × 480 mode. The colors can be selected from a palette of 256K (262,144) available colors. Of course, none of these computers will work with current digital IBM monitors. They all need new analog monitors, either color or black-and-white (64 gray scales). The Atari ST and Amiga have used analog RGB color monitors all along, although the many gray scales are an improvement over current monochrome modes.


- **IBM Invents Built-In Peripheral Ports.** The new IBMs all come with a minimum of 640K memory, and built-in serial, parallel, and mouse ports. Of course, the Mac, ST, and Amiga all have. . . .

In short, IBM has updated its computer lineup to current standards. In some cases—as with its

new graphics adapter, and optional high-density 1.44-megabyte 3½-inch floppy disk drive—it has actually advanced the state of the art. This is not to be sneered at, considering that IBM usually likes to stay several months in back of the cutting edge of technology.

So what effect will these machines have on the rest of the industry? First, they signal the triumph of the 3½-inch floppy disk. A few die-hards may fight it, but they'll eventually have to join the parade. This means that price levels for 3½-inch disks may soon drop to meet those of 5¼-inch disks. Second, these machines should pave the way for higher graphics resolution modes on less-expensive home computers. A minimum resolution of 640 × 480 appears to be the new standard. Third, the next generation of PCs should be compact desktop units like the new IBMs, instead of the sprawling monsters built in the image of the old IBMs. Other than that, these new computers shouldn't prove to be "clone killers." IBM hasn't switched to a proprietary operating system, nor has it lowered prices anywhere near enough to cut into the home segment of the clone market.

Where IBM hopes these new machines will have an impact is with the large corporate customers. By stressing "connectivity" with their bigger computers, IBM is suggesting that everybody who owns an IBM mainframe had better stick with IBM PCs. Though their \$800-version of DOS that interfaces with mainframe databases may be years away, they still are playing on the fears of corporate America that they may miss out on big innovations unless they remain true-blue. The rest of us who don't own an IBM mainframe can heave a sigh of relief, and go ahead and buy any computer that we want to buy. ©



**It's easy to make a copy.
It's quick.
It's illegal.
It's wrong.**

It's hard to believe.

People who wouldn't think of shoplifting a software product on their lunch hour don't think twice about going back to the office and making several illegal copies of the same software.

Making unauthorized copies of software is a violation of U.S. Copyright Law. Yet, the problem has reached epidemic proportions because many people are unaware, or simply choose to ignore the law. The software industry is urging decision-makers and software users to take steps to stop software piracy in their organizations. In the meantime, the industry has been forced to prosecute willful copyright violators.

There are legal, moral and economic imperatives forbidding theft of copyrighted software.

There is a free pamphlet on the subject. Call or write for a copy. A copy. A copy. A copy for everyone you know. Please ask for Priscilla.



ADAPSO
1300 North Seventeenth Street
Arlington, Virginia 22209
(703) 522-5055



Sandbox Fred Rides The Wild Electrons

Now you can send news stories and wire photos over the telephone just like the big boys do at UPI and AP. And it's so simple.

It gives you goose bumps seeing yourself captured on a video image and watching the computer digitize it and transmit it over the telephone line to another person far away. You feel the same sense of awe and wonder that an isolated tribesman in the bush must feel when he first sees himself in a photograph.

That digitized image is like a little electronic "you," and when it journeys out of your computer and into the phone system, you feel that you are going with it—riding the wild electrons.

The "One Million Stories" Newsletter

I have ridden the wild electrons, and so have several teachers and students. It all began the other day when Sandra Pilley and her third graders sat down at their Apple computer at Hewitt Elementary School in Birmingham, Alabama, and typed in a two-page *Newsroom* newsletter. (*Newsroom* is available for \$49.95 from Springboard Software, 7808 CreekrIDGE Cir., Minneapolis, MN 55435.) The newsletter was entitled "One Million Stories" and was written by Sandra's Skies and Wings Group. The stories were illustrated with *Newsroom Clip Art* cartoons.

Typical of the stories was one written by Kris Roberts called "The Loc Nas Monster." According to Kris: "It all began in the biggest swamp ever in the hotel front yard on a summer day. Snakes dropped out of trees of course. Alligators swam everywhere. Mostly some turtles looked like rocks." Crouching down in the belly of the story was a picture of a big, ugly monster, presumably the dreaded Loc Nas

Monster himself.

After creating the story and laying it out in the *Newsroom* Layout work area, Sandra ejected the disk from the computer and took it home after school. That night, she booted up *Newsroom* on her Apple IIc and entered the *Newsroom* Wire Service work area. After answering questions (like at what baud rate she planned to transmit), she typed in my telephone number and then hit Return. The computer signalled the modem plugged into Sandra's home phone, and the modem dialed my telephone number.

At my end, the telephone began ringing. Sandra had taken the precaution of calling me before she got her computer to phone me, so I was ready. I had booted up *Newsroom* on my home computer (it was an Apple, but it could have been a Commodore 64 or an IBM PC or compatible). My computer was in Answer mode, so as soon as it received the phone call, it signalled Sandra's computer that it was ready to receive *Newsroom* files. Sandra's computer complied, and within seconds the screen began filling up with the names of photos, banners, page layouts, and text panels from the "One Million Stories" newsletter.

After only a few minutes of transmission (at 1200 baud) I had received the entire newsletter. I told the Wire Service program to hang up my phone, and I turned on my printer and printed out the newsletter to make sure it was safe and sound.

It looked great—especially when I thought how just a few seconds before it was lots of little wild electrons riding the phone line across central Alabama.

A Grinning, Bearded Man—Over The Wires

Sandra and her kids had left the last panel of their newsletter blank so I

could put something in it and transmit it back. I wanted to send something special, so I booted up my ComputerEyes/2 digitizer program (for more on this, see my April column). I pointed my little JVC camcorder at myself, fiddled with the controls, and captured myself on the computer picture screen—a grinning, bearded man making a V sign for victory. Using ComputerEyes/2, I saved my picture as a *Newsroom* Photo file, and then booted up *Newsroom*. I added a caption to the photo, and, in the Layout work area, I tucked the photo onto the tail end of the Skies and Wings' newsletter.

A moment later I was on the phone calling Sandra's house. I couldn't wait to tell her. I was ready to send back the entire newsletter—along with my digitized photo. I had forgotten only one thing: It was almost one in the morning—on a school night!

A sleepy Sandra Pilley came to the phone and then turned on her computer and booted up *Newsroom* one last time. Five minutes later I entered the Wire Service and told the computer to dial Sandra's number and send the newly modified newsletter.

And it was sent—without a hitch. For the first time ever, Sandbox Fred got to ride the wild electrons—along with the Loc Nas Monster, the Magic Rock, and Mr. Fuzzy the spider (who lived in Kris Roberts' desk and ate Mrs. Pilley's lunch).

I was dying to find out if Sandra had received the newsletter successfully and if she liked my digitized photo.

But I wasn't brave enough to call back that night. No sir. ©



Since 1981

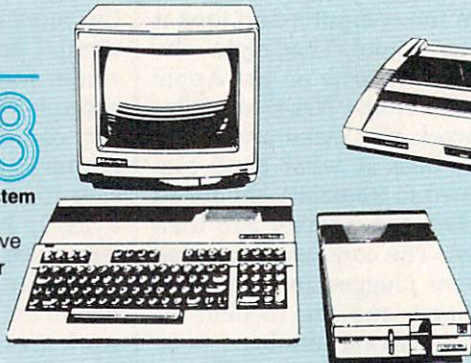
Lycos Computer Marketing & Consultants

COMMODORE

(reg. \$1009.85)

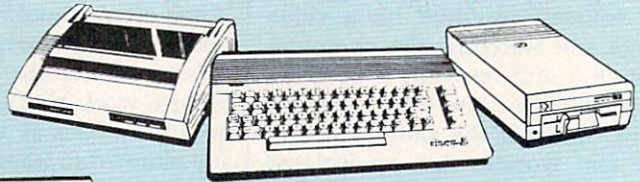
\$715

128 System



- Commodore 1571 Disk Drive
- Commodore 128 Computer
- Thompson 4120 Color Monitor w/Cable

COMMODORE 64 System



- Commodore 64 C Computer
- 1541 C Drive
- Seikosha SP-1000VC Printer

PLUS

(reg. \$789)

\$499

ATARI 130XE System



- 130XE Computer
- 1050 Drive

\$265

NEW RELEASE!

Blue Chip Turbo

- dual-speed processor, 4.77 and 8.00 MHz
 - 640K internal RAM
 - color display adapter
- Call for details!

\$749

COMMODORE HARDWARE

C-1700 128K RAM	..... \$109.95
1750 RAM	..... \$169.95
Indus GT C-64 Drive	..... \$185
GEOS	..... \$36.95
C-1351 Mouse	..... \$39
1670 Modem	..... \$99
128 Computer	..... \$249
1571 Disk Drive	..... \$229
64 C Computer	..... \$175
1541 C Disk Drive	..... \$185
1902 Monitor	..... \$269
1802C Monitor	..... \$189
Blue Chip 64C Dr.	..... SCALL
Blue Chip C128 Dr.	..... SCALL
128D Computer	..... SCALL
1581 Disk Drive	..... SCALL

ATARI HARDWARE

SF 314 Disk Drive	..... \$219.95
SF 354 Disk Drive	..... \$159.95
1050 Drive (XE, XL)	.. \$139.95
SHD 204 20 MEG Dr.	..... \$589
65XE	..... \$99
520 ST Mono	..... \$515
1040 Color	..... \$879
Indus GT Atari Drive	..... \$179
130XE Computer	..... \$135
SX 212 Modem	..... \$89.95

BLUE CHIP HARDWARE

PC 5 1/4 Drive	..... \$119
MS DOS+ Basic Soft	..... \$99
BCM 12G Gr. Monitor	..... \$89
BCM 12A Am. Monitor	..... \$89
BCM 14C Color RGB Monitor	..... \$269
BCC CG Color Card	... \$94.99
BCPC PC/XT Comp	..... \$559

ATARI 520 ST Color System

- SC 1224 Color Monitor
- SF 354 Disk Drive
- 520 Keyboard

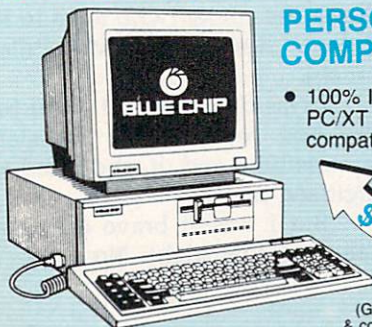


\$745

BLUE CHIP

PERSONAL COMPUTER

- 100% IBM PC/XT compatible!

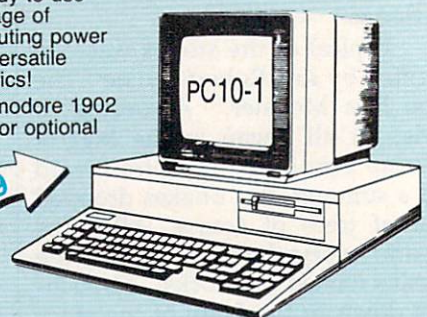


\$559

(Green, amber & color monitors available)

COMMODORE PC 10-1

- A ready-to-use package of computing power and versatile graphics!
- Commodore 1902 monitor optional



\$749

1-800-233-8760

Lycor Computer is one of the oldest and most established computer suppliers in America. Because we are dedicated to satisfying every customer, we have earned our reputation as the best in the business. And, our six years of experience in mail-order computer sales is your assurance of knowledgeable service and quality merchandise.

The Reliable, Affordable Choice

limited offer
*with interface or
cable purchase
(2-year warranty)

Panasonic 1080i



\$189*

PRINTERS



NP-10	\$169
NX-10C	\$199
NL-10	\$209
NX-15	\$329
NB-15	\$889
SD-10	\$249
ND-15	\$425
SR-10	\$469
NR-15	\$499
NB24-15	\$659
NB24-10	\$459
ND-10	\$329
NB-15	\$899

Purchase orders accepted from educational institutions. Also, ask about volume discounts!

SEIKOSHA

SP-1200Ai	\$195
SP-1000AP IIc	\$179
SP-1200AS	\$195
SP 180VC	\$145
SL-80Ai	\$375
MP 1300Ai	\$369
MP 5300Ai	\$549
BP 5420Ai	\$1075
1300 Color Kit	\$119
BP5420Ribbon	\$12.50
SP1000Ribbon	\$8.50

Panasonic

1091i	\$269
1092i	\$335
1592	\$399
1595	\$499
3131	\$249
3151	\$379
1080 AP IIc	\$239

JUKI

5510 w/color	\$435
RS232 serial board	\$55
Juki 6300	\$739
Juki 6100	\$369

SILVER REED

EXP 420P	\$209
EXP 600P	\$539
EXP 800P	\$649

OKIDATA

Okimate 20	\$129
120 NLQ	\$209
292 w/interface	\$539
293 w/interface	\$679
182	\$245
192+	\$355
193+	\$539

DIABLO

D25	\$499
635	\$779
D-80 IF	\$1299
(special shipping — call for details)	

LEGEND

808	\$159
1080	\$199
1380	\$229
1385	\$289

CITIZEN

120 D	\$175
Premiere 35	\$469
MSP-10	\$285
MSP-15	\$385
MSP-20	\$325
MSP-25	\$485
Tribute 224	\$649

Toshiba

321 P/S	\$479
P341E	\$699
P351 Model II	\$1099

EPSON

LX 86	\$CALL
EX 800	\$389
EX 1000	\$519
LQ 800	\$459
LQ 1000	\$649
FX 86E	\$329
FX 286E	\$459
LX 800	\$189
LQ 2500	\$949

Monitors

Thompson:

4120 RGB/COM	\$249
4160	\$279

Teknika:

MJ-503	\$499
--------------	-------

Zenith:

ZVM 1220	\$89
ZVM 1230	\$89

Panasonic:

TR-122 MYP 12" Am TTL	\$139
TR-122 M9P 12" Gr TTL	\$139

Commodore:

1902 Color	\$285
1802 C	\$189

NEC:

Multisync	\$CALL
-----------------	--------

Modems

Avatex 1200hc Modem

* with cable purchase
Limited Offer

Avatex:

1200	\$89
1200i	\$99
2400	\$289

Atari:

XM-301	\$42.95
SX 212	\$89.95

Hayes:

Smartmodem 300	\$125
Smartmodem 1200	\$369
Smartmodem 1200B	\$339
Smartmodem 2400	\$559
Micromodem IIe	\$125
Smart 300 Apple IIc	\$149

Commodore:

1670	\$99
------------	------

US Robotics:

Password 1200	\$189
Microlink 1200	\$139
Microlink 2400	\$219
Courier HST 9600	\$879

CompuServe

.....	\$17.95
-------	---------

Xetec Printer Enhancer

NEW

- 64K memory
- multi-tasking
- 7 direct available fonts
- combines two dot addressable printers

List price: \$249

Versatile and IBM Compatible



NX-10

- superb printing quality



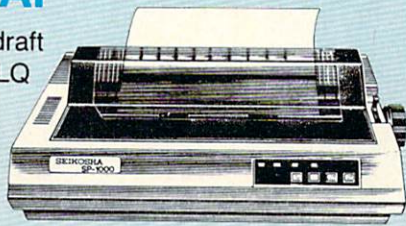
\$195

New Release

SEIKOSHA (2-year warranty)

SP180AI

- 100 cps draft
- 20 cps NLQ
- standard parallel and IBM



Introductory price

\$145

\$179

SOFTWARE

TARI ST

COMMODORE

COMMODORE



IBM

..... \$24.95 Triple Pack \$14.95
 \$New Wild. Cl. Leader Brd. ... \$24.95
 \$17.95
Activision:
 \$24.95 Aliens \$22.95
 \$24.95 Champion. Basketball .. \$22.95
 \$17.95 Hacker \$17.95
 \$24.95 Hacker 2 \$22.95
 \$29.95 Labyrinth \$19.95
 \$24.95 Music Studio \$22.95
 \$24.95 Portal \$24.95
 \$24.95 Tass Times \$19.95
 \$24.95 Titanic \$14.95
Microprose:
 \$26.95 F-15 Strike Eagle \$22.95
 \$17.95 Gunship \$24.95
 \$34.95 Kennedy Approach \$19.95
 \$26.95 Silent Service \$22.95
 \$24.95 Solo Flight \$19.95
 \$24.95 Top Gunner \$19.95
Microleague:
 \$24.95 Microleag. Baseball \$24.95
 \$48.95 General Manager \$19.95
 \$51.95 Stat Disk \$17.95
 \$14.95 '86 Team Disk \$14.95
 \$New Microleag. Wrestling
Strategic Simulations:
 \$24.95 Gemstone Healer \$18.95
 \$35.95 Gettysburg \$35.95
 \$35.95 Kampfgruppe \$24.95
 \$24.95 Phantasie II \$29.95
 \$24.95 Phantasie III \$29.95
 \$24.95 Ring of Zelfin \$24.95
 \$24.95 Road War 2000 \$24.95
 \$24.95 Shard of Spring \$24.95
 \$24.95 Wizards Crown \$24.95
 \$35.95 War in the S. Pacific ... \$35.95
 \$21.95 Wargame Constr. \$21.95
 \$35.95 Battlecruiser \$35.95
 \$14.95 Gemstone Warrior \$14.95
 \$24.95 Baltic 1985 \$24.95
 \$27.95 Field of Fire \$27.95
 \$27.95 Battalion Commander . \$27.95
 \$27.95 Battle for Normandy ... \$27.95
 \$34.95 Battle of Antetiem \$34.95
 \$27.95 Colonial Conquest \$27.95
 \$39.95 Computer Ambush \$39.95
 \$27.95 Pro Golf Tour \$27.95
Sublogic:
 \$15.95 Baseball Stadium \$15.95
 \$31.95 Flight Simulator II \$31.95
 \$31.95 Jet Simulator \$31.95
 \$21.95 Night Mission Pinball ... \$21.95
 \$15.95 Scenery Disk \$15.95
 \$31.95 Sublogic Baseball \$31.95
 \$26.95 Sublogic Football \$26.95

COMMODORE

..... \$32.95
 \$22.95
 \$24.95
 \$15.95
 \$18.95
 \$25.95
 \$22.95
 \$12.95
 \$35.95
 \$24.95
 \$32.95
 \$32.95
 \$32.95
 \$24.95
 \$23.95
 \$29.95
 \$24.95
 \$13.95
 \$13.95
 \$32.95
 \$22.95
 \$24.95
 \$24.95
 \$19.95
 \$19.95
 \$24.95
 \$24.95
 \$24.95
 \$24.95
 \$24.95
 \$21.95
 \$19.95
 \$19.95
 \$24.95
 \$24.95
 \$24.95
 \$24.95
 \$17.95
 \$24.95
 \$19.95

..... \$24.95 Tracker \$24.95
 \$24.95 Starglider \$24.95
 \$24.95 Sentry \$24.95
Hi Tech Expressions:
 \$6.95 Heart Ware \$6.95
 \$8.95 Holiday Paper \$8.95
 \$6.95 Card Ware \$6.95
 \$9.95 Party Ware \$9.95
Unison World:
 \$15.95 Art Gallery 1 or 2 \$15.95
 \$22.95 Print Master \$22.95
Datasoft:
 \$24.95 Alt. Reality-Dungeon ... \$24.95
 \$15.95 Black Magic \$15.95
 \$15.95 Saracen \$15.95
 \$19.95 221 B Baker St. \$19.95
Action Soft:
 \$19.95 Up Periscope \$19.95
Timeworks:
 \$34.95 Partner 64 \$34.95
 \$39.95 Partner 128 \$39.95
 \$39.95 Swift Calc 128 \$39.95
 \$39.95 Wordwriter 128 \$39.95

Access:
 \$14.95 Triple Pack \$14.95
Activision:
 \$29.95 Zork Trilogy \$29.95
 \$29.95 Game Maker \$29.95
 \$24.95 Leather Goddesses ... \$24.95
 \$29.95 Term Paper \$29.95
 \$24.95 Champ. Baseball \$24.95
 \$24.95 Champ. Basketball \$24.95
 \$New Championship Golf \$New
 \$24.95 GFL Football \$24.95
 \$27.95 Portal \$27.95
Microprose:
 \$24.95 Crusade in Europe \$24.95
 \$24.95 Decision in Desert \$24.95
 \$22.95 F-15 Strike Eagle \$22.95
 \$22.95 Silent Service \$22.95
Microleague:
 \$25.95 Microleag. Baseball \$25.95
 \$19.95 General Manager \$19.95
 \$17.95 Stat Disk \$17.95
 \$14.95 '86 Team Disk \$14.95
Broderbund:
 \$22.95 Airheart \$22.95
 \$25.95 Ancient Art of War \$25.95
 \$29.95 Print Shop \$29.95
 \$25.95 Print Shop Comp. \$25.95
 \$28.95 Carmen S. Diego (USA). \$28.95
 \$62.95 On Balance \$62.95
 \$44.95 Bank St. Writer + \$44.95
Strategic Simulations:
 \$35.95 Battlecruiser \$35.95
 \$35.95 Battlegruppe \$35.95
 \$24.95 Colonial Conquest \$24.95
 \$35.95 Gettysburg \$35.95
 \$24.95 Phantasie II \$24.95
 \$24.95 Phantasie III \$24.95
 \$24.95 Realms of Darkness ... \$24.95
 \$24.95 Shard of Spring \$24.95
 \$24.95 Wizards Crown \$24.95
Sublogic:
 \$32.95 Flight Simulator II \$32.95
 \$26.95 Jet Simulator \$26.95
 \$22.95 Night Mission Pinball ... \$22.95
 \$69.95 Scenery #1-#6 \$69.95
 \$32.95 Sublogic Baseball \$32.95
Epyx:
 \$17.95 Create A Calendar \$17.95
 \$24.95 Destroyer \$24.95
 \$24.95 Fastload \$24.95
 \$14.95 Football \$14.95
 \$19.95 Karate Champ \$19.95
 \$14.95 Movie Monster \$14.95
 \$24.95 Multiplan \$24.95
 \$23.95 Sub Battle \$23.95
 \$23.95 Winter Games \$23.95
 \$14.95 Super Cycle \$14.95
 \$14.95 Graphics Scrapbook ... \$14.95
 \$24.95 St. Sports Basketball ... \$24.95
 \$19.95 Wild.'s Great Baseball . \$19.95
 \$24.95 Summer Games II \$24.95
 \$15.95 Vorpul Utility Kit \$15.95
 \$24.95 World Games \$24.95
Firebird:
 \$21.95 Colossus IV \$21.95
 \$19.95 Elite \$19.95
 \$19.95 Frankie...Hollywood ... \$19.95
 \$24.95 Golden Path \$24.95
 \$24.95 Guild of Thieves \$24.95
 \$24.95 Pawn \$24.95
 \$24.95 Talking Teacher \$24.95

..... \$14.95 Movie Monster \$14.95
 \$24.95 St. Sports Basketball ... \$24.95
 \$24.95 Sub Battle Simulator ... \$24.95
 \$24.95 Winter Games \$24.95
 \$24.95 World Games \$24.95
 \$24.95 Wrestling \$24.95
Firebird:
 \$24.95 Colossus IV Chess \$24.95
 \$22.95 Elite \$22.95
 \$27.95 The Pawn \$27.95
 \$28.95 Starglider \$28.95
Unison World:
 \$19.95 Art Gallery 2 \$19.95
 \$25.95 Print Master \$25.95
Datasoft:
 \$15.95 Saracen \$15.95

Access:
 \$24.95 Leader Board \$24.95
 \$24.95 10th Frame \$24.95
 \$14.95 Tournament #1 \$14.95
Activision:
 \$27.95 Champ. Basketball \$27.95
 \$24.95 Championship Golf \$24.95
 \$27.95 GFL Football \$27.95
 \$17.95 Hacker \$17.95
 \$24.95 Hacker 2 \$24.95
 \$29.95 Music Studio \$29.95
 \$24.95 Tass Times \$24.95
Strategic Simulations:
 \$24.95 Computer Baseball \$24.95
 \$35.95 Kampfgruppe \$35.95
Sublogic:
 \$32.95 Flight Simulator II \$32.95
 SCALL Jet Simulator \$32.95
Epyx:
 \$22.95 Apsahai Trilogy \$22.95
 \$22.95 Rogue \$22.95
 \$22.95 Winter Games \$22.95
Firebird:
 \$27.95 Guild of Thieves \$27.95
 \$26.95 Pawn \$26.95
 \$27.95 Starglider \$27.95
Unison World:
 \$24.95 Print Master \$24.95
 \$18.95 Art Gallery 1 or 2 \$18.95
Microprose:
 \$24.95 Silent Service \$24.95

Activision:
 \$24.95 Pebble Beach \$24.95
 \$27.95 Portal \$27.95
 \$24.95 Champ. Baseball \$24.95
 \$24.95 Champ. Basketball \$24.95
 \$39.95 Zork Trilogy \$39.95
 \$24.95 GFL Football \$24.95
 \$24.95 Leather Goddesses ... \$24.95
 \$24.95 Moonmist \$24.95
Microprose:
 \$24.95 Conflict in Vietnam \$24.95
 \$24.95 Crusade in Europe \$24.95
 \$24.95 Decision in Desert \$24.95
 \$22.95 F-15 Strike Eagle \$22.95
 \$22.95 Silent Service \$22.95
Microleague:
 \$25.95 Microleag. Baseball \$25.95
 \$19.95 General Manager \$19.95
 \$17.95 Stat Disk \$17.95
 \$14.95 '86 Team Disk \$14.95

Epyx:
 \$24.95 Apsahai Trilogy \$24.95
 \$17.95 Create A Calendar \$17.95
 \$24.95 Destroyer \$24.95
 \$19.95 Karate Champ \$19.95
 \$14.95 Movie Monster \$14.95
 \$19.95 Rogue \$19.95
 \$24.95 St. Sports Basketball ... \$24.95
 \$24.95 Sub Battle Simulator ... \$24.95
 \$24.95 Winter Games \$24.95
 \$24.95 World Games \$24.95
Strategic Simulations:
 \$24.95 Road War 2000 \$24.95
 \$35.95 Kampfgruppe \$35.95
 \$24.95 Shard of Spring \$24.95
 \$35.95 Battle of Antetiem \$35.95
 \$14.95 Computer Baseball \$14.95
 \$35.95 Gettysburg \$35.95
 \$27.95 Knights in Desert \$27.95
Sublogic:
 \$32.95 Jet Simulator \$32.95
 \$15.95 Scenery Japan \$15.95
 \$15.95 Scenery San Fran. \$15.95
 \$69.95 Scenery #1-#6 \$69.95
 \$32.95 Sublogic Baseball \$32.95
 \$32.95 Sublogic Football \$32.95
 \$36.95 Flight Simulator \$36.95

Broderbund:
 \$28.95 Ancient Art of War \$28.95
 \$37.95 Print Shop \$37.95
 \$31.95 Print Shop Compan. ... \$31.95
 \$21.95 Graphic Lib. I or II \$21.95
 \$21.95 Karateka \$21.95
 \$29.95 Toy Shop \$29.95
 \$54.95 Bank St. Writer + \$54.95
Unison World:
 \$18.95 Art Gallery 2 \$18.95
 \$55.95 News Master \$55.95
 \$36.95 Print Master \$36.95

Firebird:
 \$27.95 Starglider \$27.95
 \$27.95 Guild of Thieves \$27.95

Diskettes
5-1/4
Maxell:
 \$9.95 SSDD \$9.95
 \$12.95 DSDD \$12.95
Bonus:
 \$6.95 SSDD \$6.95
 \$7.95 DSDD \$7.95
SKC:
 \$8.95 SSDD \$8.95
 \$9.95 DSDD \$9.95
 \$16.95 DSHD \$16.95
Verbatim:
 \$9.95 SSDD \$9.95
 \$12.95 DSDD \$12.95
3.5
3M:
 \$16.95 SSDD \$16.95
 \$23.95 DSDD \$23.95
Maxell:
 \$15.95 SSDD \$15.95
 \$21.95 DSDD \$21.95
Verbatim:
 \$16.95 SSDD \$16.95
 \$24.95 DSDD \$24.95
SKC:
 \$14.95 SSDD \$14.95
 \$16.95 DSDD \$16.95
Lycos stocks joysticks by
Wico, Suncom, Tac, Epyx,
and more, starting as low
as \$5.95!



**Mark "Mac" Bowser,
Sales Manager**

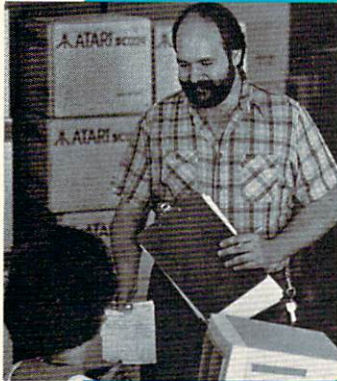
All of us at Lyc0 Computer are grateful to the millions of customers who have helped make Lyc0 what it is today. They have come to rely on the Lyc0 symbol as assurance of quality products, the lowest prices, and prompt, courteous service.

Call Lyc0

Our philosophy is to keep abreast of the changing market so that we can be ready for any customer inquiry. We are continually in contact with manufacturers' representatives, replacing older product lines with the newest models, and compiling information to help you select the right product for your needs.

Feel free to call Lyc0 if you want to know more about a particular item. Many companies have a toll-free number for ordering, but if you just want to ask a question about a product, you have to make a toll call. Not at Lyc0. Everyone on our trained sales staff is very knowledgeable about the merchandise we carry, and we're glad to give you the information you seek. We also have Saturday hours — one more reason to call us for all your computer needs.

Once you've placed your order with Lyc0, we don't forget about you. Our friendly, professional customer service representatives will find answers to your questions about the status of an order, warranties, product availability, or prices.



Order Now



Lyc0 stocks a multimillion dollar inventory of factory-fresh merchandise.

Chances are we have exactly what you want right in our warehouse. That means you'll get it fast. In fact, orders are normally shipped within 24 hours.

Shipping on prepaid cash orders is free in the U.S., and there is **no deposit** required on C.O.D. orders. Air freight or UPS Blue/Red shipping is also available.

Here's How

So, if you're looking for excellent prices, experienced and courteous people, immediate access to the quality merchandise you want, and fast delivery, call our toll-free number. At Lyc0 Computer, we're always ready to serve you in any way we can.

**TO ORDER, CALL TOLL-FREE: 1-800-233-8760
In PA: 1-717-494-1030**

Hours: 9AM to 8PM, Mon. - Thurs.
9AM to 6PM, Friday — 10AM to 6PM, Saturday

For Customer Service, call 1-717-494-1670,
9AM-5PM, Mon. - Fri.

Or write: Lyc0 Computer, Inc.
P.O. Box 5088, Jersey Shore, PA 17740

Risk-Free Policy: • full manufacturers' warranties • no sales tax outside PA
• prices show 4% cash discount; add 4% for credit cards • APO, FPO, international: add \$5 plus 3% for priority • 4-week clearance on personal checks • we check for credit card theft • compatibility not guaranteed • return authorization required • price/availability subject to change

Access:

Leader Board	\$24.95
Tournament #1	\$14.95
Triple Pack	\$14.95
10th Frame	\$24.95

Activision:

Hacker	\$15.95
Hitch Hikers	\$22.95
Leather Goddesses	\$22.95
Moonmist	\$22.95
Music Studio	\$22.95

Microprose:

Conflict in Vietnam	\$24.95
Decision in Desert	\$24.95
F-15 Strike Eagle	\$22.95
Kennedy Approach	\$19.95
Silent Service	\$22.95
Top Gunner	\$19.95

Microleague:

Microleag. Baseball	\$24.95
General Manager	\$24.95
Stat Disk	\$17.95
'86 Team Disk	\$14.95

Broderbund:

Print Shop	\$25.95
Print Shop Compan.	\$22.95
Graphic Lib. I, II, III	\$15.95
Karateka	\$18.95
Bank St. Writer	\$29.95

Optimized Systems:

Action	\$46.95
Action Tool Kit	\$18.95
Basic XE	\$46.95
Basic XL	\$36.95
Basic XL Tool Kit	\$18.95
Mac 65	\$46.95
Mac 65 Tool Kit	\$18.95

Strategic Simulations:

Battle of Antietam	\$32.95
Battlecruiser	\$35.95
Nam	\$24.95
Phantasia	\$24.95
Wargame Construc.	\$18.95
Warship	\$39.95
Wizards Crown	\$24.95

Sublogic:

Flight Simulator II	\$31.95
Night Mission Pinball	\$21.95
Scenery Japan	\$15.95
Scenery #1 - #6	\$69.95
Scenery Disks, each	\$14.95

Epyx:

Eidolon	\$22.95
Karate Champ	\$18.95
Koronis Rift	\$22.95
Summer Games	\$24.95

Firebird:

Golden Path	\$22.95
The Pawn	\$27.95

Datasoft:

Alt. Reality-Dungeon ...	\$24.95
Gunslinger	\$19.95
221 B Baker St.	\$19.95

ATARI ST

Access:

Leader Board	\$24.95
Tournament #1	\$13.95
10th Frame	\$24.95

Activision:

Ballyhoo	\$23.95
Borrowed Time	\$32.95
Champion. Baseball	\$29.95
Champion. Basketball ..	\$28.95
Championship Golf	\$New

GFL Football

Game Maker	
Hacker	
Hacker 2	
Leather Godde	
Little People	
Moonmist	
Music Studio	
Paint Works	
Shanghai	
Tass Times	
Bureaucracy	

Data Soft:

Mercenary	
Mercenary - 2	
Alt. Reality - T	
Alt. Reality-Du	

Microprose:

Silent Service	
F-15 Strike Ea	

Optimized Sys:

Personal Pasco	
Personal Prolo	

Strategic Sim:

Phantasia	
Phantasia II	
Road War 200	
Colonial Conqu	

Epyx:

Apsai Trilog	
Sub Battle Sim	
Super Cycle	
World Games	
Wrestling	
Karate Champ	

Firebird:

Pawn	
Starglider	
Golden Path	
Guild of Thieve	
Tracker	

VIP:

Accounts	
VIP Profession	

Unison World:

Art Gallery 1 o	
Print Master	

Zoom:

Zoomracks	
Zoomracks II	

Microleague:

Microleague Ba	
General Manag	

Broderbund:

Bank St. Writ	
Carmen San D	
Champ. Lode F	
Graphic Lib. I,	
Karateka	
Print Shop	
Print Shop Con	
Print Shop Pap	
Science Kit	
Lode Runner	
Bank St. Filer	
Bank St. Mailer	

Access:

Leader Board	
Mach 5	
Mach - 128	
10th Frame	
Exec. Turnam	
Tournament #1	





Three Questions

I have received a fair number of letters from 8-bit owners in recent months, and most people ask one of these three questions: "Where can I find a book that tells me . . . ?" "Do you know of any program that will . . . ?" "How do I convert my Atari BASIC program to assembly language so that I can . . . ?"

Although all your questions are slightly different, I have a few answers that will work for most of you, regardless of the ending you would like to put on any of the questions.

First, it is an unfortunate fact that many of the best books for the 8-bit Atari computers (400, 800, and XL/XE series) are no longer in print. I would like to hope that some enterprising publisher might decide to reprint a few of the best of these in limited editions, but I am not going to hold my breath until that happens. In the meantime, your best bet is to try to track down a copy *now*, while there are still a few in dealers' hands. What books am I referring to? There are so many books that would make my "nice to have" list that I can't possibly list them here, so, instead, here (reluctantly) is a limited list of what I consider my own, personal "basic necessities" library.

For *all* programmers:

- *COMPUTE's Mapping the Atari* and then either
- *Your Atari Computer* by Lon Poole or
- *ABC's of Atari Computers* by Dave Mentley

For BASIC neophytes:

- *Atari BASIC for Kids 8 to 80*

For assembly language neophytes:

- *Atari Roots* by Mark Andrews
- *Programming the 6502* by Rodney Zaks

For those who are *really* serious:

- Atari Technical Reference

Manuals from Atari

- and, perhaps the hardest to find:
 - *Atari Graphics and Arcade Game Design* by Jeff Stanton

Some of these are still pretty easy to find. Others have all but disappeared. Still, every so often I hear of dealers who have a nice stock of one or more of them. For example, you may have read in the May issue of *COMPUTE!* that B&C ComputerVisions of Santa Clara, CA, has a stock of *De Re Atari* (which just barely failed to make my essentials list). I have just learned that they also have a good stock of the Atari Technical Reference Manuals. Dealers rarely advertise that they have a certain book—by the time the ad appears, they may be sold out with no way to get more copies. So call around, ask around, check with your local bulletin board, and/or leave a message or two on some of the national time-share systems that have Atari interest areas (for example, CompuServe, Genie, and Delphi).

Ask

By now, you probably won't be surprised to find that the answer to that second question is about the same: *Ask*. About the only kind of programs you can *not* find for your 8-bit Atari are what I call "heavy-duty" programs. For example, I have yet to see a good, complete civil engineering package. Or an off-the-shelf order-entry system. The primary limitations of these small machines have always been their slow disk I/O speed and limited disk space. (Historically, there has been a more important limitation that I'll address in a future column. Ironically, I am writing this column on an 800 XL connected to a Supra 10-megabyte hard disk using ICD's *SpartaDOS*, and I find that this system now does everything I need. But a large percentage

of Atari owners have only one floppy disk drive, which is simply not enough for most business purposes.)

One amazing aspect of Atari software is the amount of usable public-domain software available. But until you join a user group—or, perhaps, buy a modem and call some BBSs or one of the national time-sharing systems—you will be cut off from this free software.

Converting BASIC To ML

The final question listed above is actually the most interesting to me: "How do I convert my Atari BASIC program into machine language?" The first and most obvious answer: *Buy a BASIC compiler*. I don't want to belabor this topic now, but you should know that Atari BASIC is an *interpreted* language. It is not fast. If you could *compile* your program into machine language, it would run much faster. (Of course, getting a better BASIC interpreter will also speed up your programs.) Remembering my advice above about finding Atari software, you *might* be able to find such a compiler. But even compiled BASIC doesn't come close to what is possible in assembly language. (Did you notice my shift from *machine* to *assembly* language? There *is* a technical difference between the two, but it is one we can ignore.)

Many, many articles have been written that provide you with handy machine language subroutines that you can call with Atari BASIC's USR function. For example, also in the May issue, Rhett Anderson presented a set of routines for doing bitwise operations via USR calls. The problem with most of these routines: They all tend to reside in the same hunk of Atari memory (the so-called Page 6, memory locations \$600-\$6FF, 1536-1791 decimal), so you can use only one or, perhaps, two at a time.

What happens when you need about 20 or 30 machine language subroutines? I did a whole series of articles, once upon a time, on writing self-relocatable code, machine language routines that can be loaded anywhere in memory; but it seems I was fighting a losing battle. In truth, though, it may be just as well: If you are ready to use 20 or 30 major assembly language routines, why not write the entire program in assembly language?

To do so, you need to learn two things: First, how to program in assembly language. Second, how BASIC performs its various operations. The first of these needs is answered by the books I mentioned in the first part of this article. And some of those books also go far, far beyond what Atari BASIC is capable of. But nobody seems to have written a book that shows, in a simple direct manner, how to convert the most common and useful operations of Atari BASIC into assembly language.

In particular, the topic of Atari graphics is poorly covered. There have been volumes written on display-list interrupts, player-missile graphics, custom character sets, and so on. But how does one do a simple little PLOT in assembly language? Finding the answer to that is like looking for the proverbial needle in a haystack.

When I first saw how well-designed the Atari Operating System (OS) was, I was impressed. That was more than eight years ago, and I still think it is the best OS in the world of small machines. I think you'll agree when I show you next month how little work Atari BASIC must do to perform such seemingly complex operations as GRAPHICS, PLOT, and DRAWTO. ©

COMPUTE!
TOLL FREE
Subscription
Order Line
1-800-247-5470
 In IA 1-800-532-1272

Copies of articles from this publication are now available from the UMI Article Clearinghouse.

For more information about the Clearinghouse, please fill out and mail back the coupon below.

UMI Article Clearinghouse

Yes! I would like to know more about UMI Article Clearinghouse. I am interested in electronic ordering through the following system(s):

- DIALOG/Dialorder ITT Dialcom
 OnType OCLC ILL Subsystem
 Other (please specify) _____
 I am interested in sending my order by mail.
 Please send me your current catalog and user instructions for the system(s) I checked above.

Name _____
 Title _____
 Institution/Company _____
 Department _____
 Address _____
 City _____ State _____ Zip _____
 Phone (____) _____

Mail to: University Microfilms International
 300 North Zeeb Road, Box 91 Ann Arbor, MI 48106

Atari Laser Chess

A number of lines appear twice in the listing for the Atari version of this game from the June issue. When entering Program 3, simply ignore the duplicate lines 20020-21060 on page 48.

Applesoft Memory Management

The "Readers' Feedback" column from the June issue included a question about moving an Applesoft BASIC program in memory to the area above high-resolution screen page 1. There is an error in the program line provided in the answer to this question (p. 52). The final command in the line should be RUN rather than LOAD. The complete line should read as follows:

```
5 IF PEEK(104)<>64 THEN POKE 104,64:
   POKE 16384,0: PRINT CHR$(4)"RUN
   PROGRAM"
```

Font Printer For The IBM PC/PCjr

There are no corrections for any of the programs that accompany this article from the May issue (p. 79). However, the instructions for using the printing segment, Program 2, neglected to mention that disk drive names (A:, B:, and so forth) should always be entered in upper-case. Although the computer understands that A: and a: both refer to the same drive, the program does not. Also, the article states that, when using the same drive for document and font disks, the program will beep twice when it's time to change disks. Actually, only one beep is sounded. ©



The Beginners Page

Tom R. Halfhill, Editor

Using Variables

I've recently had several letters asking about variables, so we'll examine that topic this month.

A variable name is a label given to a value that represents a number or string. The value of the variable may change while the program is running.

For example, in the early part of a program you may define N to be 5 ($N = 5$), so variable N will have the value of 5. Later in the program you may redefine N with $N = 8$. You may also use an expression such as $N = N + 1$. This expression means to replace value N with $N + 1$. If N was 8, it becomes $8 + 1$, or 9.

You will want to use a variable name whenever you are working with numbers or strings that could change. For example, you could use the variable S for Score. As points are made, you increment S .

A string variable name ends with a dollar sign. For example, you may read in from DATA a value for NAME\$, print NAME\$, read in another NAME\$, and so forth.

Variables And Constants

Many statements specify parameters which may be numeric constants or variables. Using variables allows changes to be made rather easily. For example, consider drawing graphics on the screen. Let's say you want to draw a train car that has four wheels visible. The center of the first circle can be specified with variables X and Y . The center of the next circle can be relative to the first, with $X + 20$ and Y . The third circle may be $X + 80$ and Y , and the fourth may be $X + 100$ and Y . Before you draw the four circles, you need to define X and Y , so you can use the CIRCLE command to draw the wheels. Now let's suppose the wheels are not positioned quite right. They need to be higher and a bit more toward the center of the screen. If you had used con-

stants in the CIRCLE commands, you would need to change the constants in the four CIRCLE commands. However, by using variables, all you need to do is change the definitions of X and Y .

Another place I like to use a variable is as a timing function in music commands. Use a variable such as N for a quarter note. An eighth note would be $N/2$, and a whole note, $N * 4$. You can write all the sound commands in terms of that variable duration and define N at the beginning of the program. To speed up or slow down the whole piece, you simply need to change one statement defining the duration N —not every sound command.

Another example of variable usage is to define the variables and then call a subroutine that uses them. For example, you might have a subroutine that draws a hexagon with a starting point of row R and column C and with the length of a side equal to S . To draw a hexagon on the screen, simply define R , C , and S ; then GOSUB for the drawing routine. To draw another hexagon, redefine R , C , and S ; then GOSUB.

Naming Variables

How do we name variables? Most versions of BASIC specify that a variable name must contain alphanumeric characters (letters plus numbers) and must start with an alphabetic character. Some BASICs allow certain symbols such as the underline or the at sign (@) to be part of the variable name.

There are just a couple of restrictions. Some computers recognize only the first two characters of a variable name, even though the name may actually be longer. In such a case, the variables BLACK and BLUE would be considered the same variable—BL. Some computers do not allow a variable name to contain a reserved keyword. For ex-

ample, FORK, KNIFE, and SPOON would not be acceptable variable names because they have the embedded keywords FOR, IF, and ON. Newer computers are allowing longer variable names and aren't so picky about embedded words.

Also, BASIC does not recognize a difference between lowercase and uppercase letters. Thus, STARSHIP, Starship, and starship all represent the same variable.

Many of the early BASIC programmers started programming in FORTRAN. Any integer variable in FORTRAN had to start with I , J , K , L , M , or N . Out of habit, the programmers carried over that tradition to BASIC and used those letters for variable names in FOR-NEXT loops or as counters or flags. You can choose much more meaningful variable names, such as FOR ROW = 1 TO 24 . . . NEXT ROW.

Another habit from the early days of micros was using A for the first variable used in a program, B for the second, and so on. Back when computers had small memories, it really helped to use variable names with just one letter. I also recall that some of the early machines tracked the variables in alphabetic order, so it was faster to use variables from the first part of the alphabet.

Now, with faster and larger-memory computers, the trends for naming variables are changing. Most programmers like to use variables that mean something. Rather than A , B , C , X , and Y , you might see names such as AREA, LENGTH, NUMBER, FLAG, SCORE, and HIGH_SCORE. This is a way of documenting your program. Also, you'll find it much easier to keep track of variables if you name them meaningfully—and using meaningful variable names is one of the advantages often listed for programming in Pascal. Now you can do the same in BASIC. ©



Computer III—The Verdict

Good news for telecomputers comes from Washington, D.C. In April, the Federal Communications Commission ruled on two items that were of keen interest to online computer users. The FCC ruled against regulation of network-based information services and prohibited the Bell Operating Companies (a.k.a. the phone companies) from offering information services of their own.

This means that commercial information services and services such as Telenet's PC Pursuit will not be forced to pay access charges for interconnecting their private networks to the local phone system. It was widely felt that the access charges would have been passed on to the consumer in the form of higher hourly connect-time rates. The FCC ruled that, since there is currently no competition for local phone service, the BOCs would have an unfair competitive advantage over independent information providers. Apparently, the FCC noted the influx of mail from the telecomputing community. Many thanks to the readers of this column who wrote the commission to express their views on Computer III.

Exchange Shut Down

Even without new regulations from the FCC, PC Pursuit is still experiencing some growing pains. Pursuit recently had to axe 20 exchanges from its San Francisco service area because of higher-than-expected costs. If local phone companies in other cities raise their rates, service to more exchanges may have to be dropped. Some users have also been grumbling about the lack of 2400 bps service on Pursuit. Implementation of 2400 bps Pursuit links is still in beta test and over a year tardy. Rumor mongers claim that the holdup is throughput little better than the current 1200 bps due to

network congestion and delays.

Going Once, Twice . . .

Reader's Digest has apparently decided to forego the videotex market and stick with the printed page. In April it sold off *The Source* to a group of venture capitalists. Although the author of this column could not contact any of the parties involved, they would have surely stated "By George! Some fellow at COMPUTE! predicted that this would happen last January!"

Daylight Savings Time

CompuServe subscribers may not have to wait until dinner is over to link up with the service at budget rates. As of late the service has been experimenting with lowering its daytime hourly connect charges. During April and May, prime time rates were made the same as standard evening and weekend charges (\$6 per hour for 300 bps and \$12.50 per hour for 1200 and 2400 bps). If the trial is successful, don't be surprised if the lower daytime rates become permanent.

Polly Want A Modem?

Last month's column briefly touched on the new wave of compact, battery-powered modems that are finding favor with laptop computer users. Novation, a long-time manufacturer of data communications equipment for the computer hobbyist, has just upped the ante in the compact modem market. Novation's new "Parrot 1200" is a 300/1200 bps unit that supports the Hayes "AT" command set and is roughly the size of an audio cassette. The Parrot sports four indicator lights and a speaker for monitoring the progress of calls, and it requires no batteries or AC power transformer. When the modem is activated, all required power is drawn directly from the RS-232

port. The most impressive feature of the Parrot 1200 is the suggested list price of \$119, well under the \$200-\$260 price of its competitors.

So Sue Me . . .

Having grown tired of letting spreadsheet software firms hog the "Lawsuit of the Month" spotlight, communications firms struck back in April.

A U.S. District court ruled that Softclone Distributing's *Mirror* infringed on the copyright of a screen display of *Crosstalk*, a popular communications program for the IBM PC and compatible computers. The hot issue was one screen of *Mirror*, which was virtually identical to *Crosstalk's* primary status screen display. At best, the court's ruling was a modest victory for *Crosstalk* distributor DCA, who had sought a more extensive "look and feel" infringement ruling. Softclone responded by immediately shipping a new version of *Mirror* in which the structure, capitalization of words, and highlighting of the screen in question had been modified.

No sooner had *Mirror vs. Crosstalk* been put to bed than another U.S. District Court ruled that US Robotics and Hayes Microcomputer Products will duke it out in the courts. The court refused to dismiss antitrust charges brought by USR against Hayes, who had asked that the suit be tossed on the grounds of improper filing and bogus claims. The US Robotics suit charges Hayes and Business Computer (Bizcomp) with attempting to monopolize the personal computer modem market. It's likely that the dust won't begin to settle until the summer of 1988, at which time the ghost of Herman Hollerith will likely appear and sue the computer industry at large for appropriating the "look and feel" of the ASCII character set. ©



Using Your Printer With The Amiga

One of the most misunderstood aspects of the Amiga is how its printer device works. Most computers use a "dumb" printer device, like the MS-DOS device PRN:, that sends each character to the printer exactly as it receives it. When you want to make your printer perform a special function, like underlining or bold-face print, you use this device to send a special sequence of characters to the printer. Such a sequence of characters is sometimes called an escape code, since most start with the escape (ESC) character, ASCII character 27. Escape codes vary from printer to printer, so the command to start underlining on one printer may not mean a thing to another printer. So every IBM program has to know the specific codes for your printer in order to activate its special features. For example, each word processor comes with its own collection of printer driver files that tell it how to use the special features of each printer. Since there's no standard format for IBM printer driver files, the *WordPerfect* printer drivers won't work with *Microsoft Word*.

The Amiga's Answer

The Amiga, on the other hand, has a "smart" printer device called PRT:. This device uses the settings that you've saved with the Preferences program to find out all about your printer (these preferences are saved in a file called System-Configuration in the Devs directory of the Workbench disk). PRT: checks to see which printer you've selected from the Change Printers screen of Preferences. The device reads in the printer driver file whose filename corresponds to the printer you've selected (it looks for this file in the Devs/Printers subdirectory). This printer driver file tells PRT: what special features your printer supports and how to access them. It also

contains a program for printing screen graphics on your dot-matrix printer.

With the Amiga's smart PRT: device you don't have to know the printer-specific code for each special feature. Instead, you send it an Amiga-specific code, and PRT: translates that into your printer's own code. If your program wants the printer to start underlining, for example, it sends the Amiga-specific code ESC[4m to PRT:, and PRT: sends your printer the correct code to start underlining. The important thing to remember is that not only will the PRT: device not respond to your printer-specific escape codes, it will also not even pass them on to your printer. Any escape code that PRT: doesn't recognize will be ignored.

Of course, you can still send escape codes directly to your printer via the Amiga's dumb printer device, PAR:. This device sends characters straight through to printers connected on the parallel port. The SER: device sends them to serial printers. But if at all possible, you should try using the Amiga's codes and PRT:. That way, your program will work with any printer, and, should you happen to switch printers six months down the road, you won't have to rewrite the program completely.

The following short BASIC program shows you how to send commands to your printer through either the dumb or smart printer devices. Since the Toshiba printer that I use is not that common, odds are the sample codes used for the PAR: device won't work with your printer. But, the PRT: version should work with any printer, provided that the proper printer driver is installed from Preferences.

```
AS$ = "Condensed Print is ON "
BS$ = "Condensed Print is OFF "
PAR: device - works only with
```

```
Toshiba printer
OPEN "PAR:" FOR OUTPUT AS #1
FS$ = CHR$(27) + "[" + AS$
GS$ = CHR$(27) + "]" + BS$ + CHR$(13)
GOSUB DoPrint
PRT: device - works with ANY printer
OPEN "PRT:" FOR OUTPUT AS #1
FS$ = CHR$(27) + "[4w" + AS$
GS$ = CHR$(27) + "[3w" + BS$
GOSUB DoPrint: END
DoPrint:
PRINT #1: PRINT #1, FS$;GS$
CLOSE #1 : RETURN
```

A full list of Amiga printer escape codes can be found on pages 22-25 of "Introduction to Amiga Update" in the manual that comes with Version 1.2 of AmigaDOS. Here are a few of the more commonly used codes. Remember that ESC stands for CHR\$(27), the escape character.

Feature	On	Off
Italics	ESC[3m	ESC[23m
Underline	ESC[4m	ESC[24m
Bold	ESC[1m	ESC[22m
Expanded	ESC[6w	ESC[5w
Condensed	ESC[4w	ESC[3w

The secret to using PRT: is having the correct printer driver file installed on your Workbench disk. What if you have an odd printer that isn't supported directly? First, you might try finding a public-domain driver on a BBS or an information service, or a commercial driver from a software company. But if you can't find one, you might try making one yourself with a shareware program called *PrtDrvGen* by Jorgen Thomsen. This impressive program can help create a driver for almost any conceivable printer, from 8 pins to 24 pins, black-and-white or color. The program comes with a fantastic set of help screens that give a great deal of insight into how PRT: uses the printer drivers. At a suggested donation of \$10, it's the best software bargain of the year. You can contact Jorgen on CompuServe (ID 71310,2206) or PeopleLink (J.THOMSEN). ©



Journey From The Center Of The ST: Part 2

Our tour of the ST's system software began last month with a look at the three elements of its operating system: BIOS (Basic Input/Output System), XBIOS (Extended BIOS), and GEMDOS (GEM Disk Operating System). This month we'll conclude by examining GEM, the user interface that lets you control the operating system.

Who Needs An Interface?

An operating system, as we noted earlier, gives the computer the basic equipment needed to perform useful work. But without a user interface of some kind, you still can't make the system do your bidding. In older systems such as CP/M or MS-DOS, the user interface is the notoriously unfriendly command line, which waits for you to type in some magic words and responds with an electronic raspberry if you use the wrong lingo or make a typing error. GEM replaces the command line interface with a graphics interface. As on the Macintosh or Amiga, the screen depicts a work surface populated with graphic objects whose form suggests their purpose: The trash can is where you discard unwanted material, for instance. And this interface is mouse-driven instead of keyboard-driven: Rather than type arcane commands on a keyboard, you use a mouse pointer to manipulate graphic shapes.

In terms of ultimate results, the GEM desktop doesn't differ notably from, say, the MS-DOS command line: Both interfaces allow you to run programs, shuffle files around, and find out what's on a disk, for example. But the *way* you do those jobs is very different. By substituting a set of related visual metaphors for a list of gobbledygook commands, GEM, the Graphics Environment Manager, creates a coherent little world in the computer which is certainly easier to learn, if not inher-

ently more efficient, than the old command line environment.

GEM is composed of three major parts, known as VDI (Virtual Device Interface), GDOS (Graphics Device Operating System), and AES (Applications Environment Services).

VDI

VDI, which includes well over 100 functions, is concerned mainly with drawing and text operations. There are VDI routines to draw points, lines, and polygons, fill enclosed areas, display and manipulate text, control screen colors, and so forth. The name Virtual Device Interface underscores an important characteristic of GEM, which is that it's designed for device-independent graphics output. Unlike the Macintosh and Amiga graphic interfaces, GEM was not written with a specific host computer in mind. In theory, at least, it can work on a variety of machines, which may have different screen sizes, numbers of colors, and so on. Accordingly, VDI allows you to write programs that aren't tied to specific hardware. Thus, rather than program specifically for a particular device like the ST color monitor (although that's always an option), you can program for a virtual, or ideal, display device, unconcerned about such details as the number of dots or colors on the physical screen. In effect, a device-independent program says to the system, "I don't care *how* you get it done, just do it."

GDOS

It's the task of GDOS, the Graphics Device Operating System, to help translate ideal, device-independent graphics requests into output on an actual device. Just as a disk operating system mediates between a program and file-storage hardware, GDOS mediates between a program and graphics hardware. As an

example of what GDOS does, consider a desktop publishing program, which needs to support a variety of printing devices and a number of different text fonts. GDOS allows such a program to load fonts and device drivers as needed, and to access them once they're in memory.

AES

At the top of the GEM/TOS software hierarchy is AES, which stands for Applications Environment Services. This group of routines gives life to the surface characteristics of GEM: the mouse pointer, menus, windows, icons, and interactive dialogs.

A single AES routine can do a lot, and it may call on several other levels of system software. Consider, for instance, the familiar file-selector dialog used to choose a filename in GEM applications. To create this dialog, GEM must first save the contents of the screen underlying the dialog box and draw the box with all of its gadgets in place. Then it must respond to your manipulation of the box, displaying the contents of whatever disk and subdirectory you choose. When you choose OK, GEM remembers the DOS path and filename that you have chosen and erases the box, restoring the image that previously occupied that area. All this is done with just one call to the AES routine known as `fsel` input. In addition to such large-scale routines, AES has routines to handle GEM's smaller details, like the shape of the mouse pointer.

We've covered a lot of ground. There still are a few minor items floating around at the operating system level (line A exceptions, for instance, or intelligent keyboard processing). But if you understand what makes up TOS and GEM, you know basically what's inside the ST. ©



Fishing in *The Washington Post*

If you think that Dow Jones News/Retrieval is a source for business and financial information, you're right; but it also has a considerable amount of general information such as book and movie reviews, weather reports, sports scores, and even a discount shopping service. And there's one rich deposit of consumer information that's often overlooked because it's stashed away with the business data.

The DJNR has a full-text search and retrieval service for a variety of business and financial publications including *The Wall Street Journal*, *The Dow Jones News Service*, *Forbes*, *Barron's*, and *The American Banker*. It also has electronic copies of *The Washington Post* dating back to January 1984, and the issues of that newspaper are full of consumer-oriented columns and features.

Let's check out what the *Post* has to say about saltwater fishing. We'll assume that you have a modem, communications software, and an account with Dow Jones News/Retrieval, and that you know how to use all three. If not, you can open a News/Retrieval account by calling 1-800-257-5114 (toll-free) or 1-609-452-1511 (in New Jersey). After signing-on to DJNR, type //TEXT to bring up the text-retrieval database and to display the opening menu. This is the point where you select *The Washington Post*—number 3 on the menu—as the source you want to search.

//TEXT prompts for your input by typing a number; you may enter queries in upper- or lowercase letters, but do not use any punctuation like commas or periods. The DJNR Guide shows many examples of how to enter search terms. The first thing I do in //TEXT is turn on the detail switch so I can see the particulars of a search. Notice that //TEST commands begin with two periods; this is to distinguish them

from search terms.

1: ..set detail=on

Next we want to look for articles—*documents* is the term DJNR uses—that have to do with fishing. These could contain the word fish, fisherman, fishing, or some other variation of fish, so we'll use the //TEXT wild-card symbol to look for fish with any ending. (This works much like the * symbol in DOS DIR.)

1: fish\$

DJ/NRS PAGE 1 OF 11

00001 FISH\$

E1417 * TOO MANY WORDS FOR FISHS—
QUERY ACCEPTED WITH WORDS AND
COUNTS FOR TERM ONLY UP TO THE
OVERFLOW.

FISH\$	
FISH	3816 DOC
FISH.FROM	1 DOC
FISH.IN	2 DOC
FISH-	1 DOC
FISH-AND-CHIPS	1 DOC
FISH-AND-LEMON-GRASS	1 DOC
FISH-AND-VEGETABLE	1 DOC
FISH-BELLY	1 DOC
FISH-BONING	1 DOC
FISH-BOWL	1 DOC
FISH-BUYING	1 DOC
FISH-CLEANING	3 DOC
FISH-COUNTER	1 DOC

After a minute, DJNR reports more than three thousand documents in *The Washington Post* database that contain *fish* in the text. It then it starts to list the first of 11 pages. Obviously, this is too many for us to review; we need to narrow our search to a more manageable size. Let's try entering (SPORT OR SPORTS) SAME AS FISHING for a search term. This says we're looking for all articles that have the words *sport* or *sports* in the same paragraph as the word *fishing*. The results are:

2: (sport or sports) same fishing

DJ/NRS	SEARCH MODE	
00002	(SPORT OR SPORTS) SAME FISHING	
SPORT	3062 DOC	
SPORTS	28586 DOC	
FISHING	1904 DOC	
RESULT	143 DOC	

Now we're down to something

more manageable, but we still can't review 143 documents. Suppose we also restrict the search to those articles that contain the word *saltwater*. We don't have to reenter the search term used in number 2, but rather we can add to it as follows:

3: 2 same saltwater

DJ/NRS	SEARCH MODE	
00003	2 SAME SALTWATER	
2	(SPORT OR SPORTS) SAME	143 DOC
	SALTWATER	114 DOC
	RESULT	5 DOC

Now we're down to just five articles. We could print all of these and use the capture feature of the communications software to save a copy in a disk file for leisurely reading when we're offline. But downloading even five documents can take a long time, and, since DJNR charges by the minute, we want to minimize the length of time we're connected. Instead, we want to review the headlines (HL) of these five documents along with the dates (DD) they were written, then decide which ones are worth a further look.

An alternate strategy is to read the first page of each of the five articles and then make a decision. I suppose a professional researcher would choose that method since it's more thorough, but it does take longer—and I've had very good results looking at just the headlines. It's very important to include the accession number (AN) in the display because, once we've decided on an article, we can use that number to retrieve the document without having to redo the search.

We'll use the ..CP (Continuous Print) command so the display won't pause at each screen—however this command is dangerous to use for anything that might produce a large amount of output because there's no way to stop it. Even if we hang up the telephone, the computer will continue to

"print" the information and we'll get charged for a lot of time. The ..P (print) command pauses after each screenful of information, giving us a chance to stop the printing. Nevertheless, ..CP is safe enough for just printing headlines.

4: ..CP HL,DD,AN/DOC=1-5

DOCUMENT 1

AN 840323-0057.

HL INFORMATION FOR FISHERMEN:
THESE FOLKS CAN HELP YOU OUT

DD 03/23/84

To save space, I've included only the first headline, but some of the other titles were "Fishermen Take Last Legal Rockfish" and "Sporting Life." We can print this article now by entering ..CP /DOC=1 (don't forget to turn on capture so you'll save a copy to disk), or we can logout of Dow Jones News/Retrieval and go back next week or next month to print the article. For example, there's no need for you to reproduce the search if you'd like to read this piece: Just enter a search term to locate the article by its accession number (1: 840323-0057.AN.), and then enter the ..CP /DOC=1 command to print it.

Using the //TEXT database can be a little intimidating for first-time users, but the key to success—as in most things—is advanced planning. Write down search terms and commands before you call DJNR, and leave the capture active during the entire session. That way you'll have a record of everything. Good fishing.

Donald B. Trivette is the author of *A Guide to Dow Jones News/Retrieval* published by COMPUTE! Books. ©

Only NRI teaches you to service all computers as you build your own fully IBM-compatible microcomputer

With computers firmly established in offices—and more and more new applications being developed for every facet of business—the demand for trained computer service technicians surges forward. The Department of Labor estimates that computer service jobs will actually *double* in the next ten years—a faster growth rate than for any other occupation.

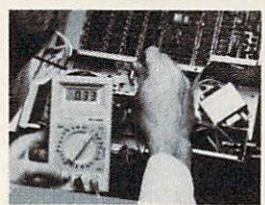


Your NRI total systems training includes all of this: NRI Discovery Lab® to design and modify circuits • Four-function digital multimeter with walk-you-through instruction on audio tape • Digital logic probe for visual examination of computer circuits • Sanyo 880 Series Computer with "intelligent" keyboard and 350K double-density, double-sided disk drive • High resolution monochrome monitor • 8K ROM, 256K RAM • Bundled software including GW BASIC, MS DOS, WordStar, CalcStar • Reference manuals, schematics, and bite-sized lessons.

Total systems training

No computer stands alone... it's part of a total system. And if you want to learn to service and repair computers, you have to understand computer systems. Only NRI includes a powerful computer system as part of your training, centered around the new, fully IBM-compatible Sanyo 880 Series computer.

As part of your training, you'll build this highly rated 16-bit IBM-compatible computer system. You'll assemble Sanyo's "intelligent" keyboard, install the power supply and disk drive, and interface the high-resolution monitor. The 880 Computer has two operating speeds: standard IBM speed of 4.77 MHz and a remarkable turbo speed of 8 MHz. It's confidence-building, real-world experience that includes training in programming, circuit design and peripheral maintenance.



NRI is the only technical school that trains you on a total computer system. You'll install and check keyboard, power supply, disk drive, and monitor, following step-by-step directions.

No experience necessary—NRI builds it in

Even if you've never had any previous training in electronics, you can succeed with NRI training. You'll start with the basics, then rapidly build on them to master such concepts as digital logic, microprocessor design, and computer memory.

Send for 100-page free catalog

Send the coupon today for NRI's 100-page, full-color catalog, with all the facts about at-home computer training. If the coupon is missing, write to: NRI, 3939 Wisconsin Ave., NW, Washington, D.C. 20016.

SEND COUPON TODAY FOR FREE NRI CATALOG!



McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue, NW, Washington, DC 20016

We'll give you tomorrow.

CHECK ONE FREE CATALOG ONLY

- Computer Electronics
- TV/Audio/Video Servicing
- Satellite Electronics
- Robotics & Industrial Control
- Data Communications

- Industrial Electronics
- Communications Electronics
- Electronic Design Technology
- Telephone Servicing
- Digital Electronics Servicing
- Basic Electronics
- Electricians

For Career courses approved under GI Bill
 check for details.

- Appliance Servicing
- Small Engine Repair
- Air Conditioning, Heating, & Refrigeration
- Locksmithing & Electronic Security
- Building Construction
- Automotive Servicing
- Photography
- Bookkeeping & Accounting

COMPUTE!
TOLL FREE
Subscription
Order Line
1-800-247-5470
In IA 1-800-532-1272

Name (Please print) _____ Age _____
Street _____
City/State/Zip _____

P/M Magic

Gary Costanza

"P/M Magic" is a complete tool for the Atari BASIC programmer who wishes to use Player/Missile (P/M) graphics. It's a machine language program that enables fast movement and animation of both players and missiles from BASIC. With this system, you can create arcade-quality graphics and animation without being a machine language expert.

"P/M Magic" is designed to handle all the aspects of arcade graphics that BASIC can't handle. And because it runs as a background task, during the computer's vertical blank interrupt, P/M Magic is invisible to BASIC, doing its work without slowing down BASIC operations. Here are some of the features that P/M Magic provides:

- High-speed animation of two players
- Eight-direction missile firing logic for two players
- Player and missile movement limits
- Missile collision detection and automatic missile reset
- Two players control with one joystick
- Multicolored, double-width, or shadowed players
- Detailed and realistic explosions
- Variable speed for players and missiles
- Works with any graphics mode, in one- or two-line resolution

Typing In P/M Magic

To show what P/M Magic can do, this article includes three demonstration programs. Before you can use any of them, you must type in Program 1 and LIST it to disk or tape. This program is a loader which puts all of the P/M Magic machine language routines in memory. It's important to use LIST instead of SAVE when saving Program 1, because you will later need to use ENTER to merge it with the three demonstration programs. Don't try to run Program 1; it isn't designed to be a stand-alone program—it's a subroutine to load the P/M Magic routines into memory.

After you enter Program 1 and LIST it to disk, type in and save Programs 2-4. The lines from Program 1 must be merged with each of these programs in order for them to work. Thus, to run Program 2, you would load Program 2, then ENTER Program 1 to merge its code with the program lines already in memory. When that step is complete, run the program. For example, if you saved Program 2 on disk with the name DEMO1 and Program 1 with the name PMMAGIC, then the steps for running Program 2 would be as follows:

```
LOAD "D:DEMO1"  
ENTER "D:PMMAGIC"  
RUN
```

The same process is used for Programs 3 and 4. If you like, the complete, merged versions of Programs 2-4 can be saved for future use.

This will eliminate the step of having to ENTER the lines from Program 1 each time.

We'll discuss each demonstration program in detail later in this article. In order to understand them fully, however, you should first note a few facts about the way that P/M Magic uses the computer's memory. This information is vital if you wish to use this utility in your own programs.

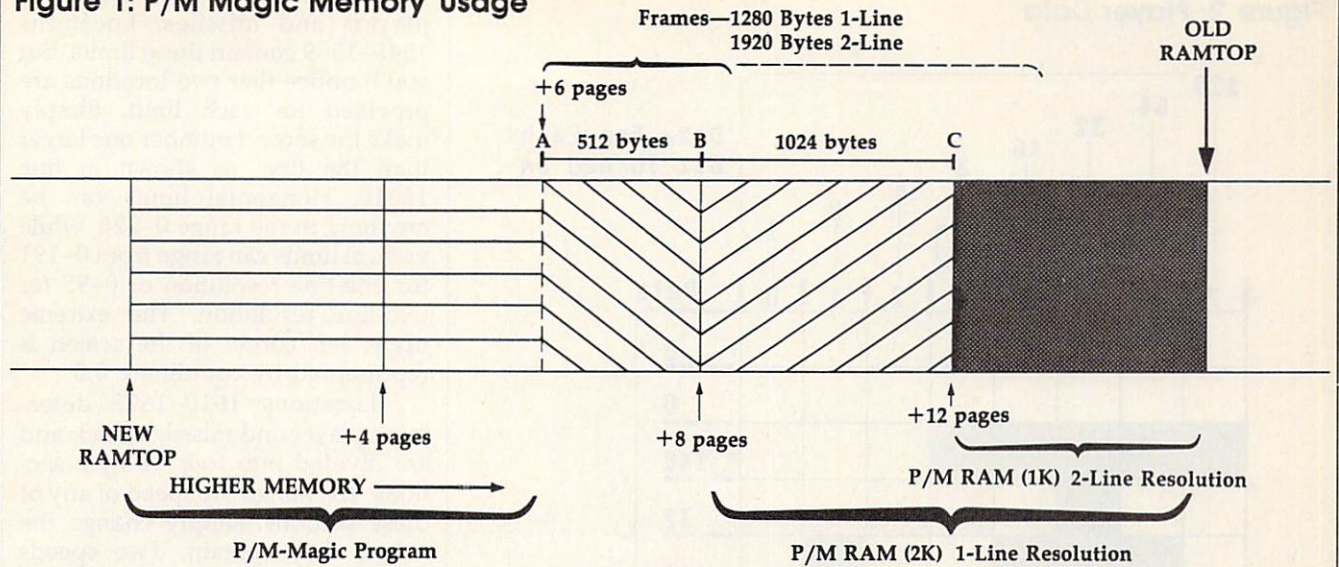
Memory Management

As noted earlier, P/M Magic works in the background, allowing you to run BASIC programs while it is active. To communicate with P/M Magic, you must place information somewhere in memory where the utility can find it. P/M Magic uses most of memory page 6 (locations 1536-1699) for this communication. By PEEKing or POKEing certain locations in page 6, you can tell P/M Magic exactly what you want done. The locations and their usage are detailed in Figure 1 and in the table.

P/M Magic resides at the high end of RAM and requires 4K (4096 bytes) of memory. To protect this memory area, you should perform POKE 106,PEEK(106)-16 before POKEing the machine language into memory. That statement moves the computer's RAMTOP pointer 4K lower in memory, making the computer think it has 4K of memory less than it actually has.

As shown in Figure 1, this 4K memory block will hold three

Figure 1: P/M Magic Memory Usage



things: the P/M Magic machine language program itself, data which the program uses for player animation, and P/M RAM. The program itself occupies about 1.5K and starts at the beginning of the 4K block. The animation data area begins 1.5K higher in memory (point A in Figure 1). The amount of memory available in this zone depends on the P/M resolution, which is 1280 bytes for one-line resolution and 1920 bytes for two-line resolu-

tion. The P/M RAM area starts at either point B or C, using eight 2K for one-line resolution and 1K pages for two-line resolution. Since a certain amount of P/M RAM is unused (the first 384-768 bytes, depending on resolution), it is used for animation data storage.

Running The Demos

With that information in mind, let's examine the demonstration programs. Note that all of them begin

by performing some setup tasks. The screen appears blank during this process, which takes about one minute.

Program 2 demonstrates several basic features of P/M Magic. After a delay of about one minute, it displays a helicopter-shaped player on the screen, complete with a realistic shadow. Plug a joystick into port 1, and you will be able to move the helicopter in any of eight directions (up, up and left, left, and so on). Notice that the helicopter has definite horizontal and vertical limits; when you reach the edge of the screen, it simply stops moving.

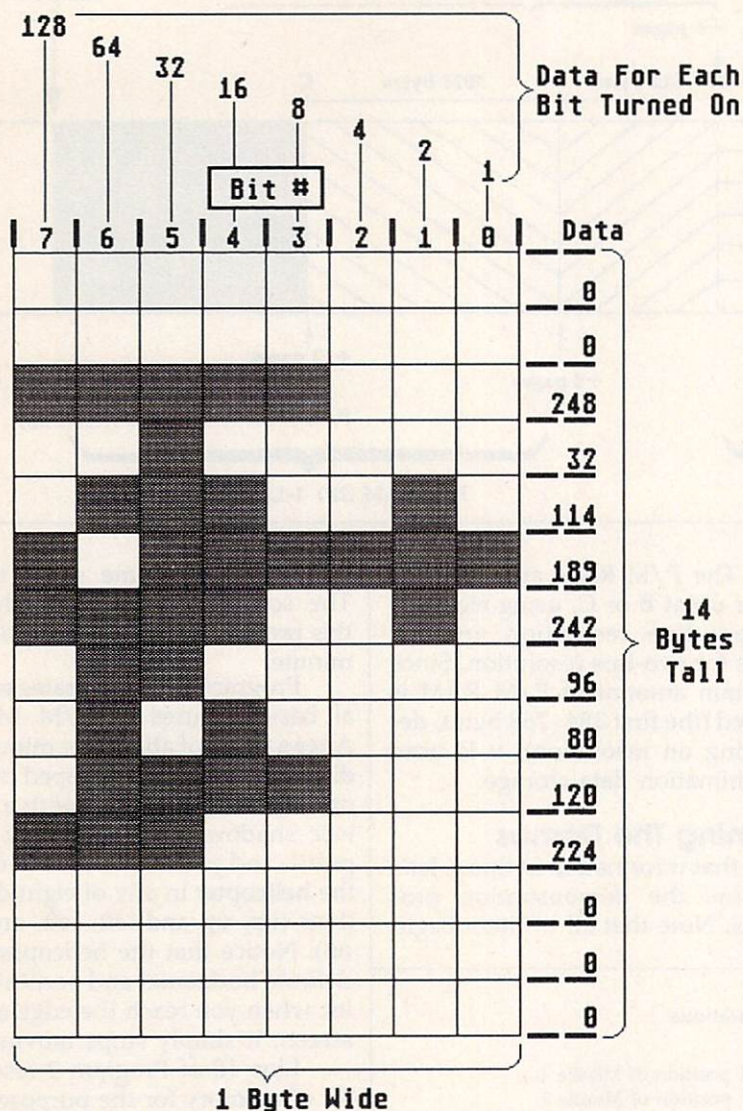
Line 10 of Program 2 reserves 4K of memory for the purposes explained above. In line 20, RAMTOP is the first address of our reserved 4K block, which is used to call the P/M Magic machine code. Lines 30 and 40 both compute the address where P/M RAM begins and POKE it into the P/M hardware register, telling the computer where that zone is located. Lines 60 and 62 compute the address where our P/M data begins.

Lines 70 and 75 set up a GRAPHICS 0 screen and temporarily turn off the screen to make the computer run a bit faster. Note that you always should perform a GRAPHICS statement after modifying the RAMTOP pointer (as in line 10); that action causes the computer to set up its display list and screen below the new location of RAMTOP, protecting your reserved memory area.

Important Memory Locations

- | | |
|---|---|
| 1536 Player 0 animation; POKE with frame number | 1593 X position of Missile 1 |
| 1537 Player 1 animation | 1594 Y position of Missile 1 |
| 1540 POKE with 1 to disable Missile 0 | 1600 Player 1's change in X position; use when under program control (POKE with 0, 1, 2, 3, 255, 254, or 253) |
| 1541 POKE with 1 to disable Missile 1 | 1601 Player 1's change in Y position |
| 1542 Missile 0's X offset from Player 0 | 1610-1625 players' horizontal speed |
| 1543 Missile 0's Y offset from Player 0 | 1626-1641 players' vertical speed |
| 1544 Missile 1's X offset from Player 1 | 1642-1657 missiles' horizontal speed |
| 1545 Missile 1's Y offset from Player 1 | 1658-1673 missiles' vertical speed |
| 1546-47 Player 0's left limit; Player 0's left limit plus 1 | 1674 POKE with 1 to stop Player 0 |
| 1548-49 Player 0's right limit | 1684 Missile 0 to Playfield 0; collisions—POKE with 1 to enable |
| 1550-51 Player 0's top limit | 1685 M0 to PF 1 |
| 1552-53 Player 0's bottom limit | 1686 M0 to PF 2 |
| 1554-55 Player 1's left limit | 1687 M0 to PF 3 |
| 1556-57 Player 1's right limit | 1688 M1 to PF 0 |
| 1558-59 Player 1's top limit | 1689 M1 to PF 1 |
| 1560-61 Player 1's bottom limit | 1690 M1 to PF 2 |
| 1562-63 both missiles' left limit | 1691 M1 to PF 3 |
| 1564-65 both missiles' right limit | 1692 M0 to Player 0 |
| 1566-67 both missiles' top limit | 1693 M0 to P1 |
| 1568-69 both missiles' bottom limit | 1694 M0 to P2 |
| 1570 POKE with 1 to allow Player 1 to be program-controlled | 1695 M0 to P3 |
| 1587 X position of Player 0 | 1696 M1 to P0 |
| 1588 Y position of Player 0 | 1697 M1 to P1 |
| 1589 X position of Player 1 | 1698 M1 to P2 |
| 1590 Y position of Player 1 | 1699 M1 to P3 |
| 1591 X position of Missile 0 | 1744 POKE with 1 to disable P/M Magic |
| 1592 Y position of Missile 0 | |

Figure 2: Player Data



Line 80 calls the subroutine that POKes the P/M data into the area defined in line 62. In this case, each DATA line containing the P/M data consists of 14 numbers, which contain pixel data for each of the 14 lines in the player shape (see Figure 2).

This particular player is 14 bytes tall, so each 14-item DATA line represents an entire player shape. Once these shapes have been stored in memory, we can display any shape at will, or flip through an entire series for animation. In effect, each 14-byte data set is one "frame" of an animated series. To switch to a new shape, POKE its frame number into location 1536 (for player 0) or 1537 (for

player 1). Frame numbers correspond to the position of the data sets in memory. For instance, the data in lines 9010, 9020, and 9030 represents frames 0, 1, and 2, respectively, and so on. Frame 0 (in line 9010) contains all zero values; it can be used to erase either player.

Notice that every player data set must have a "cushion" of two extra zeros both at the top and at the bottom of the shape (see Figure 2). This cushion is counted as part of the player's height and is necessary for P/M Magic to function.

Line 90 of Program 2 calls a routine that POKes some important information into the page six storage area (Figure 1). P/M Magic allows you to set horizontal and

vertical movement limits for both players and missiles. Locations 1546-1569 contain these limits, but you'll notice that two locations are provided for each limit. Simply make the second number one larger than the first, as shown in line 10010. Horizontal limits can be anything in the range 0-228, while vertical limits can range from 0-191 for one-line resolution or 0-95 for two-line resolution. The extreme upper left corner of the screen is represented by coordinate 0,0.

Locations 1610-1673 determine player and missile speed, and are divided into four 16-byte sections. To change the speed of any of these sections, simply change the values they contain. Two speeds are possible. For normal speed, the sections should contain 0, 1, and 255 values in the order shown in lines 10040-10060 of Program 2. For fast speed, change every 1 in those lines to 2, and change every 255 to 254 (leave the 0 values unchanged).

Line 100 calls the routine (from Program 1) that POKes the P/M machine code into memory. Line 120 disables missiles 0 and 1 and sets the colors for player 0 and the background. Line 122 turns on players and missiles and clears the P/M Magic disable flag. Line 123 clears all of P/M RAM and then, since the setup is complete, turns the screen back on.

At this point, we are ready to enable P/M Magic, a task that is done with USR. Here is the general form for the USR statement:

X=USR(RAMTOP,P0X,P0Y,P1X,P1Y, HEIGHT,FLAG,RESOLUTION)

Here is an explanation of the values you must supply in the USR statement:

RAMTOP	start address of P/M Magic
P0X	X position of player 0
P0Y	Y position of player 0
P1X	X position of player 1
P1Y	Y position of player 1
HEIGHT	height of taller player; add zeroes to bring the shorter player up to this height
FLAG	set flag to allow one joystick to control two players
RESOLUTION	1 for one-line, 2 for two-line

Once P/M Magic is enabled, a number of interesting effects are possible. For instance, the first two

demonstration programs take advantage of the feature that lets you control two players with one joystick. In the first example, the players are arranged vertically to create a shadow under the helicopter. In the second case, the players are placed side by side to create an extra-wide walking figure. By overlapping two players, you can create the appearance of a player with three colors.

Locations 1562-1569 define the limits of a missile's travel. When it exceeds these bounds, it is reset automatically. Locations 1542-1545 define the missiles' offsets from their respective players; when a missile is unfired, these offsets center a missile underneath its player, making it invisible.

The final demonstration program moves player 1 under program control. Locations 1600-1601 control the player's speed and direction, using the same scheme described earlier for locations 1610-1673.

Location 1693 is used to detect collisions between missile 0 and player 1. To enable detection, POKE a 1 into this address. When this type of collision occurs, P/M Magic first checks location 1693 to see whether detection is enabled, then resets the missile and stores a zero in the same location. After detecting a collision—with PEEK (1693)—you should store a 1 in this address as soon as you want to detect collisions again.

Avoid using the GRAPHICS statement or executing PRINT "{CLEAR}", or the equivalent PRINT CHR\$(125), after P/M Magic is enabled. Any of these activities can clear the RAM above the RAMTOP pointer, where P/M Magic resides. If you must perform one of those commands, disable P/M Magic with POKE 1744,1; then reinstall the P/M Magic machine code and activate it with USR.

For instructions on entering these programs, please refer to "COMPUTE!'s Guide to Typing In Programs" elsewhere in this issue.

Program 1: P/M Magic Loader

```
CF 200000 REM *** P/M MAGIC *
*****
HC 200001 REM COPYRIGHT 1987
COMPUTE! PUBLICATIO
NS, INC ALL RIGHTS
RESERVED.
AH 200100 FOR A=RAMTOP TO RAM
```

```
TOP+1358:READ B:POK
E A,B:NEXT A
CE 200200 DATA 216,104,104,10
4,141,51,6,109,6,6,
141,55,6,104,104,14
1,52,6,109,7,6,141,
56,6,104
AH 200300 DATA 104,141,53,6,1
09,8,6,141,57,6,104
,104,141,54,6,109,9
,6,141,58,6,104,104
,141,59
PK 200400 DATA 6,104,104,141,
61,6,104,104,201,2,
208,31,165,106,24,1
05,14,133,204,133,2
06,133,223,133,221
BH 200500 DATA 198,223,198,22
1,169,128,133,205,1
33,222,133,220,169,
0,133,203,240,33,16
5,106,24,105,13,133
,206
LP 200600 DATA 133,204,133,22
3,133,221,198,223,1
98,223,198,221,198,
221,198,204,169,0,1
33,203,133,205,133,
222,133
AI 200700 DATA 220,160,0,185,
220,0,153,204,6,200
,192,4,208,245
PC 200800 DATA 166,106,160,15
4,169,7,32,92,228,1
69,64,141,14,212,96
,216
KH 200900 DATA 160,0,185,220,
0,153,200,6,200,192
,4,208,245,160,0,18
5,204,6,153,220,0,2
00,192,4,208,245
EI 201000 DATA 173,208,6,240,
13,169,233,141,37,2
,169,5,141,36,2,76,
98,228
OE 201100 DATA 174,120,2,189,
74,6,141,62
IE 201200 DATA 6,189,90,6,141
,63,6,173,34,6,208,
38,173,61,6,201,1,2
08,16,173,62,6,141,
64,6
NA 201300 DATA 173,63,6,141,6
5,6,169,0,240,15,17
4,121,2,189,74,6,14
1,64,6,189,90,6,141
,65,6
HM 201400 DATA 173,49,6,240,2
0,173,120,2,201,15,
208,61,173,2,6,240,
56,169,0,141,49,6,1
41,2,6
HE 201500 DATA 173,132,2,208,
31,173,120,2,201,15
,240,24,169,1,141,4
9,6,174,120,2,189,1
06,6,141,66
BH 201600 DATA 6,189
OC 201700 DATA 122,6,141,67,6
,169,0,240,12,173,6
2,6,141,66,6,173,63
,6,141,67,6,173,132
,2,208
HK 201800 DATA 26,173,4,6,208
,21,169,0,141,62,6,
141,63,6,173,61,6,2
40,8,169,0,141,64,6
,141
PH 201900 DATA 65,6,173,50,6,
240,20,173,121,2,20
1,15,208,61,173,3,6
,240,56,169,0,141,5
0,6,141
```

```
CC 202000 DATA 3,6,173,133,2,
208,31,173,121,2,20
1,15,240,24,169,1,1
41,50,6,174,121,2,1
89,106,6
MG 202100 DATA 141,68,6,189,1
22,6,141,69,6,169,0
,240,12,173,64,6,14
1,68,6,173,65,6,141
,69,6
HM 202200 DATA 173,133,2,208,
13,173,5,6,208,8,16
9,0,141,64,6,141,65
,6,173,51,6,24,109,
62,6
CI 202300 DATA 141,60,6,160,0
,185,10,6,205,60,6,
240,15,200,192,4,20
8,243,173,60,6,141,
51,6,192
EC 202400 DATA 4,240,10,173,4
9,6,208,5,169,0,141
,66,6,173,52,6,24,1
09,63,6,141,60,6,16
0,0
GJ 202500 DATA 185,14,6,205,6
0,6,240,15,200,192,
4,208,243,173,60,6,
141,52,6,192,4,240,
10,173,49
EO 202600 DATA 6,208,5,169,0,
141,67,6,173,53,6,2
4,109,64,6,141,60,6
,160,0,185,18,6,205
,60
AN 202700 DATA 6,240
DH 202800 DATA 15,200,192,4,2
08,243,173,60,6,141
,53,6,192,4,240,10,
173,50,6,208,5,169,
0,141,68
KE 202900 DATA 6,173,54,6,24,
109,65,6,141,60,6,1
60,0,185,22,6,205,6
0,6,240,15,200,192,
4,208
KH 203000 DATA 243,173,60,6,1
41,54,6,192,4,240,1
0,173,50,6,208,5,16
9,0,141,69,6,173,55
,6,24
DB 203100 DATA 109,66,6,141,6
0,6,160,0,185,26,6,
205,60,6,240,14,200
,192,4,208,243,173,
60,6,141
DD 203200 DATA 55,6,24,144,5,
169,1,141,2,6,173,5
6,6,24,109,67,6,141
,60,6,160,0,185,30,
6
AB 203300 DATA 205,60,6,240,1
4,200,192,4,208,243
,173,60,6,141,56,6,
24,144,5,169,1,141,
2,6,173
AM 203400 DATA 57,6,24,109,68
,6,141,60,6,160,0,1
85,26,6,205,60,6,24
0,14,200,192,4,208,
243,173
OI 203500 DATA 60,6,141,57,6,
24,144,5,169,1,141,
3,6,173,58,6,24,109
,69,6,141,60,6,160,
0
DK 203600 DATA 185,30,6,205,6
0,6,240,14,200,192,
4,208,243,173,60,6,
141,58,6,24,144,5,1
69,1,141
HK 203700 DATA 3,6,162,0,173,
0,208,168,41,1,240,
```

```

18,189,148,6,240,13
,205,49,6,208,8,141
,2,6
BD 20380 DATA 169,0
EH 20390 DATA 157,148,6,152,
74,232,224,4,208,22
6,173,1,208,168,41,
1,240,18,189,148,6,
240,13,205,50
EN 20400 DATA 6,208,8,141,3,
6,169,0,157,148,6,1
52,74,232,224,8,208
,226,173,8,208,168,
41,1,240
IC 20410 DATA 18,189,148,6,2
40,13,205,49,6,208,
8,141,2,6,169,0,157
,148,6,152,74,232,2
24,12,208
EN 20420 DATA 226,173,9,208,
168,41,1,240,18,189
,148,6,240,13,205,5
0,6,208,8,141,3,6,1
69,0,157
KB 20430 DATA 148,6,152,74,2
32,224,16,208,226,1
69,1,141,30,208,173
,2,6,240,8,169,0,14
1,39,6,141
OF 20440 DATA 40,6,173,72,6,
240,8,169,0,141,39,
6,141,40,6,173,3,6,
240,8,169,0,141,45,
6
HP 20450 DATA 141,46,6,173,7
3,6,240,8,169,0,141
,45,6,141,46,6,173,
51,6,141,0,208,173,
53,6
KF 20460 DATA 141,1,208,173,
55,6,141,4,208,173,
57,6,141,5,208,174,
0,6,169,0,133,208,1
33,209,224
GE 20470 DATA 0,240,17,165,2
08,24,109,59,6,133,
208,144,2,230,209,2
02,224,0,208,239,16
5,106,24,105,6
JK 20480 DATA 24,101,209,133
,209,165,208,24,109
,59,6,141,70,6,172,
52,6,162,0,161,208,
145,203,230,208
BB 20490 DATA 208,2
NB 20500 DATA 230,209,200,16
5,208,205,70,6,208,
238,174,1,6,169,0,1
33,208,133,209,224,
0,240,17,165,208
MA 20510 DATA 24,109,59,6,13
3,208,144,2,230,209
,202,224,0,208,239,
165,106,24,105,6,24
,101,209,133,209
BD 20520 DATA 165,208,24,109
,59,6,141,71,6,172,
54,6,162,0,161,208,
145,205,230,208,208
,2,230,209,200
DP 20530 DATA 165,208,205,71
,6,208,238,172,56,6
,162,0,177,222,41,2
52,29,37,6,145,222,
200,232,224,6
PO 20540 DATA 208,241,172,58
,6,162,0,177,220,41
,243,29,43,6,145,22
0,200,232,224,6,208
,241,173,2,6
FA 20550 DATA 208,7,173,72,6
,208,2,240,32,173,5
1,6,24,109,6,6,141,

```

```

55,6,173,52,6,24,10
9,7
FO 20560 DATA 6,141,56,6,173
,62,6,141,66,6,173,
63,6,141,67,6,169,3
,141,39,6,141,40,6,
173
PD 20570 DATA 3,6,208,7,173,
73,6,208,2,240,32,1
73,53,6,24,109,8,6,
141,57,6,173,54,6,2
4
JP 20580 DATA 109,9,6,141,58
,6,173,64,6,141,68,
6,173,65,6,141,69,6
,169,12,141,45,6,14
1,46
EI 20590 DATA 6,173,4,6,240,
5,169,0,141,4,208,1
73,5,6,240,5,169,0,
141,5,208,173,61,6,
240
BD 20600 DATA 5,169
JB 20610 DATA 0,141,5,208,16
9,0,141,72,6,141,73
,6,248
KE 20620 DATA 160,0,185,220,
0,153,204,6,200,192
,4,208,245,160,0,18
5,200,6,153,220,0,2
00,192,4,208,245,76
,98,228
NL 20630 RETURN

```

Program 2: Helicopter Demo

```

GC 5 PRINT "(CLEAR)COPYRIGHT
1987":PRINT "COMPUTE!
PUBLICATIONS, INC.":PRI
NT "ALL RIGHTS RESERVED
"
BK 8 FOR X=1 TO 1000:NEXT X
PE 10 POKE 106,PEEK(106)-16
EB 20 RAMTOP=PEEK(106)*256
FB 30 A=PEEK(106)+8
AL 40 POKE 54279,A
GC 50 PMBASE=A*256
FC 60 A=PEEK(106)+6
BL 62 FRAMES=A*256
OI 70 GRAPHICS 0
JK 75 POKE 559,0
LB 80 GOSUB 9000
NK 90 GOSUB 10000
AD 100 GOSUB 20000
KE 120 POKE 1540,1:POKE 1541
,1:POKE 704,148:POKE
710,0
MA 122 POKE 53277,3:POKE 174
4,0
JJ 123 FOR R=PMBASE TO PMBAS
E+2047:POKE R,0:NEXT
R:POKE 559,62
MH 125 X=USR(RAMTOP,100,100,
0,0,14,0,1)
PF 127 POKE 1536,1
BL 130 END
BE 8600 REM ***** ANIMATION
DATA *****
BH 9000 FOR I=FRAMES TO FRAM
ES+69:READ A:POKE I,
A:NEXT I
MA 9010 DATA 0,0,0,0,0,0,0
,0,0,0,0,0,0
FL 9020 DATA 0,0,31,4,78,189
,79,6,10,30,7,0,0,0
HC 9030 DATA 0,0,4,4,142,125
,143,6,10,30,7,0,0,0
OI 9040 DATA 0,0,248,32,114,
189,242,96,80,120,22
4,0,0,0
KG 9050 DATA 0,0,32,32,113,1
90,241,96,80,120,224
,0,0,0

```

```

LA 9070 RETURN
PN 9100 REM ***** PAGE 6 MEM.
USAGE *****
AE 10000 FOR A=1546 TO 1673:
READ B:POKE A,B:NEX
T A
PA 10010 DATA 46,47,204,205,
30,31,212,213,48,49
,206,207,38,39,220,
221,40,41,210,211,2
5,26,225,226
AN 10020 DATA 0,0,0,0,3,3,
0,0,0,0,12,12,0,0,0
IC 10030 DATA 0,0,0,0,0,0,0,
0,0,0,0,0,0,0,0,0,0
BL 10035 REM PLAYER SPEED
PB 10040 DATA 0,0,0,0,1,1,
1,0,255,255,255,0,0
,0,0,0,0,0,0,2,25
4,0,0,2
OI 10045 DATA 254,0,0,2,254,
0
OH 10047 REM MISSILE SPEED
PP 10050 DATA 0,0,0,0,2,2,
2,0,254,254,254,0,0
,0,0,0,0,0
NI 10060 DATA 0,0,2,254,0,0,
2,254,0,0,2,254,0
NI 10070 RETURN

```

Program 3: Street Scene Demo

```

GC 5 PRINT "(CLEAR)COPYRIGHT
1987":PRINT "COMPUTE!
PUBLICATIONS, INC.":PRI
NT "ALL RIGHTS RESERVED
"
BK 8 FOR X=1 TO 1000:NEXT X
PE 10 POKE 106,PEEK(106)-16
EB 20 RAMTOP=PEEK(106)*256
FB 30 A=PEEK(106)+8
AL 40 POKE 54279,A
GC 50 PMBASE=A*256
FC 60 A=PEEK(106)+6
BL 62 FRAMES=A*256
IH 63 GRAPHICS 23:POKE 559,0
NB 64 POKE 53250,120:POKE 53
251,120:POKE 53254,100
:POKE 53255,140
JD 90 POKE 623,17:POKE 53277
,3:POKE 53260,96:POKE
54286,32
DE 100 FOR I=PMBASE+0 TO PMB
ASE+2047:POKE I,0:NEX
T I
BA 120 FOR Y=PMBASE+800 TO P
MBASE+889:POKE Y,240:
NEXT Y
AF 130 FOR R=PMBASE+890 TO P
MBASE+946:POKE R,192:
NEXT R
KN 150 FOR T=PMBASE+1698 TO
PMBASE+1707:READ A:PO
KE T,A:NEXT T
NH 160 FOR X=PMBASE+1960 TO
PMBASE+1970:READ S:PO
KE X,S:NEXT X
GO 170 DATA 16,56,124,124,25
4,124,16,2,3,2
FL 180 DATA 108,124,124,124,
124,124,124,124,254,5
6,0
FG 190 FOR I=704 TO 711:READ
A:POKE I,A:NEXT I
IB 200 DATA 84,84,14,236,22,
146,152,2
FK 210 K=140:L=100:J=212
HG 220 DL=PEEK(560)+256*PEEK
(561)
EN 222 DL82=DL+82:LBYTE=40
FC 224 POKE DL+81,77:POKE DL
+82,40:POKE DL+83,PEE

```

```

K(DL+5)+12
OC 226 GOSUB 8000
OF 228 GOSUB 9000
AG 230 GOSUB 10000
AJ 232 GOSUB 20000
LC 240 POKE 1744,0:POKE 1540
,1:POKE 1541,1:POKE 5
59,62
KJ 260 X=USR(RAMTOP,120,180,
128,180,26,1,1)
NC 290 REM ***** MAIN LOOP
*****
HI 300 T=6:SPEED=6
KE 310 FOR I=1 TO 5:POKE 153
6,I:POKE 1537,T:T=T+1
:IF PEEK(632)=11 THEN
SPEED=12
LG 320 IF PEEK(632)=7 THEN S
PEED=0
MH 330 K=K-1:IF K=44 THEN K=
212
GJ 340 L=L-0.75:IF L<44 THEN
L=212
MK 350 J=J-1:IF J=44 THEN J=
212
BK 360 FOR P=0 TO SPEED:NEXT
P
BN 370 POKE 53250,J:POKE 532
51,J
CJ 380 POKE 53255,K:POKE 532
54,L
AB 390 LBYTE=LBYTE+0.25:IF L
BYTE=50 THEN LBYTE=10
GJ 400 POKE DL82,LBYTE
NB 410 IF PEEK(1588)<181 THE
N POKE 623,24
NK 415 IF PEEK(1588)>181 THE
N POKE 623,17
BO 420 NEXT I
BO 430 GOTO 300
EB 7000 REM ***** DRAW PLAYF
IELD *****
HB 8000 COLOR 1:PLOT 159,39:
DRAWTO 159,0:DRAWTO
0,0:POSITION 0,39:PO
KE 765,1:XIO 18,#6,0
,0,"S:"
HM 8010 COLOR 3:PLOT 159,47:
DRAWTO 159,40:DRAWTO
0,40:POSITION 0,47:
POKE 765,3:XIO 18,#6
,0,0,"S:"
KB 8020 PLOT 159,95:DRAWTO 1
59,68:DRAWTO 0,68:PO
SITION 0,95:XIO 18,#
6,0,0,"S:"
OC 8030 COLOR 2:PLOT 159,51:
DRAWTO 159,48:DRAWTO
0,48:POSITION 0,51:
POKE 765,2:XIO 18,#6
,0,0,"S:"
HN 8060 COLOR 1:W=1
JF 8080 FOR I=1 TO 6:PLOT 99
,79+I:DRAWTO 99+W,79
+I:W=W+2:NEXT I
IC 8090 COLOR 2
HO 8100 FOR I=0 TO 6:PLOT 73
,78+I:DRAWTO 98,78+I
:NEXT I
HK 8110 COLOR 1
BD 8120 FOR I=0 TO 24 STEP 4
:PLOT 75+I,80:DRAWTO
75+I,84:NEXT I
PB 8130 FOR I=0 TO 13:READ A
,B:PLOT A,B+25:NEXT
I
PF 8140 FOR I=0 TO 8:READ A,
B,C,D:PLOT A,B+25:DR
AWTO C,D+25:NEXT I
HH 8150 DATA 77,58,77,56,76,
58,78,56,85,56,85,58
,86,57,86,55,86,59,8
9,59,93,56,93,58,93,

```

```

59,97,55
PP 8160 DATA 74,54,74,60,81,
55,81,58,89,55,89,57
,96,57,96,59,98,57,9
8,59,75,60,112,60,11
2,60,99,54,75,60,75,
54
BO 8170 DATA 75,54,99,54
LB 8180 RETURN
FP 9000 REM ***** ANIMATION
DATA *****
JI 9010 FOR I=FRAMES TO FRAM
ES+285:READ A:POKE I
,A:NEXT I
BB 9020 DATA 0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0
KP 9030 DATA 0,0,0,0,0,0,0,0
,0,0,0,0,0,0,3,15,29,5
9,51,7,7,15,252,224,
112,48,0
OA 9040 DATA 0,0,0,0,0,0,0,0
,0,0,0,0,0,1,7,15,31
,55,55,7,111,125,248
,192,65,0
BB 9050 DATA 0,0,0,0,0,0,0,0
,0,0,0,0,3,7,15,31,3
1,31,31,222,254,251,
231,206,15,0
NH 9060 DATA 0,0,0,0,0,0,1,3
,3,3,1,7,15,31,30,62
,62,63,63,60,124,120
,112,112,252,0
CJ 9070 DATA 0,0,0,0,0,0,0,0
,1,1,1,0,7,31,31,31,
31,31,15,15,13,31,12
3,112,124,0
BM 9080 DATA 0,0,0,0,0,0,0,2
8,62,62,62,28,240,22
0,240,240,251,255,22
0,192,192,227,118,60
,24,0
LL 9090 DATA 0,0,0,0,0,0,0,0
,56,124,124,124,56,2
24,224,224,224,246,2
54,192,128,192,224,2
24,248,0
HG 9100 DATA 0,0,0,0,0,0,0,1
12,248,248,248,112,1
92,192,128,128,128,2
24,224,0,0,0,0,0,128
,0
CB 9110 DATA 0,0,0,0,0,0,192
,224,224,224,192,0,0
,0,0,0,0,0,0,0,0,0,0
,0,0,0
KN 9120 DATA 0,0,0,0,0,0,0,2
24,240,240,240,224,1
28,128,128,128,176,2
40,0,128,192,128,192
,128,0,0
KN 9130 RETURN
PO 9200 REM ***** PAGE 6 MEM
. USAGE *****
PP 10000 FOR A=1546 TO 1641:
READ B:POKE A,B:NEX
T A
HM 10005 REM PLAYERS LIMITS
JG 10010 DATA 46,47,194,195,
154,155,195,196,54,
55,202,203,154,155,
195,196
HO 10015 REM MEMORY USED BY
PMMAGIC
ON 10020 DATA 0,0,0,0,0,0,0,0
,0,0,0,0,0,0,3,3,0,0
,0,0,12,12,0,0,0
IC 10030 DATA 0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0
JF 10035 REM PLAYERS' SPEED
PA 10040 DATA 0,0,0,0,0,1,1,
1,0,255,255,255,0,0

```

```

,0,0,0,0,0,0,0,1,25
5,0,0,1
OF 10050 DATA 255,0,0,1,255,
0
NI 10070 RETURN

```

Program 4: Arcade Game Demo

```

BC 5 PRINT "(CLEAR)COPYRIGHT
1987":PRINT "COMPUTE!
PUBLICATIONS, INC.":PRI
NT "ALL RIGHTS RESERVED
."
BK 8 FOR X=1 TO 1000:NEXT X
PE 10 POKE 106,PEEK(106)-16
EB 20 RAMTOP=PEEK(106)*256
FB 30 A=PEEK(106)+8
AL 40 POKE 54279,A
BC 50 PMBASE=A*256
FC 60 A=PEEK(106)+6
BL 62 FRAMES=A*256
BA 64 GRAPHICS 1:POKE 53248,
0:POKE 53249,0:POKE 53
252,0:POKE 53253,0
KB 65 ?;"(7 SPACES)HOW MANY
TARGETS";
FL 66 INPUT 0:IF 0<1 THEN 66
HC 67 ?;"(6 SPACES)TARGET S
PEED (1 OR 2)";:INPUT
F:IF F>2 OR F<1 THEN 6
7
OD 68 ?;"(5 SPACES)1=EASY ;
2=DIFFICULT";:INPUT N
:IF N>2 OR N<1 THEN 68
BB 80 ?;"(8 SPACES)SCREEN W
ILL BLANK":?;"
(11 SPACES)TEMPORARILY"
;
EH 82 FOR T=1 TO 1300:NEXT T
IH 84 GRAPHICS 1+16:SOUND 0,
0,0
GI 90 POKE 559,0:POKE 623,49
:POKE 53277,3:POKE 532
56,1:POKE 53258,0:POKE
53259,0
DE 100 FOR I=PMBASE+0 TO PMB
ASE+2047:POKE I,0:NEX
T I
NI 190 POKE 704,148:POKE 705
,68:POKE 707,232:POKE
706,66:POKE 708,152:
POKE 710,146
CB 240 POKE 1542,7:POKE 1543
,6:POKE 1744,0
DK 241 FOR I=1 TO 22 STEP 3:
X=RND(0)*6:POSITION X
,I:?"#6;".
HE 242 Z=RND(0)*6:POSITION 6
+Z,I:?"#6;".":Z=RND(0
)*7:POSITION 12+Z,I:?"
#6;".
HP 243 NEXT I:RESTORE
DF 244 FOR T=0 TO 511:POKE 3
2768+T,PEEK(57344+T):
NEXT T:POKE 756,128
IB 245 FOR T=32768+24 TO 327
68+47:READ B:POKE T,B
:NEXT T
LC 246 DATA 0,0,0,0,0,0,112,
248,124,126,127,255,2
55,255,255,255,255,25
5,255,255,255,255,255
,255
JE 247 FOR T=0 TO 19:POSITIO
N T,21:?"#6;":"#":NEXT
T:POSITION 0,22
MA 248 FOR T=0 TO 19:?"#6;""
":NEXT T:POSITION 0,
23
FC 249 FOR T=0 TO 19:?"#6;""
":NEXT T
OC 252 GOSUB 9000

```

```

AM 254 GOSUB 10000
AP 256 GOSUB 20000
PM 260 POKE 1585,0:X=USR(RAM
TOP,118,120,10,100,14
,0,1)
PP 280 POKE 559,62:T=1:M=2:A
B=0:MISS=0
OD 290 POKE 1540,0:POKE 1570
,1:POKE 1537,1:POKE 1
536,3:POKE 77,0
OG 295 IF PEEK(53279)=6 THEN
302
BB 300 IF PEEK(53279)=3 THEN
POKE 1744,1:POKE 532
48,0:POKE 53249,0:BOT
O 64
PJ 301 POKE 1600,0:GOTO 295
CL 302 POKE 1600,F:POKE 1601
,1:POKE 1693,1:IF N=1
THEN POKE 1601,0
MN 303 REM ***** MAIN LOOP
*****
KF 304 E=STICK(0):IF E<8 THE
N POKE 1536,T+4:M=4:0
OTO 310
BD 306 IF E<12 THEN POKE 153
6,T+2:M=2:GOTO 310
JB 308 POKE 1536,T+M
KD 310 POKE 1537,T:IF PEEK(1
693)=0 THEN POKE 1693
,1:GOSUB 8010
MD 320 IF PEEK(53260)=2 THEN
POKE 1540,1:GOTO 850
DC 350 IF PEEK(1590)>190 THE
N POKE 1601,255
JP 360 IF PEEK(1590)<30 THEN
POKE 1601,1
FL 390 T=T+1:IF T=3 THEN T=1
CA 400 IF PEEK(1589)>240 THE
N MISS=MISS+1:AB=AB+1

```

```

:POKE 1589,10:IF AB=0
THEN POP :GOTO 500
BH 430 GOTO 304
NB 440 REM ***** GAME OVER *
*****
PD 500 POKE 1537,1:POKE 1536
,M+1
OE 505 POSITION 5,0:ZX=((0-M
ISS)/0)*100: ? #6;INT(
ZX): ? #6;" PERCENT"
PC 510 POKE 1744,1
OB 520 IF PEEK(53279)=6 THEN
540
BB 530 IF PEEK(53279)=3 THEN
POKE 1744,1:POKE 532
48,0:POKE 53249,0:BOT
O 64
BN 535 GOTO 520
KJ 540 POKE 53248,0:POKE 532
49,0:POKE 53252,0:POK
E 53253,0:POKE 1744,0
:POSITION 5,0: ? #6;"
[14 SPACES]"
NP 550 FOR T=PMBASE+768 TO P
MBAASE+1535:POKE T,0:N
EXT T:GOTO 260
KD 8000 REM ** TARGET EXPLOS
ION *****
JM 8010 POKE 1536,1+M
EA 8015 FOR Z=7 TO 11:POKE 1
537,Z:SOUND 0,200,8,
22-Z*2:FOR I=1 TO 10
:NEXT I:NEXT Z
BB 8020 SOUND 0,0,0,0:AB=AB+
1:IF AB=0 THEN POP :
GOTO 500
KH 8030 POKE 1537,0:IF N=2 T
HEN 8040
EH 8032 L=PEEK(53770):IF L<3
0 OR L>190 THEN 8032
EF 8034 POKE 1590,L

```

```

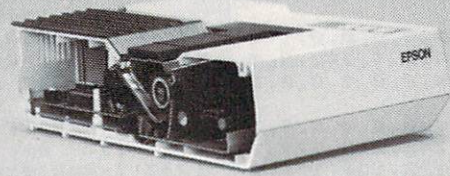
HJ 8040 POKE 1589,10:RETURN
DB 8400 REM ** COLLISION WIT
H TARGET ***
AB 8500 FOR Z=7 TO 14:POKE 1
537,Z:SOUND 0,200,8,
28-Z*2:POKE 1536,Z:F
OR I=1 TO 10:NEXT I:
NEXT Z
BH 8502 POKE 1536,0:POKE 153
7,0:POKE 1744,1:SOUN
D 0,0,0,0:GOTO 540
GE 8600 REM ***** ANIMATION
DATA *****
JB 9000 FOR I=FRAMES TO FRAM
ES+153:READ A:POKE I
,A:NEXT I
MA 9010 DATA 0,0,0,0,0,0,0,0
,0,0,0,0,0,0
FL 9020 DATA 0,0,31,4,78,189
,79,6,10,30,7,0,0,0
HC 9030 DATA 0,0,4,4,142,125
,143,6,10,30,7,0,0,0
FE 9060 DATA 0,0,31,4,252,38
,46,62,124,92,120,48
,0,0
PB 9062 DATA 0,0,4,4,36,38,4
6,62,124,92,120,48,0
,0
LA 9064 DATA 0,0,248,32,63,1
00,116,124,62,58,30,
12,0,0
HI 9065 DATA 0,0,32,32,36,10
0,116,124,62,58,30,1
2,0,0
GC 9066 DATA 0,0,16,4,80,28,
58,28,80,4,16,0,0,0
HE 9067 DATA 0,0,16,36,89,28
,186,61,158,56,82,40
,0,0
OI 9068 DATA 0,0,20,42,189,1
02,202,83,230,161,86
,40,0,0
OI 9069 DATA 0,0,40,84,130,1
,129,0,129,2,72,20,0
,0
LA 9070 RETURN
PN 9100 REM *** PAGE 6 MEM.
USAGE *****
AE 10000 FOR A=1546 TO 1673:
READ B:POKE A,B:NEX
T A
DH 10010 DATA 46,47,194,195,
21,22,193,194,0,0,2
55,255,0,0,210,211,
45,46,215,216,25,26
,215,216
AN 10020 DATA 0,0,0,0,0,3,3,
0,0,0,0,12,12,0,0,0
IC 10030 DATA 0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0
BL 10035 REM PLAYER SPEED
PB 10040 DATA 0,0,0,0,1,1,
1,0,255,255,255,0,0
,0,0,0,0,0,0,0,2,25
4,0,0,2
OI 10045 DATA 254,0,0,2,254,
0
GH 10047 REM MISSILE SPEED
PP 10050 DATA 0,0,0,0,2,2,
2,0,254,254,254,0,0
,0,0,0,0,0
NI 10060 DATA 0,0,2,254,0,0,
2,254,0,0,2,254,0
NI 10070 RETURN ©

```

Attention all FX80, FX100, JX, RX, & MX owners:

You already own half of a great printer

Now Only \$79.95



Now for \$79.95 you can own the rest. You see, today's new dot matrix printers offer a lot more.

Like an NLQ mode that makes their letters print almost as sharp as a daisy wheel. And mode switching at the touch of a button in over 160 styles. But now, a Dots-Perfect

upgrade kit will make your printer work like the new models in minutes — at a fraction of their cost.

And FX, JX and MX models will print the IBM character set, too.

So, call now and use your Visa, MasterCard, or AmerEx. Don't replace your printer, upgrade it!

1-800-368-7737

(Anywhere in the United States or Canada)

g Sample of letter with Dots-Perfect

Dots-Perfect™

Dresselhaus

Sample of letter without Dots-Perfect



(714) 945-5600

8560 Vineyard Ave., Ste. 405, Rancho Cucamonga, CA 91730

An upgrade kit for EPSON FX, JX, RX, & MX printers

IBM is a registered trademark of International Business Machines Corp. Graftex™ is a trademark of Epson America, Inc. Epson is a registered trademark of Epson America, Inc.

PFkey 64

Jeffrey D. Partch

If you're a 64 programmer, or a 128 programmer who feels a little lost when you switch modes, this comprehensive utility is well worth adding to your library. "PFkey 64" makes many 128-specific features available when you are using BASIC 2.0 on the Commodore 64.

It's no secret that the Commodore 128's BASIC 7.0 is one of the most powerful BASICs available on any microcomputer. But the Commodore 64 is still very popular, and many 128 owners spend a significant amount of time computing in 64 mode. "PFkey 64" allows you to use many BASIC 7.0 features on the Commodore 64, including programmable function keys, reserved variables, disk drive commands, special functions, and a number of BASIC 7.0 utility commands.

PFkey 64 is written entirely in machine language, so you'll need to use "MLX," the entry program found elsewhere in this issue, to type it in. Please read all of the instructions for using MLX before you get started. You must make one temporary change to MLX before you begin entering the data for PFkey 64. MLX does not normally permit the entry of data at addresses which correspond to BASIC or Kernal ROM. However, a portion of PFkey 64 is designed to reside in RAM beneath BASIC ROM. Thus, you must disable MLX's address error-checking feature before you begin entering data. (If you don't, you'll get an error message when

you try to begin entry.) To turn off the address testing, place a *REM* before the first statement in line 1040 of the MLX program. This is just a temporary patch for entering the PFkey 64 data; do not make this a permanent change to MLX.

When you first run the modified MLX program, you will be asked for starting and ending addresses for the data you'll be entering. For PFkey 64, respond with the following values:

Starting address: BF40
Ending address: CFFF

After you've entered all the data for PFkey 64 and have saved a copy, you can load it into memory at any time. (BASIC programs currently in memory will be preserved.) Use the syntax *LOAD "PFKEY",8,1* for disk or *LOAD "PFKEY",1,1* for tape. (If you saved the program with some other filename, use that name in place of PFKEY.) To activate PFkey 64, simply type *SYS 49152*.

PFkey provides several kinds of enhancements to Commodore 64 BASIC: new commands, new reserved variables, new functions, and new DOS commands. Like other BASIC keywords, these can be typed in abbreviated form; see the table accompanying this article. Here is an explanation of each group of BASIC enhancements.

Utility Commands

QUIT. This command disables PFkey 64 and reclaims the memory previously occupied by the PFkey code. It works in both program

mode and direct mode. You should always use this command before loading another machine language program that occupies the same memory area as PFkey 64 (see "Program Notes" below). To restart PFkey 64, you must reload the program and use a *SYS* as described above.

BANK. The *BANK* command allows you to *PEEK* and *POKE* memory areas that are normally hidden from BASIC. This is done in part because PFkey itself occupies a substantial amount of the 64's memory; making other memory areas available compensates for the loss to some extent. *BANK* must be followed by a number in the range 0-4. For instance, *BANK 0* resets the 64 to its normal memory configuration. Here is an explanation of all the *BANK* commands.

- *BANK 0* is the normal configuration. This configuration is reset whenever the computer enters direct mode (when the *READY* prompt reappears after you exit a program, for instance).

- *BANK 1* allows you to *PEEK* values stored in the RAM underlying the BASIC ROM (Read Only Memory) chip at locations 40960-49151.

- *BANK 2* allows you to *PEEK* values stored in the RAM underlying the Kernal ROM at locations 57344-65535.

- *BANK 3* affects only the *POKE* command, and allows you to *POKE* into areas used by PFkey itself. (See "Program Notes," below.) You should rarely, if ever,

have to do this, but the capability is there for advanced programmers.

- **BANK 4** allows you to read the character shape data stored in ROM at locations 53248-57343.

SYS. Although it is not a new command, SYS has been modified to work as it does in BASIC 7.0. If you supply additional values after the address parameter, SYS stores those values in the processor's internal registers. Here is the syntax to use:

SYS *address, A, X, Y, status*

The last four parameters are optional and can be used to store values in the A register, X register, Y register, and status register, respectively. This assumes, of course, that you are calling a machine language program that expects those registers to contain certain values. The SYS command accepts any number or numeric variable in the range 0-255 for these parameters. It's not necessary to supply values for all parameters, but to specify a value for any parameter, you must supply values for all preceding ones. For example, if you wish to supply a value for the Y register, you must also provide values for the A-register and X-register parameters, but it is not necessary to provide a value for the status register.

RREG. The RREG (Read REGisters) command returns the values of the processor's internal registers. One use for this command is to pass information from a machine language routine back to BASIC. The registers are read in the same order as that used for SYS. (See above.) Here is the basic syntax:

RREG *var1, var2, var3, var4*

You can use any numeric variable for the four parameters. For instance, the command RREG AR, XR, YR, SR assigns the contents of the A, X, Y, and status registers to the variables AR, XR, YR, and SR, respectively.

KEY. This is one of the most versatile and useful commands provided by PFkey 64. With it, you can assign commands to any of the computer's function keys. As on the 128, default commands are assigned when you first run PFkey. To display a list of the current function-key assignments, type KEY

and press RETURN without typing anything else. You also can create your own function-key assignments, using this general syntax:

KEY *number, command\$*

The *number* parameter tells PFkey which function key to define; this must be a value in the range 1-8. The *command\$* parameter must be a string containing the command or commands you wish to assign to that function key. For instance, say that you want function key f1 to execute these commands each time you press it:

PRINT CHR\$(147):LIST

The first command prints a CLR/HOME character, which clears the screen, and the second lists the program in memory. These commands assign this definition to the f1 key:

A\$="PRINT CHR\$(147):LIST" + CHR\$(13)
KEY 1, A\$

Note that we added a carriage return (character 13) to the end of the command string A\$. This causes the computer to "press RETURN" at the end of the command. In some cases, you might not want a carriage return; for example, in a load command, you might want the computer to first print LOAD followed by one set of quotation marks, and then to allow you to type in the rest.

You can use the CHR\$ function to include any nonprinting characters, such as quotation marks, in the command string. The command string can be a single BASIC statement or several BASIC statements. However, BASIC itself limits the length of an input line to 80 characters, so you should not attempt to create a function-key definition longer than that.

DELETE. This command deletes a single program line or a range of program lines. Here are two simple examples:

DELETE 100
DELETE 100-200

The first command deletes line 100 from the program in memory. The second command deletes every line from 100 to 200, inclusively. This command works only in direct mode (when you're not running a program) and does not accept numeric variables in place of line

numbers. You must always specify two line numbers for a range (for example, DELETE -100 is invalid), and the command does not work unless both line numbers in the specified range exist.

HELP. This command provides a shortcut for locating program errors. When a program stops with an error, type HELP and press RETURN. PFkey 64 lists the line where the error occurred and highlights the erroneous statement in reverse video. (In a few cases, the statement which generates the error is not itself wrong. For example, while it READs values from DATA statements and POKEs the values into memory, a program might stop with an ILLEGAL QUANTITY error in the line that contains the POKE. But the illegal quantity is actually contained in the DATA value which the computer was reading at the time.)

AUTO. The AUTO command eliminates the drudgery of typing line numbers by hand as you enter a program. To turn on automatic line numbering, type AUTO followed by an increment value in the range 1-63999. As soon as you press RETURN at the end of a program line the computer automatically types the next line number. For instance, this command causes the computer to print line numbers in increments of 10:

AUTO 10

If you execute a direct-mode statement, or press RETURN on a blank line, the computer suspends automatic numbering until you enter another program line. Automatic line numbering is turned off if you type AUTO and press RETURN without typing anything else, or when you run any program.

RENUMBER. This command rennumbers the BASIC program in memory. It can be used in two different ways. If you simply type RENUMBER and press RETURN, PFkey rennumbers the first line of the program as line 10 and rennumbers all remaining lines in increments of 10 (the second line is 20, the third is 30, and so on). You can also specify the initial line value, the increment, and the line on which to start renumbering. Here is the general syntax:

RENUMBER *newline, increment, oldline*

For instance, this command tells PFkey to start at existing line 200, renumbering that line with the new number 1000, and numbering all successive lines in increments of 20:

```
RENUMBER 1000, 20, 200
```

The **RENUMBER** command operates only in direct mode and does not accept variables in place of its parameters. This command renumbers all internal references preceded by **GOSUB**, **TRAP**, **RESUME**, **RUN**, **THEN**, **GOTO**, **GO TO** (as two keywords), and **ON GOTO**. **RENUMBER** stops without harming the program if the renumbering would create a reference to a non-existent line, create a line number higher than the legal limit (63999), corrupt the chronological order of program lines, duplicate an existing line number, or create a program too large for PFkey's memory.

TRAP, RESUME. These closely-related commands allow you to respond to many BASIC errors that would otherwise cause a program to stop.

TRAP permits you to regain control of the computer when a BASIC error would normally cause execution to cease. **TRAP** must be followed by the number of the program line where you want to branch when a BASIC error occurs. For instance, the statement **TRAP 5000** causes the computer to branch to line 5000 whenever any error occurs. At line 5000, you would place the routine that takes whatever action is necessary to correct or respond to the error.

The **RESUME** command allows you to reenter the main program after executing a **TRAP** routine. This command can take either of two forms:

```
RESUME NEXT  
RESUME linenumber
```

The command **RESUME NEXT** causes the computer to resume execution at the statement immediately after the one which triggered the error. You ordinarily would use this syntax for errors that can be cured completely by the **TRAP** routine. The second form of trap allows you to branch to the line specified by *linenumber*. This option is appropriate for more serious situations—for instance, when an error requires

that you terminate the program completely or restart it, rather than continue where the program left off.

Both **TRAP** and **RESUME** are valid only in program mode, and neither command accepts variables as line numbers or nonexistent line numbers. Keep in mind that **TRAP** and **RESUME** turn each other off. In other words, **TRAP** is not reinstated automatically after a **RESUME**; if you wish to turn error trapping back on after **RESUME**, you must do so with a second **TRAP** statement. Similarly, **RESUME** is invalid unless a **TRAP** is in effect; executing **RESUME** before you perform **TRAP**, or executing two **RESUMES** in a row, causes an error.

TRAP and **RESUME** are very useful for catching errors, particularly in programs designed for beginners or unsophisticated computer users. However, most programmers wait until a program is finished and debugged before inserting **TRAPS**. In that way, you can prevent a **TRAP** from confusing you, the programmer, unnecessarily.

TRON, TROFF. This pair of related commands turns *trace mode* on and off. **TRON** (**TR**ace **O**N) turns the trace feature on, while **TROFF** (**TR**ace **O**FF) disables it. Neither command accepts any parameters. When a program is running in trace mode, the current line number is listed just prior to the execution of each new statement. Although there are limitations to this method—the trace display occupies the same screen that may be used for your program's output, and may not be visible at all if the computer is not in text mode—this feature can be quite useful if you suspect a problem with a program's logic.

Reserved Variables

PFkey 64 provides you with four reserved variables taken from BASIC 7.0. You already may be familiar with **ST**, **TI**, and **TI\$**, which are reserved variables in BASIC 2.0. Reserved variables are set aside for the computer's own use and cannot be assigned a new value with **LET**, **GET**, or any other BASIC assignment statements. Keep in mind, however, that this limitation applies only to variables of the same

type. For example, although the floating-point variable **EL** is reserved (see below), you can still use the string variable **EL\$**, the integer variable **EL%**, and so on, because BASIC can distinguish those variables on the basis of their types.

All of the new reserved variables are reset to their default (normal) values after you execute a **CLR** command, or perform any action that edits a program. Here is a list of the reserved variables:

EL, ER. These two numeric variables are particularly useful in **TRAP**-handling routines. **EL** (**E**rror **L**ine) stores the number of the program line where the most recent BASIC error occurred, and **ER** (**E**rror number) holds the error number for the most recent error.

DS, DS\$. This pair of reserved variables holds information about disk operations. The string variable **DS\$** holds the text of the most recent error message from the disk drive command channel, while the numeric variable **DS** holds the error number for the most recent disk error. The next time the error light starts to blink on your drive, try typing **PRINT DS,DS\$** and pressing **RETURN**. If **DS** equals 0, and **DS\$** prints **OK**, the drive's status is normal.

Functions

Like all BASIC functions, the new functions provided by PFkey 64 require some additional information inside parentheses.

HEX\$. This function converts decimal (base 10) numeric values into their hexadecimal (base 16) equivalent. The number inside parentheses must be in the range 0-65535. For instance, the statement **PRINT HEX\$(255)** yields **00FF**. Note that the result is returned as a string four characters long; after you execute **X\$ = HEX\$(254)**, the string **X\$** contains the four-character string **00FE**.

DEC. The **DEC** function does the opposite of **HEX\$**, converting a hexadecimal string into a decimal numeric value. Again, the value must be in the range 0-65535. **DEC** accepts either string variables or literal strings. For instance, after you execute the statement **X = DEC("FF")**, the numeric variable **X** holds the value 255. You do not

need to supply leading zeros for a hex number of less than four digits; for example, DEC("FE") works just as well as DEC("00FE").

ERR\$. The ERR\$ function prints the text of BASIC error messages. It is especially useful in conjunction with the reserved variable EL and the commands TRAP and RESUME. (See above.) You must supply ERR\$ with a numeric value in the range 1-31 (error 34 is also valid). A typical use of this function is to display error messages from within a trap routine. To demonstrate this function, enter NEW in direct mode, followed by NEXT; then enter this line in direct mode: PRINT ER, ERR\$(ER)

POINTER. The POINTER function expects you to supply the name of a variable used in the current program. It returns the memory address where that variable's descriptor can be found. For instance, the statement ADDR = POINTER(X) assigns to the variable ADDR the address of the variable X's descriptor. This function is useful primarily to advanced programmers who wish to examine how a particular variable is stored internally. If the variable has not yet been used, POINTER returns a zero. The variable's name is located in the two bytes immediately preceding the returned address. Be careful when using array variables, because this function creates a new, single-dimension, 11-element array if you have not previously performed DIM. Dan Heeb's book *Tool Kit: BASIC* (available from COMPUTE! Books), contains a detailed description of the structure of BASIC variable descriptors.

XOR. This function requires two numeric values in its parentheses. It performs an exclusive OR operation on the bits of the first value, using the bits in the second value. Both values must be in the range 0-65535. For instance, the statement PRINT XOR(1,255) yields 254.

DOS commands

PFkey supplies several new commands which simplify the use of a floppy disk drive. These differ from the commands available in BASIC 7.0 because no provision is made for a double disk drive (two disk

drives in one case, which are addressed as drive 0 and drive 1). All of the current Commodore disk drives—the 1541 and 1571—are single drive units which are addressed as drive 0.

The allowable range of device numbers for these commands is from 8 to 31. The normal device number for a single Commodore drive is 8. The default drive is the last device used in the current session; if for some reason that number falls outside the range 8-31, it is reset to 8, the normal device number for a Commodore disk drive.

Every DOS command can be used in two forms. If your drive is device 8 (the usual situation), simply enter the command, followed by whatever information is indicated in the explanation for that command. If you have more than one drive, you can access the second drive (which will have a different device number) by adding ,U and a device number to the end of the command. For instance, the normal syntax for the DIRECTORY command is to type DIRECTORY and press RETURN. However, you would use the command DIRECTORY,U9 to get a directory of the disk in device 9. This optional syntax can be used with all DOS commands.

All of these commands open the disk drive command channel (channel 15) during execution and close it when they finish. Thus, you always must close the command channel (15) before using any of these DOS commands.

In direct mode (when you are not running a program) all DOS commands that would alter the contents of a disk require confirmation before the command is carried out; the computer prints ARE YOU SURE? and does not carry out the command unless you press Y and then press RETURN. If you have more than one drive in your system (for instance, one which is device 8 and another which is device 9), it is strongly suggested that you include the device number wherever appropriate.

DIRECTORY. If you learn only one DOS command, this should be the one. DIRECTORY lists the directory of the current disk in the specified drive, without alter-

ing the program in memory. In other words, you no longer have to use the familiar LOAD "\$0",8 command to view the directory.

COLLECT. This command recovers disk sectors which have been temporarily lost as a result of repeatedly scratching and resaving files. (This operation is also called validation.) You should perform an immediate COLLECT whenever you discover an unclosed (splat) file on a disk, which is signaled by an asterisk (*) next to the filename in the disk directory.

SCRATCH. This command erases the specified file or files from a disk. For instance, SCRATCH "TEST" removes the file TEST from the current disk. This command accepts variables in place of literal strings; for instance, both of these commands accomplish the same thing:

```
SCRATCH "TEST"  
A$ = TEST:SCRATCH A$
```

You can also use wild-card characters to scratch more than one file. For instance, SCRATCH "TEST*" deletes the files TESTFILE, TESTER, and any other file beginning with the characters TEST. The disk drive manual contains more information about DOS wild cards. Do not use SCRATCH on any disk that contains an unclosed (splat) file; use COLLECT (see above) on the disk immediately.

RENAME. The RENAME command changes the name of an existing file. For instance, this command renames the existing file OLDFILE with the new name NEWFILE:

```
RENAME "OLDFILE" TO "NEWFILE"
```

The contents of the file are not changed by RENAME.

COPY. This command creates a duplicate of an existing file on the same disk. The original file is left unchanged. For instance, this command creates a new copy of the existing file TEST, naming the new file COPYOFTEST:

```
COPY "TEST" TO "COPYOFTEST"
```

DCLEAR. The DCLEAR command closes all open files and channels on the specified drive. The drive is reset to its power-on state, and the current disk is initialized. It's a good idea to enter this command every time you perform a

disk swap, to make sure the drive knows it's dealing with a different disk.

HEADER. This command formats a disk. Before using a new disk for the first time, you must format it to mark off storage zones for the drive to use. The **HEADER** command can take two forms. Use this syntax if you are formatting a disk that has never been used before:

HEADER "name",id

The name inside quotes must be no more than 16 characters in length. The disk ID can be any two characters; it is *important* that every disk have a unique ID. For instance, this command formats a new disk with the name **WORKDISK**, giving it **WD** as a disk ID:

HEADER "WORKDISK",WD

If you are formatting a previously formatted disk (for instance, to erase its contents), you can omit the ID from the command. This command removes all the files from a previously formatted disk, giving it the name **MYDISK**:

HEADER "MYDISK"

Of course, you can also use the first syntax on a previously formatted. Use care with **HEADER**, since it effectively destroys all information that a disk might have contained before.

VIEW. You can consider this command a bonus, since it doesn't appear in either **BASIC 7.0** or **BASIC 2.0**. It allows you to view a program file without disturbing the program currently in memory. This is very useful when you need to refer to a second program quickly and do not wish to save and reload the program you are working on. This command, for instance, displays the contents of the program file named **MYPROG**:

VIEW "MYPROG"

VIEW displays correctly all **BASIC 2.0** keywords, as well as the **BASIC 7.0** keywords that are added by **PFkey 64**. However, it does not recognize other **BASIC 7.0** keywords that **PFkey 64** does not support (**BUMP** is one example).

Program Notes

PFkey 64 uses the memory areas from locations 40448-40959, 49152-53247, and 679-767. You

PFkey 64 Quick Reference

This table lists the abbreviations for every PFkey 64 keyword. It also shows the mode in which a command or function can be used. The abbreviation PRG means that a command works only in program mode, while DIR means that it works only in direct mode (when you're not running a program). ALL means that it works in both program and direct mode. The token value indicates the one- or two-byte value used to represent the keyword internally within a program line.

Command	Abbreviation	Mode	Token value
AUTO	A shift-U	DIR	\$DC (220)
BANK	B shift-A	ALL	\$FE 02 (254 02)
COLLECT	COL shift-E	ALL	\$F3 (243)
COPY	CO shift-P	ALL	\$F4 (244)
DCLEAR	DCL shift-E	ALL	\$FE 15 (254 21)
DEC	none	ALL	\$D1 (209)
DELETE	DE shift-L	DIR	\$F7 (247)
DIRECTORY	DI shift-R	ALL	\$EE (238)
ERR\$	E shift-R	ALL	\$D3 (211)
HEADER	HE shift-A	ALL	\$F1 (241)
HELP	H shift-E	ALL	\$EA (234)
HEX\$	H shift-E	ALL	\$D2 (210)
POINTER	PO shift-I	ALL	\$CE 0A (206 10)
RENAME	RE shift-N	ALL	\$F5 (245)
RENUMBER	REN shift-U	DIR	\$F8 (248)
RESUME	RES shift-U	PRG	\$D6 (214)
RREG	R shift-R	ALL	\$FE 09 (254 09)
SCRATCH	SC shift-R	ALL	\$F2 (242)
TRAP	T shift-R	PRG	\$D7 (215)
TROFF	TRO shift-F	ALL	\$D9 (217)
TRON	TR shift-O	ALL	\$D8 (208)
VIEW	VI shift-W	ALL	\$FE 06 (254 06)
XOR	X shift-O	ALL	\$CE 08 (206 08)

should not attempt to use other utilities or programs that make use of those memory areas. The first area is also used by the computer itself whenever you open a channel to the RS-232 device (a modem or serial printer). If you wish to use **PFkey 64** with programs that open the RS-232 channel, install **PFkey 64** first, and then load and run the program that accesses the RS-232 device. The program also creates four variable descriptors when it is installed. To help protect against crashes, **PFkey 64** modifies the **POKE** command to produce an **ILLEGAL QUANTITY** error when you to change the contents of memory areas used by this program.

Those **PFkey 64** keywords that are equivalent to **BASIC 7.0** keywords are tokenized just like in **BASIC 7.0**. Thus, a Commodore 64 program that uses **PFkey 64** statements like **RREG** or **TRAP** will also load and run properly on a Commodore 128. Likewise, a Commodore 128 program using these keywords will work, load, and run on a 64 with **PFkey 64**. A very significant exception is that the **BANK** statement performs a very different operation in **PFkey 64** than it does in **BASIC 7.0**. You

should also be aware that **PFkey 64** supports only a few of the added features of **BASIC 7.0**. Thus, it will not allow all 128 programs to be run on a 64—just those that use the **BASIC 7.0** statements specifically supported by **PFkey 64**.

PFkey 64

Please refer to the "MLX" article in this issue before entering the following program.

```

BF40:28 43 29 38 37 43 4F 4D FF
BF48:50 55 54 45 21 15 C1 63 68
BF50:C0 54 CF 59 C5 0F C2 3B FF
BF58:CE 60 A5 01 48 2C 45 C0 5A
BF60:10 06 78 2D 45 C0 85 01 84
BF68:A0 00 B1 14 A8 68 85 01 A2
BF70:58 4C A2 B3 A9 00 85 48 5F
BF78:85 47 20 FA AE 20 28 AF 36
BF80:A9 00 85 0D A5 48 85 62 12
BF88:A5 47 4C 03 CE 4C 6E CB B6
BF90:20 9E B7 8A F0 21 C9 05 0C
BF98:B0 F3 49 FF 30 19 A0 E7 A5
BFA0:B9 02 CF 99 FF 9D 88 D0 69
BFAB:F7 78 A0 0B B9 00 03 99 74
BFB0:EB 9E B9 4D BF 99 00 03 41
BFB8:88 10 F1 AD 15 03 8D E0 4A
BFC0:C3 AD 14 03 8D DF C3 AD 61
BFC8:90 02 8D F8 9E AD 8F 02 1F
BFD0:8D F7 9E A0 32 B9 24 9E 52
BFD8:99 F9 9E 88 10 F7 60 A0 C1
BFE0:44 B9 59 BF 99 00 C0 88 EE
BFE8:10 F7 A0 02 B9 C4 9E 99 5A
BFF0:DC CF 88 10 F7 A0 02 B9 E4
BFF8:C7 9E 99 3A CF 88 10 F7 93
C000:A4 38 8C 83 C4 C0 9E 90 A2
C008:05 A0 9E 20 84 C4 20 A8 2A
C010:C4 90 06 20 82 C4 4C A0 3B
C018:C4 A5 01 AA 29 FE 85 01 81
C020:20 9E BF 86 01 A0 97 B9 2D
C028:7B A5 99 53 CF 88 D0 F7 73

```

C030:A0	50	B9	C9	A6	99	03	CF	5B	C2D8:24	D0	03	20	C3	C2	C9	24	E7	C580:11	CA	D0	F8	38	E9	7F	AA	04
C038:88	10	F7	A5	01	AA	29	FE	5F	C2E0:F0	EB	C9	25	F0	E7	C9	28	48	C588:A9	A0	85	23	A9	9E	85	22	E8
C040:85	01	20	DF	B2	86	01	78	59	C2E8:F0	E3	68	68	D0	2B	AA	A5	A1	C590:30	08	A9	CC	85	23	A9	55	99
C048:A9	4D	8D	8F	0F	A9	C3	8D	68	C2F0:7A	48	A5	7B	48	8A	D0	03	43	C598:85	22	A0	FF	CA	F0	07	C8	74
C050:90	02	A9	D6	8D	14	03	A9	A9	C2F8:20	73	00	F0	21	CD	F0	16	A5	C5A0:B1	22	10	FB	30	F6	C8	B1	EF
C058:C3	8D	15	03	A9	00	8D	45	9F	C300:24	F0	30	24	C9	B2	F0	0E	BB	C5A8:22	30	9C	20	D2	FF	D0	F6	16
C060:C0	58	60	20	47	C0	2C	99	95	C308:C9	3A	F0	0A	20	13	B1	90	03	C5B0:4C	6E	CB	20	EB	B7	A5	15	18
C068:9E	10	11	EE	99	9E	20	BD	93	C310:E7	20	AA	C2	D0	E5	A9	00	86	C5B8:AC	45	C0	C0	FC	F0	10	C9	A5
C070:C4	90	09	20	F8	C3	20	60	13	C318:2C	A9	FF	85	0B	68	85	7B	F8	C5C0:D0	B0	0C	C9	C0	B0	E9	C9	65
C078:A6	4C	A0	C4	AD	92	9E	10	C5	C320:68	85	7A	A5	0B	60	08	20	F0	C5C8:A0	B0	04	C5	38	B0	E1	C9	BF
C080:27	CD	8F	9E	F0	22	AD	8F	DF	C328:A6	B3	28	F0	1A	A5	39	8D	6B	C5D0:02	D0	03	20	2B	CC	4C	27	40
C088:9E	85	62	AD	8E	9E	85	63	3F	C330:BC	9E	A5	40	8D	BD	9E	A5	BC	C5D8:B8	20	1B	CD	A0	00	20	79	C7
C090:20	6F	CA	A2	00	BD	00	01	79	C338:7A	8D	BE	9E	A5	7B	8D	BF	18	C5E0:00	F0	13	84	0B	20	FD	AE	D6
C098:F0	06	9D	77	02	E8	D0	F5	8A	C340:9E	20	F8	A8	A9	FF	2C	A9	18	C5E8:20	9E	B7	8A	A4	0B	99	0C	5C
C0A0:A9	20	9D	77	02	E8	8E	C6	B1	C348:00	8D	9B	9E	60	AD	8D	02	67	C5F0:03	C8	C0	04	D0	E8	4C	30	7B
C0A8:20	60	A5	86	7A	84	7B	86	D2	C350:C9	03	D0	03	4C	4F	EB	0A	49	C5F8:E1	A8	24	00	30	08	20	A2	79
C0B0:3A	8E	8F	9E	20	73	00	F0	8E	C358:C9	08	90	F2	A9	06	AA	BD	71	C600:B3	A5	0E	4C	C2	A9	4C	9D	4A
C0B8:AD	90	96	20	79	A5	4C	E1	D4	C360:79	EB	85	F5	BD	7A	EB	85	E4	C608:C4	A0	00	84	0B	F0	09	A4	3B
C0C0:A7	CE	99	9E	20	6B	A9	C9	B2	C368:F6	A4	CB	C4	C5	F0	1D	B1	38	C610:0B	C0	04	F0	19	20	FD	AE	D6
C0C8:00	F0	16	2C	92	9E	10	11	4C	C370:F5	C9	20	D0	08	AD	96	9E	39	C618:20	8B	B0	85	49	84	4A	A4	9C
C0D0:A5	14	18	6D	90	9E	8D	8E	AC	C378:49	FF	8D	96	9E	2C	93	9E	2B	C620:0B	B9	C0	03	E6	0B	20	F9	F0
C0D8:9E	A5	15	6D	91	9E	8D	8F	3E	C380:10	2D	A2	08	DD	1B	9E	F0	B9	C628:C5	20	79	00	D0	E1	60	20	BE
C0E0:9E	4C	9F	A4	20	8C	C4	F0	B0	C388:06	CA	D0	F8	4C	E0	EA	8A	B5	C630:34	C5	20	E1	FF	F0	11	24	75
C0E8:12	20	6B	A9	A5	15	8D	91	B1	C390:A8	A9	00	18	7D	F8	9E	CA	30	C638:90	70	01	60	A9	02	24	90	7E
C0F0:9E	A5	14	F0	0F	8D	90	9E	2B	C398:D0	F9	8D	94	9E	38	F9	FA	C4	C640:F0	03	A9	04	2C	A9	80	2C	B1
C0F8:A9	FF	2C	A9	00	8D	92	9E	69	C3A0:9E	CD	94	9E	F0	E6	8D	BF	65	C648:A9	1E	2C	A9	05	48	20	DD	B9
C100:8D	8F	9E	60	4C	6E	CB	20	DB	C3A8:C3	8D	95	9E	EE	93	9E	20	35	C650:C6	68	10	03	68	68	60	AA	DD
C108:E1	FF	F0	03	4C	B1	A7	A5	8E	C3B0:B7	C3	A2	FF	4C	26	EB	A6	D2	C658:6C	00	03	A0	00	2C	A0	F0	87
C110:91	10	FC	A2	1E	A4	3A	C8	EA	C3B8:C6	EC	89	02	F0	15	A0	00	4D	C660:A9	0F	85	B8	84	B9	A9	02	23
C118:08	F0	05	A9	FF	8D	9E	9E	29	C3C0:B9	01	9F	9D	77	02	E8	C8	91	C668:85	BC	A9	A7	85	BB	20	79	6C
C120:8A	30	45	8E	9E	9E	A8	20	67	C3C8:8C	BF	C3	CC	94	9E	D0	E9	76	C670:00	F0	0D	20	FD	AE	A9	55	31
C128:A2	B3	A9	17	20	D3	9E	28	46	C3D0:CE	93	9E	86	C6	60	2C	93	84	C678:20	FF	AE	20	9E	B7	86	BA	89
C130:08	F0	1F	A0	01	B9	39	00	43	C3D8:9E	30	03	20	B7	C3	4C	31	B4	C680:2C	9D	9E	10	03	20	FE	C7	BE
C138:99	C0	9E	B9	3D	00	99	C2	08	C3E0:EA	4C	94	C4	4C	A3	C4	20	6A	C688:20	2B	CC	A5	BA	C9	08	90	82
C140:9E	88	10	F1	AD	C1	9E	AC	B4	C3E8:8C	C4	F0	F8	20	6B	A9	20	B7	C690:04	C9	1F	90	02	A9	08	85	CB
C148:C0	9E	20	91	B3	A9	10	20	75	C3F0:F8	C3	4C	6E	C9	4C	6E	CB	7E	C698:BA	2C	98	9E	10	06	20	AD	12
C150:D3	9E	AE	9E	9E	AD	90	9E	A6	C3F8:20	13	A6	90	E4	A5	14	48	61	C6A0:F5	20	FD	C4	20	DD	C6	20	63
C158:30	26	E0	1E	F0	0D	E0	1F	18	C400:A5	15	48	20	79	00	F0	0A	64	C6A8:C0	FF	A6	B8	20	C9	FF	B0	CF
C160:90	06	20	6E	C1	4C	47	A4	0B	C408:A9	AB	20	FF	AE	20	6B	A9	CB	C6B0:9A	20	CC	FF	A6	B8	4C	C6	A4
C168:4C	8B	E3	4C	32	A8	F0	03	4F	C410:D0	D2	68	AA	68	E4	15	90	FF	C6B8:FF	A2	00	86	B7	A9	0F	85	5F
C170:A2	02	2C	A2	00	BD	CA	9E	A0	C418:08	D0	DA	C5	14	90	02	D0	49	C6C0:B8	85	B9	20	88	C6	A0	00	E5
C178:85	22	BD	CB	9E	85	23	60	6D	C420:D4	A5	5F	85	22	A5	60	85	AF	C6C8:20	CF	FF	99	A7	02	2C	9D	2F
C180:28	F0	D7	AD	BE	9E	85	7A	20	C428:23	20	13	A6	90	B3	A0	00	AC	C6D0:9E	10	03	20	D2	FF	C8	24	60
C188:AD	BF	9E	85	7B	AD	BC	9E	A9	C430:B1	5F	AA	C8	B1	5F	85	00	C2	C6D8:90	50	ED	84	B7	20	CC	FF	A0
C190:85	39	AD	BD	9E	85	40	20	62	C438:86	5F	A0	00	B1	5F	91	22	41	C6E0:A5	B8	4C	C3	FF	A9	53	20	A2
C198:A7	C1	A5	7A	D0	02	C6	7B	54	C440:E6	22	D0	02	E6	23	A6	60	71	C6E8:21	C8	85	B7	A6	3A	E8	F0	46
C1A0:C6	7A	A9	89	4C	34	C2	AD	5A	C448:A4	5F	C8	D0	01	E8	86	60	3B	C6F0:03	4C	7E	C7	CE	9D	9E	20	A9
C1A8:9B	9E	8D	9C	9E	49	FF	8D	C4	C450:84	5F	C4	2D	D0	E4	E4	2E	71	C6F8:5E	C6	20	FD	C4	4C	C6	C6	F6
C1B0:9B	9E	68	8A	68	A2	00	9A	A9	C458:D0	E0	4C	8A	C4	78	A0	0B	EA	C700:A9	4E	20	21	C8	85	B7	85	5F
C1B8:48	98	48	60	A2	1F	6C	00	FF	C460:B9	EB	9E	99	00	03	88	10	5C	C708:B8	AA	20	79	00	C9	C2	D0	8A
C1C0:03	20	A6	B3	2C	9B	9E	30	1B	C468:F7	AD	F7	9E	8D	8F	02	AD	9E	C710:36	9D	A7	02	A0	01	B1	7A	1E
C1C8:F3	2C	9C	9E	10	EE	C9	82	21	C470:F8	9E	8D	90	02	AD	E0	C3	25	C718:C9	49	D0	2B	C8	20	7B	A8	13
C1D0:D0	C5	A0	01	B9	C0	9E	99	F9	C478:8D	15	03	AD	DF	C3	8D	14	86	C720:A0	FF	C8	EB	B1	7A	9D	A7	02
C1D8:3B	00	B9	C2	9E	99	7A	00	AD	C480:03	58	A0	A0	A2	00	20	2D	42	C728:02	F0	08	C9	24	F0	0B	C9	57
C1E0:88	10	F1	20	A7	C1	20	73	E4	C488:FE	4C	02	E4	A4	3A	C8	D0	A3	C730:2C	D0	EF	C0	02	F0	0D	4C	4E
C1E8:00	20	F8	A8	4C	B1	A7	20	B6	C490:09	4C	79	00	A2	11	2C	A2	35	C738:A3	C4	20	26	C8	AA	A5	B8	26
C1F0:9E	AD	20	79	00	C9	89	F0	F5	C498:80	2C	A2	22	2C	A2	16	2C	28	C740:C9	02	D0	F3	20	FB	A8	86	57
C1F8:05	A9	A7	20	FF	AE	A5	61	C7	C4A0:A2	10	2C	A2	0B	6C	00	03	3C	C748:B7	4C	7B	C7	A9	43	2C	A9	0F
C200:D0	03	4C	3B	A9	68	68	20	CB	C4A8:20	33	A5	A4	23	A5	22	18	1A	C750:52	48	24	13	A9	3D	9D	A7	C5
C208:79	00	B0	24	4C	9A	C1	2C	1F	C4B0:69	02	90	01	C8	84	2E	85	CB	C758:02	20	A2	C8	85	B7	A9	A4	05
C210:9A	9E	10	19	A6	3A	E8	F0	FE	C4B8:2D	84	30	85	2F	A5	2D	A4	67	C760:20	FF	AE	68	20	21	C8	C9	3D
C218:14	A9	5B	20	FF	C4	CA	8A	B2	C4C0:2E	18	69	1C	90	01	C8	C4	35	C768:13	F0	13	BD	A7	02	99	A7	1C
C220:A6	39	20	34	C5	20	CD	BD	96	C4C8:38	90	04	D0	02	C5	37	60	16	C770:02	C8	E8	E4	B7	D0	F4	84	0E
C228:A9	5D	20	FF	C4	20	73	00	6B	C4D0:A9	FF</																

C828:CD	F0	EE	C9	11	B0	ED	A6	25	CAD0:CB	A9	00	85	14	A9	9F	85	1B	CD78:20	7D	B4	A9	02	85	0B	A0	91	
C830:B8	85	B8	A0	00	E8	B1	22	C9	CAD8:4A	A9	01	85	49	E6	14	A5	2A	CD80:FF	C8	84	A1	A5	64	48	29	6B	
C838:9D	A7	02	C8	C4	B8	D0	F5	EF	CAE0:14	AA	09	80	8D	52	9E	A0	E2	CD88:0F	AA	68	4A	4A	4A	4A	A8	C8	
C840:98	18	69	03	A8	E8	8A	A2	22	CAE8:06	B9	50	9E	20	D2	FF	88	B8	CD90:B9	7E	9E	A4	41	91	62	BD	99	
C848:13	60	A2	00	9D	A7	02	E8	48	CAF0:D0	F7	BD	F8	9E	F0	50	85	13	CD98:7E	9E	C8	91	62	A5	65	85	47	
C850:A9	30	9D	A7	02	E8	A9	3A	32	CAF8:15	B1	49	48	C9	22	F0	0A	F5	CDA0:64	C6	0B	D0	DC	4C	CA	B4	F0	
C858:9D	A7	02	60	4C	97	C4	20	53	CB00:29	7F	C9	14	F0	04	C9	0D	BE	CDA8:A5	14	48	A5	15	48	A9	2C	C8	
C860:8C	C4	C8	B1	2B	F0	F5	88	2F	CB08:D0	2C	A6	D4	F0	03	A2	00	0E	CDB0:20	18	CD	68	45	15	85	62	8E	
C868:B9	57	9E	99	BC	9E	C8	C0	CC	CB10:2C	A2	02	BD	5D	9E	C9	29	A4	CDB8:68	45	14	4C	03	CE	A9	28	EF	
C870:06	90	F5	85	0B	8D	9B	9E	A4	CB18:F0	06	20	D2	FF	E8	D0	F3	14	CDC0:20	0C	CD	48	20	F7	AE	68	54	
C878:8D	9E	9E	20	79	00	D0	08	C3	CB20:68	AA	98	48	A9	00	20	CD	89	CDC8:D0	05	20	E9	BC	F0	36	C9	90	
C880:20	79	00	F0	1C	20	FD	AE	9B	CB28:BD	68	A8	20	62	CB	F0	17	0B	CDD0:05	B0	15	A9	00	A0	FF	85	60	
C888:20	6B	A9	A5	0B	AA	0A	A8	54	CB30:88	20	65	CB	D0	C3	A6	D4	35	CDD8:63	85	62	C8	B1	22	A2	0F	CA	
C890:A5	14	99	BC	9E	A5	15	99	48	CB38:D0	04	88	20	5F	CB	68	20	67	CDE0:DD	7E	9E	F0	06	CA	10	F8	62	
C898:BD	9E	E8	86	0B	E0	03	90	A8	CB40:67	CB	D0	B5	20	5F	CB	A6	B0	CDE8:4C	6E	CB	A5	0D	29	01	D0	F9	
C8A0:DF	20	74	C9	C8	B1	5F	8D	AE	CB48:14	E0	08	F0	0F	BD	F8	9E	32	CDF0:0B	8A	0A	0A	0A	0A	85	63	7D	
C8A8:C0	9E	C8	B1	5F	8D	C1	9E	C9	CB50:18	65	49	85	49	90	02	E6	46	CDF8:C6	D0	10	DF	8A	05	63	C6	31	
C8B0:A5	62	18	C9	FA	90	03	4C	B9	CB58:4A	4C	DD	CA	A9	0D	2C	A9	14	CDE0:0D	D0	D6	85	63	A2	90	38	8A	
C8B8:B2	C9	20	BA	C9	D0	F1	20	5B	CB60:22	2C	A9	29	2C	A9	2B	20	5A	CE08:4C	49	BC	68	68	20	73	00	E6	
C8C0:D7	C9	90	C0	4C	5B	C9	20	07	CB68:D2	FF	C8	C4	15	60	A2	0E	4C	CE10:CA	30	AB	A5	14	48	A5	15	11	
C8C8:A8	C4	4C	94	C4	20	FE	C9	21	CB70:2C	A2	17	4C	15	C1	20	9E	FC	CE18:48	8A	0A	F0	07	48	A9	28	A1	
C8D0:B0	71	20	13	A6	90	F0	A4	4A	CB78:B7	8A	F0	F2	C9	09	B0	EE	9E	CE20:20	18	CD	68	AA	BD	02	CD	32	
C8D8:14	A5	15	CD	C1	9E	90	ED	F4	CB80:8D	52	9E	A9	2C	20	0C	CD	A9	CE28:85	56	BD	03	CD	85	55	20	55	
C8E0:D0	05	CC	C0	9E	90	E6	85	4C	CB88:A0	00	A2	09	A9	00	CA	F0	29	CE30:54	00	68	85	15	68	85	14	C6	
C8E8:25	84	24	20	57	CA	2C	9E	91	CB90:06	18	7D	F8	9E	90	F7	99	31	CE38:4C	F7	AE	A5	7A	48	A5	7B	E5	
C8F0:9E	30	29	C4	0B	F0	D6	90	A9	CB98:A7	02	C8	C0	04	F0	21	AE	7E	CE40:48	20	73	00	C9	CE	F0	F9	DD	
C8F8:0E	98	E5	0B	18	65	2D	85	5B	CBA0:52	9E	BD	F8	9E	48	38	E5	BC	CE48:A2	05	DD	4F	CC	F0	BC	CA	97	
C900:2D	90	CA	E6	2E	B0	C6	A5	7D	CBA8:0D	99	A7	02	C8	A5	0D	48	81	CE50:10	F8	2C	9F	9E	30	2A	C9	87	
C908:0B	84	0B	38	E5	0B	85	0B	98	CBB0:38	FD	F8	9E	99	A7	02	68	C4	CE58:44	D0	26	20	EE	C2	F0	21	98	
C910:A5	2D	E5	0B	85	2D	B0	B5	27	CBB8:9D	F8	9E	8A	48	C8	D0	CC	AD	CE60:20	B9	C6	A9	FF	8D	9F	9E	A4	
C918:C6	2E	90	B1	C4	0B	F0	03	FE	CBC0:48	18	65	0D	99	A7	02	C8	38	CE68:88	98	A0	02	91	2D	A9	07	E0	
C920:20	80	CA	A0	00	B9	00	01	2F	CBC8:68	99	A7	02	68	AA	68	48	17	CE70:85	7A	A9	02	85	7B	20	79	98	
C928:F0	05	91	45	C8	D0	F6	98	0C	CBD0:18	79	A7	02	99	A7	02	68	BF	CE78:00	20	F3	BC	A9	09	20	D3	ED	
C930:18	65	45	00	E2	E6	46	85	98	CBD8:85	0B	C5	0D	F0	3B	90	1D	32	CE80:9E	68	85	7B	68	85	7A	4C	8A	
C938:7A	A5	46	85	7B	20	A8	C4	06	CBE0:AE	AB	02	AC	AC	02	B9	01	A7	CE88:86	AE	A9	00	8D	9F	9E	8D	FF	
C940:4C	CD	C8	2C	9E	9E	30	13	2C	CBE8:9F	9D	01	9F	C8	E8	EC	A7	3D	CE90:9C	9E	8D	9B	9E	20	BD	C4	45	
C948:CE	9E	9E	20	BD	C4	08	20	F1	CBF0:02	D0	F3	F0	24	A5	0B	9D	B6	CE98:84	30	84	32	85	2F	85	31	5D	
C950:A8	C4	28	B0	03	4C	BF	C8	0B	CBF8:F8	9E	4C	71	CB	AD	A7	02	BB	CEA0:A0	1B	B9	A0	9E	91	2D	88	B4	
C958:4C	A0	C4	20	74	C9	A0	03	E3	CC00:18	6D	A9	02	B0	EF	AA	AC	9D	CEA8:10	F8	60	A0	FF	E6	0B	A6	FA	
C960:A5	62	91	5F	78	A5	63	91	BA	CC08:A7	02	CC	AA	02	90	0A	B9	5A	CEB0:7A	CA	E8	C8	BD	00	02	38	12	
C968:5F	20	BA	C9	D0	F0	20	60	92	CC10:01	9F	9D	01	9F	CA	88	10	1F	CEB8:F9	55	CC	F0	F5	C9	80	D0	F9	
C970:A6	4C	97	C4	AD	C0	9E	85	DC	CC18:F1	AE	AA	02	A0	00	C4	0D	67	CEC0:2A	A5	0B	38	E9	4A	AB	B9	45	
C978:14	AD	C1	9E	85	15	20	13	77	CC20:F0	09	B1	22	9D	01	9F	E8	E5	CEC8:38	CC	85	0B	A0	07	88	30	79	
C980:A6	A5	5F	48	A5	60	48	AD	2E	CC28:C8	D0	F3	A9	00	8D	9F	9E	87	CED0:15	D9	31	CC	D0	F8	C0	02	50	
C988:BC	9E	85	14	85	63	AD	BD	E6	CC30:60	08	0A	02	09	15	1E	24	5A	CED8:90	03	A9	9F	2C	A9	CE	E6	31	
C990:9E	85	15	85	62	20	13	A6	30	CC38:8B	9E	97	EE	EA	F2	F5	24	54	CEE0:71	A4	71	9F	9E	01	A9	00	5F	
C998:68	AA	68	E4	60	90	08	D0	8C	CC40:F9	1E	15	F1	F3	F8	D8	D9	2F	CEE8:4C	9D	CF	B9	55	CC	30	06	ED	
C9A0:11	C5	5F	90	02	D0	0B	86	13	CC48:D7	D6	F7	DC	09	F4	02	D1	42	CEF0:C8	B9	55	CC	10	FA	B9	56	0F	
C9A8:60	85	5F	A0	01	B1	5F	F0	42	CC50:A4	D2	D3	08	C2	44	49	52	AA	CEF8:CC	D0	B2	A6	7A	BD	00	02	BE	
C9B0:BD	60	A9	FF	8D	C1	9E	4C	6D	CC58:05	43	54	4F	52	D9	48	45	B4	CF00:4C	9F	CF	43	41	4E	27	54	C1	
C9B8:6E	CB	A5	63	18	6D	BE	9E	F3	CC60:4C	D0	53	43	52	41	54	43	76	CF08:20	52	45	53	55	4D	C5	44	D9	
C9C0:85	63	A5	62	BD	BF	9E	85	F7	CC68:C8	52	45	4E	41	4D	C5	56	A9	CF10:49	52	45	43	54	20	4D	4F	D2	
C9C8:62	A0	01	B1	5F	48	88	B1	CF	CC70:49	45	D7	4E	45	D9	51	55	39	CF18:44	45	20	4F	4E	4C	D9	85	01	
C9D0:5F	85	5F	68	85	60	60	20	76	CC78:49	D4	44	43	4C	45	41	D2	75	CF20:89	86	8A	87	8B	88	8C	04	8B	
C9D8:8E	A6	A0	02	B1	7A	D0	02	AC	CC80:48	45	41	44	45	D2	43	4F	47	CF28:05	05	05	04	04	05	05	04	44	EE
C9E0:38	60	C8	B1	7A	85	39	C8	0C	CC88:4C	4C	45	43	D4	52	45	4E	01	CF30:49	D2	D0	3F	44	53	24	0D	83	
C9E8:B1	7A	85	3A	20	FB	A8	A5	30	CC90:55	4D	42	45	D2	54	52	4F	A0	CF38:48	45	4C	50	0D	56	49	45	75	
C9F0:7A	85	3D	A5	7B	85	3E	A9	3D	CC98:CE	54	52	4F	46	C6	54	52	36	CF40:57	22	52	55	4E	0D	4B	45	36	
C9F8:00	85	0E	20	73	00	20	79	07	CCA0:41	D0	52	45	53	55	4D	C5	FD	CF48:59	0D	4C	49	53	54	0D	51	4D	
CA00:00	20	21	CD	F0	D4	24	0F	D0	CCA8:44	45	4C	45	54	C5	41	55	25	CF50:55	49	54	0D	2C	23	59	45	2E	
CA08:30	F1	C9	CB	D0	09	20	73	86	CCB0:54	CF	52	52	45	C7	43	4F	F6	CF58:4B	D0	0A	00	0A	00	00	00	72	
CA10:00	C9	A4	D0	02	A9	89	A0	24	CCB8:50	D9	42	41	4E	CB	44	45	BC	CF60:22	2B	43	48	52	24	28	29	65	
CA18:04	D9	CE	9E	F0	15	88	10	E6	CCC0:C3	50	4F	49	4E	54	45	D2	EF	CF68:93	94	95	9F	0D	47	4E	49	0F	
CA20:F8	C9	8A																									

Zookeeper For The Amiga

Michael Barron

Data for object images is stored in individual files—which can quickly lead to an unmanageable directory. This utility provides a solution—programs not only initialize faster, but they are also easier to handle.

The object commands in Microsoft Amiga BASIC, which allow you to manipulate sprites, vsprites, and bobs, provide easy access to some of the Amiga's most powerful animation routines. However, you must store the data for each object image in its own, separate file. Thus, if your program uses six objects, you'll have to manage seven separate disk files (six object files, plus the program itself). Before long, your previously-neat disk directory can start looking like a zoo.

"Zookeeper" offers a neat solution to this problem by converting image definition files into DATA statements which can be part of the main program. The DATA lines are organized into meaningful sections with commentary, bringing order to the object zoo.

Defining objects under program control does make the program itself somewhat larger. But the advantages of this method definitely outweigh the drawbacks. Only one file need be duplicated when exchanging the program with a friend, and a printed listing of the program shows everything needed

to make it run properly. The program also initializes faster, since it simply READs DATA statements already in memory, rather than seeking and loading separate files on disk. And, finally, it eliminates the problems that can occur when a program is not able to load the necessary object files.

Using The Zookeeper

Type in Program 1 and save a copy. The Zookeeper can handle object definition files for both sprites and bobs, in the format produced by the object editor program on the Amiga BASIC Extras disk. Let's demonstrate how it works using an example image file from the Extras disk.

In the BASICDemos drawer of the Extras disk is an image definition file named *ball*. Copy that file onto the same disk (and directory, if applicable) where you saved the Zookeeper program.

Run Zookeeper and enter the appropriate filename at the prompt. The program then asks you to enter the maximum number of data elements for each DATA statement (eight is a good number). With this information, Zookeeper creates a text file consisting of commented DATA statements. The DATA lines contain the same information as the image definition file. This new file has the same filename as the one which you entered earlier, with the

filename extension .ZOO. Thus, if you are converting the image file named *ball*, the new file is named *ball.ZOO*.

When the .ZOO file has been created, the Zookeeper program gives you the option to delete the original image definition file. Do not delete anything at this point.

Demonstration

After you have created the *ball.ZOO* file, type in Program 2. This program will show you how easy it is to use the new image format. After you type in all the lines listed in Program 2, enter this command in the BASIC Output window:

MERGE "ball.ZOO"

The effect of this command is to merge the DATA lines from the *ball.ZOO* file with Program 2, which is already in memory. The DATA lines appear at the end of the current program.

Before you run the combined program, look at the subroutine named *InitPlayer*, near the end of Program 2. That routine sets a variable named *ByteCount*, which is used to indicate how many items to read from the DATA statements. If you examine the comments at the beginning of the *ball.ZOO* data, you will see a comment indicating how many bytes this particular set of DATA lines contains.

Since we knew in advance that *ball.ZOO* would create 106 bytes of

data, we were able to use that number in the statement from *InitPlayer* which sets *ByteCount*. For any other image, however, that value will be different. When using these routines to display your own objects, you will need to examine the comment at the beginning of the DATA lines and modify the statement in *InitPlayer* to match the number shown.

When you run the demonstration, notice how much faster the program begins. Not having to access the disk drive is a great advantage. Another advantage is easy accessibility to the image data itself. To see what we mean, find the twenty-second DATA number in the ball.ZOO data set, change that number from 24 to 48, and then rerun the program.

For instructions on entering these programs, please refer to "COMPUTE!'s Guide to Typing in Programs" elsewhere in this issue.

Program 1: Zookeeper

```

<
' ZooKeeper<
' Convert image definition files
to DATA statements<
' Copyright 1987 COMPUTE! Public
ations, Inc.<
' All rights reserved.<
PRINT"Copyright 1987":PRINT"Comp
utel Publications, Inc."<
PRINT"All Rights Reserved.":FOR
X=1 TO 2000:NEXT X<
CLS<
MainLine:<
GOSUB HouseKeeping<
GOSUB ParameterEntry<
GOSUB DefineFileLds<
IF NoErrors THEN<
GOSUB CreateZooFile<
GOSUB FileMaintenance<
END IF<
GOSUB EndJob<
END<
<
HouseKeeping:<
DEFINT a-z<
WINDOW 1,"The ZooKeeper",(0,56)-
(500,186),15<
TRUE=-1<
FALSE=0<
HeaderBytes= 26<
CoLorMapBytes= 6<
RETURN<
<
ParameterEntry:<
PRINT<
INPUT "Enter name of AmigaBASIC
object file: ",FiLename$<
INPUT "Enter maximum number of d
ata elements per statement: ",Ma
xBytes<
PRINT<
RETURN<
<
DefineFileLds:<
PRINT "Input file: ",FiLename$<
OPEN FiLename$ FOR INPUT AS 1<
Image$=INPUT$(LOF(1),1)<
CLOSE 1<
Depth&= CVL(MID$(Image$,9,4))<

```

```

Wide&= CVL(MID$(Image$,13,4))<
Height&= CVL(MID$(Image$,17,4))<
Flags= CVI(MID$(Image$,21,2))<
BytesPerRow= 2*INT((Wide&+15)/16
)<
BytesPerPlane= BytesPerRow*Heigh
t&<
BytesInBitmap= BytesPerPlane*Dep
th&<
IF Flags AND 1 THEN<
ObjectIsSprite= TRUE<
ReqBytes= HeaderBytes+BytesInBit
map+CoLorMapBytes<
ELSE<
ObjectIsSprite= FALSE<
ReqBytes= HeaderBytes+BytesInBit
map<
END IF<
IF LEN(Image$)<>ReqBytes THEN<
PRINT FiLename$;" is not compati
ble with the ZooKeeper."<
NoErrors= FALSE<
ELSE<
NoErrors= TRUE<
END IF<
RETURN<
<
CreateZooFile:<
PRINT "Output file: ";FiLename$;
".ZOO"<
PRINT<
PRINT "Please wait..."<
PRINT<
OPEN FiLename$+".ZOO" FOR OUTPUT
AS 1<
PRINT # 1,<
PRINT # 1, "ObjectData:"<
IF ObjectIsSprite THEN<
PRINT # 1, "' SPRITE Format"<
ELSE<
PRINT # 1, "' BOB Format"<
END IF<
PRINT # 1, "' Total Bytes: ";Req
Bytes<
PRINT # 1, "' Bit Planes: ";Dep
th&<
PRINT # 1, "' Pixels Wide: ";Wid
e&<
PRINT # 1, "' Pixels Tall: ";Hei
ght&<
CurrentByte= 1<
Comment$= "' Object Header"<
CALL FormatData(Comment$,MID$(Im
age$,CurrentByte,HeaderBytes),Ma
xBytes,1)<
CurrentByte= CurrentByte+HeaderB
ytes<
FOR Plane=1 TO Depth&<
Comment$= "' BitPlane "+ STR$(PL
ane)<
CALL FormatData(Comment$,MID$(Im
age$,CurrentByte,BytesPerPlane),
MaxBytes,1)<
CurrentByte= CurrentByte+BytesPe
rPlane<
NEXT Plane<
IF ObjectIsSprite THEN<
Comment$="' Sprite Color Map"<
CALL FormatData(Comment$,MID$(Im
age$,CurrentByte,CoLorMapBytes),
MaxBytes,1)<
END IF<
CLOSE 1<
RETURN<
<
FileMaintenance:<
PRINT "Shall I delete ";FiLename
$;" (y/n)"<
INPUT Response$<
IF UCASE$(Response$)= "Y" THEN<
KILL FiLename$<
PRINT FiLename$;" deleted."<
END IF<
PRINT<
RETURN<
<

```

```

EndJob:<
PRINT "Job complete: returning t
o AmigaBASIC."<
PRINT<
RETURN<
<
SUB FormatData(Note$,Dat$,DatLim
it,FileNo) STATIC<
PRINT # FileNo, Note$<
NoBytes= LEN(Dat$)<
NoFuLLLines= INT(NoBytes/DatLimi
t)<
CurrentByte= 1<
FOR LineOut= 1 TO NoFuLLLines<
CALL PrintDataLine(MID$(Dat$,Cur
rentByte,DatLimit),FileNo)<
CurrentByte= CurrentByte+DatLimi
t<
NEXT LineOut<
IF CurrentByte<= NoBytes THEN<
BytesLeft= NoBytes-CurrentByte+1
<
CALL PrintDataLine(MID$(Dat$,Cur
rentByte,BytesLeft),FileNo)<
END IF<
END SUB<
<
SUB PrintDataLine(Dat$,FileNo) S
TATIC<
NoBytes= LEN(Dat$)<
PRINT # FileNo, USING " DATA
###";ASC(MID$(Dat$,1,1));<
FOR Element= 2 TO NoBytes<
PRINT # FileNo, USING " , ###";A
SC(MID$(Dat$,Element,1));<
NEXT Element<
PRINT # FileNo,<
END SUB<

```

Program 2: Demonstration

```

<
' Zookeeper demonstration<
' Copyright 1987 COMPUTE! Public
ations, Inc.<
' All rights reserved.<
PRINT"Copyright 1987":PRINT"Comp
utel Publications, Inc."<
PRINT"All Rights Reserved.":FOR
X=1 TO 2000:NEXT X<
CLS<
MainLine:<
GOSUB HouseKeeping<
GOSUB InitPlayer<
WHILE INKEY$=""<
IF MOUSE(0)<>0 THEN<
OBJECT.X 1, MOUSE(1)<
OBJECT.Y 1, MOUSE(2)<
END IF<
WEND<
END<
<
HouseKeeping:<
DEFINT a-z<
WINDOW 1,"Ball Demo",(0,136)-(45
0,186),15<
PRINT "Manipulate object with mo
use."<
PRINT "Hit any key to exit."<
RETURN<
<
InitPlayer:<
ByteCount= 106<
Image$= ""<
FOR Loop= 1 TO ByteCount<
READ ImageData<
Image$=Image$+CHR$(ImageData)<
NEXT Loop<
OBJECT.SHAPE 1, Image$<
OBJECT.ON<
RETURN<
<

```

©

Sprite Designer

André Corbin

This full-featured sprite editor from a Canadian reader lets you design Commodore 64 sprite shapes quickly and conveniently. The program works with either disk or tape.

Nearly every Commodore 64 programmer uses sprites at one time or another. They're the movable graphics shapes that add so much to arcade games and other programs. If you have plenty of time, you can draw the sprites on graph paper, calculate the numbers that make up each sprite, type those numbers into a program, and hope that you didn't make any mistakes along the way. But "Sprite Designer" offers a much faster and easier alternative, allowing you to design sprites directly on the screen, with convenient keyboard controls. You can save a group of sprite shapes to disk or tape and reload them for future use, or you can create a series of BASIC DATA statements containing the sprite data. The program supports both single-color and multicolor sprites and it allows you to work on a group of eight sprites at a time.

Typing It In

Sprite Designer is written in machine language, so you must type it in with the "MLX" machine language entry program published elsewhere in this issue. Read the MLX instructions carefully before you begin. When you run MLX, you'll be asked for a starting address and an ending address for the data you'll be entering. Here are the values to use for Sprite Designer:

Starting address: 84D0
Ending address: 9E47

After you've saved a copy of the program, load it with LOAD

"PROGRAM",8,1 for disk or LOAD "PROGRAM",1,1 for tape (replace PROGRAM with the name you used when saving the program). To start the program, type SYS 34000 and press RETURN.

Sprite Designer uses the memory in locations 8192-16383 to store sprite shape data. This work area can hold 16 groups of 8 sprites, allowing you to have a total of 128 sprite shapes in memory at one time.

Main Menu

When you start Sprite Designer, it displays a main menu containing the following choices:

1. INITIALIZE
2. EDIT
3. ANIMATE
4. SAVE
5. LOAD
6. BASIC DATA
7. MONOCHROME
8. MULTICOLORED
0. QUIT

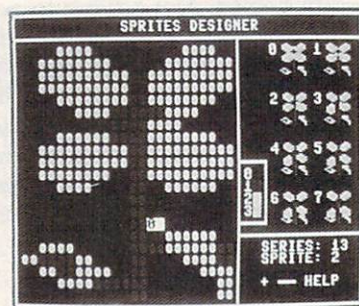
To choose a menu option, simply press the number key next to that option. For instance, the Edit option lets you design a sprite. To choose that option, you press the 2 key. Let's look at the menu options in order.

1. Initialize

Sprite Designer always begins by asking you if you want to initialize, or clear out, the entire sprite workspace. Since this action erases all sprite data in memory, the program asks you to confirm before it continues. If you press Y to answer yes, every dot in all of the sprite shapes is turned on. You can choose this option at any time from the main menu.

2. Edit

Option 2 (Edit) moves you to the sprite-editing screen, which is divided into three areas. In the lower



"Sprite Designer" is a comprehensive utility for designing sprite shapes for use in games and animation. This photo depicts the main editing screen.

right corner are two numbers that show the sprite series you are working on, as well as the individual sprite you are designing. Each series contains eight sprites, and the series are numbered 0-15, corresponding to their respective positions in memory. Within a series, each of the eight sprites is given a number 0-7.

In the upper right portion of the screen you will see the shapes of all eight sprites in the current series. As you design a sprite, the changes immediately appear in this area.

The left portion of the screen is the editing area, where you actually design the sprite shape. This area is 24 x 21 spaces in size, with each screen space corresponding to a dot in the sprite shape.

Editing Functions

Once you have reached the editing screen, you need to remember only one command: The plus key (+) displays an entire screen of instructions for editing. To return from the help screen to the editing screen, press any key. The asterisk (*) returns you from the editing screen to the main menu.

When you enter the editing

screen, the editing area contains the shape of sprite 0 within the current series. The function keys f3-f6 allow you to select any series and any individual sprite within a series. Press f3 to go to the next series, or f4 (SHIFT-f3) to go back to the previous series. The f5 key advances to the next sprite in the series, while f6 moves to the previous sprite. If you have designed a series of shapes for animation, you can hold down f3 or f4 to move through the entire series quickly.

A reverse-video cursor indicates your position in the editing area. To move the cursor around, press the cursor keys just as you would normally. The size of the cursor depends on whether you are working on a single color or multicolor sprite. For a single-color sprite, the cursor is a square one space in size; for a multicolor sprite, it is a rectangle two spaces in size, containing a number in the range 0-3.

You can turn on every dot in the current sprite shape by pressing CLR. For a single-color sprite, the space bar lets you turn individual dots on and off inside the editing area. You can erase a dot by pressing the space bar and turn a dot on by pressing SHIFT-SPACE (hold down SHIFT and press the space bar).

For a multicolor sprite, a dot can have any of four different colors, including the background color (see "Multicolor," below). Use the numbers 0-3 or the letter keys Z, X, C, and V to color a dot with the desired color.

You also can change the position of the sprite shape within the editing frame, shifting everything one dot to the right, left, up, or down. This is done by holding down the Commodore key and pressing W, Q, R, or E, respectively.

It is possible to flip a sprite shape horizontally or vertically, by pressing Commodore-I or Commodore-K, respectively.

The f1 key allows you to copy a shape from one sprite to any other shape in memory. First, use function keys f3-f6 to put the shape you want to copy into the editing area. Press f1 to copy the shape; then use f3-f6 to select the shape you want to copy to. Press f1 a second time, and the shape is copied instantly.

The f2 key inverts every dot in

the current sprite shape. Use f7 and f8 to change the sprite's color.

3. Animate

Option 3 (Animate) lets you cycle through all the sprite shapes in ascending order, beginning with series 0, sprite 0. When you choose this option, Sprite Designer prompts you to enter a delay interval which controls the speed of the animation. The smaller the delay interval, the faster the animation. Press SHIFT-SPACE to stop the animation and return to the main menu. You can also use keys f3-f6 to cycle forward or backward through the sprite shapes, as explained in the preceding section.

4. Save

Sprite Designer allows you to save an entire set of sprite shapes to disk or tape. Enter a filename when prompted; then press D or T to indicate disk or tape, respectively. To cancel the operation, press RETURN when prompted to choose disk or tape. If a disk error occurs, Sprite Designer prints the appropriate error message at the bottom of the screen.

5. Load

This option allows you to reload a set of sprite shapes from disk or tape. Follow the onscreen prompts as explained in the preceding section.

6. Add DATA Lines

Option 6 (BASIC DATA) lets you save sprite shapes in the form of BASIC DATA statements. This is done by adding DATA lines to an existing BASIC program. Activate Sprite Designer and load your existing sprite shapes or design new ones. Once the sprite shapes are in memory, exit Sprite Designer and type NEW. Then load the BASIC program to which you wish to add the sprites. Don't worry that the program will disturb the sprite shapes: Sprite Designer automatically copied them into a safe place (the RAM under BASIC ROM) when you exited the program.

When the BASIC program loads, do not run it. Instead, type SYS 34000 to reactivate Sprite Designer. Do *not* initialize the sprite shapes at this stage, or load any shapes from disk or tape. Instead, choose option 6. The program prompts you to enter the series of

sprites that you wish to save. When that is done, you also are given the opportunity to include REMarks along with the DATA lines.

After you answer those questions, the program prompts you to enter a filename and indicate whether to use disk or tape, as in options 4 and 5. At this point, Sprite Designer adds the DATA lines to the program in memory and saves the new program. If you wish to cancel the operation, press RETURN at the filename prompt without typing anything.

After the save is complete, exit Sprite Designer and type NEW (to reset BASIC's internal pointers). In order to work properly, the BASIC program to which you add the DATA lines must not exceed 24 disk blocks (6144 bytes) in length.

7. Monochrome

Each series of eight sprites can be either monochrome (single color) or multicolor. You cannot mix monochrome and multicolor sprites in the same series. When you choose option 7, a 16-color board appears on the screen. To choose a color, press the letter key matching that color. That color will be used for all eight sprites in the designated series.

8. Multicolor

Option 8 allows you to choose colors for a series of multicolor sprites. When you choose this option, a 16-color board appears as described in the previous section. Since a multicolor sprite can have four colors, the program asks you to select four colors, numbered 0-3. When you're drawing in multicolor mode, the cursor contains a number to indicate which color you are drawing in. To switch to a different color, press a number in the range 0-3. A small color board to the right of the drawing area shows you the current drawing colors.

9. Quit

When you exit Sprite Designer, the program copies all the sprite shapes in the workspace into the "hidden" RAM underlying the BASIC ROM chip. This is done to make it easy for you to alternate between using your own BASIC programs and Sprite Designer. You can load and use a BASIC program after using Sprite Designer, then reload and

activate Sprite Designer again. If you choose *not* to initialize the work area, Sprite Designer copies the previously stored sprite shapes back into its workspace. This eliminates the need to reload the sprites from disk or tape every time you switch between a BASIC program and Sprite Designer.

Sprite Designer

Please refer to the "MLX" article elsewhere in this issue before entering the following program.

```
84D0:4C 35 85 20 95 88 C9 30 92
84D8:90 F9 C9 39 B0 F5 8D 21 0F
84E0:85 A9 03 20 6B 87 38 E9 4D
84E8:30 0A AA BD 23 85 85 FD F5
84F0:E8 BD 23 85 85 FE 6C FD 99
84F8:00 20 F0 85 4C D3 84 20 5B
8500:E4 FF F0 FB 60 00 A5 FB A5
8508:18 6D 05 85 85 FB 90 02 B2
8510:E6 FC 60 00 A5 FD 18 6D 9C
8518:13 85 85 FD 90 F4 E6 FE C3
8520:60 20 00 07 94 E3 93 94 C3
8528:8B CE 97 FB 98 6D 98 3E 85
8530:9B C7 95 88 96 A9 EF 8D FE
8538:28 03 A9 C1 8D 18 03 A9 E5
8540:8E 20 D2 FF A9 08 20 D2 75
8548:FF AD 86 02 8D FE 9F AD 05
8550:20 D0 8D FD 9F AD 21 D0 F7
8558:8D FC 9F AD 8A 02 8D FF AF
8560:9F 9F 01 8D 86 02 8D 20 16
8568:D0 A9 15 8D 18 D0 20 F0 F6
8570:85 A9 00 85 F9 85 FA 8D 6A
8578:23 9F 20 90 FF A9 33 8D A4
8580:21 85 20 68 8E A9 0D 85 C2
8588:F7 85 F8 A9 30 8D 79 9F F4
8590:8D 7A 9F A9 80 8D 8A 02 E0
8598:A9 31 8D 21 85 A9 03 20 81
85A0:6B 87 4C E3 93 20 44 E5 96
85A8:A9 04 8D 5B 86 A9 42 85 D5
85B0:22 A9 70 8D 80 04 A9 6E EF
85B8:8D 27 04 A9 7D 8D E7 07 68
85C0:A9 6D 8D C0 07 A2 25 A9 70
85C8:43 9D 01 04 9D 51 04 9D 15
85D0:C1 07 CA 10 F4 20 75 88 74
85D8:A9 6B 8D 50 04 A9 73 8D 85
85E0:77 04 A5 22 85 02 A9 00 07
85E8:20 6B 87 A5 02 85 22 60 F4
85F0:20 48 86 A9 6B 8D 30 06 81
85F8:A9 72 8D 62 04 A9 7D 8D 9C
8600:42 06 A2 10 A9 43 9D 31 CB
8608:06 CA 10 FA A2 0A A0 12 0D
8610:A9 78 20 58 86 A9 01 4C C2
8618:6B 87 A9 5F 8D 15 D0 20 74
8620:A5 85 A9 72 8D 69 04 A9 81
8628:71 8D D9 07 20 87 8D A9 D6
8630:6B 8D E9 06 A9 73 8D F7 22
8638:06 A2 0C A9 43 9D EA 06 79
8640:CA 10 FA A9 02 4C 6B 87 50
8648:A9 00 8D 15 D0 8D 21 D0 FC
8650:A9 01 8D 86 02 4C A5 85 9E
8658:85 FB A9 FF 85 FC A9 28 F7
8660:8D 05 85 A5 22 91 FB 20 EF
8668:06 85 CA 10 F6 A5 22 60 27
8670:53 50 52 49 54 45 53 20 98
8678:44 45 53 49 47 4E 45 52 48
8680:00 31 2E 20 49 4E 49 54 0C
8688:49 41 4C 49 5A 45 0D 1D C7
8690:1D 32 2E 20 45 44 49 54 A2
8698:0D 1D 1D 33 2E 20 41 4E 0D
86A0:49 4D 41 54 45 0D 1D 1D C8
86A8:34 2E 20 53 41 56 45 0D 8F
86B0:1D 1D 35 2E 20 4C 4F 41 2F
86B8:44 0D 1D 1D 36 2E 20 44 8F
86C0:41 54 41 20 42 41 53 49 B4
86C8:43 0D 1D 1D 37 2E 20 4D 30
86D0:4F 4E 4F 4D 48 52 4F 4D AE
86D8:45 0D 1D 1D 38 2E 20 4D 49
```

```
86E0:55 4C 54 49 43 4F 4C 4F 0A
86E8:52 45 44 0D 1D 1D 30 2E B5
86F0:20 51 55 49 54 0D 0D 1D AF
86F8:1D 41 43 54 49 4F 4E 20 D6
8700:00 30 20 20 20 31 11 16
8708:11 11 11 9D 9D 9D 9D 1C
8710:9D 32 20 20 20 33 11 79
8718:11 11 11 9D 9D 9D 9D 2C
8720:9D 34 20 20 20 35 11 0E
8728:11 11 11 9D 9D 9D 9D 3C
8730:9D 36 20 20 20 37 11 A2
8738:11 11 11 9D 9D 9D 9D 4C
8740:9D 9D 53 45 52 49 45 53 D9
8748:3A 11 9D 9D 9D 9D 9D 82
8750:9D 53 50 52 49 54 45 3A 92
8758:11 11 9D 9D 9D 9D 9D FD
8760:9D 2B 20 C3 C3 20 48 45 BD
8768:4C 50 00 0A 0A A8 A2 03 8D
8770:B9 87 87 48 C8 CA 10 F8 3E
8778:68 A8 68 AA 18 20 F0 FF C0
8780:68 A8 68 4C 1E AB 00 70 CF
8788:86 01 0C 81 86 03 02 01 F9
8790:87 03 1D 21 85 0D 09 81 CD
8798:91 16 1C 61 87 16 1C CF 2C
87A0:93 10 02 1F 96 07 18 2A DA
87A8:96 07 1F 14 96 05 18 A7 8A
87B0:94 10 02 13 95 12 02 A4 1D
87B8:97 10 02 4D 98 10 02 FF B5
87C0:9E 14 02 E4 91 0C 19 1C BD
87C8:92 0C 19 58 98 12 02 86 64
87D0:87 14 02 F9 93 10 02 7F E8
87D8:95 07 13 A6 95 15 02 4A 90
87E0:9E 15 02 8C 99 14 02 B6 61
87E8:88 04 02 AF 89 0E 02 78 79
87F0:8A 11 17 85 9A 10 02 2D 0B
87F8:9B 10 02 A9 D8 8D 5B 86 EE
8800:A5 22 8D 00 D8 8D 27 D8 42
8808:8D E7 DB 8D C0 DB A2 25 0E
8810:9D 01 D8 9D 51 D8 9D C1 10
8818:DB CA 10 F4 20 75 88 8D 90
8820:50 D8 8D 77 D8 A2 1F 9D E5
8828:2C D8 CA 10 FA 8D 69 D8 99
8830:8D D9 DB 20 87 88 8D 59 5F
8838:DA 8D F7 DA A2 0C 9D EA 32
8840:DA CA 10 FA 8D 95 D8 8D 25
8848:9A D8 D8 35 D9 8D 3A D9 35
8850:8D 05 D9 8D DA D9 8D 75 80
8858:DA 8D 7A DA A2 09 9D 14 BF
8860:DB CA 10 FA A2 08 9D 3C 70
8868:DB CA 10 FA A2 08 9D 8C C8
8870:DB CA 10 FA 60 A2 16 A0 2E
8878:00 A9 28 20 58 86 A2 16 33
8880:A0 27 A9 28 4C 58 86 A2 D6
8888:14 A0 19 A9 78 4C 58 86 B5
8890:12 20 92 9D 00 A9 90 A0 47
8898:88 18 20 1E AB A9 8C 85 3D
88A0:A2 20 E4 FF D0 0F A5 A2 58
88A8:D0 F7 4D 90 88 49 80 8D D6
88B0:90 88 4C 95 88 60 1F 44 57
88B8:49 53 50 4C 41 43 45 20 D3
88C0:54 48 45 20 43 55 52 53 20
88C8:4F 52 20 20 9E 43 52 53 16
88D0:52 20 1C 4B 45 59 53 0D 8E
88D8:0D 1D 1D 1F 4D 4F 44 49 C6
88E0:46 59 20 20 20 4D 4F 4E 94
88E8:4F 43 48 52 4F 4D 45 20 FA
88F0:20 9E 53 50 41 43 45 11 DB
88F8:9D 9D 9D 9D 9D 53 48 49 E1
8900:46 54 2D 53 50 41 43 45 79
8908:0D 1D 1D 1D 1D 1D 1D 13
8910:1D 1D 1F 4D 55 4C 54 49 7F
8918:43 4F 4C 4F 52 45 44 20 6F
8920:20 9E 30 20 20 20 31 20 F6
8928:20 20 32 20 20 20 33 11 94
8930:9D 9D 9D 9D 9D 9D 9D 43
8938:9D 9D 9D 9D 9D 1C 28 D2
8940:9E 5A 1C 29 20 28 9E 58 86
8948:1C 29 20 28 9E 43 1C 29 9D
8950:20 28 9E 56 1C 29 0D 0D 63
8958:1D 1D 1F 4D 4F 56 45 20 78
8960:41 52 4F 55 4E 44 20 53 FE
8968:43 52 45 4E 20 20 20 02
8970:9E 51 20 1C 4C 45 46 54 45
8978:20 20 9E 45 20 1C 42 4F 11
```

```
8980:54 54 4F 4D 0D 1D 1D 1F C7
8988:43 4F 4D 4D 4F 44 4F 52 0C
8990:45 20 4B 45 50 20 41 4E 28
8998:44 2E 2E 20 20 9E 57 20 6B
89A0:1C 52 49 47 48 54 20 9E 66
89A8:52 20 1C 54 4F 50 00 1F 90
89B0:53 59 4D 4D 45 54 52 59 BB
89B8:20 20 20 20 20 20 20 20 CB
89C0:20 20 20 20 20 9E 4B 20 24
89C8:1C 48 4F 52 49 5A 4F 4E AB
89D0:54 41 4C 0D 1D 1D 1F 43 97
89D8:4F 4D 4D 4F 44 4F 52 45 CE
89E0:20 4B 45 59 20 41 4E 44 FB
89E8:2E 2E 20 20 9E 49 20 1C 1B
89F0:56 45 52 54 49 43 41 4C 36
89F8:0D 0D 1D 1D 9E 46 31 20 DB
8A00:05 C3 C3 20 1C 43 4F 50 DF
8A08:59 0D 1D 1D 9E 46 32 20 15
8A10:05 C3 C3 20 1C 52 45 56 1E
8A18:45 52 53 45 0D 1D 1D 9E 08
8A20:46 33 20 05 C3 C3 20 1C 03
8A28:53 45 52 49 45 53 20 28 F6
8A30:9E 46 34 1C 29 0D 1D 1D 43
8A38:9E 46 35 20 05 C3 C3 20 B5
8A40:1C 53 50 52 49 54 45 20 AD
8A48:28 9E 46 36 1C 29 0D 1D 02
8A50:1D 9E 46 37 20 05 C3 C3 38
8A58:20 1C 53 50 52 49 54 45 99
8A60:27 53 0D 1D 1D 1D 1D 02 06
8A68:1D 1D 1D 43 4F 4C 4F 5D C7
8A70:20 28 9E 46 38 1C 29 00 5C
8A78:9E 43 4C 52 20 05 C3 20 19
8A80:1C 44 45 4C 45 54 45 11 39
8A88:9D 9D 9D 9D 9D 9D 53 50 BB
8A90:52 49 54 45 11 11 9D 9D A5
8A98:9D 9D 9D 9D 9D 9D 9D AD
8AA0:9D 9D 9E 2A 20 05 C3 C3 C2
8AA8:20 1C 4D 45 4E 55 11 11 CD
8AB0:11 9D 9D 9D 9D 9D 9D 7F
8AB8:9D 05 53 54 52 49 4B 45 21
8AC0:20 41 20 4B 45 59 2E 2E 09
8AC8:2E 00 20 48 86 A9 6B 8D BC
8AD0:C8 04 8D 90 05 8D 08 06 7A
8AD8:80 80 06 A9 73 8D EF 04 E5
8AE0:8D B7 05 8D 2F 06 8D A7 78
8AE8:06 A9 71 8D 04 07 A9 43 CB
8AF0:A2 25 9D C9 04 9D 91 05 AF
8AF8:9D 09 06 9D 81 06 CA 10 83
8B00:F1 A9 72 8D 94 06 A9 06 B7
8B08:8D 5B 86 A2 06 A0 14 A9 3C
8B10:42 85 22 A9 A8 20 58 86 85
8B18:A9 18 20 6B 87 A9 19 20 F9
8B20:6B 87 A9 1A 20 6B 87 A9 0D
8B28:00 85 C6 A5 C6 F0 FC A9 71
8B30:00 85 C6 C4 94 8B 30 31 AA
8B38:32 33 5A 58 43 56 20 A0 5A
8B40:11 91 1D 9D 86 87 88 8A AF
8B48:8B 8C 89 85 AB B3 B2 B1 15
8B50:A1 A2 93 2B 2A EB 8B EB 0A
8B58:8B EB 8B EB 8B 1F 8C 24 76
8B60:8C 29 8C 2E 8C C1 8B C1 C0
8B68:8B 49 8C 52 8C 5B 8C 6C A5
8B70:8C 80 8C 8F 8C 9B 8C 86 EA
8B78:8C 95 8C A3 8C AE 8C C2 02
8B80:8C 8C 8C F3 8C 2B 8D 5A 67
8B88:8D 87 8D 09 8E 38 8E CA C7
8B90:8A 47 8E 00 20 1A 86 20 27
8B98:4D 8E 20 FF 84 8D 93 8B 0B
8BA0:A0 1E A2 00 0D 36 8B F0 B3
8BA8:07 E8 88 10 F7 4C 9A 8B 41
8BB0:8A 0A AA BD 55 8B 85 FD A2
8BB8:E8 BD 55 8B 85 FE 6C FD 16
8BC0:00 AD 1C D0 F0 03 4C 9A 9A
8BC8:8B AD 93 8B C9 20 D0 05 B1
8BD0:A9 20 4C D7 8B A9 51 85 F6
8BD8:B5 20 92 90 20 F9 90 20 58
8BE0:49 91 20 72 90 20 20 90 02
8BE8:4C 9A 8B AD 1C D0 D0 03 E1
8BF0:4C 9A 8B AD 9C 8B 29 0F 4D
8BF8:C9 02 D0 08 A6 FA BD 27 D3
8C00:D0 4C 08 8C AA BD 24 9F 92
8C08:85 B6 20 92 90 AD 93 8B AC
8C10:20 36 8C 20 72 90 AD 93 1F
8C18:8B 20 37 8C 4C E2 8B A9 5D
```



```

9BB8:10 9B 4C 4B 9B A9 00 C5 66
9BC0:69 D0 07 C5 6A D0 03 4C 07
9BC8:F9 84 20 F0 85 A9 1C 20 5C
9BD0:6B 87 20 3C 94 85 70 A4 A7
9BD8:2E A5 2D 18 69 FE 85 FD 08
9BE0:85 65 B0 01 88 84 FE 84 33
9BE8:66 20 34 9E A9 30 85 63 48
9BF0:A9 F2 85 64 A9 2C 8D F8 C2
9BF8:9E A9 00 85 6D 46 69 66 FF
9C00:6A B0 0B E6 6D A5 6D C9 11
9C08:10 D0 F2 4C B8 9C A2 00 1E
9C10:A5 6D C9 0A 90 04 E8 38 EF
9C18:E9 0A 09 30 8D F9 99 8A FE
9C20:09 30 8D F8 99 A5 6D 0A 73
9C28:0A 0A 69 80 20 10 90 A5 26
9C30:FC 18 69 80 85 FC A5 70 FE
9C38:D0 06 20 39 9D 4C 4A 9C 42
9C40:A9 00 85 62 20 06 9D 20 99
9C48:0A 9D 20 03 9E A9 01 8D 4D
9C50:05 85 A9 20 85 29 A9 10 D8
9C58:85 2A A2 05 20 72 9D 20 A9
9C60:06 9D A9 7C 85 FB A9 9F 10
9C68:85 FC A5 6D 0A 0A 8D 49
9C70:05 85 20 06 85 A0 07 B1 60
9C78:FB 29 0F 91 FB 88 10 F7 0F
9C80:A9 01 8D 05 85 85 29 A9 0F
9C88:08 85 2A A2 05 20 72 9D C1
9C90:20 06 9D A9 28 85 FB A9 A2
9C98:9F 85 FC A5 6D 0A 0A 8D 32
9CA0:05 85 20 06 85 A9 01 8D 84
9CAB:05 85 85 29 A9 04 85 2A 9B
9CB0:A2 05 20 72 9D 4C 03 9C 68
9CB8:A9 00 A8 91 FD C8 91 FD 29
9CC0:A9 02 8D 13 85 20 14 85 8C
9CC8:A5 FD 85 2D A5 FE 85 2E 3A
9CD0:20 12 9E 20 F0 85 20 1D 6F
9CD8:99 A0 FF 20 BA FF A6 FD 2A
9CE0:A4 FE 20 0D 99 20 9B 99 1F
9CE8:C9 14 B0 EA 20 21 9E 4C DF
9CF0:F9 84 A5 64 8D 03 02 A5 65
9CF8:63 8D 02 02 18 69 01 85 95
9D00:63 90 02 E6 64 60 A5 70 20
9D08:F0 2F 20 F2 9C A9 8F 8D F2
9D10:04 02 A4 62 B9 6F 9A 8D D6
9D18:26 9D C8 B9 6F 9A 8D 27 AA
9D20:9D A2 05 A0 00 B9 FF FF 64
9D28:F0 08 9D 00 02 E8 C8 4C 23
9D30:25 9D 20 43 9D E6 62 E6 D1
9D38:62 20 F2 9C A9 83 8D 04 4F
9D40:02 60 CA A9 00 9D 00 02 01
9D48:86 61 E8 8A 18 65 65 85 8B
9D50:65 90 02 E6 66 A5 65 8D 33
9D58:00 02 A5 66 8D 01 02 A4 48
9D60:61 B9 00 02 91 FD 88 10 80
9D68:F8 A5 65 85 FD A5 66 85 67
9D70:FE 60 86 61 A0 00 20 A0 10
9D78:9D 20 06 85 C6 2A D0 F2 17
9D80:20 42 9D C6 29 F0 18 A5 5F
9D88:29 29 03 D0 06 20 06 9D 6A
9D90:4C 96 9D 20 39 9D A9 10 F0
9D98:85 2A A2 05 4C 72 9D 60 8D
9DA0:A2 00 A9 30 8D F5 9E 8D 74
9DA8:F6 9E 8D F7 9E B1 FB DD C9
9DB0:ED 99 90 0A 38 FD ED 99 2B
9DB8:FE F5 9E 4C AF 9D E8 E0 30
9DC0:03 D0 EC A6 61 B1 FB C9 4D
9DC8:64 B0 06 C8 C9 0A B0 01 88
9DD0:C8 B9 F5 9E 9D 00 02 E8 61
9DD8:C8 C0 04 D0 F4 60 A9 00 B2
9DE0:8D EB 9D 8D EE 9D A0 20 B9
9DE8:A2 00 AD FF FF 8D FF FF 61
9DF0:EE EB 9D EE EE 9D CA D0 95
9DF8:F1 EE EC 9D EE EF 9D 88 5B
9E00:D0 E6 60 AD 0E 29 FE 7B
9E08:8D 0E DC A5 01 29 FE 85 B5
9E10:01 60 A5 01 09 01 85 01 03
9E18:AD 0E DC 09 01 8D 0E DC 13
9E20:60 20 03 9E A9 A0 8D EC B7
9E28:9D A9 20 8D EF 9D 20 DE 90
9E30:9D 4C 12 9E A9 20 8D EC 51
9E38:9D A9 A0 8D EF 9D 4C DE 09
9E40:9D 00 00 00 00 00 00 4C

```

Disk Expander For Apple II

Boris Troyanovsky

Everyone can use more disk space. This program allows you to format DOS 3.3 disks with an extra track of space, giving you 16 more disk sectors for storage.

Here is a utility that gives you extra storage space on any DOS 3.3 disk. After formatting a disk with this program, you have 16 extra disk sectors for storing programs and other files. Type in the program and save it to disk.

When you run the program, it waits for you to press a key. Insert a blank disk into slot 6, drive 1 (this is the built-in drive on Apple IIc computers). Press any key to begin. When the drive stops spinning, the disk has been formatted with 16 extra sectors. Now you can save a HELLO program on the disk or use it as you would a normal DOS 3.3 disk. The FID program on the DOS 3.3 System Master disk can be used to verify that the disk really does contain the extra space.

Disk Expander for Apple II

For instructions on entering this program, please refer to "COMPUTE!'s Guide to Typing in Programs" elsewhere in this issue.

```

8A 10 D$ = CHR$ (4): GOSUB 200
1A 20 TEXT = HOME : HTAB 17: PRI
NT "D.M.E.S.": VTAB 1: FOR

```

```

X = 1 TO 16: HTAB X: PRIN
T "-"; NEXT X: FOR X = 25
TO 40: HTAB X: PRINT "-";
: NEXT X
BF 30 VTAB 13: PRINT "INSERT DIS
K INTO SLOT 6,DRIVE 1": PR
INT "AND PRESS ANY KEY": G
ET A$
9B 40 PRINT
3D 50 REM ***EXPAND DISK CAP.***
39 60 POKE 48874, PEEK (48874) +
1
BF 70 PRINT D$;"INIT HELLO,D1,S6
": PRINT D$;"DELETE HELLO"
3C 80 POKE 48874, PEEK (48874) -
1
2A 90 SS = 0:SE = 0:BU = 8192:OP
= 1:TR = 17: GOSUB 130
18 100 POKE 8192 + 196,255: POKE
8192 + 197,255: POKE 819
2 + 52,36
F6 110 SS = 0:SE = 0:BU = 8192:O
P = 2:TR = 17: GOSUB 130
AD 120 GOTO 20
5C 130 REM ***DISK ACCESS***
85 140 FOR SA = SS TO SE
F7 150 POKE 788,TR: POKE 789,SA:
POKE 796,OP
C7 160 HB = INT (BU / 256):LB =
BU - (HB * 256)
6E 170 POKE 792,LB: POKE 793,HB
27 180 CALL 768:BU = BU + 256: N
EXT SA
23 190 RETURN
37 200 FOR I = 768 TO 822: READ
A: POKE I,A: NEXT I: RETU
RN
9B 210 DATA 169,3,160,16,32,217,
3,96,0,0,0
7C 220 DATA 0,0,0,0,0,1,96,1,0,1
7,15
C2 230 DATA 48,3,0,32,0,0,1,0,25
4,96,1
28 240 DATA 0,0,0,0,0,0,0,0,0,0,
0
3C 250 DATA 0,0,0,0,0,1,239,216,
0,0,0

```

1571 Utility Package

Dick Smit

Among other exciting features, the Commodore 1571 disk drive has the ability to perform high-speed burst mode operations and can read MFM (non-Commodore) disks for CP/M mode. The four programs included with this article let you copy MFM-format disks, read and alter the information on an MFM disk, and access all of the 1571's special features from BASIC. A Commodore 128 with 1571 disk drive and 80-column monitor is required.

The Commodore 1571 is the most versatile disk drive ever offered by Commodore. It can operate as a 1541 drive, giving you access to the huge library of existing Commodore 64 software. With a Commodore 128 in 128 mode, it can also transfer data in *burst mode* at much higher speeds than a 1541 disk drive. Commodore disks use a recording system known as GCR (Group Code Recording), but CP/M disks for many other computers use a different system known as MFM (Modified Frequency Modulation). Since the 128 can operate as a CP/M computer, the 1571 provides the ability to read and write MFM-format disks. CP/M is one of the most widely used microcomputer operating systems, and vast amounts of public domain CP/M software are available on MFM disks. The IBM PC and compatible computers also use MFM disks.

The 1571's special capabilities are impressive, but using them from BASIC is not always so easy. Some of the most useful 1571 routines aren't designed for use with

Command Descriptions

There are 14 individual routines included in Program 3. Five of these serve as subroutines for the other nine user-callable subroutines. These five subroutines (SENDCMD, SPOUT, SPIN, CLKLO, and CLKHI) are not meant to be called directly from BASIC with SYS.

The following descriptions provide all the information needed to use these routines. The *Call address* specifies the entry point of the routine; to activate the routine, SYS to this address. The *Table address* shows the location of that command's data storage area. The *Format* section of each description details the function of each byte in the command's storage area. Note that some bits are common to all commands; they are detailed only in the description of the first command, *Read Sector*.

READ SECTOR

Purpose: Reads a sector from the currently logged disk and stores the data in the computer's memory

Call address: \$30F8 (12536)

Table address: \$3800-\$3806 (7 bytes)

Format: \$3802: Control byte

- bit 7 transfer data (1 = no transfer)
- bit 6 error ignore flag (1 = ignore error)
- bit 5 buffer transfer (1 = transfer buffer)
- bit 4 side select (MFM only—0 = front, 1 = back)
- bits 1-3 burst command (000 for Read Sector)
- bit 0 drive select (keep at 0 for all commands)

\$3803: Track to be read (0-35 for GCR or 0-39 for MFM)

\$3804: Sector to be read (range of valid values depends on format and mode)

\$3805: Number of sectors (must be more than zero)

\$3806: Next track (optional, normally unused)

Explanation: This routine reads a sector from the disk into the memory. Before this routine is called, the correct values should be placed in the instruction table by POKEing into locations \$3802-\$3806. You must also specify the addresses where the data read from disk is to be stored. Computing the length of this area is not difficult for GCR, since a GCR block always contains exactly 256 bytes. For MFM, however, the block length may vary from 128-1024 bytes. Make sure that the difference between the starting and ending addresses matches the number of bytes you expect the sector to contain. Store the low byte of the starting address in location \$FB and the high byte in location \$FC. Similarly, locations \$FD-\$FE must contain the low and high bytes of the ending address. You can calculate the low and high bytes of an address A with the statements $HI = INT(A/256)$ and $LO = A - HI * 256$, where HI is the high byte and LO is the low byte.

Example: None.

BASIC, and cannot be called directly with a SYS command. And the 1571 user's manual offers little information on how to use special features such as burst mode.

This article includes four programs which make the 1571's power easily accessible to BASIC programmers. Program 1 lets you copy MFM-format disks. Program 2 is a comprehensive "disk doctor" that permits you to read and alter any data found on an MFM disk. Program 3 is a machine language utility which makes it possible to access all burst mode routines with BASIC SYS commands. Program 4 is a machine language display routine used by Program 2.

Type in and save all four programs (be sure you have copies of all four on the the same disk). Programs 1 and 2 are ordinary BASIC programs. (To generate the {BELL} character in Program 1, hold down the CONTROL key and type a G.) Programs 3 and 4 are written in machine language and must be typed in with the Commodore 128 version of "MLX," the machine language entry program listed elsewhere in this issue. Be sure to read the MLX instructions carefully before you begin. Here are the addresses required to enter Programs 3 and 4 with MLX:

Program 3: BURST

Starting address: 3000
Ending address: 323F

Program 4: SCREEN

Starting address: 3400
Ending address: 349F

You *must* save Programs 3 and 4 with the filenames BURST and SCREEN, respectively. It's important to use these filenames because Programs 1 and 2 use them when attempting to load the programs from disk. Again, it's also important that you save Programs 3 and 4 on the same disk with Programs 1 and 2.

MFM Disk Copier

Program 1 makes copies of MFM-format disks, including both CP/M and IBM PC disks. It will not copy GCR-format Commodore disks, nor can it be used to duplicate copy-protected MFM-format disks. (Note that the master system disk for Commodore 128 CP/M isn't in true

WRITE SECTOR

Purpose: Write a sector from memory to the currently logged disk

Call address: \$3153 (12627) in bank 12-15

Table address: \$3807-\$380D (7 bytes)

Format: \$3809: Control byte

bits 4-7 same as Read Sector

bits 1-3 command (001 for write)

bit 0 same as Read Sector

\$380A-\$380D: same as Read Sector

Explanation: The format of this command is almost identical to that of Read Sector. The only difference is that it writes a block to the current disk.

Example: This program writes the contents of locations \$4000-\$40FF to track 20, sector 3 in GCR format.

```
10 B=DEC("3800"):POKE251,0:POKE253,0:POKE252,64:POKE254,65
20 POKE B+3,20:POKE B+4,3:POKE B+5,2
30 OPEN15,8,15:BANK 15:SYS DEC("3153"):END
```

INQUIRE DISK

Purpose: Log the disk in the drive

Call address: \$30E8 (12520) in bank 12-15

Table address: \$380E-\$3810 (3 bytes)

Format: \$3810: Control byte

bits 5-7 not used (can be any value)

bit 4 same as Read Sector

bits 1-3 command (010 for Inquire Disk)

bit 0 same as Read Sector

Explanation: This command logs a disk for use. Disks must be logged in before they are used. Information pertaining to the disk is returned in the status byte. The status byte indicates the disk's format (MFM or GCR), the number of bytes in each sector, and the drive's error status. If you wish to determine the format of the disk, use the command Query Disk Format, which returns more information.

Example: This line logs the disk and prints the status and format on the screen.

```
10 OPEN15,8,15:BANK 15:SYS DEC("30E8"):PRINT PEEK(250):END
```

FORMAT MFM

Purpose: Format an MFM disk

Call address: \$30EE (12526)

Table address: \$3811-\$381B (11 bytes)

Format: \$3813: Control byte

bit 7 partial format (1=partial)

bit 6 index mark written (1=written)

bit 5 double side select (1=format double side)

bit 4 side select (valid if bit 5=0)

bits 1-3 command (011 for MFM)

bit 0 same as Read Sector

\$3814: Control byte

bit 7 must be a 1

bit 6 must be a 0

bits 0-5 specify the logical starting sector

\$3815: Interleave byte (normally 0)

\$3816: Sector size (0 = 128 bytes, 1 = 256, 2 = 512, 3 = 1024)

\$3817: Last track (0 to 39, used for partial format)

\$3818: Number of sectors per track (standard is 26 for 128-byte sectors, 16 for 256-byte sectors, 9 for 512-byte sectors, and 5 for 1024-byte sectors.)

\$3819: Logical starting track (normally 0)

\$381A: Starting track offset (normally 0)

\$381B: Fill byte (value which to fill all sectors; normal value is \$E5)

Explanation: This command formats an MFM disk, which allows great flexibility. You may control the size of the sectors, the number of sectors

MFM format, and cannot be copied with this program.) When you run the program, it checks to see whether the burst utility routine (Program 3) is in memory, and loads it from disk if it is not. Follow the prompts on the screen and swap disks when indicated. The program automatically detects the format of the source disk and creates the same format on the destination disk. An 80-column monitor is required because the program uses the 128's FAST mode.

MFM Disk Utility

Program 2, "MFM Disk Utility," offers a number of useful features for manipulating the information on MFM disks. Note that it requires an 80-column display, since a 40-column screen doesn't have enough room to display the contents of an entire 1024-byte MFM disk sector. When you run the program, it loads both the BURST and SCREEN routines (Programs 3 and 4) from disk, if they aren't already in memory. Line 4 of the program is optional: Its only purpose is to make sure that the drive's read/write head is within the range of a GCR disk (tracks 1-35) before the main program begins.

The program has the standard features found in most disk utilities. With this program, you can examine the contents of any sector on an MFM-format disk, and change the data as desired. The program is self-prompting, so you won't need extensive instructions to use it. Simply respond to the prompts displayed on the screen. Here is a list of the program's functions:

- Log in new disk
- New block
- Rewrite block
- Move to next block
- Move to previous block
- Move to next track
- Move to previous track
- Change byte under cursor
- Text mode
- Double side select

You should always perform a *log in* operation when you insert a new disk in the drive. After logging in a new disk, you should use the New block option to select the first block before using the + or - keys to change blocks. The program dis-

per track, and the number of tracks per disk. You need not precede this command with an Inquire Disk or Query Disk Format command.

Example: The following will format an MFM disk with ten 512-byte sectors per track on both sides.

```
10 OPEN 15,8,15:B=DEC("3800"):POKE B+19,102:POKE B+22,2
20 POKE B+20,128:POKE B+24,10:BANK 15:SYS DEC("30EE"):END
```

FORMAT GCR

Purpose: Format a GCR disk

Call address: \$30E4 (12516) in bank 12-15

Table address: \$381C-\$3821 (6 bytes)

Format: \$381E: Control byte (must be \$06)

\$381F: Control byte (must be \$00)

\$3820-\$3821: ID characters (can be any value)

Explanation: Formats a disk in Commodore GCR (Group Code Recording) format. This command operates the same as a normal format but *does not write a directory to the disk*.

Example: Format a GCR disk with an ID of GC

```
10 OPEN 15,8,15:B=DEC("3800"):POKE B+32,71:POKE B+33,67
20 POKE B+30,6:POKE B+31,0:BANK 15:SYS DEC("30E4"):END
```

SECTOR INTERLEAVE

Purpose: Read or change the sector interleave factor used for multisector burst read and write

Call address: \$30C4 (12484) in bank 12-15

Table address: \$3822-\$3825 (4 bytes)

Format: \$3824: Control byte

bit 7 interleave read or write (0=write interleave, 1=read interleave)

bits 1-4 select command (0100 for sector interleave)

bit 0 same as Read Sector

\$3825 Interleave (interleave to be written to the drive; \$00 is normal)

Explanation: Reads or sets the interleave byte stored in the drive used for multisector reads or writes. The interleave byte is usually set to zero.

Example: Read and display the sector interleave.

```
10 OPEN 15,8,15:BANK 15:B=DEC("3800"):POKE B+36,136
20 SYS DEC("30C4"):SI=PEEK(250):PRINT SI:END
```

QUERY DISK FORMAT

Purpose: Determine the disk format on the specified track

Call address: \$3099 (12441) in bank 12-15

Table address: \$3826-\$3829 (4 bytes)

Format: \$3828 Control byte:

bit 7 step head flag (0=track 0)

bit 4 same as Read Sector

bits 1-3 select command (101 for Query Disk Format)

bit 0 same as Read Sector

\$3829 Track offset (if bit 7 of \$3828 is set to 1)

Explanation: Determines the format of any track on the disk. This command also logs in the disk so that it can be used. The status byte in \$FA (250) is updated to indicate any errors, the sector size of the disk (128, 256, 512, or 1024), and the disk's format (MFM or GCR). For an MFM disk, the routine returns additional information about the format in locations \$3700-\$3704 (14080-14084). Location \$3700 holds the number of sectors on the track; \$3701 holds the logical track number on the track; and \$3702 holds the minimum logical sector number (the sector with the lowest value address). Location \$3703 holds the maximum logical sector number (the sector with the highest value address); \$3704 holds the CP/M hard interleave found on the track. This data can be useful in finding the format of nonstandard MFM disks.

Example: Determine the format of track 10.

plays information about the format of the currently logged disk. The *double side select* operation lets you access the alternate side of a double-sided disk. You can't access the back side of an MFM disk by simply flipping it over, since that maneuver prevents the drive from finding the disk's index hole.

Burst Mode Utility

In addition to its use with Programs 1 and 2, Program 3 provides full access to the 1571's extra features—including burst mode commands—for anyone wishing to write disk-oriented programs. Although the program itself is written in machine language, you need not be a machine language expert to use it. All of the disk-handling routines can be accessed from BASIC with a SYS command. Of course, the routines can also be accessed from machine language if you wish.

Program 3 occupies memory locations 12288–12860 (\$3000–\$323C). Each burst utility command is activated by SYSing to a different location. For instance, the SYS address for the *Query Disk Format* routine is \$3099 (12441). To execute this routine, you can perform either SYS 12441 or SYS DEC("3099").

Program 3 also uses a small *command table* which begins at location \$3800 (14336). This table contains the actual commands which are sent to the drive to perform disk operations. To create the command table from BASIC, include the following lines in your program (this routine may be renumbered as needed):

```
1000 RESTORE:FOR I=DEC("3800")
    TO DEC("3800")+16*3-1
1010 READ A$:POKE I,DEC(A$):NEXT I:RETURN
1020 DATA 55,30,00,00,01,02,01,55,30,02,00,01,02,01,55,30
1030 DATA 04,55,30,06,81,00,02,27,0A,00,00,E5,55,30,06,00
1040 DATA 58,58,55,30,08,00,55,30,0A,00,55,30,8C,00,00,00
```

You can also generate the command table by calling the GEN TABLE routine contained in Program 3 (see below).

Many of the special disk commands require that you pass some information to the drive along with the command itself. For example, when you wish to read the contents

```
10 OPEN 15,8,15:BANK 15:B=DEC("3800"):POKE B+41,10
20 POKE B+40,138:SYS DEC("3099"):END
```

INQUIRE STATUS

Purpose: Read or write the status byte in the drive

Call address: \$3075 (12405) in bank 12–15

Table address: \$382A–\$382D (4 bytes)

Format: \$382C (14380) Control byte

bits 6–7 00=write new status

01=log in disk

10=read status

11=has disk been changed? (\$FA contains \$0B if changed)

bits 1–4 burst command (110 for Inquire Status)

bit 0 same as Read Sector

\$382D (14381) New status (status sent to the drive if \$382C bit 7 is 0)

Explanation: Reads or writes the status in the drive. The command can also be used to detect whether the disk has been swapped, and if it has, to log it in.

Example: Read and display the status from the drive.

```
10 OPEN 15,8,15:BANK 15:B=DEC("3800"):POKE B+44,140
20 SYS DEC("3075"):PRINT PEEK(250):END
```

SENDCMD

Purpose: Send a command to the disk drive

Call address: \$304A (12362) in bank 12–15

Table address: none

Format: none

Explanation: Sends a command to the disk drive. The Y and X registers must contain the high and low byte, respectively, of the address for the character string which comprises the command. The A register must contain the length of the command. This subroutine is called by all the burst utility commands. For the subroutine to function properly, the disk command channel must be open to logical file 15 (OPEN 15,8,15).

Example: Send a Query Disk Format command.

```
10 OPEN 15,8,15:BANK 15:SYS DEC("304A"),4,38,56:END
```

SPIN

Purpose: Prepares the serial bus for fast serial input

Call address: \$3025 (12325) in banks where the I/O block is visible (for example, bank 15)

Table address: none

Format: none

Explanation: For standard (slow) data transfers, the 128's serial bus is bidirectional—data is free to flow either in or out. However, the bus has extra circuitry to enforce the direction of data flow for fast (burst mode) transfers. This subroutine, intended for use by other burst utility routines, sets up the serial bus for fast input.

Example: Prepares bus for fast input.

```
10 SYS DEC("3025"):END
```

SPOUT

Purpose: Prepares the serial bus for fast serial output

Call address: \$3000 (12288) in banks where the I/O block is visible (for example, bank 15)

Table address: none

Format: none

Explanation: See the explanation above for the SPIN routine. This routine sets up the serial bus for fast output.

Example: Prepares bus for fast output.

```
10 SYS DEC("3000"):END
```

of a sector, you must tell the drive which sector to read. The command table contains a storage area for each command. Before you activate a command with SYS, you must POKE the data needed by that command into the corresponding storage area for that command. The descriptions at the end of this article contain all the details you need to call the 14 routines provided by Program 3.

To see how this works, let's call the *Read Sector* routine. The description for this routine indicates that its storage area is at locations \$3802-\$3086. In addition to placing information in that area, you must indicate the starting and ending addresses of the memory area where you wish to store the data from the disk sector. The addresses are stored in locations \$FB-\$FC and \$FD-\$FE, respectively, using standard low-byte/high-byte format. The following program segment calls *Read Sector* to read the contents of track 10, sector 1 into memory at \$4000 (it assumes you are reading a GCR disk).

```
10 B=DEC("3800"):POKE251,0:POK
E253,0:POKE252,64:POKE254,6
5
20 POKE B+3,10:POKE B+4,1:POKE
B+5,2
30 OPEN15,8,15:BANK 15:SYS DEC
("30F8"):END
```

Program 1: MFM Disk Copier

For instructions on entering this program, please refer to "COMPUTE!'s Guide to Typing In Programs" elsewhere in this issue.

```
QF 1 REM COPYRIGHT 1987 COMPUT
E1 PUBLICATIONS, INC.
{2 SPACES}ALL RIGHTS RESE
RVED.
PF 2 PRINT"{CLR}COPYRIGHT 1987
":PRINT"COMPUTE! PUBLICAT
IONS, INC.":PRINT"ALL RIG
HTS RESERVED.":FORX=1TO10
00:NEXT
CJ 10 OPEN15,8,15
FB 20 FAST
MQ 30 BANK15
KK 40 PRINT"{CLR}{4 TAB}MFM DI
SK COPIER"
FB 45 IFPEEK(DEC("3800"))=85TH
ENGOTO60
DX 50 BLOAD"BURST"
XF 60 SYSDEC("3200")
PX 70 S$="{BELL}{CLR}INSERT SO
URCE DISK"
XB 80 D$="{BELL}INSERT DESTINA
TION DISK"
KG 90 E$="{BELL}{CLR}ERRORS: "
QF 100 PRINT:PRINT"{BELL}INSE
R T SOURCE DISK"
MR 110 GETA$:IFA$<>CHR$(13)THE
NGOTO110
FK 115 POKED("3828"),26:SYSD
```

CLKLO

Purpose: Set the serial bus clock line to a low state

Call Address: \$3038 (12344) in banks where the I/O block is visible (for example, bank 15)

Table address: none

Format: none

Explanation: Sets the serial bus clock line output to a low state (0 volts). This subroutine is intended for use by other burst utility routines.

Example: Bus clock line output set to a low state.

```
10 SYS DEC("3038"):END
```

CLKHI

Purpose: Set the serial bus clock line to a high state

Call address: \$3041 (12353) in banks where the I/O block is visible (for example, bank 15)

Table address: none

Format: none

Explanation: Sets the serial bus clock line output to a high state (+5 volts). This subroutine is intended for use by other burst utility routines.

Example: Bus clock line output set to a high state.

```
10 SYS DEC("3041"):END
```

GEN TABLE

Purpose: Generates the command table at \$3800 required for the other BURST subroutines

Call address: \$3200 (12800) in banks with block 0 RAM

Table address: none

Format: none

Explanation: Creates the command table at \$3800. The table can also be generated using the BASIC program shown above.

Example: Generates the command table at \$3800.

```
10 SYS DEC("3200"):END
```

```
EC("3099"):A=PEEK(250):
A=AAND15:IFA<2THENBS=1:
ELSEBS=0
PX 116 POKE DEC("3828"),10
SM 120 SYSDEC("3099"):SB=PEEK(
250):SI=0
RC 130 TD=SBAND128
KM 140 IFSB=0THENPRINT:PRINT"I
DONT COPY GCR DISKS":C
LOSE15:RUN
MK 150 PRINT"MFM FORMAT"
MJ 160 BL=SBAND48
RA 170 IFBL=0THENP1=0:BY=128
BR 180 IFBL=16THENP1=1:BY=256
MF 190 IFBL=32THENP1=2:BY=512
PH 200 IFBL=48THENP1=3:BY=1024
QE 205 P2=PEEK(DEC("3700"))
HX 210 B=DEC("3800")
BX 220 POKEB+22,P1:POKEB+24,P2
CK 230 PRINTBY"BYTE SECTORS"P2
"SECTORS PER TRACK"
AF 270 PRINT:PRINTD$
QK 280 GETA$:IFA$<>CHR$(13)THE
NGOTO280
EF 290 PRINT:PRINT"{3 BELL}FOR
MATTING..."
EC 294 SL=DEC("3900"):SA=252:E
A=254:POKE251,0:POKE253
,0:IFBS=1THENPOKEDEC("3
813"),38:POKEDEC("3813"
),PEEK(DEC("3813"))OR64
RE 300 SYSDEC("30EE"):CLOSE15:
OPEN15,8,15
DP 310 FORD=00TO39STEPINT(144/
P2/BY*256)
HM 320 PRINT:PRINTS$
QE 330 GETA$:IFA$<>CHR$(13)THE
NGOTO330:ELSESYSDEC("30
99")
KS 335 TL=INT(144/P2/BY*256)-1
CX 340 SL=DEC("3900"):DL=SL
QG 350 FORT=0TOTL
KB 360 FORS=1TOP2
AD 370 GOSUB3000:POKESA,HI:POK
ESA-1,LO:SL=SL+BY:GOSUB
3000:POKEEA,HI:POKEEA-1
,LO
AE 380 POKEB+3,T+D:POKEB+4,S:P
OKEB+5,2:POKEB+6,T+D+1
GB 390 PRINTSI"{LEFT}R:"T+D"
{LEFT}{2 SPACES}"S"
{LEFT}{2 SPACES}{UP}"
QX 400 SYSDEC("30F8")
MH 410 IFT+D>38ANDS+1>P2THENGO
TO420:ELSENEXT:NEXT
DC 420 PRINT:PRINTD$
AP 425 TL=INT(144/P2/BY*256)-1
DQ 430 GETA$:IFA$<>CHR$(13)THE
NGOTO430:ELSESYSDEC("30
99")
PQ 440 FORT=0TOTL
GE 450 FORS=1TOP2
MS 460 GOSUB3010:POKESA,HI:POK
ESA-1,LO:DL=DL+BY:GOSUB
3010:POKEEA,HI:POKEEA-1
,LO
FJ 470 POKEB+10,T+D:POKEB+11,S
:POKEB+12,0:POKEB+13,T+
D+1
RH 480 PRINTSI"{LEFT}W:"T+D"
```



```

      {LEFT}{2 SPACES}"S"
      {LEFT}{2 SPACES}{UP}"
CS 490 BANK15:SYSDEC("3153"):B
      ANK15
FH 500 IFT+D>38ANDS+1>P2THENGO
      TO505:ELSENEXT:NEXT:NEX
      T
XR 505 IFBS=1ANDSI=0THENGOTO52
      0
DR 510 PRINT"{CLR}{3 BELL}COPY
      COMPLETE...":SLEEP4:RU
      N
ES 520 POKEDEC("3802"),16:POKE
      DEC("3809"),18:POKEDEC(
      "3828"),26
HC 530 SL=DEC("3900"):SA=252:E
      A=254:POKE251,0:POKE253
      ,0:SI=1
RE 540 GOTO310
SJ 3000 HI=INT(SL/256):LO=SL-H
      I*256:RETURN
JJ 3010 HI=INT(DL/256):LO=DL-H
      I*256:RETURN

```

Program 2: MFM Disk Utility

For instructions on entering this program, please refer to "COMPUTE!'s Guide to Typing In Programs" elsewhere in this issue.

```

QF 1 REM COPYRIGHT 1987 COMPUT
      E1 PUBLICATIONS, INC.
      {3 SPACES}ALL RIGHTS RESE
      RVED.
PF 2 PRINT"{CLR}COPYRIGHT 1987
      ":PRINT"COMPUTE1 PUBLICAT
      IONS, INC.":PRINT"ALL RIG
      HTS RESERVED.":FORX=1TO10
      00:NEXT
DQ 3 BANK15
QE 4 DCLEAR:A$=DS$
AM 5 PRINTCHR$(14)
AK 6 RZ$=CHR$(19):FOR J=1 TO 1
      4:RZ$=RZ$+CHR$(17):NEXT
SA 10 FAST
XJ 20 OPEN15,8,15
HF 30 PRINT"{CLR}{15 DOWN}[L]O
      G IN NEW DISK"
XD 40 PRINT"[N]EW BLOCK"
HR 50 PRINT"[R]EWRITE BLOCK"
BB 60 PRINT"[+]NEXT BLOCK"
DP 70 PRINT"[-]PREVIOUS BLOCK"
GK 80 PRINT"[+]NEXT TRACK"
KX 90 PRINT"[-]PREVIOUS TRACK"
EG 100 PRINT"[C]HANGE BYTE UND
      ER CURSOR"
KH 110 PRINT"[T]EXT MODE"
RA 115 PRINT"[D]OUBLE SIDE SEL
      ECT{HOME}"
PS 120 PRINT"{HOME}{15 DOWN}
      {40 RIGHT}DISK INFO:
      {2 SPACES}MFM/GCR:"
PB 130 PRINT"{52 RIGHT}BYTES P
      ER BLOCK:"
JF 140 PRINT"{52 RIGHT}BLOCKS
      {SPACE}PER TRACK:"
DR 145 IFPEEK(DEC("3800"))=85T
      HENGOTO170
JD 150 BLOAD"BURST"
HB 160 BLOAD"SCREEN"
SC 170 POKE14302,00:POKE14303,
      45
JM 180 SYS13433:SYS13418
HB 190 B=DEC("3800"):SA=252:EN
      =254:CP=0:SI=1:CS=0
DJ 195 SYSDEC("3200")
EQ 200 POKE251,0:POKE253,0:POK
      E252,44:POKE254,46:POKE
      B+2,0:POKEB+9,2
MA 210 GOSUB 1420
AF 211 GETB$:IFB$=""THENGOTO21
      1

```

```

BG 220 IFB$<"L"THEN380
ED 230 SYSDEC("3099"):SYS13433
DS 240 SU=PEEK(250)
PR 250 A$="" :FORF=0TO70:A$=A$+
      "{RIGHT}":NEXT
MC 260 PRINT"{HOME}{14 DOWN}"
RS 270 PRINTA$;:PU=SUAND128
XR 280 IFPU=128THENP$=" MFM":E
      LSEP$=" GCR":SU=16
XS 290 PRINTP$
MQ 300 PRINTA$;
BK 310 AU=SUAND48:POKE14302,0
FB 320 IFAU=0THENBY=128:POKE14
      302,80:POKE14303,44
MJ 330 IFAU=16THENBY=256:POKE1
      4303,45
AM 340 IFAU=48THENBY=1024:POKE
      14303,48
JE 350 IFAU=32THENBY=512:POKE1
      4303,46
GH 351 BL=PEEK(DEC("3700"))
RB 352 IFPU>128THENBL=20:T=1:
      S=-1
KF 355 PRINT"{5 SPACES}":PRINT
      A$;"{5 SPACES}"
PR 356 PRINT"{2 UP}";A$;
PQ 360 PRINTBY:PRINTA$;BL
MK 370 GOTO210
ES 380 IFB$<"N"THENGOTO500
JG 390 PRINT"{HOME}{19 DOWN}";
AD 400 A$="" :FORF=1TO40:A$=A$+
      "{RIGHT}":NEXT
PA 410 PRINTA$"TRACK";:INPUT:
      PRINTA$"BLOCK";:INPUTS
CK 420 PRINT"{2 UP}"A$"
      {17 SPACES}":PRINTA$"
      {20 SPACES}"
MD 430 POKEB+3,T:POKEB+4,S:SYS
      13433:POKESA,42
AP 431 PRINT"{HOME}{22 DOWN}";
      LEFT$(A$,40);"TRACK
      {5 SPACES}{5 LEFT}";T
XD 432 PRINTLEFT$(A$,40);"BLOC
      K{5 SPACES}{5 LEFT}";S
EA 433 PRINTLEFT$(A$,40);"SIDE
      {6 SPACES}{5 LEFT}";CS;
CC 435 POKEEN-1,0:POKESA-1,0:P
      OKESA,44
PE 440 IFBY=128THENPOKEEN,44:P
      OKEEN-1,80
MA 450 IFBY=256THENPOKEEN,45
XH 460 IFBY=512THENPOKEEN,46
CG 470 IFBY=1024THENPOKEEN,48
XB 480 SYSDEC("30F8")
DD 485 C=0:PRINT"{HOME}";
SB 490 GOTO210
RH 500 IFB$<"+"THENGOTO580
CH 510 IFSI=1THENS=S+1:GOTO515
BE 511 CS=CS+1:CS=CSAND1:AV=16
      *CS:POKEB+2,AV:POKEB+9,
      AV+2
EG 512 IFCS=0THENS=S+1
MP 515 IFPU=0THENGOTO550
RB 520 IFS>BLTHENT=T+1:S=1
MK 530 IFT>39THENT=0
DF 540 GOTO430
BP 550 IFS>20THENT=T+1:S=0
MS 560 IFT>35THENT=1
XJ 570 GOTO430
GX 580 IFB$<"-"THENGOTO670
BH 590 IFSI=1THENS=S-1:GOTO600
DX 591 CS=CS-1:CS=CSAND1:AV=16
      *CS:POKEB+2,AV:POKEB+9,
      AV+2
PX 592 IFCS=1THENS=S-1
SX 600 IFPU=0THENGOTO640
CF 610 IFS<1THENT=T-1:S=BL
PK 620 IFT<0THENT=39
MP 630 GOTO430
MD 640 IFS<0THENT=T-1:S=20
XJ 650 IFT<1THENT=35

```

```

GR 660 GOTO430
JB 670 IFB$<"+"THENGOTO740
HA 680 T=T+1
FC 690 IFPU=0THENGOTO720
DE 700 IFT>39THENT=0
CB 710 GOTO430
XE 720 IFT>35THENT=1
MA 730 GOTO430
SQ 740 IFB$<"-"THENGOTO810
AF 750 T=T-1
XR 760 IFPU=0THENGOTO790
KH 770 IFT<0THENT=39
GE 780 GOTO430
KB 790 IFT<1THENT=35
PE 800 GOTO430
AE 810 IFB$<"R"THENGOTO930
PC 820 PRINT"{HOME}{19 DOWN}"L
      EFT$(A$,40);"ARE YOU SU
      RE?";
SE 830 GETB$:IFB$=""THENGOTO83
      0
AA 835 PRINT"{17 LEFT}
      {20 SPACES}"
DX 840 IFB$<"Y"THENGOTO210
PA 850 POKE251,0:POKE253,0:POK
      ESA,44
PP 860 IFAU=0THENPOKEEN,44:POK
      EEN-1,80
CP 870 IFAU=16THENPOKEEN,45
SE 880 IFAU=32THENPOKEEN,46
XQ 890 IFAU=48THENPOKEEN,48
DK 900 POKEB+10,T:POKEB+11,S
EK 910 SYSDEC("3153")
GM 920 GOTO210
PP 930 IFB$<"{"DOWN}"THENGOTO9
      60
MM 940 R=INT(C/80):IFC+80>BY-1
      THENGOTO210
QE 950 PRINT"{DOWN}";:C=C+80:G
      OTO210
XM 960 IFB$<"{"UP}"THENGOTO990
EP 970 R=INT(C/80):IFR=0THENGO
      TO210
HD 980 PRINT"{UP}";:C=C-80:GOT
      O210
AA 990 IFB$<"{"RIGHT}"THENGOTO
      1020
BE 1000 IFC=BY-1THENGOTO210
FP 1010 PRINT"{RIGHT}";:C=C+1:
      GOTO210
XA 1020 IFB$<"{"LEFT}"THENGOTO
      1050
AR 1030 IFC=0THENGOTO210
GR 1040 PRINT"{LEFT}";:C=C-1:G
      OTO210
GG 1050 IFB$<"{"HOME}"THENGOTO
      1070
EK 1060 PRINT"{HOME}";:C=0:GOT
      O210
DQ 1070 IFB$<"{"C"THENGOTO1160
QH 1080 PRINT"{HOME}{19 DOWN}"
      LEFT$(A$,40)"NEW VALUE
      ";:INPUTNV
PS 1090 PRINTLEFT$(A$,40)"{"UP}
      {10 SPACES}"
BE 1100 POKE11264+C,NV:R=INT(C
      /80):O=C-R*80:M=INT(O/
      8):L=O-M*8
RQ 1110 PRINT"{HOME}";:IFR=0TH
      ENGOTO1130
SP 1120 FORF=1TOR:PRINT"{DOWN}
      ";:NEXT
KS 1130 IFM=0THENGOTO1150
MX 1140 FORF=1TOM:PRINTCHR$(9)
      ;:NEXT
EX 1150 IFL=0THENGOTO1000:ELSE
      FORF=1TOL:PRINT"
      {RIGHT}";:NEXT:GOTO1000
      0
XK 1160 IFB$<"{"T"THENGOTO1350
BX 1170 PRINT"{HOME}{19 DOWN}"

```

```

LEFT$(A$,40)"RETURN TO
EXIT";
AP 1180 R=INT(C/80):O=C-R*80:M
=INT(O/8):L=O-M*8
GB 1190 PRINT"{HOME}";:IFR=0TH
ENGOTO1210
BH 1200 FORF=1TOR:PRINT"{DOWN}
";:NEXT
BD 1210 IFM=0THENGOTO1230
GC 1220 FORF=1TOM:PRINTCHR$(9)
;:NEXT
JQ 1230 IFL=0THENGOTO1240:ELSE
FORF=1TOL:PRINT"
{RIGHT}";:NEXT
MX 1240 GETB$:IFB$=""THENGOTO1
240
XP 1250 A=ASC(B$):IFA=13THENGO
TO1270:ELSEPOKE11264+C
,A:IFC=BY-1THENPRINT"
{HOME}";:C=0:GOTO1240
XB 1260 C=C+1:PRINT"{RIGHT}";:
GOTO1240
RX 1270 PRINT"{HOME}{19 DOWN}"
LEFT$(A$,40)"
{16 SPACES}";
SF 1280 R=INT(C/80):O=C-R*80:M
=INT(O/8):L=O-M*8
JK 1290 PRINT"{HOME}";:IFR=0TH
ENGOTO1310
PS 1300 FORF=1TOR:PRINT"{DOWN}
";:NEXT
JP 1310 IFM=0THENGOTO1330
RJ 1320 FORF=1TOM:PRINTCHR$(9)
;:NEXT
AE 1330 IFL=0THENGOTO1340:ELSE
FORF=1TOL:PRINT"
{RIGHT}";:NEXT
JX 1340 GOTO210
FQ 1350 IFB$<>"D"THENGOTO210
KS 1360 IFSITHENGOTO1380
AH 1370 SI=1:P$="DOUBLE SIDE O
FF":GOTO1390
RK 1380 SI=0:P$="DOUBLE SIDE O
N"
ES 1390 PRINT"{HOME}{20 DOWN}"
LEFT$(A$,40)P$;
SK 1400 SLEEP1
QJ 1410 PRINT"{20 LEFT}
{22 SPACES}";:GOTO210
DG 1420 PRINT RZ$;:RETURN

```

Program 3: BURST

Please refer to the "MLX" article elsewhere in this issue before entering the following program.

```

3000:AD 05 D5 09 08 8D 05 D5 1A
3008:A9 7F 8D 0D DC A9 00 8D BA
3010:05 DC A9 03 8D 04 DC AD 73
3018:0E DC 29 80 09 55 8D 0E AA
3020:DC 2C 0D DC 60 AD 0E DC 1C
3028:29 80 09 08 8D 0E DC AD EA
3030:05 D5 29 F7 8D 05 D5 60 B9
3038:AD 00 DD 09 10 8D 00 DD 50
3040:60 AD 00 DD 29 EF 8D 00 3E
3048:DD 60 8C 66 30 8E 65 30 5E
3050:A8 A9 00 85 FA AD 1C 0A 98
3058:29 BF 8D 1C 0A A2 0F 20 C9
3060:C9 FF A2 00 BD 26 38 20 11
3068:A8 FF E8 88 D0 F6 20 CC 32
3070:FF 2C 1C 0A 60 A2 2A A0 82
3078:38 A9 04 20 4A 30 20 25 5A
3080:30 2C 0D DC 20 38 30 A9 5F
3088:08 2C 0D DC F0 FB AD 0C 46
3090:DC 85 FA AA 20 41 30 8A BB
3098:60 A2 26 A0 38 A9 04 20 31
30A0:4A 30 20 DF 31 85 FA 29 F2
30A8:80 10 18 A5 FA 29 15 C9 1B
30B0:02 90 00 A9 00 85 FB A9 88
30B8:05 85 FD A9 37 85 FC 85 A6
30C0:FE D0 3E 60 A2 22 A0 38 B9

```

```

30C8:AD 24 38 29 80 D0 05 A9 9D
30D0:04 4C D6 30 A9 03 20 4A 08
30D8:30 AD 24 38 29 80 F0 03 F4
30E0:20 75 30 60 A2 1C A0 38 B9
30E8:A9 06 20 4A 30 60 A2 11 A1
30F0:A0 38 A9 0A 20 4A 30 60 70
30F8:A2 00 A0 38 A9 07 20 4A 36
3100:30 78 2C 0D DC AD 00 DD 6A
3108:49 10 8D 00 DD A9 08 2C 96
3110:0D DC F0 FB AD 00 DD 49 80
3118:10 8D 00 DD AD 0C DC 85 A0
3120:FA 29 0F C9 02 B0 2A A0 90
3128:00 A9 08 2C 0D DC F0 FB 72
3130:AD 00 DD 49 10 8D 00 DD 4E
3138:AD 0C DC 91 FB E6 FB D0 6D
3140:02 E6 FC A5 FD C5 FB D0 27
3148:E0 A5 FE C5 FC D0 DA 58 F9
3150:60 58 60 A2 07 A0 38 A9 04
3158:06 20 4A 30 4C A1 31 8D EA
3160:EF 37 A0 00 20 00 30 AD AB
3168:00 DD CD 00 DD D0 F8 4D 6D
3170:EF 37 29 40 F0 F1 AD EF 5C
3178:37 49 40 8D EF 37 B1 FB 65
3180:8D 0C DC A9 08 2C 0D DC CA
3188:F0 FB E6 FB D0 02 E6 FC 58
3190:A5 FE C5 FC D0 D1 A5 FD 25
3198:C5 FB D0 CB 4C AC 31 58 83
31A0:60 78 A9 3E 8D 00 FF A9 80
31A8:40 4C 5F 31 A9 00 8D 00 A5
31B0:FF 20 C6 31 EE 20 D0 AD 4E
31B8:0A 38 8D EF 37 AD 0B 38 9D
31C0:8D EE 37 4C 9F 31 20 25 78
31C8:30 2C 0D DC 20 38 30 A9 A9
31D0:08 2C 0D DC F0 FB AD 0C 90
31D8:DC 85 FA 20 41 30 60 20 18
31E0:25 30 2C 0D DC 20 38 30 40
31E8:A9 08 2C 0D DC F0 FB AD C8
31F0:0C DC 60 EA AD 00 DD 49 BD
31F8:10 8D 00 DD AD 0C DC 60 5C
3200:A2 2F BD 0C 32 9D 00 38 3A
3208:CA 10 F7 60 55 30 00 00 46
3210:01 02 01 55 30 02 00 01 75
3218:02 01 55 30 04 55 30 06 47
3220:81 00 01 27 10 00 00 E5 3E
3228:55 30 06 00 58 58 55 30 03
3230:08 00 55 30 0A 00 55 30 71
3238:8C 00 00 00 00 00 00 00 E2

```

Program 4: SCREEN

Please refer to the "MLX" article elsewhere in this issue before entering the following program.

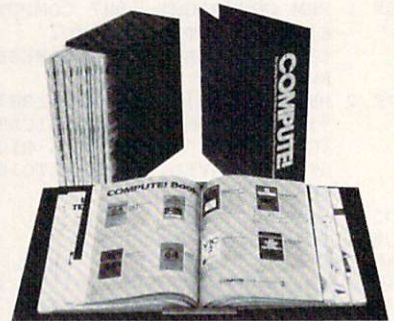
```

3400:A2 12 20 DA CD 8D D0 37 6D
3408:A2 13 20 DA CD 8D D1 37 B7
3410:A2 0A 20 DA CD 8D D2 37 7F
3418:A9 00 A2 12 20 CC CD E8 83
3420:20 CC CD A2 7F A9 00 20 72
3428:CC CD A9 2C 8D 36 34 A9 B9
3430:00 8D 35 34 AD 00 2E 20 CF
3438:CA CD EE 35 34 D0 03 EE 84
3440:36 34 AD 35 34 CD DE 37 A7
3448:D0 EA AD 36 34 CD DF 37 BC
3450:D0 E2 AD D0 37 A2 12 20 25
3458:CC CD E8 AD D1 37 20 CC 0B
3460:CD A9 60 EA A2 0A 20 CC 1F
3468:CD 4C 65 FA 78 A9 34 8D 87
3470:15 03 A9 8D 8D 14 03 58 4D
3478:60 A2 00 A9 20 9D 00 2F FA
3480:9D 00 2C 9D 00 2D 9D 00 07
3488:2E E8 D0 F1 60 CE CF 37 90
3490:F0 03 4C 65 FA A9 05 8D 28
3498:CF 37 4C 00 34 00 00 00 E1

```

Save Your Copies of COMPUTE!

Protect your back issues of *COMPUTE!* in durable binders or library cases. Each binder or case is custom-made in flag-blue binding with embossed white lettering. Each holds a year of *COMPUTE!*. Order several and keep your issues of *COMPUTE!* neatly organized for quick reference. (These binders make great gifts, too!)



Binders

\$8.50 each;
3 for \$24.75;
6 for \$48.00

Cases:

\$6.95 each;
3 for \$20.00;
6 for \$36.00

(Please add \$2.50 per unit for orders outside the U.S.)

Send in your prepaid order with the attached coupon

Mail to: Jesse Jones Industries
P.O. Box 5120
Dept. Code COTE
Philadelphia, PA 19141

Please send me _____ COM-
PUTE! cases binders.
Enclosed is my check or money
order for \$ _____. (U.S. funds
only.)

Name _____
Address _____
City _____
State _____ Zip _____

Satisfaction guaranteed or money
refunded.
Please allow 4-6 weeks for delivery.

Medium-Resolution Autorun For Atari ST

Brian McCorkle

This compact program allows you to run Atari ST programs from the AUTO folder in medium resolution.

The AUTO folder on the Atari ST is a handy device. When you turn on the ST, the computer looks on the disk in drive A: for a folder (subdirectory) named AUTO. If AUTO exists, the ST automatically runs every program it finds in that folder. One of the most common uses of the AUTO folder is to run programs that allow you to set the time and date or that set up a RAMdisk in the computer's memory.

The AUTO folder has some significant limitations, however. First, because the ST runs programs from AUTO before it installs the GEM graphics interface, you cannot autorun any GEM program. (A GEM program is one such as *First Word*, which uses the ST's mouse, windows, menus, and icons. All GEM programs end with the filename extension .PRG, but it also is possible for a non-GEM program to have that extension. Files that end with .TOS or .TTP are never GEM programs.)

Secondly, if you have a color monitor, the ST always autoruns programs in the low-resolution (320 x 200) screen. This screen has only 40 columns for text, which is inconvenient for applications such as word processing.

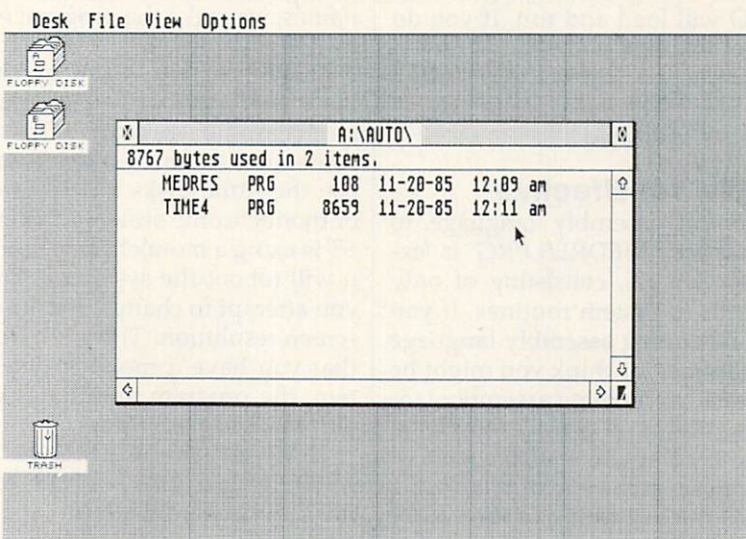
"Medium-Resolution Autorun" allows you to autorun programs in medium resolution, with a full 80-column screen. Boot ST BASIC, type in the program from the listing, save a copy, and then run it. The BASIC program creates an executable program file named MEDRES.PRG. (Because the BASIC program creates a file named MEDRES.PRG, *be sure that you do not use that name for the BASIC program itself.*) An internal checksum is used to detect typing errors. If the program signals an error, check all of your typing carefully, especially the DATA lines.

Inside the AUTO Folder

Once you have created MEDRES.PRG, select the disk on which it is to be used. If the disk does not already have an AUTO folder, create one now with the New Folder option from the desktop. (Click twice on the disk icon to open its directory window, then move the pointer to the File menu and select New Folder. When the dialog box appears, type AUTO and press Return.)

It is *very important* that MEDRES.PRG be the first program placed in the AUTO folder. This is necessary because the order in

AUTO Folder Example



which files are run from AUTO is determined by their times of creation. The program with the earliest time and date runs first; the next earliest program runs second, and so on.

Thus, if you have just created the AUTO folder, be sure to copy MEDRES.PRG to that folder before putting any other programs there. If AUTO already exists, you should remove everything else from the folder, copy MEDRES.PRG to the folder, and then return the other programs to AUTO. The act of copying a file to a new place gives it a new time and date.

Although the ST's internal clock keeps time with an accuracy of two seconds, the time-stamping of files is accurate only to within one minute. To be absolutely certain that the AUTO folder will work correctly, you should allow at least two minutes to elapse between the time that you place each file in AUTO. This ensures that the ST will have no difficulty deciding the correct order in which to run the programs.

The figure illustrates an example AUTO folder. In this case we have copied MEDRES.PRG into the folder first, followed by SET-TIME.PRG, a short program that lets you set the time and date. Notice the difference in creation times between the two files. This AUTO folder will work correctly because MEDRES.PRG has an earlier time and date than SETTIME.PRG.

Once you have set up the disk, press the reset button to try it out. The disk drive spins as MEDRES.PRG loads and executes, then the other program or programs in AUTO will load and run. If you do not get the expected results, reread the instructions carefully and make sure you have set up the AUTO folder as indicated.

Simple Yet Effective

Written in assembly language to save space, MEDRES.PRG is extremely simple, consisting of only five calls to system routines. If you are a beginning assembly language programmer, or think you might be interested in learning assembly language, this is a good example to study. A complete source code listing appears at the end of this article.

At the beginning of the source code are three equate (equ) state-

Source Code Listing

```

*
* MEDRES.PRG for Atari ST.
* Boot in medium resolution from the AUTO folder.
*
* Copyright 1987 COMPUTE! Publications, Inc.
* All rights reserved
*
GEMDOS equ 1
BIOS equ 13
XBIOS equ 14

.text

* See whether we're running on a monochrome system
move.w #4,-(sp) * Getrez, XBIOS function 4
trap #XBIOS * Perform XBIOS trap
addq.l #2,sp * Clean up stack
cmpi.w #2,d0 * 2 = high resolution
beq skip * Don't run on a mono system

* Shift to medium resolution
move.w #1,-(sp) * 1 = medium resolution
move.l #-1,-(sp) * Retain same physical screen base
move.l #-1,-(sp) * Retain same logical screen base
move.w #5,-(sp) * Setscreen, XBIOS function 5
trap #XBIOS * Perform XBIOS trap
add.l #12,sp * Clean up stack

* Turn on flashing cursor
move.w #40,-(sp) * Flashing cursor
move.w #1,-(sp) * Enable cursor
move.w #21,-(sp) * Cursconf, XBIOS function 21
trap #XBIOS * Perform XBIOS trap
addq.l #6,sp * Clean up stack

* Set text color to black (otherwise, it ends up yellow)
move.w #0,-(sp) * Black color
move.w #3,-(sp) * Color #3
move.w #7,-(sp) * Setcolor, XBIOS function 7
trap #XBIOS * XBIOS trap
addq.l #6,sp * Clean up stack

skip:

* Terminate program and release our memory to the system
clr.l -(sp) * Term, GEMDOS function 0
trap #GEMDOS * Perform GEMDOS trap

.end

```

ments which define constant values that appear later in the program. By giving these numbers meaningful names, we make the program easier to understand.

The program begins by checking to see whether you are using a monochrome monitor. This is a convenience which allows you to use the same disks on either color or monochrome systems. When the ST is using a monochrome monitor, it will reboot the system whenever you attempt to change to a different screen resolution. Thus, if it detects that you have a monochrome system, the program terminates without changing anything.

All of the GEMDOS and XBIOS calls in this program follow the same general pattern. First, you must push onto the microproces-

sor's stack whatever information the system routine needs to work. (The expression *sp* stands for the stack pointer, which is actually processor register A7.) Second, you push the number, or opcode, of the routine you wish to execute. Third, you execute a *trap* instruction to invoke the system routine. Different categories of routines use different trap numbers. Finally, after returning from the routine, you must clean up the stack by adding as many bytes as you previously pushed onto it.

When a system routine returns information to you, that information usually appears in the microprocessor registers D0 and A0. Thus, after executing the first system routine, we look at the number contained in register D0. The

cmpi.w instruction checks whether the value in D0 is equal to 2, which stands for a monochrome (high-resolution) monitor.

The second system call shifts the computer into medium resolution. The first value pushed onto the stack is 1, which stands for medium resolution. This routine also allows you to change the physical base or logical base of the display screen. Since we don't want to change the screen, we push the value -1 for each of these parameters.

The third system call controls the cursor. The first value pushed on the stack makes the cursor flash and the second makes it visible.

The fourth system call sets the text color to black. If this were not done, the computer would use the low-resolution palette and color assignments, which would create yellow text on white background.

The final system call terminates the program. While there are other ways to terminate ST programs, this is the simplest and probably the most common. All the memory which our program used is released to the system, which takes back control of the computer.

Medium Resolution Autorun For ST

```
100 rem "MEDRES.PRG" filemaker
110 rem Copyright 1987 COMPUTE
    Publications, Inc.
120 rem All rights reserved.
130 data 60,1A,00,00,00,00,4E
140 data 00,00,00,00,00,00
150 data 00,00,00,00,00,00
160 data 00,00,00,00,00,00
170 data 00,00,00,00,3F,3C
180 data 00,04,4E,4E,54,8F
190 data 0C,40,00,02,67,3C
200 data 3F,3C,00,01,2F,3C
210 data FF,FF,FF,FF,2F,3C
220 data FF,FF,FF,FF,3F,3C
230 data 00,05,4E,4E,DF,FC
240 data 00,00,00,0C,3F,3C
250 data 00,2B,3F,3C,00,01
260 data 3F,3C,00,15,4E,4E
270 data 5C,8F,3F,3C,00,00
280 data 3F,3C,00,03,3F,3C
290 data 00,07,4E,4E,5C,8F
300 data 42,A7,4E,41,00,00
310 close:open "R",1,"\\MEDRES.
    PRG",6
320 field #1,6 as x$
330 for j=1 to 18
340 y$="":for k=1 to 6
350 read z$:byt=val("&H"+z$):y
    $=y$+chr$(byt)
360 c=c+1:chk=chk+c+byt:next
370 lset x$=y$:r=r+1:put 1,r:n
    ext
380 close:if chk=11954 then en
    d
390 print "Typing error in DAT
    A":kill "\\MEDRES.PRG" ©
```

Text File Splitter For Atari

Frank P. Walters

This Atari utility is especially useful for telecommunications buffs who download long text files to disk. It splits any text file—including those created by SpeedScript—into shorter files for more convenient use.

Have you ever captured a long text file with a modem, and then tried to edit it in your word processor—only to find it was too long to fit in memory? "Text File Splitter" splits a long text file into shorter ones for editing. Type in and save the program.

When you run the program, it asks you for a source filename. This is the name of the long file you wish to split. If you don't specify a drive, the program defaults to drive D1:. You must also tell the program the density of the source disk. Single-density disks contain 128 bytes per sector, while double-density disks contain about twice that much. This allows the program to estimate the file size, based on the number of disk sectors in its directory entry.

You then choose the number of new files to create, entering a number from 2-5, depending on the size of the original file. Finally, the program asks that you enter the destination disk drive number (1-4).

Single Drive Use

This program can be used with just one disk drive, but you must be sure that the destination disk has enough free space to contain the

new files you are creating. The program does not close the channel for the file it is reading between saves, so absolutely no disk-swapping is permitted. If you are splitting an exceptionally long file on a single drive, you may need to use a DOS 2.5 enhanced-density disk or a true double-density disk to contain all the data.

If you have a 130XE computer and a single drive, you can copy the source file into the RAMdisk, deleting the DUP.SYS and MEM.SAV files, if necessary. Format a new disk to use as the destination, then run the program and specify drive D8: for the source file and D1: for the destination.

The maximum length of each split file is limited to the buffer size displayed at the top of your screen. Other information appears while the task is in progress.

Ready To Edit

The program saves the new files with the same filename as the original, but with extensions .ZZ1, .ZZ2, and so on, in numerical order. When the process is complete, you can load the new files in a word processor for editing, or do whatever you like. If for any reason you want to reassemble the original file, go to DOS and use the copy (C) function with the append (/A) option. (The copy-with-append function starts each appended file on a new sector, so the reassembled file

may use more sectors than the original. You can eliminate the extra sectors by copying the reassembled file to another disk.)

Since the original file is split at arbitrary points, there is no guarantee that any of the smaller files will end with a RETURN character. Thus, if you print a split file without editing, the last portion of text may not be printed unless you force the printer to print an extra RETURN. This can be cured by adding a RETURN at the end of the file when editing. Some editing is normally needed, anyway, since the split files probably will end in the middle of a word or sentence. (You can print the entire file without losing data if you copy the unedited split files from disk to printer with the command D:*.ZZ?,P:.)

Text File Splitter

For instructions on entering this program, please refer to "COMPUTE!'s Guide to Typing In Programs" elsewhere in this issue.

```

00 5 REM COPYRIGHT 1987 COMP
    UTE! PUBLICATIONS, INC.
    (3 SPACES)ALL RIGHTS RE
    SERVED.
FF 10 READ N0,N1,N2,N3,N4,N1
    5,N128,N155,N255,Q:GOT
    O 260
IL 20 TRAP 250:CLOSE #N2:OPE
    N #N2,N4+N2,N0,F#:INPU
    T #N2;A#:CLOSE #N2
LC 30 IF A$(N2,N2)<>" " THEN
    ? :? "File not found"
    :GOTO 320
CB 40 SEC=VAL(A$(N15,LEN(A$)
    )):Q=N0
AA 50 ? :? "Single (enhanced
    ) or Double density?"
PD 60 GET #N1,K:IF K<>68 AND
    K<>83 THEN 60
KL 70 DEN=N128-N3:IF K=68 TH
    EN DEN=N255-N2
AK 80 ? CHR$(K):BLOCK=INT(SE
    C*DEN/N255+1):? :? A$
HB 90 IF BLOCK<N4 THEN POP :
    POP :GOTO 600
NC 100 A$="":IF BLOCK/N2>ME
    M/N255 THEN A$="":IF
    BLOCK/N3>MEM/N255 TH
    EN A$="":IF BLOCK/N4
    >MEM/N255 THEN A$="":
IC 110 B$=A$:B=N2+N3:IF INT(
    BLOCK/(ASC(A$)-176)+0
    .5)>MEM/N255 THEN 620
FO 120 IF BLOCK/B<N4 THEN B=
    B-N1:GOTO 120
JL 130 B$=CHR$(B+176):IF B$<
    A$ THEN B$=A$
LN 140 ? :? "File is ";BLOCK
    ;" BLOCKS long." :? "S
    plit into how many fi
    les (":A$;" "":B$;" "":
    "":
BF 150 GET #N1,K:IF K<ASC(A$
    )-N128 OR K>ASC(B$)-N
    128 THEN 150
ND 160 FOR I=N0 TO N4:FIL(I)
    =N0:NEXT I
BN 170 ? CHR$(K):NUM=K-48:FO

```

```

R I=N0 TO NUM-N2:FIL(
I)=INT((BLOCK/NUM)+0.
999):NEXT I
MH 180 FOR I=N0 TO NUM-N2:FI
L(NUM-N1)=FIL(NUM-N1)
+FIL(I):NEXT I:FIL(NU
M-N1)=BLOCK-FIL(NUM-N
1)
HK 190 RETURN
ED 200 FOR J=N1 TO FIL(I-N1)
AH 210 A$="{,}":A$(N255)=A$:
A$(N2)=A$
HB 220 TRAP 240:XIO N4+N3,#N
2,N4,N0,A$
AL 230 B$(LEN(B$)+N1)=A$:NEX
T J:RETURN
HC 240 POP :B$(LEN(B$)+N1)=A
$:RETURN
KB 250 ? :? :? "(BELL)ERROR
- ";PEEK(195):TRAP 40
000:CLR:END
OI 260 DIM A$(N255),F$(N15),
FN$(N15),M$(N4+N1),FI
L(4):MEM=INT(FRE(N0)/
N255)*N255:IF FRE(0)-
MEM<100 THEN MEM=MEM-
N255
IF 270 DIM B$(MEM):M$=STR$(M
EM):FOR I=N1 TO LEN(M
$):J=ASC(M$(I,I)):J=J
+N128:M$(I,I)=CHR$(J)
:NEXT I
HP 280 GRAPHICS N0:POKE 710,
N128
MK 290 ? "(4 SPACES)DOCUMENT
/TEXT FILE SPLITTER
(4 SPACES)":? "Copyri
ght 1987 Compute! Pub
l., Inc."
LI 292 ? "(8 SPACES)All Right
s Reserved.
(7 SPACES)"
CH 295 ? "(5 SPACES) BUFFER
="":M$;" BYTES"
AB 300 CLOSE #N1:OPEN #N1,N4
,N0,"K:"
KP 310 ? :? "Enter filename
of text file to
(8 SPACES)to be split
into several files."
HB 320 TRAP 320: ? :? "File
":INPUT FN$:IF FN$=
" " THEN ? :? "(UP)RETURN
(3 DELETE)":GOTO 590
JD 330 IF LEN(FN$)<N3 THEN 3
70
BE 340 IF FN$(N1,N2)="D:" TH
EN FN$=FN$(N3):GOTO 3
70
BP 350 IF FN$(N2,N2)<>": " AN
D FN$(N3,N3)<>": " THE
N 370
LB 360 IF FN$(N3,N3)=":" THE
N FN$=FN$:GOTO 380
KA 370 F$="D1":F$(N4)=FN$
HP 380 DRV=VAL(F$(N2,N2))
PF 390 ? :? "Insert disk wit
h ";F$;" into":? "dis
k drive ";DRV;" and p
ress RETURN";
MH 400 GET #N1,K:IF K<>N155
THEN 400
ME 410 ?
JL 420 IF Q THEN GOSUB 20: ?
"(UP)";
ME 430 ? :? :? "Save files c
n drive # (1-4)";
FI 440 GET #1,K:IF K<49 OR K
>52 THEN 440
FH 450 FN$=F$:FN$(N2,N2)=CHR
$(K):? CHR$(K)
CN 460 ? :? "Insert SAVE dis
k in drive ";K-48: ? "
and press RETURN";

```

```

IH 470 GET #1,K:IF K<>N155 T
HEN 470
IB 480 ? :? :TRAP 250:CLOSE
#N2:OPEN #N2,N4,N0,F$
:B$="":FOR I=N1 TO NU
M
BA 490 ? "Reading ";F$;" - "
;FIL(I-N1);" BLOCKS":
GOSUB 200
MK 500 IF I=NUM THEN ? "Clear
ring nulls";
CF 510 IF I=NUM THEN IF B$(L
EN(B$))="{,}" THEN B$
(LEN(B$))="":? "{,}";
:GOTO 510
AK 520 IF I=NUM THEN ?
IL 530 FOR M=N4 TO LEN(FN$):
IF FN$(M,M)="." THEN
FN$(M+1)="ZZ":FN$(M+3
)=STR$(I):POP :GOTO 5
50
CB 540 NEXT M:FN$(LEN(FN$)+N
1)="ZZ":FN$(LEN(FN$)
+N1)=STR$(I)
FO 550 ? "Saving ";FN$;" -
";INT((LEN(B$)/DEN)+0
.999);" SECTORS"
LD 560 TRAP 250:CLOSE #N3:OP
EN #N3,N4*N2,N0,FN$
JC 570 ? #N3;B$;:CLOSE #N3:B
$="":NEXT I
FD 580 ? :? "(BELL)DONE
(BELL){3 SPACES}Hit R
ETURN to quit":Q=N1:G
OTO 310
OO 590 CLOSE #N1:CLOSE #N2:C
LOSE #N3:TRAP 40000:C
LR:END
BN 600 ? :? F$;" has less th
an 1020":? "BYTES. Th
is program will only
split":? "files great
er than 1020 BYTES."
BO 610 GOTO 590
BO 620 ? :? "(BELL)";F$;" is
too long to split":?
"5 ways with ";MEM;
byte buffer.":? "Mod
ify it to split more
than that:"
DC 630 ? "DIM FIL(5)...Lines
100-120...etc.":GOTO
590
KD 640 DATA 0,1,2,3,4,15,128
,155,255,1

```

All the programs in this issue are available on the ready-to-load *COMPUTE! Disk*. To order a one-year (four-disk) subscription, call toll free **800-247-5470** (in IA 800-532-1272). Please specify which computer you are using.

Converter

Graphics Conversion Utility For *The Print Shop*TM

Lee Swoboda

Now you can convert graphics from the popular Print Shop program for use in Apple hi-res mode, and vice versa. This utility performs both conversions.

One of the more popular Apple II programs in recent years is *The Print Shop*, which has sparked users' clubs of its own, workalike programs, and thousands of graphics pictures that can be included in *Print Shop* banners and cards. Unfortunately, *Print Shop* images aren't directly compatible with Apple II high-resolution graphics. You can't use them in hi-res screens, and vice versa. "*Print Shop Converter*" solves that problem, allowing you to convert easily between *Print Shop* pictures and Apple hi-res mode.

Starting Out

This program is in two parts. The main program, written in BASIC, loads the second portion, a machine language file, from disk when it runs. Note that *you must enter both programs using DOS 3.3*. This is a limitation imposed by *The Print Shop* itself, which saves files only in DOS 3.3 format.

Type in and save Programs 1 and 2. If your computer is one that can't display lowercase graphics, you will have to type Program 1

entirely in uppercase.

Program 2 is machine language, so it must be entered with the Apple version of the "MLX" machine language entry program printed elsewhere in this issue. When you run MLX, you'll be asked for a starting address and an ending address for the data you'll be entering. Here are the values you need to enter for Program 2:

STARTING ADDRESS?	6000
ENDING ADDRESS?	6C08

Note that you *must* save Program 2 with the filename CV. This is necessary because Program 1 attempts to load Program 2 from disk with that name. Make sure that both programs are saved on the same disk.

Converting

When you run the Converter, it begins by loading the machine language portion (Program 2) from disk. After a brief delay, it displays a menu screen offering several choices. If you need instructions about using the program, select the option labeled Instructions. The computer prints out several screens of instructions, pausing at the end of each screen until you press a key.

Before converting a picture, you should understand the different format choices. In hi-res mode,

you can load and save pictures in normal hi-res format or in a special compressed form which makes a picture file smaller than usual. *Print Shop* mode allows you to load and save graphics in *Print Shop* format.

You must begin by indicating which conversion you wish to make. The program asks you two questions, once with the prompt CONVERT FROM? and again with the prompt CONVERT TO?. The choices are the same both times. If you are using hi-res graphics, don't worry about whether the picture is compressed; the program will detect compression and respond accordingly.

After asking what conversion you want to make, Converter asks you the name of the file you wish to convert. Enter the name of the source file which you want to convert to a different format. If you can't remember the filename, press RETURN without typing anything; the program prints a disk catalog and repeats the prompt.

At this point, the program loads the designated file, then does one of the following, depending on which conversion format you have chosen:

1. If you want to convert from *Print Shop* to hi-res format, Converter asks you what to name the new file.

Type the name and press RETURN. Converter then asks if you want to save it as a full-size (8192-byte) hi-res picture or if you want to compress it. If you select a full-size picture, Converter saves hi-res page 1 intact so you can use it with other programs or graphics editors. If you elect to compress the picture, Converter scans hi-res page 1 and squeezes the file to about half or two-thirds of its normal size. Compression saves disk space, allowing you to store more pictures on a disk. (Note that you will need this program to restore a compressed file to normal hi-res format.)

2. If you are converting from hi-res format to *Print Shop* format, the program first loads the picture, then draws an 88 X 52 window in the middle of the screen. This area will hold the *Print Shop* picture. You can move the window around using the arrow keys. (Apple II+ owners can use CTRL-J and CTRL-K to move up and down, respectively.) At first, the window moves nine dots each time you press a cursor key. This allows you to move in coarse increments. The number keys at the top of the keyboard change the increment to the corresponding number of dots. If the graphics you want to save are on the lower part of the screen (hidden behind the four text lines), use the F key to turn the full screen on and off as needed. When you have finished positioning the window, press RETURN to save the graphics contained in the window.

3. After you finish a conversion, or if you press the ESC key during a conversion, Converter returns you to the main menu. From there, you can quit the program by pressing 0.

How It Works

The *Print Shop* graphics format differs from normal hi-res format in three respects. First, the graphics occupy only 572 bytes (88 X 52 dots) instead of the 8192 bytes taken up by a hi-res page. Second, the dots are arranged sequentially (with the second row following the first) rather than in the reverse order of Apple hi-res. Third, *Print Shop* uses all eight bits in a byte rather than seven bits per byte as with hi-res.

One final caution: The graphics sold by Brøderbund and other commercial software vendors are

protected under United States and international copyright laws. Merely converting graphics from one format to another does not destroy its copyright protection, so you should respect the copyright of the converted graphics just as you would the original.

Program 1: *Print Shop Converter*

For instructions on entering this program, please refer to "COMPUTE!'s Guide to Typing In Programs" elsewhere in this issue.

```
F7 10 REM PRINT SHOP (TM)
49 20 REM CONVERTER
80 30 REM COPYRIGHT 1987
#5 40 REM COMPUTE! PUBLICATIONS,
    INC.
6C 50 REM ALL RIGHTS RESERVED.
6E 60 REM
CF 70 TEXT : HOME : HIMEM: 8191
83 80 FU% = 0: X0% = 0: Y0% = 0: X1
    % = 0: Y1% = 0: V0% = 0
6F 90 D$ = CHR$(13) + CHR$(4):
    Q$ = CHR$(34)
7D 100 IF PEEK(41868) < > 113 T
    HEN PRINT "Sorry! You mus
    t use DOS 3.3": END
CC 110 POKE 1013,76: POKE 1014,0
    : POKE 1015,96
82 120 POKE 768,104: POKE 769,16
    8: POKE 770,104: POKE 771
    ,166: POKE 772,223: POKE
    773,154: POKE 774,72: POK
    E 775,152: POKE 776,72: P
    OKE 777,96
28 130 PRINT D$"BLOAD CV"
#F 140 IF PEEK(64435) < > 6 THE
    N FU% = 6: &
29 150 VTAB 10:HTAB 15:PRINT "PR
    INT SHOP":HTAB 12:PRINT "
    C O N V E R T E R":PRINT:
    HTAB 13:PRINT "COPYRIGHT
    1987":VTAB 15:HTAB 7:PRIN
    T "COMPUTE! PUBLICATIONS,
    INC.":FOR I = 1 TO 2000:
    NEXT I
2E 155 VTAB 17: HTAB 10: PRINT "
    All Rights Reserved": FOR
    I = 1 TO 1000: NEXT I
A1 160 HOME : HGR : POKE 49234,0
98 170 POKE 44596,234: POKE 4459
    7,234: POKE 44598,234
92 180 REM
D4 190 REM Main Menu
83 200 REM
A8 210 HOME : HGR : POKE 49235,0
E8 220 HOME : VTAB 21: PRINT " C
    onvert from..." SPC(10)"
    0 = Quit"
87 230 PRINT TAB(6)"1 = HIRES p
    icture"
93 240 PRINT TAB(6)"2 = Print S
    hop(tm) graphic"
1C 250 PRINT TAB(6)"3 = Instruc
    tions": VTAB 1: HTAB 1
48 260 FOR I = 0 TO 1 STEP 0
88 270 KB = PEEK(49152): IF KB
    > 127 THEN I = 1
83 280 NEXT I: POKE 49168,0
CA 290 F0 = KB - 176: IF F0 < 0
    OR F0 > 3 THEN 260
83 300 IF F0 = 3 THEN 1690
F4 310 IF F0 = 0 THEN TEXT : HOM
    E : END
F8 320 VTAB 21: HTAB 1: PRINT "
    Convert to...": CALL - 8
    68
```

```
63 330 VTAB 24: HTAB 1: CALL - 8
    68: VTAB 1: HTAB 1
48 340 FOR I = 0 TO 1 STEP 0
88 350 KB = PEEK(49152): IF KB
    > 127 THEN I = 1
88 360 NEXT I: POKE 49168,0
A9 370 IF KB = 155 THEN 210
8D 380 F1 = KB - 176: IF F1 < 1
    OR F1 > 2 THEN 340
88 390 ON F0 GOTO 430,520
85 400 REM
AA 410 REM Load HIRES
89 420 REM
C6 430 GOSUB 1000
A4 440 ONERR GOTO 430
C3 450 GOSUB 1660: PRINT D$"BLOA
    D"FI$",A$4000,D1": POKE 2
    16,0: CALL 768
B1 460 FU% = 0: IF PEEK(43616)
    + 256 * PEEK(43617) < 80
    00 THEN FU% = 4
1C 470 &
A5 480 GOTO 560
97 490 REM
84 500 REM Load Print Shop
88 510 REM
C5 520 GOSUB 1000
J9 530 ONERR GOTO 520
87 540 GOSUB 1660: PRINT D$"BLOA
    D"FI$",A$5800,D1": POKE 2
    16,0: CALL 768
7C 550 FU% = 1: &
2A 560 ON F1 GOTO 600,770
94 570 REM
88 580 REM Save HIRES
98 590 REM
83 600 GOSUB 980: HOME : VTAB 21
    : PRINT " Save this as...
    "
89 610 PRINT TAB(6)"1 = Full-si
    ze HIRES picture"
FA 620 PRINT TAB(6)"2 = Compres
    sed HIRES picture"
49 630 FOR I = 0 TO 1 STEP 0
89 640 KB = PEEK(49152): IF KB
    > 127 THEN I = 1
44 650 NEXT I: POKE 49168,0: VTA
    B 1
AA 660 IF KB = 155 THEN 210
8D 670 F0 = KB - 176: IF F0 < 1
    OR F0 > 2 THEN 630
F7 680 FI$ = FI$ + ".PIC"
82 690 IF F0 = 1 THEN PRINT D$"B
    SAVE"FI$",A$2000,L$1FFF,D
    1": GOSUB 1530: GOTO 210
75 700 FU% = 3: &
9E 710 L = PEEK(1) - 64
18 720 L = 256 * L + 2 * PEEK(0
    )
AC 730 PRINT D$"BSAVE"FI$",A$400
    0,L"L",D1": GOSUB 1530: G
    OTO 210
98 740 REM
46 750 REM Save Print Shop
94 760 REM
CF 770 FR = 5: GOSUB 1440
84 780 X0% = 95: Y0% = 50: X1% = 1
    83: Y1% = 102: FU% = 5: &
57 790 J = 9
45 800 FOR I = 0 TO 1 STEP 0
44 810 KB = PEEK(49152): IF KB
    < 128 THEN NEXT I
8A 820 POKE 49168,0: & : KB = KB
    - 32 * (KB > 223)
1A 830 IF KB = 141 THEN 930
FA 840 IF KB = 136 THEN X0% = X0
    % - J: IF X0% < 0 THEN X0
    % = 0
6C 850 IF KB = 138 THEN Y0% = Y0
    % + J: IF Y0% > 139 THEN
    Y0% = 139
AB 860 IF KB = 139 THEN Y0% = Y0
    % - J: IF Y0% < 0 THEN Y0
    % = 0
```



```

4B 870 IF KB = 149 THEN X0% = X0
% + J: IF X0% > 191 THEN
X0% = 191
A6 880 X1% = X0% + 88: Y1% = Y0%
+ 52
B2 890 IF KB = 155 THEN 210
E3 900 IF KB > 176 AND KB < 186
THEN J = KB - 176
9C 910 IF KB = 198 THEN F = 4923
4 + (F = 49234): POKE F,0
E2 920 & : NEXT I
66 930 GOSUB 980:FU% = 2: &
19 940 FI% = FI% + ".PS": PRINT
D$"BSAVE"FI%",A22528,L576
,D1": GOSUB 1530: GOTO 21
0
94 950 REM
B0 960 REM SUBROUTINES
5E 970 REM File name
90 980 HOME : VTAB 21: POKE 4923
5,0: PRINT "What name sho
uld I use to save this?"
22 990 GOSUB 1090: GOSUB 1550: R
ETURN
2E 1000 HOME : VTAB 21: PRINT "W
hat graphic do you want
to convert?"
05 1010 VTAB 24: PRINT "Press 'R
ETURN' for a catalog of
files";
3F 1020 GOSUB 1110
EB 1030 IF FI% > "" THEN 1070
77 1040 TEXT : HOME : PRINT D$"C
ATALOG,D1"
9D 1050 PRINT "Press any key to
continue... ";: CALL - 7
56: HGR
62 1060 GOTO 1000
AC 1070 GOSUB 1540: RETURN
65 1080 REM Get file name
D2 1090 VTAB 23: PRINT "CTRL-X=E
rase file name" SPC( 3)"
ESC=Main menu"
61 1100 PRINT "<- or DELETE=Dele
te char RETURN=Accept";
E2 1110 VTAB 22: HTAB 1: CALL -
868:FI% = ""
36 1120 FOR I = 0 TO 1 STEP 0
76 1130 CALL - 756:KB = PEEK (49
152): POKE 49168,0
C8 1140 KB = KB - 32 * (KB > 96)
7E 1150 IF KB = 13 THEN RETURN
4D 1160 IF KB = 27 THEN 210
89 1170 IF KB = 24 THEN 1110
18 1180 IF KB < > 8 AND KB < > 9
5 AND PEEK (36) = 25 THE
N CALL - 198: NEXT I
5F 1190 IF KB < > 8 AND KB < 32
THEN NEXT I
A9 1200 IF KB < > 8 AND KB < > 9
5 THEN FI% = FI% + CHR%
(KB): PRINT CHR% (KB):
NEXT I
81 1210 IF PEEK (36) = 0 THEN CA
LL - 198: NEXT I
19 1220 PRINT CHR% (8) CHR% (32)
CHR% (8);
C4 1230 IF LEN (FI%) = 1 THEN FI
% = "": NEXT I
93 1240 FI% = LEFT$(FI%, LEN (F
I%) - 1): NEXT I
D2 1250 REM Move window frame
78 1260 GOSUB 1440: &
4D 1270 FOR K = 0 TO 1 STEP 0
5A 1280 KB = PEEK (49152): IF KB
< 128 THEN NEXT K
D5 1290 POKE 49168,0: & :KB = KB
- 32 * (KB > 223)
A5 1300 IF KB = 141 THEN & : RET
URN
84 1310 IF KB = 136 OR KB = 139
THEN Y0% = Y0% - J * (FR
= 1):Y1% = Y1% - J * (F
R = 2):X0% = X0% - J * (

```

```

FR = 3):X1% = X1% - J *
(FR = 4)
0D 1320 IF KB = 149 OR KB = 138
THEN Y0% = Y0% + J * (FR
= 1):Y1% = Y1% + J * (F
R = 2):X0% = X0% + J * (
FR = 3):X1% = X1% + J *
(FR = 4)
79 1330 IF KB > 176 AND KB < 186
THEN J = KB - 176
81 1340 IF X0% < 35 THEN X0% = 3
5
68 1350 IF X1% > 266 THEN X1% =
266
A4 1360 IF Y0% < 0 THEN Y0% = 0
IF 1370 IF Y1% > 167 THEN Y1% =
167
FB 1380 IF X0% > X1% - 2 THEN X0
% = X1% - 2
CC 1390 IF Y0% > Y1% - 2 THEN Y0
% = Y1% - 2
D0 1400 IF X1% < X0% + 1 THEN X1
% = X0% + 1
A1 1410 IF Y1% < Y0% + 1 THEN Y1
% = Y0% + 1
75 1420 & : NEXT K
94 1430 REM Messages
CB 1440 HOME : VTAB 21: PRINT "A
RROWS = Move";: ON FR GO
TO 1450,1460,1470,1480,1
490
84 1450 PRINT " TOP";: GOTO 1490
85 1460 PRINT " BOTTOM";: GOTO 1
490
E7 1470 PRINT " LEFT";: GOTO 149
0
50 1480 PRINT " RIGHT";
8C 1490 PRINT " window frame"
71 1500 PRINT SPC( 3)"1-9 = Dist
ance of frame movement"
B7 1510 PRINT SPC( 5)"F = Turn f
ull screen ON/OFF"
32 1520 PRINT "RETURN = Accept p
osition";: VTAB 1: RETUR
N
3C 1530 HOME : VTAB 21: PRINT "S
aved as "Q$FI$Q$: FOR I
= 1 TO 2000: NEXT I: RET
URN
4B 1540 A$ = "Place the disk con
taining " + Q$ + FI% + Q
$: GOTO 1560
5E 1550 A$ = "Place the disk you
want to save " + Q$ + F
I% + Q$ + " on"
73 1560 A$ = A$ + " in drive 1 a
nd press any key "
12 1570 HOME : VTAB 21:I = 40
16 1580 J = 0
CB 1590 B$ = LEFT$(A$,I - J)
08 1600 IF LEN (B$) = LEN (A$) O
R RIGHT$(B$,1) = CHR% (
32) THEN 1620
C6 1610 J = J + 1: GOTO 1590
8C 1620 PRINT LEFT$(B$,I - 1)
9B 1630 K = LEN (A$) - LEN (B$)
A6 1640 IF K = 0 THEN CALL - 198
: CALL - 198: CALL - 756
: RETURN
24 1650 A$ = RIGHT$(A$,K): GOTO
1580
AE 1660 HOME : VTAB 21: PRINT "L
oading "Q$FI$Q$: RETURN
DC 1670 REM
CB 1680 REM Help
05 1690 TEXT : I = 1
D4 1700 HOME : INVERSE : PRINT S
PC( 15)"CONVERTER" SPC(
15): NORMAL : VTAB 3: HT
AB 1
91 1710 FOR J = I TO I + 9
5E 1720 READ A$: IF A$ = "END" T
HEN 1770
8D 1730 PRINT A$: PRINT

```

```

D0 1740 NEXT J:I = + I + 9
C7 1750 VTAB 24: PRINT "Press an
y key to continue... ";
1A 1760 GET B$: PRINT : GOTO 170
0
CF 1770 VTAB 24: PRINT "Press an
y key to continue... ";
93 1780 GET B$: PRINT : RESTORE
: GOTO 210
94 1790 DATA "Broderbund Softwar
e's Print Shop (tm)"
67 1800 DATA "program uses a spe
cial format to store"
4E 1810 DATA "graphic images. C
ONVERTER converts"
93 1820 DATA "graphics back and
forth between"
12 1830 DATA "Apple's high resol
ution (HIRES) screen"
DA 1840 DATA "and Print Shop's f
ormat. You have"
1F 1850 DATA "three choices of f
ormats you can"
0F 1860 DATA "convert to or from
:"
F4 1870 DATA " 1) A normal Apple
HIRES screen, which"
93 1880 DATA "will let you store
up to 17 images on"
2D 1890 DATA "a disk."
4E 1900 DATA " 2) A special HIRE
S format that"
9E 1910 DATA "appears normal whe
n you view it, but"
43 1920 DATA "is stored on disk
in a 'compressed'"
5A 1930 DATA "format that lets y
ou store up to 50"
D4 1940 DATA "images on a disk."
C9 1950 DATA " 3) The standard P
rint Shop image."
7A 1960 DATA "CONVERTER lets you
convert an"
E5 1970 DATA "image in any of th
ese three formats to"
36 1980 DATA "any of the other f
ormats. Just select"
DB 1990 DATA "the 'from' and 'to
' format you desire"
DA 2000 DATA "from the menus and
CONVERTER will do"
F5 2010 DATA "the work 'automati
cally.'"
BD 2020 DATA "The computer will
add the following"
BF 2030 DATA "prefix or suffix t
o the name you"
8B 2040 DATA "choose:"
11 2050 DATA "'filename.PS' for
Print Shop images."
DE 2060 DATA "'filename.PIC' for
normal or"
DF 2070 DATA "compressed HIRES i
mages."
D0 2080 DATA "END"

```

Program 2. CV

Please refer to the Apple "MLX" article in this issue before entering the following program.

```

6000: A5 D9 48 A5 76 48 A5 88 46
6008: 48 A5 B9 48 A9 02 85 76 E8
6010: A9 FF 85 D9 A9 BF 85 33 7E
6018: A9 00 85 F3 4C 1F 60 A9 E6
6020: 00 85 85 A9 7D A0 00 A2 9E
6028: 1D 20 ED 6B A5 69 8D 00 E1
6030: 7D A9 00 8D 01 7D A5 6A A4
6038: 8D 02 7D A9 00 8D 03 7D 44
6040: A9 01 85 8A A9 00 AE 03 1D
6048: 7D AC 02 7D 20 BF 68 8E 70
6050: 03 7D 8C 02 7D 18 AD 00 4B
6058: 7D 6D 02 7D 8D 14 7D AD B0
6060: 01 7D 6D 03 7D 8D 15 7D AB
6068: 18 AD 14 7D 69 03 8D 0E 7B

```

6070: 7D AD 15 7D 69 00 8D 0F 4B
6078: 7D AD 0E 7D 8D 86 60 AD F1
6080: 0F 7D 8D 87 60 AD 00 10 1C
6088: 8D 00 7D A9 00 8D 01 7D 12
6090: AE 00 7D CA 10 06 4C 7D 2E
6098: 60 4C CF 60 CA 10 06 4C 8B
60A0: 69 61 4C CF 60 CA 10 06 49
60A8: 4C 4C 63 4C CF 60 CA 10 79
60B0: 06 4C 8B 64 4C CF 60 CA 72
60B8: 10 06 4C B3 65 4C CF 60 24
60C0: CA 10 06 4C 69 64 4C CF 8D
60C8: 60 CA 10 03 4C B1 67 20 86
60D0: 58 FC 20 36 FB 20 22 6B 74
60D8: C6 D5 A5 AC CD D5 D3 D4 73
60E0: A0 C2 C5 A0 C9 CE A0 D2 03
60E8: C1 CE C7 C5 A0 B0 AD B7 6E
60F0: 00 20 07 6B 4C D0 03 A9 A6
60F8: 00 8D 00 7D A9 40 8D 01 5F
6100: 7D AD 01 7D 48 49 60 10 1D
6108: 05 68 30 15 10 10 68 C9 1A
6110: 60 30 0E D0 09 AD 00 7D 5A
6118: C9 00 90 05 F0 03 4C 66 B4
6120: 01 AD 00 7D 8D 2E 61 AD 6C
6128: 01 7D 8D 2F 61 AD 00 10 41
6130: 8D 0E 7D A9 00 8D 0F 7D 59
6138: 38 AD 00 7D E9 00 8D 02 C6
6140: 7D AD 01 7D E9 20 8D 03 13
6148: 7D AD 02 7D 8D 59 61 AD 8F
6150: 03 7D 8D 5A 61 AD 0E 7D A6
6158: 8D 00 10 EE 00 7D D0 03 6D
6160: EE 01 7D 4C 01 61 4C CF 45
6168: 6A A9 FF 8D 0C 7D A9 57 A4
6170: 8D 0D 7D A9 32 8D 18 7D FC
6178: A9 00 8D 19 7D A9 5F 8D 32
6180: 16 7D A9 00 8D 17 7D A9 50
6188: 00 8D 04 7D A9 00 8D 05 74
6190: 7D AD 05 7D 48 49 00 10 6D
6198: 05 68 30 15 10 10 68 C9 AA
61A0: 00 30 0E D0 09 AD 04 7D C2
61A8: C9 06 90 05 F0 03 4C 49 A9
61B0: 63 A9 00 8D 02 7D A9 00 C1
61B8: 8D 03 7D AD 03 7D 48 49 75
61C0: 00 10 05 68 30 15 10 10 B4
61C8: 68 C9 00 30 0E D0 09 AD AB
61D0: 02 7D C9 07 90 05 F0 03 1B
61D8: 4C 3E 63 A9 00 8D 00 7D 0C
61E0: A9 00 8D 01 7D AD 01 7D 5C
61E8: 48 49 00 10 05 68 30 15 62
61F0: 10 10 68 C9 00 30 0E D0 17
61F8: 09 AD 00 7D C9 00 30 05 20
6200: F0 03 4C 18 63 EE 0C 7D 75
6208: D0 03 EE 0D 7D AD 0C 7D DC
6210: 8D 1A 62 AD 0D 7D 8D 1B DD
6218: 62 AD 00 10 8D 0A 7D A9 B3
6220: 00 8D 0B 7D AD 04 7D C9 C3
6228: 06 D0 18 AD 05 7D C9 00 B3
6230: D0 11 AD 02 7D C9 04 D0 63
6238: 0A AD 03 7D C9 00 D0 03 98
6240: 4C CF 6A A9 8D 8D 10 7D DE
6248: A9 00 8D 11 7D A9 00 8D C4
6250: 06 7D A9 00 8D 07 7D AD DD
6258: 07 7D 48 49 00 10 05 68 50
6260: 30 15 10 10 68 C9 00 30 20
6268: 0E D0 09 AD 06 7D C9 07 25
6270: 90 05 F0 03 4C FC 62 A2 CA
6278: 00 20 F0 F6 38 AD 10 7D EB
6280: E9 01 8D 12 7D AD 11 7D 8F
6288: E9 00 8D 13 7D AD 0B 7D 5B
6290: 48 4D 13 7D 10 05 68 30 9C
6298: 2C 10 12 68 CD 13 7D 30 26
62A0: 24 D0 0A AD 0A 7D CD 12 BB
62A8: 7D 90 1A F0 18 A2 03 20 14
62B0: F0 F6 38 AD 0A 7D ED 10 BF
62B8: 7D 8D 0A 7D AD 0B 7D ED 3B
62C0: 11 7D 8D 0B 7D 18 AD 16 8D
62C8: 7D 6D 06 7D 8D 12 7D AD 9D
62D0: 17 7D 6D 07 7D 8D 13 7D 64
62D8: AD 18 7D AE 12 7D AC 13 08
62E0: 7D 20 11 F4 20 5A F4 AD DF
62E8: 11 7D 0A 6E 11 7D 6E 10 29
62F0: 7D EE 06 7D D0 03 EE 07 40
62F8: 7D 4C 57 62 18 AD 16 7D C1
6300: 69 08 8D 16 7D AD 17 7D DE
6308: 69 00 8D 17 7D EE 00 7D CB
6310: D0 03 EE 01 7D 4C E5 61 38
6318: 18 AD 18 7D 69 01 8D 18 B3
6320: 7D AD 19 7D 69 00 8D 19 8B
6328: 7D A9 5F 8D 16 7D A9 00 D6
6330: 8D 17 7D EE 02 7D D0 03 CC
6338: EE 03 7D 4C 8B 61 EE 04 F0
6340: 7D D0 03 EE 05 7D 4C 91 91
6348: 61 4C CF 6A A9 FF 8D 0C E7
6350: 7D A9 57 8D 0D 7D 20 2D CF
6358: 68 AD 18 7D 8D 00 7D AD AE
6360: 19 7D 8D 01 7D AD 01 7D F6
6368: 48 4D 1D 7D 10 05 68 30 B7
6370: 17 10 12 68 CD 1D 7D 30 9D
6378: 0F D0 0A AD 00 7D CD 1C C4
6380: 7D 90 05 F0 03 4C 8B 64 F8
6388: A9 00 8D 02 7D A9 00 8D 16
6390: 03 7D AD 03 7D 48 49 00 8D
6398: 10 05 68 30 15 10 68 2A
63A0: C9 00 30 0E D0 09 AD 02 3B
63A8: 7D C9 0A 90 05 F0 03 4C 29
63B0: AD 64 EE 0C 7D D0 03 EE 2A
63B8: 0D 7D A9 00 8D 0A 7D A9 D3
63C0: 00 8D 0B 7D A9 8D 10 9E
63C8: 7D A9 00 8D 11 7D A9 00 63
63D0: 8D 04 7D 8D 00 8D 05 7D 67
63D8: AD 05 7D 48 49 00 10 05 5B
63E0: 68 30 15 10 10 68 C9 00 41
63E8: 30 0E D0 09 AD 04 7D C9 38
63F0: 07 90 05 F0 03 4C 90 64 DD
63F8: A9 00 85 8A A9 08 AE 03 BB
6400: 7D AC 02 7D 20 BF 6B BE 30
6408: 0F 7D 8C 0E 7D 18 AD 0E DF
6410: 7D 6D 04 7D 8D 0E 7D AD 98
6418: 0F 7D 6D 05 7D 8D 0F 7D 83
6420: 18 AD 16 7D 6D 0E 7D 8D 27
6428: 0E 7D AD 17 7D 6D 0F 7D BB
6430: 8D 0F 7D AD 00 7D AE 0E 6F
6438: 7D AC 0F 7D 20 11 F4 B1 85
6440: 26 25 30 29 7F F0 02 A9 6B
6448: 01 8D 12 7D A9 00 8D 13 8A
6450: 7D AD 11 7D 85 8A AD 10 FE
6458: 7D AE 13 7D AC 12 7D 20 8E
6460: BF 6B 8E 09 7D 8C 08 7D F1
6468: 18 AD 0A 7D 6D 08 7D 8D D5
6470: 0A 7D AD 0B 7D 6D 09 7D 35
6478: 8D 0B 7D AD 11 7D 0A 6E 56
6480: 11 7D 6E 10 7D EE 04 7D 2D
6488: D0 03 EE 05 7D 4C D8 63 DA
6490: AD 0C 7D 8D 0A 64 AD 00 BA
6498: 7D 8D A1 64 AD 0A 7D 8D 1C
64A0: 00 10 EE 02 7D D0 03 EE 8F
64A8: 03 7D 4C 92 63 EE 00 7D 59
64B0: D0 03 EE 01 7D 4C 65 63 DB
64B8: 4C CF 6A A9 00 85 00 A9 43
64C0: 40 85 01 A9 FE 85 09 A9 BF
64C8: 80 85 0B A9 00 85 0C A0 FD
64D0: 27 A9 78 85 02 A9 20 85 7B
64D8: 03 A5 02 38 E9 28 85 02 4F
64E0: B0 02 C6 03 A5 02 85 04 CD
64E8: A5 03 18 69 04 85 05 A5 C4
64F0: 04 38 E9 80 85 04 B0 02 AE
64F8: C6 05 A5 04 85 06 A5 05 EF
6500: 18 69 20 85 07 A5 07 38 A2
6508: E9 04 85 07 18 90 20 A5 D2
6510: 07 C5 05 D0 F0 08 A4 C5 69
6518: 02 D0 D4 A5 05 C5 03 D0 23
6520: CE A5 02 D0 B4 88 10 A9 9A
6528: A9 80 85 0C 18 90 2A B1 62
6530: 06 24 0B 30 24 C5 08 D0 84
6538: 20 A6 0A 0E FF F0 1A E6 EA
6540: 0A EB 0E 04 B0 0E C5 09 F8
6548: F0 0A A2 00 81 00 E6 00 3C
6550: D0 02 E6 01 85 08 18 90 FD
6558: B6 AA 48 98 48 8A 20 00 6D
6560: C5 09 D0 05 A0 02 91 00 EA
6568: EB A5 00 38 E9 03 85 00 FA
6570: B0 02 C6 01 24 0B 30 17 C1
6578: A5 0A C9 04 B0 06 A5 08 03
6580: C5 09 D0 0B A0 00 A5 09 94
6588: 91 00 C8 A5 0A 91 00 86 AC
6590: 0B A5 00 E0 01 18 D0 05 67
6598: 69 06 B8 50 02 69 03 85 F6
65A0: 00 90 02 E6 01 A9 01 85 74
65A8: 0A 68 AB 68 24 0C 10 96 36
65B0: 4C CF 6A A9 00 85 00 A9 3D
65B8: 40 85 01 A9 FE 85 08 A9 87
65C0: 00 85 0A 00 27 A9 78 85 8E
65C8: 02 A9 20 85 03 A5 02 38 46
65D0: E9 28 85 02 B0 02 C6 03 89
65D8: A5 02 85 04 A5 03 18 69 BA
65E0: 04 85 05 A5 04 38 E9 80 5F
65E8: 85 04 B0 02 C6 05 A5 04 47
65F0: 85 06 A5 05 18 69 20 85 31
65F8: 07 A5 07 38 E9 04 85 07 86
6600: 18 90 1C A5 07 C5 05 D0 05
6608: F0 A5 04 C5 02 D0 D4 A5 36
6610: 05 C5 03 D0 CE A5 02 D0 20
6618: B4 88 10 A9 4C CF 6A 24 98
6620: 0A 30 38 AD 00 A1 00 85 3B
6628: 0B C5 08 D0 21 E6 00 D0 6F
6630: 02 E6 01 A1 00 85 09 E6 01
6638: 00 D0 02 E6 01 A1 00 85 FB
6640: 0B E6 00 D0 02 E6 01 A9 B0
6648: 80 85 0A 18 90 0D A5 0B 88
6650: 91 06 E6 00 D0 02 E6 01 B1
6658: 18 90 AB A5 0B 91 06 C6 36
6660: 09 D0 A0 A9 00 85 0A F0 AF
6668: 9A 20 2D 68 AD 18 7D 8D 0D
6670: 02 7D AD 19 7D 8D 03 7D 8A
6678: AD 16 7D 8D 00 7D AD 17 92
6680: 7D 8D 01 7D AD 01 7D 48 1C
6688: 4D 1B 7D 10 05 68 30 17 B4
6690: 10 12 68 CD 1B 7D 30 0F 12
6698: D0 0A AD 00 7D CD 1A 7D DA
66A0: 90 05 F0 03 4C B5 66 20 6B
66A8: E7 67 EE 00 7D D0 03 EE 45
66B0: 01 7D 4C 84 66 EE 18 7D CB
66B8: D0 03 EE 19 7D AD 1A 7D 72
66C0: 8D 00 7D AD 1B 7D 8D 01 B9
66C8: 7D AD 18 7D 8D 02 7D AD C7
66D0: 19 7D 8D 03 7D AD 03 7D 91
66D8: 48 4D 1D 7D 10 05 68 30 2E
66E0: 17 10 12 68 CD 1D 7D 30 14
66E8: 0F D0 0A AD 02 7D CD 1C 4B
66F0: 7D 90 05 F0 03 4C 06 67 0D
66F8: 20 E7 67 EE 02 7D D0 03 56
6700: EE 03 7D 4C D5 66 AD 1A 39
6708: 7D D0 03 CE 1B 7D CE 1A 9D
6710: 7D AD 1C 7D 8D 02 7D AD 81
6718: 1D 7D 8D 03 7D AD 16 7D 03
6720: 8D 00 7D AD 17 7D 8D 01 0B
6728: 7D AD 01 7D 48 4D 1B 7D 44
6730: 10 05 68 30 17 10 12 68 DD
6738: CD 1B 7D 30 0F D0 0A AD E4
6740: 00 7D CD 1A 7D 90 05 F0 F2
6748: 03 4C 5A 67 20 E7 67 EE CB
6750: 00 7D D0 03 EE 01 7D 4C 8B
6758: 29 67 AD 1C 7D D0 03 CE 11
6760: 1D 7D CE 1C 7D AD 16 7D 05
6768: 8D 00 7D AD 17 7D 8D 01 53
6770: 7D AD 18 7D 8D 02 7D AD 61
6778: 19 7D 8D 03 7D AD 03 7D 3B
6780: 48 4D 1D 7D 10 05 68 30 D7
6788: 17 10 12 68 CD 1D 7D 30 8D
6790: 0F D0 0A AD 02 7D CD 1C F4
6798: 7D 90 05 F0 03 4C AE 67 08
67A0: 20 E7 67 EE 02 7D D0 03 FF
67A8: EE 03 7D 4C 7D 67 4C CF 16
67B0: 6A A5 67 85 06 A5 68 85 80
67B8: 07 A0 01 B1 06 D0 03 4C 34
67C0: CF 6A A0 04 B1 06 F0 10 FD
67C8: C9 7F B0 09 C9 61 90 05 FC
67D0: 38 E9 20 91 06 C8 D0 EC 35
67D8: A0 00 B1 06 AA C8 B1 06 70
67E0: 86 06 85 07 38 B0 D2 AD 6D
67E8: 02 7D AE 00 7D AC 01 7D 0C
67F0: 20 11 F4 B1 26 25 30 29 1D
67F8: 7F F0 02 A9 01 8D 0B 7D 6A
6800: A9 00 8D 09 7D A2 00 20 7E
6808: F0 F6 AD 0B 7D C9 00 D0 29
6810: 0C AD 09 7D C9 00 D0 05 40
6818: A2 03 2D F0 F6 AD 02 7D FD
6820: AE 00 7D AC 01 7D 20 11 12
6828: F4 20 5A F4 60 18 AD 14 EB
6830: 7D 69 0A 8D 00 7D AD 15 9A
6838: 7D 69 00 8D 01 7D AD 00 54
6840: 7D 8D 4B 68 AD 01 7D 8D 1D
6848: 4C 68 AD 00 10 8D 16 7D 6F
6850: A9 00 8D 17 7D AD 00 7D 39
6858: D0 03 CE 01 7D CE 00 7D E0
6860: AD 00 7D 8D 6D 68 AD 01 F9
6868: 7D 8D 6E 8D AD 00 10 8D CA
6870: 0E 7D A9 00 8D 0F 7D A9 2A
6878: 01 85 8A A9 00 AE 0F 7D 6D

6880: AC 0E 7D 20 BF 68 8E 0F B4
 6888: 7D 8C 0E 7D 18 AD 16 7D F5
 6890: 6D 0E 7D 8D 16 7D AD 17 3D
 6898: 7D 6D 0F 7D 8D 17 7D 18 19
 68A0: AD 14 7D 69 11 8D 00 7D CF
 68A8: AD 15 7D 69 00 8D 01 7D 91
 68B0: AD 00 7D 8D 8D 68 AD 01 CC
 68B8: 7D 8D 8E 68 AD 00 10 8D 25
 68C0: 18 7D A9 00 8D 19 7D 18 16
 68C8: AD 14 7D 69 18 8D 00 7D 30
 68D0: AD 15 7D 69 00 8D 01 7D B9
 68D8: AD 00 7D 8D E5 68 AD 01 36
 68E0: 7D 8D E6 68 AD 00 10 8D 52
 68E8: 1A 7D A9 00 8D 18 7D AD DC
 68F0: 00 7D 0D 03 CE 01 7D CE AF
 68F8: 00 7D AD 00 7D 8D 07 69 78
 6900: AD 01 7D 8D 08 69 AD 00 B3
 6908: 10 8D 0E 7D A9 00 8D 0F 57
 6910: 7D A9 01 85 8A A9 00 AE 2E
 6918: 0F 7D AC 0E 7D 20 BF 6B 9F
 6920: 8E 0F 7D 8C 0E 7D 18 AD BA
 6928: 1A 7D 6D 0E 7D 8D 1A 7D C9
 6930: AD 18 7D 6D 0F 7D 8D 18 CB
 6938: 7D 18 AD 14 7D 69 1F 8D 24
 6940: 00 7D AD 15 7D 69 00 8D 98
 6948: 01 7D AD 8D 7D 8D 57 69 EA
 6950: AD 01 7D 00 58 69 AD 00 86
 6958: 10 8D 1C 7D A9 00 8D 1D 77
 6960: 7D 18 AD 14 7D 69 26 8D 5A
 6968: 02 7D AD 15 7D 69 00 8D C1
 6970: 03 7D AD 02 7D 8D 7F 69 84
 6978: AD 03 7D 8D 8D 69 AD 00 70
 6980: 10 8D 00 7D A9 00 8D 01 FF
 6988: 7D AD 02 7D D0 03 CE 03 D0
 6990: 7D CE 02 7D AD 02 7D 8D EB
 6998: A1 69 AD 03 7D 8D A2 69 4D
 69A0: AD 00 10 8D 0E 7D A9 00 DE
 69A8: 8D 0F 7D A9 01 85 8A A9 2D

69B0: 00 AE 0F 7D AC 0E 7D 20 A1
 69B8: BF 6B 8E 0F 7D 8C 0E 7D C0
 69C0: 18 AD 00 7D 6D 0E 7D 8D 0F
 69C8: 00 7D AD 01 7D 6D 0F 7D FD
 69D0: 8D 01 7D 60 A9 00 8D 06 CE
 69D8: 7D A9 20 8D 07 7D AD 09 44
 69E0: 7D 85 88 AD 08 7D A2 00 3B
 69E8: A0 08 20 49 6B 8E 0B 7D CF
 69F0: 8C 0A 7D AD 09 7D 85 88 EB
 69F8: AD 08 7D A2 00 A0 40 20 A1
 6A00: 49 6B 8E 0D 7D 8C 0C 7D AA
 6A08: A9 00 85 8A A9 08 AE 0B E0
 6A10: 7D AC 0A 7D 20 BF 6B 8E 4D
 6A18: 0F 7D 8C 0E 7D 38 AD 08 76
 6A20: 7D ED 0E 7D 8D 0E 7D AD 16
 6A28: 09 7D ED 0F 7D 8D 0F 7D 4D
 6A30: 38 AD 0E 7D ED 0C 7D 8D 4E
 6A38: 0E 7D AD 0F 7D ED 0D 7D 55
 6A40: 8D 0F 7D A9 04 85 8A A9 DE
 6A48: 00 AE 0F 7D AC 0E 7D 20 3B
 6A50: BF 6B 8E 0F 7D 8C 0E 7D 5A
 6A58: 18 AD 06 7D 6D 0E 7D 8D 69
 6A60: 06 7D AD 07 7D 6D 0F 7D FA
 6A68: 8D 07 7D A9 00 85 8A A9 E4
 6A70: 80 AE 0B 7D AC 0A 7D 20 13
 6A78: BF 6B 8E 0F 7D 8C 0E 7D 82
 6A80: 18 AD 06 7D 6D 0E 7D 8D 91
 6A88: 06 7D AD 07 7D 6D 0F 7D 23
 6A90: 8D 07 7D A9 00 85 8A A9 0D
 6A98: 28 AE 0D 7D AC 0C 7D 20 57
 6AA0: BF 6B 8E 0F 7D 8C 0E 7D AA
 6AA8: 18 AD 06 7D 6D 0E 7D 8D 89
 6AB0: 06 7D AD 07 7D 6D 0F 7D 4B
 6AB8: 8D 07 7D 18 AD 06 7D 6D 35
 6AC0: 04 7D 8D 06 7D AD 07 7D 37
 6AC8: 6D 05 7D 8D 07 7D 6E 68 75
 6AD0: 85 89 68 85 88 68 85 76 25
 6AD8: 68 85 D9 A9 8D 8D 01 02 BF

6AE0: A9 01 85 34 A9 DD 85 33 C1
 6AEB: 60 00 C9 84 D0 06 A2 01 54
 6AF0: 8E E9 6A 60 C9 8D F0 0F 50
 6AF8: AE E9 6A F0 07 9D FF 01 AB
 6B00: EE E9 6A 60 4C ED FD AE E0
 6B08: E9 6A A9 00 8D E9 6A 8A 17
 6B10: F0 0D A9 8D 9D FF 01 20 BF
 6B18: 03 BE 90 E7 4C 0C BE 4C 0D
 6B20: 8E FD 68 85 85 68 85 86 82
 6B28: A0 01 B1 85 F0 0E 09 80 70
 6B30: C9 A0 90 02 05 F3 20 EA 69
 6B38: 6A C8 D0 EE 38 98 65 85 F3
 6B40: 85 85 90 02 E6 86 6C 85 1D
 6B48: 00 85 87 84 89 86 8A A0 D5
 6B50: 00 84 86 84 85 88 8A 10 D4
 6B58: 0E 38 A9 00 E5 89 85 89 63
 6B60: A9 00 E5 8A 85 8A C8 A5 FE
 6B68: 88 10 0E 38 A9 00 E5 87 6D
 6B70: 85 87 A9 00 E5 88 85 88 06
 6B78: C8 84 8B A2 0F 06 87 26 36
 6B80: 88 26 85 26 86 38 A5 85 1E
 6B88: E5 89 A8 A5 86 E5 8A 90 95
 6B90: 06 E6 87 85 86 84 85 CA 89
 6B98: 10 E3 A5 8B D0 1A 38 A9 E6
 6BA0: 00 E5 87 85 87 A9 00 E5 03
 6BA8: 88 85 88 38 A9 00 E5 85 58
 6BB0: 85 85 A9 00 E5 86 85 86 88
 6BB8: A6 88 A4 87 A5 86 60 85 9F
 6BC0: 89 84 87 86 88 A9 00 85 47
 6BC8: 85 85 86 46 88 66 87 90 76
 6BD0: 0D 18 A5 89 65 85 85 85 53
 6BD8: A5 8A 65 86 85 86 06 89 16
 6BE0: 26 8A A5 88 05 87 D0 E3 76
 6BE8: A4 85 A6 86 60 85 86 4A 5B
 6BF0: 87 A0 00 A9 00 91 85 C8 68
 6BF8: D0 02 E6 86 8A D0 04 C6 64
 6C00: 87 30 04 CA 4C F3 6B 60 3F
 6C08: 59 20 46 49 49 20 3A 4A 7C



PROF JONES
 SUMMER/FALL 1987
 ORDER LINE
 (208) 342-6939
 THOROUGHBRED
 GREYHOUND
 HARNNESS
 LOTTERY/LOTTO
 FOOTBALL
 BASKETBALL
 OFFICE HOURS
 M-F 9 AM - 5 PM
 SAT 9 AM - 1 PM
 (Mountain Standard Time)
 FREE CATALOG
 1940 W. STATE
 BOISE, IDAHO 83702
 VISA
 AMEX

PROFESSIONAL HANDICAPPING SYSTEMS

PROFESSIONAL SERIES™
 PROFESSIONAL HANDICAPPING TOOLS from PROF. JONES
 The New PROFESSIONAL SERIES™ "Software for the Serious Handicapper"

Thoroughbred
 • Mini-Pro Analysis™ \$149.95
 Complete race analysis for the sophisticated handicapper with single screen input, holding tanks to check entries, powerful use of 30 variables in data manipulation, complete "HELP" functions, and more.

• Analysis Module™ \$249.95
 Our comprehensive, full featured package contains Mini-Pro Analysis plus betting analyses, money managers, post position adjusters, fractional adjusters, multi-track abilities, watch lists, and on-screen betting philosophy.

• Multiple Regression Module™ \$149.95
 Using linear regression, this module regresses out factors relating to winning animals and then automatically recalculates the weighting formula as successive races are analyzed to derive the most precise formula possible, dramatically increasing win percentage!

NEW for 1987
 BELL CURVE ANALYSIS
 CLUSTER ANALYSIS

PROFESSIONAL LOTTERY/LOTTO™ \$149.95
 Cutting edge analyses for the serious professional. Contains Bell Curve, Central Tendency, Cluster Analysis, and 17 Dimitrov Systems, for complete, high accuracy analysis of Lottery or Lotto.

Cumulative Stats
 Last 4 weeks
 Last 2 weeks
 Previous Weeks?
 Power Plays
 (49ers)
 Bills
 (Vikings)
 Seahawks

PROFESSIONAL SERIES FOOTBALL™ \$199.95
 A flexible, high performance football analysis with complete built-in scheduling, excellent file capacity, single input for two teams, and high accuracy, contains predictors for team scores, over/under, non-bets, regular bets and superbets. The regression analysis is adjustable to give results based on any number of previous weeks.

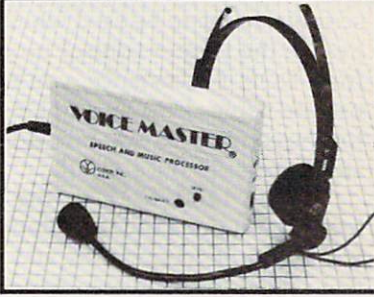
BOOKIE BUSTER™ FOOTBALL ANALYSIS \$149.95
 A high accuracy football analysis using 21 separate and structured analyses and a complete database of all NFL games from 1978 to 1986 to predict the spread winner.

Terms: Free shipping all software. Add \$6.00 COD / \$6.00 UPS Blue / \$9.00 International delivery / ID residents add 5%. Allow 3 weeks when paid by personal check. Prices above are for cash or money order only. Add 3% for Visa, MasterCard, and AMEX. Prices subject to change.

Many more programs available.
 Call today for a copy of our FREE CATALOG!

THE AMAZING VOICE MASTER

ENTER THE FINAL FRONTIER OF MAN-TO-MACHINE COMMUNICATIONS



There is nothing else like it. Voice Master gives both speech output and voice recognition with this single hardware product! Your voice controls programs, or home appliances, robots, and more with spoken commands. Verbal response back gives status, verifies, or requests your reply! Speech output and recognition patterns are recorded in with your voice. Or use the voice of your friend, boss, teacher, mother, even the family pet! Programming is simple with new commands added to BASIC. A music bonus program lets you write and compose musical scores simply by humming the tune. Unlimited applications for fun, education, and commercial use. Design your own programs for profit. Speech and recognition quality unsurpassed by even the most sophisticated machines. Only Covox provides this high-tech marvel at a price less than most common peripherals.

The Covox Voice Master comes complete with all hardware and software for only \$89.95. (Add \$4 shipping and handling for USA, \$6 Canada, \$10 overseas.) Available for Commodore 64/128, Apple II, II+, IIc, IIe, Atari 800, 800XL, 130 XE. Specify when ordering. Visa, MasterCard phone orders accepted.



Call or write for FREE Voice Master Infopak and special combination package offers.
COVOX INC., DEPT. C!
 675-D Conger Street • Eugene, Oregon 97402 • U.S.A.
 Area Code (503) 342-1271 • Telex 706017 (Av Alarm UD)

IBM Printer Control

Ronald Dorchester

Now you can send printer control codes from DOS with a program that understands your own commands.

One of the most common, and sometimes bothersome, tasks for any IBM PC/PCjr user is sending control codes to a printer prior to printing. "IBM Printer Control" is a compact, convenient program which is customized exactly for your needs. It can send a variety of different commands to the printer, using command names that you have devised.

Before you type in the program, decide what control codes you want to use. Consult your printer manual to determine the control codes for the features you want. For each feature, select a descriptive name to be used when you invoke the printer control program from DOS. For instance, you might use the names DS-ON and DS-OFF for the commands that turn double-strike printing on and off.

Lines 1200-1231 of the program contain DATA statements with example commands and control sequences. The commands are the words you will type from the DOS prompt to invoke the corresponding features, and the numbers following the commands are the control characters for those commands. Some commands, such as BKSPC (backspace) are very simple, consisting of only a single character. Others contain a sequence of several control characters. If you frequently use a certain sequence of commands, you might want to put the entire sequence into a single command. The NORMAL command in line 1209 is an example of one such sequence.

Notice that each control se-

quence ends with the value -1, which is a marker indicating the end of the sequence. The last control character is a carriage return (character 13). The carriage return causes the control sequence to take effect immediately, allowing each command to execute independently.

When you type in the program, edit lines 1200-1231, adding or substituting your commands for the example commands. The name of the command must come first, followed by its control characters, and the value -1. The command names can be any legal DOS name; however, no name extensions are allowed.

After making all the necessary modifications, save a copy and then run the program. If you made no typing errors in your DATA statements, an executable machine language program called PRNCTRL.COM will be written to disk. Like other machine language programs, this one is run from the DOS prompt by typing its name (the .COM extension is optional). If you type PRNCTRL from the DOS prompt and press RETURN, the program prints all the command names which it understands. This is a convenience in case you forget some of the command names. The normal usage is to supply the name of one or more commands. For instance, assuming you included a command named NORMAL, the following invokes PRNCTRL, sending the NORMAL command to reset the printer to its default condition:

PRNCTRL NORMAL

You can send more than one control sequence at a time. For instance, you might use this command to turn on compressed and double-strike mode:

PRNCTRL CMP-ON DS-ON

If you supply an invalid command name, the program displays the error message *Invalid Option* and returns to the DOS prompt.

PRNCTRL.COM Filemaker

For instructions on entering this program, please refer to "COMPUTE!'s Guide to Typing In Programs" elsewhere in this issue.

```
HE 100 ' Printer Control
GN 110 ' Copyright 1987
FN 111 ' Compute! Publications,
      Inc.
LK 120 ' All Rights Reserved.
HH 125 '
GD 126 CLS:PRINT"Copyright 1987"
      :PRINT"Compute! Publicati
      ons, Inc.":PRINT"All Righ
      ts Reserved.":FOR X=1 TO
      1500:NEXT
PJ 130 CLS:DEFINT I:FOR I=0 TO 5
      :READ MSG$(I):NEXT
BH 131 READ PGM$,I1MAX,I2MAX,GR
      TCTK,ILOF
ND 140 IPASS=IPASS+1:PRINT MSG$(
      IPASS):IF IPASS=0 OR IPAS
      S=3 THEN 1000
BI 150 PRINT:IF IPASS=2 THEN OPE
      N PGM$ AS #1 LEN=1:FIELD
      #1,1 AS BYTE$
BH 160 RESTORE 501:GRTOT=0:FOR I
      1=1 TO I1MAX:FOR I2=1 TO
      I2MAX
FP 170 READ H$:IBYTE=VAL("&H"+H$
      ):ITOT=ITOT+IBYTE
PF 180 IF IPASS=2 AND ICLOF<ILOF
      THEN LSET BYTE$=CHR$(IBY
      TE):PUT #1:ICLOF=ICLOF+1
JL 190 NEXT I2:READ ICHECK:IF IC
      HECK=ITOT GOTO 210
JL 200 PRINT MSG$(4);500+I1:IPAS
      S=-1
BH 210 GRTOT=GRTOT+ITOT:ITOT=0:N
      EXT I1:PRINT
GN 220 IF IPASS>0 AND GRTOTCTK=GR
      TOT GOTO 140
AH 230 IF IPASS<>-1 THEN PRINT M
      SG$(5):END ELSE GOTO 140
HA 300 DATA Correct Errors.,Chec
      king DATA Lines.,Creating
      Program.
HB 310 DATA Program Created.,Err
      or(s) On Line -,Check Lin
      e 500.
BI 500 DATA "A:PRNCTRL.COM",24,1
      6,34236,381
MH 501 DATA E9,AC,00,0D,09,0D,0A
      ,50,52,4E,43,54,52,4C,20,
      20,1063
FD 502 DATA 2D,20,20,4F,75,74,70
      ,75,74,20,50,72,69,6E,74,
      65,1424
```

Modem Promotion!!!

The Best Modem for as low as \$99.95.

Everything from Electronic Mail (E-mail) to stock quotes and huge databases of every imaginable type is now on-line just waiting for you to dial up. All you need is a telephone line and a modem connected to your Computer which allows you to download this information.

Which modem is best for you? Lets first say that almost all modems (and services) are set up to communicate in one of two speeds; 300 and 1200 Baud. If you look around you will find that there is a flood of 300 baud modems on the market and sometimes at very low prices. The reason is simple. They are being dumped because most computer users prefer 1200 Baud. (1200 Baud is about 4 times as fast which means you spend less time and money getting the data you want and more time using it.) You will also notice a few very cheap 1200s on the market at "too good to be true prices". They are. Most are cheaply built foreign copies of American designs. The service and support you receive is minimal-to-nonexistent for many of these models.

Recently we re-evaluated our modem line and discovered that the best price/performance tradeoff for our customers would be a straightforward, easy-to-use unit with no complicated switch settings or indicators, but one that just did what our customers wanted. To our surprise (and contrary to popular belief), we found that we could build this product with better reliability and performance levels in the USA than anywhere else. We found that because of a significant increase in reliability that American components and manufacturing give us, we now have the best product possible. Why not get a modem that will satisfy your present AND future needs by going directly to the American built Aprotex 12 series modem.

What do you get for your money? Everything! You don't need to worry about cables, compatibility or anything else! We don't just make hardware, we make solutions. Our modems are full feature, 300 and 1200 Baud units with Auto Answer, Auto Dial, Touch-Tone or rotary dialing, and have status indications on screen to let you know what is happening all the time. They come complete with terminal programs and have a built in speaker, so that you can hear it dial and connect. Just plug it into your computer and standard phone jack with the cable supplied.



STILL NOT SURE? Aprotex's reputation as a first rate peripherals supplier and our 5 year warranty on the 12 series plus our 2 week satisfaction or your money back guarantee tells you that we support our products.

The bottom line:

Aprotex 12C (Commodore) order #12C only \$ 99.95

Aprotex 12AM (AMIGA) order #12AM only \$119.95

Aprotex 12AT (ATARI ST) order #12AT only \$119.95

Aprotex 12R (RS-232 all others) order #12R only \$119.95

Shipping-Cont US. = \$5., UPS Blue, Can, AK, HI, APO = \$10.

ORDER INFORMATION California residents add 6% tax. All prices are cash prices—VISA and MC add 3% to total. We ship the next business day on money orders, cashier's checks, and charge cards. A 14-day clearing period is required for checks. Prices and availability subject to change—CALL. Available at Selected Dealers. Dealer inquiries invited.

For information call 805/987-2454

TO ORDER CALL TOLL FREE

1 (800) 962-5800 - USA

1 (800) 962-3800 - Calif (7-7 PST)

Or send order to:

APROTEK Dept. 1071-A Avenida Acaso
CP Camarillo, CA 93010

```

LN 503 DATA 72,20,43,6F,6E,74,72,6F,6C,20,43
,6F,64,65,73,2E, 1455
CC 504 DATA 0D,0A,43,6F,70,79,77,72,69,74,65
,20,52,6F,6E,61, 1421
NI 505 DATA 6C,64,20,44,6F,72,63,68,65,73,74
,65,72,20,31,39, 1421
NN 506 DATA 38,36,0D,0A,09,20,20,31,30,39,34
,37,20,43,72,6F, 791
HP 507 DATA 77,6E,20,50,61,72,6B,0D,0A,09,20
,20,53,61,6E,20, 1077
FN 508 DATA 41,6E,74,6F,6E,69,6F,2C,20,54,58
,20,20,37,38,32, 1201
KA 509 DATA 33,39,0D,0A,1A,0D,0A,56,61,6C,69
,64,20,4F,70,74, 1015
JH 510 DATA 69,6F,6E,73,20,41,72,65,3A,0D,0A
,0D,0A,49,6E,76, 1158
CK 511 DATA 61,6C,69,64,20,4F,70,74,69,6F,6E
,3A,20,07,01,BE, 1363
BE 512 DATA 80,00,AC,3C,00,77,12,80,3E,AE,01
,01,75,06,EB,7A, 1340
OI 513 DATA 00,EB,86,00,B8,00,4C,CD,21,BF,5C
,00,B8,03,29,CD, 1580
JL 514 DATA 21,80,3E,5D,00,20,74,DF,56,BB,7D
,02,83,3F,00,74, 1397
EK 515 DATA 2B,BF,5D,00,8B,F3,B9,08,00,F3,A6
,74,08,8B,77,08, 1701
FN 516 DATA 8D,5B,0A,EB,E7,C6,06,AE,01,00,8B
,4F,08,8B,D3,83, 1791
CN 517 DATA C2,0A,BB,04,00,B4,40,CD,21,5E,EB
,BD,EB,2C,00,BA, 1857
DI 518 DATA 9B,01,B9,13,00,EB,17,00,C7,06,65
,00,0D,0A,BA,5D, 1223
II 519 DATA 00,B9,0C,00,EB,08,00,EB,20,00,BB
,FF,4C,CD,21,50, 1534
KI 520 DATA 53,BB,02,00,B4,40,CD,21,5B,58,C3
,C6,06,84,01,20, 1497
HN 521 DATA BA,05,01,B9,80,00,EB,E6,FF,C3,BA
,85,01,B9,16,00, 1944
DK 522 DATA EB,DC,FF,BB,7D,02,BB,20,20,83,3F
,00,74,1E,8B,D3, 1959
KJ 523 DATA 8D,7F,08,8B,35,8D,58,0A,83,3F,00
,75,03,88,0D,0A, 1228
KF 524 DATA 87,05,B9,0A,00,EB,B7,FF,87,05,EB
,DD,C3,00,00,00, 1796
LJ 1000 IF IPASS=0 THEN END
PA 1010 DIM IB(128):RESTORE 1200:PRINT "Addi
ng Printer Control Statements..."
CH 1020 CMD$=SPACE$(8):READ RD$
ON 1030 IF RD$="/#" THEN LSET BYTE$=CHR$(0):
PUT #1:PUT #1:PRINT "Done.":END
MD 1040 MID$(CMD$,1)=RD$:PRINT SPC(5);CHR$(3
4);CMD$;CHR$(34)
HI 1050 FOR I=1 TO 8:IC=ASC(MID$(CMD$,I,1)):
IF IC>96 AND IC<123 THEN IC=IC-32
LC 1060 LSET BYTE$=CHR$(IC):PUT #1:NEXT
HA 1070 IBX=0:READ IC:WHILE IC>=0 AND IC<=25
5:IBX=IBX+1:IB(IBX)=IC:READ IC:WEND
HI 1080 LSET BYTE$=CHR$(IBX MOD 256):PUT #1:
LSET BYTE$=CHR$(IBX\256):PUT #1
OL 1090 FOR I=1 TO IBX:LSET BYTE$=CHR$(IB(I
)):PUT #1:NEXT:GOTO 1020
HN 1100 '
JD 1110 ' Printer Control Statements.
QM 1120 ' Format: DATA cmd-name,code,<co
de,...>-1
HG 1130 '
OM 1200 DATA CR,13,-1
IG 1201 DATA LF,10,-1
NJ 1202 DATA FF,12,08,13,-1
KE 1203 DATA BKSPC,08,-1
GE 1204 DATA LPI-6,27,50,08,13,-1
CK 1205 DATA LPI-8,27,48,08,13,-1
FK 1209 DATA NORMAL,18,27,70,27,72,27,50,08,
08,08,08,13,-1
DL 1210 DATA CMP-ON,15,08,13,-1
NB 1211 DATA CMP-OFF,18,08,13,-1
FK 1220 DATA EMP-ON,27,69,08,13,-1
KJ 1221 DATA EMP-OFF,27,70,08,13,-1
EO 1230 DATA DS-ON,27,71,08,13,-1
BH 1231 DATA DS-OFF,27,72,08,13,-1
PP 1500 DATA /# :*Mar
ks End of Printer Control Statements

```

Auto-Display Hi-Res Picture Maker

Jaideep Vijan

From a reader in Hong Kong, this utility turns any Apple II hi-res picture into a file that you can BRUN. Several display options are available. The program works under both DOS 3.3 and ProDOS.

"Auto-Display Hi-Res Picture Maker" is an Apple II program which will convert any normal hi-res picture file on disk into a file which can be BRUN. When you BRUN the converted file, the picture isn't instantly displayed on the screen; instead, it is drawn onto the screen. The picture can be drawn in a variety of ways.

To begin, boot up DOS 3.3 or ProDOS, enter the program, and save it to disk. It's important that you save the program with the filename AUTO.HIRES.PIC. When you run the program, it displays the main menu. Option 1 (instructions) outlines the steps needed to convert a file from an ordinary hi-res picture to one which can be BRUN and gives details of the memory locations used by the converted file.

Option 2 (load picture) loads a hi-res picture file from disk into the hi-res screen. When you choose this option, you are prompted for a filename. If you change your mind and decide not to load a file, press Ctrl-C and Return to display the main menu again. To view a catalog of the disk, press Return without typing anything. When you are ready to load a file, enter its filename and press Return. Filenames must start with a letter and be no longer than 15 characters for ProDOS or no

longer than 30 characters for DOS 3.3. Once the picture has loaded, you return to the main menu.

Option 3 (try draw routines) lets you try out the various ways in which the picture can be drawn on the screen (there are five). When you select this option, you are given a choice of seeing one of the drawing routines or of returning to the main menu. To try out one of the drawing routines, type in its number and wait until it is POKEd into memory. After the drawing routine has finished, you return to the option 3 menu. Once you have decided which routine you like best, return to the main menu and go to option 4.

Option 4 (make auto-display hi-res picture) is the part of the program which converts the hi-res picture into a file which can be BRUN. When you choose this option, you are asked which drawing routine you want to use. Enter the number corresponding to the drawing routine that you liked best in the previous step. Then you are asked for the name of the file you wish to create (this will be the file that can be BRUN). Again, press Return by itself to view a disk catalog, or use Ctrl-C and Return to go back to the main menu. After you enter a filename, you are asked to confirm that this choice is correct. If you answer in the affirmative, the conversion takes place, and you return to the main menu.

Option 5 (see screen) lets you look at whatever is present on the hi-res screen. After you finish looking at the picture, press any key to return to the main menu.

Option 6 lets you change the disk drive or DOS prefix used by the rest of the program. The slot and drive apply if you are using DOS 3.3, while the DOS prefix is relevant only to ProDOS. If you are using DOS 3.3, enter the slot and drive numbers when prompted and you will return to the main menu. If you are using ProDOS, the program displays the current prefix near the top of the screen and invites you to enter a new prefix. If you enter an illegal prefix, or if ProDOS cannot find the directory you want, you are prompted to enter another prefix. (Note that you must enter a valid prefix in order to exit this option.)

Choose option 7 once you have finished and want to leave the program.

If a DOS error occurs, the program prints an error message and returns you to the main menu. If an Applesoft error occurs, the program stops after printing the error number and the line number in which it happened. Pressing Ctrl-C and Return while the program is running always returns you to the main menu, except when you are entering a prefix for ProDOS.

Auto-Display Hi-Res Picture Maker

For instructions on entering this program, please refer to "COMPUTE!'s Guide to Typing In Programs" elsewhere in this issue.

```
FF 1 REM COPYRIGHT 1987 COMPUTE!  
PUBLICATIONS, INC. ALL RI  
GHTS RESERVED
```

```
FB 5 IF PEEK (103) + PEEK (104)  
* 256 < > 25345 THEN POKE 2  
5344,0: POKE 103,1: POKE 10  
4,99: PRINT : PRINT CHR# (4  
) ; "RUN AUTO.HIRES.PIC"
```

```

52 20 D$ = CHR$ (4)
58 30 SL$ = ",S6,D1":SL$ = 6:DR$
   = 1:MN$ = "SET SLOT AND D
   RIVE (NOW 6,1)":CT$ = "CAT
   ALOG":NL% = 30: IF PEEK (4
   8896) = 76 THEN CT$ = "CAT
   ":NL% = 15:MN$ = "SET PREF
   IX": PRINT D$;"PREFIX": IN
   PUT PX$:SL$ = ""
82 990 ONERR GOTO 63000
88 997 REM
85 998 REM MAIN MENU
88 999 REM
98 1000 TEXT : HOME : HTAB 3: PR
   INT "AUTO-DISPLAY HI-RES
   PICTURE MAKER": HTAB 3:
   PRINT "=====
   =====": PRIN
   T
E0 1003 PRINT "COPYRIGHT 1987 CO
   MPUTE! PUBLICATIONS": HT
   AB 10: PRINT "ALL RIGHTS
   RESERVED"
16 1005 VTAB 8
60 1010 PRINT "<1> INSTRUCTIONS"
   : PRINT "<2> LOAD PICTUR
   E FROM DISK": PRINT "<3>
   TRY DRAW ROUTINES": PRI
   NT "<4> MAKE AUTO-DISPLA
   Y HI-RES PICTURE": PRINT
   "<5> SEE SCREEN IN MEMO
   RY"
D2 1011 PRINT "<6> ";MN$: PRINT
   "<7> QUIT": PRINT
88 1015 PRINT "PLEASE CHOOSE ONE
   (1-7) : ";: GET X$: PRI
   NT X$: IF X$ < "1" OR X$
   > "7" THEN PRINT CHR$ (
   7): GOTO 1000
E1 1020 X = VAL (X$): ON X GOTO
   2000,3000,4000,5000,7000
   ,8000,6000
23 1997 REM
10 1998 REM INSTRUCTIONS
33 1999 REM
72 2000 TEXT : HOME : PRINT "INS
   TRUCTIONS": PRINT "-----
   -----": PRINT : POKE 3
   4,3
44 2010 PRINT "THIS PROGRAM WILL
   TAKE ANY HI-RES": PRINT
   "PICTURE AND CONVERT IT
   INTO A FILE WHICH WILL A
   UTOMATICALLY DISPLAY THE
   PICTURE": PRINT "WHEN T
   HE FILE IS BRUN.": PRINT
67 2020 PRINT "WHEN THE FILE IS
   BRUN, THE PICTURE WILL":
   PRINT "BE DRAWN ONTO TH
   E SCREEN. THIS CAN BE":
   PRINT "DONE IN A NUMBER
   OF WAYS. TO TRY OUT THED
   IFFERENT DRAWING ROUTINE
   S, LOAD A": PRINT "PICTU
   RE USING OPTION 2 FROM T
   HE MAIN"
D4 2021 PRINT "MENU AND GO TO OP
   TION 3.": PRINT : GOSUB
   10000
CC 2030 HOME : PRINT "ONCE YOU H
   AVE CHOSEN THE DRAWING R
   OUTINETHAT YOU LIKE BEST
   , GO BACK TO THE MAIN ME
   NU AND GO TO OPTION 4. (
   BEFORE GOING": PRINT "TO
   OPTION 4, MAKE SURE YOU
   HAVE LOADED YOUR PICTU
   RE INTO MEMORY.): PRINT
20 2040 PRINT "YOU WILL BE ASKED
   FOR THE NUMBER OF THE D
   RAWING ROUTINE THAT YOU
   WANT TO USE FORYOUR PICT
   URE AND FOR THE NAME OF
   A FILE TO SAVE IT TO. WH
   EN THE PROGRAM HAS"
3C 2041 PRINT "FINISHED CREATING
   THE FILE, YOU WILL BE R
   ETURNED TO THE MAIN MENU
   .": PRINT
A4 2050 PRINT "NOTE: WHEN THE CR
   EATED FILE IS BRUN, IT W
   ILL OVERWRITE MEMORY LOC
   ATIONS $2000- $62FF (81
   92-25343).": PRINT
88 2060 GOSUB 10000: GOTO 1000
24 2997 REM
13 2998 REM LOAD PICTURE
34 2999 REM
83 3000 TEXT : HOME : PRINT "LOA
   D PICTURE FROM DISK": PR
   INT "-----
   ----": PRINT : POKE 34,3
88 3010 PRINT "ENTER FILENAME (J
   UST RETURN FOR CATALOG)"
   : INPUT "":FI$
CC 3020 IF FI$ = "" THEN POKE 34
   ,0: PRINT D$;CT$;SL$: PR
   INT : PRINT : GOSUB 1000
   0: GOTO 3000
18 3030 IF LEN (FI$) > NL% OR AS
   C ( LEFT$ (FI$,1)) < ASC
   ("A") OR ASC ( LEFT$ (F
   I$,1)) > ASC ("Z") THEN
   PRINT CHR$ (7): GOTO 300
   0
8D 3040 HGR : POKE 49234,0: PRIN
   T D$;"BLOAD ";FI$;"A$20
   00";SL$: FOR X = 1 TO 15
   00: NEXT : GOTO 1000
25 3997 REM
6F 3998 REM TRY DRAW ROUTINES
35 3999 REM
27 4000 TEXT : HOME : PRINT "TRY
   DRAW ROUTINES": PRINT "
   -----": PRIN
   T
E9 4010 PRINT "PLEASE CHOOSE ONE
   ": PRINT
6D 4020 FOR X = 1 TO 5: PRINT "<
   ";X;"> DRAWING ROUTINE "
   ;X: NEXT : PRINT "<6> RE
   TURN TO MAIN MENU": PRIN
   T
2E 4030 PRINT "WHICH (1-6) ? ";:
   GET X$: PRINT X$: IF X$
   < "1" OR X$ > "6" THEN
   PRINT CHR$ (7);: GOTO 40
   00
D6 4040 X2 = VAL (X$): IF X2 = 6
   THEN 1000
38 4050 RESTORE : PRINT : PRINT
   "SKIPPING DATA...": PRI
   NT : GOSUB 10010
D8 4060 IF X2 = 1 THEN PO = 2457
   6: GOSUB 10030: GOTO 420
   0
15 4070 FOR X1 = 1 TO X2 - 1: GO
   SUB 10010: NEXT
DA 4080 PO = 24576: GOSUB 10030
56 4081 IF X2 = 5 THEN GOSUB 100
   30: GOTO 4200
89 4090 FOR X1 = 1 TO 5 - X2: GO
   SUB 10010: NEXT : GOSUB
   10030
38 4200 CALL 24576: FOR X = 1 TO
   5000: NEXT : GOTO 4000
26 4997 REM
CC 4998 REM MAKE PIC.
36 4999 REM
69 5000 RESTORE : TEXT : HOME :
   PRINT "MAKE AUTO-DISPLAY
   HI-RES PIC.": PRINT "----
   -----": PRINT : POKE 34,3
A7 5010 PRINT "USE WHICH DRAWING
   ROUTINE (1-5) : ";: GET
   X$: PRINT X$: IF X$ < "
   1" OR X$ > "5" THEN PRIN
   T CHR$ (7): HOME : GOTO
   5010
D2 5020 DR = VAL (X$)
DD 5030 HOME : PRINT "ENTER NAME
   OF FILE TO SAVE TO.": P
   RINT "(JUST RETURN FOR C
   ATALOG)": PRINT : INPUT
   "":FI$
82 5040 IF FI$ = "" THEN POKE 34
   ,0: PRINT D$;CT$;SL$: PR
   INT : PRINT : GOSUB 1000
   0: HOME : PRINT "MAKE AU
   TO-DISPLAY HI-RES PIC.":
   PRINT "-----
   -----": PRINT :
   POKE 34,3: GOTO 5030
2C 5050 IF LEN (FI$) > NL% OR AS
   C ( LEFT$ (FI$,1)) < ASC
   ("A") OR ASC ( LEFT$ (F
   I$,1)) > ASC ("Z") THEN
   PRINT CHR$ (7): GOTO 503
   0
A9 5060 HOME : PRINT "FILENAME:"
   ;FI$: PRINT : PRINT "DRA
   WING ROUTINE ";DR: PRINT
   : PRINT : PRINT "OK (Y/
   N) ? ";: GET X$: PRINT X
   $: IF X$ = "N" THEN 5000
88 5070 IF X$ = "Y" THEN 5090
15 5080 PRINT CHR$ (7): GOTO 506
   0
AE 5090 POKE 34,6: HOME : POKE 3
   4,0: VTAB 10
E3 5100 PRINT "CREATING FILE....
   ": PRINT
77 5110 X1 = PEEK (8192):X2 = PE
   EK (8193):X3 = PEEK (819
   4)
A6 5120 POKE 8192,76: POKE 8193,
   0: POKE 8194,64
38 5130 PO = 16384: GOSUB 10030
93 5140 POKE 16385,X1: POKE 1639
   0,X2: POKE 16395,X3
41 5150 PO = 16640
AC 5160 IF DR = 1 THEN GOSUB 100
   30: GOTO 5300
9C 5170 FOR X5 = 1 TO DR - 1: GO
   SUB 10010: NEXT : GOSUB
   10030
8C 5180 IF DR = 5 THEN GOSUB 100
   30: GOTO 5300
26 5190 FOR X5 = 1 TO 5 - DR: GO
   SUB 10010: NEXT : GOSUB
   10030
68 5300 PRINT "SAVING FILE...":
   PRINT : PRINT D$;"BSAVE
   ";FI$;"A$2000,L$2400":
   SL$: PRINT : PRINT "DONE
   .": FOR X = 1 TO 2000: N
   EXT : POKE 8192,X1: POKE
   8193,X2: POKE 8194,X3:
   GOTO 1000
27 5997 REM
D4 5998 REM QUIT
37 5999 REM
E1 6000 TEXT : HOME : VTAB 12: H
   TAB 14: PRINT ".... BYE
   ....": VTAB 23: END
28 6997 REM
97 6998 REM SEE SCREEN
38 6999 REM
77 7000 TEXT : HOME : PRINT "SEE
   SCREEN IN MEMORY": PRIN
   T "-----"
   : PRINT
28 7010 PRINT "PRESS ANY KEY TO
   GO BACK TO MENU ONCE": P
   RINT "PICTURE COMES ON":
   FOR X = 1 TO 2500: NEXT
EC 7020 POKE 49232,0: POKE 49234
   ,0: POKE 49236,0: POKE 4
   9239,0: WAIT - 16384,128
   : POKE - 16368,0: GOTO 1
   000

```

```

29 7997 REM
07 7998 REM SLOT,DRIVE / PREFIX
39 7999 REM
28 8000 TEXT : HOME : PRINT MN$:
FOR X = 1 TO LEN (MN$):
PRINT "-"; NEXT : PRIN
T : PRINT : IF CT$ = "CA
T" THEN 8500
FF 8010 PRINT "SLOT (1-7) ? ";;
GET X$
95 8020 IF X$ < "1" OR X$ > "7"
THEN PRINT CHR$ (7): HTA
B 1: VTAB PEEK (37): GOT
O 8010
AE 8030 SLX = VAL (X$): PRINT X$
: PRINT
2E 8040 PRINT "DRIVE (1-2) ? ";;
GET X$
55 8050 IF X$ < "1" OR X$ > "2"
THEN PRINT CHR$ (7): VTA
B PEEK (37): HTAB 1: GOT
O 8040
36 8060 DRX = VAL (X$):MN$ = "SE
T SLOT AND DRIVE (NOW "
+ STR$ (SLX) + ", " + STR
$ (DRX) + ")":SL$ = ",S"
+ STR$ (SLX) + ",D" + S
TR$ (DRX): GOTO 1000
9F 8500 PRINT "CURRENT PREFIX: "
;PX$: PRINT : POKE 34, P
EEK (37) + 1: HOME
33 8510 INPUT "ENTER NEW PREFIX:
";X$
39 8520 ONERR GOTO 8600
91 8530 PRINT D$;"PREFIX ";X$:PX
$ = X$: ONERR GOTO 63000
68 8540 GOTO 1000
A5 8600 PRINT CHR$ (7): HOME : G
OTO 8510
18 9995 REM
71 9996 REM SUBROUTINES
28 9997 REM
07 9998 REM WAIT FOR KEYPRESS
38 9999 REM
6D 10000 VTAB 23: PRINT "PRESS A
NY KEY TO CONTINUE ";;
GET X$: PRINT : RETURN
89 10007 REM
83 10008 REM SKIP ONE DATA BLOCK
A9 10009 REM
57 10010 READ X: IF X = 300 THEN
RETURN
7A 10020 GOTO 10010
99 10027 REM
48 10028 REM POKE ONE DATA BLOCK
B9 10029 REM
67 10030 READ X: IF X = 300 THEN
RETURN
3E 10040 POKE PO,X:PO = PO + 1:
GOTO 10030
EB 59995 REM
A5 59996 REM DATA
8C 59997 REM
48 59998 REM MOVER ROUTINE
2C 59999 REM
A7 60000 DATA 169,0,141,0,32,169
,0,141,1,32,169,0,141,2
,32,160,0,169,0,133,60,
169,65,133,61,169,255,1
33,62,169
81 60010 DATA 67,133,63,169,0,13
3,66,169,96,133,67,32,4
4,254,76,0,96,300
9E 60027 REM
DF 60028 REM DRAWING ROUTINE 1
BE 60029 REM
EA 60030 DATA 32,216,243,173,82,
192,162,0,189,102,96,20
1,255,240,40,141,57,96,
189,115,96,141,61,96,18
9,127,96,141,65,96
F3 60040 DATA 189,139,96,141,69,
96,189,151,96,141,75,96
,142,163,96,32,56,96,17
4,163,96,232,76,8,96,96
,169,32,133,61,169
FC 60050 DATA 40,133,63,169,64,1
33,67,169,0,133,60,133,
66,169,255,133,62,32,82
,96,96,160,0,177,60,145
,66,32,180,252,176
CF 60060 DATA 8,169,16,32,168,25
2,76,82,96,96,32,57,37,
61,35,48,41,53,44,59,45
,58,255,35,58,41,63,37,
52,43,56
DF 60070 DATA 45,61,47,58,64,89,
69,93,67,80,73,85,76,91
,77,90,0,0,128,128,128,
0,128,0,0,80,128,127,
127,127
71 60080 DATA 255,127,255,255,25
5,127,127,255,255,181,3
00
CE 60087 REM
58 60088 REM DRAWING ROUTINE 2
EE 60089 REM
A8 60090 DATA 32,216,243,173,82,
192,169,0,141,232,97,16
9,191,141,233,97,169,96
,141,234,97,174,232,97,
189,104,96,133,60,133
5B 60100 DATA 64,189,40,97,133,6
1,24,105,32,133,65,174,
233,97,189,104,96,133,6
2,133,66,189,40,97,133,
63,24,105,32,133,67
53 60110 DATA 160,0,177,60,145,6
4,177,62,145,66,200,192
,40,240,3,76,63,96,169,
192,32,168,252,206,234,
97,169,255,205,234,97
1E 60120 DATA 240,9,238,232,97,2
06,233,97,76,21,96,96,3
00
A2 60127 REM
64 60128 REM DRAWING ROUTINE 3
C2 60129 REM
3D 60130 DATA 32,216,243,173,82,
192,169,96,141,232,97,1
69,95,141,233,97,169,96
,141,234,97,174,232,97,
189,104,96,133,60,133
7B 60140 DATA 64,189,40,97,133,6
1,24,105,32,133,65,174,
233,97,189,104,96,133,6
2,133,66,189,40,97,133,
63,24,105,32,133,67
73 60150 DATA 160,0,177,60,145,6
4,177,62,145,66,200,192
,40,240,3,76,63,96,169,
192,32,168,252,206,234,
97,169,255,205,234,97
6F 60160 DATA 240,9,206,232,97,2
38,233,97,76,21,96,96,3
00
C2 60167 REM
E4 60168 REM DRAWING ROUTINE 4
E2 60169 REM
92 60170 DATA 32,216,243,173,82,
192,169,0,141,7,98,169,
191,141,8,98,169,96,141
,9,98,174,7,98,189,135,
96,133,60,133
91 60180 DATA 64,189,71,97,133,6
1,24,105,32,133,65,174,
8,98,189,135,96,133,62,
133,66,189,71,97,133,63
,24,105,32,133,67
EF 60190 DATA 160,0,177,60,73,25
5,145,64,177,62,73,255,
145,66,200,192,40,240,3
,76,63,96,169,192,32,16
8,252,206,9,98,169
4A 60200 DATA 255,205,9,98,240,9
,238,7,98,206,8,98,76,2
1,96,169,32,133,61,169,
63,133,63,169,64,133,67
,169,0,133,60
AE 60210 DATA 133,66,169,255,133
,62,160,0,32,44,254,96,
300
9E 60217 REM
E8 60218 REM DRAWING ROUTINE 5
BE 60219 REM
2B 60220 DATA 32,216,243,173,82,
192,169,0,141,77,98,169
,191,141,78,98,169,96,1
41,79,98,174,77,98,189,
205,96,133,60,133
18 60230 DATA 64,189,141,97,133,
61,24,105,32,133,65,174
,78,98,189,205,96,133,6
2,133,66,189,141,97,133
,63,24,105,32,133,67
3A 60240 DATA 160,0,177,60,73,25
5,145,64,177,62,73,255,
145,66,200,192,40,240,3
,76,63,96,169,96,32,168
,252,206,79,98,169
FD 60250 DATA 255,205,79,98,240,
9,238,77,98,206,78,98,7
6,21,96,169,96,141,77,9
8,169,95,141,78,98,169,
96,141,79,98,174
5A 60260 DATA 77,98,189,205,96,1
33,60,133,64,189,141,97
,133,61,24,105,32,133,6
5,174,78,98,189,205,96,
133,62,133,66,189,141
A5 60270 DATA 97,133,63,24,105,3
2,133,67,160,0,177,60,1
45,64,177,62,145,66,200
,192,40,240,3,76,164,96
,169,96,32,168,252
E4 60280 DATA 206,79,98,169,255,
205,79,98,240,9,206,77,
98,238,78,98,76,122,96,
96,300
D6 60287 REM
31 60288 REM COMMON DATA
F6 60289 REM
99 60290 DATA 0,0,0,0,0,0,0,0,12
8,128,128,128,128,128,1
28,128,0,0,0,0,0,0,0,0,
128,128,128,128,128,128
F5 60300 DATA 128,128,0,0,0,0,0,
0,0,0,128,128,128,128,1
28,128,128,128,0,0,0,0,
0,0,0,0,128,128,128,128
,128
89 60310 DATA 128,128,128,40,40,
40,40,40,40,40,40,168,1
68,168,168,168,168,168,
168,40,40,40,40,40,40,4
0,40,168,168,168,168
E2 60320 DATA 168,168,168,168,40
,40,40,40,40,40,40,168,
168,168,168,168,168,168,
168,168,40,40,40,40,40,
40,40,40,168,168
95 60330 DATA 168,168,168,168,16
8,80,80,80,80,80,80,80,
80,208,208,208,208,208,
208,208,208,80,80,80,80
,80,80,80,80,208,208
98 60340 DATA 208,208,208,208,20
8,208,80,80,80,80,80,80
,80,80,208,208,208,208,
208,208,208,80,80,80,8
0,80,80,80,80,80,208
D4 60350 DATA 208,208,208,208,20
8,208,208,32,36,40,44,4
8,52,56,60,33,37,41,45
,49,53,57,61
87 60360 DATA 33,37,41,45,49,53,
57,61,34,38,42,46,50,54
,58,62,34,38,42,46,50,5
4,58,62,35,39,43,47,51,

```



```

55,59
27 60370 DATA 63,35,39,43,47,51,
55,59,63,32,36,40,44,48
,52,56,60,32,36,40,44,4
8,52,56,60,33,37,41,45,
49,53
17 60380 DATA 57,61,33,37,41,45,
49,53,57,61,34,38,42,46
,50,54,58,62,34,38,42,4
6,50,54,58,62,35,39,43,
47,51
64 60390 DATA 55,59,63,35,39,43,
47,51,55,59,63,32,36,40
,44,48,52,56,60,32,36,4
0,44,48,52,56,60,33,37,
41,45
70 60400 DATA 49,53,57,61,33,37,
41,45,49,53,57,61,34,38
,42,46,50,54,58,62,34,3
8,42,46,50,54,58,62,35,
39,43
03 60410 DATA 47,51,55,59,63,35,
39,43,47,51,55,59,63,16
0,137,160,0,300
FE 62997 REM
6E 62998 REM ERROR HANDLER
1F 62999 REM
04 63000 E1 = PEEK (222):E2 = PE
EK (218) + PEEK (219) *
256
70 63010 IF E1 = 255 THEN 1000
74 63020 IF E1 = 4 THEN ER$ = "D
ISK WRITE PROTECTED" +
CHR$ (13) + CHR$ (13) +
"PLEASE REMOVE WRITE P
ROTECT STICKER": GOTO 6
3900
96 63030 IF E1 = 8 THEN ER$ = "D
ISK I/O ERROR" + CHR$ (
13) + CHR$ (13) + "PLEA
SE TRY ANOTHER DISK": G
OTO 63900
15 63040 IF E1 = 9 THEN ER$ = "D
ISK FULL" + CHR$ (13) +
CHR$ (13) + "PLEASE TR
Y ANOTHER DISK": GOTO 6
3900
FA 63050 IF E1 = 10 THEN ER$ = "
FILE LOCKED" + CHR$ (13
) + CHR$ (13) + "PLEASE
TRY ANOTHER FILE": GOT
O 63900
69 63060 IF E1 = 13 THEN ER$ = "
FILE IS NOT A BINARY FI
LE" + CHR$ (13) + CHR$
(13) + "PLEASE TRY ANOT
HER FILE": GOTO 63900
57 63070 IF E1 = 6 OR (E1 = 7 AN
D PEEK (48896) = 76) TH
EN ER$ = "FILE NOT FOUN
D" + CHR$ (13) + CHR$ (
13) + "PLEASE TRY ANOTH
ER FILE": GOTO 63900
AE 63080 IF E1 = 11 OR (E1 = 16
AND PEEK (48896) = 76)
THEN ER$ = "DOS SYNTAX
ERROR" + CHR$ (13) + CH
R$ (13) + "PLEASE TRY A
GAIN": GOTO 63900
A3 63499 TEXT : HOME : PRINT "ER
ROR NO. ";E1;" AT LINE
NO. ";E2: END
EC 63900 TEXT : HOME : PRINT ER$
: GOSUB 10000: GOTO 100
0

```

©

Autoload: A Streamlined 130XE RAMdisk Loader

Mark Slagell

Here's a utility that no Atari 130XE owner can afford to be without. Only seven lines long, this tiny program copies up to ten BASIC programs from disk to the RAMdisk. Atari DOS 2.5 is required.

When you boot up an Atari 130XE using Atari DOS 2.5, a RAMdisk is automatically established in the computer's second 64K bank of memory—an area that few programs use. This electronic "drive," designated D8:, can be used to save and load programs in the same manner as the more familiar mechanical drive. The advantage of the RAMdisk is that data can be loaded or saved much faster. The disadvantage is that all information in the RAMdisk is lost when the computer is turned off.

One of the most common uses for the RAMdisk is to hold frequently used programs for faster access. "Autoload" simplifies the use of the RAMdisk by automatically copying as many as ten BASIC programs to the 130XE's RAMdisk when you boot the computer. That task has been accomplished before, but this program does it with only seven

lines of code. You can watch the program at work, and it also offers an instructive and unusual demonstration of Atari's forced read mode.

In order to squeeze the program into only eight lines, we'll be pushing to the limit Atari's 120-character restriction on the length of a logical line. Before you start to enter the program, type POKE 82,0 and press RETURN to get wider-than-normal screen margins. Note, too, that the listing includes several abbreviations. The abbreviations are present to save crucial space, so type each line exactly as it's listed, including the abbreviations.

Line 12 of Autoload contains a list of the programs you want to copy to the RAMdisk at boot time. The names in the listing are merely examples; replace them with filenames of your own. Every name must be exactly 12 characters long, so add blank spaces as needed to the end of any shorter filenames—except for the very last name, which doesn't require extra spaces. Other than in line 12, you should not type extra spaces anywhere in the program.

When you are finished typing in Autoload, be sure to save a copy



NEIL J. RUBENKING PIANOMAN, NAMEGRAM

Author Rubenking's goals are straightforward: to have fun with computers and get paid for it. So far he is batting 1000. Along with his technical support position he also edits a column in PC Magazine titled "Turbo Power User". His PIANOMAN and NAMEGRAM programs evolved while he was teaching himself Turbo Pascal programming. Finding basic computer tunes "offensive" his PIANOMAN used his musical background as a source to create music on a PC (within the limits of its 2" speaker).

PIANOMAN allows you to:

Play your PC keyboard as if it were a piano. Save and edit your tunes. Compile your tunes to a self-running program & another option turns your tune into a macro for Superkey.

NAMEGRAM is wild, wacky and is a must for anagram (the ability to make a word or phrase from another word or phrase) freaks. After experimenting with algorithms, author Rubenking came up with a program that would handle any size of input and any size of dictionary.

- 279 PIANO MAN V3 \$6
- 477 NAMEGRAM/BREAK DOWN/PHONE WORD \$6
- 5 . 730 PC-FILE + , an excellent database manager for labels, inventory, and form letters ... \$12
- 78,627 PC-WRITE VERSION 2.7/4 A powerful wordprocessor, that is easy to use \$12
- 199 PC-CALC Make a spreadsheet to track expenses, a budget or whatever \$6
- 212,334,621,622 RBBS VERSION 14.1a Set up a bulletin board for your local area \$24
- 310 QMODEM COMMUNICATIONS — Send letters or programs to your friends or business constituents . . . \$6
- 403 COMPUTER TUTOR — Learn to use your computer, great for new users \$6
- 405 DESKTEAM — A memory resident calculator, calendar, printer utility, phone dialer, and other desk organizational tools \$6
- 480 PC-OUTLINE Program comparable to Thinktank \$6

- PC-SIG LIBRARY ON CD ROM \$295.00
- NEW 1987 PC-SIG DIRECTORY \$ 12.95
- 1 YEAR PC-SIG MEMBERSHIP \$ 20.00
(\$36 Foreign) (Includes directory, bimonthly magazine and more.)

SPECIAL

Any 5 Disks plus
1-Year Membership
Only \$39 (Include \$4 shipping & handling)

Most programs have documentation on disk and request a donation from satisfied users. Please add \$4 postage and handling per order (\$10 foreign) — California residents add state sales tax.

376

Total Enclosed \$_____ by Check VISA MC
Card No. _____

Exp. date _____ Signature _____

Name _____

Address _____

City _____ State _____ Zip _____



To order, call: 800-245-6717
In CA: 800-222-2996
For technical questions or local orders: (408) 730-9291

10300 East Duane Avenue Sunnyvale, CA 94086

before you run it. This is important because the program erases itself when it runs. Save the program with the filename AUTOLOAD. You should save the program on a boot disk—one that you use to start the computer. If you use more than one boot disk, you should save a copy of Autoload on all boot disks for which you wish to use the autoloading feature. To set up the RAMdisk, your working boot disks must also have a copy of the RAMDISK.COM file from the DOS 2.5 master disk.

Now, remove your working boot disk and place a copy of the DOS master disk in the drive. Type DOS and press RETURN to bring up the DOS command menu; then use option L to call up the SETUP.COM utility from the DOS disk. Remove the master disk from the drive and replace it with the boot disk containing Autoload. Follow the prompts of SETUP.COM to create an AUTO-RUN.SYS file that points to the AUTOLOAD program. Finally, copy to the same disk the programs you wish to load into the RAMdisk when the computer boots. At this stage, the program is ready to use. Whenever you start the computer with this boot disk in the drive, Autoload will automatically be executed to transfer the specified programs into the RAMdisk.

How It Works

Autoload works in an interesting way. The program itself actually runs, in the technical sense, only for a fraction of a second: It merely writes some instructions to the screen and erases itself. The instructions form a sequence of commands which are, in effect, carried out in direct mode, just as if an invisible hand were pressing RETURN over each line. Atari literature calls this technique *forced read mode*; it is also called the *dynamic keyboard* technique on other systems.

In a sense, this set of commands on the screen is a miniature program. Each command is performed in order, just as in an ordinary BASIC program. However, the command lines don't begin with line numbers. You also can branch around in a program of this type—not with GOTO, but with a POSITION command which places the cursor over the command you want

to execute next.

This series of instructions contains LOAD commands, each of which performs a NEW. But since NEW doesn't erase the screen, our set of instructions can be performed in its entirety. Variables are erased after each LOAD, however, so it is necessary to redefine them after each program loads. When all files have been copied into the RAMdisk, the screen clears and execution stops. If desired, you can automatically run the last program in the chain. Simply add the characters :RUN before the quotation mark in line 4 and make sure that the program you want to run is the last one listed in line 12.

Autoload

For instructions on entering this program, please refer to "COMPUTE!'s Guide to Typing in Programs" elsewhere in this issue.

```

ND 1 REM COPYRIGHT 1987 COMP
UTE! PUBLICATIONS, INC.
{3 SPACES}ALL RIGHTS RE
SERVED.
OC 2 POKE 82,0:GRAPHICS 0
KD 4 POSITION 0,2:? "POKE752
,1:9=40840:IFPEEK(S)=0
THEN POKE 842,12:GR.0"
AA 6 POSITION 0,6:? "POS.0,2
1:J=40448:FOR I=40568 T
O 40579:POKEI,PEEK(S):P
OKE J,PEEK(S):J=J+1:?CH
R*(254);:NEXT I:POS.0,9
"
BC 8 POSITION 0,11:? "LOAD";
CHR*(34);"D1":POSITION
0,14:? "SAVE";CHR*(34)
;"D8":POSITION 0,17
FD 10 ? "POSITION 0,0":POSIT
ION 0,21
GM 12 ? "FLOORWAX{4 SPACES}L
ONGNAME.EXTPROB3.BAS
{3 SPACES}MENU"
PN 14 POSITION 0,0:POKE 842,
13
  
```

©

COMPUTE!

TOLL FREE Subscription

Order Line

1-800-247-5470

In IA 1-800-532-1272

Smooth-Scrolling Billboard

For Commodore 64

Paul W. Carlson

This program turns your Commodore 64 into an electronic billboard, smoothly scrolling large, multicolored messages across the screen.

Would you like to be able to glide a message across the Commodore 64's screen in giant, multicolored letters? The program with this article makes it easy. Or perhaps you're a machine language programmer interested in smooth-scrolling techniques. This article explains how it's done.

Jumbo Billboard

To see smooth scrolling in action, type in, save, and run the program. The program takes a few seconds to read the machine language in the DATA statements and then asks if you want multicolored letters. Respond by pressing Y (yes) or N (no); do not press RETURN. The upper part of the screen fills with arrow symbols, with the cursor positioned over the first arrow symbol. Starting at the cursor, type in the text that you want to scroll across the screen. Your text will replace the arrow symbols as you type. Any nongraphics characters can be used (although lowercase letters will scroll as uppercase). You can make changes to your text by overtyping the unwanted letters or by using the DEL key.

Press RETURN when you have

entered the entire message. The program reads all of the text up to the first arrow symbol. If the program doesn't find an arrow symbol, it uses the first 250 characters (including blanks) of the message. After you press RETURN, the billboard immediately starts to scroll. The message continues to scroll with two spaces separating the end of the text from the beginning. If you want more separation, add extra spaces at the end of your text. To stop the program, press any key while the text is scrolling.

Changing Colors

You can easily modify the program to display colors of your own choosing. The numbers in lines 70-90 can be changed to any legal color number (0-15). When multicolor letters are in use, the program uses the color numbers in lines 160-230 instead of the foreground color in line 80. The color numbers in lines 160-230 can also be changed to any legal color number. This allows you to match the colors to the content of your message. For example, the letters in a patriotic message might have alternating red and white stripes against a blue background.

If you simply want to use the program, you needn't read any further. The remainder of this article discusses techniques which machine language programmers may find interesting.

Text Input

In order to work, this program must pass a long string—the text of your message—to a machine language subroutine. You may wonder why a simple INPUT statement isn't used to enter the message. After all, that's what INPUT is designed to do. There are two reasons why it isn't used. First, certain characters that you might want to use in your text, such as quotation marks, colons, and commas, can cause problems with INPUT. Second, INPUT can only handle strings up to 80 characters in length, but you might want to display a longer message.

The same limitations apply to the INPUT# statement. In fact, the program takes advantage of the way that INPUT# responds to a colon as input. The INPUT# statement in line 280 halts the program, reads data from the keyboard buffer, and continues execution when you press RETURN. Before we execute that INPUT#, however, the program manipulates the keyboard buffer to prevent INPUT# from processing the text that you type. Line 240 POKes four values into the keyboard buffer, where they will be found by the INPUT# in line 280. The four values are the ASCII codes for a colon, left cursor, arrow symbol, and left cursor. The colon, because it is a delimiter, causes INPUT# to disregard anything that follows. This allows you to type anything you want without

causing an error message. When INPUT# is executed, anything in the keyboard buffer is displayed. The left cursor, arrow symbol, and left cursor are placed in the keyboard buffer to restore the screen by overwriting the colon with an arrow symbol and moving the cursor back to the first screen location.

Smooth Scrolling

As you can see by looking carefully, the large letters move horizontally one pixel (screen dot) at a time, making for very smooth movement. The 64's VIC (Video Interface Controller) chip can instantly position the screen at any one of eight pixel positions. This, combined with the VIC's ability to instantly change the location screen memory, allows you to scroll shapes one pixel at a time. For machine language programmers, here are the steps this program uses for smooth scrolling:

1. Set aside two 1000-byte memory areas for screen data. One of these can be the normal screen memory area, which starts at location 1024 (\$0400). Next, set up pointers in zero-page memory to the two screen memory locations. We'll refer to these locations as SRCE and DEST (for source and destination). In this program, the two screen memory locations are 1024 (\$0400) and 15360 (\$3C00). It makes no difference which location is initially SRCE or DEST.
2. Clear both screens and fill color memory at locations 55296-56295 (\$D800-\$DFE7). The four high-order bits of location 53272 (\$D018) control which screen is active. Make DEST the active screen. Set the screen size to 38 columns by clearing bit three of location 53270 (\$D016). Set the scroll position to seven by setting the three low-order bits of 53270 (\$D016).
3. Swap the pointers to SRCE and DEST and copy columns 1-39 of the SRCE screen to columns 0-38 of the DEST screen.
4. Fill column 39 of the DEST screen with new data.
5. Using a time delay, decrement 53270 (\$D016) until the three low-order bits are zero. The time delay is approximately equal to the execution time of steps 3 and 4 to

prevent jerking.

6. Wait until location 53266 (\$D012) equals zero (indicating raster line zero), and then make the inactive screen the active screen and immediately set the scroll position to seven. Go to step 3.

Steps 3 and 4 are performed only on screen rows 9-17 in this program, since these are the only rows that change. In many programs that use smooth scrolling, the time delay between each decrement of 53270 (\$D016) in step 5 would be replaced with routines that move sprites, check for collisions, and so on. When this is the case, a time delay loop will usually be needed at the end of step 4 to make the execution time of steps 3 and 4 equal the execution time between decrements of 53270 (\$D016).

Smooth scrolling is not as difficult as you may think. The VIC chip does much of your work for you. This article has described only horizontal smooth scrolling, but that's the most difficult direction to scroll. Vertical smooth scrolling is much easier. If you've never tried smooth scrolling, I hope that this article will encourage you to do so. You can find more information about scrolling in *Programming the 64* by Raeto West, and *Mapping the 64 and 64C* by Sheldon Leemon; both books are available from COMPUTE! Books.

Smooth-Scrolling Billboard

For instructions on entering this program, please refer to "COMPUTE!'s Guide to Typing in Programs" elsewhere in this issue.

```
PG 5 REM COPYRIGHT 1987 COMPUT
E1 PUBLICATIONS, INC
{3 SPACES}ALL RIGHTS RESE
RVED.
RS 10 POKE55,255:POKE56,59:CLR
:POKE53272,(PEEK(53272)A
ND15)OR16
RX 11 PRINT"{CLR}"
RS 12 PRINTTAB(12);"COPYRIGHT
{SPACE}1987":PRINTTAB(6)
;"COMPUTE! PUBLICATIONS,
INC.
JK 14 PRINTTAB(10);"ALL RIGHTS
RESERVED."
PF 15 FOR X=1TO1200:NEXT
KH 20 PRINTCHR$(147);"READING
{SPACE}MACHINE CODE...":
PRINT
BR 30 T=0:FORN=49152TO49640:RE
ADK:POKEN,K:T=T+K:NEXT
FF 40 IFT=72434THEN70
XA 50 PRINT"***ERROR IN DATA S
TATEMENTS***":END
RX 60 REM ** SCREEN COLORS **
XK 70 BG=0:REM BACKGROUND
CR 80 FG=15:REM FOREGROUND
JF 90 BR=0:REM BORDER
```

```
KC 100 PRINT"MULTI-COLOR LETTE
RS (Y/N)? ";
MP 110 GETA$:IFA$=""THEN110
BM 120 PRINTA$:IF A$<>"Y"ANDA$
<>"N"THEN100
BK 130 IF A$="N"THENPOKE49649,
0:GOTO240
DM 140 POKE49649,1
EP 150 REM ** MULTI-COLOR LETT
ER COLORS **
MF 160 POKE49648,4:REM TOP
QJ 170 POKE49647,2:REM 2ND
GF 180 POKE49646,8:REM 3RD
HR 190 POKE49645,7:REM 4TH
XJ 200 POKE49644,3:REM 5TH
SR 210 POKE49643,5:REM 6TH
SD 220 POKE49642,6:REM 7TH
XS 230 POKE49641,14:REM 8TH
EK 240 POKE198,4:POKE631,58:PO
KE632,157:POKE633,95:PO
KE634,157
BF 250 PRINTCHR$(147):FORN=1TO
12:PRINT:NEXT
EA 260 PRINT"{2 SPACES}ENTER T
EXT AT CURSOR - PRESS [
RETURN]{3 SPACES}WHEN F
INISHED.";CHR$(19);
QC 270 FORN=0TO250:PRINTCHR$(9
5);:NEXT:PRINTCHR$(19);
BG 280 OPEN1,0:INPUT#1,A$
CD 290 POKE53280,BR:POKE53281,
BG:POKE49261,FG
XH 300 SYS49152
BH 310 POKE53280,14:POKE53281,
6:PRINTCHR$(147);CHR$(1
54);
ER 320 POKE55,0:POKE56,160:CLR
:END
JG 330 DATA 173,14,220,41,254,
141,14,220
DK 340 DATA 165,1,41,251,133,1
,169,0
HC 350 DATA 133,251,133,253,16
9,208,133,252
RD 360 DATA 169,196,133,254,16
2,2,160,0
XQ 370 DATA 177,251,145,253,20
0,208,249,230
CG 380 DATA 252,230,254,202,20
8,240,165,1
SS 390 DATA 9,4,133,1,173,14,2
20,9
EM 400 DATA 1,141,14,220,162,0
,160,0
QR 410 DATA 189,0,4,201,31,240
,11,153
BS 420 DATA 0,198,232,224,250,
240,3,200
KE 430 DATA 208,238,169,32,153
,0,198,200
HB 440 DATA 153,0,198,200,169,
0,153,0
KF 450 DATA 198,173,241,193,20
8,24,133,253
BQ 460 DATA 169,216,133,254,16
9,14,162,4
BG 470 DATA 160,0,145,253,200,
208,251,230
JK 480 DATA 254,202,208,246,24
0,38,169,104
MP 490 DATA 133,253,169,217,13
3,254,162,8
JJ 500 DATA 160,0,189,232,193,
145,253,200
RX 510 DATA 192,40,208,246,165
,253,24,105
MA 520 DATA 40,133,253,165,254
,105,0,133
CG 530 DATA 254,202,208,228,16
9,4,133,252
BA 540 DATA 169,60,133,254,169
,0,133,251
CM 550 DATA 133,253,162,4,160,
```

0, 169, 32
 SH 560 DATA 145, 251, 145, 253, 20
 0, 208, 249, 230
 SK 570 DATA 252, 230, 254, 202, 20
 8, 242, 173, 22
 HM 580 DATA 208, 41, 247, 141, 22,
 208, 169, 0
 BH 590 DATA 141, 250, 193, 172, 25
 0, 193, 238, 250
 CD 600 DATA 193, 185, 0, 198, 240,
 242, 133, 251
 PR 610 DATA 169, 0, 133, 252, 6, 25
 1, 38, 252
 EX 620 DATA 6, 251, 38, 252, 6, 251
 , 38, 252
 DA 630 DATA 169, 196, 24, 101, 252
 , 133, 252, 160
 PF 640 DATA 0, 177, 251, 153, 242,
 193, 200, 192
 DJ 650 DATA 8, 208, 246, 32, 228, 2
 55, 201, 0
 HA 660 DATA 240, 27, 173, 22, 208,
 9, 8, 141
 SA 670 DATA 22, 208, 173, 24, 208,
 41, 15, 9
 KM 680 DATA 16, 141, 24, 208, 173,
 22, 208, 41
 FE 690 DATA 248, 141, 22, 208, 96,
 169, 61, 133
 HA 700 DATA 252, 169, 5, 133, 254,
 169, 0, 141
 DB 710 DATA 251, 193, 165, 252, 16
 4, 254, 133, 254
 QQ 720 DATA 132, 252, 169, 104, 13
 3, 251, 133, 253
 FC 730 DATA 162, 8, 160, 39, 177, 2
 51, 136, 145
 KG 740 DATA 253, 192, 0, 208, 247,
 202, 240, 28
 EG 750 DATA 165, 251, 24, 105, 40,
 133, 251, 165
 FH 760 DATA 252, 105, 0, 133, 252,
 165, 253, 24
 XX 770 DATA 105, 40, 133, 253, 165
 , 254, 105, 0
 DH 780 DATA 133, 254, 208, 214, 19
 8, 254, 169, 143
 MD 790 DATA 133, 253, 162, 0, 160,
 0, 30, 242
 XP 800 DATA 193, 144, 4, 169, 160,
 208, 2, 169
 RQ 810 DATA 32, 145, 253, 232, 165
 , 253, 24, 105
 JR 820 DATA 40, 133, 253, 165, 254
 , 105, 0, 133
 CK 830 DATA 254, 224, 8, 208, 225,
 173, 22, 208
 RP 840 DATA 9, 7, 141, 22, 208, 162
 , 0, 160
 AB 850 DATA 6, 202, 208, 253, 136,
 208, 250, 206
 RB 860 DATA 22, 208, 173, 22, 208,
 41, 7, 208
 ED 870 DATA 236, 198, 252, 198, 25
 4, 173, 24, 208
 HS 880 DATA 41, 15, 166, 254, 224,
 61, 208, 4
 PQ 890 DATA 9, 240, 208, 2, 9, 16, 1
 62, 0
 EF 900 DATA 236, 18, 208, 208, 251
 , 141, 24, 208
 KH 910 DATA 173, 22, 208, 9, 7, 141
 , 22, 208
 DF 920 DATA 174, 251, 193, 232, 22
 4, 8, 240, 6
 HM 930 DATA 142, 251, 193, 76, 50,
 193, 76, 211
 SH 940 DATA 192

©

Vanishing Directory

Paul W. Carlson

This handy utility for the IBM PC/PCjr and compatibles allows you to display all the files in your current directory without losing the information displayed on the screen. It works with both monochrome and color displays.

The DIR command is used perhaps more often than any other DOS command. Quite often, however, DIR causes valuable information to scroll off the screen. It can help somewhat to use the /W switch with DIR, since that option lists files in wide screen format, without indicating the number of bytes or date of a file. However, this format usually overwrites some information, too, and it can be harder to read than the normal DIR display.

"Vanishing Directory" can display all the normal files (not hidden or system files) on a floppy disk or in the current directory of a hard disk. What makes this program so useful is that it literally vanishes when it's no longer needed, leaving the screen as it appeared before you summoned the program. (You may lose the top line of the screen if you invoke the program when the cursor is on the very bottom screen line.)

The program listed in this article is a BASIC filemaker. Type in the program and save a copy, then run it. The program uses an internal checksum to check for typing errors. If no errors are found, it cre-

ates an executable machine language file named VDIR.COM. (Because the BASIC program creates a file named VDIR.COM, you must not use that name for the BASIC program itself.)

VDIR.COM is very easy to use. At the DOS prompt, simply type VDIR and press Enter. The program clears the screen and displays a directory similar to that shown by DIR/W. Filenames are separated with double vertical bars for easier reading. If there are more than 100 files on the disk, the display pauses after the first 100 files are listed, waiting until you press a key. After all the files are listed, you can press any key to restore the previous screen instantly.

The program always displays the contents of the current disk and does not allow an opportunity for swapping disks. If you have two floppy disk drives, put VDIR.COM on your working copy of the system disk. To display the contents of another disk, place the disk containing VDIR.COM in the inactive drive and place the disk you want to examine in the active drive. Then invoke VDIR.COM, preceding the command with the inactive drive's designation. For instance, if the drive A: is the active drive, place the disk containing VDIR.COM in drive B: and enter the command B:VDIR.COM.

If you have a single drive, put VDIR.COM on any disk where you



LET'S DO IT!

It's fun. It's fascinating. It's challenging. It will take all you've got.

But we think you are up to it. You are bright. You are alert. You are imaginative. And you want to know who you are.

Meet your new mentor, **MENTOR™** software that lets you know how you're doing: your memory capacity, your quickness and coordination, your competitive ability to take tests, your perceptual keenness.

Do it. Just because you want to know.

Do it by yourself. **MENTOR™** contains 58 mental exercises and tests, including 25 complete I.Q. tests with more than 950 questions.

Do it for yourself. Build the prowess of your mind with **MENTOR™**

To order your copy of **MENTOR™**, please call 800-443-7380 (in Texas, call collect 915-694-5936). Visa/MasterCard accepted.

IBM PC and compatibles, 256K, graphics board • \$49.95 (postage included)
Heuristic Research, Inc. • 3112-A West Cuthbert • Midland, Texas 79701

might want to use it. Fortunately, **VDIR.COM** is a small program and does not take up much disk space.

Hard disk users should put a copy of **VDIR.COM** in the same directory that contains other DOS commands that load from disk (such as **FORMAT**) or in any directory included in the DOS search path. If you want a display of the files in some other directory, use a **CHDIR** or **CD** command to change directories before invoking **VDIR.COM**.

VDIR.COM Filemaker

For instructions on entering this program, please refer to "COMPUTE!'s Guide to Typing in Programs" elsewhere in this issue.

```

II 100 ' VDIR.COM filemaker
BB 110 '
FE 120 ' Copyright 1987 COMPUTE!
      ' Publications, Inc.
FM 130 ' All rights reserved.
IN 140 CLS:PRINT"COPYRIGHT 1987"
      :PRINT"COMPUTE! PUBLICATI
      ONS, INC.":PRINT"ALL RIGH
      TS RESERVED.":FOR X=1 TO
      1500:NEXT X
IL 145 '
MC 150 CLOSE:OPEN "VDIR.COM" FOR
      OUTPUT AS 1
KM 160 PRINT#1,CHR*(&HE9);CHR*(&
      H6E);CHR*(&H11);
OD 170 FOR N=1 TO 4327:PRINT#1,C
      HR*(0);:NEXT
FJ 180 T=0:FOR J=1 TO 579:READ A
      #:N=VAL("&H"+A#)
BK 190 T=T+N:PRINT#1,CHR*(N);:NE
      XT:CLOSE 1
FI 200 IF T=55374! THEN PRINT"VD
      IR.COM successfully creat
      ed":END
BP 210 KILL "VDIR.COM":PRINT CHR
      *(7);"Typing error. Check
      DATA statements"
PC 220 DATA 00,00,00,00,2A,2E,2A
      ,00,43,75
KC 230 DATA 72,72,65,6E,74,20,64
      ,69,72,65
KK 240 DATA 63,74,6F,72,79,20,69
      ,73,20,20
OJ 250 DATA 3F,3A,5C,24,44,69,73
      ,6B,20,61
CA 260 DATA 63,63,65,73,73,20,65
      ,72,72,6F
FB 270 DATA 72,0A,0D,24,0A,0D,50
      ,72,65,73
EC 280 DATA 73,20,61,6E,79,20,6B
      ,65,79,20
KI 290 DATA 74,6F,20,63,6F,6E,74
      ,69,6E,75
JN 300 DATA 65,20,6C,69,73,74,69
      ,6E,67,2E
DK 310 DATA 2E,2E,24,0A,0A,0D,50
      ,72,65,73
DH 320 DATA 73,20,61,6E,79,20,6B
      ,65,79,20
FD 330 DATA 74,6F,20,72,65,73,74
      ,6F,72,65
NB 340 DATA 20,74,68,65,20,73,63
      ,72,65,65
LN 350 DATA 6E,2E,2E,2E,24,B4,0F
      ,CD,10,A2
PD 360 DATA A3,10,8B,3E,A6,10,C7
      ,06,A7,10
OC 370 DATA BA,03,C7,06,A4,10,00
      ,B0,AB,04

```

```

EP 380 DATA 75,0C,C7,06,A4,10,00
      ,BB,C7,06
QN 390 DATA A7,10,DA,03,B4,03,BA
      ,3E,A6,10
OB 400 DATA CD,10,8B,2E,AA,10,8B
      ,0E,AB,10
CN 410 DATA 8B,36,A9,10,B9,A0,0F
      ,1E,0E,07
OJ 420 DATA 8B,16,A7,10,8D,3E,03
      ,01,A1,A4
OI 430 DATA 10,8E,DB,BE,00,00,EC
      ,AB,01,75
HM 440 DATA FB,EC,AB,01,74,FB,8A
      ,24,26,8B
ND 450 DATA 25,46,47,E2,ED,1F,C6
      ,06,AC,10
IK 460 DATA 00,8B,00,06,B7,07,33
      ,C9,BA,4F
CB 470 DATA 18,CD,10,8B,00,02,33
      ,DB,33,D2
HF 480 DATA CD,10,8B,00,00,A0,A3
      ,10,3C,07
CG 490 DATA 74,02,B0,02,CD,10,C6
      ,06,AD,10
LH 500 DATA 00,F6,06,AC,10,01,75
      ,36,B4,19
OL 510 DATA CD,21,04,41,8D,36,F2
      ,11,83,C6
NK 520 DATA 16,8B,04,B4,47,8D,36
      ,AE,11,B2
HN 530 DATA 00,CD,21,8D,36,AE,11
      ,BA,04,46
BL 540 DATA 3C,00,75,F9,4E,B0,0A
      ,8B,04,46
CN 550 DATA 8B,04,B0,0D,46,8B,04
      ,46,B0,24
OL 560 DATA 8B,04,B4,09,8D,16,F2
      ,11,CD,21
OK 570 DATA 8D,16,AE,11,CD,21,F6
      ,06,AC,10
CA 580 DATA 01,75,4B,8D,16,AE,10
      ,B4,1A,CD
EB 590 DATA 21,C6,06,AC,10,01,B4
      ,4E,8D,16
PI 600 DATA EE,11,B9,00,00,CD,21
      ,72,50,FE
MN 610 DATA 06,AD,10,B9,11,00,8D
      ,1E,AE,10
HK 620 DATA 83,C3,1E,49,8A,17,80
      ,FA,00,74
PF 630 DATA 07,B4,02,CD,21,43,EB
      ,F1,B4,02
GC 640 DATA 83,F9,02,75,04,B2,BA
      ,EB,02,B2
NI 650 DATA 20,CD,21,E2,F1,80,3E
      ,AD,10,64
OH 660 DATA 75,0F,8D,16,20,12,B4
      ,09,CD,21
EK 670 DATA B4,07,CD,21,E9,2B,FF
      ,8D,16,EE
HM 680 DATA 11,B4,4F,CD,21,72,0A
      ,EB,B0,8D
BF 690 DATA 16,0C,12,B4,09,CD,21
      ,8D,16,47
IH 700 DATA 12,B4,09,CD,21,B4,07
      ,CD,21,B4
II 710 DATA 00,A0,A3,10,CD,10,B4
      ,05,A0,A6
ND 720 DATA 10,CD,10,B9,A0,0F,8D
      ,36,03,01
BH 730 DATA A1,A4,10,8B,16,A7,10
      ,1E,0E,1F
DH 740 DATA BE,C0,BF,00,00,EC,AB
      ,01,75,FB
ND 750 DATA EC,AB,01,74,FB,8A,24
      ,26,8B,25
EP 760 DATA 46,47,E2,ED,1F,B4,01
      ,8A,2E,AA
FK 770 DATA 10,BA,0E,AB,10,CD,10
      ,B4,02,BA
JF 780 DATA 3E,A6,10,8A,36,A9,10
      ,80,FE,00
GH 790 DATA 74,02,FE,CE,B2,00,CD
      ,10,C3

```

LEARN PROGRAMMING



MASTER COMPUTERS IN YOUR OWN HOME

Now you can write programs and get a computer to do just what you want. Get the most out of any computer, and avoid having to pay the high price of pre-packaged software.

LEARN AT YOUR OWN PACE IN YOUR SPARE TIME

Our independent study program allows you to learn about computers, operations, applications and programming in your spare time, at home. Our instructors provide you with one-on-one counseling.

LEARN EVEN BEFORE YOU DECIDE ON A COMPUTER

Everything is explained in simple language. You will enjoy learning to use a computer—EVEN IF YOU DON'T OWN ONE. Learn to program on any personal computer, IBM, APPLE, COMMODORE, TRS, and more.

BE YOUR OWN COMPUTER EXPERT

Programming is the best way to learn to use computers, and we can show you the best—and most economical—way to learn programming! Send today for your free information package. No obligation. No salesman will call.

halix CENTER FOR COMPUTER EDUCATION
INSTITUTE 1543 W. OLYMPIC # 226 Los Angeles, CA 90015-3894

HALIX INSTITUTE CENTER FOR COMPUTER EDUCATION DEPT. 61-7
1543 W. OLYMPIC # 226 LOS ANGELES, CA 90015-3894

YES! Send me information on how I can learn about computers and programming at home!

Name _____ Age _____

Address _____

City _____ State/Zip _____

Relative Files On The 1571 Disk Drive

Myron Achtman

This article demonstrates reliable methods for using relative files. A Commodore 128 and 1571 disk drive are required.

What is a relative file? A file, as you may know, is simply a collection of information stored on disk. A relative file differs from other files in that you can access any part of the file instantly, without having to read through other items of information first. Relative files have been considered a mystery by many Commodore 64 owners, because they are cumbersome to manipulate in BASIC 2.0.

The introduction of the Commodore 128 and 1571 disk drive changed this situation dramatically. BASIC 7.0 contains several commands for handling relative files, and the *Commodore 1571 Disk Drive User's Guide* contains an entire chapter devoted to explaining them.

This is not a general tutorial on using relative files on the 1571. That information can be found in Chapter 6 of the *User's Guide*. Instead, this article demonstrates several factors that affect the reliability of relative file handling on the 1541

and 1571 drives, including a bug in the 1571 DOS (Disk Operating System).

Beginning The Test

Before typing in the program, format a new, blank disk for use. It is *important* that you use a new disk for this demonstration because the bug in 1571 DOS can corrupt all the files on a disk.

Type in and save the program on disk (but *not* on the new one which you just formatted). Insert the newly formatted disk in the drive and run the program.

When questions appear on the screen, answer them as follows. (We'll begin conservatively.) First, request that the 128 operate in SLOW mode (enter S). Second, request that the disk drive operate as a 1541 drive (enter 41). Third, indicate that you want the program to check the disk drive error channel (enter ON). The error check also includes a slight time delay, which is explained below. Next, indicate that you want to create a total of 15 records (enter 15). Finally, indicate that you want to position the record pointer to the last record in the file (enter Y).

As the program runs, it displays the number of each record that it writes. When it prompts you to press a key, the program is ready to read back the file that it just created. Notice that each record consists of five items, or fields; each field is a different length. When all records have been read, the program displays the disk directory. As you can see, the name of the newly created file (R-S-41-ON-Y-15) is descriptive, showing the options you selected when creating the file. The S in the filename stands for SLOW, and so forth. You will not need this file again, so you may enter Y for yes when the program asks whether to scratch this file.

FAST Mode

So far, everything worked perfectly. The program created and read back the file with complete accuracy. Now let's try some different options. Rerun the program and enter F for FAST mode when prompted. Select 1541 mode as before, but enter OFF when prompted to choose error checking. Choose 15 records as before, but do not position the record pointer to the last record in the file.

If you are using a 40-column monitor, your screen will blank while portions of this program run. However, some messages appear from time to time to assure you that everything is proceeding properly. When the program is finished, we see that it worked properly, reading back every record as written. When the drive is in 1541 mode, it doesn't seem to matter whether we use SLOW or FAST mode, whether we use error checking, or whether we position the record pointer at the last record in the file.

1571 Mode

Now let's try the test in 1571 mode. Select SLOW mode and 1571 mode, turn on error checking, select 15 records, and select to position the record pointer. At the end of this test, you should see that everything worked properly again.

Rerun the test, selecting FAST mode and 1571 mode. Turn error checking off this time. Choose 15 records, and tell the program not to position the record pointer. After the tenth record is written, you should see the drive light blink, accompanied by sounds of protest from the drive. You will see an ILLEGAL TRACK OR SECTOR error message. (Even though error checking is turned off, the program automatically checks the error status after every tenth record.) The program continues trying to write the remaining five records, and eventually finishes with another error message.

At this point, the disk contains a corrupted relative file. If it had contained other files, the corrupted relative file might have damaged those files, as well.

It is nearly impossible to read a corrupted relative file reliably. When a program tries to do so, several things may happen.

The subroutine in lines 2050-2160 is designed to detect corrupted records. When this occurs, you will see a flashing message and hear a bell sound. If the data is not too badly corrupted, this routine is called repeatedly, each time it encounters a garbled record.

If the data is more seriously corrupted, the program itself may abort with the error message STRING TOO LONG. If this hap-

pens, press RUN/STOP-RESTORE to recover control, then type DCLOSE:DCLEAR and press RETURN before proceeding further.

In the worst case of corruption, the computer and disk drive will silently lock up, ceasing all activity. If this occurs, follow the same procedure described in the preceding paragraph.

The test shows that it is necessary to check the error channel—with a slight time delay as shown in lines 2010-2020 of the program—when creating relative files in 1571 mode. To confirm that the corruption does not result from failing to position the record pointer, you can rerun the test if you like, entering Y when asked about the pointer. As long as the error/delay option is turned off, the file is corrupted.

Perhaps, you might think, the errors result because we are in FAST mode? To test this possibility, rerun the program, choosing SLOW mode and 1571 mode, turning the delay/error check option off, choosing 15 records and answering yes to the record pointer question. With these parameters, the relative file usually writes with accuracy, but occasionally aborts with the error message DEVICE NOT PRESENT. Reading the records back is a real problem. It is nearly impossible to read record 15 without a DEVICE NOT PRESENT error. (If this error occurs, press RUN/STOP-RESTORE, then type DCLOSE:DCLEAR and press RETURN.)

Time Delay

Clearly, some errors will occur when writing a relative file in SLOW mode on the 1571 without the time delay and error check used in this program. In 1541 mode, it didn't matter if we turned that option on or off, but it seems essential in 1571 mode.

Let's see whether the time delay is actually doing anything. Modify lines 2010-2020 so they look like this:

```
2010 REM: T2=TI+5
2020 REM: IF TI<T2 THEN 2020
```

We have disabled the delay (which normally consumes about 1/12 second), but line 2030 still checks the disk drive error channel. Rerun the program, choosing FAST mode and 1571 mode, turning error

checking on, choosing 200 records, and choosing not to position the record pointer (that last option is actually irrelevant). In most tests, you will find 1 or 2 corrupted records for each 100 records that you create. The time delay does seem to have an effect, after all.

As a rule, you can enhance the reliability of relative file handling by checking the error channel, with this slight time delay, upon every file access. If you use the method employed in this program, the time delay will be consistent even if you later compile the program (compiling BASIC programs greatly speeds up their execution). It also is recommended that you follow Commodore's advice in positioning the record pointer both before and after you access a record.

This advice is imperative when using the 1571 drive in 1571 mode. When using it in 1541 mode (or when using an ordinary 1541 drive), you can often get away without the time delay/error check—provided that you access records in numerical sequence (record 1, record 2, and so on). However, if your program writes files in nonnumerical order (for instance, record 1, record 5, and so on), it is necessary to position the record pointer before and after each operation, and to use the time delay/error check, as well.

Relative File Test

For instructions on entering this program, please refer to "COMPUTE! Guide to Typing In Programs" elsewhere in this issue.

```
JH 1000 REM: RELATIVE FILE TESTING PROGRAM FOR THE C-128 COMPUTER AND 1571 DISK DRIVE.
BR 1010 REM: COPYRIGHT 1987 COMPUTE! PUBLICATIONS, INC. {3 SPACES} ALL RIGHTS RESERVED.
BA 1011 PRINT "{CLR} COPYRIGHT 1987": PRINT "COMPUTE! PUBLICATIONS, INC."
FX 1012 PRINT "ALL RIGHTS RESERVED."
QX 1013 FORX=1 TO 1200: NEXT
ES 1020 SLOW: IF PEEK(3300)=0 THEN N2170
HF 1030 CLR: SCNCLR: COLOR 5, 14: N N$="{38 SPACES}"
AX 1040 CHAR, 0, 1, "ONE MOMENT PLEASE...": SCRATCH "R*": GOSUB 2030: COLLECT: GOSUB 2030
PQ 1050 CHAR, 0, 3, "C-128: SLOW {SPACE} MODE OR FAST MODE": CHAR, 0, 4, "ENTER 'S' OR 'F'": INPUT M$
```



DISCOUNT SOFTWARE

ABBY'S SUPER BUYS

ATARI XL/XE

Pac Man (R)	\$12.00
Donkey Kong (R)	12.00
Donkey Kong Jr. (R)	12.00
Joust (R)	12.00
Jungle Hunt (R)	12.00
Moon Patrol (R)	12.00
Timewise (D)	9.99
Star Raiders II (D)	12.00
Qix (R)	9.99
Paint (D)	15.50
Star Raider (R)	9.99
Dig Dug (R)	12.00
Robotron: 2084 (R)	12.00
Missile Command (R)	9.99
Home Filing Manager (R)	15.50
Skywriter (R)	12.00
Invitation to Programming #1 (C)	2.99

ATARI ARCADE CHAMP KIT

\$14⁹⁵

INCLUDES: Pac Man,
Qix, Two Joysticks
& Cartridge Holder

BASIC TUTOR KIT

\$22⁹⁵

INCLUDES: 3 Tapes on
Basic &
2 Books

COMMODORE 64/128 MASTERTRONICS

Captive	\$4.99
Vegas Jackpot	\$4.99
Golden Talisman	\$4.99
1985 - The Day After	\$4.99
Ant Attack	\$4.99
Challenger	\$4.99
Spooks	\$4.99
Black Crystal	\$4.99
Se-Kah of Assiah	\$4.99
Quest For Holy Grail	\$4.99
Finders Keepers	\$4.99
Big Mac	\$4.99

TIMEWORKS

Data Manager	\$4.95
Money Manager	\$4.95
Electronic Checkbook	\$4.95

ALL 3 FOR \$12.00

WE CARRY A FULL LINE OF HARDWARE & SOFTWARE FOR THE ATARI & COMMODORE. PLEASE CALL.

LASER 128™: the best of the Apple® IIe and IIc

Input/Output; floppy disk drive;
serial printer interface; parallel
printer interface; mouse interface;
modem interface; 80 column text;
expansion slot; numeric keypad

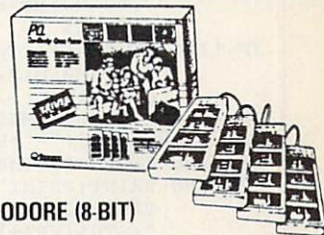


By Video Technology Computers Inc.

\$399⁹⁵

SUNCOM P.O. PARTY QUIZ ONLY

\$14⁹⁵



ATARI OR COMMODORE (8-BIT)

CASIO — THE KEYS TO MUSICAL CREATIVITY

SK-1

DIGITAL SAMPLING KEYBOARD

8-bit sampling; 4-note
polyphonic; 3-track memory
built-in speaker

\$89⁹⁵

SK-5

SAMPLING KEYBOARD

32 keys; 8-note polyphonic;
8 preset sounds; 10
built-in rhythms;
tempo control

\$119⁹⁵

SK-8

DIGITAL SAMPLING KEYBOARD

4-sample sounds; 8-bit
sampling; 4-note poly-
phonic; built-in speaker

\$139⁹⁵

CZ-230C

DIGITAL SAMPLING SYNTHESIZER

100 factory presets;
built-in rhythms; pattern
memory; monitor speaker

\$319⁹⁵

CASIO TYPEWRITERS

CW-10

CW-30



CW30

DISKS

NASHUA DS/DD 5 1/4" w/Sleeves

\$39.00 a Hundred or

\$31.00 a Hundred

In Quantities of a Thousand

COBRA ANSWERING MACHINES

AN8300

ANSWERING MACHINE

NON REMOTE ANSWERING SYSTEM;
MICROPROCESSOR CONTROLLED; ONE TOUCH
COMMAND AUTOMATIC ANSWER & PLAY; (VOX)
VOICE ACTIVATION; ELECTRONIC BULLETIN
BOARD MEMO FEATURE

\$69⁹⁵



AN 8400

ANSWERING PHONE

REMOTE ANSWERING SYSTEM;
MICROPROCESSOR CONTROLLED; ONE TOUCH
COMMAND AUTOMATIC ANSWER AND PLAY;
(VOX) VOICE ACTIVATION; ELECTRONIC
BULLETIN BOARD MEMO FEATURE.

\$79⁹⁵

AN 8500

ANSWERING MACHINE

BEERLESS REMOTE ANSWERING SYSTEM;
MICROPROCESSOR CONTROLLED; ONE TOUCH
COMMAND AUTOMATIC ANSWER & PLAY; (VOX)
VOICE ACTIVATION; ELECTRONIC BULLETIN
BOARD MEMO FEATURE.

\$89⁹⁵



ALL TITLES ON DISK UNLESS MARKED (R) FOR ROM CARTRIDGE & (C) FOR CASSETTE TAPE

Order Line

1-800-282-0333

ORDERS ONLY! Sales Personnel Do
Not Have Information on
Previous Orders or Product Specs.

WE CHECK FOR STOLEN CHARGE CARDS

M-F 10 a.m.-8 p.m.; Sat. 10-3 ET

37 S. Broad Street, Fairborn, OH 45324

Customer Service

& Ohio Residents

1-513-879-9699



SOFTWARE ONLY — Prepaid orders over \$50 receive free shipping via UPS in continental U.S. Please add \$2 orders under \$50. HARDWARE and all orders requiring shipment via U.S. Post Office are subject to additional freight charges. C.O.D. orders under \$100.00 accepted - add \$5. Charge card orders add \$2 service charge. Ohio residents add 6% sales tax. Personal checks require a three-week waiting period. No waiting when paid by credit card, certified check or money order. All items subject to availability and price change. PLEASE CITE AD NUMBER WHEN ORDERING. ALL RETURNS MUST BE ACCOMPANIED BY AN AUTHORIZATION NUMBER.

AD #CP-077



DC 1060	IFMO\$<>"S"ANDMO\$<>"F"TH HENCHAR,0,4,NN\$:PRINTC HR\$(7):GOTO1050	CH 1420	25:GOSUB2010 RECORD#3,(PT),42:GOSUB 2010:PRINT#3,F3\$(J):GO SUB2010:RECORD#3,(PT), 42:GOSUB2010	RC 1730	030:PRINTF2\$:IFLEN(F2\$)<>16THENCND=6:SU\$=F2\$: GOSUB2050
XC 1070	CHAR,0,6,"DRIVE: 1541 {SPACE}MODE OR 1571 MO DE":CHAR,0,7,"ENTER '4 1' OR '71'":INPUTDD\$	CS 1430	RECORD#3,(PT),52:GOSUB 2010:PRINT#3,F4\$(J):GO SUB2010:RECORD#3,(PT), 52:GOSUB2010	AM 1740	RECORD#5,(I),42:GOSUB2 010:INPUT#5,F3\$:GOSUB2 030:PRINTF3\$:IFLEN(F3\$)<>9THENCND=7:SU\$=F3\$:G OSUB2050
PD 1080	IFDD\$<>"41"ANDDD\$<>"71 "THENCHAR,0,7,NN\$:PRIN TCHR\$(7):GOTO1070	RJ 1440	RECORD#3,(PT),72:GOSUB 2010:PRINT#3,F5\$(J):GO SUB2010:RECORD#3,(PT), 72:GOSUB2010	CR 1750	RECORD#5,(I),72:GOSUB2 010:INPUT#5,F5\$:GOSUB2 030:PRINTF5\$:IFLEN(F5\$)<>29THENCND=9:SU\$=F5\$: GOSUB2050
QC 1090	CHAR,0,9,"WANT TO CHEC K ERROR CHANNEL":CHAR, 0,10,"ENTER 'ON' OR 'O FF'":INPUTCK\$	CQ 1450	BEND	PB 1760	BEND
PD 1100	IFCK\$<>"ON"ANDCK\$<>"OF F"THENCHAR,0,10,NN\$:PR INTCHR\$(7):GOTO1090	HQ 1460	IFCK\$="OFF"THENBEGIN	HJ 1770	IFCK\$="OFF"THENBEGIN
XR 1110	CHAR,0,12,"HOW MANY RE CORDS DO YOU WANT":CHA R,0,13,"TO CREATE (10 {SPACE}TO 999)":INPUTN R\$:NR=VAL(NR\$)	CR 1470	RECORD#3,(PT),1:PRINT# 3,F1\$(J):RECORD#3,(PT) ,1	CG 1780	RECORD#5,(I),1:INPUT#5 ,F1\$:PRINTF1\$:IFLEN(F1 \$)<>23THENCND=5:SU\$=F1\$: GOSUB2050
XR 1120	IFNR<10ORNR>999THENCH AR,0,13,NN\$:PRINTCHR\$(7):GOTO1110	RR 1480	RECORD#3,(PT),25:PRINT #3,F2\$(J):RECORD#3,(PT) ,25	GB 1790	RECORD#5,(I),25:INPUT# 5,F2\$:PRINTF2\$:IFLEN(F 2\$)<>16THENCND=6:SU\$=F2 \$:GOSUB2050
KB 1130	CHAR,0,15,"WANT TO POS ITION POINTER TO":CHAR ,0,16,"LAST RECORD 'Y' OR 'N'":INPUTPP\$	RD 1490	RECORD#3,(PT),42:PRINT #3,F3\$(J):RECORD#3,(PT) ,42	EJ 1800	RECORD#5,(I),42:INPUT# 5,F3\$:PRINTF3\$:IFLEN(F 3\$)<>9THENCND=7:SU\$=F3\$: GOSUB2050
KM 1140	IFPP\$<>"Y"ANDPP\$<>"N"TH HENCHAR,0,16,NN\$:PRINT CHR\$(7):GOTO1130	HK 1500	RECORD#3,(PT),52:PRINT #3,F4\$(J):RECORD#3,(PT) ,52	SX 1810	RECORD#5,(I),52:INPUT# 5,F4\$:PRINTF4\$:IFLEN(F 4\$)<>19THENCND=8:SU\$=F4 \$:GOSUB2050
RA 1150	IFDD\$="41"THENOPEN15,8 ,15,"U0>M0":GOSUB2030: CLOSE15	SQ 1510	RECORD#3,(PT),72:PRINT #3,F5\$(J):RECORD#3,(PT) ,72	AQ 1820	RECORD#5,(I),72:INPUT# 5,F5\$:PRINTF5\$:IFLEN(F 5\$)<>29THENCND=8:SU\$=F5 \$:GOSUB2050
JP 1160	IFDD\$="71"THENOPEN15,8 ,15,"U0>M1":GOSUB2030: CLOSE15	EA 1520	BEND	MF 1830	BEND
JE 1170	FT\$="R"+"MO\$+"-"+DD\$+" -"+CK\$+"-"+PP\$+"-"+NR\$	XA 1530	IFJ=10THENPRINT:PRINTD S\$	BA 1840	SLEEP1:IFI=NRTHEN1910
MF 1180	IFPP\$="N"THEN1250	BM 1540	IFPT=NRTHENPRINT:PRINT DS\$:GOTO1560	RQ 1850	CHAR,0,5,LEFT\$(NN\$,23)
CP 1190	PRINT:PRINT"WAIT - WRI TING POINTER TO REC. # "+STR\$(NR)+"":SLEEP2	EC 1550	NEXT	KP 1860	CHAR,0,6,LEFT\$(NN\$,16)
FJ 1200	IFMO\$="F"THENFAST	AB 1560	DCLOSE#3	PB 1870	CHAR,0,7,LEFT\$(NN\$,9)
GQ 1210	DOPEN#1,(FT\$),L102	MA 1570	IFPT=NRTHENSLOW:PRINT: PRINT"TOTAL # OF RECOR DS WRITTEN=";PT:COLOR5 ,2:PRINT:PRINT"END OF {SPACE}WRITING PROGRAM ":PRINT"PRESS ANY KEY {SPACE}NOW.":GETKEYK\$: GOTO1590	DD 1880	CHAR,0,8,LEFT\$(NN\$,19)
CD 1220	RECORD#1,(NR),1	MC 1610	IFMO\$="F"THENFAST	QQ 1890	CHAR,0,9,LEFT\$(NN\$,29)
XC 1230	IFDS=50THENPRINT#1,CHR \$(255):GOTO1220	GX 1620	DOPEN#5,(FT\$),L102:GOS UB2030	MK 1900	NEXT
DX 1240	GOSUB2030:DCLOSE#1	AQ 1630	FORI=1TONR	CG 1910	DCLOSE#5
EJ 1250	PT=0	QB 1640	CHAR,23,5,CHR\$(158)+CH R\$(95)+CHR\$(153)+" {6 SPACES}"	SM 1920	SLOW:PRINT:PRINT:PRINT "TOTAL # OF RECORDS RE AD=";NR:COLOR5,2:PRINT "END OF READING PROGRA M."
JE 1260	SLOW:SCNCLR:PRINT"CREA TING TEXT FOR THE RELA TIVE FILE.":SLEEP2	SG 1650	CHAR,16,6,CHR\$(158)+CH R\$(95)+CHR\$(153)+" {13 SPACES}"	DX 1930	CATALOG:GOSUB2030
RC 1270	FORJ=1TO10	MG 1660	CHAR,9,7,CHR\$(158)+CHR \$(95)+CHR\$(153)+" {20 SPACES}"	GR 1940	COLOR5,14:INPUT"WANT T O SCRATCH RELATIVE FIL E{SHIFT-SPACE}(Y/N)";N Y\$
PA 1280	F1\$(J)="23 CHARACTER F IELD*****"	CC 1670	CHAR,19,8,CHR\$(158)+CH R\$(95)+CHR\$(153)+" {10 SPACES}"	XX 1950	IFNY\$="Y"THENSSCRATCH"R *":GOSUB2030:COLLECT:G OSUB2030
DE 1290	F2\$(J)="16 CHARACTER F IE"	RR 1680	CHAR,29,9,CHR\$(158)+CH R\$(95)+CHR\$(153)	JK 1960	CATALOG:GOSUB2030
DJ 1300	F3\$(J)="09 CHARAC"	QX 1690	COLOR5,2:CHAR,0,3,"REC ORD #"+STR\$(I):COLOR5, 14:CHAR,0,5	PB 1970	COLOR5,2:PRINT"PRESS A NY KEY TO RE-RUN PROGR AM.":PRINT"PRESS '+'CH R\$(95)+' ' TO QUIT PROG RAM."
BX 1310	F4\$(J)="19 CHARACTER F IELD*"	MB 1700	IFCK\$="ON"THENBEGIN	AC 1980	GETKEYK\$
GH 1320	F5\$(J)="29 CHARACTER F IELD*****"	XM 1710	RECORD#5,(I),1:GOSUB20 10:INPUT#5,F1\$:GOSUB20 30:PRINTF1\$:IFLEN(F1\$) <>23THENCND=5:SU\$=F1\$:G OSUB2050	AR 1990	IFK\$=CHR\$(95)THENEND
BE 1330	NEXT	CE 1720	RECORD#5,(I),25:GOSUB2 010:INPUT#5,F2\$:GOSUB2	EM 2000	GOTO1030
AD 1340	SLOW:PRINT:PRINT"WRITI NG ARRAY ITEMS ON DISK ":SLEEP2			HH 2010	T2=TI+5
KC 1350	IFMO\$="F"THENFAST			KH 2020	IFTI<T2THEN2020
RB 1360	DOPEN#3,(FT\$),L102:GOS UB2030			DQ 2030	IFDS<20ORDS=50THENRETU RN
HJ 1370	FORJ=1TO10			EB 2040	PRINTDS\$:END
MA 1380	PT=PT+1:PRINTPT;			KC 2050	SLOW
QH 1390	IFCK\$="ON"THENBEGIN			HF 2060	CHAR,0,CD,NN\$
PK 1400	RECORD#3,(PT),1:GOSUB2 010:PRINT#3,F1\$(J):GOS UB2010:RECORD#3,(PT),1 :GOSUB2010			GK 2070	FORB=1TO3
QF 1410	RECORD#3,(PT),25:GOSUB 2010:PRINT#3,F2\$(J):GO SUB2010:RECORD#3,(PT),			MP 2080	CHAR,0,CD,SU\$,1:CHAR,0 ,12,"CORRUPTED RECORD"

SOFTWARE DISCOUNTERS OF AMERICA

S.D. of A.

For Orders Only — 1-800-225-7638
PA Orders — 1-800-223-7784
Customer Service 412-361-5291

- Free shipping on orders over \$100 in continental USA
- No Surcharge for VISA/MasterCard
- Your card is not charged until we ship

IBM SOFTWARE

ACCESS	Mind Mirror.....\$9.88
10th Frame Bowling...\$29	Music Const. Set.....\$9.88
ACCOLADE	One-on-One.....\$9.88
Mean 18 Golf.....\$30	Pinball Const. Set.....\$9.88
Mean 18 Famous Course Disk.....\$14	Seven Cities Gold.....\$9.88
ACTIVISION	Super Boulder Dash.....\$9.88
Hacker.....\$9.88	ELECTRONIC ARTS
Hacker 2.....\$24	Amnesia.....\$29
Portal.....\$27	Chessmaster 2000.....\$26
Shanghai.....\$23	Grand Slam Bridge.....\$39
Tass Times.....\$23	Murder Party.....\$26
ARTWORX	Scrabble.....\$26
Bridge 4.0.....\$16	Starfleet 1.....\$32
Strip Poker.....\$25	Starflight.....\$32
Data Disk #1 Female.....\$14	World Tour Golf.....\$32
Data Disk #2 Male.....\$14	EPYX
Data Disk #3 Female.....\$14	Create A Calendar.....\$19
Linkword Languages:	Pitstop 2.....\$9.88
Dutch.....\$19	P.S. Graphics Scrapbook:
French.....\$19	#1 Sports.....\$16
German.....\$19	#2 Off the Wall.....\$16
Italian.....\$19	#3 School.....\$16
Russian.....\$19	Sub Battle Simulator.....\$24
Spanish.....\$19	Summer Games 2.....\$24
AVALON HILL	World Games.....\$24
Dr. Ruth's Game.....\$19	GAMESTAR
Super Bowl Sunday.....\$21	Champ. Baseball.....\$24
S.B.S. Champs Disk.....\$14	Champ. Basketball.....\$24
S.B.S. '85 Team Disk.....\$14	Champ. Golf.....\$24
BRODERBUND	GFL Ch. Football.....\$24
Ancient Art of War.....\$27	HAYDEN
Bank St. Writer Plus.....\$59	Sargon 3 Chess.....\$25
Carmen Sandiego	HI-TECH EXPRESSIONS
USA.....\$29	Award Ware.....\$9.88
World.....\$25	Card Ware.....\$6.88
Karateka.....\$21	Heart Ware.....\$6.88
Print Shop.....\$36	Party Ware.....\$9.88
P.S. Companion.....\$32	INFOCOM
P.S. Graphics	Bureaucracy.....\$24
Holiday Edition.....\$21	Hitchhikers Guide.....\$24
P.S. Graphics	Hollywood Hijinx.....\$24
Library #1 or #2.....\$21 Ea.	Leather Goddesses.....\$24
Toy Shop.....\$32	Zork 1.....\$24
Type!.....\$30	Zork Trilogy.....\$44
CBS	MASTERTRONIC
Success with Algebra Call	Five a Side Soccer.....\$6.88
Success with Math.....Call	Ninja.....\$6.88
CDA	Pro Golf.....\$6.88
Mr. Boston	MECA
Bartender's Guide.....\$9.88	Andrew Tobias: Managing
America Cooks Series:	Your Money 2.0.....\$129
American.....\$9.88	MICROLEAGUE
Chinese.....\$9.88	Baseball.....\$24
French.....\$9.88	*Box Score/Stats.....\$24
Italian.....\$9.88	Compiler.....\$16
Mexican.....\$9.88	*General Mgr./Owner.....\$19
CENTRAL POINT	*1986 Team Disk.....\$12
Copy 2.....\$23	*Add-on programs!
PC Tools.....\$23	MICROPROSE
DATA EAST	Crusade in Europe.....\$24
Commando.....\$24	F-15 Strike Eagle.....\$21
Tag Team Wrestling.....\$24	Silent Service.....\$21
DAVIDSON	MINDSCAPE
Grammar Gremlins.....\$30	American Challenge.....\$24
Homeworker.....\$59	Balance of Power.....\$30
Math Blaster.....\$30	Bop & Wrestle.....\$19
Spell II.....\$30	Crossword Magic.....\$30
Word Attack.....\$30	Defender of the Crown.....\$24
ELECTRONIC ARTS	Infiltrator.....\$19
Software Classic Series:	Perfect Score SAT.....\$44
Archon.....\$9.88	Sub Mission.....\$24
	Super Star Ice Hockey.....\$24

PERSONAL CHOICE

Term Paper Writer.....\$32
SIERRA
Black Cauldron.....\$24
King's Quest
1, 2, or 3.....\$32 Ea.
Space Quest.....\$30
SIMON & SHUSTER
Chem Lab.....\$24
Star Trek: Kobayashi
Alternative.....\$24
Promethean Prophecy.....\$24
Typing Tutor 3.....\$30
Websters:
Spelling Checker.....\$39
Thesaurus.....\$44
Wine Cellar.....\$44
SPECTRUM HOLOBYTE
Gato.....\$24
Wilderness.....\$30
SPRINGBOARD
Certificate Maker.....\$36
C.M. Library #1.....\$21
Early Games.....\$21
Easy as ABC.....\$24
Newsroom.....\$36
Newsroom Pro.....\$89
N.R. Clip Art #1.....\$19
N.R. Clip Art #2.....\$24
N.R. Clip Art #3.....\$19
P.S. Graphics Expander.....\$24
SSI
Battle of Antietam.....\$30
Gettysburg.....\$36
Kampfgruppe.....\$36
Rings of Zilfin.....\$24
Roadwar 2000.....\$24
Shard of Spring.....\$24
SUBLOGIC
Football.....\$26
Jet.....\$32
TELARIUM
Amazon.....\$9.88
Dragonworld.....\$9.88
Fahrenheit 451.....\$9.88
Nine Princes.....\$9.88
Perry Mason.....\$9.88
Rendezvous.....\$9.88
THUNDER MOUNTAIN
Top Gun.....\$6.88
TIMETWORKS
*Data Manager.....\$39
Evelyn Wood Reader.....\$39
Partner.....\$39
*Swiftcalc w/Sideways.....\$39
Sylvia Porter's Financial
Planner.....\$59
*Word Writer.....\$39
*All 3 in 1 Power Pack.....\$59
UNISON WORLD
Newsmaster.....\$59
Printmaster Plus.....\$36
Art Gallery 1 or 2.....\$19 Ea.
VALUE TIME
Art Library 1 or 2.....\$6.88 Ea.
Calendars & Stationery.....\$6.88
Greeting Cards.....\$6.88
Signs & Banners.....\$6.88
WEEKLY READER
Stickybear Math.....\$23
Stickybear Numbers.....\$23
Stickybear Reading.....\$23

APPLE II SERIES

ACCESS	Tag Team Wrestling.....\$21
Triple Pack: BH1, BH2	ELECTRONIC ARTS
Raid Over Moscow.....\$14	Age of Adventure.....\$9.88
World Class	Amnesia.....\$29
Leader Board.....\$25	Archon.....\$9.88
ACCOLADE	Archon 2: Adept.....\$9.88
Comics.....\$19	Arctic Fox.....\$26
Fight Night.....\$19	Bard's Tale GS.....\$32
Hardball.....\$19	Bard's Tale 2.....\$32
ACTIVISION	Battlefront.....\$25
GameMaker Library Disks:	Carriers at War.....\$30
Sci-Fi.....\$16	Chessmaster 2000.....\$29
Sports.....\$16	Deluxe Paint II GS.....\$65
GameMaker.....\$30	D. Paint Art #1 GS.....\$19
Chostbusters.....\$9.88	D. Paint Art #2 GS.....\$19
Hacker 2.....\$24	Lords of Conquest.....\$26
Hacker 2 GS.....\$29	Murder Party.....\$26
Music Studio GS.....\$49	Marble Madness.....\$23
Paintworks Clip Art	Mind Mirror.....\$9.88
Gallery GS.....\$19	Moebius.....\$36
Paintworks GS.....\$47	Movie Maker.....\$9.88
Portal.....\$27	Music Const. Set.....\$9.88
Shanghai.....\$21	Music Const. Set GS.....\$32
Shanghai GS.....\$29	One-on-One.....\$9.88
Tass Times GS.....\$24	Pegasus.....\$23
ARTWORX	Pinball Const. Set.....\$9.88
Bridge 4.0.....\$16	Russia (The Great War).....\$26
International Hockey.....\$19	Scrabble.....\$26
Strip Poker.....\$19	Seven Cities of Gold.....\$9.88
Data Disk #1 (Female).....\$14	Skyfox.....\$9.88
Data Disk #2 (Male).....\$14	Star Fleet 1.....\$32
Super Boulder Dash.....\$9.88	Ultima 4.....\$36
AVALON HILL	EPYX
Dr. Ruth.....\$19	Champ. Wrestling.....\$23
Super Sunday.....\$21	Create A Calendar.....\$19
BAUDVILLE	Destroyer.....\$23
Award Maker.....\$24	P.S. Graphics Scrapbook:
French Paper Pack.....\$9.88	#1 Sports.....\$14
Video Vegas.....\$19	#2 Off the Wall.....\$14
BRODERBUND	#3 School.....\$14
Airheart (128K).....\$21	Summer Games 2.....\$23
Animat (128K).....\$42	Winter Games.....\$23
Bank St. Writer	GAMESTAR
Plus (128K).....\$47	Champ. Baseball (128K).....\$24
Carmen San Diego	Ch. Basketball (128K).....\$24
USA.....\$27	Champ. Football (128K).....\$24
World.....\$24	HI-TECH EXPRESSIONS
Dazzle Draw (128K).....\$34	Award Ware.....\$9.88
Fantavision.....\$30	Card Ware.....\$6.88
Karateka.....\$21	Heart Ware.....\$6.88
On Balance (128K).....\$59	Party Ware.....\$9.88
Print Shop.....\$27	INFOCOM
Print Shop Companion.....\$23	Bureaucracy (128K).....\$24
P.S. Graphics Library	Hitchhiker's Guide.....\$19
#1, 2 or 3.....\$14 Ea.	Hollywood Hijinx.....\$24
P.S. Graphics Library	Leather Goddesses.....\$24
Holiday Edition.....\$14	Zork Trilogy.....\$44
Science Tool Kit.....\$39	MECA
Toy Shop.....\$32	Andrew Tobias: Managing
Type!.....\$27	Your Money 2.0.....\$95
CENTRAL POINT	MICROLEAGUE
Copy 2.....\$21	Baseball.....\$24
DAVIDSON	Box Score Stats.....\$14
Algeblaster.....\$27	General Mgr./Owner.....\$19
Grammar Gremlins.....\$27	1986 Team Disk.....\$12
Math Blaster.....\$27	MICROPROSE
Spell II.....\$27	F-15 Strike Eagle.....\$21
Word Attack.....\$27	Silent Service.....\$21
DATA EAST	Commando.....\$21
Commando.....\$21	

Commodore 64 & 128 Owners: Please read our full page ad in this month's Compute's Gazette!

P.O. BOX 111327 — DEPT. CP — BLAWNOX, PA 15238

*Please Read The Following Ordering Terms & Conditions Carefully Before Placing Your Order: Orders with cashiers check or money order shipped immediately on in stock items. Personal & Company checks, allow 3 weeks clearance. No C.O.D.'s! Shipping: Continental U.S.A. — Orders under \$100 add \$3; free shipping on orders over \$100. AK, HI, FPO, APO — add \$5 on all orders. Canada & Puerto Rico — add \$10 on all orders. Sorry, no other International orders accepted! PA residents add 6% sales tax on the total amount of order including shipping charges! REASONS FOR CALLING CUSTOMER SERVICE — 412-361-5291 (1) Status of order or back order (2) If any merchandise purchased within 60 days from S.D. of A. is defective, please call for a return authorization number. Defective merchandise will be replaced with the same merchandise only. Other returns subject to a 15% restocking charge. After 60 days please refer to the manufacturers warranty included with the merchandise & return directly to the manufacturer. Customer service will not accept collect calls or calls on S.D. OF A.'s 800# order lines! Have you seen our on line catalog of 1000 software titles for Commodore, Atari, Apple, IBM and Amiga! It's on Compuserve's Electronic Mall — just type GO SDA and shopping for software will never be the same again! HOURS: Mon-Fri, 9AM-5:30 PM, Sat. 10AM-4PM Eastern Time. Because this ad had to be written 2-3 mos. before it was published, prices & availability are subject to change! When sending a mail order, please specify make & model of your computer!

Ice Hockey Simulation From Mindscape

Mindscape has introduced *Superstar Ice Hockey*, a computer hockey simulation that allows one or two players the chance to compete against the computer or each other, to coach a team, and to manage a league. As a player, you take the ice as center or goalie: fire slapshots, hip-check opponents, make slick passes, and block shots. As the coach, you set up and rotate your players' lines. And as general manager, you trade and draft players, send them to training camp, and aim to build a weak franchise into a contender for the Sport-Time Cup.

Superstar Ice Hockey is currently available for the Commodore 64 for \$34.95; IBM PC and Apple II versions are planned.

Mindscape, 3444 Dundee Rd., Northbrook, IL 60062

Circle Reader Service Number 236.

First Amiga Title From MicroProse

An enhanced version of *Silent Service* is MicroProse's first title available for the Commodore Amiga.

Silent Service puts the player in command of a World War II submarine in the South Pacific. Enhancements for the new Amiga version take special advantage of the computer's graphics, sound, and animation capabilities. Sunsets, burning ships, oil slicks, and the intricately designed battle station screens are displayed using more than 32 colors. Enemy cruisers, escorts, and aircraft carriers can now be differentiated on the map views, and digitized sound recordings from actual submarine listening devices add to the realism of the simulation. Game controls have been simplified to employ onscreen icons for all function and activity selections. Using these icons, the player can control the submarine with the mouse.

The player-selected and historical scenarios range from single-ship attacks to multipatrol missions with heavily escorted convoys. All of a submarine's critical battle stations are represented, including the conning tower, periscope, engine room, and bridge. Multiple diffi-

culty levels and automatic time scaling are also included as game features.

The new *Silent Service* version works on all Amiga computers with 512K of memory. It was designed to be operated with a mouse, although joystick and keyboard controls are also supported. Suggested retail price is \$39.95.

MicroProse Simulation Software, 120 Lakefront Dr., Hunt Valley, MD 21030
Circle Reader Service Number 237.

Atari ST Version Of True BASIC Released

True BASIC, developers of the *True BASIC* language system and publishers of TBI Educational Software, has announced that version 2.0 of the *True BASIC* language is now available for the Atari ST. This version, which was recently released for the IBM PC, offers a high level of graphics support and is significantly faster than ST BASIC, which makes it a language tailored for use with the sophisticated graphics capabilities of the ST. In addition, Version 2.0 offers modules, a programming concept found in languages like Modula-2 and Ada, which can be used within a program to facilitate data sharing between program segments, or can be compiled separately and stored as libraries for use with other programs.

The Atari ST version of *True BASIC* is available for \$99.95.

True BASIC, 39 S. Main St., Hanover, NH 03755

Circle Reader Service Number 238.

Atari And Macintosh Versions Of Springboard Products

Springboard has announced the release of Atari and Macintosh versions of its popular programs, *Certificate Maker* and *Certificate Library Volume 1*. Together, these two programs provide the user with more than 300 predesigned certificates, awards, diplomas, and licenses covering everything from academic, business, and athletic achievements to activities involving families and friends. Each certificate can be personalized for a different occasion or

person. The user selects a title or headline, chooses a border to frame it, enters a personalized message, fills in the signature and date line, and prints out the certificate. *Certificate Maker* provides more than 200 certificates, 24 border choices, and three dozen gold-foil and colorful stickers for a finishing touch.

Certificate Maker and *Certificate Library Volume 1* supports most popular dot-matrix printers. Suggested retail price for the Atari and Macintosh versions of *Certificate Maker* are \$49.95 and \$59.95, respectively; both versions of *Certificate Library 1* are \$34.95.

Springboard Software, 7808 Creekridge Cir., Minneapolis, MN 55435

Circle Reader Service Number 239.

New Simulations From SSI

SSI is now distributing *Phantasia III: The Wrath of Nikademus*, the final confrontation between a band of adventurers and the dark Lord Nikademus with his army of vile beasts and creatures.

The sequel boasts improved features such as a detailed method of handling wounds that determines location and extent of injuries; more strategy and combat options, such as the ability to move each character to different positions in the party; enhanced graphics with all new character and monster displays; more potent magic spells; and increased playing speed while traveling across the wilderness or into dungeons. Players can also reuse favorite characters from previous *Phantasia* games.

Phantasia III is a multiple-character role-playing game wherein players assemble a party of up to six adventurers. Players can create a wizard elf, a fighter dwarf, or combine in other ways the eight races and six classes of characters which include humans, elves, dwarves, thieves, warriors, and wizards. The characters use spells and weapons to invade difficult terrain, escape dungeons, destroy demons, and confront and finally destroy the evil power of Nikademus, the Dark Lord. Over 36 types of monsters are fought by players in their quest which takes them through a myriad of dungeons. Suggested retail price is \$39.95.

SSI has also begun shipping its

ATARI® Station

The one Stop shop

ORDERS ONLY
CALL TOLL FREE

1-800-225-5878

ORDER STATUS, INFORMATION, R.A.'s
1-313-595-0788

520ST SYSTEMS 1040ST
\$659 COLOR \$CALL
\$469 MONO \$CALL



OR CALL FOR
LATEST PRICES

3 1/2" Continuous Label Kit

- ★ 500 3 1/2" Disk Labels
- ★ FREE Label Program
- Automatically Reads Disk & Makes Label
- Create Database

All Just
\$9.95

1200 BAUD MODEM KIT

- ★ AVATEX 1200 HC
 - ★ ST TALK SOFTWARE
 - ★ COMPUSERVE STARTER KIT
 - ★ RS-232 CABLE M-F
- COMPLETE KIT JUST **\$139**

BULK 3 1/2 DISKS

LIFETIME WARRANTY!

\$.99 SS/DD QTY. 25 | **\$1.29** DS/DD QTY. 25

PANASONIC 1080i

- ★ 120 CPS
- ★ EPSON/IBM
- ★ NLQ MODE
- ★ FRICTION TRACTOR



\$199 2 YEAR WARRANTY!

ATARI SH 204

OR
SUPRA DRIVE
20 MEG HARD DRIVE
YOUR CHOICE SAVE LOW PRICE
\$549

ST Monitor Riser



\$19.95

- ★ Covers up all cables
- ★ Organizes System
- ★ Room for Drives
- ★ Metal Construction

FREE CATALOG!

WITH ANY \$10.00 PURCHASE - COMPLETE WITH PICTURES, DESCRIPTIONS AND MORE THOUSANDS OF ITEMS AT LOW, LOW PRICES!

ST HARDWARE

Atari 1040ST	Call
Atari 314 Drive	199.00
Atari 354 Drive	105.00
Atari 520ST	259.00
Atari SC1224 Color Monitor	299.00
Atari SH204 Hard Drive	539.00
Atari SM124 Mono Monitor	119.00
Atari SMM804 Printer	169.00
Atari SX212 Modem	79.00
Supra 20 Meg Hard Drive	549.00
Upgrade, EZ-Ram	159.00
Z-Time 1040	49.95
Z-Time 520	39.95

PRINTERS

Okimate 20 w/Plug N-Print	198.00
Panasonic KX-P1060	199.00
Panasonic KX-P1091	259.00
Panasonic KX-P1092	335.00
Panasonic KX-P1582	399.00
Panasonic KX-P1595	469.00
Panasonic KX-P3151	399.00
Panasonic KX-P3131	255.00

DUST COVERS

1040 ST	9.95
520 ST	6.95
520 ST System	24.95
Gemini 10	6.95
IBM PC Keyboard	6.95
IBM PC System	23.95
Panasonic 1080/90/91	6.95
SF 314	5.95
SF 354	5.95
SM 1224	11.95
SM 124	11.95

COLOR PAPER

BLUE, YELLOW, GREEN, PINK	
WHITE, SALMON & GOLD	
500 Sheets (Any Color)	
20# LZ Cut, 9.5x11	6.95
Rainbow Pack #1 (P-Y-B)	6.95
Rainbow Pack #2 (Gr-S-Go)	6.95
CONTINUOUS CARD STOCK	
3 X 5	4.99
4 X 6	7.99
5 X 7	9.99
CONTINUOUS LABELS	
Audio Cassette, White	9.99
Desk (2.75 X 2) 250 White	4.99
File Folder (3 1/2 X 8) 750	9.99
Mail (3 1/2 X 5 1/2) 1000	6.99

CABLES, INTERFACES

AB Switch Box Parallel	39.95
AB Switch Box RS-232	39.95
AB-X Crossover Box Par.	49.95
IBM/ST Printer Cable 10'	9.95
IBM/ST Printer Cable 6'	6.95
Microstuffer	59.95
P R Connection	79.95
RS-232 F F 6'	9.95
RS-232 M F 10'	12.95
RS-232 M F 6'	9.95
ST Drive Cable 6'	14.95
XE Serial 6'	9.95

MISCELLANEOUS ACCESSORIES

14 Twist-N-Tilt	14.95
5.25" Disk Notcher	7.95
Amaray Printer Stand	14.95
Mouse House	4.95
Mouse Mat	7.95
Printer Stand 2-Piece	12.95
Six Outlet Surge Strip	14.95
Atari Economy	4.95
Epyx 500XJ	14.95

DISKETTES

Bulk 3.5" SS/DD	.99
Bulk 3.5" DS/DD	1.29
Bulk 5.25" DS/DD	.39
BASF 3.5" SS/DD	13.95
BASF 3.5" DS/DD	19.95
BASF 5.25" DS/DD	9.95
BASF 5.25" DS/HD	19.95
Maxell 3.5" SS/DD	14.95
Maxell 3.5" DS/DD	22.95
Maxell 5.25" SS/DD	10.95
Maxell 5.25" DS/DD	11.95
Maxell 5.25" DS/HD	23.95
Sony 3.5" SS/DD	14.95
Sony 3.5" DS/DD	22.95
Sony 5.25" SS/DD	8.95
Sony 5.25" DS/DD	9.95
Sony 5.25" DS/HD	22.95
3M 3.5" SS/DD	15.95
3M 3.5" DS/DD	22.95
3M 5.25" SS/DD	10.95
3M 5.25" DS/DD	11.95
3M 5.25" DS/HD	29.95

DISK STORAGE

Disk Directory (3.5")	22.99
Disk File 40 - 3.5"	6.99
Disk File 60 - 5.25"	6.99
Library Case-3 (5.25")	.99
Library Case-5 (3.5")	.99
Pocket Pack (3.5")	14.99

RIBBONS

Epson FX/MX/RX-80	5.99
IBM Proprietary	9.95
Panasonic 1080/90	9.99
Star Okidata	2.99
XMM 801 Legend/BMC	7.99
SMM 804	7.99

BUSINESS

Cash Disbursements Journal	66.95
DB Master One	39.95
Regent Word II	66.95
Dac Easy Accounting	46.95
Data Manager ST	52.95
DB Man	119.95
Isgr Portfolio	132.95
Swiftax ST	52.95
Swiftonic ST	52.95
Sylvia Porter Vol. I	52.95
VIP Professional	166.95
Word Writer ST	52.95

EDUCATIONAL

Decimal Dungeon	26.95
Fraction Action	26.95
Defender of the Crown	32.95
Dungeonmaster	26.95
Math Talk	32.95
Math Wizard	26.95
Speller Bee	32.95
Animal Kingdom	26.95
Donald Duck's Playground	19.95
First Shapes	32.95
Kid Talk	32.95
Read & Rhyme	26.95

ENTERTAINMENT

Alternate Reality	32.95
Autoduel	33.95
Crystal Castles	19.95
Deep Space	32.95
Dollars & Sense	66.95
Flight Simulator II	34.95
Guid of Thieves	29.95

Joust	18.95
Karate Kid II	26.95
Mercenary	26.95
Ogre	26.95
Pson Chess	39.95
Rogue	26.95
Skyfox	31.95
Space Quest	32.95
ST Karate	23.95
Tass Times	32.95
Temple of Apshal Trilogy	26.95
Tenth Frame	26.95
Winnie The Pooh	16.95
World Games	26.95
Arctic Fox	27.95
Arena	23.95
Balance of Power	32.95
Black Cauldron	26.95
Brattacus	32.95
Championship Wrestling	26.95
Defender of the Crown	32.95
Dungeonmaster	26.95

F-15 Strike Eagle	26.95
First Word	34.95
Gato	32.95
Golden Path	29.95
Hammer Strike Mission	32.95
Hex	26.95
Jet	33.95

King of Chicago	32.95
Kings Quest I, II or III	32.95
Leader Board	26.95
Major Motion	26.95
Mean 18	29.95
Phantasia	26.95
Phantasia II	26.95
Pinball Factory	26.95
RPV	26.95
S D I	32.95
Shanghai	29.95
Silent Service	26.95

Sinbad & The Throne	
of the Falcon	32.95
Star Raiders	19.95
Starglider	29.95
Sundog	26.95
Super Cycle	26.95
The Pawn	29.95
Time Bandits	26.95
Ultima III	39.95
Wanderer	26.95
Wintergames	26.95

UTILITIES

Degal Elite	53.95
Easy Draw	53.95
GFA Basic	52.95
ISO Pascal	66.95
Lattice C	99.95
Mark Williams C	119.95
Necronome	26.95
New Technologies Coloring Book	15.95
Paintworks	46.95
Personal Pascal	49.95
Publishing Partner	99.95
Thunder	26.95
Aegis Animator	53.95
Art Gallery I or II	19.95
Degas	26.95
First Cadd	32.95
GFA Basic Compiler	52.95
I.S. Talk	34.95
Music Studio	39.95
Paperclip Elite	66.95
PrintMaster Plus	26.95
ST Talk	9.95
Time Link	32.95
Z-Time 520	39.95

No surcharge for MasterCard or Visa

Ordering Information: Credit Card - Have number, expiration date, shipping address and DAY phone number ready with order. Personal and company checks: Call order in - you will receive an order number, send order number and check to the P.O. Box listed. Allow 14 Business Days for check to clear. Money Orders: Call order in - you will receive an order number, send number with money order to P.O. Box listed. Shipping: Continental USA - All Orders add 3%, minimum \$3.00. HI, AK, Canada add 5%, minimum \$5.00. All other order areas add 15% minimum \$10.00. No C.O.D.'s over \$100.00, add an additional \$3.00 shipping charges for C.O.D. All areas not serviced by U.P.S. will be shipped first class insured mail. All shipping charges in excess of the above terms will be added. All goods are new and include factory warranty. All defectives must have a return authorization number. Please call (313)595-0788 to obtain an R.A. # or return will not be accepted. Prices and availability subject to change without notice. All correspondence should be sent to P.O. Box 75 - Wayne, MI 48184.

newest Civil War simulation, *Rebel Charge at Chickamauga*, for the Commodore 64, Apple II, and Atari eight-bit computers. It uses a refined version of the game system used in *Gettysburg: The Turning Point*. All units are now brigade size and may be broken down into smaller units, then built up. Command Control may be altered by the player(s), and each turn now represents two hours rather than one. The entire battle is recreated in 13 turns. Both strategic and tactical screen displays are available; the larger strategic display shows 40 squares by 20 squares of the battlefield, while the tactical display enables the players to zoom in for a more detailed view. Introductory, intermediate, and advanced versions of the game are included. Both the Union and Confederate sides may be managed by human players, or you can choose the computer as opponent. Suggested retail price is \$49.95.

Strategic Simulations, 1046 N. Rengstorff Ave., Mountain View, CA 94043

Circle Reader Service Number 240.

New Text Adventure From Cosmi Software

Cosmi Software has introduced *Delta Man*, a survival simulation featuring realistic survival simulations and 3-D scrolling graphics.

The scenario: A nuclear holocaust has reduced Chicago to a smoldering, poisonous ruin. Having survived because of your discovery of a high-tech, robotic space suit, you pick through the wreckage to find supplies, weapons, and fuel. You ward off roaming bands of genetic mutants while searching for other surviving humans until you can escape.

Delta Man is available for the Commodore 64 for \$19.95.

Cosmi, 415 N. Figueroa, Wilmington, CA 90744

Circle Reader Service Number 241.

IIGs Clip Art

Clip Art Gallery from Activision offers more than 600 graphic images for the Apple IIGs. This database of designs can be used with *Paintworks Plus* and the soon-to-be-released *Writer's Choice elite* to design invitations, cards, and logos, or to add artwork to any document. There are 24 categories, including business, school, sports, bugs, gadgets, food, symbols, birds, and vehicles. You can redraw parts of the images, change the colors and size, add words, and mix or match images from the different files.

Suggested retail price for *Clip Art*

Gallery is \$29.95.

Activision, 2350 Bayshore Frontage Rd., Mountain View, CA 94043

Circle Reader Service Number 242.

New Street Sport Game From Epyx

Epyx has announced plans to release *Street Sports Baseball*, a unique new baseball game for the Commodore 64, Apple II series, and IBM PC and compatibles.

In keeping with the winner-take-all, neighborhood pick-up game approach of the Street Sports line, the game will feature the 52nd Street Gang—hitters, fielders, and pitchers from which players can choose their team. The rules of the game are the same as those of big-league baseball, but the rules of the street provide a special challenge. Players must run and field around tree stumps and bushes, and contend with trash can lids, spare tires, or flattened cardboard boxes. After you select the members of your team, you assign positions and decide on a batting order. Then you control the pitches, time the swings, and regulate the field action. You can play against a friend or the computer using a split-view screen with perspectives from above and close up, so you can keep an eye on the whole field as well as a specific playing area.

The price of *Street Sports Baseball* was unavailable at press time.

Epyx, 600 Galveston Dr., P.O. Box 8020, Redwood City, CA 94063

Circle Reader Service Number 243.

New Civil War Game

Blue Powder Grey Smoke from Gardé is now available for the Commodore 64. This war game uses strategy and tactics to simulate actual Civil War combat along with a zoom-in feature for combat display. All the game mechanics are joystick controlled with onscreen menus.

Blue Powder Grey Smoke is also available for the Apple II series. Retail price for each version is \$49.95.

Gardé Games of Distinction, 8 Bishop Ln., Madison, CT 06443

Circle Reader Service Number 244.

EA Buys Batteries Included

Electronic Arts has purchased the assets, inventory, contracts, trademarks and brand names of Batteries Included. All of Batteries Included's operations will be consolidated into the San Mateo offices of Electronic Arts. The EA customer service department will fulfill all requests for upgrades, warranty replacements, product inquiries, and promotional of-

fers from Batteries Included customers.

The Batteries Included name will exist as a separate line of products within EA. Representatives believe the Batteries Included line will benefit from EA's distribution channels and sales program.

Circle Reader Service Number 245.

Amiga Math Aquarium

Doug's Math Aquarium (DMA) compiles expressions for high-speed display on the Amiga. It uses single-purpose math programs—like the Mandelbrot set—to create artlike fractal images on the screen.

DMA is available for \$79.95.

Seven Seas Software, 35 Cape George Wye, Port Townsend, WA 98368

Circle Reader Service Number 246.

New Stickybear Programs

Two new software packages from the Stickybear series are designed to help elementary school kids improve their math and grammar skills. *Stickybear Parts of Speech* contains four drills to help children ages 8–12 learn the parts of speech—nouns, pronouns, adjectives, verbs, adverbs, conjunctions, prepositions, and interjections. Animated sequences reward users who choose the correct part of speech from sentences and paragraphs. The word lists can be customized by level of difficulty. There's also a print option for printing out tests.

The *Stickybear Word Problems* disk contains hundreds of different math word problems for children ages 7 and up. It has adjustable levels of difficulty, a print option to print out practice problems, and a report-card option. Colorful screen graphics reward correct answers. And teachers and parents can customize the problems for individualized math instruction.

Both *Stickybear Parts of Speech* and *Word Problems* are available for the Apple II series with 48K and DOS 3.3.

Each software package contains one floppy disk, a *Stickybear* poster, user's guide, and *Stickybear* stickers. The suggested retail price for each program is \$39.95.

Weekly Reader Family Software, 245 Long Hill Rd., Middletown, CT 06457

Circle Reader Service Number 247.

©

COMPUTE!'s Author's Guide

Most of the following suggestions serve to improve the speed and accuracy of publication. COMPUTE! is primarily interested in new and timely articles on the Commodore 64/128, Atari, Apple, IBM PC/PCjr, Amiga, and Atari ST. We are much more concerned with the content of an article than with its style, but articles should be clear and well-explained.

The guidelines below will permit your good ideas and programs to be more easily edited and published:

1. The upper left corner of the first page should contain your name, address, telephone number, and the date of submission.

2. The following information should appear in the upper right corner of the first page: If your article is specifically directed to one make of computer, please state the brand name and, if applicable, the BASIC or ROM or DOS version(s) involved. In addition, *please indicate the memory requirements of programs.*

3. The underlined title of the article should be placed about 2/3 of the way down the first page.

4. Following pages should be typed normally, except that in the upper right corner there should be an abbreviation of the title, your last name, and the page number—for example: Memory Map/Smith/2.

5. All lines within the text of the article must be double- or triple-spaced. A one-inch margin should be left at the right, left, top, and bottom of each page. No words should be divided at the ends of lines. And please do not right-justify. Leave the lines ragged.

6. Standard typing paper should be used (no erasable, onionskin, or other thin paper), and typing should be on one side of the paper only (upper- and lowercase).

7. If you are submitting more than one article, send each one in a separate mailer with its own tape or disk.

8. Short programs (under 20 lines) can easily be included within the text. Longer programs should be separate listings. *It is essential that we have a copy of the program, recorded twice, on a tape or disk.* If your article was written with a word processor, we request that you include a copy of the text file on the tape or disk. If you include a copy of your article on disk, please save the article as plain text, without any special formatting characters or control codes. Most word processors provide an option for saving a document as plain ASCII text or in unformatted form. Please use high-quality 10- or 30-minute tapes with the program recorded on both sides. The tape or disk should be labeled with your name, the title of the article, and, if applicable, the BASIC/ROM/DOS version(s). Tapes are fairly sturdy, but disks need to be enclosed within

plastic or cardboard mailers (available at photography, stationery, or computer supply stores). If possible, programs written in machine language or a compiled language should include source code (or an annotated disassembly if the program was written with a machine language monitor).

9. A good general rule is to spell out the numbers zero through ten in your article and write higher numbers as numerals (1024). The exceptions to this are: Figure 5, Table 3, TAB(4), and so on. Within ordinary text, however, the zero through ten should appear as words, not numbers. Also, symbols and abbreviations should not be used within text: Use *and* (not &), *reference* (not ref.), *through* (not thru).

10. For greater clarity, use all capitals when referring to keys (RETURN, TAB, ESC, SHIFT), BASIC words (LIST, RND, GOTO), and three languages (BASIC, APL, PILOT). Headlines and subheads should, however, be initial caps only, and emphasized words are not capitalized. If you wish to emphasize, underline the word; then it will be italicized during typesetting.

11. Articles can be of any length—from a single-line routine to a multiple-issue series. The average article is about four to eight double-spaced, typed pages.

12. We do not consider articles which are submitted simultaneously to other publishers. If you wish to send an article to another magazine for consideration, please do not submit it to us.

13. COMPUTE! pays between \$70 and \$800 for published articles. In general, the rate reflects the length and quality of the article. Payment is made upon acceptance. Following submission (to Editorial Department, COMPUTE! Magazine, P.O. Box 5406, Greensboro, NC 27403), it will take from four to eight weeks for us to reply. If your work is accepted, you will be notified by a letter which will include a contract for you to sign and return. *Rejected manuscripts are returned to authors who enclose a self-addressed, stamped envelope.*

14. If your article is accepted and you have since made improvements to the program, please submit an entirely new tape or disk and a new copy of the article reflecting the update. We cannot easily make revisions to programs and articles. It is necessary that you send the revised version as if it were a new submission entirely, but be sure to indicate that your submission is a revised version by writing *Revision* on the envelope and the article.

15. COMPUTE! does not accept unsolicited product reviews. If you are interested in serving on our panel of reviewers, contact the Features Editor for details.

COMPUTE!'s Guide To Typing In Programs

Computers are precise—type the program *exactly* as listed, including necessary punctuation and symbols, except for special characters noted below. We have provided a special listing convention as well as a program to check your typing—"The Automatic Proofreader."

Programs for the IBM, TI-99/4A, and Atari ST models should be typed exactly as listed; no special characters are used. Programs for Commodore, Apple, and Atari 400/800/XL/XE computers may contain some hard-to-read special characters, so we have a listing system that indicates these control characters. You will find these Commodore and Atari characters in curly braces; *do not type the braces*. For example, {CLEAR} or {CLR} instructs you to insert the symbol which clears the screen on the Atari or Commodore machines. A complete list of these symbols is shown in the tables below. For Commodore, Apple, and Atari, a single symbol by itself within curly braces is usually a control key or graphics key. If you see {A}, hold down the CONTROL key and press A. This will produce a reverse video character on the Commodore (in quote mode), a graphics character on the Atari, and an invisible control character on the Apple.

Graphics characters entered with the Commodore logo key are enclosed in a special bracket: [<A>]. In this case, you would hold down the Commodore logo key as you type A. Our Commodore listings are in uppercase, so shifted symbols are underlined>. A graphics heart symbol (SHIFT-S) would be listed as S. One exception is {SHIFT-SPACE}. When you see this, hold down SHIFT and press the space bar. If a number precedes a symbol, such as {5 RIGHT}, {6 S}, or {<8 Q>}, you would enter five cursor rights, six shifted S's, or eight Commodore-Q's. On the Atari, inverse characters (white on black) should be entered with the inverse video

Atari 400/800/XL/XE

When you see	Type	See
{CLEAR}	ESC SHIFT <	↵ Clear Screen
{UP}	ESC CTRL -	↑ Cursor Up
{DOWN}	ESC CTRL =	↓ Cursor Down
{LEFT}	ESC CTRL +	← Cursor Left
{RIGHT}	ESC CTRL *	→ Cursor Right
{BACK S}	ESC DELETE	⌫ Backspace
{DELETE}	ESC CTRL DELETE	⌫ Delete character
{INSERT}	ESC CTRL INSERT	⌫ Insert character
{DEL LINE}	ESC SHIFT DELETE	⌫ Delete line
{INS LINE}	ESC SHIFT INSERT	⌫ Insert line
{TAB}	ESC TAB	⏪ TAB key
{CLR TAB}	ESC CTRL TAB	⏪ Clear tab
{SET TAB}	ESC SHIFT TAB	⏪ Set tab stop
{BELL}	ESC CTRL 2	🔔 Ring buzzer
{ESC}	ESC ESC	⏪ ESCape key

Commodore PET/CBM/VIC/64/128/16/+4

When You Read:	Press:	See:	When You Read:	Press:	See:
{CLR}	SHIFT CLR/HOME	⌫	[1]	COMMODORE 1	⌫
{HOME}	CLR/HOME	⌫	[2]	COMMODORE 2	⌫
{UP}	SHIFT ↑ CRSR ↓	⬆	[3]	COMMODORE 3	⬆
{DOWN}	↑ CRSR ↓	⬆	[4]	COMMODORE 4	⬆
{LEFT}	SHIFT ← CRSR →	⬅	[5]	COMMODORE 5	⬅
{RIGHT}	← CRSR →	⬅	[6]	COMMODORE 6	⬅
{RVS}	CTRL 9	⬛	[7]	COMMODORE 7	⬛
{OFF}	CTRL 0	⬛	[8]	COMMODORE 8	⬛
{BLK}	CTRL 1	⬛	{ F1 }	f1	⬛
{WHT}	CTRL 2	⬛	{ F2 }	SHIFT f1	⬛
{RED}	CTRL 3	⬛	{ F3 }	f3	⬛
{CYN}	CTRL 4	⬛	{ F4 }	SHIFT f3	⬛
{PUR}	CTRL 5	⬛	{ F5 }	f5	⬛
{GRN}	CTRL 6	⬛	{ F6 }	SHIFT f5	⬛
{BLU}	CTRL 7	⬛	{ F7 }	f7	⬛
{YEL}	CTRL 8	⬛	{ F8 }	SHIFT f7	⬛
			<	←	⬛

key (Atari logo key on 400/800 models).

Whenever more than two spaces appear in a row, they are listed in a special format. For example, {6 SPACES} means press the space bar six times. Our Commodore listings never leave a single space at the end of a line, instead moving it to the next printed line as {SPACE}.

Amiga program listings contain only one special character, the left arrow (←) symbol. This character marks the end of each program line. Whenever you see a left arrow, press RETURN or move the cursor off the line to enter that line into memory. Don't try to type in the left arrow symbol; it's there only as a marker to indicate where each program line ends.

The Automatic Proofreader

Type in the appropriate program listed below, then save it for future use. The Commodore Proofreader works on the Commodore 128, 64, Plus/4, 16, and VIC-20. Don't omit any lines, even if they contain unfamiliar commands or you think they don't apply to your computer. When you run the program, it installs a machine language program in memory and erases its BASIC portion automatically (so be sure to save several copies before running the program for the first time). If you're using a Commodore 128, Plus/4 or 16, do not use any GRAPHIC commands while the Proofreader is active. You should disable the Commodore Proofreader before running any other program. To do this, either turn the computer off and on or enter SYS 64738 (for the 64), SYS 65341 (128), SYS 64802 (VIC-20), or SYS 65526 (Plus/4 or 16). To reenable the Proofreader, reload the program and run it as usual. Unlike the original VIC/64 Proofreader, this version works the same with disk or tape.

On the Atari, run the Proofreader to activate it (the Proofreader remains active in memory as a machine language program); you must then enter NEW to erase the BASIC loader. Pressing SYSTEM RESET deactivates the Atari Proofreader; enter PRINT USR(1536) to reenable it.

The Apple Proofreader erases the BASIC portion of itself after you run it, leaving only the machine language portion in memory. It works with either DOS 3.3 or ProDOS. Disable the Apple Proofreader by pressing CTRL-RESET before running another BASIC program.

The IBM Proofreader is a BASIC program that simulates the IBM BASIC line editor, letting you enter, edit, list, save, and load programs that you type. Type RUN to activate. Be sure to leave Caps Lock on, except when typing lowercase characters.

Once the Proofreader is active, try typing in a line. As soon as you press RETURN, either a hexadecimal number (on the Apple) or a pair of letters (on the Commodore, Atari, or IBM) appears. The number or pair of letters is called a *checksum*.

Compare the value displayed on the screen by the Proofreader with the checksum printed in the program listing in the magazine. The checksum is given to the left of each line number. Just type in the program a line at a time (without the printed checksum), press RETURN or Enter, and compare the checksums. If they match, go on to the next line. If not, check your typing; you've made a mistake. Because of the checksum method used, do not type abbreviations, such as ? for PRINT. On the Atari and Apple Proofreaders, spaces are not counted as part of the checksum, so be sure you type the right number of spaces between quote marks. The Atari Proofreader does not check to see that you've typed the characters in the right order, so if characters are transposed, the checksum still matches the listing. The Commodore Proofreader catches transposition errors and ignores spaces unless they're enclosed in quotation marks. The IBM Proofreader detects errors in spacing and transposition.

IBM Proofreader Commands

Since the IBM Proofreader replaces the computer's normal BASIC line editor, it has to include many of the direct-mode IBM BASIC commands. The syntax is identical to IBM BASIC. Commands simulated are LIST, LLIST, NEW, FILES, SAVE, and LOAD. When listing your program, press any key (except Ctrl-Break) to stop the listing. If you enter NEW, the Proofreader prompts you to press Y to be especially sure you mean yes.

Two new commands are BASIC and CHECK. BASIC exits the Proofreader back to IBM BASIC, leaving the Proofreader in memory. CHECK works just like LIST, but shows the checksums along with the listing. After you have typed in a program, save it to disk. Then exit the Proofreader with the BASIC command, and load the program as usual (this replaces the Proofreader in memory). You can now run the program, but you may want to re-save it to disk. This will shorten it on disk and make it load faster, but it can no longer be edited with the Proofreader. If you want to convert an existing BASIC program to Proofreader format, save it to disk with SAVE "filename",A.

Program 1: Atari Proofreader

By Charles Brannon

```
100 GRAPHICS 0
110 FOR I=1536 TO 1700:READ A:POKE I,A:CK=CK+A:NEXT I
120 IF CK<>19072 THEN ? "Error in DATA Statement. Check Typing.":END

130 A=USR(1536)
140 ? :? "Automatic Proofreader Now Activated."
150 END
160 DATA 104,160,0,185,26,3,201,69,240,7
170 DATA 200,200,192,34,208,243,96,200,169,74
180 DATA 153,26,3,200,169,6,153,26,3,162
190 DATA 0,189,0,228,157,74,6,232,224,16
200 DATA 208,245,169,93,141,78,6,169,6,141
210 DATA 79,6,24,173,4,228,105,1,141,95
220 DATA 6,173,5,228,105,0,141,96,6,169
230 DATA 0,133,203,96,247,238,125,241,93,6
240 DATA 244,241,115,241,124,241,76,205,238
250 DATA 0,0,0,0,0,32,62,246,8,201
260 DATA 155,240,13,201,32,240,7,72,24,101
270 DATA 203,133,203,104,40,96,72,152,72,138
280 DATA 72,160,0,169,128,145,88,200,192,40
290 DATA 208,249,165,203,74,74,74,24,105
300 DATA 161,160,3,145,88,165,203,41,15,24
310 DATA 105,161,200,145,88,169,0,133,203,104
320 DATA 170,104,168,104,40,96
```

Program 2: IBM Proofreader

By Charles Brannon

```
10 'Automatic Proofreader Version 3.0 (Lines 205,206 added/190 deleted/470,490 changed from V2.0)
100 DIM L$(500),LNUM(500):COLOR 0,7,7:KEY OFF:CLS:MAX=0:LNUM(0)=65536!
110 ON ERROR GOTO 120:KEY 15,CHR$(4)+CHR$(70):ON KEY(15)GOSUB 640:KEY(15) ON:GOTO 130
120 RESUME 130
130 DEF SEG=&H40:W=PEEK(&H4A)
140 ON ERROR GOTO 650:PRINT:PRINT"Proofreader Ready."
150 LINE INPUT L$:Y=CSRLIN-INT(LEN(L$)/W)-1:LOCATE Y,1
160 DEF SEG=0:POKE 1050,30:POKE 1052,34:POKE 1054,0:POKE 1055,79:POKE 1056,13:POKE 1057,28:LINE INPUT L$:DEF SEG:IF L$="" THEN 150
170 IF LEFT$(L$,1)="" THEN L$=MID$(L$,2):GOTO 170
```

```

180 IF VAL(LEFT$(L$,2))=0 AND
MID$(L$,3,1)=" " THEN L$=M
ID$(L$,4)
200 IF ASC(L$)>57 THEN 260 'no
line number, therefore co
mmand
205 BL=INSTR(L$," "):IF BL=0 T
HEN BL=L$:GOTO 206 ELSE B
L$=LEFT$(L$,BL-1)
206 LNUM=VAL(BL$):TEXT$=MID$(L
$,LEN(STR$(LNUM))+1)
210 IF TEXT$="" THEN GOSUB 540
:IF LNUM=LNUM(P) THEN GOSU
B 560:GOTO 150 ELSE 150
220 CKSUM=0:FOR I=1 TO LEN(L$)
:CKSUM=(CKSUM+ASC(MID$(L$,
I)))*I AND 255:NEXT:LOCATE
Y,1:PRINT CHR$(65+CKSUM/1
6)+CHR$(65+(CKSUM AND 15))
+" "+L$
230 GOSUB 540:IF LNUM(P)=LNUM
THEN L$(P)=TEXT$:GOTO 150
'replace line
240 GOSUB 580:GOTO 150 'insert
the line
260 TEXT$="" :FOR I=1 TO LEN(L$)
:A=ASC(MID$(L$,I)):TEXT$=
TEXT$+CHR$(A+32*(A>96 AND
A<123)):NEXT
270 DELIMITER=INSTR(TEXT$," ")
:COMMAND$=TEXT$:ARG$="" :IF
DELIMITER THEN COMMAND$=L
EFT$(TEXT$,DELIMITER-1):AR
G$=MID$(TEXT$,DELIMITER+1)
ELSE DELIMITER=INSTR(TEXT
$,CHR$(34)):IF DELIMITER T
HEN COMMAND$=LEFT$(TEXT$,D
ELIMITER-1):ARG$=MID$(TEXT
$,DELIMITER)
280 IF COMMAND$<>"LIST" THEN 4
10
290 OPEN "scrn:" FOR OUTPUT AS
#1
300 IF ARG$="" THEN FIRST=0:P=
MAX-1:GOTO 340
310 DELIMITER=INSTR(ARG$,"-"):
IF DELIMITER=0 THEN LNUM=V
AL(ARG$):GOSUB 540:FIRST=P
:GOTO 340
320 FIRST=VAL(LEFT$(ARG$,DELIM
ITER)):LAST=VAL(MID$(ARG$,
DELIMITER+1))
330 LNUM=FIRST:GOSUB 540:FIRST
=P:LNUM=LAST:GOSUB 540:IF
P=0 THEN P=MAX-1
340 FOR X=FIRST TO P:N$=MID$(S
TR$(LNUM(X),2)+" "
350 IF CKFLAG=0 THEN A$="" :GOT
O 370
360 CKSUM=0:A$=N$+L$(X):FOR I=
1 TO LEN(A$):CKSUM=(CKSUM+
ASC(MID$(A$,I))*I) AND 255
:NEXT:A$=CHR$(65+CKSUM/16)
+CHR$(65+(CKSUM AND 15))+"
"
370 PRINT #1,A$+N$+L$(X)
380 IF INKEY$<>" " THEN X=P
390 NEXT :CLOSE #1:CKFLAG=0
400 GOTO 130
410 IF COMMAND$="LLIST" THEN O
PEN "lpt1:" FOR OUTPUT AS
#1:GOTO 300
420 IF COMMAND$="CHECK" THEN C
KFLAG=1:GOTO 290
430 IF COMMAND$<>"SAVE" THEN 4
50
440 GOSUB 600:OPEN ARG$ FOR OU
TPUT AS #1:ARG$="" :GOTO 30
0
450 IF COMMAND$<>"LOAD" THEN 4
90

```

```

460 GOSUB 600:OPEN ARG$ FOR IN
PUT AS #1:MAX=0:P=0
470 WHILE NOT EOF(1):LINE INPU
T #1,L$:BL=INSTR(L$," "):B
L$=LEFT$(L$,BL-1):LNUM(P)=
VAL(BL$):L$(P)=MID$(L$,
LEN(STR$(VAL(BL$)))+1):P=P+1:
WEND
480 MAX=P:CLOSE #1:GOTO 130
490 IF COMMAND$="NEW" THEN INP
UT "Erase program - Are yo
u sure";L$:IF LEFT$(L$,1)=
"y" OR LEFT$(L$,1)="Y" THE
N MAX=0:LNUM(0)=65536!:GOT
O 130:ELSE 130
500 IF COMMAND$="BASIC" THEN C
OLOR 7,0,0:ON ERROR GOTO 0
:CLS:END
510 IF COMMAND$<>"FILES" THEN
520
515 IF ARG$="" THEN ARG$="A:"
ELSE SEL=1:GOSUB 600
517 FILES ARG$:GOTO 130
520 PRINT "Syntax error":GOTO 1
30
540 P=0:WHILE LNUM>LNUM(P) AND
P<MAX:P=P+1:WEND:RETURN
560 MAX=MAX-1:FOR X=P TO MAX:L
NUM(X)=LNUM(X+1):L$(X)=L$(
X+1):NEXT:RETURN
580 MAX=MAX+1:FOR X=MAX TO P+1
STEP -1:LNUM(X)=LNUM(X-1)
:L$(X)=L$(X-1):NEXT:L$(P)=
TEXT$:LNUM(P)=LNUM:RETURN
600 IF LEFT$(ARG$,1)<>CHR$(34)
THEN 520 ELSE ARG$=MID$(A
RG$,2)
610 IF RIGHT$(ARG$,1)=CHR$(34)
THEN ARG$=LEFT$(ARG$,LEN(
ARG$)-1)
620 IF SEL=0 AND INSTR(ARG$,".
")=0 THEN ARG$=ARG$+".BAS"
630 SEL=0:RETURN
640 CLOSE #1:CKFLAG=0:PRINT "St
opped.":RETURN 150
650 PRINT "Error #";ERR:RESUME
150

```

Program 3: Commodore Proofreader

By Philip Nelson, Assistant Editor

```

10 VEC=PEEK(772)+256*PEEK(773)
:LO=43:HI=44
20 PRINT "AUTOMATIC PROOFREAD
R FOR ";:IF VEC=42364 THEN
{SPACE}PRINT "C-64"
30 IF VEC=50556 THEN PRINT "VI
C-20"
40 IF VEC=35158 THEN GRAPHIC C
LR:PRINT "PLUS/4 & 16"
50 IF VEC=17165 THEN LO=45:HI=
46:GRAPHIC CLR:PRINT "128"
60 SA=(PEEK(LO)+256*PEEK(HI))+
6:ADR=SA
70 FOR J=0 TO 166:READ BYT:POK
E ADR,BYT:ADR=ADR+1:CHK=CHK
+BYT:NEXT
80 IF CHK<>20570 THEN PRINT "*"
ERROR* CHECK TYPING IN DATA
STATEMENTS":END
90 FOR J=1 TO 5:READ RF,LF,HF:
RS=SA+RF:HB=INT(RS/256):LB=
RS-(256*HB)
100 CHK=CHK+RF+LF+HF:POKE SA+L
F,LB:POKE SA+HF,HB:NEXT
110 IF CHK<>22054 THEN PRINT "
*ERROR* RELOAD PROGRAM AND

```

```

{SPACE}CHECK FINAL LINE":EN
D
120 POKE SA+149,PEEK(772):POKE
SA+150,PEEK(773)
130 IF VEC=17165 THEN POKE SA+
14,22:POKE SA+18,23:POKESA+
29,224:POKESA+139,224
140 PRINT CHR$(147);CHR$(17);"
PROOFREADER ACTIVE":SYS SA
150 POKE HI,PEEK(HI)+1:POKE (P
EEK(LO)+256*PEEK(HI))-1,0:N
EW
160 DATA 120,169,73,141,4,3,16
9,3,141,5,3
170 DATA 88,96,165,20,133,167,
165,21,133,168,169
180 DATA 0,141,0,255,162,31,18
1,199,157,227,3
190 DATA 202,16,248,169,19,32,
210,255,169,18,32
200 DATA 210,255,160,0,132,180
,132,176,136,230,180
210 DATA 200,185,0,2,240,46,20
1,34,208,8,72
220 DATA 165,176,73,255,133,17
6,104,72,201,32,208
230 DATA 7,165,176,208,3,104,2
08,226,104,166,180
240 DATA 24,165,167,121,0,2,13
3,167,165,168,105
250 DATA 0,133,168,202,208,239
,240,202,165,167,69
260 DATA 168,72,41,15,168,185,
211,3,32,210,255
270 DATA 104,74,74,74,74,168,1
85,211,3,32,210
280 DATA 255,162,31,189,227,3,
149,199,202,16,248
290 DATA 169,146,32,210,255,76
,86,137,65,66,67
300 DATA 68,69,70,71,72,74,75,
77,80,81,82,83,88
310 DATA 13,2,7,167,31,32,151,
116,117,151,128,129,167,136
,137

```

Program 4: Apple Proofreader

By Tim Victor, Editorial Programmer

```

10 C = 0: FOR I = 768 TO 768 +
68: READ A:C = C + A: POKE I
,A: NEXT
20 IF C < > 7258 THEN PRINT "ER
ROR IN PROOFREADER DATA STAT
EMENTS": END
30 IF PEEK(190 * 256) < > 76 T
HEN POKE 56,0: POKE 57,3: CA
LL 100: GOTO 50
40 PRINT CHR$(4);"IN#A300"
50 POKE 34,0: HOME : POKE 34,1:
VTAB 2: PRINT "PROOFREADER
INSTALLED"
60 NEW
100 DATA 216,32,27,253,201,141
110 DATA 208,60,138,72,169,0
120 DATA 72,189,255,1,201,160
130 DATA 240,8,104,10,125,255
140 DATA 1,105,0,72,202,208
150 DATA 238,104,170,41,15,9
160 DATA 48,201,58,144,2,233
170 DATA 57,141,1,4,138,74
180 DATA 74,74,74,41,15,9
190 DATA 48,201,58,144,2,233
200 DATA 57,141,0,4,104,170
210 DATA 169,141,96

```

MLX Machine Language Entry Program For Commodore 64 And 128

Ottis Cowper, Technical Editor

"MLX" is a labor-saving utility that allows almost fail-safe entry of machine language programs. Included are versions for the Commodore 64 and 128.

Type in and save some copies of whichever version of MLX is appropriate for your computer (you'll want to use it to enter future ML programs from COMPUTE!). Program 1 is for the Commodore 64, and Program 2 is for the 128 (128 MLX can also be used to enter Commodore 64 ML programs for use in 64 mode). When you're ready to enter an ML program, load and run MLX. It asks you for a starting address and an ending address. These addresses appear in the article accompanying the MLX-format program listing you're typing.

If you're unfamiliar with machine language, the addresses (and all other values you enter in MLX) may appear strange. Instead of the usual decimal numbers you're accustomed to, these numbers are in *hexadecimal*—a base 16 numbering system commonly used by ML programmers. Hexadecimal—hex for short—includes the numerals 0-9 and the letters A-F. But don't worry—even if you know nothing about ML or hex, you should have no trouble using MLX.

After you enter the starting and ending addresses, you'll be offered the option of clearing the workspace. Choose this option if you're starting to enter a new listing. If you're continuing a listing that's partially typed from a previous session, don't choose this option.

A functions menu will appear. The first option in the menu is ENTER DATA. If you're just starting to type in a program, pick this. Press the E key, and type the first number in the first line of the program listing. If you've already typed in part of a program, type the line number where you left off typing at the end of the previous session (be sure to load the partially completed program before you resume entry). In any case, make sure the address you enter corresponds to the address of a line in the listing you are entering. Otherwise, you'll be unable to enter the data correctly. If you pressed E by mistake, you can return to the command menu by pressing RETURN alone when asked for the address. (You can get back to the menu from most options by pressing RETURN with no other input.)

Entering A Listing

Once you're in Enter mode, MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight data bytes and a checksum. Although an MLX-format listing appears similar to the "hex dump" listings from a machine language monitor program, the extra checksum number on the end allows MLX to check your typing. (Commodore 128 users *can* enter the data from an MLX listing using the built-in monitor if the rightmost column of data is omitted, but we recommend against it. It's much easier to let MLX do the proofreading and error checking for you.)

Figure 1: 64 MLX Keypad

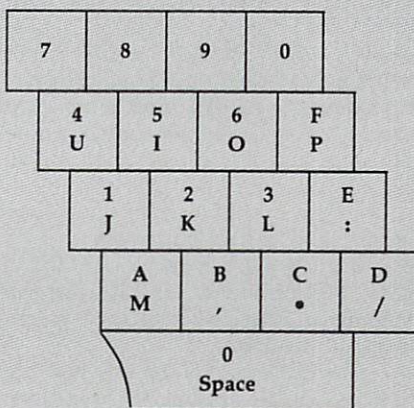
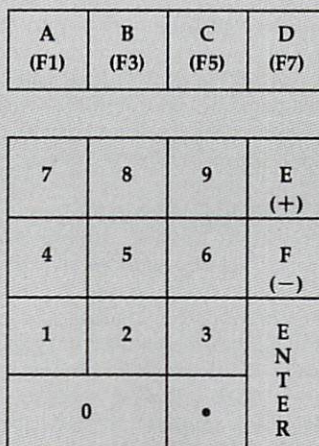


Figure 2: 128 MLX Keypad



When you enter a line, MLX recalculates the checksum from the eight bytes and the address and compares this value to the number from the ninth column. If the values match, you'll hear a bell tone, the data will be added to the workspace area, and the prompt for the next line of data will appear. But if MLX detects a typing error, you'll hear a low buzz and see an error message. The line will then be redisplayed for editing.

Invalid Characters Banned

Only a few keys are active while you're entering data, so you may have to unlearn some habits. You *do not* type spaces between the columns; MLX automatically inserts these for you. You *do not* press RETURN after typing the last number in a line; MLX automatically enters and checks the line after you type the last digit.

Only the numerals 0-9 and the letters A-F can be typed in. If you press any other key (with some exceptions noted below), you'll hear a warning buzz. To simplify typing, 128 MLX redefines the function keys and + and - keys on the numeric keypad so that you can enter data one-handed. In either case, the keypad is active only while entering data. Addresses must be entered with the normal letter and numeric keys. The figures below show the keypad configurations for each version.

MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, MLX will catch your mistake. There is one error that can slip past MLX: Because of the checksum formula used, MLX won't notice if you accidentally type FF in place of 00, and vice versa. And there's a very slim chance that you could garble a line and still end up with a combination of characters that adds up to the proper checksum. However, these mistakes should not occur if you take reasonable care while entering data.

Editing Features

To correct typing mistakes before finishing a line, use the INST/DEL key to delete the character to the left of the cursor. (The cursor-left key also deletes.) If you mess up a line really badly, press CLR/HOME to start the line over. The RETURN key is also active, but only before any data is typed on a line. Pressing RETURN at this point returns you to the command menu. After you

type a character of data, MLX disables RETURN until the cursor returns to the start of a line. Remember, you can press CLR/HOME to quickly get to a line number prompt.

More editing features are available when correcting lines in which MLX has detected an error. To make corrections in a line that MLX has redisplayed for editing, compare the line on the screen with the one printed in the listing, then move the cursor to the mistake and type the correct key. The cursor left and right keys provide the normal cursor controls. (The INST/DEL key now works as an alternative cursor-left key.) You cannot move left beyond the first character in the line. If you try to move beyond the rightmost character, you'll reenter the line. During editing, RETURN is active; pressing it tells MLX to recheck the line. You can press the CLR/HOME key to clear the entire line if you want to start from scratch, or if you want to get to a line number prompt to use RETURN to get back to the menu.

Display Data

The second menu choice, DISPLAY DATA, examines memory and shows the contents in the same format as the program listing (including the checksum). When you press D, MLX asks you for a starting address. Be sure that the starting address you give corresponds to a line number in the listing. Otherwise, the checksum display will be meaningless. MLX displays program lines until it reaches the end of the program, at which point the menu is redisplayed. You can pause the display by pressing the space bar. (MLX finishes printing the current line before halting.) Press space again to restart the display. To break out of the display and get back to the menu before the ending address is reached, press RETURN.

Other Menu Options

Two more menu selections let you save programs and load them back into the computer. These are SAVE FILE and LOAD FILE; their operation is quite straightforward. When you press S or L, MLX asks you for the filename. You'll then be asked to press either D or T to select disk or tape.

You'll notice the disk drive starting and stopping several times during a load or save (save only for the 128 version). Don't panic; this is normal behavior. MLX opens and reads from or writes to the file instead of using the usual LOAD and SAVE commands (128 MLX makes use of BLOAD). Disk users should also note that the drive prefix 0: is automatically added to the filename (line 750 in 64 MLX), so this should *not* be included when entering

the name. This also precludes the use of @ for Save-with-Replace, so remember to give each version you save a different name. The 128 version makes up for this by giving you the option of scratching the existing file if you want to reuse a filename.

Remember that MLX saves the entire workspace area from the starting address to the ending address, so the save or load may take longer than you might expect if you've entered only a small amount of data from a long listing. When saving a partially completed listing, make sure to note the address where you stopped typing so you'll know where to resume entry when you reload.

MLX reports the standard disk or tape error messages if any problems are detected during the save or load. (Tape users should bear in mind that Commodore computers are never able to detect errors during a save to tape.) MLX also has three special load error messages: INCORRECT STARTING ADDRESS, which means the file you're trying to load does not have the starting address you specified when you ran MLX; LOAD ENDED AT *address*, which means the file you're trying to load ends before the ending address you specified when you started MLX; and TRUNCATED AT ENDING ADDRESS, which means the file you're trying to load extends beyond the ending address you specified when you started MLX. If you see one of these messages and feel certain that you've loaded the right file, exit and rerun MLX, being careful to enter the correct starting and ending addresses.

The 128 version also has a CATALOG DISK option so you can view the contents of the disk directory before saving or loading.

The QUIT menu option has the obvious effect—it stops MLX and enters BASIC. The RUN/STOP key is disabled, so the Q option lets you exit the program without turning off the computer. (Of course, RUN/STOP-RESTORE also gets you out.) You'll be asked for verification; press Y to exit to BASIC, or any other key to return to the menu. After quitting, you can type RUN again and reenter MLX without losing your data, as long as you don't use the clear workspace option.

The Finished Product

When you've finished typing all the data for an ML program and saved your work, you're ready to see the results. The instructions for loading and using the finished product vary from program to program. Some ML programs are designed to be loaded and run like BASIC programs, so all you need to type is LOAD "filename",8 for disk

(DLOAD "filename" on the 128) or LOAD "filename" for tape, and then RUN. Such programs will usually have a starting address of 0801 for the 64 or 1C01 for the 128. Other programs must be reloaded to specific addresses with a command such as LOAD "filename",8,1 for disk (BLOAD "filename" on the 128) or LOAD "filename",1,1 for tape, then started with a SYS to a particular memory address. On the Commodore 64, the most common starting address for such programs is 49152, which corresponds to MLX address C000. In either case, you should always refer to the article which accompanies the ML listing for information on loading and running the program.

An Ounce Of Prevention

By the time you finish typing in the data for a long ML program, you may have several hours invested in the project. Don't take chances—use our "Automatic Proofreader" to type the new MLX, and then test your copy *thoroughly* before first using it to enter any significant amount of data. Make sure all the menu options work as they should. Enter fragments of the program starting at several different addresses, then use the Display option to verify that the data has been entered correctly. And be sure to test the Save and Load options several times to insure that you can recall your work from disk or tape. Don't let a simple typing error in the new MLX cost you several nights of hard work.

Program 1: MLX For Commodore 64

```
SS 10 REM VERSION 1.1: LINES 8
30,950 MODIFIED, LINES 4
85-487 ADDED
EK 100 POKE 56,50:CLR:DIM IN$,
I,J,A,B,A$,B$,A(7),N$
DM 110 C4=48:C6=16:C7=7:Z2=2:Z
4=254:Z5=255:Z6=256:Z7=
127
CJ 120 FA=PEEK(45)+Z6*PEEK(46)
:BS=PEEK(55)+Z6*PEEK(56)
:H$="0123456789ABCDEF"
SB 130 R$=CHR$(13):L$="{LEFT}"
:S$=" ":D$=CHR$(20):Z$=
CHR$(0):T$="{13 RIGHT}"
CQ 140 SD=54272:FOR I=SD TO SD
+23:POKE I,0:NEXT:POKE
{SPACE}SD+24,15:POKE 78
8,52
FC 150 PRINT "{CLR}"CHR$(142)CH
R$(8):POKE 53280,15:POK
E 53281,15
EJ 160 PRINT T$" {RED}{RVS}
{2 SPACES}{B @}
{2 SPACES}"SPC(28)"
{2 SPACES}[OFF]{BLU} ML
X II {RED}{RVS}
{2 SPACES}"SPC(28)"
{12 SPACES}"{BLU}"
FR 170 PRINT "{3 DOWN}
{3 SPACES}COMPUTE! 'S MA
```

```

CHINE LANGUAGE EDITOR
{3 DOWN}"
JB 180 PRINT"[BLK]STARTING ADD
RESS[4]";:GOSUB300:SA=A
D:GOSUB1040:IF F THEN18
0
GF 190 PRINT"[BLK]{2 SPACES}EN
DING ADDRESS[4]";:GOSUB
300:EA=AD:GOSUB1030:IF
{SPACE}F THEN190
KR 200 INPUT"[3 DOWN]{BLK}CLEA
R WORKSPACE [Y/N][4]";A
$:IF LEFT$(A$,1)<>"Y"TH
EN220
PG 210 PRINT"[2 DOWN]{BLU}WORK
ING...";:FORI=BS TO BS+
EA-SA+7:POKE I,0:NEXT:P
RINT"DONE"
DR 220 PRINTTAB(10)"[2 DOWN]
{BLK}{RVS} MLX COMMAND
{SPACE}MENU {DOWN}[4]":
PRINT T$"{RVS}E{OFF}NTE
R DATA"
BD 230 PRINT T$"{RVS}D{OFF}ISP
LAY DATA":PRINT T$"
{RVS}L{OFF}OAD FILE"
JS 240 PRINT T$"{RVS}S{OFF}AVE
FILE":PRINT T$"{RVS}Q
{OFF}UIT{2 DOWN}{BLK}"
JH 250 GET A$:IF A$=N$ THEN250
HK 260 A=0:FOR I=1 TO 5:IF A$=
MID$("EDLSQ",I,1)THEN A
=I:I=5
FD 270 NEXT:ON A GOTO420,610,6
90,700,280:GOSUB1060:GO
TO250
EJ 280 PRINT"[RVS] QUIT ":INPU
T"[DOWN][4]ARE YOU SURE
[Y/N]";A$:IF LEFT$(A$,
1)<>"Y"THEN220
EM 290 POKE SD+24,0:END
JX 300 IN$=N$:AD=0:INPUTIN$:IF
LEN(IN$)>4THENRETURN
KF 310 B$=IN$:GOSUB320:AD=A:B$
=MID$(IN$,3):GOSUB320:A
D=AD*256+A:RETURN
PP 320 A=0:FOR J=1 TO 2:A$=MID
$(B$,J,1):B=ASC(A$)-C4+
(A$>"@")*C7:A=A*C6+B
JA 330 IF B<0 OR B>15 THEN AD=
0:A=-1:J=2
GX 340 NEXT:RETURN
CH 350 B=INT(A/C6):PRINT MID$(
H$,B+1,1);:B=A-B*C6:PRI
NT MID$(H$,B+1,1);:RETI
RN
RR 360 A=INT(AD/Z6):GOSUB350:A
=AD-A*Z6:GOSUB350:PRINT
":";
BE 370 CK=INT(AD/Z6):CK=AD-Z4*
CK+Z5*(CK>Z7):GOTO390
PX 380 CK=CK*Z2+Z5*(CK>Z7)+A
JC 390 CK=CK+Z5*(CK>Z5):RETURN
QS 400 PRINT"[DOWN]STARTING AT
[4]";:GOSUB300:IF IN$<>
N$ THEN GOSUB1030:IF F
{SPACE}THEN400
EX 410 RETURN
HD 420 PRINT"[RVS] ENTER DATA
{SPACE}":GOSUB400:IF IN
$=N$ THEN220
JK 430 OPEN3,3:PRINT
SK 440 POKE198,0:GOSUB360:IF F
THEN PRINT IN$:PRINT"
{UP}[5 RIGHT]";
GC 450 FOR I=0 TO 24 STEP 3:B$
=S$:FOR J=1 TO 2:IF F T
HEN B$=MID$(IN$,I+J,1)
HA 460 PRINT"[RVS]"B$";:IF I<
24THEN PRINT"{OFF}";
HD 470 GET A$:IF A$=N$ THEN470
FK 480 IF (A$>"/"ANDAS<":)OR(A
$>"@"ANDAS<"G")THEN540
GS 485 A=(A$="M")-2*(A$="")-
3*(A$=".")-4*(A$="/")-5
*(A$="J")-6*(A$="K")
FX 486 A=A-7*(A$="L")-8*(A$=":
")-9*(A$="U")-10*(A$="I
")-11*(A$="O")-12*(A$="
P")
CM 487 A=A-13*(A$=S$):IF A THE
N A$=MID$("ABCD123E456F
0",A,1):GOTO 540
MP 490 IF A$=R$ AND((I=0)AND(J
=1)OR F)THEN PRINT B$;:
J=2:NEXT:I=24:GOTO550
KC 500 IF A$="{HOME}" THEN PRI
NT B$:J=2:NEXT:I=24:NEX
T:F=0:GOTO440
MX 510 IF (A$="{RIGHT}")ANDF TH
ENPRINT B$;:GOTO540
GK 520 IF A$<>L$ AND A$<>D$ OR
((I=0)AND(J=1))THEN GOS
UB1060:GOTO470
HG 530 A$=L$+S$+L$:PRINT B$;:
J=2-J:IF J THEN PRINT
{SPACE}L$;:I=I-3
QS 540 PRINT A$;:NEXT J:PRINT
{SPACE}S$;
PM 550 NEXT I:PRINT:PRINT"[UP]
{5 RIGHT}";:INPUT#3,IN$
:IF IN$=N$ THEN CLOSE3:
GOTO220
QC 560 FOR I=1 TO 25 STEP3:B$=
MID$(IN$,I):GOSUB320:IF
I<25 THEN GOSUB380:A(I
/3)=A
PK 570 NEXT:IF A<>CK THEN GOSU
B1060:PRINT"[BLK]{RVS}
{SPACE}ERROR: REENTER L
INE [4]":F=1:GOTO440
HJ 580 GOSUB1080:B=BS+AD-SA:FO
R I=0 TO 7:POKE B+I,A(I
):NEXT
QQ 590 AD=AD+8:IF AD>EA THEN C
LOSE3:PRINT"[DOWN]{BLU}
** END OF ENTRY **{BLK}
{2 DOWN}":GOTO700
GQ 600 F=0:GOTO440
QA 610 PRINT"[CLR]{DOWN}{RVS}
{SPACE}DISPLAY DATA ":G
OSUB400:IF IN$=N$ THEN2
20
RJ 620 PRINT"[DOWN]{BLU}PRESS:
{RVS}SPACE{OFF} TO PAU
SE, {RVS}RETURN{OFF} TO
BREAK[4]{DOWN}"
KS 630 GOSUB360:B=BS+AD-SA:FOR
I=BTO B+7:A=PEEK(I):GOS
UB350:GOSUB380:PRINT S$
;
CC 640 NEXT:PRINT"[RVS]";:A=CK
:GOSUB350:PRINT
KH 650 F=1:AD=AD+8:IF AD>EA TH
ENPRINT"[DOWN]{BLU}** E
ND OF DATA **":GOTO220
KC 660 GET A$:IF A$=R$ THEN GO
SUB1080:GOTO220
EQ 670 IF A$=S$ THEN F=F+1:GOS
UB1080
AD 680 ONFGOTO630,660,630
CM 690 PRINT"[DOWN]{RVS} LOAD
{SPACE}DATA ":OP=1:GOTO
710
PC 700 PRINT"[DOWN]{RVS} SAVE
{SPACE}FILE ":OP=0
RX 710 IN$=N$:INPUT"[DOWN]FILE
NAME[4]";IN$:IF IN$=N$
{SPACE}THEN220
PR 720 F=0:PRINT"[DOWN]{BLK}
{RVS}T{OFF}APE OR {RVS}
D{OFF}ISK: [4]";
FP 730 GET A$:IF A$="T"THEN PR
INT"[DOWN]":GOTO880
HQ 740 IF A$<>"D"THEN730
HH 750 PRINT"D[DOWN]":OPEN15,8
,15,"I0":B=EA-SA:IN$=
0:"+IN$:IF OP THEN810
SQ 760 OPEN 1,8,8,IN$+",P,W":G
OSUB860:IF A THEN220
FJ 770 AH=INT(SA/256):AL=SA-(A
H*256):PRINT#1,CHR$(AL
);CHR$(AH);
PE 780 FOR I=0 TO B:PRINT#1,CH
R$(PEEK(BS+I));:IF ST T
HEN800
FC 790 NEXT:CLOSE1:CLOSE15:GOT
O940
GS 800 GOSUB1060:PRINT"[DOWN]
{BLK}ERROR DURING SAVE:
[4]":GOSUB860:GOTO220
MA 810 OPEN 1,8,8,IN$+",P,R":G
OSUB860:IF A THEN220
GE 820 GET#1,A$,B$:AD=ASC(A$+Z
$)+256*ASC(B$+Z$):IF AD
<>SA THEN F=1:GOTO850
RX 830 FOR I=0 TO B:GET#1,A$:P
OKE BS+I,ASC(A$+Z$):IF(
I<B)AND ST THEN F=2:AD
=I:I=B
FA 840 NEXT:IF ST<>64 THEN F=3
FQ 850 CLOSE1:CLOSE15:ON ABS(F
>0)+1 GOTO960,970
SA 860 INPUT#15,A,A$:IF A THEN
CLOSE1:CLOSE15:GOSUB1
060:PRINT"[RVS]ERROR: "A
$
GQ 870 RETURN
EJ 880 POKE183,PEEK(FA+2):POKE
187,PEEK(FA+3):POKE188,
PEEK(FA+4):IFOP=0THEN92
0
HJ 890 SYS 63466:IF(PEEK(783)A
ND1)THEN GOSUB1060:PRIN
T"[DOWN]{RVS} FILE NOT
{SPACE}FOUND ":GOTO690
CS 900 AD=PEEK(829)+256*PEEK(8
30):IF AD<>SA THEN F=1:
GOTO970
SC 910 A=PEEK(831)+256*PEEK(83
2)-1:F=F-2*(A<EA)-3*(A>
EA):AD=A-AD:GOTO930
KM 920 A=SA:B=EA+1:GOSUB1010:P
OKE780,3:SYS 63338
JF 930 A=BS:B=BS+(EA-SA)+1:GOS
UB1010:ON OP GOTO950:SY
S 63591
AE 940 GOSUB1080:PRINT"[BLU]**
SAVE COMPLETED **":GOT
O220
XP 950 POKE147,0:SYS 63562:IF
{SPACE}ST>0 THEN970
FR 960 GOSUB1080:PRINT"[BLU]**
LOAD COMPLETED **":GOT
O220
DP 970 GOSUB1060:PRINT"[BLK}
{RVS}ERROR DURING LOAD:
{DOWN}[4]":ON F GOSUB98
0,990,1000:GOTO220
PP 980 PRINT"INCORRECT STARTIN
G ADDRESS (":GOSUB360:
PRINT")":RETURN
GR 990 PRINT"LOAD ENDED AT ";:
AD=SA+AD:GOSUB360:PRINT
D$:RETURN
FD 1000 PRINT"TRUNCATED AT END
ING ADDRESS":RETURN
RX 1010 AH=INT(A/256):AL=A-(AH
*256):POKE193,AL:POKE1
94,AH
FF 1020 AH=INT(B/256):AL=B-(AH
*256):POKE174,AL:POKE1
75,AH:RETURN

```

```

FX 1030 IF AD<SA OR AD>EA THEN
1050
HA 1040 IF(AD>511 AND AD<40960
)OR(AD>49151 AND AD<53
248)THEN GOSUB1080:F=0
:RETURN
HC 1050 GOSUB1060:PRINT"{RVS}
{SPACE}INVALID ADDRESS
{DOWN}{BLK}":F=1:RETU
RN
AR 1060 POKE SD+5,31:POKE SD+6
,208:POKE SD,240:POKE
{SPACE}SD+1,4:POKE SD+
4,33
DX 1070 FOR S=1 TO 100:NEXT:GO
TO1090
PF 1080 POKE SD+5,8:POKE SD+6,
240:POKE SD,0:POKE SD+
1,90:POKE SD+4,17
AC 1090 FOR S=1 TO 100:NEXT:PO
KE SD+4,0:POKE SD,0:PO
KE SD+1,0:RETURN

```

Program 2: MLX For Commodore 128

```

AE 100 TRAP 960:POKE 4627,128:
DIM NL$,A(7)
XP 110 Z2=2:Z4=254:Z5=255:Z6=2
56:Z7=127:BS=256*PEEK(4
627):EA=65280
FB 120 BE$=CHR$(7):RT$=CHR$(13
):DL$=CHR$(20):SP$=CHR$(
32):LF$=CHR$(157)
KE 130 DEF FNHB(A)=INT(A/256):
DEF FNLB(A)=A-FNHB(A)*2
56:DEF FNAD(A)=PEEK(A)+
256*PEEK(A+1)
JB 140 KEY 1,"A":KEY 3,"B":KEY
5,"C":KEY 7,"D":VOL 15
:IF RGR(0)=5 THEN FAST
FJ 150 PRINT"{CLR}"CHR$(142);C
HR$(8):COLOR 0,15:COLOR
4,15:COLOR 6,15
GQ 160 PRINT TAB(12){RED}
{RVS}{2 SPACES}{9 0}
{2 SPACES}"RT$;TAB(12)"
{RVS}{2 SPACES}{OFF}
{BLU} 128 MLX {RED}
{RVS}{2 SPACES}"RT$;TAB
(12){RVS}{13 SPACES}
{BLU}"
FE 170 PRINT"{2 DOWN}
{3 SPACES}COMPUTE!'S MA
CHINE LANGUAGE EDITOR
{2 DOWN}"
DK 180 PRINT"{BLK}STARTING ADD
RESS[43]":GOSUB 260:IF
{SPACE}AD THEN SA=AD:EL
SE 180
FH 190 PRINT"{BLK}{2 SPACES}EN
DING ADDRESS[43]":GOSUB
260:IF AD THEN EA=AD:E
LSE 190
MF 200 PRINT"{DOWN}{BLK}CLEAR
{SPACE}WORKSPACE [Y/N]?
[43]":GETKEY A$:IF A$<"
Y" THEN 220
QH 210 PRINT"{DOWN}{BLU}WORKIN
G...":BANK 0:FOR A=BS
{SPACE}TO BS+(EA-SA)+7:
POKE A,0:NEXT A:PRINT"D
ONE"
DC 220 PRINT TAB(10){DOWN}
{BLK}{RVS} MLX COMMAND
{SPACE}MENU [43]{DOWN}":
PRINT TAB(13){RVS}E
{OFF}NTER DATA"RT$;TAB(
13){RVS}D{OFF}ISPLAY D
ATA"RT$;TAB(13){RVS}L
{OFF}OAD FILE"

```

```

HB 230 PRINT TAB(13){RVS}S
{OFF}AVE FILE"RT$;TAB(1
3){RVS}C{OFF}ATALOG DI
SK"RT$;TAB(13){RVS}Q
{OFF}UIT{DOWN}{BLK}"
AP 240 GETKEY A$:A=INSTR("EDLS
CQ",A$):ON A GOTO 340,5
50,640,650,930,940:GOSU
B 950:GOTO 240
SX 250 PRINT"STARTING AT";:GOS
UB 260:IF(AD<>0)OR(A$=N
L$)THEN RETURN:ELSE 250
BG 260 A$=NL$:INPUT A$:IF LEN(
A$)=4 THEN AD=DEC(A$)
PP 270 IF AD=0 THEN BEGIN:IF A
$<>NL$ THEN 300:ELSE RE
TURN:BEND
MA 280 IF AD<SA OR AD>EA THEN
{SPACE}300
PM 290 IF AD>511 AND AD<65280
{SPACE}THEN PRINT BE$;:
RETURN
SQ 300 GOSUB 950:PRINT"{RVS} I
NVALID ADDRESS {DOWN}
{BLK}":AD=0:RETURN
RD 310 CK=FNHB(AD):CK=AD-Z4*CK
+Z5*(CK>Z7):GOTO 330
DD 320 CK=CK*Z2+Z5*(CK>Z7)+A
AH 330 CK=CK+Z5*(CK>Z5):RETURN
QD 340 PRINT BE$;:{RVS} ENTER
{SPACE}DATA ":GOSUB 250
:IF A$=NL$ THEN 220
JA 350 BANK 0:PRINT:F=0:OPEN 3
,3
BR 360 GOSUB 310:PRINT HEX$(AD
)+":;:IF F THEN PRINT
{SPACE}L$:PRINT"{UP}
{5 RIGHT}";
QA 370 FOR I=0 TO 24 STEP 3:BS
=SP$:FOR J=1 TO 2:IF F
{SPACE}THEN BS=MID$(L$,
I+J,1)
PS 380 PRINT"{RVS}"B$+LF$;:IF
{SPACE}I<24 THEN PRINT
{OFF}";
RC 390 GETKEY A$:IF (A$>"/" AN
D A$<"." ) OR(A$>"@" AND
A$<"G") THEN 470
AC 400 IF A$="+" THEN A$="E":G
OTO 470
QB 410 IF A$="-" THEN A$="F":G
OTO 470
FB 420 IF A$=RT$ AND ((I=0) AN
D (J=1) OR F) THEN PRIN
T B$;:J=2:NEXT:I=24:GOT
O 480
RD 430 IF A$="{HOME}" THEN PRI
NT B$:J=2:NEXT:I=24:NEX
T:F=0:GOTO 360
XB 440 IF (A$="{RIGHT}") AND F
THEN PRINT B$+LF$;:GOT
O 470
JP 450 IF A$<>LF$ AND A$<>DL$
{SPACE}OR ((I=0) AND (J
=1)) THEN GOSUB 950:GOT
O 390
PS 460 A$=LF$+SP$+LF$:PRINT B$
+LF$;:J=2-J:IF J THEN P
RINT LF$;:I=I-3
GB 470 PRINT A$;:NEXT J:PRINT
{SPACE}SP$;
HA 480 NEXT I:PRINT:PRINT"{UP}
{5 RIGHT}";:L$="
{27 SPACES}"
DP 490 FOR I=1 TO 25 STEP 3:GE
T#3,A$,B$:IF A$=SP$ THE
N I=25:NEXT:CLOSE 3:GOT
O 220
BA 500 A$=A$+B$:A=DEC(A$):MID$(
L$,I,2)=A$:IF I<25 THE
N GOSUB 320:A(I/3)=A:GE
T#3,A$

```

```

AR 510 NEXT I:IF A<>CK THEN GO
SUB 950:PRINT:PRINT"
{RVS} ERROR: REENTER LI
NE ":F=1:GOTO 360
DX 520 PRINT BE$:B=BS+AD-SA:FO
R I=0 TO 7:POKE B+I,A(I
):NEXT I
XB 530 F=0:AD=AD+8:IF AD<=EA T
HEN 360
CA 540 CLOSE 3:PRINT"{DOWN}
{BLU}** END OF ENTRY **
{BLK}{2 DOWN}":GOTO 650
MC 550 PRINT BE$;:{CLR}{DOWN}
{RVS} DISPLAY DATA ":GO
SUB 250:IF A$=NL$ THEN
{SPACE}220
JF 560 BANK 0:PRINT"{DOWN}
{BLU}PRESS: {RVS}SPACE
{OFF} TO PAUSE, {RVS}RE
TURN{OFF} TO BREAK[43]
{DOWN}"
XA 570 PRINT HEX$(AD)+":;:GOS
UB 310:B=BS+AD-SA
DJ 580 FOR I=B TO B+7:A=PEEK(I
):PRINT RIGHT$(HEX$(A),
2);SP$;:GOSUB 320:NEXT
{SPACE}I
XB 590 PRINT"{RVS}";RIGHT$(HEX
$(CK),2)
GR 600 F=1:AD=AD+8:IF AD>EA TH
EN PRINT"{BLU}** END OF
DATA **":GOTO 220
EB 610 GET A$:IF A$=RT$ THEN P
RINT BE$:GOTO 220
QK 620 IF A$=SP$ THEN F=F+1:PR
INT BE$;
XS 630 ON F GOTO 570,610,570
RF 640 PRINT BE$"{DOWN}{RVS} L
OAD DATA ":OP=1:GOTO 66
0
BP 650 PRINT BE$"{DOWN}{RVS} S
AVE FILE ":OP=0
DM 660 F=0:F$=NL$:INPUT"FILENA
ME[43]":F$:IF F$=NL$ THE
N 220
RF 670 PRINT"{DOWN}{BLK}{RVS}T
{OFF}APE OR {RVS}D{OFF}
ISK: [43]";
SQ 680 GETKEY A$:IF A$="T" THE
N 850:ELSE IF A$<>"D" T
HEN 680
SP 690 PRINT"DISK{DOWN}":IF OP
THEN 760
EH 700 DOPEN#1,(F$+"P"),W:IF
{SPACE}DS THEN A$=D$:GO
TO 740
JH 710 BANK 0:POKE BS-2,FNLB(S
A):POKE BS-1,FNHB(SA):P
RINT"SAVING ":F$:PRINT
MC 720 FOR A=BS-2 TO BS+EA-SA:
PRINT#1,CHR$(PEEK(A));:
IF ST THEN A$="DISK WRI
TE ERROR":GOTO 750
GC 730 NEXT A:CLOSE 1:PRINT"
{BLU}** SAVE COMPLETED
{SPACE}WITHOUT ERRORS *
*":GOTO 220
RA 740 IF DS=63 THEN BEGIN:CLO
SE 1:INPUT{BLK}REPLACE
EXISTING FILE [Y/N][43]
";A$:IF A$="Y" THEN SCR
ATCH(F$):PRINT:GOTO 700
:ELSE PRINT"{BLK}":GOTO
660:BEND
GA 750 CLOSE 1:GOSUB 950:PRINT
"{BLK}{RVS} ERROR DURIN
G SAVE: [43]":PRINT A$:G
OTO 220
FD 760 DOPEN#1,(F$+"P"):IF DS
THEN A$=D$:F=4:CLOSE
{SPACE}1:GOTO 790

```



```

PX 770 GET#1,A$,B$:CLOSE 1:AD=
ASC(A$)+256*ASC(B$):IF
{SPACE}AD<>SA THEN F=1:
GOTO 790
KB 780 PRINT"LOADING ";F$:PRIN
T:BLOAD(F$),B0,P(BS):AD
=SA+FNAD(174)-BS-1:F=-2
*(AD<EA)-3*(AD>EA)
RQ 790 IF F THEN 800:ELSE PRIN
T"{BLU}** LOAD COMPLETE
D WITHOUT ERRORS **":GO
TO 220
ER 800 GOSUB 950:PRINT"{BLK}
{RVS} ERROR DURING LOAD
: [4]":ON F GOSUB 810,8
20,830,840:GOTO220
QJ 810 PRINT"INCORRECT STARTIN
G ADDRESS (";HEX$(AD);"
)":RETURN
DP 820 PRINT"LOAD ENDED AT ";H
EX$(AD):RETURN
EB 830 PRINT"TRUNCATED AT ENDI
NG ADDRESS ("HEX$(EA)"
)":RETURN
FP 840 PRINT"DISK ERROR ";A$:R
ETURN
KS 850 PRINT"TAPE":AD=POINTER(
F$):BANK 1:A=PEEK(AD):A
L=PEEK(AD+1):AH=PEEK(AD
+2)
XX 860 BANK 15:SYS DEC("FF68")
,0,1:SYS DEC("FFBA"),1,
1,0:SYS DEC("FFBD"),A,A
L,AH:SYS DEC("FF90"),12
8:IF OP THEN 890
FG 870 PRINT:A=SA:B=EA+1:GOSUB
920:SYS DEC("E919"),3:
PRINT"SAVING ";F$
AB 880 A=BS:B=BS+(EA-SA)+1:GOS
UB 920:SYS DEC("EA18"):
PRINT"[DOWN]{BLU}** TAP
E SAVE COMPLETED **":GO
TO 220
CP 890 SYS DEC("E99A"):PRINT:I
F PEEK(2816)=5 THEN GOS
UB 950:PRINT"[DOWN]
{BLK}{RVS} FILE NOT FOU
ND ":GOTO 220
GQ 900 PRINT"LOADING ...{DOWN}
":AD=FNAD(2817):IF AD<
SA THEN F=1:GOTO 800:EL
SE AD=FNAD(2819)-1:F=-2
*(AD<EA)-3*(AD>EA)
JD 910 A=BS:B=BS+(EA-SA)+1:GOS
UB 920:SYS DEC("E9FB"):
IF ST>0 THEN 800:ELSE 7
90
XB 920 POKE193,FNLB(A):POKE194
,FNHB(A):POKE 174,FNLB(
B):POKE 175,FNHB(B):RET
URN
CP 930 CATALOG:PRINT"[DOWN]
{BLU}** PRESS ANY KEY F
OR MENU **":GETKEY A$:G
OTO 220
MM 940 PRINT BE$"{RVS} QUIT
[4]";RT$: "ARE YOU SURE
{SPACE}[Y/N]?" :GETKEY A
$:IF A$<>"Y" THEN 220:EL
SE PRINT"[CLR]":BANK 1
5:END
JE 950 SOUND 1,500,10:RETURN
AF 960 IF ER=14 AND EL=260 THE
N RESUME 300
MK 970 IF ER=14 AND EL=500 THE
N RESUME NEXT
KJ 980 IF ER=4 AND EL=780 THEN
F=4:A$=DS$:RESUME 800
DQ 990 IF ER=30 THEN RESUME:EL
SE PRINT ERR$(ER);" ERR
OR IN LINE";EL

```

MLX Machine Language Entry Program For Apple

Tim Victor, Editorial Programmer

To make it easier to enter machine language programs into your computer without typos, COMPUTE! is introducing its "MLX" entry program for the Apple II series. It's our best MLX yet. It runs on the II, II+, IIe, and IIc, and with either DOS 3.3 or ProDOS.

A machine language (ML) program is usually listed as a long series of numbers. It's hard to keep your place and even harder to avoid making mistakes as you type in the listing, since an incorrect line looks almost identical to a correct one. To make error-free entry easier, COMPUTE! generally lists ML programs for Commodore and Atari computers in a format designed to be typed in with a utility called "MLX." The MLX program uses a checksum system to catch typing errors almost as soon as they happen.

Apple MLX checks your typing on a line-by-line basis. It won't let you enter invalid characters or let you continue if there's a mistake in a line. It won't even let you enter a line or digit out of sequence. Best of all, you don't have to know anything about machine language to enter ML programs with MLX. Apple MLX makes typing ML programs almost foolproof.

Using Apple MLX

Type in and save some copies of Apple MLX on disk (you'll want to use MLX to enter future ML programs in COMPUTE!). It doesn't matter whether you type it in on a disk formatted for DOS 3.3 or ProDOS. Programs entered with Apple MLX, however, must be saved to a disk formatted with the same operating system as Apple MLX itself.

If you have an Apple IIe or IIc, make sure that the key marked CAPS LOCK is in the down position. Type RUN. You'll be asked for the starting and ending addresses of the ML program. These values vary for each program, so they're given at the beginning of the ML program listing and in the program's accompanying article. Find them and type them in.

Invalid Characters Banned

Apple MLX is fairly flexible about how you type in the numbers. You can put extra spaces between numbers or leave the spaces out entirely, compressing a line into 18 keypresses. Be careful not to put a space between two digits in the middle of a number. Apple MLX will

read two single-digit numbers instead of one two-digit number (F 6 means F and 6, not F6).

You can't enter an invalid character with Apple MLX. Only the numerals 0-9 and the letters A-F can be typed in. If you press any other key (with some exceptions noted below), nothing happens. This safeguards against entering extraneous characters. Even better, Apple MLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, Apple MLX will catch your mistake.

The next thing you'll see is a menu asking you to select a function. The first is (E)NTER DATA. If you're just starting to type in a program, pick this. Press the E key, and the program asks for the address where you want to begin entering data. Type the first number in the first line of the program listing if you're just starting, or the line number where you left off if you've already typed in part of a program. Hit the RETURN key and begin entering the data.

Once you're in Enter mode, Apple MLX prints the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight bytes and a checksum. When you enter a line and hit RETURN, Apple MLX recalculates the checksum from the eight bytes and the address. If you enter more or less than nine numbers, or the checksum doesn't exactly match, Apple MLX erases the line you just entered and prompts you again for the same line.

Apple MLX also checks to make sure you're typing in the right line. The address (the number to the left of the colon) is part of the checksum recalculation. If you accidentally skip a line and try to enter incorrect values, Apple MLX won't let you continue. Just make sure you enter the correct starting address; if you don't, you won't be able to enter any of the following lines. Apple MLX will stop you.

Editing Features

Apple MLX also includes some editing features. The left- and right-arrow keys allow you to back up and go forward on the line that you are entering, so you can retype data. Pressing the CONTROL (CTRL) and D keys at the same time (*delete*) removes the character under the

cursor, shortening the line by one character. Pressing CTRL-I (*insert*) puts a space under the cursor and shifts the rest of the line to the right, making the line one character longer. If the cursor is at the right end of the line, neither CTRL-D nor CTRL-I has any effect.

When you've entered the entire listing (up to the ending address that you specified earlier), Apple MLX automatically leaves Enter mode and redisplay the functions menu. If you want to leave Enter mode before then, press the RETURN key when Apple MLX prompts you with a new line address. (For instance, you may want to leave Enter mode to enter a program listing in more than one sitting; see below.)

Display Data

The second menu choice, (D)ISPLAY DATA, examines memory and shows the contents in the same format as the program listing. You can use it to check your work or to see how far you've gotten. When you press D, Apple MLX asks you for a starting address. Type in the address of the first line you want to see and hit RETURN. Apple MLX displays program lines until you press any key or until it reaches the end of the program.

Save And Load

Two more menu selections let you save programs on disk and load them back into the computer. These are (S)AVE FILE and (L)OAD FILE. When you press S or L, Apple MLX asks you for the filename. The first time you save an ML program, the name you assign will be the program's filename on the disk. If you press L and specify a filename that doesn't exist on the disk, you'll see a disk error message.

If you're not sure why a disk error has occurred, check the drive. Make sure there's a formatted disk in the drive and that it was formatted by the same operating system you're using for Apple MLX (ProDOS or DOS 3.3). If you're trying to save a file and see an error message, the disk might be full. Either save the file on another disk or quit Apple MLX (by pressing the Q key), delete an old file or two, then run Apple MLX again. Your typing should still be safe in memory.

Apple MLX: Machine Language Entry Program

For instructions on entering this program, please refer to "COMPUTE!'s Guide to Typing in Programs" elsewhere in this issue.

```

88 100 N = 9: HOME : NORMAL : PR
INT "APPLE MLX": POKE 34,
2: ONERR GOTO 610
CC 110 VTAB 1: HTAB 20: PRINT "S
TART ADDRESS": GOSUB 530
: IF A = 0 THEN PRINT CHR
$ (7): GOTO 110
8C 120 S = A

```

```

E3 130 VTAB 2: HTAB 20: PRINT "E
ND ADDRESS "": GOSUB 530
: IF S >= A OR A = 0 THE
N PRINT CHR$ (7): GOTO 13
0
20 140 E = A
85 150 PRINT : PRINT "CHOOSE: (E)
NTER DATA": HTAB 22: PRI
NT "(D)ISPLAY DATA": HTAB
B: PRINT "(L)OAD FILE (
S)AVE FILE (Q)UIT": PRIN
T
AE 160 GET A$: FOR I = 1 TO 5: I
F A$ < > MID$ ("EDLSQ", I,
1) THEN NEXT : GOTO 160
93 170 ON I GOTO 270,220,180,200
: POKE 34,0: END
AF 180 INPUT "FILENAME: ";A$: IF
A$ < > "" THEN PRINT CHR
$ (4);"BLOAD";A$;"A";S
AI 190 GOTO 150
38 200 INPUT "FILENAME: ";A$: IF
A$ < > "" THEN PRINT CHR
$ (4);"BSAVE";A$;"A";S;"
,L";(E - S) + 1
92 210 GOTO 150
C2 220 GOSUB 590: IF B = 0 THEN
150
9E 230 FOR B = B TO E STEP 8:L =
4:A = B: GOSUB 580: PRIN
T A$;" "":L = 2
85 240 FOR F = 0 TO 7:V(F + 1) =
PEEK (B + F): NEXT : GOS
UB 560:V(9) = C
F2 250 FOR F = 1 TO N:A = V(F):
GOSUB 580: PRINT A$;" "":
NEXT : PRINT : IF PEEK (4
9152) < 128 THEN NEXT
94 260 POKE 49168,0: GOTO 150
CC 270 GOSUB 590: IF B = 0 THEN
150
48 280 FOR B = B TO E STEP 8
A6 290 HTAB 1:A = B:L = 4: GOSUB
580: PRINT A$;" "": CAL
L 64668:A$ = "":P = 0: GOS
UB 330: IF L = 0 THEN 15
0
F9 300 GOSUB 470: IF F < > N THE
N PRINT CHR$ (7): GOTO 2
90
27 310 IF N = 9 THEN GOSUB 560:
IF C < > V(9) THEN PRINT
CHR$ (7): GOTO 290
72 320 FOR F = 1 TO 8: POKE B +
F - 1,V(F): NEXT : PRINT
: NEXT : GOTO 150
8E 330 IF LEN (A$) = 33 THEN A$
= 0:P = 0: PRINT CHR$ (7
);
22 340 L = LEN (A$):O$ = A$:O =
P:L$ = "": IF P > 0 THEN
L$ = LEFT$ (A$,P)
E0 350 R$ = "": IF P < L - 1 THE
N R$ = RIGHT$ (A$,L - P -
1)
55 360 HTAB 7: PRINT L$; FLASH
: IF P < L THEN PRINT MID
$ (A$,P + 1,1): NORMAL :
PRINT R$;
7B 370 PRINT " "": NORMAL
E6 380 K = PEEK (49152): IF K <
128 THEN 380
C1 390 POKE 49168,0:K = K - 128
5B 400 IF K = 13 THEN HTAB 7: PR
INT A$;" "": RETURN
8A 410 IF K = 32 OR K > 47 AND K
< 58 OR K > 64 AND K < 7
1 THEN A$ = L$ + CHR$ (K)
+ R$:P = P + 1
C1 420 IF K = 4 THEN A$ = L$ + R
$
5F 430 IF K = 9 THEN A$ = L$ + "
" + MID$ (A$,P + 1,1) +
R$
8A 440 IF K = 8 THEN P = P - (P
> 0)

```

```

93 450 IF K = 21 THEN P = P + (P
< L)
9D 460 GOTO 330
37 470 F = 1:D = 0: FOR P = 1 TO
LEN (A$):C$ = MID$ (A$,P
,1): IF F > N AND C$ < >
" " THEN RETURN
8B 480 IF C$ < > " " THEN GOSUB
520:V(F) = J + 16 * (D =
1) * V(F):D = D + 1
5F 490 IF D > 0 AND C$ = " " OR
D = 2 THEN D = 0:F = F +
1
88 500 NEXT : IF D = 0 THEN F =
F - 1
17 510 RETURN
85 520 J = ASC (C$):J = J - 48 -
7 * (J > 64): RETURN
AB 530 A = 0: INPUT A$:A$ = LEFT
$ (A$,4): IF LEN (A$) = 0
THEN RETURN
6F 540 FOR P = 1 TO LEN (A$):C$
= MID$ (A$,P,1): IF C$ <
"0" OR C$ > "9" AND C$ <
"A" OR C$ > "Z" THEN A =
0: RETURN
2D 550 GOSUB 520:A = A * 16 + J:
NEXT : RETURN
28 560 C = INT (B / 256):C = B -
254 * C - 255 * (C > 127
):C = C - 255 * (C > 255)
28 570 FOR F = 1 TO 8:C = C * 2
- 255 * (C > 127) + V(F):
C = C - 255 * (C > 255):
NEXT : RETURN
DA 580 I = FRE (0):A$ = "": FOR
I = 1 TO L:T = INT (A / 1
6):A$ = MID$ ("0123456789
ABCDEF",A - 16 * T + 1,1)
+ A$:A = T: NEXT : RETUR
N
IF 590 PRINT "FROM ADDRESS "": G
OSUB 530: IF S > A OR E <
A OR A = 0 THEN B = 0: R
ETURN
8D 600 B = S + 8 * INT ((A - S)
/ 8): RETURN
86 610 PRINT "DISK ERROR": GOTO
150

```

All the programs in this issue are available on the ready-to-load COMPUTE! Disk. To order a one-year (four-disk) subscription, call toll free **800-247-5470** (in IA 800-532-1272). Please specify which computer you are using.

Classified

SOFTWARE

COMMODORE: TRY BEFORE YOU BUY. Best selling games, utilities, educational, + classics and new releases. 100's of titles. Visa/MC. Free brochure. RENT-A-DISC, Frederick Bldg. #345, Hunt'n, WV 25701 (304) 529-3232

FREE APPLE SOFTWARE

Over 1000 Public Domain Programs on 50 diskettes. \$5 each plus \$1 for shipping per order. Send \$1 for catalog, refundable with order.

C&H ENTERPRISES

PO Box 29243, Memphis, TN 38127

TI-99/4A QUALITY SOFTWARE for Business, Home and Entertainment ** Bonus Software Offer! ** Send for FREE catalog to MICRO-BIZ HAWAII, BOX 1108, PEARL CITY, HI 96782

TI-99/4A Software/Hardware bargains. Hard-to-find items. Huge selection. Fast service. Free catalog. D.E.C., Box 690, Hicksville, NY 11801

DISCOUNT SOFTWARE for most computers. FREE CATALOG. Sale: 5.25" DSDD Disks 25 for \$13.95 ppd. WMJ DATA SYSTEMS-C, 4 Butterfly Dr., Hauppauge, NY 11788

Cheap Software/IBM,PCjr, Compatibles. 5.25 or 3.5 disk. For catalog of diskettes available for education, games, business, etc., write: Morning Star Industry, P.O. Box 3095, Ann Arbor, MI 48106

FREE! PUBLIC DOMAIN SOFTWARE! MS-DOS, IBM & Compatibles - Save \$\$\$ @ \$3.50 per disk! Free flyer: AP-JP, Inc, PO Box 1155, W. Babylon, NY 11704

FREE SOFTWARE for C64, C128, IBM & CPM send SASE for info (specify computer) to: PUBLIC DOMAIN USERS GROUP PO Box 1442-A1, Orange Park, FL 32067

MILLION \$ LOTTO BUSTER PROGRAM GUARANTEED. SCIENTIFIC. HITS MILLIONS. AUTHOR HITS WEEKLY. NOT A R/N GEN. Z-WAY, PO BOX 9017, CANTON, OH 44711



\$\$ WIN \$\$
with our
SPORTS
Handicapping
Software



THOROUGHbred/HARNESS Handicapping. \$29.95, enhanced. \$49.95. GREYHOUND Handicapping. \$29.95, enhanced. \$49.95. PRO FOOTBALL Handicapping System. \$39.95. Specify disk/tape: Apple II+ce, Atari, IBM PC, COM 64/128, TI, TRS-80 Mod 3/4, Mod 100/200, Color. Add \$2 post/handl. MC/VISA/CODs accepted. Free information. SOFTWARE EXCHANGE, Box 5382 CP, W. Bloomfield, MI 48033. Orders: 1-800-527-9467

T.I.99/4A OWNERS
1-800-USA-994A

Tech Help Catalogs
Newsletters

IN FLORIDA 305-962-8846

IBM PUBLIC DOMAIN SOFTWARE \$3 PER DISK.

Send for free list. We have dbases/games/spreadsheets/finance/educational/and more. For home or business. Disks are new DSDD. JDY/C PO Box 1561, Corona, CA 91718

HEY AMIGOI! PD software for AMIGAI

Games, Graphics, Utilities & More! Over 70 Disks available, only \$5.95 ea! SASE for Cat. AMYWARE, POB 19474, Jacksonville, FL 32245

APPLE PUBLIC DOMAIN SOFTWARE (almost free) Send \$2 for sample disk and catalog. Refundable with order. Disks cost \$2.50 and less. CALOKE IND., Box 18477, KC, MO 64133

HARDWARE

IBM-APPLE
Compatibility Card

Now run Apple programs on all MS-DOS systems including IBM, clones and Tandy systems

Free Brochure

1-800-872-9942 In Fla: 305-962-8846

MISCELLANEOUS

SAFWARE INSURES COMPUTERS against fire, theft, & power surges for as little as \$39. Call Safaware, The Insurance Agency Inc. at 800/848-3469, Columbus, Ohio.

EARN MONEY WITH YOUR HOME COMPUTER! Work your own hours at home. Send for details. Northeastern, 234-I N. 16th St., Bloomfield, NJ 07003

BUY-SELL-SWAP New/Used PC Hardware and Software. Send Stamped Self-Addressed Envelope For Sample National Listing to: Off-Site, 303 Cedarville Rd., Pottstown, PA 19464

Back issues of *COMPUTE!*, *COMPUTE!'s Gazette*, or any magazine disks can be ordered by calling **800-346-6767** (in NY 212-887-8525). Some issues may no longer be available.

USE YOUR COMPUTER TO PLAY LOTTO!

Increase your chances at winning big! LOTTO-LUCK is a computer program, designed by a computer scientist using the latest techniques of Geometrical, Kabalism and Random Relationships of numbers to give you an opportunity to predict possible winning PICK/6 lotto numbers. LOTTO-LUCK will work on any lottery, in any state or country. No need for expensive updates. LOTTO-LUCK will work this year, next year and virtually forever. Runs on IBM PC, Commodore 64 and Apple II w/disk. Send \$29.95 plus \$3 S/H to:

WIN\$WARE SYSTEMS
P.O. Box 8130, 2710 X St., Suite 1
Sacramento, CA 95818
(916) 457-5535

COMPUTE! Classified is a low-cost way to tell over 350,000 microcomputer owners about your product or service.

Rates: \$25 per line, minimum of four lines. Any or all of the first line set in capital letters at no charge. Add \$15 per line for boldface words, or \$50 for the entire ad set in boldface (any number of lines.) Inquire about display rates.

Terms: Prepayment is required. Check, money order, American Express, Visa, or MasterCard is accepted. Make checks payable to COMPUTE! Publications.

Form: Ads are subject to publisher's approval and must be either typed or legibly printed. One line equals 40 letters and spaces between words. Please underline words to be set in boldface.

General Information: Advertisers using post office box numbers in their ads must supply permanent address and telephone numbers. Ad will appear in next available issue after receipt.

Closing: 10th of the third month preceding cover date (e.g., June issue closes March 10th). Send order and remittance to: Harry Blair, Classified Manager, COMPUTE!, P.O. Box 5406, Greensboro, NC 27403. To place an ad by phone, call Harry Blair at (919) 275-9809.

Notice: COMPUTE! Publications cannot be responsible for offers or claims of advertisers, but will attempt to screen out misleading or questionable copy.

Advertisers Index

Reader Service Number/Advertiser	Page	Reader Service Number/Advertiser	Page
102 Abacus	31	118 PC-SIG	104
103 Abby's Discount Software	113	119 Precision Data Products	132
104 Acorn of Indiana	116	120 Precision Images, Inc.	116
105 Air Force	1	121 Prof Jones	97
106 Aprotex	99	122 Silicon Express	45
107 Banana Software	116	123 Software Discounters of America	115
108 CompuServe	IBC	124 Spinnaker Software Corp.	2
109 Comp-u-store OnLine	9	125 ST Station	119
110 ComputAbility	110-111	126 Video Technology Computers, Inc.	BC
111 Computer Direct	38-39	127 WIN\$WARE Systems	131
112 Computer Mail Order	18-19		
113 Covox, Inc.	97		
114 Dresselhaus	66		
115 Electronic One	117		
GE Information Services	5		
Halix Institute	108		
116 Heuristic Research, Inc.	108		
117 Lyco Computer	48-51		
Mindscape, Inc.	IFC		
NRI Schools	59		

Classified Ads	131
COMPUTE! Books' Amiga Collection	25
COMPUTE! Books' Flight Simulator Books	41
COMPUTE! Books for Commodore 64 and 128	23
COMPUTE! Books' Quick & Easy Books Selections	33
COMPUTE!'s PC Magazine and Contest Announcement	12-13

pd
Precision Data Products™
 Complete Line of Quality Supplies for Your Computer

Precision Data Products™
POLY PACK 5¼" DISKETTES
 (From Leading Mfr.)

- Blank Jackets
- WP Tabs
- Envelopes
- Made in USA

100% Error Free
 Lifetime Warranty

36¢ Each
 Sold in Lots of 100 Only

SALE!

SONY POLY PACK 3.5" DISKETTES

SS 135TPI \$1.10 Each
 DS 135TPI \$1.23 Each
 Sold in lots of 50 only.

PERSONAL COMPUTER TOOL KIT

vinyl zipper case.
 Includes 10 tools and spare parts container.

Just \$19.95 plus \$2.00 S&H

Discounts on Larger Quantities

Min. Order \$25.00. S&H: Continental USA \$4.00/100 or fewer disks. Reduced shipping charge on larger quantities. Foreign orders, APO/FPO, please call.
 MI residents add 4% tax. Prices subject to change without notice. Hours: 8:30 AM - 7:00 PM ET.

Precision Data Products™
 P.O. Box 8367, Grand Rapids, MI 49518
 Customer Service & Information:
 (616) 452-3457
 Toll-Free Order Lines:
 MI 1-800-632-2468/Outside MI 1-800-258-0028

Save Your Copies of COMPUTE!



Protect your back issues of *COMPUTE!* in durable binders or library cases. Each binder or case is custom-made in flag-blue binding with embossed white lettering. Each holds a year of *COMPUTE!*. Order several and keep your issues of *COMPUTE!* neatly organized for quick reference. (These binders make great gifts, too!)

Cases:	Binders	(Please add \$2.50 per unit for orders outside the U.S.)
\$7.95 each;	\$9.95 each;	
3 for \$21.95;	3 for \$27.95;	
6 for \$39.95	6 for \$52.95	

Send in your prepaid order with the attached coupon

Mail to: Jesse Jones Industries, P.O. Box 5120,
 Dept. Code COTE, Philadelphia, PA 19141

Please send me _____ *COMPUTE!* cases binders.
 Enclosed is my check or money order for \$ _____. (U.S. funds only.)

Name _____
 Address _____
 City _____
 State _____ Zip _____

Satisfaction guaranteed or money refunded.
 Please allow 4-6 weeks for delivery.

PRICE BUSTER RENEWAL SAVINGS OFFER

As a current COMPUTE! subscriber you're now entitled to big renewal savings of up to 50%. Don't miss these price buster savings. Return this card today, or call us at 1-800-247-5470.

SAY YES NOW TO SAVINGS			YOU SAVE
How Long?	Newsstand Price	Your Renewal Savings Rate	
2 Years	\$72.00	\$36.00	50%
1 Year	36.00	19.95	44%

Check one: 1 Year 2 Years

Name _____ (please print)

Address _____ Apt. _____

City _____ State _____ Zip _____

My payment is enclosed (use separate envelope) Please bill me

RATES GOOD IN U.S. ONLY AND ARE SUBJECT TO CHANGE.
FOR DELIVERY OUTSIDE THE U.S. ADD \$6 (U.S. CURRENCY).



J77113

*off the single copy price.



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS

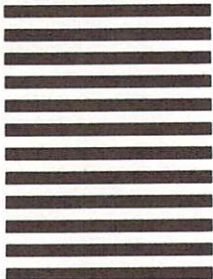
PERMIT NO. 7478

DES MOINES, IA

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE!

P.O. Box 10955
Des Moines, IA 50347-0955



COMPUTE!'s FREE Reader Information Service

Use these cards to request FREE information about the products advertised in this issue. Clearly print or type your full name and address. Only one card should be used per person. Circle the numbers that correspond to the key number appearing in the advertisers index.

Send in the card and the advertisers will receive your inquiry. Although every effort is made to insure that only advertisers wishing to provide product information have reader service numbers, COMPUTE! cannot be responsible if advertisers do not provide literature to readers.

Please use these cards *only* for subscribing or for requesting product information. Editorial and customer service inquiries should be addressed to: COMPUTE!, P.O. Box 5406, Greensboro, NC 27403. Check the expiration date on the card to insure proper handling.

Use these cards and this address only for COMPUTE!'s Reader Information Service. Do not send with payment in any form.

COMPUTE!

101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117
118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134
135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151
152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168
169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185
186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202
203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219
220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236
237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253

Circle 101 for a one year new U.S. subscription to COMPUTE!: you will be billed for \$24.

Please let us know. Do you own:

- | | |
|---|---------------------------------------|
| <input type="checkbox"/> Apple _____
270 | <input type="checkbox"/> _____
271 |
| <input type="checkbox"/> Atari _____
272 | <input type="checkbox"/> _____
273 |
| <input type="checkbox"/> Commodore _____
274 | <input type="checkbox"/> _____
275 |
| <input type="checkbox"/> IBM _____
276 | <input type="checkbox"/> _____
277 |
| <input type="checkbox"/> TI-99/4A _____
278 | <input type="checkbox"/> _____
279 |
| <input type="checkbox"/> Other _____
280 | <input type="checkbox"/> _____
281 |
- (specify model)

Please print or type name and address.
Limit one card per person.

Name _____
Address _____
City _____
State/Province _____ Zip _____
Country _____
Phone _____

Please include ZIP Code

Expiration Date 9/30/87

CO787

SUBSCRIBE TO COMPUTE!

- \$24.00 One Year US Subscription
 \$45.00 Two Year US Subscription

For Fastest Service,
Call Our **Toll-Free**
US Order Line
800-247-5470

Name _____

Address _____

City _____ State _____ Zip _____

Payment Enclosed Bill me

Charge my: VISA MasterCard American Express

Account No. _____ Expires _____ / _____

Your subscription will begin with the next available issue. Please allow 4-6 weeks for delivery of first issue. Subscription prices subject to change at any time. Outside the U.S.A. please add \$6 for each subscription.

J7749

Place
Stamp
Here

COMPUTE! Reader Service

P.O. Box 2141
Radnor, PA 19089



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS

PERMIT NO. 7478

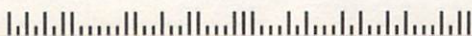
DES MOINES, IA

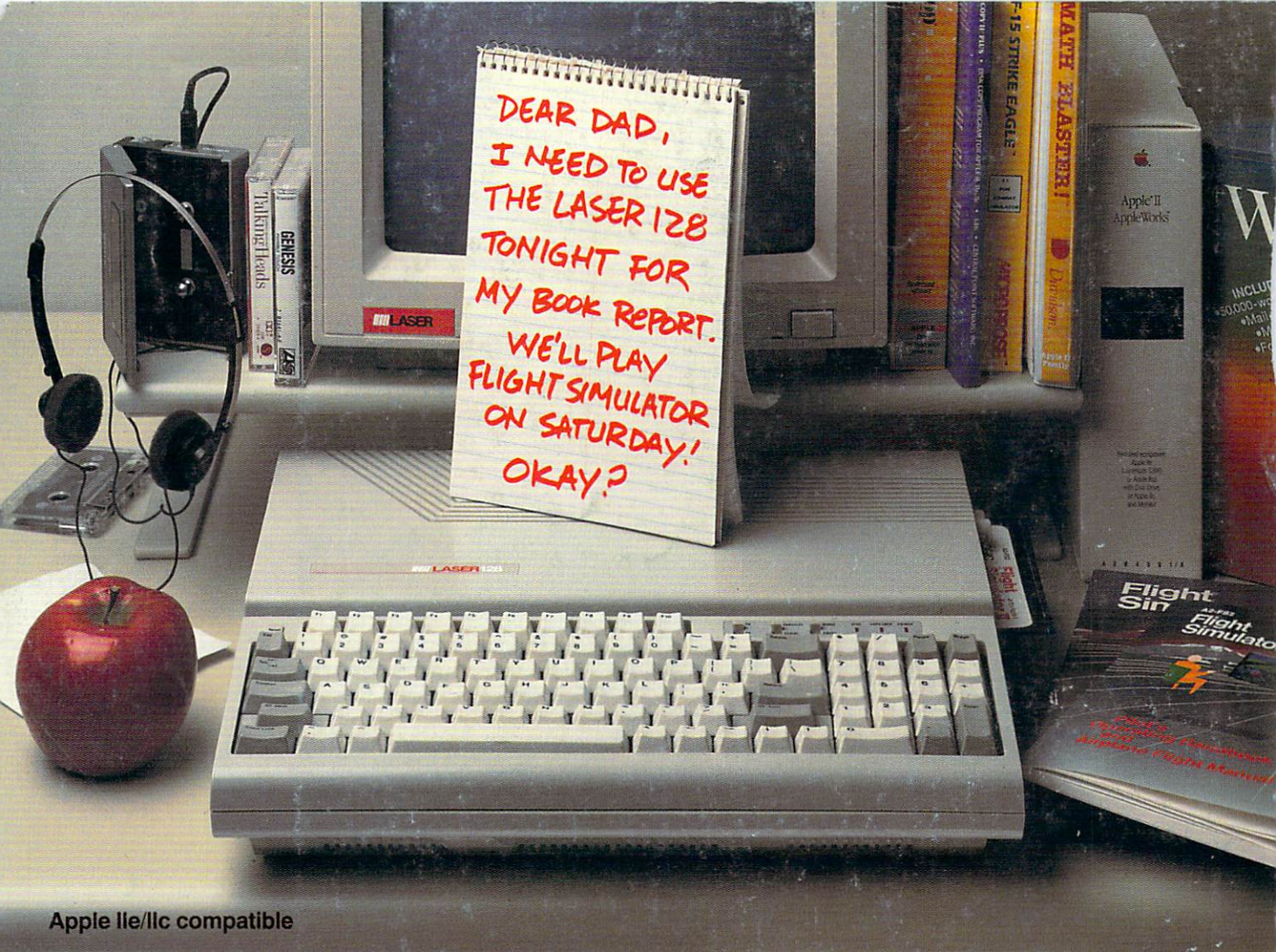
POSTAGE WILL BE PAID BY ADDRESSEE



COMPUTE!

P.O. Box 10955
Des Moines, IA 50347-0955





Apple IIe/IIc compatible

Now your kids can afford to do their homework

More and more students are learning with computers. However most parents haven't been able to work a computer into their budget. The Laser 128 Apple-compatible computer will let you do all those things that you and your family want to or have to do – homework, write reports, even play games for a fraction of the cost of an Apple. With a Laser you can work out your budget on a computer, instead of breaking it with one. The Laser lets you take advantage of the largest software library available, so your child can learn more at home with the same programs they learn on in school. And, you can do your work at home on the Laser, too.

The Laser 128 with all its features: built-in disk drive; 128K RAM (expandable to 1 megabyte); serial, parallel, modem and mouse interfaces; 80 column text mode; numeric keypad; and an expansion slot; makes for a pretty educated buy. When you do your homework on which computer to buy, you'll find the Laser 128 at the head of the class with value. For more information on the Laser 128 and the name of your nearest dealer, contact Video Technology Computers, Inc., 400 Anthony Trail, Northbrook, IL 60062, or call (312) 272-6760.

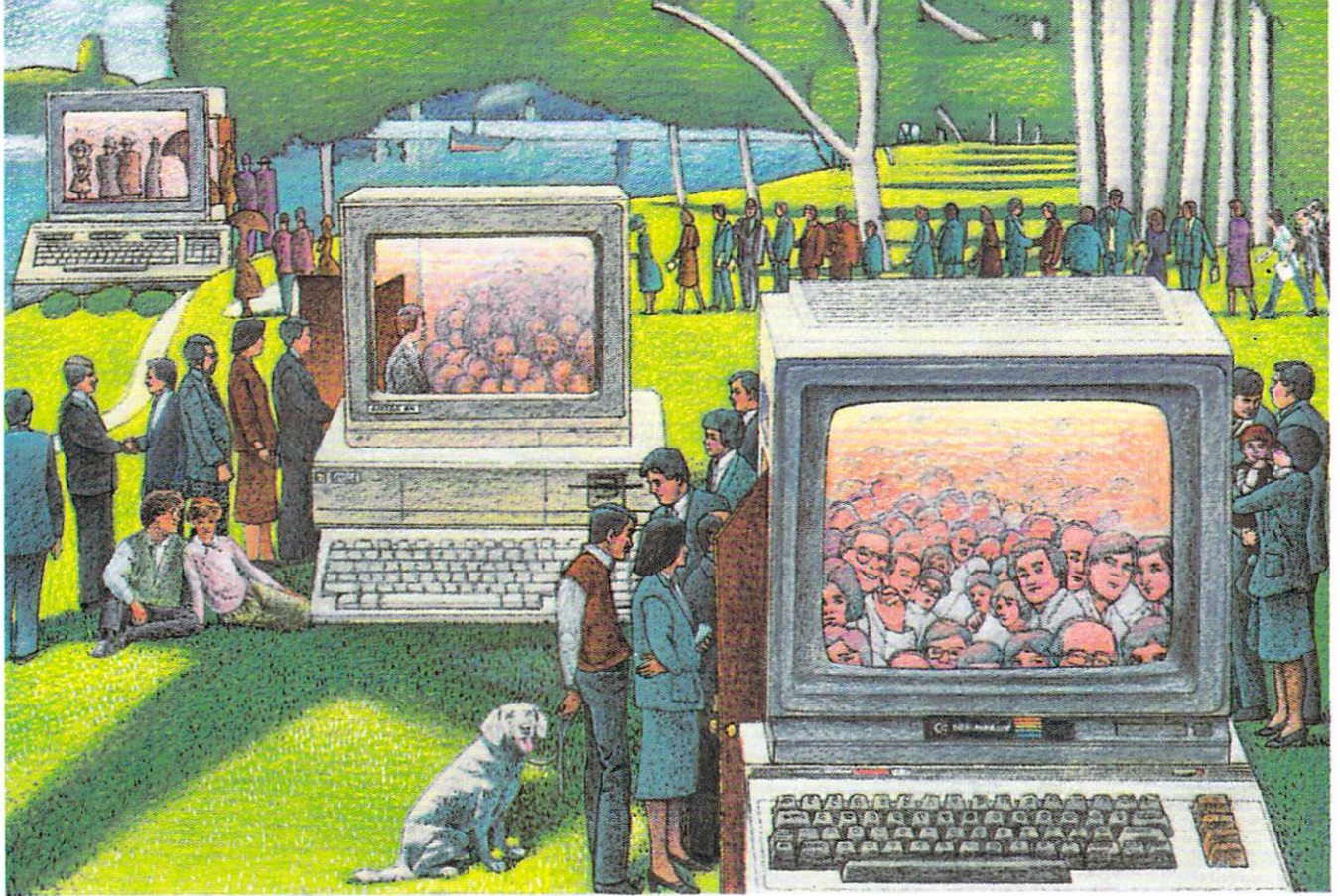


Apple, Apple IIe and Apple IIc are registered trademarks of Apple Computer, Inc.

LASER 128

Manufactured by
VIDEO TECHNOLOGY COMPUTERS, INC.

MAKING COMPUTERS AFFORDABLE



USE THE BRAINS YOUR IBM WASN'T BORN WITH.

Right at your fingertips in CompuServe's IBM® Forums.

Our IBM Forums involve thousands of users worldwide who will show you just how easy it is to get the most from your IBM and IBM compatibles.

The IBM New Users Forum lets you ask basic questions of PC experts. The IBM Junior Forum is perfect for PCjr® users. Trade tips with other IBM PC and AT users in the IBM Software Forum. Ask questions and get answers directly from the manufacturers in the PC Vendor Support Forum. And if you're looking for a PC Bulletin Board, visit the IBM Communications Forum. Or try the IBM Hardware Forum for discussions on hardware topics and product updates.

Easy access to free software, including free uploads.

You can easily download first-rate,

non-commercial software and utility programs. Upload your own programs free of connect time charges. And take advantage of CompuServe's inexpensive weeknight and weekend rates, when forums are most active and standard online charges are just 10¢ a minute. You can go online in most areas with a local phone call. Plus, you'll receive a \$25.00 Introductory Usage Credit when you purchase your CompuServe Subscription Kit.

Information you just can't find anywhere else.

Use the Forum Message Board to send and receive electronic messages. Join ongoing, real-time discussions in a Forum Conference. Communicate with industry experts, including the programmers who write your favorite programs. Search Forum Data Libraries for non-commercial software and shareware.

Enjoy other useful services too, like electronic editions of popular computer magazines.

All you need is your IBM computer or IBM compatible computer (or almost any other personal computer) and a modem.

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

CompuServe®

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

800-848-8199

In Ohio, call 614-457-0802

An H&R Block Company