

WIN
A Dream
Computer System!!
See page 69.

Exclusive Interview With Apple's John Sculley

COMPUTE!

\$3.00
December
1987
Issue 91
Vol. 9, No. 12
\$4.25 Canada
02193
ISSN 0194-357X

The Leading Magazine Of Home, Educational, And Recreational Computing

IBM's Newest Entry

All about the Personal System/2

Leaping Larry

An exciting arcade-style game for the Commodore 64, Apple II series, and Atari

In-House Expert

Disk-based professional advice for the home

SuperCount

Lightning fast word counter for 64 and 128

Atari Persistent Ramdisk

Survive any catastrophe short of a power loss

Mystery Mania

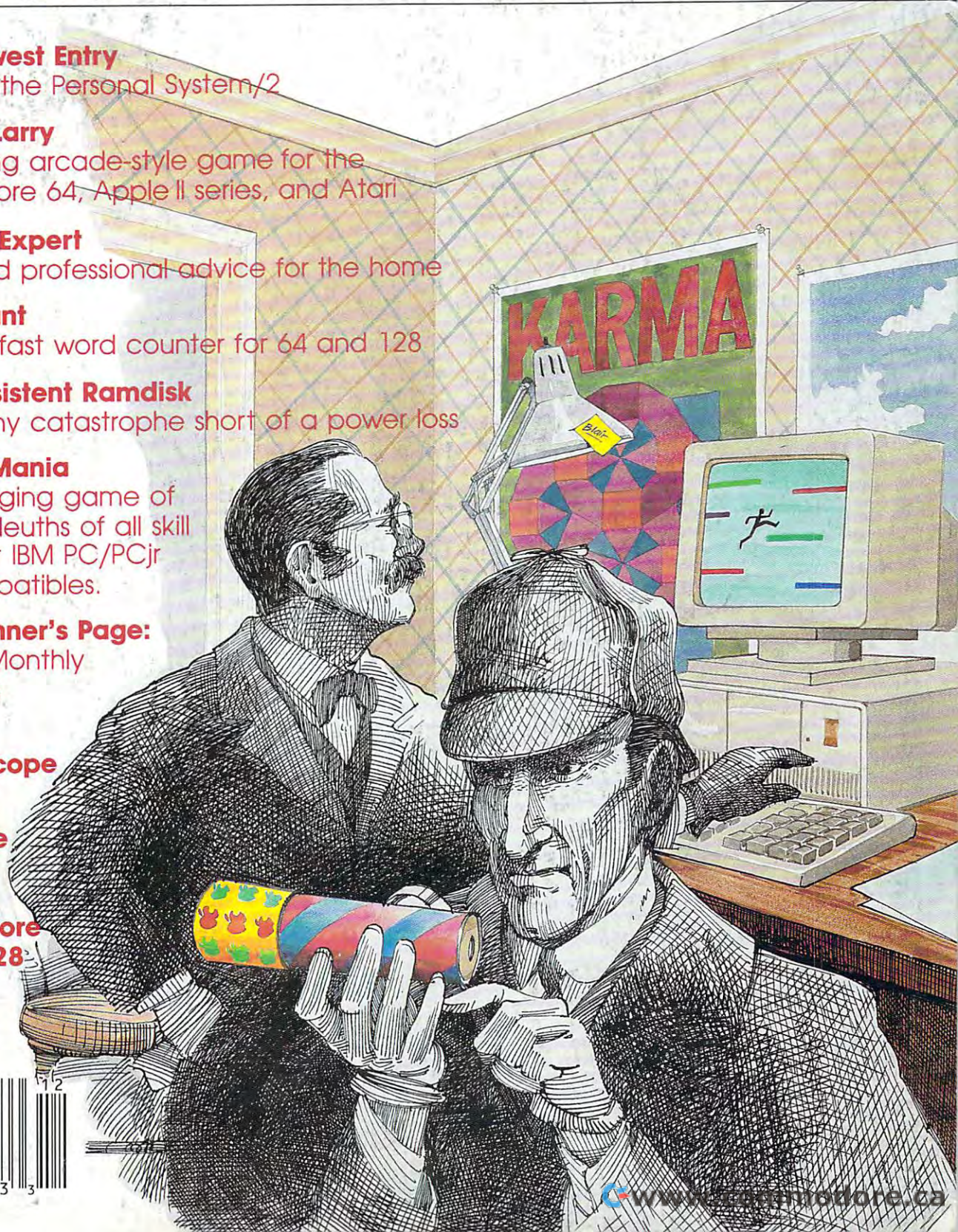
A challenging game of logic for sleuths of all skill levels. For IBM PC/PCjr and compatibles.

The Beginner's Page:

Figuring Monthly Payments

Apple Kaleidoscope

Machine Language Routines For The Commodore 64 And 128



From Origin comes the long-awaited sequel
to the award-winning
Ultima™ III

Ultima IV

Quest of the Avatar

Available on Apple®

A state-of-the-art fantasy role-playing game of unprecedented magnitude by Lord British™.

Prepare yourself for a grand adventure: Ultima™ IV, sixteen times larger than Ultima III, is a milestone in computer gaming—one that challenges your physical and mental skills while testing the true fabric of your character.

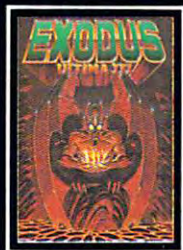
Enter Britannia, kingdom of Lord British. Journey through terrain of infinite proportions, conversing with characters on hundreds of topics. Unravel the mysteries of a superior magic system. At each turn beware of daemons, dragons and long-dead wizards haunting the most tranquil of places. Encounters with parties of mixed enemy types test your strategic abilities. Shrewd use of terrain can lead to victory against seemingly impossible odds.

Survive this multi-quest fantasy, then begin the final conflict, your quest of the Avatar. The ultimate challenge—the self—awaits...

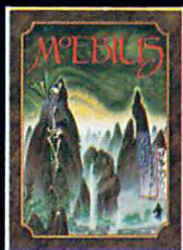


ORIGIN
SYSTEMS INC.

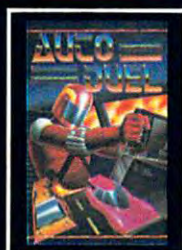
136 HARVEY ROAD, LONDONDERRY, NH 03053 (603) 644-3360



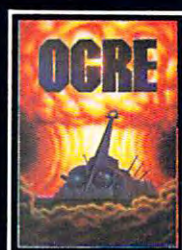
ULTIMA™ III sends you on an incredible fantasy role-playing journey through monster-plagued Sosaria in search of the elusive Exodus.



MOEBIUS™ takes you through the elemental planes of a colorful Oriental world of fantasy and adventure in search of the Orb of Celestial Harmony.



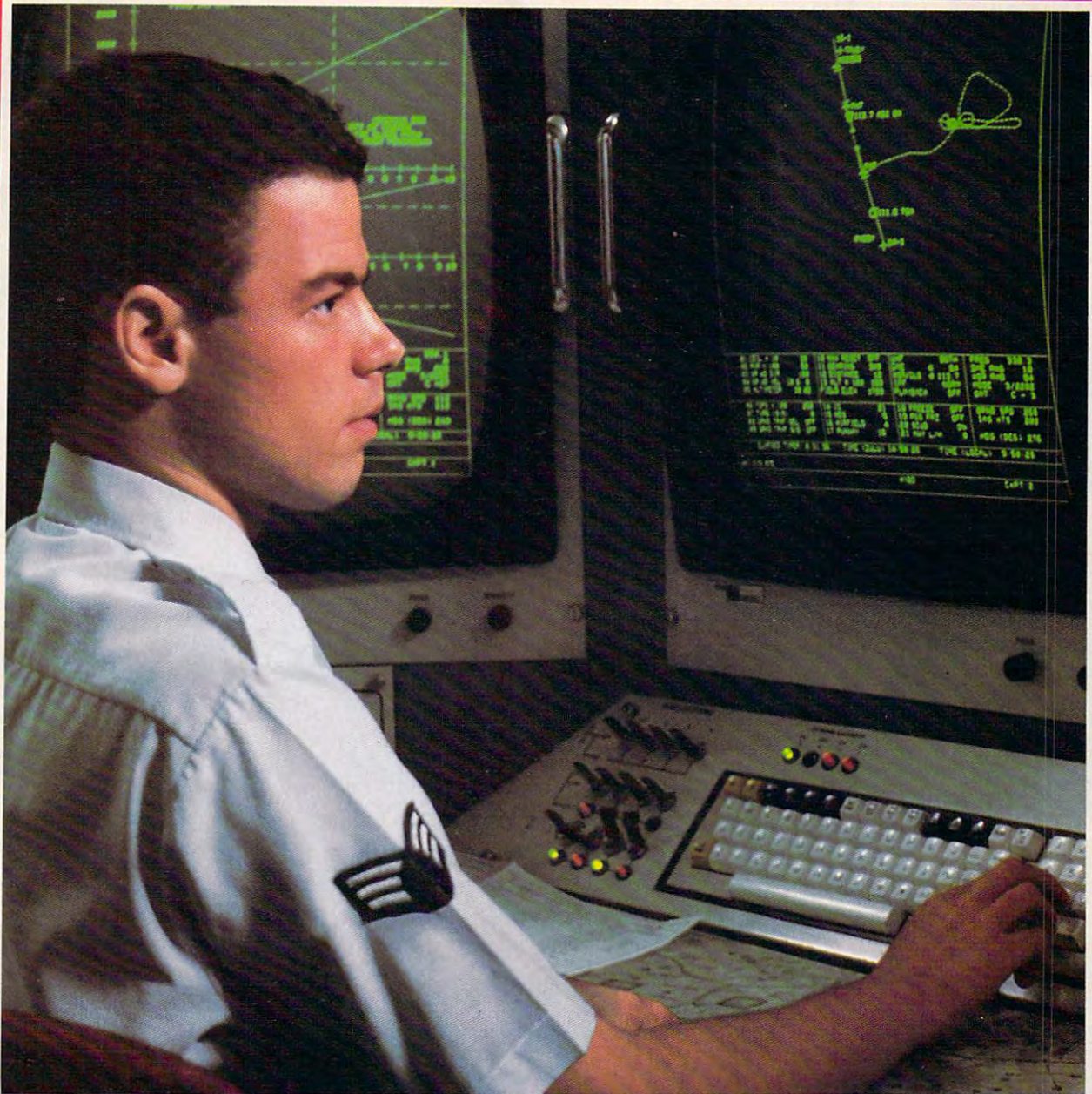
AUTODUEL™ is a futuristic, fast-paced strategy role-playing game where the right of way goes to the biggest guns.



OGRE™ is a strategy game fought on the nuclear battlefield of tomorrow as an inhuman juggernaut Cyber-tank battles conventional forces.

Ultima and Lord British are trademarks of Richard Garriott/Moebius is a trademark of Greg Malone/AutoDuel and Ogre are trademarks of Steve Jackson/Apple is a trademark of Apple Computer Inc./Previous Ultimas are not needed to enjoy Ultima IV **Authors wanted. Call us today.**

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.

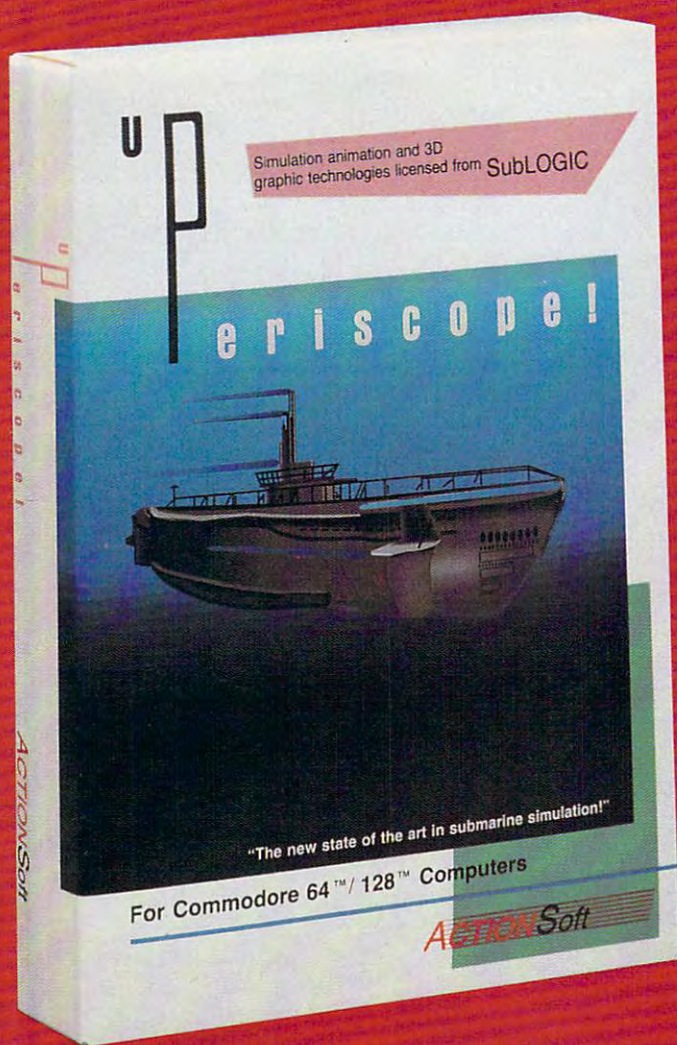
If you attend college, we'll pick up 75% of your tuition. You can even earn an associate degree from the Community College of the Air Force.

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.

WE'VE BLOWN THE COMPETITION



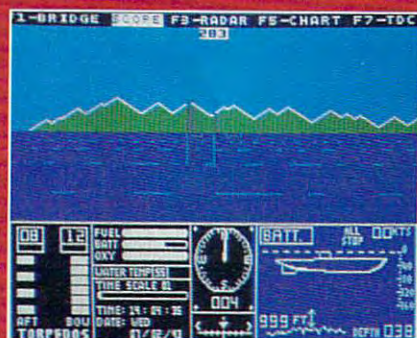
Up Periscope!, the new state of the art in submarine simulation! Blowing the competition out of the water with superior combat strategy and tactics courtesy of Captain John Patten, USN (Ret.). With true animated 3D graphics courtesy of SubLOGIC. Up Periscope!, generations ahead of the pack!

**-\$29.95-
Better Engineering at a Better
Price**

Compare hits for yourself!

Feature (IBM versions)	Up Periscope!	Silent Service	GATO	Sub Battle
Suggested Retail Price	\$29.95	\$34.95	\$39.95	\$39.95
Real 3-D Graphics	Yes	No	No	No
Split-Screen Views	Yes	No	No	No
Torpedo Data Computer	Authentic WWII TDC display	5-line text display only	No	2-line text display only
Size of "World"	All U.S. operating areas in Atlantic and Pacific, fully detailed.	Section of Pacific, not all of Japan!	Tiny, imaginary patrol area.	Sections of Atlantic and Pacific Oceans, partial details only.
Time-Date Selection Capability	Yes	No	No	No
Zoom Feature	Map or ship view	Map view only	No	Map or Ship view
Save Feature	Yes	No	No	Yes

ION RIGHT OUT OF THE WATER!

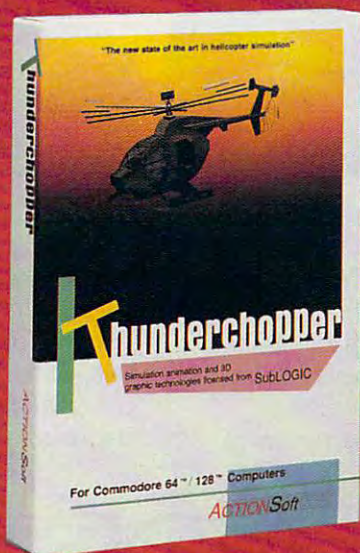


C64 Screens shown. Other computer versions may vary.



ThunderChopper

And don't forget Thunder-Chopper! For true helicopter action and realism, nothing else even comes close. Thunder-Chopper incorporates the most advanced graphics, flight systems, and game-playing factors to provide a sensational balance of strategy and fun.



See Your Dealer

Or write or call for more information. Up Periscope! and Thunder-Chopper are available on disk for the Commodore 64/128, Apple II, and IBM PC line of personal computers for the suggested retail price of \$29.95. For direct orders please specify which computer version you want. Include \$2.00 for shipping (outside U.S. \$6.25) and specify UPS or first class mail delivery. Visa, MasterCard, American Express, and Diners Club charges accepted.

© 1987 ActionSoft Corporation
 3D graphics and special effects courtesy SubLOGIC Corp.
 Commodore 64 and Commodore 128 are registered trademarks of Commodore Electronics Ltd.
 Apple is a registered trademark of Apple Computer, Inc. IBM is a registered trademark of International Business Machines Corp.
 Silent Service is a trademark of Microprose Software, Inc.
 GATO is a trademark of Spectrum Holobyte, a division of Sphera, Inc.
 Sub Battle Simulator is a trademark of Epyx, Inc.

ACTIONSoft

"GENERATIONS AHEAD IN STRATEGY ACTION SOFTWARE"

201 WEST SPRINGFIELD AVENUE SUITE 211
 CHAMPAIGN, ILL. 61820 (217) 595-6588

THE SECRET LIVES OF AN

The story you are about to read is typical. The six new titles from Accolade are not.

“My name is Arnold P. I’ve been hooked on Accolade since ‘85. Accolade gives me a rush that no other recreational software can match. Maybe it’s the superior graphics... maybe it’s the playability. Whatever... all I know is I feel like I’m actually *living* each game. These aren’t computer games. These are mind-altering experiences.

“I thought my habit was under control, but those guys at Accolade know my weaknesses. Six new titles. Six new ways to experience my wildest fantasies. I told my girlfriend Friday night was off. ‘My dog ran away... uh... and he stole all my money!’ She bought it. I bought all the new games.



“Soon all the telltale signs of an Accolade user were there. I played **4th & Inches**, Accolade’s action-packed football game. I started wearing a helmet at breakfast. I even sacked the mailman.



“I booted up **Mini-Putt**, the wackiest miniature golf game in the world. The next morning I found myself in golf knickers on the subway. We hit a tunnel and I panicked. I thought I had putted us into Hell’s Windmill!



“**Pinball Wizard** turned my computer into a virtual pinball parlor. Not only could I play a bunch of killer pinball games, but I could create them as well. I started answering the phone as ‘The Prince Of Pinball.’ I bought a cape. I couldn’t go

to the laundromat ‘cause I’d shoved all my quarters in the disk drive.



“**Apollo 18** put me in the space-suit of an astronaut in a realistic depiction of an actual Apollo moon mission. My neighbor called the cops when I started picking up rocks in his front yard, then stuck a flag in his lawn and claimed his birdbath ‘for all mankind.’



“**Test Drive** was no different. It put me behind the wheel of five of the world’s most exotic sports cars in a simulation that let me push each car to its limits. The next day I hit a hair-raising 68 mph in my Gremlin and it caught fire.



“Everything came to a head with **The Graphics Studio**, the powerful and easy-to-use paint program. Suddenly, a man who couldn’t draw stick figures was transformed into a Michelangelo. I began wearing a little beanie and speaking with a French accent. Some friends stopped by and caught me pasting all of my print-outs on the ceiling.

“So that’s my story. My secret lives are all out in the open. My family is trying to rehabilitate me with some other boring recreational software, but it’s useless. I still sneak down to the den in the middle of the night for a little 4th & Inches. Hey, once you’ve played Accolade, you’re addicted.”

If you know of someone like Arnold P., please feel free to contact us at Accolade. We’ll give them details on how to get an “Accolade Addict” T-shirt. Just call 1-800-423-8366. In CA 1-800-732-2212.

ACCOLADE™

20813 Stevens Creek Boulevard,
Cupertino, CA 95014.
Telephone: 408-446-5757.

ACCOLADE ADDICT.

www.commodore.ca

COMPUTE!

DECEMBER 1987
VOLUME 9
NUMBER 12
ISSUE 91

FEATURES

- 18** Out to Change the World:
A Conversation with John Sculley Keith Ferrell and Selby Bateman
- 24** In-House Experts Keith Ferrell
- 28** IBM's Newest Entry: The Personal System/2 Dennis L. Foster
- 46** Leaping Larry Michael Streeter

GUIDE TO ARTICLES AND PROGRAMS

•
•
•
AP/AT/64

REVIEWS

- 34** *Deluxe Video 1.2* for the Amiga Larry White
- 36** *The Easy Working Series* Carol S. Holzberg
- 37** *Borodino: 1812, Napoleon in Russia* James Maki
- 38** *Word Perfect* for the Amiga Neil Randall
- 44** *Chuck Yeager's Advanced Flight Trainer* Ervin Bobo

AM
AP/64/PC
AT/64
AM
PC/64

COLUMNS AND DEPARTMENTS

- 6** The Editor's Notes Keith Ferrell
- 10** Readers' Feedback The Editors and Readers of COMPUTE!
- 62** Microscope Sheldon Leemon
- 64** The World Inside the Computer: Black Boxes and Best Friends . . . Fred D'Ignazio
- 65** The Beginner's Page: Monthly Payments C. Regena
- 68** Telecomputing Today: Christmas at the Phone Company Arlan R. Levitan
- 70** INSIGHT: Atari—Crosswords and Home Computers Bill Wilkinson
- 72** AmigaView: On the Cutting Edge Sheldon Leemon
- 73** ST Outlook: BASIC File Dumper Philip I. Nelson
- 76** IBM Personal Computing: All Sass Sal Donald B. Trivette
- 77** Computers and Society:
Computer Users as Programmers—The Next Wave David D. Thornburg

•
•
•
•
•
•
AT
AM
ST
PC

THE JOURNAL

- 78** SuperCount Bert Halverson
- 80** Mystery Mania David Leithauser
- 83** Blipper Patrick Parrish
- 84** Atari Trace Norman Lin
- 86** Machine Language Routines
for the Commodore 64 and 128 Todd Heimarck and Patrick Parrish
- 93** The Elementary Amiga, Part 1 Jim Butterfield
- 95** Atari Persistent Ramdisk Robert Berry
- 97** Total Disk Menu Scott Rickman
- 101** Karma for the Amiga Todd Heimarck and Rhett Anderson
- 106** GET and PUT Graphics for Atari Bernard Cozier
- 110** Apple Kaleidoscope Danny Faught

64/128
PC/PCjr
AP
AT

64/128
AM
AT
64
AM
AT
AP

- 75** **COMPUTE!** Modifications or Corrections
to Previous Articles
- 120** **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 107
before typing in
programs.

AP Apple, GS Apple IGS, 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. 

One of the ABC Consumer Magazines, Inc.
A Capital Cities/ABC, Inc. Company
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.

We witnessed a pretty dramatic turnout recently—more than 23,000 people, all of them marching to the tune of the Apple II. The occasion for which they turned out was pretty important—the first Applefest in several years.

The gathering was held in San Francisco, in a spacious convention center filled to bursting with booths and displays showing the very latest in Apple II software, hardware, and peripherals. Best of all, the convention center was filled with *people*, all of them enthusiastic and eager to talk about their computers, their experiences, and the ways in which computing has shaped and will shape their lives.

Part of the excitement flowed from Apple itself. Despite the successful introduction of the IIGs, there had been a subtle sense, on the part of many people, that Apple's heart belonged to the Macintosh. Applefest seemed designed to put those worries to rest. From CEO John Sculley's keynote address (in which he not only reaffirmed Apple's commitment to the II line, but also happily announced an installed base in excess of 200,000 IIGs's) to the show's final moments, the Apple II was center stage—discussed, dissected, displayed—but not dismissed. The audience was predisposed to hear such corporate endorsement of its favorite computer, but that made the endorsement no less welcome.

Applefest itself is solidly reestablished. Next year, there will be two Applefests, one in Boston and one in San Francisco.

Certainly we at COMPUTE! perceive a solid future for the Apple II line. We took the opportunity at our Applefest booth to announce our newest publication, the bimonthly *Apple Applications*. This publication has appeared before in special newsstand-only issues; response to the specials was so strong that we've made it a regular part of our line-up.

During Applefest, we also had the opportunity to interview John Sculley. The result was a wide-ranging discussion that avoided many of the areas too many interviews with Sculley have dwelled upon of late, and touched upon some areas that CEOs usually don't talk

about. You'll find that interview in this issue.

For a long weekend, a portion of the computer universe revolved around the Apple II, but the rest of that universe has remained busy. Particularly the world's largest computer manufacturer, IBM. In this issue, we take a look at IBM's newest line, the Personal System/2. While it's no longer true that "wherever Big Blue goes, the rest of computers follow," IBM does exert a large and ongoing effect on microcomputers.

One thing we did note at Applefest was an increased awareness that differences among computers and operating systems matter less and less. Successful software on one system tends to be ported to other systems. Several companies at Applefest were showing add-on boards that allow Apple IIs to run MS-DOS software. Several IBM compatibles and peripherals manufacturers are marketing boards that let clones run Apple software. Business networks are increasingly open to intercommunication among many types of computers.

The Apple II owners at the show were, naturally, partisan toward the computer of their choice, but then so are the PC owners we've talked with elsewhere, and the ferociously loyal Commodore owners, and the Amiga, ST, and Macintosh users. It's natural that computer owners identify with their particular model, especially in this brand-specific society.

But there's also an awareness expressed by most of the people we speak with that they are part of something larger than their own brand. We are moving rapidly into an age of trans-brand computing. Users who regularly go online are accustomed to conversing with other users on wholly different computers. They might not be able to swap software, but they can swap ideas and insights, and trade attitudes and opinions. And it's something they're interested in doing.

COMPUTE! is one of the longest lived of the computer magazines, and the only remaining consumer computer publication that takes a cross-brand stance. Our machine-specific publications address issues and applications

related to their designated computers. At COMPUTE!, we try to cover the whole field of personal computing. Thus, an interview with John Sculley stands alongside a look at IBM's latest models; our programs are provided in formats for each of the major home computers; framing it all is considered commentary that addresses issues and options touching all of us who enjoy microcomputers and are committed to the future of personal computing.

It's a nice position to be in, and one that we know many of you share. You're aware that *any* personal computer is a tool of such sophistication and power that only governments possessed just a few years ago. The proliferation of *all* personal computers can only help each of us further achieve our personal goals.

Keith Ferrell
Features Editor

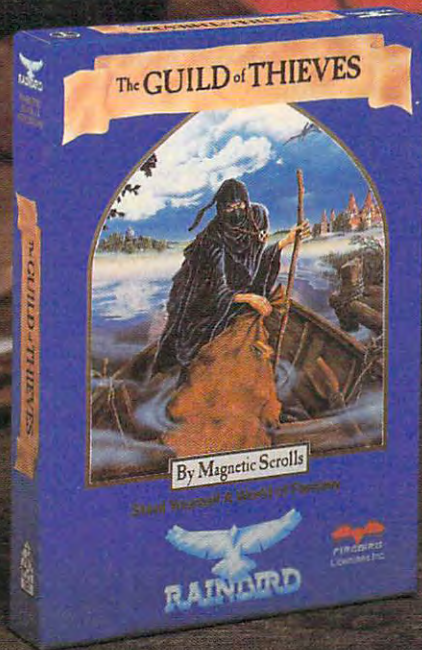
COMPUTE! Publications, Inc., is seeking to fill the following in-house editorial positions:

Technical Editor—Requires extensive experience with microcomputers, knowledge of machine language, familiarity with electronic hardware. Experience or training in editing or writing. Undergraduate degree preferred.

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 confidence to:

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



This is the difference between reading an adventure and living one.

Picture the most exciting text-only Adventure in your software collection— WITH PICTURES!



GUILD OF THIEVES is the long-awaited sequel to THE PAWN, which came sizzling onto the software scene to awards and accolades. Both are available now from Firebird.

These stunning Adventures, completely different from any game you've ever played, seduce the sight with

their breathtaking illustrations and engage the intellect with a truly revolutionary text-handling system. The most sophisticated parser on the market lets you input complicated sentences and interact with a whole cast of fascinating characters in the mythical kingdom of Kerovnia.

GUILD OF THIEVES and PAWN, Computer Entertainment Adventure of the Year, come to you from Firebird, publishers of world-famous leading edge games under the Rainbird label.

You'll find the Firebird logo on other addictive Adventures too, as well as on absorbing Strategies, realistic Simulations, and fast-paced action Arcade games.

Firebird brings the best in entertainment software to those who enjoy a whole range of interactive excitement. We'll prove to you that you don't have to keep switching brands to satisfy your obsession for challenge!



FIREBIRD

"The First Full Line In Software"

Firebird Licensees, Inc.
P.O. Box 49, Ramsey, NJ 07446
(201) 444-5700

Available for C-64, Amiga, Atari 520ST, Atari 800/130, Macintosh, IBM and compatibles. A "text-only" version is available for Apple II computers at \$39.95.

Firebird, and the Firebird logo are registered trademarks of Firebird Licensees, Inc.



• (520ST Graphics)

IBM is a registered trademark of International Business Machines Corporation. Amiga and Commodore 64 are registered trademarks of Commodore Business Machines, Inc. Macintosh and Apple II are registered trademarks of Apple Computer, Inc. 520ST is a registered trademark of Atari Corporation.

www.computergames.com

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

Editor, COMPUTE! & COMPUTE!'s GAZETTE Lance Elko
Assistant Editors, COMPUTE! Rhett Anderson, Randy Thompson, Clifton Karnes, Tony Roberts

Production Director
Editor, COMPUTE!'s Atari ST Disk & Magazine and COMPUTE!'s PC Magazine Tom R. Halthill

Editor, COMPUTE!'s Apple Applications Magazine Gregg Keizer
Features Editor Keith Ferrell
Technical Editor Otis R. Cowper
Assistant Technical Editors Dale McBane, Jim Fuchs

Assistant Editor, COMPUTE!'s Atari ST Disk & Magazine Todd Heimark
Assistant Editor John Shaale
Assistant Features Editor Tom Netsel
Programming Supervisor Patrick Parrish
Editorial Programmers Tim Victor, Tim Midkiff, William Chin, George Miller

Buyer's Guide Coordinator Caroline Hanlon
Copy Editors Karen Uhlendorf, Karen Siepak, Jill Champion, Lori Sonoski

Editorial Assistant Mickey McLean
Submissions Reviewer David Hensley
Programming Assistants Troy Tucker, Joyce Sides
Executive Assistant Debi Nash
Administrative Assistants Julia Fleming, Iris Brooks, Sybil Agee, Claudia Earhart

Receptionist Anita Armfield
Associate Editors Jim Butterfield, Toronto, Canada
 Fred D'Ignazio, East Lansing, MI
 David Thornburg, Los Altos, CA
Contributing Editor Bill Wilkinson

COMPUTE!'s Book Division Editor Stephen Levy
Assistant Editors Tammie Taylor, Robert Bixby, Lynne Weatherman
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, Jr.
Assistant Production Manager De Potter
Designer Tony Jacobson
Artists Robin Case, Kim Potts, Scotty Billings
Typesetting Terry Cash, Carole Dunton
Illustrator Harry Blair

Group Advertising Director/Consumer Electronics Peter Johnsmeyer
Advertising Director Bernard J. Theobald, Jr.
Production Coordinator Kathleen H. Ingram

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

James A. Casella, Group Vice President
 Richard Mansfield, Vice President, Editorial Director
 Richard J. Marino, Vice President, Advertising Sales
 Ilene Berson Weiner, Vice President, Production

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

COMPUTE! Publications, Inc. publishes:
COMPUTE!
COMPUTE!'s Gazette
COMPUTE!'s Gazette Disk
COMPUTE!'s Apple Applications
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

Individual Orders: 800-346-6767 (In NY 212-887-8525) 10:00 AM-12:30 PM, 1:30 PM-3:00 PM Monday-Friday

Dealer Sales: 800-638-3822 (In NY 212-887-8566) 9 AM-5 PM Monday-Friday

Coming In Future Issues
Canfield: An Intriguing Solitaire-Style Game for Commodore 64, IBM PC/PCjr, Amiga, Atari ST, Apple II, and Atari
Field Sort: An Amazing Sorting Program for the 64
Flexible Files for the PC
Softkey for Atari XL/XE
Computers and Society: The Power of HyperCard
Apple Fast Scan
Sprite Grabber for the 64
Time Stamp for IBM PC
Tri-Sort for Atari

Subscription Orders & Inquiries
COMPUTE!
 P.O. Box 10954
 Des Moines, IA 50340
TOLL FREE
Subscription Order Line
1-800-727-6937

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



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

Advertising Director: Bernard J. Theobald, Jr.
COMPUTE! Sales Office 212-315-1665
Address all advertising materials to: Kathleen H. Ingram, 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 50350. 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 lowercase, please) with double spacing. Each page of your article should bear the title of the article, date and name of the author. COMPUTE! assumes no liability for errors in articles or advertisements. Opinions expressed by authors are not necessarily those of COMPUTE!.

VIC-20, Commodore 64, and Commodore 128 are trademarks of Commodore Business Machines, Inc. and/or Commodore Electronics Limited. Amiga is a registered trademark of Commodore-Amiga, Inc. Atari, XL, XE, and Atari ST are trademarks of Atari, Inc. Apple, Apple II, and Apple IIG are trademarks of Apple Computer Company, Macintosh is a trademark licensed to Apple Computer, Inc. IBM PC and PCjr are trademarks of International Business Machines, Inc. Radio Shack is a trademark of Tandy, Inc.

(Boldly go where no game has gone before.)

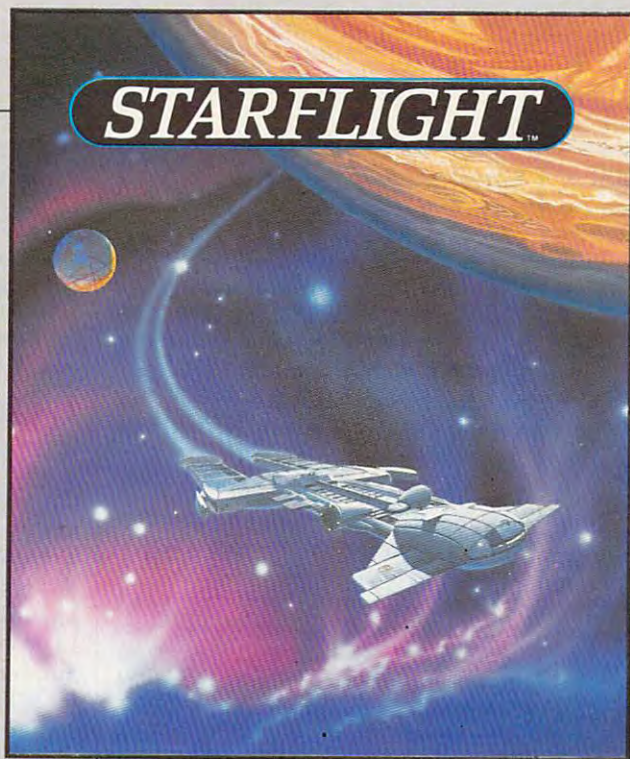
Turn Your Computer Into a Starship.

Beam Aboard, Captain.

Your starship is fueled and ready. Your crew is fully trained. You launch from Starport, heading toward the galaxy's core on a hunch. You've been chosen to seek new worlds to colonize. New resources for a homeworld gone stale.

Your navigator zeroes in on a red dwarf star. Long-range scans show three planets: a gas giant, a frozen ice world, and a blue-oceaned paradise that looks just like heaven. A good place to land.

Suddenly a klaxon sounds. "Captain, we're being scanned," says your Science Officer. A giant hologram of a squid-like crea-



State-of-the-art Outer Space Simulation.

- Stunning graphic simulation of rotating planets, landing sequences, laser battles, and more.

- Explore 270 star systems and 800 planets with unique ecosystems. Each planet contains almost 2 million different locations.

- Choose your own crew—Science Officer, Communications Officer, Navigator, Chief Engineer, Medical Officer, and Captain.

- Includes full starmap and security decoder.

- The state-of-the-art in entertainment software. Over 15 man-years in development.



Explore Strange New Worlds

Land on different planets to collect valuable minerals, lifeform specimens, and artifacts from ancient civilizations. But keep your laser on stun—not all the locals will be glad to see you.



Talk to Aliens

Each alien race, like this Veloxi, has a unique culture, personality, and language. They can give you clues—if you can get them to trust you.



"Standard Orbit, Captain."

From hull-crushing gas giants to frozen dwarves, each star system is unique. Study your sensors carefully—there's a stiff fine for recommending colonization of boiling lava planets.



ELECTRONIC ARTS™

For the IBM,™ Tandy, and all 100% compatibles. 256K RAM required. Not copy-protected.

How to Order: Visit your retailer, or call 800-245-4525 for direct VISA or Mastercard orders (in CA call 800-562-1112). There is a 14-day, money-back guarantee on direct orders. The price for direct orders is \$49.95. To order by mail, send check or money order to Electronic Arts Direct Sales, PO Box 7530, San Mateo, CA 94403. Add \$3 for shipping and handling (\$4 Canadian). Allow 4 weeks for delivery. For a complete product catalog, send 50¢ and a stamped, self-addressed #10 envelope to Electronic Arts Catalog Offer, 1820 Gateway Drive, San Mateo, CA 94404. IBM is a registered trademark of International Business Machines, Inc. Starflight and Electronic Arts are registered trademarks of Electronic Arts.

Starflight Cluebook also available \$12.95 direct.



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.

My Computer Can't Count

My computer can't seem to count correctly. A program I'm writing in BASIC needs to display a timer adding by tenths. No matter which way I try to do it, I end up with numbers that have long strings of 9s after them. Here's an example program:

```
10 A=0
20 PRINT A:A=A+.1
30 GOTO 20
```

Can you help me with this problem?
Jeremy Zaucha

Try the above program on your computer. The Atari eight-bit series handles it properly, but most other microcomputers (64, Apple II, IBM, Atari ST, and Amiga) have difficulties. The problem occurs when the BASIC interpreter converts your base 10 (decimal) number to base 2 (binary) and back. All math operations are done in binary, while all display is done in decimal. Another way to understand this problem is by trying to add $\frac{1}{3}$ to a number. As a decimal number, $\frac{1}{3}$ becomes .333333... where the 3s trail on to infinity. Since you can't include all these 3s in the calculation, your answer won't be totally accurate. Repeated calculations make the cumulative error larger.

Some BASICs have double-precision variables which do a better job for the type of task you are attempting. The Atari eight-bits solve the problem by using binary-coded-decimal (BCD) numbers. This means that Ataris store values as decimal numbers. This is the same approach used by several "business" BASICs for the IBM PC.

Here's one solution to your problem:

```
10 A=0:T=0
20 PRINT A:T=T+1:A=T/10
30 GOTO 20
```

All additions are done with integers. Whenever you want to print the number, divide it by 10.

Simulating An Apple

I am trying to locate a machine language simulator for the Apple II family which I recall having seen about two years ago. The simulator I have in mind breaks each operation into micro-operations, displaying them on the screen as their execution is demonstrated.

My problem is that I've forgotten the name of this program. Can you help me find it?

Charlotte J. Chell

It sounds like you're looking for The Visible Computer: 6502 for the Apple II series. This product does just what you describe and is an excellent learning tool. You can order the simulator from Software Masters, P.O.Box 3638, Bryan, TX 77805 for \$49.95 plus \$3 shipping and handling. Software Masters also publishes micro-processor simulators for the Commodore 64 and IBM PC.

FORTRAN For The 64

I am interested in running FORTRAN on my Commodore 64. To do this I understand I need the CP/M cartridge. Where can I get one?

Randy Boss

When Commodore first introduced the 64, one of its big drawing cards was the fact that CP/M compatibility was promised for the machine. When the CP/M cartridge and software for the 64 finally arrived, many people were disappointed. The 64's CP/M still used 40 columns (most CP/M software requires 80), had a slow disk drive (CP/M uses the disk a lot), was unable to read any standard CP/M disk formats, and the operating system didn't implement the user port—you couldn't use a modem, for example. (We should note that Commodore addressed every one of these complaints in their first-rate implementation of CP/M on the 128.)

Since the 64 couldn't read any of the usual CP/M disk formats and had some limitations, Commodore arranged to release special versions of two of Ellis Computing's best-selling CP/M packages: Nevada COBOL and Nevada FORTRAN.

The 64 CP/M cartridge and the Nevada software packages were only manufactured for a short time, and neither is currently available. There is a new FOR-

TRAN system that does not require the CP/M cartridge—64-Tran, from Trident Software. It is an enhanced FORTRAN development environment tailored to the 64. The suggested retail price of this package is \$50. For more information, contact Trident Software, P.O. Box 180, Glenelg, MD.

Apple DOS 3.3 Quirks

I own an Apple IIc. When writing programs, I often use the GET statement like this:

```
80 GET AS
90 PRINT CHR$ (4) "RUN PROGRAM"
```

When I run this and press a key, however, all the program does is print RUN PROGRAM to the screen. It does not run the program specified. Can what I'm trying be done?

Daniel Markarian

Your problem is inherent to DOS 3.3. A good rule of thumb when accessing DOS 3.3 from BASIC is to precede all disk commands with a single PRINT statement. To fix your program, simply insert the following line:

```
85 PRINT
```

If you use ProDOS, you do not have to prefix DOS commands with a PRINT. Only DOS 3.3 has this little quirk.

Compatible Graphics

I am writing to ask if you have any information on the Hercules monochrome graphics card. Can BASICA or Logo programs access the graphics card?

Timothy Hansell

I have an IBM XT clone. Once I started programming in BASICA, I found that I was not able to get any graphics even though I had a Hercules Graphics Adapter. My dealer suggested I buy an EGA (extended graphics adapter) which he said would solve my problems. Can you tell me a more reasonable alternative to buying an EGA card?

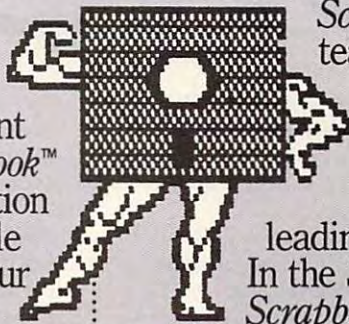
Ishan Joshi

The Hercules Graphics Adapter can produce beautiful monochrome graphics, but it doesn't respond to BASICA's graphics commands. To produce graphics on the Hercules card you normally must program it pixel



There are two things almost everyone has in common. An active imagination. And a tough time putting it on paper.

But now we present our *Graphics Scrapbook*™ series. A huge collection of pictures that enable you to easily bring your creative inspirations to The Print Shop,™



Over a hundred eye-catching pictures on every disk.

PrintMaster™ or Create a Calendar.

On each disk there are over 100 unique pictures. For example, in our *School Scrapbook*, teachers and students will find everything from cheer-leading to finals. In the *Sports Scrapbook*, dozens of sports, mascots



and trophies. In the *Off the Wall Scrapbook*, well, just expect the unexpected. And plenty more Scrapbooks are coming. So even if you can't draw a straight line, it's okay.

As long as you make a straight one to the offer below.

Apple & Compatibles, C64/128, IBM & compatibles.



ALLOW US TO DRAW YOUR ATTENTION.



Introducing *Create A Calendar*.

Our simple, powerful tool that lets you design daily, weekly, monthly or yearly calendars. In moments.

Time flies. It might as well look snazzy as it goes by.

Among numerous features, it includes graphics, borders and fonts for just about every occasion. Or use your own pictures from the *Graphics Scrapbooks* or *Print Shop* compatible graphics disks.

What's more, it lets you write multiple lines of text on every date. To make it easy to keep track of everything

you're supposed to do. And everything you've done. So this year, go ahead and make your own calendars.

There couldn't be a nicer way to pass the time. **EPYX**

USE OUR PREVIEW DISK TO DRAW YOUR OWN CONCLUSION. Send your name, address, phone number, computer type, and a check or money order for \$1.50 to *Calendar/Scrapbook Preview*, P.O. Box 3745, Young America, Minnesota 55394. Be sure to include the Part Number in the box with your order. Canadian orders add 50¢ postage, 6-8 weeks delivery. Expires 4/30/88. Valid only in cont. U.S. and Canada.

The Print Shop is a trademark of Broderbund Software, Inc. Printmaster is a trademark of Unison World, Inc. Graphics Scrapbook is a trademark of Epyx, Inc. © 1986 Epyx, Inc.



Strokes C

If you haven't been to Europe or taken a world tour lately, you may not have heard of AMSTRAD. So, let us introduce ourselves.

AMSTRAD is the British company that makes the best selling computer in Europe.* We even out-sell IBM. And worldwide, over 2,000,000 AMSTRAD computers have been sold — not to mention all the AMSTRAD printers and word processors in use.

Now AMSTRAD is coming to America. And you'll soon see why AMSTRAD is making the competition very nervous.

Why buy your computer in expensive little pieces?

With most computers, expanding capabilities means spending a fortune for add-ons. Not with AMSTRAD.

Both the PC1640 and the PC1512 come with additional ports *built-in*. That means no expensive brain surgery is required when you're ready to expand.

AMSTRAD computers also allow you to upgrade graphics capabilities — also without brain surgery. The PC1640 has monochrome (Hercules), CGA and EGA capabilities built into a single motherboard. So, to make your work look better, simply install a more sophisticated AMSTRAD high quality monitor. (Starting to see why AMSTRAD is so popular?)

Everything you need in two manageable boxes. Everything.

Naturally, both models are IBM compatible. They'll run virtually all IBM software for every business or personal need you can think of. And not only that, we've built in

the boards necessary to run mouse-driven, windowing GEM® software to create spectacular graphics. We even give you a mouse.

Of course, we realize that's not everything you need to start computing. That's why both computers come with lots of software — MS DOS V 3.2, GEM® Desktop, GEM® Paint, LOCOMOTIVE Basic and more.

Imagine. Virtually everything you need to start computing within minutes after you open the box. (A smart way to buy a computer, don't you think?)

Extraordinary printers, too.

AMSTRAD gives you a choice of two brilliantly designed printers — the DMP 3000 and the DMP 4000. Both offer IBM compatibility and a list of standard features other printer manufacturers call options.

*Source: International Data Corp.



Of Genius.

(We're making our competitors nervous in that department, too.)

What if you don't need a computer?

If you just want to express yourself in plain English, but don't want to learn the language of computing, you'll love AMSTRAD's 9512 Word Processor. It's incredibly easy to use, comes with powerful built-in software to perform a variety of tricks, a large, high-resolution monitor — and a letter quality daisy-wheel printer. To create a bestseller, all you need to add is a great plot.

The Coup de Grâce.

Because of AMSTRAD's ingenious engineering and integration of traditionally optional features into our products, our prices are significantly less than you'd ever expect for such performance. In fact, you

can buy a complete AMSTRAD computer system, for less than \$700. Add a printer and the price is still less than a thousand dollars. Or buy a complete word processing system for less than \$800.

We may not become as famous as the Beatles, but . . .

With more than 700 dealers in America already (and the number is growing fast), it's no wonder AMSTRAD is quickly becoming famous for putting high performance within reach of thousands of businesses and personal users.

To find out more about putting brilliant performance in your hands, send in the reply form for the name of your nearest AMSTRAD Dealer. You'll see for yourself, you don't have to be an Einstein to be a genius. Just smart enough to buy AMSTRAD.

Please send me the name of my nearest AMSTRAD Dealer.

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Mail to:

AMSTRAD, 1915 Westridge Dr.,
Irving, TX 75038



Strokes Of Genius.

Brentwood, England • Paris • Dallas
Sidney • Hong Kong • Milan

IBM, MS DOS, LOCOMOTIVE Basic2 and Hercules are registered trademarks of International Business Machines, Microsoft Corp., LOCOMOTIVE Software Limited and Hercules Computer Co., respectively. GEM Desktop and GEM Paint are registered trademarks of Digital Research, Inc.



by pixel in machine language, or in a high-speed compiled language like C. There is, however, a solution to your problem that doesn't involve buying a new monitor and video card.

SIMCGA by Chuck Guzis allows a Hercules card to emulate a CGA. With SIMCGA you can use all your favorite BASICA graphic commands and run commercial programs—like Flight Simulator—that require a CGA card. There are both public domain and commercial versions of this program.

Indivisible

I have an Atari 800XL. How can I redefine a pixel in graphics mode 5? If I could do this, it would be easy to get 80 columns of text.

D. Botha

Unfortunately, you cannot redefine a pixel. The word pixel is short for picture element. It is the smallest element that you can address in any graphics mode. Even if you could redefine the pixel, 80-column text would be nearly impossible to read on a television and not very legible on a composite monitor.

Atari has been showing an 80-column adapter (the XEP80) for the Atari eight-bit computers. We haven't seen one yet, but it is supposed to display very readable text on an inexpensive monochrome monitor. The suggested retail price for the XEP80 is \$79.95. Contact Atari for details.

Atari Corp.
1196 Borregas Ave.
P.O. Box 3427
Sunnyvale, CA 94088-3427

No Easy Way To Color

I recently purchased an Atari 1040ST with a monochrome monitor. Color was not a major concern at the time. After reading about the computer in COMPUTE!, I expected it to have an RF modulator. Well, there's no modulator and I can't afford an RGB monitor. Do I have any other options?

Scott Berkey

The 1040ST was designed to accommodate an RF output, but at the last moment it was taken out, probably for cost considerations. The 520ST does have an RF modulator.

Although Atari's RGB monitor provides better color and sharper graphics than any alternatives, it is expensive. Cables To Go and Practical Solutions are two companies that market cables to let you use alternative monitors. For instance, Practical Solutions advertises a \$14.99 cable that interfaces the Atari RGB output to a composite monitor. Since composite monitors are less expensive than their RGB counterparts, this might be a

good solution for you, especially if you already have a composite monitor that you were using with an eight-bit computer like the Atari 800 or Commodore 64. This cable also should work with a VCR or TV/monitor.

Cables To Go
4215 N. Main, Suite 201
Dayton, OH 45405

Practical Solutions
1930 East Grant Rd.
Tucson, AZ 85719

Conversion One-Liners

I need a program for my Apple IIc that will convert hexadecimal numbers to base 10 and vice versa. I don't know where to start. Could you show me a BASIC program that does this?

David Kilzer

The two one-line subroutines listed below should do what you need. They were written under Applesoft BASIC, but should work with other BASICs with one small change, detailed below. The first one, numbered 1000, is adapted from line 580 of COMPUTE!'s "Apple MLX" program. It takes a decimal value, stored in the variable A and creates a four-digit hexadecimal equivalent in the string variable A\$, with the assumption that A is a positive integer between 0 and 65535. To use it, just set A to the value you want to convert and GOSUB 1000. You can PRINT A\$ to see the result.

A little bit about how it works: The subroutine is made from a single FOR-NEXT loop with the variable I acting as a loop counter. On each cycle of the loop, it adds one hexadecimal digit to the left side of A\$, so A\$ has to be set to null before the loop starts (A\$ = ""). Within the loop, the operation T = INT (A / 16) creates a new value equal to A without its rightmost hex digit (that is, if A equaled 20178—\$4ED2 in hex—it would set T to 1261—hex \$4ED). The next statement finds the digit missing in T and uses the MID\$ function to add it to A\$. Having created one digit, the same thing is done for the next digit to the left by setting A = T and repeating the loop.

The second subroutine, numbered 2000, works in the opposite way. It accepts a four-digit hex number in A\$ and produces the decimal equivalent in A. This routine is a condensed version of lines 520, 540, and 550 from Apple MLX.

Again, a FOR-NEXT loop using the variable I is the main structure. On each loop, the decimal equivalent of a hex digit will be added to the variable A, moving from left to right through the string, so A is set to 0 before the loop starts. The MID\$ operation selects a single character from the string, and the ASC function converts it into the equivalent ASCII code in the

variable J. Since the ASCII code for the numeral 0 is 48, the following statement subtracts 48 from J, converting it to its actual value. But there's one catch: The ASCII code for the letter A, 65, is 8 greater than the code for 9, which is 57. In hex notation, these should differ only by 1. To compensate, an additional quantity of 7 is subtracted from the larger values. The expression 7 * (J > 64) accomplishes this since the condition within the parentheses evaluates to the number 1 if it's true and 0 if it's false. Note: This is the only statement in these two programs that won't work on Commodore and PC-compatible computers, since those versions of BASIC produce a -1 when a conditional expression is true. To adjust for this difference, change the subtraction operation to an addition.

```
1000 A$ = "": FOR I = 1 TO 4: T = INT  
(A / 16): A$ = MID$ ("0123456789  
ABCDEF", A - 16 * T + 1, 1) + A$: A  
= T: NEXT I: RETURN
```

```
2000 A = 0: FOR I = 1 TO 4: J = ASC (  
MID$ (A$, I, 1)): J = J - 48 - 7 * (J >  
64): A = A * 16 + J: NEXT I  
RETURN
```

Learning To Drive

I am just finishing my driver's course and I'm wondering if there is a driving simulator on the market. It should be as true to life as possible—just like the flight simulators are. This program could improve my reaction time and overall driving skills.

Mike Hofmann

Racing simulations have been popular for years. Programs like Pole Position (Atari-soft), Pit Stop (Epyx), and Auto Duel (Electronic Arts) provide excitement and action, but lack settings for driver training. Accolade's new Test Drive may be more up your alley—it provides a less frantic setting for driving.

Printer-Only Output For The Apple

I own an Apple II+ and a dot-matrix printer. Whenever I send something to my printer, the output is also sent to the screen. Is there any way to stop the screen output?

Richard J. Kuhn

Almost every printer interface for the Apple uses the same command for turning off video output. To issue this command, you must first open the printer for output with a PR#4. Next, print a CTRL-I (CHR\$(9)) followed by the desired printer interface command. In your case, you want to send the three characters 80N, telling the interface to print 80-column text and to turn off video output. The following program illustrates this technique by printing a

familiar sentence to the printer, and not the screen.

```
10 PRINT
20 PRINT CHR$(4) "PR#4": REM OPEN
  PRINTER FOR OUTPUT
30 PRINT CHR$(9) "80N": REM 80-
  COLUMN TEXT/NO VIDEO
  OUTPUT
40 PRINT "THE QUICK BROWN FOX
  JUMPED OVER THE LAZY DOG."
50 PRINT CHR$(4) "PR#1": REM
  RESET 40-COLUMN SCREEN AS
  OUTPUT DEVICE
```

There are several standard printer interface commands available to Apple owners. All are preceded by the CTRL-I command character. It is even possible to send these commands directly from the keyboard. For example, if you use a serial printer you can change your interface's baud rate to 9600 from immediate mode by typing the following lines (press RETURN after each line):

```
PR#4
CTRL-I 14B
PR#1
```

This changes your serial interface's output to 9600 baud, overriding whatever baud rate the dip-switch settings may specify. Of course, turning your computer's power off and on resets the interface to its default condition.

Typewriting

I recently purchased the Commodore MPS-803 printer and connected it to my Commodore 64 computer. I have been trying to figure out how to print directly from the computer keyboard to the printer. In other words, type a key and have it shown on the screen and printed immediately.

F. Matt Ford

The following command sends each line to the printer when you press RETURN. It works on a 64 with most printers. Type it in direct mode (without a line number). All commands will be interpreted. For example, if you type LIST, your program will be listed to the printer.

```
OPEN 4,4:CMD 4
```

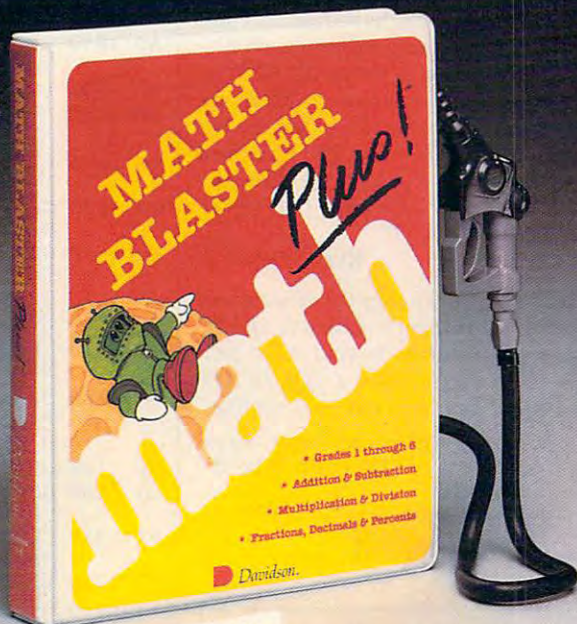
Since you want each character to be sent to the printer as you type, you'll have to type in this short BASIC program:

```
10 OPEN 4,4
20 GET A$:PRINT A$;PRINT#4,A$;
30 GOTO 20
```

Type RUN to begin. Each letter you type is sent to the printer. On many printers, this will produce the effect you desire: The printer will echo your typing just like a typewriter. However, some printers hold characters in an internal buffer and print them on paper only when the buffer is full or when a carriage return character is sent to the printer. If your printer falls into this

HIGH GRADE FUEL.

NEW



Davidson's new Math Blaster Plus is the highest octane math software program you can buy for your kids. Built by teachers to grow with kids—from addition and subtraction to multiplication, division, fractions, decimals, and percents.

Math Blaster Plus pumps in confidence and motivation, prints out Certificates of Excellence, and improves kids' grades from 1st grade through 6th.

With four motivating learning activities, exciting graphics and color, and a new action-packed arcade-style game, Math Blaster Plus makes learning fun. And, it has new pull-down menus that are easy to use with keyboard or mouse.

So pull into your local software dealer and pick-up the highest



REPORT CARD	
MATH	A
READING	A
SPELLING	A

performance math software around—Math Blaster Plus.

Call us toll-free for more information and for the name of the Authorized Davidson Dealer nearest you.

800-556-6141 or 213-534-4070
(California residents)

Grades 1 through 6.
Available for Apple® and IBM®
\$49.95 suggested retail.

Return this coupon to enter our monthly drawing for \$100 worth of free Davidson software* We'll also send you more information about all the high grade programs available from Davidson.

Name _____

Address _____

City, State, Zip _____

Type of Computer _____

Davidson & Associates, Inc.
3135 Kashiwa St. Torrance, CA 90505

*NO PURCHASE NECESSARY. Offer ends Dec. 31, 1988. Void wherever prohibited or restricted by law. Odds of winning will be determined by total number of entries received.

©1987 Davidson & Associates, Inc. C12/87



Davidson.

category, each line of your typing will be printed only after you press RETURN. When you've finished typing, press RUN/STOP and then type CLOSE 4 in direct mode.

Pound Cakes On The 64

I'm writing a recipe database program on my 64 for my mother and have run into a snag. The program, as written, stores recipes to disk as sequential files. The £ symbol, placed prior to each filename, marks it as a recipe file (that is, £CAKES). Problems occur when my mother wishes to reload a recipe file but can't recall its name. Can you give me a routine that will examine the directory and display only the recipe files (those beginning with a £)?

Ryan Desjarlais

To read and display only the filenames in the directory that begin with a £, add the following subroutine to your main program. Then simply insert a GOSUB 1000 just prior to your load and save routines.

```
QC 10 REM SUBROUTINE THAT PRINTS "£" FILES FROM THE DIRECTORY
MR 1000 GOSUB1210:GOSUB1170
JD 1010 GET#2,A$,B$
RG 1020 GET#2,A$,B$:GET#2,A$,B$
```

```
KF 1030 A=0:IFAS<>" "THENA=ASC(A$)
HF 1040 IFB$<>" "THENA=A+ASC(B$)*256
GA 1050 PRINT"{9 RIGHT}{RVS}"MID$(STR$(A),2);TAB(12);"{OFF}";
HH 1060 GET#2,B$:IFST<>ØTHENPRINT" BLOCKS FREE":GOTO1160
GG 1070 IFB$<>CHR$(34)THEN1060
JS 1080 GET#2,B$:IFB$<>CHR$(34)THENPRINTB$;:GOTO1080
AC 1090 GET#2,B$:IFB$=CHR$(32)THEN1090
RE 1100 PRINTTAB(28);:A$=""
CK 1110 A$=A$+B$:GET#2,B$:IFB$<>" "THEN1110
EG 1120 PRINT"{RVS}"LEFT$(A$,3)
CR 1130 GETA$:IFAS<>" "THEN1150
FC 1140 GETA$:IFAS<>" "THEN1140
AK 1150 IFST=ØTHEN1020
MS 1160 GOSUB1220:RETURN
JC 1170 INPUT#15,A$,B$,C$,D$;IFVAL(A$)=ØTHENRETURN
FM 1180 PRINTA$,B$,C$,D$:PRINT"{DOWN}PRESS ANY KEY TO TRY AGAIN."
BP 1190 GETC$:IFC$=""THEN1190
XJ 1200 GOSUB1220:GOSUB1210:RETURN
PX 1210 OPEN15,8,15:OPEN2,8,Ø,"$0:£*":RETURN
HD 1220 CLOSE2:CLOSE15:RETURN
```

This subroutine first opens the error channel (15) and a channel (2) through which to read the directory of £ programs. Should any errors occur at this point (that is, if the disk is not formatted or not in the drive, and so on), a description of the error will print to the screen. After attending to the problem, you can start over by pressing any key.

Once the subroutine begins to read in filenames, you can press the space bar to pause the routine. This is handy should your list of filenames exceed one screen. To continue reading the directory, press the space bar again.

When the routine is done, it returns you to your main program.

Note To Readers

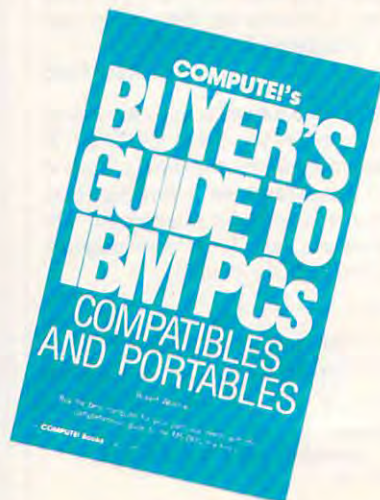
In last month's feature "The Future of Computer Games: Ten Industry Leaders Speak Out," two pairs of photos were inadvertently interchanged: Mark Beaumont of Activision and Michael Dornbrook of Infocom (pp. 14, 20); and Roger Buoy of Mindscape and Thomas Frisina of Accolade (pp. 15, 21). COMPUTE! regrets the error.

Everything you need to know about buying an IBM PC, compatible, or portable—all in an easy-to-understand, convenient format.

COMPUTE!'s Buyer's Guide to IBM PCs, Compatibles, and Portables

Robert Wolenik ISBN 0-87455-123-4 \$12.95

This comprehensive guide to PC compatibles and portables includes all the information needed to make intelligent decisions about the purchase of an IBM PC or compatible. For each computer, we've included a concise review, and discussions of the computer's background, features and potential drawbacks, as well as technical data. The author of *COMPUTE!'s Buyer's Guide to IBM PCs, Compatibles, and Portables* has authored or co-authored more than a dozen computer books including the highly successful *Buyer's Guide to Home Computers*.



To order COMPUTE! books, call toll free 1-800-346-6767 (in NY 212-887-8525) or write COMPUTE! Books, Customer Service, P.O. Box 5038, F.D.R. Station, New York, NY 10150. Customer Service hours are 10:00 a.m. to 12:30 p.m. and 1:30 p.m. to 3:30 p.m. Eastern time Monday through Friday. Please add \$2.00 per book U.S. and surface mail or \$5.00 air mail shipping and handling. NC residents add 5 percent sales tax and NY residents add 8.25 percent sales tax. Please allow 4-6 weeks for delivery.

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

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

Complete and Easy...
and only \$16!



Parsons Technology

MONEY COUNTS[®]

VERSION 4.0

Complete Money Management Accounting System . . .

- CPA-designed for home & business
- Manages cash, checking, savings & credit cards
- Smart checkbook balancer — makes short work of the toughest bank statement
- Handles up to 999 accounts & 24000 transactions per year

Prepares & Prints a Wealth of Reports . . .

- Financial statements (4 types including net worth)
- Inquiry reports (3 types)
- General ledger & accountant's trial balance



Now Including . . .

- Automatic transactions
- Financial calculator — computes interest rates, loan payments, prints amortization schedules
- Journal entries
- And more

Plus These Important Additional Features . . .

- Budgeting
- Fast financial data base with 3-way look-up
- Pop-up calculator
- Graphics
- Works great with monochrome & color monitors
- Not copy-protected

VISA, MasterCard & COD orders call:

1-800-223-6925

(In Iowa 319/373-0224)

Here it is. You won't find software that's easier to use:

- Requires no accounting knowledge
- Completely menu-driven with on-line help
- 93-page fully indexed tutorial manual (on disk)

A Proven Track Record. Hard to believe the \$16 price? Don't worry. MoneyCounts[®] has been marketed for three years and is continually receiving rave reviews. There's **no** catch. This is a fully functional system that compares with products selling for \$99 and more.

Same-Day Shipping. Order today and own MoneyCounts[®] for only \$16! Add \$3 shipping and handling (outside North America add \$7). Iowa residents please add 4% sales tax. Send check or money order payable to Parsons Technology. VISA and MasterCard orders welcome.



Parsons Technology

Dept. COM
6925 Surrey Drive NE
Cedar Rapids, IA 52402

MONEY COUNTS[®]

\$16 + \$3 Shipping

MoneyCounts[®] requires IBM or compatible computer with two disk drives (or a hard disk drive), 192k or more memory, DOS 2.0 or later and printer.

Name: _____

Address: _____

City/State/Zip: _____

Phone: _____

Check Money Order VISA MasterCard

Card # _____ Exp. Date _____

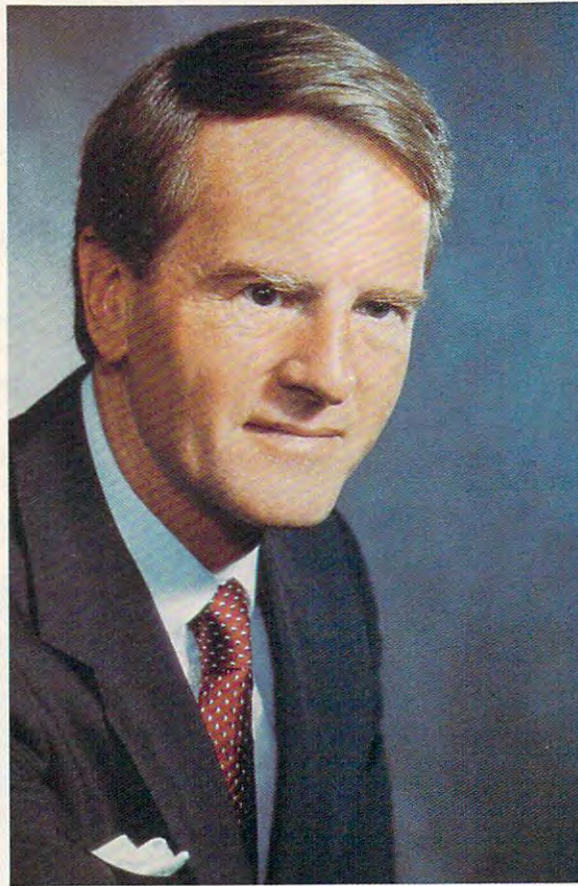
Out To Change The World: A Conversation With John Sculley

Keith Ferrell, Features Editor, and Selby Bateman, Associate Publisher

John Sculley, Chief Executive Officer of Apple Computer, is a man more interested in ideas and innovation than traditional top management concerns. In conversation, he comes across as very much a visionary, someone more interested in extrapolating the consequences of decisions over decades than in financial matters. Of course, Apple's ongoing success, and its emergence from a period of crisis, show that Sculley's also a brilliant manager and businessman. That should come as no surprise. The two sides of John Sculley are really one—he is a man passionately interested in the future.

This sense of long-term thinking, of forward rather than simply current planning, served Sculley well at Pepsi-Cola, where he served as president. Pepsi was in many ways a traditional, structured American corporation. Even there, though, Sculley was different from the classic organization man. His childhood interest in electronics and technology helped him foresee the transition that Pepsi—and all other corporations—must make as the world moved from the Industrial Age into the Information Age.

His vision was matched by an almost uncanny marketing sense. It was during Sculley's tenure at the helm of Pepsi that the company introduced such strokes of marketing genius as The Pepsi Challenge, transforming generational and lifestyle differences into market opportunities. This approach not only greatly boosted Pepsi's fortunes—it also had a dynamic effect on all of consumer advertising and marketing, an effect that can still be seen today.



Five years ago, Sculley left the traditional East Coast corporate world behind. Handpicked to head Apple's management, Sculley entered the world of computers—and crisis. During the personal computer shakeout of the mid-1980s, there was a real risk that Apple—one of the most successful startups in history—would be severely damaged, if not destroyed.

John Sculley guided Apple through that crisis and the company emerged triumphant—stronger and more innovative than ever. The emergence, however, was not accomplished without pain, both personal and professional.

*Now Sculley has written a book about his managerial and personal journey from the structured life of an industrial age company head, to the idea-based life of a man immersed in the birth of the information age. *Odyssey: Pepsi to Apple* (just published by Harper & Row, and cowritten with John*

A. Byrne) is as much an account of ideas as of events. That Sculley thinks deeply about Apple's vital business interests is obvious throughout the book. That he also devotes much of his time to contemplating the consequences of the information revolution is equally clear.

COMPUTE! spoke with John Sculley in San Francisco, in a conversation that ranged from computers to classrooms to corporations and business education. We found him to be articulate on every subject he approached, a man who does not let his commitment to vision overshadow the necessity of learning details.

We began by discussing his new book.

COMPUTE!: *What were your goals as you sat down to write Odyssey?*

Sculley: This book was written for people who are going to spend most of their lives in the twenty-first century. Apple is a company which has an average age of 29—so many of our people are going to spend most of their lives in the next century. It's only 13 years away. I felt that the world has passed through a transition from the Industrial Age to the Information Age, and, having run companies in both worlds, I felt I had a unique point from which to observe that transition. I felt that this was a perspective that might be useful.

COMPUTE!: *Books obviously have been important to you; your love of books is reflected throughout Odyssey. What would your advice be to young people who are discovering the power of computers, perhaps to the exclusion of the written word?*

Sculley: The wonderful experience you can have with books is that they open your mind to new experiences and discoveries that you might not have in your ordinary day-to-day experience. Life is really more than just episodes of what you do—it's being able to view the world ahead of you from the perspective of other people's eyes. That's what books allow you to do. They let you see life through many different lenses.

COMPUTE!: *How do we avoid the trap of having computers turn into just another TV screen? In what ways can computers contribute to literacy?*

Sculley: I think we have a serious challenge ahead, as well as a wonderful opportunity.

The challenge is that young people aren't reading books as much as they used to. We have become more dependent upon television for our information, but television is a very passive medium. You sit in front of it and don't have to interact with it.

The fundamental difference of

computers is that by their nature you have to interact with them in order to make them perform. If we can take that idea—which is still relatively primitive; we're still just at the beginning of the personal computer age—and imagine what it might be as technology evolves, then I think we can see that there are some really wonderful things in store for us.

COMPUTE!: *H.G. Wells once wrote that civilization is a race between education and catastrophe. We gather that you're betting we'll win the race.*

Sculley: Yes. And that's another very good example of why it pays to read.

COMPUTE!: *What sorts of things do you foresee?*

Sculley: I try, in *Odyssey*, to envision a product called the *Knowledge Navigator*, which says that if we could make the process of learning as entertaining as *Star Wars*, or MTV, or video games, and combine the interactive process of computing, then we might come up with a wonderful new machine that will let people navigate through knowledge in incredibly interactive, yet entertaining ways. That's something that is very much possible, in terms of where technology is going to be around the turn of the century.

The challenge is how we use this wonderful machine to be able to revolutionize our entire educational system.

COMPUTE!: *Apple's new product, Hypercard, has attracted a lot of attention as an example of the sort of interactive software that will ultimately make the Knowledge Navigator possible. Underlying it are echoes of hypertext—the linkage of all information into an easily accessible base. You've called for a Hypercard for the IIGS. Are we now seeing the foundations laid for the sort of educational technology you speak of?*

Sculley: Yes. Almost all of the ideas that are imbedded in personal computers today, whether the IIGS or

the Macintosh, have their roots back in the 1960s. The one fundamental idea that didn't make it across from the sixties, was hypertext. I felt very strongly that hypertext had to be in the roots of future technology.

When Bill Atkinson came forth with this wonderful idea of taking hypertext and turning it into a technology that we could incorporate into our computers, I was very enthusiastic and supportive.

As we look at computers in the next century, *Hypercard* will be one of the root technologies, without question.

COMPUTE!: *Do we run the risk of hypertexting changing in fundamental ways the nature of knowledge? Will the continuous flow of knowledge and culture be transformed into a collection of snippets, hypertexted together by key phrases rather than concepts?*

Sculley: No, I think that what *Hypercard* will do is rather let us avoid the problem of information doubling every three to four years. Database technology so highly structures, and is so highly procedural in the way that you have to access information that we run the risk of forcing people into a very structured way of retrieving information. That may discourage people from wanting to do it in the first place.

Hypercard makes the process of organizing information and accessing information completely natural and intuitive. That's really what you want to have as a fundamental concept if you want to pursue interactive video and multivideo learning. You can discover the contrasts and comparisons between different subjects which may have no other relationship than your own curiosity.

COMPUTE!: *One of the fundamental concepts underlying your book is the importance of innovation. Innovation is obviously key to something like Hypercard, hypertext, and the*

Knowledge Navigator. Can schools teach innovative thinking, or is innovation up to the individual?

Sculley: I think schools can do a tremendous amount with innovation. I've seen this with some of the experiments Apple has been involved with. In one of the Open schools in Los Angeles that we sponsor, they are doing some wonderfully innovative things with learning and computers. I believe that schools have to provide an environment that *encourages* people to be innovative.

How can we train people to develop their creative skills? To become builders, and not just administrators? There's a real need for our schools to develop sort of a *right brain tilt*. We need to look at the creative side of the mind as a real resource for the entire country, which will produce huge gains in productivity in a generation or so.

COMPUTE!: *Along the same lines, how can business schools encourage the levels of innovation needed to keep corporations strong? What lessons does Apple's success offer to American business?*

Sculley: One of the contrary ideas that Apple has brought forth, which corporate America hasn't been quite able to understand, is that work can be fun. If what you are doing is fun and interesting, the chances are that you're not only going to be more innovative, but you're probably going to be more personally productive.

This is a fairly simple but a fairly revolutionary idea, as far as business is concerned. Business schools don't really talk much about work being fun. Business schools focus on analytical skills, on case histories of what was.

COMPUTE!: *How do we avoid this? What areas should American business and business education address in order to better foster creativity and innovation?*

Sculley: There is a tendency in American business not only to institutionalize the process of business, but also to specialize. And that means that individuals find themselves forced into a more narrow perspective on business, without having a chance to zoom out

and look at how the whole comes together.

I believe that much of the business school curriculum that we have today gives too much emphasis to the specialization of skills—and too much focus on where we've come from—as opposed to giving people the perspective that creativity, innovation, and building are the skills that are really going to make a difference, not only in business in general, but in their own performance in the future.

And that's a very contrarian idea.

COMPUTE!: *As you point out in your book, businesses tend to resist change except in those periods when there's a crisis that points out that the traditional isn't working. At Pepsi you approached problems such as this from a marketing perspective. Is marketing the direction from which innovation flows?*

Sculley: I never set out to be a businessman. My emphasis was always on design and architecture. I think that in some sense I had an advantage because I was always looking for a way to interpolate what I was being asked to do into terms that I was most interested and comfortable with.

Even though I had gone to business school and had learned to work and compete in a fairly traditional environment, I never approached it in very traditional ways. My sense was that people who succeed the best—even in very traditional companies—are those who don't work in traditional ways.

COMPUTE!: *Among Apple's competitors is one of the world's larger traditional corporations. IBM's traditional approach has helped it build phenomenally successful relationships with other traditional-style corporations. Is it difficult for Apple to persuade Fortune 500 companies to relax a little bit, to look at how open and innovative a computer can be?*

Sculley: It was very difficult for a long time. Macintosh was more of a dream and a vision than it was a deliverable productivity tool for what corporate America wanted to be able to do. Not until the Macintosh Plus came out, along with the SE and now the Macintosh II, along

with some very rich productivity software, were we able really to capture the attention of corporate America.

Now we're finding this wonderful, enthusiastic reception. They really do understand that Macintosh offers a genuine alternative which can make tremendous differences in behavior and the way people work. I think there's a growing awareness in corporations that we aren't going to see any significant improvements in productivity until we can make some significant changes in people's behavior.

What other computers did was to continue the behaviors that people have had in the past, whereas the Macintosh actually alters the way people think, communicate, learn. You can look at a document that's created with desktop publishing tools and say, *That's different from anything we've ever done*. You could see that it was created by the people who were actually writing the substance of the document. They didn't have to send it off to some anonymous department which would then take their work and turn it into a document, or maybe not turn it into a document at all.

I think we've whetted many people's appetites. Now they want more and more.

COMPUTE!: *With this success comes growth, though. How do you avoid the risk of bureaucracy—traditional corporate structure—accompanying Apple's expansion?*

Sculley: I think top management's main role is to set the agenda, define the vision of the company, and then get all the obstacles out of the way so that the organization can then achieve the vision.

The obstacles are in most cases the bureaucracy of the organization. We approach this in several ways.

I believe that the network, which has always worked informally in any institution, needs to be given much higher priority. We focus on the network as opposed to the hierarchy. We pay very little attention to job titles, but we pay a lot of attention to internal communication. I spend a lot of my time listening and talking, fact finding. Sometimes I think of my title as *Chief Listener* for the company.

Then I believe there will be

Increase Your Programming

POWER!

COMPUTE!'s Apple IIGs Machine Language for Beginners

Roger Wagner **\$19.95**
The latest in a series of introductory machine language books, *COMPUTE!'s Apple IIGs Machine Language for Beginners* is a clear and concise tutorial to learning the IIGs's native language. Written by noted Apple columnist Roger Wagner, this book includes many programming examples and detailed explanations that make learning 65816 machine language easy. For beginning and intermediate machine language programmers as well as those who know another machine language and want to move up to this fast 16-bit language. A COMPUTE! Library Selection.
ISBN 0-87455-097-1

Mastering the Apple IIGs Toolbox

Dan Gookin and Morgan Davis **\$19.95**
The Apple IIGs merges the consumer software base of the popular Apple II machines with the advanced graphics and intuitive interface of the Macintosh. The Toolbox of the IIGs contains the routines which help the program access the powerful graphics and sound features built into this computer. *Mastering the Apple IIGs Toolbox* sorts the volumes of information and documentation about the Toolbox into a concise and practical reference that makes the Toolbox far easier to use. Some of the topics covered include how to make Toolbox calls, memory management, disk use, graphics, event management, sound, and much more. This book is ideal for the intermediate- to advanced-level C or machine language programmer. A COMPUTE! Library Selection.
ISBN 0-87455-120-X

COMPUTE! brings you two new books to help you access the power and versatility of your Apple IIGs. You'll find in-depth instructions for machine language programming as well as numerous programming examples, explanations on using the Toolbox, and ways to take advantage of the special graphics and sound features of the IIGs. Plus, like all of COMPUTE!'s books, the tutorials are clear, easy to understand, and the programs are fully tested.



To order COMPUTE! books, call toll free 1-800-346-6767 (in NY 212-887-8525) or write COMPUTE! Books, Customer Service, P.O. Box 5038, F.D.R. Station, New York, NY 10150. Customer Service hours are 10:00 a.m. to 12:30 p.m. and 1:30 p.m. to 3:30 p.m. Eastern time, Monday through Friday. Please add \$2.00 per book shipping and handling. NC residents add 5 percent sales tax and NY residents add 8.25 percent sales tax. Please allow 4-6 weeks for delivery. COMPUTE! books are available outside the United States from subsidiaries of McGraw-Hill International Book Company.

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

 www.commodore.ca

some new paradigms, new models that business may follow in the future that are quite different from those of the past.

COMPUTE!: *What sort of models?*

Sculley: During the industrial age, corporate America decided to demonstrate as much self-sufficiency as possible, by becoming as large as possible, and doing everything themselves.

On the contrary, during the information age, there's not just a network that's being formalized inside companies, there is also a network of interdependencies with companies outside the organization. At Apple, we are very dependent upon software developers, upon dealers who sell our products, upon critics who write about our products and inform users. That offers some suggestion as to how companies might want to organize in the future.

COMPUTE!: *How will this approach alter the ways in which corporations grow?*

Sculley: It's very possible that we'll see spinouts from corporations. In fact, we're creating one ourselves right now. With our new software applications company called *Claris*. We're actually taking a group of Apple managers, taking some Apple products, and spinning it out of the company. Apple holds a minority interest in *Claris*, so we can go and create a better entity which, hopefully, will help us sell more computers but also will create a lot of exciting software.

If that works, I expect to see other spinouts from Apple. We can grow, and our enterprise can get larger, but we also offer a wonderful avenue for individuals who don't want to work with a giant corporation, but want to continue to work in a much smaller environment.

COMPUTE!: *Your points of difference with traditional corporations are clearly elucidated in *Odyssey*—perhaps nowhere so clearly as in the book's opening section, where you talk about a personal and professional crisis in very open, emotional terms. Why did you start your book with that level of revelation?*

Sculley: I wanted to shatter the myth that corporate leaders are in-

vincible. We have lived in an industrial age where corporate CEOs are modeled after John Wayne. I felt that in the information age, we have to have companies that are highly flexible, that are going to be taking big chances and sometimes, therefore, making mistakes, we needed to show that leadership must have a side to it that's willing to be human, that's willing to make mistakes in order to learn. Crisis, as painful as it may be, is often one of the most valuable experiences that a company can go through.

COMPUTE!: *From that painful beginning, *Odyssey* builds to a visionary epilogue: A Twenty-First Century Renaissance. It's clear, though, that the world faces many crises, transitions, and displacements on its way toward that Renaissance. How do you see Apple over the coming decades participating in the creation of these new orders?*

Sculley: In the book, I describe the biggest crisis that I foresee, and that's the weakening of the affluent American middle class. For us it's a lifestyle; to the world it's a marketplace. I compare it to the rain forests in Brazil, which are being destroyed each year at a rate comparable to a land mass the size of Arkansas. Yet those rain forests provide some 80 percent of the oxygen for the planet.

The American middle-class marketplace provides the greatest resources for a global, dynamic world economy that we are in for the information age. But we are living beyond our means. We no longer have a clear vision in this country of how we are going to pay for the lifestyle of the affluent middle class in the early twenty-first century. That's the crisis that looms ahead.

The key to the crisis, I believe, is not found in any of the ideas that politicians are setting forth today. They're all focusing on short-term goals. To solve this crisis is going to require a long-term vision. I think the long-term vision is one that is going to build upon rejuvenating innovation—and innovation is really what America was built upon in the first place. Ever since the country was founded and all through the industrial age, we have built on creativity, entrepreneurs, and innovation.

Somehow this has become so large and so institutionalized a country that we have forgotten what our roots are, what our strengths are.

COMPUTE!: *How do we rediscover those roots and reintroduce them into our lives?*

Sculley: To bring back innovation and creativity, the fundamental change must begin with our educational system. We have to revolutionize education. This doesn't mean just spending more money, although that's certainly a factor.

But it also means changing the tools that we give to students and to educators to help people learn. We must prepare them for a very different world that they're going to live in. The world that our education system today is designed for is essentially that of the early industrial age, when people could expect to have a manual job and do it for the rest of their lifetime.

Those jobs rarely exist any more. The jobs of the future are going to require thinking skills. People will probably change jobs—and therefore skills—four or five times during their lives. Our curriculum isn't preparing them for that. So I think there are some wonderful challenges for us in education.

And as I look at how much I have gotten out of my life, I asked how I can give something back. The area that I'm most interested in giving something back is in the area of education.

COMPUTE!: *What about Apple? Where do you think Apple will be at the turn of the century?*

Sculley: I believe that we have a chance of making Apple the most exciting company in the world during the 1990s. I see the epicenter of computing shifting from mainframes to networks such as we have today, and then to connecting people to those networks. This is what Apple is interested in—the individual. I see a wonderful future ahead for a company that can bring the individual and technology together.

My sense is that we are only at the beginning. If Apple continues to pursue this vision without compromises, we have a chance to be real world-changers in the twenty-first century. ©

Choose Your Adventure!



Explore the Great Lakes from Detroit to Buffalo with Scenery Disk # 11. Or navigate the wide open expanses of the western United States with Scenery Disks # 1 through # 6.

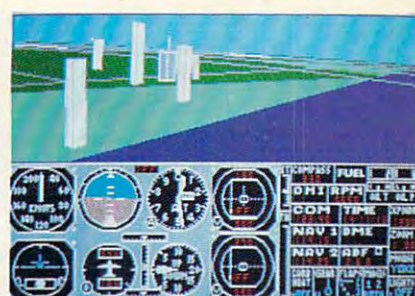
Scenery Disk # 11 features include new airborne hot-air balloons, sailplanes, and a multicolored ground patterning system. Western U.S. Scenery Disks 1-6 provide enough airports, visual cues, and radio nav-aids to support both VFR and IFR cross-country navigation.



subLOGIC
Corporation
713 Edgebrook Drive
Champaign IL 61820
(217) 359-8482 Telex: 206995
ORDER LINE: (800) 637-4983
(except in Illinois)

Go sightseeing from Washington DC to Key West Florida with Scenery Disk # 7. Or choose from the beautiful San Francisco, Japan, or soon to be released Western Europe Scenery Disks.

Scenery Disks # 11, # 7, San Francisco, and Japan are available for \$24.95 each. Scenery Disks # 1 - # 6 are \$19.95 each. For additional product ordering information or the name of the dealer nearest you, call (800) 637-4983. In Illinois, call (217) 359-8482.



See the World! www.commodore.ca

In-House Experts

Putting Professional Skills On Disk

Keith Ferrell, Features Editor

Is there a doctor in the house? Someday the answer might be yes—in those houses equipped with computers. As professional information networks grow more sophisticated, so does the expert software being developed to manipulate the networks' data. Already doctors and lawyers are using computers to help make diagnoses and prepare cases. Before long, we'll see expert systems in the hands of consumers. As artificial intelligence becomes more powerful, computers will increasingly provide expert advice in the home.

One of speculative fiction's classic predictions is the automated doctor. Suppose you had a mechanical physician ready to attend at an instant's notice to your every ache. From that, it's an easy extension to conceive of other computerized professionals. Imagine the convenience of having your own in-house attorney, accountant, and psychologist. Scenarios that once were restricted to fiction are now being regarded with increasing seriousness by members of the professions themselves.

The prestigious *New England Journal of Medicine*, for example, frequently contains articles examining the ways in which computers and medical databases are impinging upon doctors. Last July, *The Journal of the American Medical Association* published a look at "Computer Programs to Support Clinical Decision Making." The popular press has carried many stories, recently, discussing the pros and cons of high finance's growing dependence upon computerized decision-making tools.

What is happening is that the

entry and organization of professional information is approaching critical mass. Medical and legal databases, court and hospital records, clinical and diagnostic analyses, judicial and legislative rulings—all of this data is increasingly accessible via computer. Nor are areas of information isolated—huge networks have sprung up, letting a physician in one part of the world draw easily upon information and advice from all over the globe. As this information has grown more accessible, and computers more powerful, the ways in which the information is examined and assembled, likewise, continue to evolve.

We are fast approaching an age of expert systems, wherein the computer will play an integral role in medical diagnoses and the development of legal and financial strategy, and in making vital contributions to the actual decision-making processes.

Here Come The Experts

Sooner or later, advances at the upper end of computing find their way to the consumer. While we haven't yet reached the point of receiving medical attention or legal counsel via machine, we are increasingly able to draw upon expert software in our own home. At present, that software most often consists of databases made up of words, or stored text—such as standard contracts.

Tomorrow, however, or the day after, we may really have a desktop doctor, or a lawyer accessed through a compact disc interactive (CDI) system, or an automated accountant slaved to our electronic bankbook. None of this is inconceivable. The foundations for interactive professional assistance

are already being put into place, and some of the structure is even now beginning to take shape.

The Word Is Given

At the heart of a profession, side by side with its specialized skills, are words. Every profession has its own vocabulary, its exclusive jargon. Already, those vocabularies are appearing on disk.

Lexicons, or words lists, can be assembled with relative ease, forming a database that consists of properly spelled words. Most word processors now include a spelling checker; many offer a thesaurus. Their acceptance has paved the way for dedicated lexicons—those devoted to specialized vocabularies.

Among the first of these new tools to appear are, perhaps unsurprisingly, professional dictionaries. Two standard professional texts, *Stedman's Medical Dictionary* and *Black's Law Dictionary*, are now available on floppy disk from Reference Software.

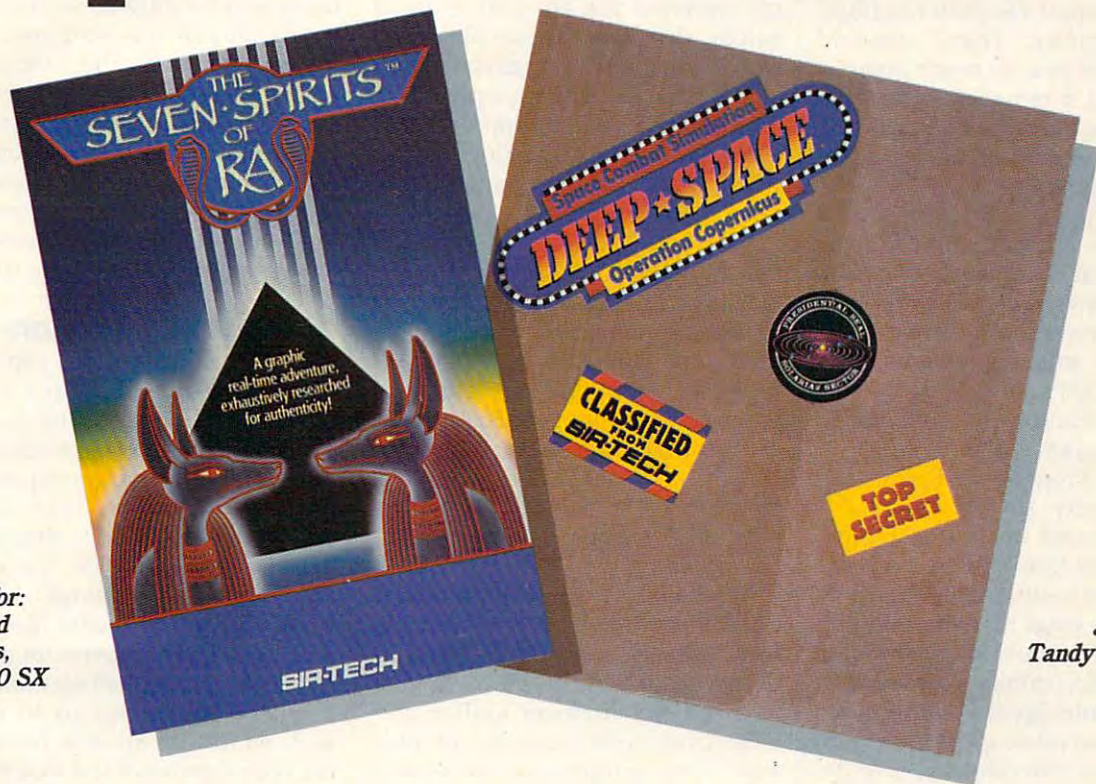
The immediate audience for these packages, of course, consists of doctors and lawyers, although Reference spokesman Scott Sedlik notes a growing consumer interest in the programs. As for the professionals, Sedlik points out that both physicians and attorneys are under mounting pressure from insurance companies to produce only perfect documents—no typos or corrections allowed. The availability of a resident proofreader familiar with legal and medical terms is warmly welcomed by the legal and medical communities.

Strong consumer response to such specialized lexicons is indicative of, among other things, consumer desire to know more about the professional services they com-

Challenging Missions:

From a mythological past

To a dangerous future



Available for:
IBM PC and
compatibles,
Tandy 1000 SX
& EX.

Available for:
IBM PC
and compatibles,
Tandy 1000 SX & EX,
C64/128 and
Apple II Series.

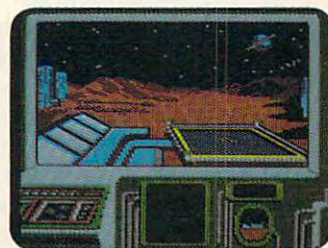


The Seven Spirits of Ra™ challenges you to an adventure from 3,000 years ago! Experience the authentic drama of an ancient Egyptian myth. Fight through tombs,

pyramids, caverns and swamps. Test your mind against complex, multilevel passages, overcome sudden perils and surprises from evil forces, guardian demons and villains.



The dangerous DEEP SPACE™ assignment: Operation Copernicus. Check your Top Secret Flight Dossier, then launch your fully armed Starship on four thrilling combat



missions. Your high-tech cockpit offers Dashboard and Out-of-Cockpit Views, detailed Quadrant Maps and Damage Control Reports. But beware! Many space enemies await you!

New from

™Trademarks of Sir-tech Software, Inc. Apple is a registered trademark of Apple Computer, Inc. C64/128 are registered trademarks of Commodore International. IBM is a registered trademark of International Business Machines. Tandy is a registered trademark of Tandy Corporation.

SIR-TECH

Sir-tech Software, Inc.
P.O. Box 245, Ogdensburg,
NY 13669
(315) 393-6633

www.commodore.ca

mission and require. While word lists do not pretend to be anything on the order of an expert decision-making system, words *do* have power. By learning the vocabulary of a field, we take a large step toward being better able to evaluate advice given us by actual experts.

Step Up To The Bar

Once the vocabulary is available, it's a logical step to begin building structures of words. Like lexicons, templates are fairly easy to assemble and store on disk. Templates provide another consumer marketing opportunity: That "standard contract" we hear so much about is nothing but a template, a text file whose basic elements don't change, but which contains blank spaces for those elements that *do*.

Microlawyer, from Progressive Peripherals, is a collection of legal text files, or templates, of many types. Mortgages, leases, wills, affidavits, powers of attorney, purchase and sale agreements, and other examples of standard legal forms and documents are included on the program's disk.

While Progressive Peripherals states clearly on *Microlawyer's* packaging, and in its documentation, that the forms are best used as a step-saver between client and attorney, it is clear that the program offers a fairly powerful legal tool to the average consumer. Nor is *Microlawyer* an intelligent system; it is a text base that relies upon the intelligence of the individual user to determine the appropriate template.

Whether or not computers will begin providing actual advice remains open to debate. Many of us are willing, for example, to call up a will template; few of us would be interested in having our computer designate the heirs of our estate.

Diagnosis And Prevention

Some medical advice is already available on disk for in-home use. Navic Software's *Family Medical Advisor* has been on the market since 1983, providing users with access to a medical glossary of close to 10,000 separate medical terms. The program's interface relies upon yes/no questions to relate symptoms to its database. Depending upon the answer given, *Family Medical Advisor* responds by sug-

gesting one of several hundred diseases in its database.

In schools, any number of computer programs are helping to educate students about the nature of disease, the workings of the body, and the effects of substance abuse. Again, we see that increased computer intelligence is fostering, first, tools for increasing our own intelligence and expertise.

One area in which computers can play an active part is in preventive medicine. Sound health habits, good nutrition, and sensible physical regimens are all vital to good health. Programs are available by which consumers can analyze their own habits, developing a picture of those areas in which improvement is called for, and suggesting areas in which deficiencies or danger signs need to be addressed.

PC Psychologist

Nor are the consumer medical products restricted to physical medicine. Heuristic Research has recently begun marketing a program called *Mentor*, which serves as a psychological tester accessed via IBM PC and compatible computers. Developer Vladimir Asinovsky describes his product as "psychometric software."

Based on the standard and nonstandard IQ tests familiar to us from schools and employment interviews, Asinovsky views *Mentor* as a self-development tool. It provides users with the ability to measure their intelligence in several areas, from verbal and mathematical skills to depth and sound perception, as well as reaction time.

He stresses that although the program generates scores based upon accepted psychological standards, *Mentor* is not judgmental. Its interactivity is aimed at self-improvement, showing areas of strength as well as weakness. As for the computer, Asinovsky feels that it is "the second-best intellectual tool ever invented." The first, he believes, remains the book.

Financial Controversies

One of the first home applications suggested for microcomputers was household financial management. Balancing the checkbook, keeping track of mortgage and other payments, and following investment

earnings are all applications that have generated consumer software.

Simultaneous with the growth of such consumer software has been the shift of our financial infrastructure to an electronic base. A topic, in fact, of much controversy, of late, has been the growing dependence of Wall Street on computerized trading, in which software plays as large a part in buy/sell decisions as do stock brokers.

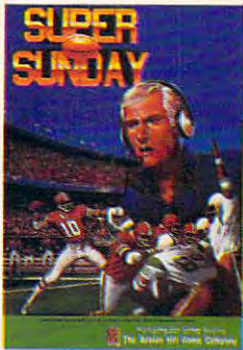
Similar questions can be applied to home financial software. At present, the advantage of financial management software is the picture it provides of our economic well-being. Certainly the computer's ability to manage data and generate rapid calculations and projections has found an appreciative home audience. But that audience's enthusiasm may not extend to permitting the computer to play an active role in *deciding* how money is spent.

Compact Counselors

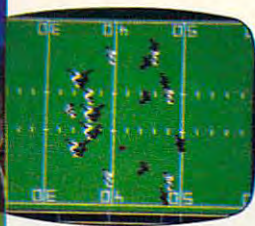
As an intellectual tool, computers have grown phenomenally in power and capability over the past decade, but remain very much in their infancy. Real in-house experts will come in other forms than lexicons and templates, and other media than magnetic disks. Computers are already increasingly able to work with other media. Reference Software, in fact, views its dictionary disks as only the beginning. The company elected to go to market with word lists on disk because of the convenience of the disk format. Farther ahead, though, is the possibility of putting the entire *Stedman's* or *Black's* dictionary on CD ROM—compact discs whose memory can be read many times but upon which the user cannot write.

The appeal of compact disc—or any optical technology such as CDI or laser storage—is the huge increase in information storage that becomes available. The larger the number of variables upon which the computer can act, the more accurate the advice that emerges at the end of the process. Additionally, these new media permit much faster access, examination, and comparison of the information they contain. More variables can be analyzed more quickly than is possible with magnetic disks.

The ability to manipulate larger



BIG LEAGUE SPORTS



SUPER SUNDAY—Armchair quarterbacks the world over have made SUPER SUNDAY the best selling computer football game. This we attribute to the right blend of graphics, game play and especially statistics, because that's what sets Avalon Hill sports games from the pack. The vicarious experience of coaching real-life players, second guessing your computer or human opponent and the feeling of BEING THERE will send you back to SUPER SUNDAY over and over again. Support of the game system also makes it distinct. You can get the entire '84, '85 or '86 season disks with rosters and stats for all the big league team starters and interchange teams of the past and present. The all new General Manager's Disk (also available separately) allows you to create "dream teams" in setting up your own Pro Football draft. Available for Apple® II, C® 64/128, IBM® PC for \$35.00

NBA—We have taken the same concept as SUPER SUNDAY from the field and put you down on the court in NBA, the definitive pro basketball game. Licensed by The National Basketball Association, NBA gives you the same flexibility, visuals and real-life player stats so you can coach the Celtics dynasty, Kareem, Magic and the Lakers or eighteen other great pro B-Ball teams. Available for Apple® II and C® 64/128 for \$39.95; IBM® coming soon.



STATIS PRO BASEBALL—It's funny that America's favorite sports pastime has not been our best selling computer sports game. Maybe it's because you haven't known about it 'til now. COMPUTER STATIS PRO BASEBALL (based on our best-selling board game) has elicited countless letters of praise from computer baseball fanatics and stat buffs alike. Although it lacks the graphic flair of SUPER SUNDAY and NBA, it's a dandy of a stat baseball game ... and offers more game utilities right on the Master Game disk than any others—such as DESIGN YOUR OWN TEAMS, STAT COMPILER and DRAFT YOUR OWN TEAMS functions. Also, we offer ten past season disks. Available for Apple® II and C® 64/128 for \$35.00

Look for our games wherever good software is sold, or call direct for ordering information ... AVALON HILL, the first name in sports and strategy games!

Dial 1-800-638-9292. Ask for Operator C11.



microcomputer games DIVISION



The Avalon Hill Game Company

A MONARCH AVALON, INC. COMPANY

4517 Harford Road ★ Baltimore, MD 21214

amounts of data faster is only one aspect of the emergence of in-house expertise. And perhaps it is not the most important aspect. Medical diagnoses, for example, require more than just data. There is an almost intuitive relationship between diagnosticians, their patients, and the body of medical knowledge. Medicine and law are not just book learning; the professions consist of more than just collections of information.

The challenge facing developers of expert systems is to find a way of replicating that intuition on a computer. It is a challenge that will not quickly be solved, but which is being taken seriously, with strides toward intuitive systems being made almost daily.

Our Litigious World

How willing will we be to accept medical or legal advice from machines? It is, after all, one thing to use your computer to check the spelling of *pellagra*, quite another to expect your PC to prescribe pharmaceuticals.

Other questions arise. Virtually all of the medical, legal, and financial software available today carry boldfaced disclaimers advising users that the software is intended as an adjunct for professional advice, not a replacement for it. Should reliable expert in-home systems become available, one can imagine as much resistance from the professions themselves as from consumers.

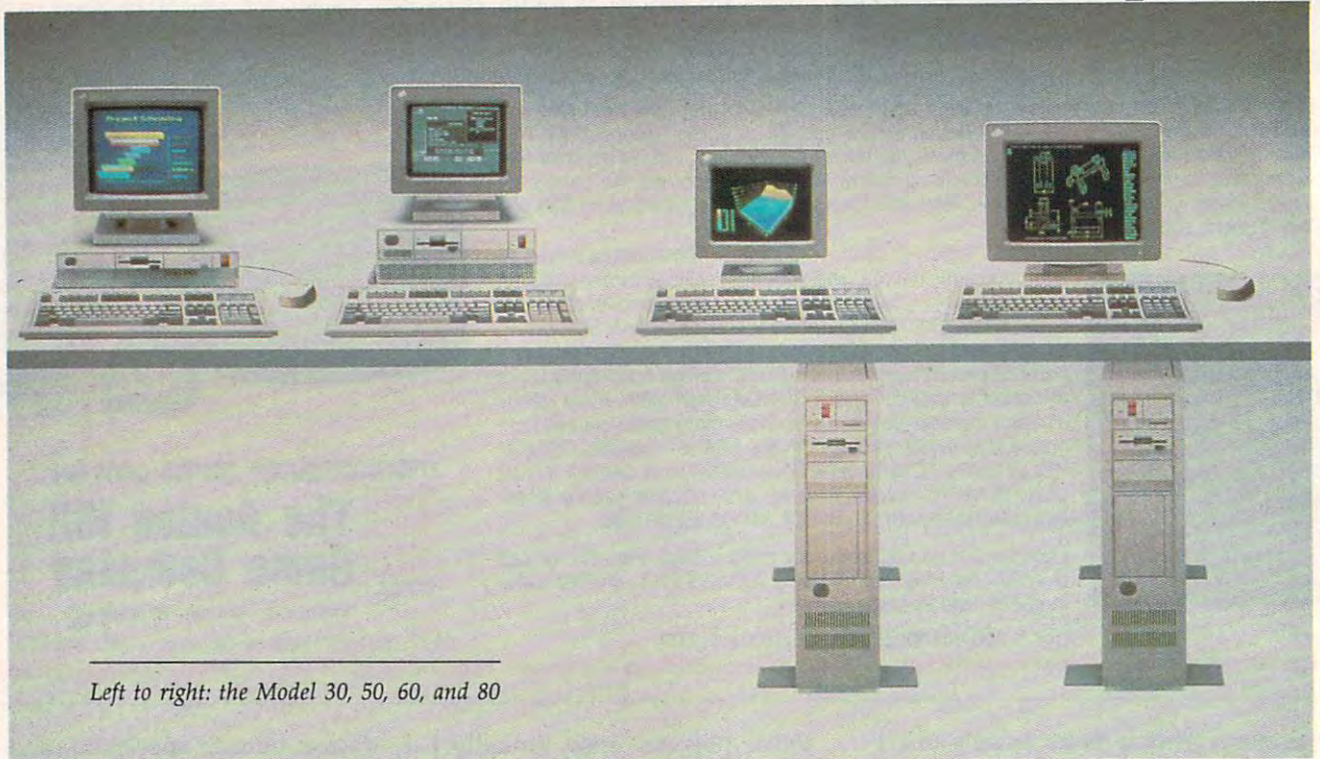
Additionally, there is the question of responsibility. We live in a litigious world. Suppose a computerized diagnostician makes an error that results in harm to a patient. Who bears the responsibility for the misdiagnosis? The computer? The software developer? The consumer who relied upon the computer in the first place? There are risks as well as advantages to depending upon computers for important matters.

A likelier scenario than a computer which serves as the sole source of advice, is one in which the home computer becomes part of a huge network consisting of other computers and databases, the fam-

ily doctor, outside specialists, and consultants. The medical profession has already reported many cases in which just such a network aided in tricky diagnoses. We have long since reached the point at which the body of computerized professional data far exceeds the ability of any single professional, or even team of professionals, to retain it.

The computer's ability to put experts in touch with other experts, with consumers, and with the accumulated experience and knowledge of previous generations, is one of information technology's great gifts. Whether or not we ever reach the point of active expert systems is an exciting question, but also a moot one. We are entering an age in which the computer can contribute to making each of us, ultimately, more expert. ©

IBM's Newest Entry:



Left to right: the Model 30, 50, 60, and 80

The Personal System/2

Dennis L. Foster

What does IBM's newest line of computers offer? Are they truly compatible with PC software? What about video display and add-on boards? These questions and more are answered in this excerpt from COMPUTE! Books' just-released Inside the IBM Personal System/2 by Dennis Foster.

IBM calls its newest microcomputer line *Personal Systems* (as opposed to the former idiom, Personal Computer, or PC) to stress that each model is integrated and contains built-in components that were once add-on options on older PCs.

This approach is carried out through two important design concepts: The components are interlocking, which eliminates most interior-mounted cables and switches, and the computers are self-configuring, meaning that they are capable of sensing what components or options are installed and can make the necessary internal adjustments automatically.

Here's an example of the differences between the old way (that is, with an IBM PC or clone) and the

Personal System/2's self-integrating approach. To add a hard disk to an IBM PC, you first needed to install a controller board in an available expansion slot, then mount the disk, install two cables between the controller and the disk, and change internal switch settings on the circuit board. Often, you had to purchase the controller board and the drive separately.

In most cases, the computer's power supply wasn't capable of handling the extra load and had to be replaced as well. Some hard disks even required low-level formatting with the operating system debugger. This invariably required you to specify an interleaving factor.

It was not much easier to add a printer port, change from a mono-

chrome to a color display, or set up the computer to use a modem.

The Personal System/2 asks only that you plug in the desired new module. Want to add a hard disk? Just slide it in and connect the cable: The controller is already installed. Want to change to color graphics? No problem—all the hardware, except the monitor, is already installed on the system board (which IBM now calls the *planar board*). Printer, modem, and mouse connections are also built in.

All Personal System/2 computers use 3½-inch floppy disks and IBM PC DOS Version 3.3. This DOS version includes sophisticated software that speeds up data access.

The smaller disks are easier to store, are more portable, and are sturdier than the older 5¼-inch floppy disk. Yet the Model 30's 3½-inch drive writes twice as much data per disk (720K) as the old IBM PC's double-sided double density drive. The floppy drives on the Models 50 and higher write up to 1.44 megabytes on a single 3½-inch disk.

To support the smaller drives, IBM PC DOS had to be modified. Early attempts to control 3½-inch drives in the PC DOS environment were not satisfactory. To overcome initial problems, Version 3.3 (released for use with the Personal System/2 family) incorporates a sophisticated caching scheme whereby the drive reads an entire track in a single pass. The data is then *cached* temporarily in memory where it can be accessed with near-instant speed, virtually eliminating the problem of disk access time. The key to this scheme is the ability to cache only that data most likely to be used by the current program on a repeated basis.

A third feature common to all models in the series is high-quality graphics, supporting either monochrome or color displays. To select a display mode, you simply plug in the IBM analog monochrome monitor or analog color monitor of your choice. Standard monochrome, color, and RGB monitors which could be used with the IBM PC are not compatible with any of the Personal System/2 models. The entry-level Model 30 uses a color graphics subsystem called *Multi-Color Graphics Array (MCGA)*. The Model 50 and higher incorporate an even

more advanced graphics system called *Video Graphics Array (VGA)*.

Components Of The Model 30

At the low end of the Personal System/2 line, the Model 30 desktop system comes in two configurations: the basic 30-002, which has two 720K, 3½-inch floppy drives, and the hard disk-based 30-021, which has one 720K floppy drive and a 20-megabyte fixed disk.

With its Intel 8086 processor running at a clock speed of 8 MHz (compared to an IBM PC XT with an 8088 processor running at 4.77 MHz), the Model 30 is closest in design and performance to the IBM PC XT. The faster clock speed means faster processing.

Both configurations include 640K standard memory (RAM). Compare that to the IBM PC's 256K RAM. To build up to 640K, a PC user needed one, possibly two, add-on memory cards (depending on the manufacturer) and no fewer than 80 plug-in RAM chips in increments of 64K.

The built-in MCGA graphics system supports both text and graphics modes, without any add-on display adapters. In text mode, the display produces an impressively clear character, 8 pixels by 16 pixels—better than some monochrome displays. The graphics mode offers a 320 × 200-pixel resolution with 256 different colors. A 640 × 480 resolution can be achieved by limiting the palette to two colors.

But the real reason the Model 30 is capable of producing such stunning graphics is its mix of 256,000 hues, delivering full color images with near-lifelike precision. That's approximately 255,700 more colors than Rembrandt used to paint his most famous masterpiece, *The Night Watch*. With an IBM analog monitor, the image translates into 64 shades of gray. By contrast, that's roughly four times more variation than a wireless photo, and about two-thirds as much tone as a good black-and-white TV picture.

The Model 30 is the only member of the Personal System/2 fam-



Color display on the Model 30

ily that truly bridges the gap from the IBM PC environment to the Personal System/2. Although all models operate with IBM PC DOS 3.3 or higher, and therefore will theoretically run a large body of software already developed for IBM PCs, only the Model 30 accepts standard IBM-compatible expansion boards.

Placing the Model 30 in historical perspective, it combines the efficiency and storage capacity of the IBM PC XT with the glitter of enhanced, Macintosh-like graphics. Its promise is to make IBM PCs and their lookalikes seem like primitive forebears in comparison.

Components Of The Model 25

A subset of the Model 30 is the Model 25, a specially packaged Model 30 modified with the educational market in mind. The Model 25 is marketed both as a stand-alone system and, alternatively, as a Collegiate Kit including a mouse

device and four floppy disks.

Although it has a separate model number, the Model 25 is largely identical to the Model 30, except in the following respect: Whereas the Model 30 is modular in design, the Model 25 is completely integrated. In fact, even the monitor casing is physically attached to the system unit. Thus, there are two different versions of the Model 25—monochrome and color—even though both versions include the MCGA video interface. In other respects, the Model 25 is a stripped-down economy edition of the Model 30.

The monochrome version (8525-01) includes a built-in 12-inch analog display, and the color Model 25 (8525-04) has an analog color display of the same size. As with the standard Model 30, both versions of the Model 25 include integral serial and parallel ports and a mouse port. The processor is the same 8086 chip used in the Model 30. The regular Model 25 is

fitted with 512K RAM; the collegiate version has 640K on the planar board.

The Model 25 Space Saving keyboard is a modified version of the professional-style keyboard supplied with the other Personal System/2 models, containing all the same keys except for the numeric pad. By eliminating the traditional accounting-style number keys on the right side of the keyboard, IBM hardware designers were able to lop four inches off the length. The standard IBM Enhanced Keyboard is available as an optional upgrade to the Model 25.

Besides the choice of color or monochrome CRTs, the Model 25 comes with either one or two 720K, 3½-inch floppy disk drives. An external 5¼-inch floppy disk drive is sold separately as an option. However, unlike its big-brother Model 30, the Model 25 does not have a formal hard disk option. The hard disk controller that is included on the Model 30 planar board is absent

Personal System/2 Model Comparison Chart

	Model 25	Model 30	Model 50	Model 60	Model 80
Processor	8086	8086	80286	80286	80386
Standard RAM	512K	640K	1MB	1MB	1 or 2MB
Maximum RAM	640K	---	7MB	15MB	16MB
Clock Speed	8 MHz	8 MHz	10 MHz	10 MHz	16 or 20 MHz
Video Display	MCGA	MCGA	VGA	VGA	VGA
Character Box	8 × 16	8 × 16	9 × 16	9 × 16	9 × 16
Resolution	300 × 200	300 × 200	640 × 480	640 × 480	640 × 480
Colors	256	256	256	256	256
Expansion Slots	1 full-size 1 half-size	3 (8-bit)	3 (16-bit)	7 (16-bit)	4 (16-bit) 3 (32-bit)
Power Supply	70 W	70 W	92 W	207 W	225 W
Floppy Drives	3½-inch 720 K	3½-inch 720K	3½-inch 1.44MB	3½-inch 1.44MB	3½-inch 1.44MB
Hard Disk		20MB Optional	20MB Standard	44MB Standard 70MB Optional	44MB Standard 70MB Optional 15MB Optional 230MB
HD Expansion	---	---	---	185MB	230MB
Operating System	DOS 3.3	DOS 3.3	DOS 3.3 OS/2	DOS 3.3 OS/2	DOS 3.3 OS/2
Weight	33 lbs.	17 lbs.	23 lbs.	52 lbs.	52 lbs.
Potential System Throughput	More than 2 times PC	More than 2 times PC XT	Up to 2 times PC AT	Up to 2 times PC AT	Up to 3½ times PC AT

from the classroom-oriented Model 25.

Moreover, the Model 25 has only one and a half expansion slots, both PC-compatible. The half-slot accepts only shortcards, such as an internal modem or a second asynchronous adapter. A use that comes readily to mind for the full-size slot is a hard disk card, containing a 3½-inch fixed disk on a printed circuit board.

Despite these variances in the way the hardware is packaged, there are no real architectural differences (only omissions) to distinguish the Model 25 from a standard Model 30. Therefore, throughout the remaining sections of this article, when we refer to the architecture of the Model 30, we imply the Model 25 also.

Components Of The Model 50

If the Model 30 is a superpowered offspring of the IBM PC XT, then the Model 50 may rightly be termed the Personal System/2 remake of the PC AT. Like the AT, the Model 50 uses the Intel 80286 processor, but runs at 10 MHz, compared with the PC AT's 8 MHz clock speed. The Model 50 also incorporates a full megabyte of RAM on the planar board, expandable to seven megabytes.

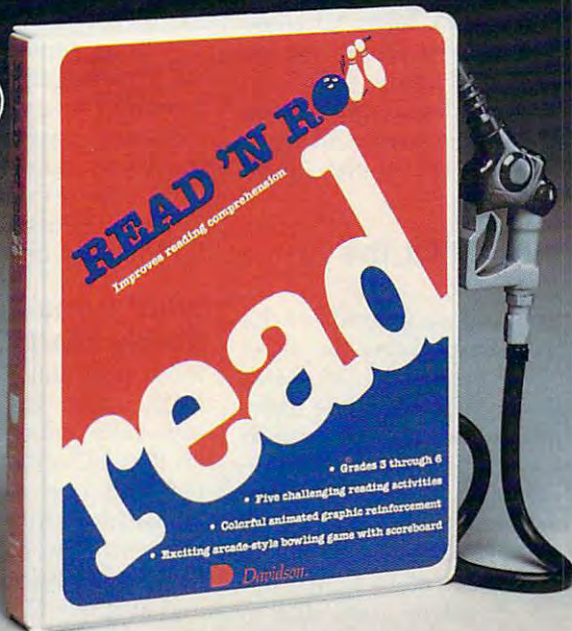
The standard configuration includes a single 1.44 megabyte 3½-inch floppy drive and a 20 megabyte internal fixed disk.

The Model 50, 60, and 80 all include a built-in VGA graphics subsystem. The graphics controller supports three color modes: 640 × 480-pixel resolution with 16 colors, 320 × 200-pixel resolution with 256 colors, or 320 × 200-pixel resolution with 16 colors. (The term *pixel* refers to a single dot on a screen.) In text mode, the system offers 720 × 400-pixel resolution with 16 colors and a 9 × 16-pixel character box. In other words, VGA equips the Personal System/2 with graphics capabilities on a par with the most powerful add-on display adapters sold for use on IBM PCs. The result is an image reproduction at least as satisfactory as the Apple Macintosh, in a PC-like hardware environment.

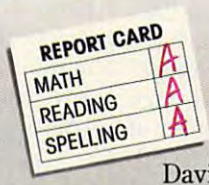
There are three available expansion slots inside the Model 50.

HIGH GRADE FUEL.

NEW



Davidson's new Read 'N Roll is the highest octane reading software program you can buy for your kids. Formulated by teachers to grow with kids and help them develop the 5 basic reading comprehension skills.



Read 'N Roll pumps in confidence and love of reading, and prints out Certificates of Excellence.

With 320 high-interest reading passages, exciting graphics and color, and an action-packed arcade-style game, Read 'N Roll makes reading fun. And new pull-down menus are easy to use with keyboard or mouse.

So pull into your local software dealer and pick up the highest performance

reading software around—Read 'N Roll.

Call us toll-free for more information and the name of the Authorized Davidson Dealer nearest you.

800-556-6141 or 213-534-4070
(California residents)

For grades 3 through 6
Available for Apple® and IBM®
\$49.95 suggested retail



Return this coupon to enter our monthly drawing for \$100 worth of free Davidson software.* We'll also send you more information about all the high grade programs available from Davidson.

Name _____
Address _____
City, State, Zip _____
Type of Computer _____

Davidson & Associates, Inc.
3135 Kashiwa St., Torrance, CA 90505

*NO PURCHASE NECESSARY. Offer ends Dec. 31, 1988. Void wherever prohibited or restricted by law. Odds of winning will be determined by total number of entries received.



Davidson.

(Actually, there are four slots, but one is reserved for the hard disk controller card.) These slots will not accept cards designed for the original IBM PC expansion bus. With the Personal System/2 Model 50 and higher, IBM introduced a new expansion bus called *Micro Channel Architecture*. This system uses a different connector, pin arrangement, and card size from the previous expansion bus. There are currently two versions of the Micro Channel Architecture bus—a 16-bit version for systems based on the 80286 microprocessor, and a 32-bit version for 80386-based systems. All three Model 50 slots are of the 16-bit version.

Components Of The Model 60

The Model 60 is an upgrade of the Model 50, incorporating the same Intel 80286 processor, 10 MHz clock speed, and 1 megabyte internal RAM. The Model 60 also offers as standard equipment a 1.44 megabyte 3½-inch floppy drive, but offers a 44 megabyte hard disk (Model 60-041) or a 70 megabyte hard disk (Model 60-071). An optional 115 megabyte hard disk is also available for the Model 60-071.

Both Model 60 versions have expandable RAM, up to 15 megabytes maximum. Hard disk storage can be expanded to a maximum of 185 megabytes. Like the Model 50, the Model 60 has a sophisticated VGA graphics subsystem included on the planar board.

The Model 60 has seven Micro Channel Architecture expansion slots, all 16-bit versions. (Actually, the unit has eight slots, one of which is reserved for the hard disk controller card.) As noted, these slots will not accept cards designed for older PC models.

Components Of The Model 80

The Model 80 represents IBM's acknowledgment of the potential of desktop computing. It combines the power of the 80386 processor with VGA graphics and expandable RAM up to 16 megabytes in size. With up to 230 megabytes of hard disk storage, the Model 80 compresses the power of a warehouse-sized mainframe costing several millions of dollars into a small

package about the size of a suitcase and costing around \$10,000.

The Model 80 comes in three standard configurations: the 80-041, with a 16 MHz clock speed, one megabyte of RAM, and 44 megabytes of hard disk storage; the 80-071, running at 16 MHz, with two megabytes of RAM and 70 megabytes of hard disk storage; and the 80-111, with a 20 MHz clock speed, two megabytes of RAM, and 115 megabytes of hard disk storage.

Every Model 80 includes a single 1.44 megabyte 3½-inch floppy drive and seven Micro Channel Architecture expansion slots—four of the 16-bit variety and three 32-bit slots. (The Model 80 actually has five 16-bit slots, but one is reserved for the hard disk controller card.)

What Does It All Really Mean?

What does the Personal System/2 really mean for the typical user, especially one who recently owned an IBM PC or MS DOS-based system and now wants to make the transition? Although much has been written about the Personal System/2's technical specifications and engineering design, little has been done to interpret them in a practical light. The following information provides the answers to a few fundamental but significant questions.

Is the Personal System/2 compatible with existing software written for the IBM PC? All models run IBM PC DOS 3.3 and, in theory, should run application programs written with the IBM PC in mind. However, several users have encountered several problems attempting to run some packages that rely on assembly language graphics routines. In general, programs designed for the IBM PC which write to video RAM and which require a color/graphics board should be considered suspect until proven otherwise.

Most PC DOS or MS DOS software which does not rely on a color/graphics adapter should run without problem. On a Model 30, there is very little worry about compatibility. Aside from the graphics interface, the Model 30 is code-compatible with virtually every program written for the IBM PC.

OS/2 provides a DOS com-

patibility feature, but the 80286 and 80386 instruction sets are not totally upward-compatible with 8088/8086 code. Moreover, some programs use critical timing loops that will not work at all on the advanced hardware. In general, most applications programs will have to be rewritten especially for OS/2 before they will run on the new operating system.

How can IBM PC software contained on a 5¼-inch floppy disk be transported to a 3½-inch disk? The most economical way is with a IBM Data Migration Facility, which connects an IBM PC to a Personal System/2, via a standard parallel printer cable. With this option, any files stored on the PC can be copied directly onto the Personal System/2 computer's floppy or fixed disk.

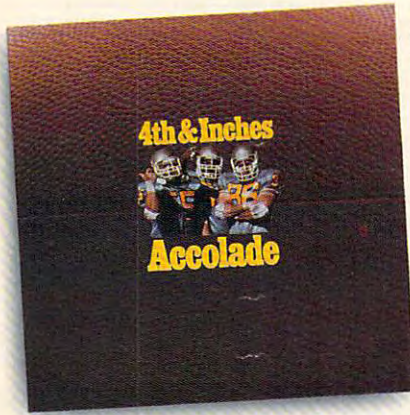
The setup requires an IBM PC and a Personal System/2. An alternative is to attach an add-on 3½-inch disk drive to an IBM PC, running DOS 3.3 or higher. Format the disk and copy the files you wish to transport from the PC's 5¼-inch floppy drive or fixed disk to the 3½-inch disk.

Yet a third alternative is to purchase and install an external 5¼-inch floppy drive for the Personal System/2.

Can standard monochrome, color, or RGB monitors be used with any model of Personal System/2? No. Both the MCGA (Model 30) and VGA (Model 50, 60, and 80) graphics subsystems require analog monitors. The standard monitors used with IBM PCs and their clones are incompatible with the Personal System/2 family.

Can add-on boards designed for IBM PCs be used with any Personal System/2 models? Only the Model 30 supports the 8-bit IBM PC-compatible expansion boards, and there are only three available expansion slots. However, with high-resolution graphics, 640K RAM, and both serial and parallel ports already built in, there are not many reasons to install add-on peripheral boards.

The Model 50, 60, and 80 have expansion slots, but they accept only cards specifically designed for the new Micro Channel Architecture bus. ©



Accolade's 4th & Inches puts you in direct contact with some very special friends. Big, fast, mean and ugly friends who would like nothing better than to break your joystick.

When was the last time you needed oxygen to play your computer?

4th & Inches gives you all of the hard-hitting action of real football: the bombs, the blitzing, the goal line stands. You'll experience graphics and animation that are as riveting as a blind side hit.

As the key player on defense, you've got to have speed, stamina and smarts. As the quarterback, you've got to read an unforgiving defense that takes no prisoners. To win, you'll need all the jukes of a #1 draft choice plus the tactical genius of a veteran head coach.

So, now you and your new friends can share all the sportsmanship and comradery of real football playing Accolade's 4th & Inches. And to show there's no hard feelings, they'll even sign your cast. Available for Commodore 64/128.

Accolade, 20813 Stevens Creek Blvd., Cupertino, CA 95014.

ACCOLADE



**You'll meet some of
the nicest people
playing 4th & Inches.**

DeluxeVideo 1.2 For The Amiga

Larry White

Requirements: Amiga with a minimum of 512K, and Kickstart 1.2.

[Ed. Note: Larry White is technical director of Modern Photography magazine.]

This is it: a program that takes full advantage of everything that is Amiga—high-quality graphics with animation, sound and music, and even multitasking. This program might well be reason enough to justify the purchase of an Amiga.

DeluxeVideo lets you create animated scenarios that can range from something as simple as a drawing slowly fading in and out, to a full-fledged video that shows characters moving in all directions, and has sound effects and even background music. The package contains four disks and a comprehensive manual. The manual, written clearly and concisely, contains step-by-step instructions for the first-time user, as well as very advanced topics and references for experienced and even professional users.

After a quick pass through the first chapter of the manual, I booted the Player disk to check out the demos. An icon of a VCR appeared next to a drawer labeled *Videos*. Clicking the mouse with the pointer on the video drawer produced a window containing several little video tape icons, one labeled *Demo*. Clicking on this started things rolling.

Animated charts and graphs appeared accompanied by various sound effects. Then came a short "commercial" proclaiming the virtues of an automobile that sped off toward the horizon. That was impressive, but it was hard to believe what happened next. After a short, clever, humorous math lesson, my monitor began to play the famous opening chords of *2001: A Space Odyssey* ("Thus Spake Zarathustra") as a scene of a space shuttle on its launch pad appeared. The shuttle blasted off with a roar, and then the scene switched to a view of Earth with the shuttle coming toward me. Next, an astronaut waving his arms approached a spaceship de-

manding, "Open the pod bay doors, HAL." In a frighteningly familiar voice, the computer replied, "Sorry, I can't do that, Dave." I was stunned.

Hands On

I couldn't wait to work through the tutorials and create my own videos. It didn't take long. After a few hours, I had reconstructed the shuttle sequence from the various components on the disk—background drawings, objects (smaller drawings that are moved like sprites and bobs), sound effects, and music. To get the most out of *DeluxeVideo*, you must use it in concert with other programs. Any program that can create drawings or music in the IFF-file format can be used to produce pictures, objects, sounds, and music, which you can then choreograph using *DeluxeVideo*.

I decided to make a short title sequence for some home videos that I was editing. I began by digitizing a camera with its flash in the up and down positions by using *Digi-View* from Newtek. I used a companion paint program, *Digi-Paint* (also from Newtek), to remove unwanted background. Using EA's *Deluxe Paint II*, I then combined and copied the drawings to create a sequence. I drew a series of expanding white and yellow ovals over the flash to simulate the flash firing.

With a utility named *Framer* from the *DeluxeVideo* Parts & Utilities disk, I changed the sequence into a four-frame animation. This procedure is remarkably simple: Specify the number and layout of frames (in this case, two rows by two columns), use the mouse to grab a grid, and then position and stretch it so that each drawing is completely enclosed in a separate rectangle. I suggest that you keep your drawings fairly simple and use few colors to conserve memory. Unfortunately, *DeluxeVideo* gives you no easy way to calculate just how much memory the object will need, and I had to try more than a few times to design one that would work. (A utility named *Vidcheck* will help, but only after the video has been created). Select *Animate* from the menu to view the sequence.

To add the whirring sound of the camera's winder to my video, I used the *Future Sound* digitizer and software from Applied Visions to create a digitized sound file of the actual camera noise.

I chose to leave the background blank (so that I could later replace it with live video via a genlock accessory), but I could have used any IFF-file drawing made with any paint program as a background.

Like A Time Line

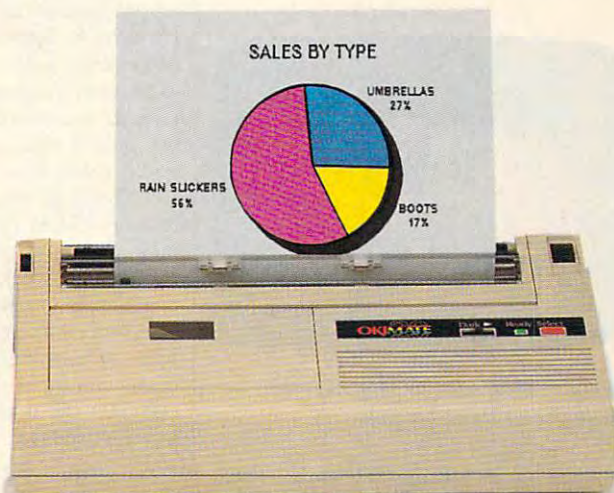
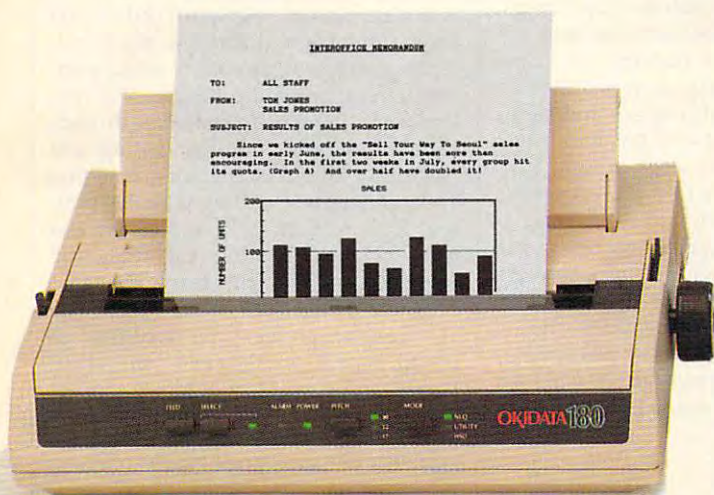
Using *DeluxeVideo* is like working with a time line. The main screen has a time bar across the top of the display.

Icons representing tracks (video, control, foreground, background, music, and control) are placed on the left side. Effect icons (scenes, fades, size, play, and so on) are then placed along each track line, with arrows indicating the start and end times for each effect. Clicking on an effect icon lets you set or change the attributes of the effect.

When you select *scene*, the "video" screen is replaced by a similar screen, except that now the time bar represents the duration specified for the specific scene. Tracks can now include object, picture, text, and sound. Choose object and the computer will request the name of an object file. Using the effect icons, you can specify when the object will be loaded from disk, when and where it will appear on the screen, where it should move to, and how long it should take to get there. If the object has been created as an animated sequence (like my flashing camera), you can specify when to start and stop the sequence, and even in which order to play the individual frames.

I specified that after loading the "camera" from disk, it should appear in the upper left corner of the screen; then, during the next 4.3 seconds, it should move to the lower right corner, disappearing at the end. (You can do this by specifying the screen coordinates, or by moving a scaled box within a rectangle, or by switching to a screen that lets you position the actual object on the full screen). While all this is going on, the object should sequence through the four frames, three times. Instead of just four frames (A,B,C,D), I used a se-

All work and some play.



The New OKIDATA 180 and the OKIMATE® 20: Office Quality and Home Versatility.

When the work you do at home needs to look good enough for the office, you need one of these two printers.

Get the new OKIDATA 180 and get crisp near letter quality printing at time-saving print speeds. Enjoy its easy-to-use push-button front panel, easy paper handling and ability to print on anything from letter-head to four-part forms.

And, for pure compatibility, use its dual Commodore® and Epson®-compatible parallel interface.

Take home the OKIMATE 20 and unlock the power of color graphics and 24-element quality.

Give life to your letters with sharp NLQ printing and a choice of built-in fonts. And add impact to your overheads with acetates in hundreds of colors.

The new OKIDATA 180 and the OKIMATE 20 both work beautifully with either your Commodore 64 or 128, your IBM® PC or compatible, Tandy® and most Apple® computers.

These two printers bring home the OKIDATA tradition of toughness you know from the office. *At a price that could convince you to buy both.*

Call 1-800-OKIDATA, Ext. 25, for the name of the retailer nearest you.





A scene from DeluxeVideo 1.2: An animated shuttle blasts off, accompanied by background music and a roar.



Sample titles, such as this one, are included with the package.

quence of A,A,B,C,D,B,C,A,A, which stretched and enhanced the effect of the simple animation. By selecting *view scene* from the pull-down menu, I could make any necessary adjustments, while playing the scene, until I was satisfied.

On the sound track, I played the file containing the digitized sound effect of the motor three times—starting just after, and ending just before the object sequence.

For another scene, I used *DeluxeVideo's* special polygon text to spell out my title. With this text, you can animate a title and even rotate it in three dimensions so that it appears to be coming out of the screen right at you.

Returning to the main video screen, I added a music track and specified an upbeat little ditty from EA's *Instant Music*. I started the music before the first scene and played it throughout both scenes.

Additional tracks let me make fancy transitions (wipes and fades) between scenes, and even chain videos together for play, one after the other (as the designers did with the demo).

The postproduction disk contains all the files you need to create animated titles that seem somewhat familiar; for example, a simple black-and-white nighttime sky flickered to the title *The Twinkle Zone*, while a familiar theme played. Other titles included *Amazing Videos* and a pastel *Amiga Vice*.

The *DeluxeVideo* manual has an extensive section which describes techniques for transferring your finished video to videotape. You can get excellent results, even with your home VCR (you'll get the best results through a genlock device that gets the video signal from the RGB interface). For more sophisticated users, *DeluxeVideo* supports overscanning so that you won't lose the edge of your videos when you transfer them to tape. The manual even explains how you can send videos to another Amiga by modem.

DeluxeVideo is a remarkable software package that takes advantage of all the special capabilities of the Amiga. It's easy to learn, but also contains sophisticated features that can take time to master. You can do so much that it's easy to run out of disk space and memory before you know it, but with time, you'll learn how to work around this.

Don't be misled by the program's low (\$129.95) price, as you'll need at least one paint program and one music program to work with it, but those are practically essential for any properly outfitted Amiga. *DeluxeVideo* should help Amiga become the next major home computer. It has certainly helped convince me that I made the right computer purchase.

DeluxeVideo 1.2
Electronic Arts
1820 Gateway Dr.
San Mateo, CA 94404
\$129.95

The Easy Working Series

Carol S. Holzberg

Requirements: Apple II series (reviewed here) with a minimum of 128K, Commodore 64, and IBM PC or compatibles with a minimum of 192K.

Spinnaker's *Easy Working Series* consists of three personal productivity programs: *The Writer*, *The Filer*, and *The Planner*. Each can be purchased separately and can stand alone or work in combination with the others. This means you can use *The Writer* to type reports with financial displays from *The Planner*, or mailing labels created with *The Filer*, and analyze your *Filer* databases using the spreadsheet functions of *The Planner*.

Each program comes on an unprotected 5¼-inch disk with its own eight-page instruction booklet. Many of the special edit commands are the same throughout the series. They require the

use of the Open- and Closed-Apple keys in association with other letter and number keys. An onscreen "help" file is accessible from each program.

The series offers a Macintosh-like user interface, complete with windows and pull-down menus. These are accessed using the right, left, and down arrow cursor keys, or by typing the command's first letter. Despite the apparent look and feel of mouse support, the *Easy Working* series does not allow the use of the mouse as an input device.

Word Processing

The Writer, the series' word processor, is not particularly powerful. But if you want a good introduction to word processing, this program offers an easy-to-learn, multifeatured program for a very low price (\$9.95). It comes with such features as block editing; cutting and pasting to and from memory; inserting and deleting text; setting tabs, headers, and footers; right, left, and center text justification; searching for text; and searching and replacing text (either case sensitive or not).

You can preview the document as it will appear printed, and print all or part of a document in boldface, underline, compressed, or expanded (and near letter quality print), and you have a choice of two fonts. *The Writer* also has a 100,000-word spellchecker on its flip side. You cannot modify the spellchecker word list, and you should be prepared to wait as much as ten minutes to check the spelling of text with as few as 500 words.

Some of the more interesting features include *cut to file*, *copy to file*, and *print/merge* (mail merge) options. The first two allow you to mark out a block of text, write it to a file, delete the original block, or just copy it without deleting it. The program then asks you for a filename for your new text. The *print/merge* option makes it possible to mark the place in your text file where you wish to bring in data fields from *The Filer*. *The Writer* also allows you to create longer documents by "chaining" or linking smaller word processed files.

The Database

The Filer, the series' database program, is designed for first-time database users. It offers five menu options: storage, update, print, setup, and quit. You select these options with the help of the arrow cursor and return keys. Call up *storage* to start a new database, open or close a database file, view your data disk directory, erase files, or format a data disk.

Each program in the series requires its own data disk. You cannot save *Writer*, *Filer*, and *Planner* program files

onto a single data disk for ease of access and storage. *The Filer* did allow me to format a data disk with an open-database file in memory without losing the RAM-stored records, but it is strongly recommended that you have a formatted data disk on hand before opening a database file.

With the *update* option, you can add, edit, find, or remove records. In addition, you can export records to, or import records from, other programs in the series. With the *print* option you can output to printer or to screen. Printing to screen enables you to check your records for errors.

Setup allows you to configure the program to work with your printer and use drive 2 as your default-data disk drive. (It was not possible for me to enter any print command definitions when configuring the printer setup because my Epson printer requires the use of the escape key in its printer definitions. Pressing the escape key, however, always sent me back to the program's main menu.)

The Filer's format is reminiscent of the once-popular, but now somewhat outdated *Visifile* database program. Restrictions apply to the number of fields (maximum ten), the length of the field name (maximum 12 characters), and the maximum number of characters (25) permitted for each field. These size limitations can prove quite frustrating because your field name and size may exceed the character limit. Moreover, once you have created your database, you cannot insert or delete field categories. In defining your database, you must designate a *key* field. This is the only field the program uses to find a record in the database.

Entering Information

Once you've created the database by defining and designating its fields, you're ready to enter your information. After a record is complete, it is saved to disk by pressing Open Apple-1. Pressing the escape key allows you to exit from the *add a record* mode. If you wish to edit a record, call it up by pressing the escape key to exit from your current activity, and then use the arrow keys to advance to *edit*. Specify the record's key category, move the cursor to the field you wish to modify, and type in your new data. Pressing Open Apple-1 accepts the screen.

There are many record selection options, although some of their instructions are a bit confusing. You can select all of the records in the database or just those records that meet certain criteria (using equal, greater than, less than, not equal, less than and equal, or more than and equal). This is where the *key* field

comes in. If you want a specific range, enter the beginning key and ending key of the records you wish to select.

Two types of wildcards exist to make record selection easier. Using an asterisk (*) ignores everything from its location to the end of the field contents. In printing a zip-code list, for example, 01* would print all records beginning with 01. Using the question mark (?) as in ???01, tells the program to ignore characters in the ? slots and select all records ending with 01. *The Filer* does not retrieve its records with great speed, but it does serve its purpose as a database compiler—and it does it inexpensively.

Templating

The Planner, the series spreadsheet program, comes with six sample templates already stored in its directory. Call up such common home-type calculations as budget, net worth, expenses, mileage, and profit/loss to get an idea of how the program works. Its built-in functions include adding, subtracting, multiplying, and dividing, as well as calculating sums, averages, percentages, and absolute values. The program can return the minimum and maximum values for a range of locations and count the number of entries in a range.

There is a menu of six options: *work*, *print*, *change*, *storage*, *setup*, and *quit*. *Work* enables you to enter your spreadsheet. Once you've accessed this option, you can call up the editing menu to cut, copy, or paste from memory/to file, insert or delete rows and columns, and blank or reformat single cells and specially marked blocks of cells. *Print* enables you to print to the printer or a file and set your print margins, paper length, and print controls.

As with *The Filer*, it's not possible to enter print commands for the Epson printer because pressing the escape key returns you to the main menu.

Accessing the *change* menu calls up the program's formatting option. You can select the options globally; or specially mark a block of cells for column width or fixed-dollar, percent, bargraph, integer, or decimal (one to four places) formats. Turn the calculating feature on for immediate recalculation after every cell entry. Turn it off to hasten the process of entering large amounts of data.

The pop-up menu for *storage* includes loading, saving, or accessing a new worksheet; loading or saving a *DIF* file; importing or exporting data; or selecting a file from the disk directory. With the *setup* option, you configure the storage drive and specify your printer type.

Enter text, numbers, or formulas. Use *The Planner* on its own or in combi-

nation with the other programs in the series. Export a spreadsheet to a document written with *The Writer*. Import a sequential data file created with *The Filer*. With *The Planner* you can set up a grid of 250 rows and 224 columns. You move around the rows and columns with the help of the Open Apple and number keys 3-9.

The Planner is not a flashy, full-featured spreadsheet program. It has a limited number of functions—nevertheless, for the price (\$9.95), it serves as a solid introduction to number-crunching.

(Editor's note: As this issue went to press, Spinnaker announced a revision of the Easy Working Series, with prices to remain the same.)

Easy Working Series
Spinnaker Software
One Kendall Square
Cambridge, MA 02139
\$9.95 per program

Borodino: 1812, Napoleon In Russia

James Maki

Requirements: Commodore 64 and Atari eight-bit computers with a minimum of 48K.

Your mission is stated simply: *Destroy the Russian Army that opposes you in the fields surrounding Borodino, a small Russian village 60 miles west of Moscow.* At your disposal are the troops of Napoleon's Grande Armee, including elite units of the Old Guard, Dragoons of the Guard Cavalry, and Cuirassiers and Lancers to pursue broken troops, and artillery to soften up the enemy for frontal assault. You command 130,000 troops from France, Poland, Italy, Spain, Portugal, and Westphalia. Opposing you are almost 120,000 Russian troops in fortification, defending their homeland.

Achieving a decisive victory will force a peace settlement with the Czar, avoid the long retreat from Moscow during the Russian Winter, and preserve the empire. If you fail, the surviving Russian troops will regroup and pursue your army relentlessly, hounding your every move as you try to flee their country.

Borodino: 1812, Napoleon in Russia is an historical simulation depicting the battle that many believe led to the downfall of Napoleon and the French Empire. One- and two-player games are included, with the computer play-

ing the Russian commander in the single-player game. The game can be saved at any point. Instructions and hints for play-by-mail are included.

A menu-driven screen allows the game to be customized for the level of play desired. The computer Russian player can be designated as easy, medium, or hard. Troop morale and fatigue can be included for more realistic combat results. To compensate for an inexperienced player in a two-player game, or to give yourself a handicap in the single-player game, the French or Russians can be designated as weak or normal. Choosing *weak* lowers the army's morale, thus making it easier to defeat. Making the French player normal and Russian player weak is a good starting point, and is also the default setting.

Many Options

Eight scenarios are provided ranging from a 20-minute game depicting the September 5 assault on the Shevardino Redoubt (fortification) to a five-hour (or more) game depicting all three days of the Borodino engagement: September 5-7, 1812. In addition to historically accurate scenarios, several variant scenarios are included depicting troop deployment had either Napoleon or the Russian Commander, Kutuzov, heeded the advice of subordinates.

The map of the Borodino battlefield contains symbols for trees, rivers, streams, fortifications, and towns. These terrain features have an effect on troop movement and battle, so careful inspection of the terrain is a necessity before issuing orders. The fine-scrolling map moves both horizontally and vertically to display the entire battlefield. The map will scroll when the joystick-controlled cursor comes in contact with the edge of the screen. Position the cursor over a terrain feature and press the fire button for a one-word description of the terrain at that point.

The armies consist of infantry, light and heavy cavalry, artillery, and horse artillery. The French units are blue, the French allies red, and the Russians green. The units are depicted as a colored symbol on a white background if they are ready for battle. A white symbol on a colored background means the unit is disorganized, and a solid colored square without a symbol means the unit is routed (demoralized to the point of ignoring commands and fleeing the field of battle).

All troop movement is made with a joystick. The keyboard is used to set the game speed (from one-minute turns to realtime play) or to pause the game. Position the cursor over a unit, press and hold the fire button, and move the cursor to another position to order the

unit to move toward the target square. The unit will continue to move toward the target square until it is reached, a new order is issued, or combat causes it to retreat, rout, or change formation. The fast action and ease of input at times resembles an arcade game, but the temptation must be resisted. Careful planning and execution rather than quick action are required to win.

Infantry units assume one of three formations: column, line, or square. And each has its own inherent weakness and strength. A column formation adds to the unit's morale, through safety in numbers, as the men are arranged in blocklike formation. The disadvantage is that only a small number of troops can fire their weapons. A line formation maximizes the firepower of a unit but leaves it open to penetration and flanking by the enemy. A square formation is used as a defense against cavalry, in which the troops form a square with guns pointing outward in all directions. A cavalry unit cannot melee with an infantry unit in square.

Infantry units automatically go into a square formation whenever an enemy cavalry unit is within two or three squares distance. While in square, the unit cannot move and is limited in its firepower against infantry attack. A quick cavalry unit can sometimes catch an infantry unit before it forms square and do severe damage. Therefore, the mere presence of cavalry in the area of a battle makes mounting an infantry attack difficult.

Tactics

Borodino is a game of tactics rather than grand strategy. Many troops are lost to unplanned retreat (that is, break and rout), and engagements end before the attacker can press home an advantage when the attacking units break and rout. The object of an attack is to demoralize the enemy by attacking a weak point so that he flees the battlefield. This allows penetration and flanking of enemy lines.

The perfect plan by the French would consist of softening up an area with artillery, moving cavalry close enough to the enemy to either quickly attack or force the enemy unit to form square, and then move the French infantry forward to the attack. When the enemy unit breaks (becomes disorganized or is routed because of low morale and/or fatigue), finish the attack with the cavalry unit. A disorganized or routed infantry unit cannot form square to defend against a cavalry charge.

An intelligent Russian opponent will position his cavalry near the front line so the French infantry will form square before the attack. In addition,

the Russians have built fortifications that are hard to assault, and the Russian artillery can break or weaken French units before they reach the enemy lines.

This game realistically translates the feel of 19th-century Napoleonic warfare to the computer screen: the interplay of infantry and cavalry, and the timing of attacks; the morale problem with green troops; and the almost-impossible odds of frontal assault on a fortified artillery position.

As much as I enjoy *Borodino*—I was able to learn the rules in a short time, but will be playing a long time before I master it—I do have a wish list of modifications. I'd like to be able to check the score during the game. The author himself notes this and indicates he spent more time checking the score than playing the game. Rather than a simple victory or loss designation, terms such as strategic victory, tactical victory, and marginal defeat would be more descriptive. Finally, I'd like a method of creating my own initial troop deployment for both the French and Russians in the one-player game. But, in light of all that *Borodino* offers, I must say that these complaints are of a minor nature.

If you're game for trying to better Napoleon and extend the dominion of France, try *Borodino*.

Borodino: 1812, Napoleon in Russia
KRENTek Software
P.O. Box 720081
McAllen, TX 78502-9990
\$59.95

WordPerfect For The Amiga

Neil Randall

Requirements: Amiga with a minimum of 512K memory.

The long wait is over.

Ever since its introduction, the Amiga has suffered from one glaring deficiency. Spectacular creativity software was available, as was video production software, and music software was superb. Where the Amiga faltered was in one very important, and, oddly, very fundamental area: word processing.

Textcraft was originally bundled with the system, but, except for correspondence and short papers, it was far from ideal. *Scribble* helped, but it, too, lacked truly professional features. One person I know actually dumped her Amiga in favor of a Macintosh, simply because she was tired of waiting for the perennially promised, but never delivered, full-featured Amiga word proces-

Your MIGHT . . . Our MAGIC!



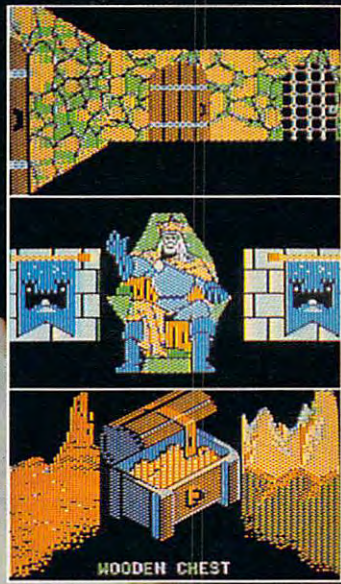
Why do the critics agree that **Might and Magic™** is a classic? Because technically, it's a fantasy role-playing simulation game for you and your personal computer, intellectually however, **Might and Magic™** is an adventure.

It packs more detail than any other role-playing game featuring:

- 200 Monsters
- 94 Spells
- 250 Magic Items
- Flicker Free, 3-D full color indoor/outdoor graphic terrains to explore.

That's quite a lot for mere mortals to handle. But then, we designed **Might and Magic™** that way. So, with all your **Might** and our **Magic**, we dare you to accept the challenge that takes you seriously.

Now available for Apple® II series, Commodore 64/128, and IBM/Compatible.
Hint/Map book also available.



WOODEN CHEST

Might and Magic™

NEW WORLD COMPUTING, INC.
ENTERTAINMENT SOFTWARE

14922 Calvert Street • Van Nuys, CA 91411

Technical Support (818) 785-0519

www.commodore.ca

Look for Might and Magic™ at your local dealer.
Exclusively Distributed by
ACTIVISION
ENTERTAINMENT SOFTWARE

Apple and the Apple logo are registered trademarks of Apple Computer, Inc.
Might and Magic is a trademark of New World Computing, Inc.
Activision logo is a registered trademark of Activision, Inc.
Commodore is a registered trademark of Commodore Business Machines, Inc.
IBM is a registered trademark of International Business Machines, Inc.
All other displays shown are from the Apple® II. Displays from other computers may vary.

sors. Indeed, for word processing I often abandoned my miracle machine and returned, with some bitterness, to my venerable 64.

Among the most eagerly awaited of all the promised packages has been *WordPerfect*. An established favorite among MS-DOS users, *WordPerfect* promised Amiga owners that their machine was finally being taken seriously by one of the most important companies in the MS-DOS world. Of course, this alone does not suggest excellence—MS-DOS business packages have a reputation for severe lack of friendliness—but being noticed by the “big boys” is important for any computer system. Besides, everyone knew that *WordPerfect* worked.

Ready At Last

WordPerfect has now arrived, and it brings to the Amiga its full MS-DOS package. All commands are accessible from both the keyboard and the mouse menus, with submenus bearing *WordPerfect's* distinctive choose-by-number system. The List Files command, for example, produces a submenu showing 10 possibilities. You either click on one of the choices with the mouse, or you type the appropriate number. For some reason, the numbering system has produced controversy among MS-DOS users, but since it is so easy to use, I really can't see why. Combined with the mouse, the numbers make *WordPerfect's* commands highly accessible.

The program's manual contains more than 600 pages, and it comes in a loose-leaf binder to simplify updating. Roughly half of the documentation is devoted to an extended tutorial, introducing users to many of the package's features. The rest contains a reference section (the most important for repeated use of the package), an installation section that shows how to set up *WordPerfect* for your own needs, an appendix, a glossary, and an index.

Unlike many companies that port a program from one machine to another, *WordPerfect* Corporation supplied an Amiga-specific manual; the right-hand third of each page displays mouse commands for the explanations given on the left. Throughout the manual are notes about how to use the software on the Amiga itself. Also included in the package are templates to place above or around the function keys (two are included: one for the 2000 and one that works for both the 500 and the 1000) and a set of transparent stick-ons for the numeric keypad, for such functions as Screen Up, Page Up and Page Down, and Insert. Finally, there is a detailed reference card to keep beside the keyboard.

The software itself comes on four disks. The first contains the *WordPerfect* program itself, along with the Print program for printing documents. A second disk contains a spell-checker and thesaurus, while a third holds the printer drivers and the Printer Definition program. On the last disk, labeled *Learn*, are the text files needed for the tutorial and a couple of ancillary programs, such as Printer Test.

Professional Tools

What, though, makes the program professional? What features does *WordPerfect* have that no other Amiga word processors have? Are these features worth *WordPerfect's* considerable price? Certainly these are questions you should ask before even thinking of buying this package.

All word processors allow you to do certain things. You can enter and edit text, save files, print files, choose among print styles, insert and delete text, work with blocks of text, and so on. At this point in the history of the personal computer, most users have a fairly sophisticated word processor, even one from the public domain. What separates the standard package from the professional are the unusual features, some of which indeed may not appeal to every user. The professional package attempts to satisfy the user who needs the sophistication.

To give you an idea of what I mean, here are a few of *WordPerfect's* extras. These are by no means all of the extras that accompany the program's sophisticated text editor:

- *Advance*—prints the selected text a half-line above or below the regular text or moves the printer to a specific line.
- *Binding Width*—widens the margin (on the printer) to the right on even-numbered pages and to the left on odd-numbered pages, so you can punch holes in the pages without putting a hole through the text itself.
- *Border Draw*—puts borders around your text, using characters such as asterisks or number signs (you choose the characters). It can also be used for charts and graphs.
- *Center Page*—All word processors center text on a line, but this command lets you center the entire page. This is particularly useful for business letters.
- *Columns*—lets you define text columns or math columns across the page. You can place text in either newspaper columns, which snake from the bottom of one to the top of the next, or parallel columns, meant to be read side to side. Creating columns is easy, and you can change standard pages into columns at

any time.

- *Footnotes and End Notes*—Some of the most requested features for writers of essays, reports, and books, footnote and end note formatting are included as features on surprisingly few word processors. *WordPerfect* allows the creation of footnotes and end notes (you can have both), keeping track of the numbers and allowing you many pages for each note. Footnotes print on the appropriate page, and the program even handles lengthy notes that overlap onto the next page. Finally, you can choose from several numbering styles.

- *Hyphenation*—will automatically hyphenate words, but lets you see what it's doing to let you correct it.

- *Help*—online help (but not memory-resident), detailing most of *WordPerfect's* features. What is impressive about Help is the way it operates. To find out about retrieving files, for example, you go to the Rs in the Help menu. Alongside Retrieve, it shows Shift-F10. This means that by pressing Shift and F10 you can retrieve files, but it also means that doing so now will produce a further Help screen about retrieving files. In other words, you invoke Help about a feature by using the same keys you would use to invoke the feature itself.

- *Index and Table of Contents*—Although far from easy to use, these features are thorough and comprehensive. The index will produce headings and sub-headings, and there is no limit to the number of words you can tag. By using the macros properly (the manual shows how to set these up), putting together even a highly detailed index becomes quite straightforward.

- *List Files*—The F5 key gives you a file management menu. From here, you can load, delete, rename, and print files, load ASCII files, and copy files from disk to disk. You can even search for files that contain specific words (without actually loading the file into memory)—a highly useful feature if your disk contains many files, and you can't remember which one has the needed information. You can also look at a file without loading it into memory, another useful, memory-saving feature.

- *Lists*—In addition to the Index and Table of Contents, you can generate a list of figures, tables, maps, and so on. *WordPerfect* allows five separate lists per document.

- *Locked Documents*—You can protect a file from prying eyes by locking it with a password. The manual warns you, though, that if you forget the password you have no way of retrieving the file. (A possible amnesia subplot on an espionage soap opera here.)

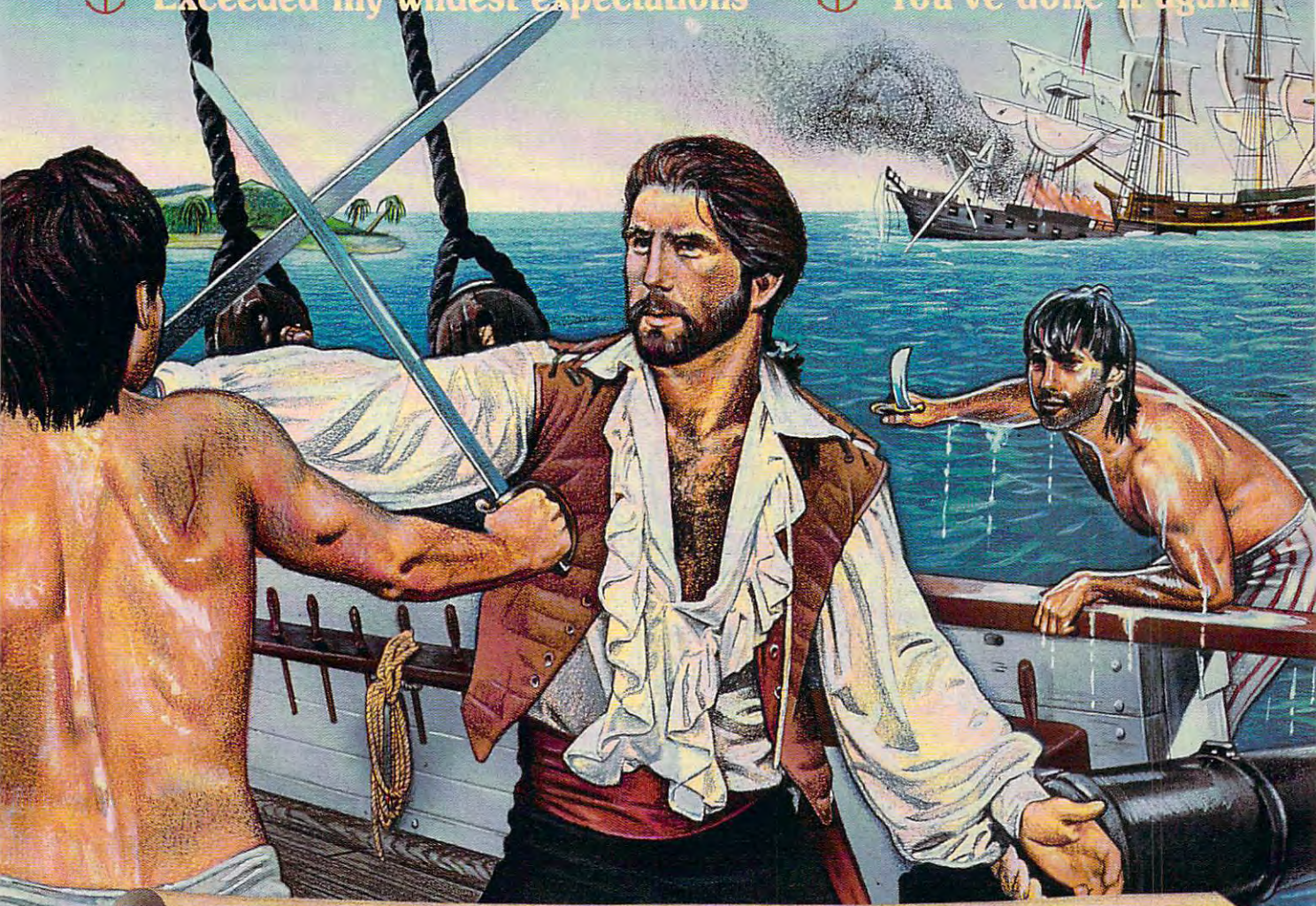
Adventure Gamers Applaud Pirates!

⚓ "Excellent... enormously good fun"

⚓ "Magnificent game"

⚓ "Exceeded my wildest expectations"

⚓ "You've done it again"



"PIRATES! is excellent... a great swashbuckling game, enormously good fun... it should keep you playing for months."
(Popular Computing Weekly, U.K.)

"... your game has exceeded my wildest expectations... I have run up more game time on the computer in 3 days than in the entire month previous."
(C.J.M., Buffalo, N.Y.)

"This is one of the most magnificent games I have ever had the pleasure of playing! It has exactly the balance of realism, playability and silliness that I most adore."
(J.P.S., San Diego, CA)

"PIRATES! is a big hit in the Dallas area. This game is one of your best efforts. The graphics on all screens are excellent! You have done it again, Microprose."
(Larry Medlin, DallasGamers, in Game News)

PIRATES! It's another winner from Sid Meier, author and designer of the award-winning F-15 STRIKE EAGLE and SILENT SERVICE. His creative genius has combined the best of simulation, role-playing and strategy games in this high seas adventure.

You're a 17th century privateer captain in the thick of the action on the Spanish Main. **PIRATES!**

challenges your reflexes in simulated sailing, sea and land battles and swordfights. It tests your cunning in bargaining with merchants and negotiating with government officials. From the romance and intrigue of more than 50 foreign ports to the thrill and excitement of buried treasure, **PIRATES!** takes you on an exhilarating quest for power and prestige.

PIRATES! is available at your local "Valued MicroProse Retailer" (VMR). Call for locations nearest you. Get it today for Commodore 64/128, IBM-PC/compatibles and the Apple IIc and 128K IIe. Call or write for MC/VISA orders if product not found locally.



MICRO PROSE™
SIMULATION • SOFTWARE

180 Lakefront Drive • Hunt Valley, MD 21030
Information and Orders: (301) 771-1151

- **Math**—You can perform several mathematical calculations with a document. I have never in my life used mathematical formulas in a word processing document, but the capability is here for those who do. It seems fairly sophisticated, and for most of us it should well-satisfy our limited spreadsheet needs.
- **Mail-merge**—allows the mass production of letters, mailing addresses, envelopes, and so on. This is the most sophisticated mail-merge feature I have seen as part of any word processing program.
- **New CLI**—You can invoke the Amiga's Command Line Interpreter from within the program. Since *WordPerfect* supports multitasking, you can use the CLI to load another program, perform disk copies, set Preferences, and so on.
- **Overstrike**—allows you to print two characters in the same position. This is useful when you are marking text that you feel should be deleted. Simply overstrike the text in question, print out the document, and give it to the person who must verify the changes.
- **Redline**—This places a vertical line in the margin beside the marked text, for the purposes of highlighting it. As with Overstrike, this allows you to show the reader what sections you feel should be changed.

And so on. Obviously, listing all the special features is neither useful nor possible, but from this list you can get the idea. Even so, there are several other important features that deserve somewhat more detailed commentary. These include Spell, Thesaurus, Print, Macros, Backup Options, and Reveal Codes.

Other Major Features

The 100,000-word Speller is complete, sophisticated, and, if you use floppy disks, unbelievably slow. It allows you to change incorrect words when it finds them, and it displays a list of suggested alternatives. You can even try to find a word phonetically. It locates double words as well as misspelled words, and it performs a word count. But you may want to spell check only if you have a hard drive or expanded RAM. I checked a 20-page document (10,000 words), and after 33 minutes the program had checked only the first four pages (it found three errors). For almost the entire time, my external drive was running constantly, finding the possible alternative words.

The Thesaurus is very useful. At any point in your writing or editing, you can put the cursor on a word and invoke the Thesaurus. A list of 5-10 synonyms will appear, sorted by part of speech. In addition, the Thesaurus

gives one or two antonyms. Since much writing is done speedily, editing with the Thesaurus will ease the problem of repeated words.

The Print program is sophisticated but a little intimidating, especially for those used to hitting Control-P and going for coffee. First of all, you must set up your printer (unless you own one of the few contained in Workbench). The Print disk contains drivers for every printer I have ever heard of, including several laser printers and daisywheels, and you can transfer up to six drivers to your boot disk (for those with more than one printer). On the slim chance that *WordPerfect* does not contain a driver for your printer, you can use the Print Define program to customize your own driver. If you kept your printer manual, defining a driver should be almost no problem at all.

One of the most impressive features of the Print command is the ability to specify Print jobs—by listing several files in order of priority, you can print several separate documents in succession, without having to worry about them. You can even change the priority of the files as the documents are printing, moving some to the top of the list and others to the bottom. You can, incidentally, work on another file while printing is going on.

Put It In A Macro

The Macros system is extremely detailed, and it demands considerable effort. What it does, though, is allow you to set up any number of macros, in any number of ways, to perform tasks you normally repeat. Any *WordPerfect* function can be placed within a macro, so you can define these precisely to your demands. For instance, if you regularly finish a short document, create an index and table of contents, and then send it to the printer, you can do so in a macro. Instead of doing all these things separately, simply invoke the macro and go for more coffee.

WordPerfect offers a few useful Backup options. You can specify, for instance, that you want your files saved automatically every so often (I use 20 minutes) to guard against typing for two hours, forgetting to save your files, and then watching as the power goes down. In the case of a reboot, *WordPerfect* searches for the backed-up file on disk (it's a special kind) and tells you to retrieve it or delete it. Highly functional, this option has saved my work on several occasions already.

Finally, *WordPerfect* uses what is called a Reveal Codes command. Because the screen is partially WYSIWIG (What You See Is What You Get), such commands as Boldface, Italics, Center,

Hard Return, Indent Paragraph, and so on, appear not as printer codes but rather as you would see them on the page. The Reveal Codes command splits the screen in half, the bottom part showing the codes within the text. You can use the cursors and the delete key to change these commands, getting rid of the Boldface or the Superscript, for example. This feature is most useful when working with a long document filled with printer commands. If it fails to print properly, you can move the cursor down to the problem area, use Reveal Codes, and try to correct the problem.

What these features suggest, of course, is *WordPerfect's* enormous flexibility. Unlike many word processing programs, which force you to work within the programmer's design, *WordPerfect* gives you the features and lets you do with them as you will. The price for this is that you must learn the program thoroughly to make it work exactly as you want, but for people who word process for a living, the payoff is enormous.

WordPerfect Corporation is renowned for supporting and upgrading its software, so we can expect even more in the future. I did manage to crash the program twice, both times while trying to hyphenate a long document I had just transformed into multiple columns, but there is no doubt such minor problems will disappear in future versions. *WordPerfect* has established the new standard for Amiga word processors. It does not allow the mixture of graphics and text, but apart from that it uses the Amiga well. If there are important features it doesn't have, I simply don't know about them.

If you need a word processor with a wealth of proven features, and you word process enough to justify the price, I recommend *WordPerfect* highly.

WordPerfect
Wordperfect Corporation
 288 W. Center St.
 Oren, Utah 84057
 \$395

The new Commodore® Amiga® 500 is everything you never expected from a home computer. That's because we designed it to excite you. To dazzle your senses with 4096 colors and stereo sound. To unleash your creativity. To allow things you never dreamed possible in a home computer. Because until now, they really weren't.

Like built-in speech synthesis, so you'll always have someone to talk to. Pro-quality 3-D animation that lets even beginners put their ideas in motion. Colorful educational programs that make lessons fun and memorable. A complete home office with powerful spreadsheet and database programs—even word processing with WordPerfect®. And unlike any other home computer, the Commodore Amiga 500 can multi-task, so you can run several programs *at the same time*.

Hook it to your VCR with an optional RF modulator, and the Commodore Amiga 500 becomes a home video production center. Paint graphics over video images. Create moving 3-D titles. Produce your own animated feature.

And for pure fun, enter the incredible world of stereo Amiga video games. With graphics so good, major video game makers use them in their coin arcade machines.

AND NOW YOU CAN SEE IT ALL, FREE.

We captured the excitement, beauty and power of the Commodore Amiga 500 on a special VHS video cassette called The Amiga 500 Video Test Flight. If you're ready for the ride of your life, call 1-800-87-AMIGA or contact your Commodore Amiga dealer to find out how you can get your free video demonstration.

1-800-87-AMIGA



COMMODORE
AMIGA[™]
500

It talks.
It animates.
It educates.
It's a home office.
It's a video studio.
It's arcade games in stereo.
It's the new Commodore
Amiga 500 home computer.



Only Amiga makes it possible.

Commodore is a registered trademark of Commodore Electronics, Ltd. Amiga is a registered trademark, and the Amiga logo a trademark of Commodore-Amiga, Inc. WordPerfect is a registered trademark of the WordPerfect Corporation. Marble Madness game screen courtesy of Electronic Arts. MaxiPlan business graphic courtesy of Oxxi.

www.commodore.ca

Chuck Yeager's Advanced Flight Trainer

Ervin Bobo

Requirements: IBM PC and compatibles,
and Commodore 64.

I was in grammar school when I first learned of Chuck Yeager breaking the sound barrier, and I suppose it is because youth is impressionable that he has remained one of my heroes, and the Bell X-1 aircraft has retained an aura of daring and adventure. A younger generation knows Yeager now, courtesy of *The Right Stuff* and his recent autobiography. And now, one of the best computer flight simulators bears his name.

Yet, as good as it is, and in spite of the fact that it gives you the chance to fly the X-1 at Mach speeds, it is not a simulator that will appeal to everybody. Perhaps because Yeager had a hand in developing it (he is credited as a co-designer), it demands a precise style of flying that is far removed from arcade-type flight simulators. And in spite of the fact that the hangar holds some of the best combat aircraft in the world, you'll never get a chance to fire guns or rockets at an enemy. What you will get is a look into the world of the test pilot.

Planes Real And Imagined

In aircraft to be flown, *Yeager's AFT* gives you many choices: 14 airplanes, ranging from a World War I Sopwith Camel to the Bell X-1, the SR-71 "Blackbird," and on to several craft that apparently never got beyond the drawing board.

It is in flying the latter that the nature of *AFT* is revealed. Performance characteristics of these craft are not known, and it is up to you to fly them in such a way as to push the outer edges of the "envelope"—to find maximum speed, cruising speed, and maximum altitude; to determine stall criteria in all flight modes; to measure rate of climb; and so on. In effect, you are a test pilot. (To aid you in evaluating performance, *AFT* allows you to print blank test-flight check lists with which you can record your observations in coherent form.)

Rather than flying around observing scenery or darting around in combat, *Yeager's AFT* puts you in touch with the unknown and leaves it up to you to find a way to make it familiar. In the prologue to *The Right Stuff* (the movie), Yeager says, "There was a demon that lived in the air. . . ." This simulator brings you into the company of that

demon, for it is still there and it is still known to those who fly higher, faster, and farther.

Trading arcade action for realism makes *AFT* a serious simulator, and this will, for some of us, cut into the fun—until you realize that the seriousness has elevated the adventure. It is a challenge to fly an aircraft according to its characteristics and an even greater challenge to fly it well.

Yet there is hare-brained flying for those of us who like it. You can try formation flying in which you follow Yeager as he darts in and around pylons, or into aerobatic maneuvers such as hammerheads, Cuban eights, and the like. And when you crash—and you will, repeatedly—a digitized photo of General Yeager will appear with a caption on the order of, *Boy, you dug a hole clear through to China.*

Still more challenges can be found in air races over several different courses, in navigating from one airstrip to another, and in takeoffs and landings.

Yeager's AFT builds upon flight simulators of the past by duplicating some of the more outstanding features of its predecessors. To observe a flight, we have views from both tower and chase plane, and a new view is from a satellite. Left and right views are also possible, and there is a flight recorder which will allow you an instant replay of your actions—especially nice for seeing how badly you botched an Immelmann. Close-ups of the ground or of your craft seen from another angle are possible through use of the zoom feature.

In using such features as the zoom, or in using any of the pull-down menu choices, the flight will pause momentarily while your computer accesses the disk. Since this interrupts the continuity of a flight, it can be rather jarring. I'd rather have an instantaneous zoom by means of pressing a single key, but I realize you can't have everything.

I also have some problems with the graphics: Though 3-D graphics are used, they are less than complex; the ground objects that rise from the desert floor are featureless blocks and pyramids (though solid as opposed to wireframe). The other problem is that all aircraft, seen from outside, look the same—or almost so. There is one blocky shape for propeller aircraft and another blocky shape for jet and rocket aircraft, and neither is exciting. (It would be nice to go to a chase-plane view and see the wedge shape of an SR-71 or the stiletto shape of the X-3).

Although the aircraft look alike, they do have individual flying characteristics. Besides providing a measure of variety, this feature insures longevity: It will take you a while to master one

aircraft and much longer to master 14 of them.

Imitating Yeager

To aid you in your mastery, there is a Flight Instruction routine. Here, Yeager is flying the craft and you duplicate his movements through one of several maneuvers by matching your windscreen cursors to his. There is a center cursor that represents the aileron and elevator control, as well as other indicators that allow you to match throttle and rudder movements. This is reminiscent of driver's ed cars with dual controls, but in this case, the instructor is driving and you're merely trying to match his movements. How much can really be learned from this is open to question, but we'd rather have the feature than not have it.

Documentation is very good, although it is written in general terms, since *AFS* will be released for other computers (for specifics, the quick-reference insert fills the bill). Especially noteworthy here are Chuck Yeager's marginal comments on the various aircraft and on flying in general. Everything I've ever heard him say (with the exception of certain TV commercials) has been both pithy and interesting, and his comments here are no exception.

In summing up, I'll mention that *Chuck Yeager's Advanced Flight Simulator* has some shortcomings, notably in the blocky graphics and the monotonous sound. And while saying this, I'll also point out that the control panel graphics are very good, and that no program can exceed the capabilities of the computer for which it was designed. These shortcomings are more than offset by the high frame rate—a fast screen updating that provides the feel of moving at high speed.

Although some prior routines from programs of this genre have been utilized and built upon, *AFS* is not an imitation of anything. It does not strive to be better than previous simulators so much as it strives to be different—to present high-performance flying from the point of view of a test pilot, and in this case, to present such flying from the viewpoint of one who has not only met the demon of the air, but who has also shaken its hand.

Chuck Yeager's Advanced
Flight Simulator

Electronic Arts

1820 Gateway Dr.

San Mateo, CA 94404

\$39.95 IBM PC and compatibles version

\$34.95 Commodore 64 version

©

TEST DIVE ONE FOR YOURSELF.

In their day, they ruled over three quarters of the earth's surface.

During WWII, they viciously brought Britain to her knees. And Japan to the ground.



These were the silent killers: Tench. Gato. U-Boat.

And now, they return. In this, the most realistic, all-encompassing simula-



tion ever created for the personal computer.

You will command one of six types of American subs or German Kriegsmarine U-Boats, during any year from 1939 to 1945. You'll perform one of over

60 missions. Or you'll engage in the most difficult task of all: To make it through *the entire war*.

Each vessel is completely unique and painstakingly authentic, so you'll have a lot to learn: Navigation. Weather. Radar.

And the contents of a vital target book, among other things.

Your arsenal will include deck and anti-aircraft guns. Torpedoes. And mines.

But even all that may not be enough.

Because besides the risk of bumping a depth charge or facing a killer Destroyer, you'll still have to contend with the gunfire of enemy aircraft.

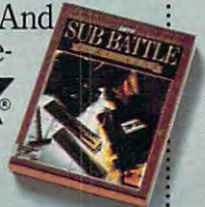
No simulation has ever had the degree of

authenticity, gut-wrenching action or historical accuracy of this one.

The first release of our new Masters Collection. And a challenge of unbelievable depth.

EPYX

Apple II & compatibles, Apple IIGS, Atari ST, C64/128, IBM & compatibles, Macintosh.



TAKE OUR PREVIEW DISK FOR A SPIN. Drop this coupon in the mail with your check or money order, and we'll gladly send you to the South Pacific to have it out with an enemy fleet.

Mail to Sub Battle Preview, P.O. Box 3745, Young America, MN 55394.

	Quantity	Total
Commodore 64/128	_____	\$1.50 ea. _____
IBM PC & compat.	_____	\$1.50 ea. _____
Atari ST	_____	\$2.75 ea. _____
Macintosh	_____	\$2.75 ea. _____
Total Disks Ordered	_____	Total Enclosed _____

Name _____ Phone () _____
 Address _____ Age _____
 City/State/Zip _____

Canadian orders please add 50c for additional postage.

Please allow 4 to 6 weeks for delivery. Offer expires 12/31/88 and is valid only in the continental U.S. and Canada. Void where prohibited.

The No. 1 battery.
The ship's heart.

Sea guard radar stub.

Your ammo.

The 360° periscopes.

The sealed control room.
Your HQ.

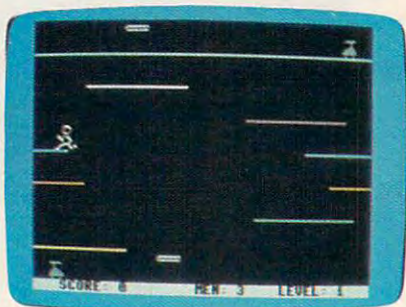
Independent generator
& diesel engines.

Salt water tank for
trimming and compensating.

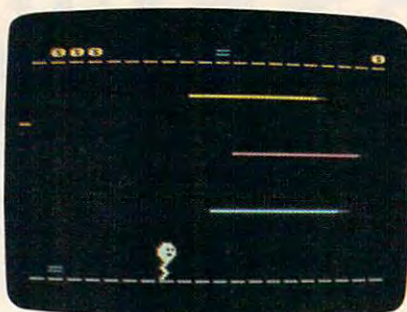
5" 25 cal. gun.

Officer's quarters.

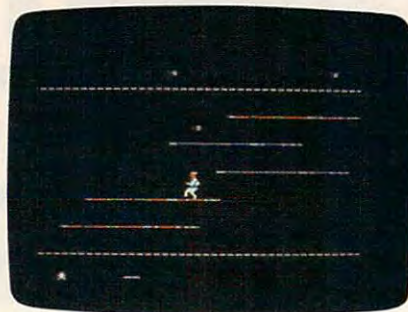
Water purification.



"Leaping Larry" for the Commodore 64, a challenging arcade-action game with great graphics and sound effects.



"Leaping Larry" for the Atari 400/800/XL/XE, written entirely in machine language.



The Apple II version of "Leaping Larry" is played with the keyboard and runs with either DOS 3.3 or ProDOS.

Leaping Larry

Michael Streeter

In this fast-paced action game, your goal is to retrieve important plans from a futuristic factory filled with nasty hazards. The original version was written for the Commodore 64. We've added new versions for the Apple II series, as well as the Atari 400, 800, XL, and XE. The Apple II version runs on any Apple II-series computer with either DOS 3.3 or ProDOS. The Atari version requires a disk drive and at least 48K RAM. The 64 and Atari versions each require a joystick.

In "Leaping Larry," you're an apprentice inventor in a future world. One evening after leaving the factory, you realize that you've left behind three sets of important plans that you intended to take home. You return to the factory, but the security robots—which can be quite dangerous—are patrolling, and you don't know how to turn them off. And the elevators have been shut down, so the only way to move from the ground floor to the top floor—where the most important plans are stored—is by riding a series of moving conveyor belts, each on a different floor. The only way to avoid the

robots and move from floor to floor on the belts is by leaping.

To get started with Leaping Larry, type in the version for your computer, save a copy, and run the program (see below for special notes concerning the version for your computer). When the game begins, you'll see Larry on the bottom floor, along with a robot and one set of plans. Above Larry there are six floors of conveyor belts moving parallel to the floor. On the top floor you'll find another robot and another set of plans. If one of the robots touches Larry, you lose him—but don't despair: You start each game with three Larrys.

To move Larry from left to right, simply move the joystick. Pressing the fire button causes Larry to leap, but he must be moving—if you press the fire button while he's standing still, he won't move at all.

To move from the bottom level to the top, Larry has to leap on moving conveyor belts. The belts move just a little bit faster than Larry, so he can stay on one only for a moment. And if Larry stands still on a belt, it will move out from under him, and he'll fall.

The object of the game is to move Larry to the top and have him pick up the plans. When the plans are secured, the game moves to the next higher level. In levels 1–6, the conveyor belts become shorter with each progressive level. Beginning with level 7, certain floors become invisible—one additional floor with each progressive level. In level 7, the top floor is invisible. In level 8, the top floor and the floor below it are invisible, and so on, until all floors are invisible.

The Commodore 64 Version

Because this version of Leaping Larry (Program 1) is written entirely in machine language, it must be typed in using "MLX," the machine language entry program found elsewhere in this issue. Be sure to read the instructions for using MLX before you begin entering data. When you run MLX, you'll be asked for a starting and an ending address for the data you'll be entering. The correct values for Leaping Larry are as follows:

Starting address: C000
Ending address: CD0F



1987 - Expanding Scenery disk coverage: East Coast, Japan, & Europe



1986 - Flight Simulator II for the 68000 computers



1985 - High-performance Jet flight simulator for the IBM, Commodore 64, and Apple II computers



1982/1983 - Microsoft Flight Simulator & Flight Simulator II



1979 - 3D graphics applied to the original FS1 Flight Simulator for the new Apple II and TRS-80 computers



1977 - SubLOGIC's 3D graphics package in BASIC and M6800 Assembly Language

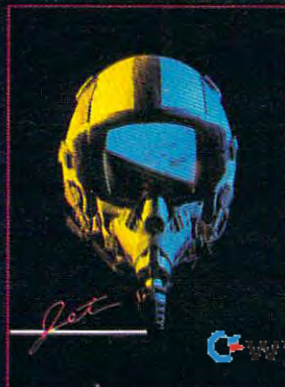
Ten Years of Technology and Dedication

Some say our technology has helped us define the state of the art in flight simulation. We believe our ten years of dedication have gotten us where we are today.

SubLOGIC's first black & white 3D graphics routines, developed in 1977, paved the way for our introduction to flight simulation and aerial combat gaming theory. Our second-generation Flight Simulator II was so well conceived that even we find it difficult to improve upon. Jet's spectacular land and sea battle scenarios set another classic milestone in state-of-the-art simulation gaming. Scenery concepts incorporated into SubLOGIC flight simulation products right from the start continue to evolve as we introduce new, more beautifully detailed areas of the world to explore. And coming in 1988 - a flight control yoke for even more realism!

We invite you to help us celebrate our first decade of success, and share in our anticipation of the next ten years to come. SubLOGIC tenth-anniversary promotional shirts and posters are available at your dealer or directly from SubLOGIC. See your dealer, or write or call us for more information.

subLOGIC
 Corporation
 713 Edgebrook Drive
 Champaign IL 61820
 (217) 359-8482 Telex: 206995
ORDER LINE: (800) 637-4983
 (except in Illinois)





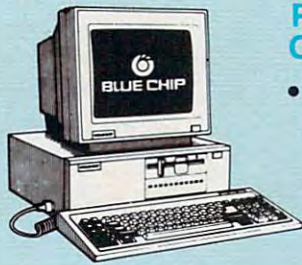
Lycó Computer Marketing & Consultants

Since 1981

Order processed within 24 hours.

BLUE CHIP

PERSONAL COMPUTER



- 100% IBM PC/XT compatible!

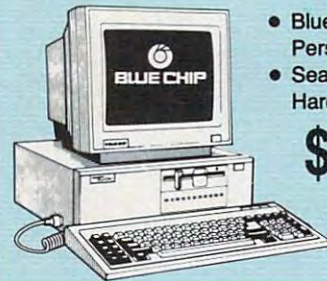
\$479⁰⁰

(Green, amber & color monitors available)

PC COMPATIBLE HARDWARE

PC 5 1/4 Drive	\$119
MS DOS + Basic Soft	\$59
BCM 12G Gr. TTL Monitor	\$79
BCM 12A Am. TTL Monitor	\$89
BCM 14C Color RGB Monitor ..	\$259.95
BCC CG Color Card	\$94.99
BCPC PC/XT Comp	\$559
Avatex Graphics Card	\$169
Zuckerboard	\$CALL
Imege Bernoulli	\$CALL
Hercules	\$CALL
AST	\$CALL

BLUE CHIP special



- Blue Chip Personal Computer
- Seagate 20 Meg Hard Drive

\$749⁹⁵

(Hard drive must be installed)

ATARI

520 ST-FM Color System

\$599⁹⁵



Seagate HARD DRIVES

20 meg kit	\$275.95*
30 meg kit	\$315.95*
40 meg kit	\$489.95*
*Drives include controller	
40 meg w/o controller	\$425.95

COMMODORE

HARDWARE

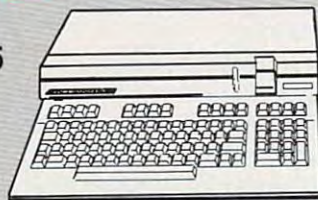
1541 C Disk Drive	\$168.95
1571 Disk Drive	\$217.95
1581 Disk Drive	\$195.95
Indus GT C-64 Drive	\$169.95
Blue Chip 64C Drive	\$CALL
Blue Chip C 128 Drive	\$CALL
1802C Monitor	\$189.95
2002 Monitor	\$239.95
1901 Monitor	\$CALL
64 C Computer	\$149.95
128D Computer/Drive	\$449.95
1670 Modem	\$CALL
C-1351 Mouse	\$32.95
1700 RAM	\$109.95
C-1750 RAM	\$169.95
1764 RAM C64	\$124.95

COMMODORE

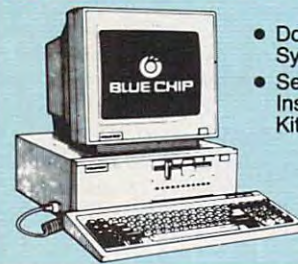
128 D System

\$439⁹⁵

Commodore 128D Plus Thomson 4120 Monitor \$659.95



BLUE CHIP PC



- Double Floppy System
- Second Drive + Installation Kit Included

\$579⁹⁵

ATARI

1040 ST Color System

\$799⁹⁵



ATARI HARDWARE

520 ST FM Mono	\$475.95
520 ST FM Color	\$599.95
1040 ST Mono	\$665.95
1040 ST Color	\$799.95
130XE Computer	\$125
SX551 Drive	\$179.95
SF 314 Disk Drive	\$199.95
SF 354 Disk Drive	\$119.95
Indus GT Atari Drive	\$175.95
SHD 204 20 MEG Drive	\$539.95
XM301 Modem	\$42.95
SX212 Modem	\$89.95
GTS 100 (3.5" DSSD ST)	\$195.95

COMMODORE 64C Computer



\$299⁹⁵

Priced too low to print.

Call For November Special!

ATARI

520 ST-FM Monochrome System

\$475⁹⁵

Internal drive included



1-800-233-8760

www.commodore.ca

Price Guarantee

Since 1981, we have led the industry by continuing to offer the lowest national prices while providing quality service. Many companies have come and gone trying to imitate our quality and service. If by some oversight we do not have the lowest prices advertised on the products you desire, then we would appreciate the opportunity to rectify this oversight.

New 1080i Model II

- Now 150 cps Draft Mode
- NLQ Mode
- Friction & Tractor Feed
- 2-Year Warranty

\$157⁹⁵

Panasonic 1080i Model II



Monitors

Thomson:	Blue Chip:
230 Amber TTL/12" \$85	BCM 12" Green TTL \$79
450 Amber TTL/15" \$149	BCM 12" Amber TTL \$89
980 White TTL/20" \$695	BCM 14" Color \$259.95
4120 CGA \$225.95	NEC:
4160 CGA \$289	Multisync \$549
4460 EGA \$359	
Zenith:	Compare & Save \$24.00
ZVM 1220 \$89	Thomson 4375 UltraScan \$525.95
ZVM 1230 \$89	

THOMSON 4120 Monitor

- 14" RGB/video composite/analog
- Compatible with IBM and Commodore
- RGB data cable included

\$225⁹⁵

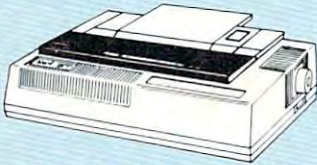
Avatec:	1200i PC Card \$89.95
	1200hc Modem \$95.95
	2400 \$209.95
	2400i PC Card \$199.95
Hayes:	
	Smartmodem 300 \$125
	Smartmodem 1200 \$369
	Smartmodem 2400 \$559

Wide Carriage Special



NX-10

- 120 cps Draft
- EZ Front Panel Selection
- NLQ Mode



\$144⁹⁵

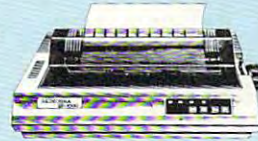
Great Performance Great Price

SEIKOSHA

SP 180Ai

- 100 cps draft
- 20 cps NLQ
- direct connect for Commodore

\$124⁹⁵



PRINTERS

SEIKOSHA

SP 180Ai \$124.95	NP-10 \$129.95
SP 180VC \$124.95	NX-10 \$144.95
SP 1000VC \$135.95	NX-10C w/interface \$165.95
SP 1200VC \$144.95	NL-10 \$195.95
SP 1200AS \$155.95	NX-15 \$289.95
SP 1200AS RS232 \$155.95	ND-10 \$249.95
SL 80Ai \$295.95	ND-15 \$375.95
MP1300Ai \$299.95	NR-15 \$409.95
MP5300Ai \$375.95	NB-15 24 Pin \$699.95
BP5420Ai \$879.95	NB24-10 24 Pin \$409.95
SP Series Ribbon \$7.95	NB24-15 24 Pin \$549.95
SK3000 Ai \$349	
SK3005 Ai \$429	



NP-10 \$129.95	
NX-10 \$144.95	
NX-10C w/interface \$165.95	
NL-10 \$195.95	
NX-15 \$289.95	
ND-10 \$249.95	
ND-15 \$375.95	
NR-15 \$409.95	
NB-15 24 Pin \$699.95	
NB24-10 24 Pin \$409.95	
NB24-15 24 Pin \$549.95	

EPSON

LX800 \$175.95	
FX86E \$289.95	
FX286E \$429.95	
EX800 \$374.95	
EX1000 \$489.95	
LQ800 \$369.95	
LQ1000 \$549.95	
LQ2500 \$849.95	
GQ3500 SLOW	
LQ850 \$499.95	
LQ1050 \$679.95	

Panasonic

1080i Model II \$157.95	
1091i Model II \$179.95	
1092i \$295	
1592 \$379	
1595 \$419	
3131 \$259	
3151 \$399	
KXP 4450 Laser SCALL	
1524 24 Pin \$549.95	

SILVER REED

EXP 420P \$199	
EXP 600P \$499	
EXP 800P \$649	

OKIDATA

Okimate 20 \$119	
Okimate 20 w/cart \$179.95	
120 \$189.95	
180 \$219.95	
182 \$229.95	
192+ \$289.95	
193+ \$429.95	
292 w/interface \$409.95	
293 w/interface \$549.95	
294 w/interface \$789.95	
393 \$939.95	

Toshiba

321SL \$489	
341 SL \$659	
P351 Model II \$899	

DIABLO

D25 \$499.95	
635 \$779.95	

BROTHER

M1109 \$195	
M1409 \$299	
M1509 \$365	
M1709 \$475	
Twinwriter 6 Dot & Daisy \$899	
M1724L \$625	
HR20 \$339	
HR40 \$569	
HR60 \$709.95	

CITIZEN

120 D \$159.95	
MSP-10 \$259.95	
MSP-20 \$289.95	
MSP-15 \$324.95	
MSP-25 \$389.95	
MSP-50 \$375	
MSP-55 SCALL	
Premiere 35 \$464.95	
Tribute 224 \$624.95	

Join the thousands who shop Lyco and Save!

www.commodore.ca

We stock interfacing for Atari, Commodore, Apple and IBM.



Pyx:	
Create A Calendar	\$15.95
Destroyer	\$22.95
Fastload	\$19.95
Football	\$11.95
Movie Monster	\$11.95
Sub Battle	\$22.95
Winter Games	\$22.95
California Games	\$22.95
Super Cycle	\$11.95
Graphics Scrapbook	\$11.95
Str. Sports Basketball	\$22.95
Wid. 's Great Baseball	\$11.95
Summer Games II	\$22.95
Vorpol Utility Kit	\$11.95
World Games	\$22.95
Firebird:	
Colossus Chess IV	\$19.95
Elite	\$18.95
Golden Path	\$22.95
Guild of Thieves	\$22.95
Pawn	\$22.95
Talking Teacher	\$22.95
Tracker	\$22.95
Starglider	\$22.95
Sentry	\$22.95
Microleague:	
Microleag. Baseball	\$22.95
General Manager	\$16.95
Stat Disk	\$13.95
'86 Team Disk	\$11.95
Microleag. Wrestling	\$New
Microprose:	
Airborne Ranger	\$CALL
F-15 Strike Eagle	\$19.95
Gunship	\$19.95
Kennedy Approach	\$13.95
Silent Service	\$19.95
Solo Flight	\$13.95
Top Gunner	\$13.95
Origin:	
Autoduel	\$28.95
Ultima III	\$22.95
Ultima IV	\$33.95
Moebius	\$22.95
Springboard:	
Newsroom	\$29.95
Certificate Maker	\$29.95
Clip Art Vol. #1	\$17.95
Clip Art Vol. #2	\$23.95
Clip Art Vol. #3	\$17.95
Graphics Expander	\$21.95
Strategic Simulations:	
Gemstone Healer	\$16.95
Gettysburg	\$33.95
Kampfgruppe	\$33.95
Phantasia II	\$22.95
Phantasia III	\$22.95
Ring of Zelfin	\$22.95
Road War 2000	\$22.95
Shard of Spring	\$22.95
Wizards Crown	\$22.95
War in the S. Pacific	\$33.95
Wargame Constr.	\$16.95
Battlecruiser	\$33.95
Gemstone Warrior	\$7.95
Battle of Antetiem	\$28.95
Colonial Conquest	\$22.95
Computer Ambush	\$33.95
B-24	\$19.95
Subloglc:	
Flight Simulator II	\$31.49
Jet Simulator	\$24.95
Night Mission Pinball	\$18.95
Scenery Disk 1-6	\$12.95
Timeworks:	
Partner C64	\$24.95
Partner 128	\$39.95
Swift Calc 128	\$29.95
Wordwriter 128	\$29.95

Unison World:	
Art Gallery 1 or 2	\$14.95
Print Master	\$17.95



Access:	
Triple Pack	\$11.95
World Class Leader	
Board	\$23.95
Famous Courses	\$11.95

Activision:	
Zork Trilogy	\$39.95
Game Maker	\$29.95
Leather Goddesses	\$22.95
Term Paper	\$29.95
Champ. Baseball	\$22.95
Champ. Basketball	\$22.95
Championship Golf	\$New
GFL Football	\$22.95
Top Fuel Eliminator	\$19.95

Broderbund:	
Airheart	\$22.95
Print Shop	\$26.95
Print Shop Comp.	\$22.95
Carmen S. Diego (USA)	\$22.95
On Balance	\$56.95
Bank St. Writer +	\$44.95

Epyx:	
Create A Calendar	\$15.95
Destroyer	\$22.95
Movie Monster	\$11.95
St. Sports Basketball	\$22.95
Sub Battle Simulator	\$22.95
Winter Games	\$22.95
World Games	\$22.95
Wrestling	\$22.95

Firebird:	
Colossus IV Chess	\$22.95
Elite	\$19.95
The Pawn	\$25.95
Starglider	\$25.95

Microleague:	
Microleag. Baseball	\$22.95
General Manager	\$16.95
Stat Disk	\$11.95
'86 Team Disk	\$11.95

Microprose:	
Crusade in Europe	\$22.95
Decision in Desert	\$22.95
F-15 Strike Eagle	\$19.95
Silent Service	\$19.95

Strategic Simulations:	
Battlecruiser	\$33.95
Colonial Conquest	\$22.95
Gettysburg	\$33.95
Phantasia III	\$22.95
Realms of Darkness	\$22.95
Shard of Spring	\$22.95
Wizards Crown	\$22.95
Eternal Dagger	\$22.95
Shiloh	\$NEW

Subloglc:	
Flight Simulator II	\$30.95
Jet Simulator	\$24.95
Night Mission Pinball	\$21.95
Scenery #1-# ea.	\$12.95

Unison World:	
Art Gallery 2	\$14.95
Print Master	\$19.95



Access:	
Leader Board	\$22.95
Tournament #1	\$11.95

Activision:	
Champ. Basketball	\$25.95
Championship Golf	\$22.95
GFL Football	\$25.95
Hacker	\$13.95
Hacker 2	\$22.95
Music Studio	\$27.95
Tass Times	\$22.95

Epyx:	
Apsahl Trilogy	\$11.95
Rogue	\$22.95
Winter Games	\$22.95
World Games	\$22.95

Firebird:	
Guild of Thieves	\$25.95
Pawn	\$25.95
Starglider	\$25.95

Microprose:	
Silent Service	\$22.95

Subloglc:	
Flight Simulator II	\$31.49
Jet Simulator	\$31.49
Scenery Disk	\$CALL

Unison World:	
Print Master	\$19.95
Art Gallery 1 or 2	\$14.95
Fonts & Borders	\$17.95



Access:	
Wid. Cl. Leader Board	\$27.95
10th Frame	\$27.95

Activision:	
Pebble Beach Golf	\$22.95
Champ. Baseball	\$22.95
Champ. Basketball	\$22.95
Zork Trilogy	\$39.95
Leather Goddesses	\$22.95
Moonmist	\$22.95

Broderbund:	
Ancient Art of War	\$25.95
Print Shop	\$32.95
Print Shop Compan.	\$31.95
Graphic Lib. I or II	\$19.95
Karateka	\$19.95
Toy Shop	\$22.95
Bank St. Writer +	\$44.95

Epyx:	
Apsahl Trilogy	\$11.95
Create A Calendar	\$15.95
Destroyer	\$22.95
Movie Monster	\$11.95
Rogue	\$16.95
St. Sports Basketball	\$22.95
Sub Battle Simulator	\$22.95
Winter Games	\$22.95
World Games	\$22.95

Firebird:	
Starglider	\$25.95
Guild of Thieves	\$25.95

Microleague:	
Microleag. Baseball	\$22.95
General Manager	\$16.95
Stat Disk	\$13.95
'86 Team Disk	\$11.95

Microprose:	
Conflict in Vietnam	\$22.95
Crusade in Europe	\$22.95
Decision in Desert	\$22.95
F-15 Strike Eagle	\$22.95
Silent Service	\$22.95
Gunship	\$27.95

Origin:	
Ultima I	\$22.95
Ultima III	\$22.95
Ultima IV	\$33.95

Moebius	\$33.95
Ogre	\$16.95
Strategic Simulations:	
Road War 2000	\$22.95
Kampfgruppe	\$33.95
Shard of Spring	\$22.95
Battle of Antetiem	\$33.95
Computer Baseball	\$7.95
Gettysburg	\$33.95
Wizards Crown	\$22.95
Chickamauga	\$33.95

Subloglc:	
Jet Simulator	\$31.49
Scenery Japan	\$17.95
Scenery San Fran.	\$17.95
Scenery #1-#6	\$64.95
Flight Simulator	\$34.95

Timeworks:	
Swiftcalc	\$39.95
Wordwriter	\$34.95

Unison World:	
Art Gallery 2	\$14.95
News Master	\$49.95
Print Master (+)	\$29.95
Fonts & Borders	\$17.95

Diskettes

5-1/4

Maxell:	
SSDD	\$7.95
DSDD	\$8.95

Bonus:	
SSDD	\$5.95
DSDD	\$6.95

SKC:	
DSDD	\$6.95
DSHD	\$13.95
Generic DSDD	\$4.95

Verbatim:	
SSDD	\$8.99
DSDD	\$11.50

3.5

Maxell:	
SSDD	\$11.50
DSDD	\$17.95

Verbatim:	
SSDD	\$14.50
DSDD	\$20.95

SKC:	
SSDD	\$11.95
DSDD	\$13.99
Generic SSDD	\$11.50
Generic DSDD	\$12.95

Joysticks

Tac 3	\$8.95
Tac 2	\$8.95
Tac 5	\$11.95
Tac 1 + IBM/AP	\$17.95
Economy	\$4.49
Slik Stick	\$4.95
Black Max	\$7.95
Boss	\$10.95
3-Way	\$17.95
Bathandle	\$14.95
500XJ	\$10.95
500XJ-Apple/PC	\$21.95
Winner 909	\$19.95
Wico IBM/AP	\$19.95
Contriver Joystick Bd	\$29.95

Lyco Means Total Service.

ATARI

A



Mark "Mac" Bowser,
Sales Manager

I would personally like to thank all of our past customers for helping to make Lyco Computer one of the largest mail order companies and a leader in the industry. Also, I would like to extend my personal invitation to all computer enthusiasts who have not experienced the services that we provide. Please call our trained

Call Lyco

sales staff at our toll free number to inquire about our diverse product line and weekly specials.

First and foremost our philosophy is to keep abreast of the changing market so that we can provide you with not only factory-fresh merchandise but also the newest models offered by the manufacturers at the absolute best possible prices. And we offer the widest selection of computer hardware, software and accessories.

Feel free to call Lyco if you want to know more about a particular item. I can't stress enough that our toll-free number is not just for orders. 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 Lyco. Our trained sales staff is knowledgeable about all the products we stock and is happy to answer any questions you may have. We will do our best to make sure that the product you select will fit your application. We also have Saturday hours — one more reason to call us for all your computer needs.

Once you've placed your order with Lyco, 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.

Lyco Computer stocks a multimillion dollar inventory of factory-fresh merchandise. Chances are we have exactly what you want right in our warehouse. And that means you'll get it fast. In fact, orders are normally shipped within 24 hours. Free shipping on prepaid cash orders over \$50, and there is no deposit required on

C.O.D. orders. Air freight or UPS Blue/Red Label shipping is available, too. And all products carry the full manufacturers' warranties.

I can't see why anyone would shop anywhere else. Selection from our huge in-stock inventory, best price, service that can't be beat — we've got it all here at Lyco Computer.

TO ORDER, CALL TOLL-FREE: 1-800-233-8760
New PA Wats: 1-800-233-8760

Outside Continental US Call: 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 to 5PM, Mon. - Fri.

Or write: Lyco 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

Attention Educational Institutions:

If you are not currently using our educational service program, please call our representatives for details.

Access:	
Leader Board	\$22.95
Tournament #1	\$11.95
Triple Pack	\$11.95
Activision:	
Hacker	\$8.95
Hitch Hikers	\$13.95
Leather Goddesses	\$19.95
Moonmist	\$19.95
Music Studio	\$19.95
Stationfall	\$19.95
Lurking Horror	\$19.95
Broderbund:	
Print Shop	\$25.49
Print Shop Compan.	\$22.95
Graphic Lib. I, II, III	\$13.49
Karateka	\$12.95
Bank St. Writer	\$27.95
Firebird:	
The Pawn	\$22.95
Microleague:	
Microleag. Baseball	\$22.95
General Manager	\$16.95
Stat Disk	\$13.95
'86 Team Disk	\$11.95
Microprose:	
Conflict in Vietnam	\$22.95
F-15 Strike Eagle	\$19.95
Kennedy Approach	\$13.95
Silent Service	\$19.95
Top Gunner	\$13.95
Optimized Systems:	
Action	\$44.95
Action Tool Kit	\$11.95
Basic XE	\$4.95
Basic XL	\$33.95
Basic XL Tool Kit	\$16.95
Mac 65	\$44.95
Mac 65 Tool Kit	\$16.95
Strategic Simulations:	
Battle of Antietam	\$28.95
Battlecruiser	\$33.95
Nam	\$22.95
Phantasia	\$22.95
Wargame Construc.	\$16.95
Warship	\$33.95
Wizards Crown	\$22.95
Sublogic:	
Flight Simulator II	\$31.49
Night Mission Pinball ...	\$18.95
Scenery #1-#6 ea.	\$12.95
Scenery #7	\$14.95

Epyx:
Sub Battle Sim
World Games
Wrestling
Winter Games

Firebird:
Pawn
Starglider
Golden Path
Guild of Thieve
Tracker

Microleague:
Microleague Ba
General Manag
Wrestling

Microprose:
Silent Service
F-15 Strike Eag

Optimized Sys:
Personal Pasca
Personal Prolog

Strategic Simu:
Phantasia
Phantasia II
Road War 2000
Colonial Conqu

Sublogic:
Flight Simulator
Scenery Disk

Unison World:
Art Gallery 1 or
Print Master
Fonts & Border

COMM

Access:
Echelon
Leader Board
Mach 5
Mach - 128
10th Frame
Triple Pack
Wld. Cl. Leader
Famous Cours
Famous Cours

Action Soft:
Up Periscope
Thunder Chopp

Activision:
Aliens
Champion. Bas
Hacker
Hacker 2
Labyrinth
Music Studio

Atari ST:
Tass Times
Titanic
Leather Godde
Stationfall
Lurking Horror
Top Fuel Elim

Berkeley Soft:
Geos
Deskpak I
Fontpak I
Geodex
Geofile
Writers Worksh
Geo Calc

Broderbund:
Bank St. Writer
Carmen San Di
Graphic Lib. I, I
Karateka
Print Shop
Print Shop Con
Print Shop Pap

ATARI ST

Access:	
Leader Board	\$22.95
Tournament #1	\$11.95
10th Frame	\$22.95
Activision:	
Champion. Baseball	\$22.95
Champion. Basketball ...	\$22.95
Championship Golf	\$New
GFL Football	\$22.95
Hacker 2	\$22.95
Leather Goddesses	\$22.95
Moonmist	\$22.95
Music Studio	\$27.95
Paint Works	\$22.95
Shanghai	\$22.95
Bureaucracy	\$22.95
Stationfall	\$22.95
Lurking Horror	\$22.95
Top Fuel	\$19.95
Broderbund:	
Karateka	\$CALL

Order Now



Here's How



Free ship

www.commodore.ca

After you've entered all the data, be sure to save a copy before leaving MLX.

To load the program, type `LOAD"filename",8,1`

where *filename* is the name you used to save the program. To run Leaping Larry, type `SYS 49152`.

In the 64 version, Larry earns points for picking up plans. The plans on the top floor are worth 600 points; the ones on the bottom floor worth 100 points; and there are several other plans, worth 50 points each, that appear randomly.

Apple II Version

The Apple version of Leaping Larry (Program 2) must be typed in using "Apple MLX," found elsewhere in this issue. When Apple MLX asks for the starting and ending addresses, enter the following values:

STARTING ADDRESS? 6000
ENDING ADDRESS? 6ACF

After you've entered all the data, be sure to save a copy before leaving MLX.

To start Leaping Larry, type `BRUN filename`, where *filename* is the name you used for saving the Leaping Larry data. The Apple version of Leaping Larry uses keyboard controls in place of the joystick. To move Larry left use *J*; to move him right, use *L*; stop him with *K*; use the space bar to make him leap.

This version doesn't use robots, but it has a unique and interesting twist: The conveyor belts move in random patterns. To compensate for this added difficulty, the third set of plans doesn't fall, but remains stationary. With each progressive level, the belts become shorter and shorter until they're just flickers.

Atari 400, 800, XL, And XE Version

Leaping Larry for the Atari is similar to the 64 version of the game. Program 3 is a BASIC program which, when run, creates a machine language program on disk. Type Program 3 in carefully and save a copy to disk before running it. When you save the program, use a name other than LEAPIN, which is the name of the program generated when you run the program. To cre-

ate the machine language game, type RUN.

To start the game, go to the DOS 2.0 or 2.5 menu and select the Load Binary File option. When asked for the filename, specify LEAPIN/N. Next, select the Run At Memory option. When asked for an address, enter 6000. If you use a third-party DOS (such as OS/A or DOS XL), you may be able to simply type LEAPIN at the DOS prompt to start the game.

There are a few minor differences in the Atari version of the game. First, there are no falling plans. Plans located on the bottom of the screen are worth 2 points; plans at the top are worth 10. The only way to score is by collecting plans.

There are no invisible levels in the Atari version. Instead, there are different hazards. The platforms become shorter on each level. Also, the robots (which are intelligent and persistent in this version) become faster after several levels have passed.

You begin the game with five lives. You lose a life each time a robot touches you or you fall off a platform.

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

Program 1: Leaping Larry—Commodore 64 Version

```
C000:20 74 C9 A9 01 8D A4 C9 D3
C008:A9 00 8D A3 C9 8D A0 C0 D0
C010:8D C8 C0 8D CA C9 8D C0 DF
C018:C9 8D 00 D4 8D 21 D0 A9 6B
C020:03 8D C9 C9 20 42 C9 A9 A3
C028:FF 8D 0F D4 A9 80 8D 18 BE
C030:D4 A9 81 8D 12 D4 A9 01 C7
C038:8D 28 D0 A9 00 8D 86 02 84
C040:8D 10 D0 8D 03 D0 A9 0C 3A
C048:8D 29 D0 8D 2A D0 78 A9 FC
C050:5D 8D 14 03 A9 C0 8D 15 17
C058:03 58 4C 69 C0 EE 03 D0 2A
C060:EE 03 D0 20 23 C8 4C 31 3C
C068:EA A9 0E 8D 20 D0 A9 00 FB
C070:8D 9D C9 AD 10 D0 29 FA 45
C078:09 08 8D 10 D0 A9 35 8D 58
C080:05 D0 A9 DD 8D 07 D0 A9 9F
C088:19 8D 04 D0 A9 3F 8D 06 F2
C090:D0 A2 F4 8E FA 07 E8 8E FE
C098:FB 07 A9 93 20 D2 FF AD 37
C0A0:00 A9 51 9D DC 04 9D 4A 0D
C0A8:05 9D BE 05 9D 44 06 9D E3
C0B0:A8 06 9D 39 07 E8 0E 0C F8
C0B8:D0 E9 A2 00 9D 50 04 9D 45
C0C0:98 07 E8 0E 28 D0 F5 A2 8E
C0C8:00 A9 77 9D 04 05 9D 72 5F
C0D0:05 9D E6 05 9D 6C 06 9D B1
C0D8:D0 06 9D 61 07 E8 E0 0C B7
C0E0:D0 E9 A2 00 9D 78 04 9D 0E
C0E8:C0 07 E8 0E 28 D0 F5 A2 CA
C0F0:00 A9 A0 9D C0 07 E8 E0 9F
C0F8:28 D0 F8 A2 00 A9 01 9D 52
C100:C0 DB E8 0E 28 D0 F8 A9 26
C108:00 A2 00 9D 50 D8 9D C8 F7
```

```
C110:D8 9D 40 D9 9D 98 DB 9D B1
C118:B8 D9 9D 30 DA 9D A8 DA 9E
C120:9D 20 DB E8 E0 28 D0 E3 B1
C128:A2 00 A9 0D 9D 78 D8 A9 2D
C130:01 9D F0 D8 A9 04 9D 68 48
C138:D9 A9 03 9D E0 D9 A9 0A 19
C140:9D 58 DA A9 05 9D D0 DA B9
C148:A9 07 9D 48 DB E8 E0 28 07
C150:D0 D8 18 A2 18 A0 03 20 09
C158:F0 FF A9 A5 A0 C9 20 1E 6E
C160:AB 20 12 C8 20 EF C7 A9 8A
C168:01 8D 2B D0 8D 2C D0 A9 AA
C170:CE 8D 09 D0 A9 26 8D 0B F8
C178:D0 A9 F6 8D FC 07 8D FD A3
C180:07 AD A3 C9 C9 05 90 0B 92
C188:AD A4 C9 D0 06 EE A0 C0 40
C190:EE C8 C0 20 FB C6 20 9C AF
C198:C1 4C C2 C1 20 B7 C1 AD 95
C1A0:1B D4 29 01 C9 01 D0 08 18
C1A8:AD 10 D0 09 02 8D 10 D0 E8
C1B0:AD 1B D4 8D 02 D0 60 AD 07
C1B8:10 D0 29 FD 8D 10 D0 A9 75
C1C0:00 60 A9 3F 8D 15 D0 A9 91
C1C8:DD 8D 01 D0 A9 FF 8D F8 2D
C1D0:07 A9 19 8D 00 D0 8D 9A 37
C1D8:C9 A9 F7 8D 9B C9 AD 1E 01
C1E0:D0 4C E4 C1 20 95 C5 20 9B
C1E8:A9 C4 AD 00 DC C9 77 F0 16
C1F0:17 C9 7B F0 25 C9 6B F0 09
C1F8:15 C9 67 F0 17 A9 FF 8D 62
C200:F8 07 8D 9B C9 4C E4 C1 3A
C208:20 20 C2 4C E4 C1 20 4E 7F
C210:C3 4C E4 C1 20 AD C3 4C CE
C218:E4 C1 20 86 C2 4C E4 C1 BF
C220:AD 9B C9 C9 F7 90 04 C9 0D
C228:FB 90 05 A9 FA 8D 9B C9 1A
C230:AD 9B C9 8D F8 07 AD 9C 61
C238:C9 C9 01 F0 18 CE 9B C9 41
C240:AD 9B C9 F7 B0 0B A9 9B
C248:01 8D 9C C9 EE 9B C9 4C A7
C250:55 C2 4C 6B C2 EE 9B C9 44
C258:AD 9B C9 C9 FB 90 0B A9 53
C260:00 8D 9C C9 CE 9B C9 4C 3E
C268:3D C2 EA 20 EF C2 20 76 DD
C270:C5 20 EF C2 20 EF C2 20 71
C278:76 C5 20 EF C2 20 95 C5 35
C280:20 A2 C4 4C CA C6 AD 9B 84
C288:C9 C9 FF 90 05 A9 FB 8D C2
C290:9B C9 C9 FB 90 F7 AD 9B AA
C298:C9 8D F8 07 AD 9C C9 C9 33
C2A0:01 F0 18 EE 9B C9 AD 9B CF
C2A8:C9 C9 FF 90 0B A9 01 8D 1D
C2B0:9C C9 CE 9B C9 4C BB C2 44
C2B8:4C D1 C2 CE 9B C9 AD 9B 19
C2C0:C9 C9 FB 0B 0B A9 00 8D B4
C2C8:9C 99 EE 9B C9 4C A3 C2 30
C2D0:EA 20 1D C3 20 76 C5 20 3A
C2D8:1D C3 20 1D C3 20 76 C5 05
C2E0:20 1D C3 20 95 C5 AD 9A F1
C2E8:C9 8D 00 D0 4C CA C6 AD 8C
C2F0:9A C9 C9 40 F0 18 C9 FF EE
C2F8:F0 06 EE 9A C9 4C 4A C3 D7
C300:AD 10 D0 09 01 8D 10 D0 3C
C308:A9 00 8D A9 C9 60 AD 10 FA
C310:D0 29 01 C9 01 F0 03 EE C7
C318:9A C9 4C 4A C3 AD 9A C9 61
C320:C9 18 F0 1A C9 00 F0 06 88
C328:CE 9A C9 4C 4A C3 AD 10 88
C330:D0 29 FE 8D 10 D0 A9 FF 3A
C338:8D 9A C9 4C 4A C3 AD 10 F7
C340:D0 29 01 C9 01 D0 03 CE 57
C348:9A C9 20 A2 C4 60 A9 FE B7
C350:8D F8 07 A2 00 20 1D C3 66
C358:CE 01 D0 CE 01 D0 20 76 90
C360:C5 20 76 C5 20 95 C5 EB C9
C368:E0 08 D0 E9 A2 00 20 1D 8D
C370:C3 20 1D C3 CE 01 D0 20 FD
C378:76 C5 20 76 C5 20 95 C5 B7
C380:E8 E0 0A D0 E9 EE 01 D0 E0
C388:20 76 C5 EE 01 D0 AD 1F 2B
C390:D0 20 98 C4 29 01 C9 01 C9
C398:F0 12 20 0C C4 AD 1F D0 CD
C3A0:20 98 C4 29 01 C9 01 F0 AB
```


C3A8:03 4C 26 C5 60 A9 F7 8D 0D
C3B0:F8 07 A2 00 20 EF C2 CE DF
C3B8:01 D0 CE 01 D0 20 76 C5 98
C3C0:20 76 C5 20 95 C5 E8 E0 27
C3C8:08 D0 E9 A2 00 20 EF C2 13
C3D0:20 EF C2 CE 01 D0 20 76 AB
C3D8:C5 20 76 C5 20 95 C5 E8 42
C3E0:E0 0A D0 E9 EE 01 D0 20 51
C3E8:76 C5 EE 01 D0 AD 1F D0 57
C3F0:20 98 C4 29 01 C9 01 F0 FB
C3F8:12 20 52 C4 AD 1F D0 20 D3
C400:98 C4 29 01 C9 01 F0 03 73
C408:4C 26 C5 60 A9 FE 8D F8 5D
C410:07 A2 00 20 1D C3 20 1D 1D
C418:C3 EE 01 D0 20 76 C5 20 F2
C420:76 C5 20 95 C5 E8 E0 0A 51
C428:D0 E9 A2 00 20 1D C3 EE D4
C430:01 D0 EE 01 D0 20 76 C5 16
C438:20 76 C5 20 95 C5 E8 E0 A0
C440:08 D0 E9 CE 01 D0 20 76 2E
C448:C5 CE 01 D0 A9 FF 8D F8 F6
C450:07 60 A9 F7 8D F8 07 A2 2B
C458:00 20 EF C2 20 EF C2 EE 49
C460:01 D0 20 76 C5 20 76 C5 6B
C468:20 95 C5 E8 E0 0A D0 E9 69
C470:A2 00 20 EF C2 EE 01 D0 F2
C478:EE 01 D0 20 76 C5 20 76 57
C480:C5 20 95 C5 E8 E0 08 D0 AF
C488:E9 CE 01 D0 20 76 C5 CE 1D
C490:01 D0 A9 FF 8D F8 07 60 C2
C498:20 76 C5 20 76 C5 AD 1F CF
C4A0:D0 60 AD 9A C9 8D 00 D0 5F
C4A8:60 20 BC C4 AD 1F D0 20 F9
C4B0:98 C4 29 01 C9 01 F0 03 24
C4B8:4C 26 C5 60 AD 1E D0 8D C5
C4C0:03 CA 29 11 C9 11 D0 10 F8
C4C8:AD 15 D0 29 EF 8D 15 D0 CB
C4D0:20 A3 C6 A0 64 4C 00 C8 53
C4D8:AD 03 CA 29 03 C9 03 D0 FB
C4E0:10 AD 15 D0 29 FD 8D 15 FE
C4E8:D0 20 A3 C6 A0 32 4C 00 2A
C4F0:C8 AD 03 CA 29 21 C9 21 D9
C4F8:D0 19 AD 15 D0 29 DF 8D B0
C500:15 D0 EE CB C9 EE CB C9 50
C508:A0 58 20 00 C8 20 A3 C6 D2
C510:4C 71 C5 AD 03 CA 29 05 4C
C518:C9 05 F0 0A AD 03 CA 29 C0
C520:09 C9 09 F0 01 60 A9 0F BE
C528:8D 18 D4 A9 11 8D 05 D4 53
C530:8D 04 D4 A9 41 8D 06 D4 D9
C538:AD 01 D0 AA 8D 01 D4 A9 63
C540:00 8D A4 C9 CE A3 C9 CE C7
C548:A0 C0 CE C8 C0 E8 8A 49 C2
C550:FF 8D 01 D4 8E 01 D0 20 E6
C558:76 C5 E0 FF D0 EF A9 10 56
C560:8D 04 D4 CE C9 C9 20 EF E0
C568:C7 AD C9 C9 D0 03 4C 7 0C
C570:C7 68 68 4C 24 C0 A9 00 43
C578:8D 98 C9 A9 00 8D 99 C9 F7
C580:EE 99 C9 AD 99 C9 C8 4E
C588:D0 F6 EE 98 C9 AD 98 C9 A1
C590:C9 03 D0 E7 60 8E 9E C9 9E
C598:20 98 C6 EE 9D C9 AD 9D 2F
C5A0:C9 C9 03 D0 03 4C A9 C5 53
C5A8:60 A9 00 8D 9D C9 AD EF 07
C5B0:04 8D 8C C9 AD 17 05 8D 31
C5B8:8D C9 AD DF 05 8D 8E C9 76
C5C0:AD 07 06 8D 8F C9 AD CF 4D
C5C8:06 8D 90 C9 AD F7 06 8D 50
C5D0:91 C9 AD 40 05 8D 92 C9 9E
C5D8:AD 68 05 8D 93 C9 AD 30 1E
C5E0:06 8D 94 C9 AD 58 06 8D 6A
C5E8:95 C9 AD 20 07 8D 96 C9 CE
C5F0:AD 48 07 8D 97 C9 A2 26 6E
C5F8:BD C8 04 9D C9 04 BD F0 BA
C600:04 9D F1 04 BD B8 05 9D ED
C608:B9 05 BD E0 05 9D E1 05 E0
C610:BD A8 06 9D A9 06 BD D0 F2
C618:06 9D D1 06 CA E0 FF D0 55
C620:D7 A2 00 BD 41 05 9D 04 B7
C628:05 BD 69 05 9D 68 05 BD 7B
C630:31 06 9D 30 06 BD 59 06 6E
C638:9D 58 06 BD 21 07 9D 20 C7

C640:07 BD 49 07 9D 48 07 E8 5F
C648:E0 27 D0 D7 AD 8C C9 8D 68
C650:C8 04 AD 8D C9 8D F0 04 3C
C658:AD 8E C9 8D B8 05 AD 8F 37
C660:C9 8D E0 05 AD 90 C9 8D 73
C668:A8 06 AD 91 C9 8D 06 C6
C670:AD 92 C9 8D 67 05 AD 93 C9
C678:C9 8D 8F 05 AD 94 C9 8D 71
C680:57 06 AD 95 C9 8D 7F 06 D3
C688:AD 96 C9 8D 47 07 AD 97 ED
C690:C9 8D 6F 07 AE 9E C9 60 A8
C698:AD 03 D0 C9 02 B0 03 20 6D
C6A0:9C C1 60 A9 0F 8D 18 D4 47
C6A8:A9 11 8D 05 D4 A9 41 8D AE
C6B0:06 D4 A9 1C 8D 01 D4 A9 31
C6B8:00 8D 00 D4 A9 21 8D 04 E7
C6C0:D4 20 76 C5 A9 20 8D 04 D8
C6C8:D4 60 A9 0F 8D 18 D4 AD 23
C6D0:F8 07 C9 FA D0 03 4C DE 8F
C6D8:C6 C9 FB F0 01 60 A9 11 B8
C6E0:8D 05 D4 A9 41 8D 06 D4 CC
C6E8:A9 50 8D 01 D4 A9 81 8D FE
C6F0:04 D4 20 76 C5 A9 80 8D 84
C6F8:04 D4 60 A9 01 8D A4 C9 B5
C700:20 B2 C7 EE A3 C9 18 A2 4B
C708:18 A0 24 20 F0 FF A9 00 2D
C710:AE A3 C9 20 CD BD AD A3 7F
C718:C9 C9 01 F0 34 C9 02 F0 EB
C720:3C C9 03 F0 38 C9 04 F0 91
C728:34 C9 05 F0 30 C9 06 F0 99
C730:33 C9 07 F0 3C C9 08 F0 C5
C738:45 C9 09 F0 11 C9 0A F0 C1
C740:07 C9 0B F0 06 4C A5 C7 AA
C748:4C 98 C7 4C A5 C7 4C 8B 52
C750:C7 A9 F6 8D F9 07 EE A0 50
C758:C0 EE C8 C0 60 EE A0 C0 E9
C760:EE C8 C0 60 A2 00 A9 00 20
C768:9D F0 D8 E8 E0 28 D0 F8 EE
C770:60 A2 00 A9 00 9D 68 D9 94
C778:E8 E0 28 D0 F8 60 A2 00 55
C780:A9 00 9D E0 D9 E8 E0 28 03
C788:D0 F8 60 A2 00 A9 00 9D 39
C790:58 DA E8 E0 28 D0 F8 60 05
C798:A2 00 A9 00 9D D0 DA E8 7D
C7A0:E0 28 D0 F8 60 A2 00 A9 8B
C7A8:00 9D 48 DB E8 E0 28 D0 52
C7B0:F8 60 AD 1B D4 C9 1E 90 D6
C7B8:F9 8D 08 D0 AD 1B D4 C9 04
C7C0:1E 90 F9 8D 0A D0 60 A9 99
C7C8:00 8D 15 D0 18 A2 0B A0 6D
C7D0:0B 20 F0 FF A9 CE A0 C9 9F
C7D8:20 1E AB 20 10 C9 20 E4 44
C7E0:FF C9 59 F0 06 C9 4E F0 02
C7E8:05 D0 F3 4C 00 C0 00 18 8D
C7F0:A2 18 A0 18 20 F0 FF A9 DB
C7F8:00 AE C9 29 20 CD BD 60 1E
C800:8C 01 CA 18 AD CA C9 6D 8C
C808:01 CA 8D CA C9 90 03 EE B0
C810:CB C9 18 A2 18 A0 0A 20 9E
C818:F0 FF AE CA C9 AD CB C9 0B
C820:4C CD BD AD 02 CA F0 11 0C
C828:20 4A C8 20 E2 C8 A9 F4 F9
C830:8D FA 07 A9 F5 8D FB 07 A7
C838:60 20 7F C8 20 AD C8 A9 71
C840:F5 8D FA 07 A9 F4 8D FB 38
C848:07 60 AD 04 D0 C9 40 F0 8A
C850:18 C9 FF F0 06 EE 04 D0 34
C858:4C AC C8 AD 10 D0 09 04 09
C860:8D 10 D0 A9 00 8D 04 D0 85
C868:60 AD 10 D0 29 04 C9 04 90
C870:F0 04 EE 04 D0 60 AD 02 FE
C878:CA 49 01 8D 02 CA 60 AD 64
C880:F4 D0 C9 18 F0 1A C9 00 86
C888:F0 06 CE 04 D0 4C AC C8 80
C890:AD 10 D0 29 FB 8D 10 D0 B0
C898:A9 FF 8D 04 D0 4C AC C8 CA
C8A0:AD 10 D0 29 04 C9 04 D0 D9
C8A8:03 CE 04 D0 60 AD 06 D0 93
C8B0:C9 40 F0 18 C9 FF F0 06 0D
C8B8:EE 06 D0 4C 0F C9 AD 10 2D
C8C0:D0 09 08 8D 10 D0 A9 00 ED
C8C8:8D 06 D0 60 AD 10 D0 29 3B
C8D0:08 C9 08 F0 04 EE 06 D0 A1

C8D8:60 AD 02 CA 49 01 8D 02 5E
C8E0:CA 60 AD 06 D0 C9 18 F0 D4
C8E8:1A C9 00 F0 06 CE 06 D0 51
C8F0:4C 0F C9 AD 10 D0 29 F7 8E
C8F8:8D 10 D0 A9 FF 8D 06 D0 1D
C900:4C 0F C9 AD 10 D0 29 08 AF
C908:C9 08 D0 A0 CE 06 D0 60 37
C910:AD CB C9 CD CD C9 90 1B 55
C918:F0 02 B0 0B AD CA C9 CD 65
C920:CC C9 90 0F 4C 27 C9 AE D0
C928:CA C9 AC CB C9 8E CC C9 D1
C930:8C CD C9 AE CC C9 AC CD 56
C938:C9 8E CA C9 8C C9 4C BD
C940:1A C8 AD A4 C9 F0 2C A9 27
C948:00 8D 15 D0 A9 93 20 D2 9D
C950:FF 18 A2 0B A0 10 20 F0 65
C958:FF A9 04 A0 CA 20 1E AB 9F
C960:A9 00 AE A3 C9 E8 20 CD D8
C968:BD A2 00 20 76 C5 E8 E0 03
C970:32 D0 F8 60 A2 00 BD 0D 14
C978:CA 9D 00 3D BD 0D CB 9D 04
C980:00 3E BD 0D CC 9D 00 3F 48
C988:E8 D0 EB 60 00 00 00 48
C990:00 00 00 00 00 00 00 24
C998:00 00 00 00 00 00 00 2C
C9A0:00 00 00 00 00 00 12 53 BF
C9A8:43 4F 52 45 3A 20 20 03
C9B0:20 20 20 20 20 20 4D 71
C9B8:45 4E 3A 20 20 20 20 AD
C9C0:20 4C 45 56 45 4C 3A 20 75
C9C8:00 00 00 00 00 00 92 96 18
C9D0:50 4C 41 59 20 41 47 41 33
C9D8:49 4E 3F 20 28 59 2F 4E E1
C9E0:29 11 11 9D 9D 9D 9D 85
C9E8:9D 9D 9D 9D 9D 9D 7C
C9F0:9D 9D 9D 9D 48 49 47 48 86
C9F8:20 53 43 4F 52 45 3A 20 0B
CA00:00 00 00 00 05 92 4C 45 E5
CA08:56 45 4C 20 00 00 00 00 A5
CA10:00 00 00 00 00 00 00 00 A5
CA18:00 00 00 00 00 00 00 00 AD
CA20:00 00 00 00 00 03 FE 00 BF
CA28:03 FF 80 00 60 00 60 60 B2
CA30:00 00 60 00 00 F8 00 01 B6
CA38:FE 00 03 FF 80 07 FF C0 8E
CA40:07 FF E0 07 FF E0 00 81 EA
CA48:00 01 C3 80 00 00 00 9E
CA50:00 00 00 00 00 00 00 00 E5
CA58:00 00 00 00 00 00 00 00 ED
CA60:00 00 00 00 00 00 7F C0 B5
CA68:01 FF C0 00 06 00 00 06 CC
CA70:00 00 06 00 00 1F 00 00 43
CA78:7F 80 01 FF C0 03 FF E0 01
CA80:07 FF E0 07 FF E0 00 81 2B
CA88:00 01 C3 80 00 00 00 00 DE
CA90:00 00 00 00 00 00 00 00 26
CA98:00 00 00 00 00 00 00 00 2E
CAA0:00 00 00 00 00 00 00 00 36
CAAB:00 00 00 00 00 00 00 00 3E
CAB0:00 00 00 00 00 00 00 00 46
CAB8:00 00 00 00 00 3F FF FE 4A
CAC0:6A AA A9 55 55 59 3F FF 4F
CAC8:FE 00 00 00 00 00 3C 00 56
CAD0:00 FE 00 01 C2 00 01 0A 58
CAD8:00 01 01 00 00 CE 00 0A
CAE0:3C 00 00 44 20 00 76 70 37
CAE8:00 F2 F0 01 C3 C0 03 83 14
CAF0:00 01 C2 00 00 FE 00 18 33
CAF8:EF C0 3D C1 E0 67 80 74 94
CB00:03 00 3C 00 00 10 00 00 E0
CB08:00 00 00 00 3E 00 3C 00 0A
CB10:00 FE 00 01 C2 00 01 0A 99
CB18:00 01 01 00 00 CE 00 00 4B
CB20:3C 00 00 44 40 00 76 E0 E9
CB28:00 73 E0 00 E3 80 00 E2 BC
CB30:00 00 BA 00 00 FE 00 00 1B
CB38:EF 00 00 C3 80 07 C1 C0 68
CB40:0F 81 D0 0C 00 F0 08 00 6E
CB48:60 00 00 00 3E 00 3C 00 7A
CB50:00 FE 00 01 C2 00 01 0A D9
CB58:00 01 01 00 00 CE 00 00 8B
CB60:3C 00 00 44 00 00 76 80 C7
CB68:00 73 C0 00 BB C0 00 BF 95

When you want to talk computers..

ATARI COMPUTERS

Atari Computers

800 XL 64K Computer.....Call
 65XE 64K Computer.....87.99
 130XE 132K Computer.....139.00
 520ST Monochrome System.....499.00
 520ST Color System.....659.00



Atari 1040 Color System **\$859**

Includes: 1040ST, 1 mb RAM with 3 1/2" drive built-in, 192K ROM with TOS, Basic, ST language and color monitor.
 New 520ST FM is in stock.....Call

ATARI SOFTWARE

Access

Leaderboard Golf.....24.99

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

Infocom

Zork Trilogy.....44.99

Microprose

Top Gunner.....19.99

Silent Service.....24.99

Optimized Systems

Personal Pascal.....47.99

Origin Systems

Ultima 4 XL/XE.....39.99

Paradox

Wanderer (3-D).....27.99

Psygnosis

Deep Space.....34.99

Timeworks

Wordwriter ST.....48.99

VIP

Professional (GEM).....144.00

COMMODORE COMPUTERS



Amiga 500 System

Includes: Amiga 500 CPU, 1 MB, 1080 RGB Monitor, Amiga DOS, Mouse, Kaleidoscope

Call

Commodore 128.....259.00

Commodore 128D.....529.00

Commodore 64C.....179.00

64C, 1541C, 1802C Package.....599.00

128, 1571, 2002 Package.....759.00

128D, 2002 Package.....829.00

COMMODORE SOFTWARE

Activision

Gamestar Series.....(ea.) 28.99

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 II.....97.99

Deluxe Print.....74.99

Instant Music.....34.99

Deluxe Video 1.2.....97.99

Infocom

Hitchhiker's Guide.....28.99

Micro Illusions

Dynamic-Cad.....349.00

Mindscape

Halley Project.....34.99

SAT Prep.....51.99

Micro Systems

Analyze Version 2.0.....119.00

Scribble.....66.99

On-Line/Comm.....46.99

Sublogic

Flight Simulator.....31.99

V.I.P.

V.I.P. Professional.....112.00

MS/DOS SYSTEMS

AT&T 6300.....from \$1299.00
 Compaq.....from 1699.00
 IBM-PS-2 Model 30.....Call
 IBM-AT Enhanced.....Call
 Leading Edge.....from 999.00
 PC-TOO 512K AT-Compat.from 999.00
 Toshiba 1000 Lap Top.....from 999.00



NEC

Multispeed Computer **\$1499**

MULTIFUNCTION CARDS

AST

Six Pak Plus PC/XT.....129.00

Hercules

Color Card.....159.00

Graphics Card Plus.....209.00

Fifth Generation

Logical Connection 256K.....299.00

Quadram

Silver Quadboard.....119.00

Video 7

EGA Video Deluxe.....319.00

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 (Premium).....119.00

Word Perfect Corp.

Word Perfect 4.2.....209.00



COMPUTER MAIL ORDER

www.commodore.ca

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

DRIVES	MODEMS	PRINTERS
Atari AA314 DS/DD Disk (ST).....\$209.00 AA354 SS/DD Disk (ST).....129.00 SHD204 20 Mb ST Hard Drive..579.00 Commodore Amiga 1020.....189.00 Amiga 1010 3½".....219.00 1541C.....179.00 1571.....239.00 1581 3½" External.....229.00 CSI 10 mb (64-128).....1099.00 Indus GT Disk Drive Atari XL/XE.....179.00 Microbotics 20 mb Hard Drive (Amiga).....1299.00 Racore Jr. Expansion Chassis.....299.00 Seagate 20 mb ST-225 Hard Drive Kit...339.00 Supra 20 Meg Hard Drive (ST).....559.00 Xebec 20 mb (Amiga).....899.00	Anchor Volksmodem 1200.....\$99.99 6480 C64/128 1200 Baud.....119.00 VM520 ST520/1040 1200 Baud.129.00 Atari XM301 300 Baud.....42.99 Best 1200 Baud External.....119.00 Commodore Amiga 1680-1200 BPS.....169.00 CBM 1670 & C-128).....99.99 Everex Evercom 1200 Baud Internal....109.00 Hayes Smartmodem 300.....129.00 Smartmodem 1200 External.....289.00 Novation Parrot 1200.....119.00 Practical Peripherals 1200 BPS External.....159.00 Supra MPP-1064 AD/AA C64.....69.99 1200AT 1200 Baud Atari.....139.00	Atari 1020 XL/XE Plotter.....\$31.99 XDM121 Letter Quality.....199.00 XMM801 XL/XE Dot Matrix.....189.00 XMM804ST Dot Matrix.....179.00 Brother M-1109 100 cps, 9 pin.....199.00 M-1409 180 cps, 9 pin.....319.00 Citizen MSP-10 160 cps, 80-Column....279.00 Premier 35 cps Daisywheel.....489.00 C.Itoh 315P 132 Column Prowriter.....449.00
MONITORS Amdek Video 300 Amber Composite.....139.00 Commodore Commodore 2002.....319.00 Amiga 1080 Hi-Res Color.....299.00	 <p>U.S. Robotics Direct 1200 Ext. \$109 U.S. Robotics 2400 Baud Internal.....189.00</p>	 <p>Epson LQ-1000 24 Wire, 180 cps \$559 Epson <i>Free Tractor (limited offer)</i> LX-800 150 cps, 80-column.....Call FX-86E 240 cps, 80-column.....Call FX286E 240 cps, 132-column.....Call EX-1000 300 cps, 132-column.....Call LQ-850, LQ-1050, 24 Pin.....Call Hewlett Packard Thinkjet379.00 NEC Pinwriter 2200 24 Wire.....319.00 Pinwriter 660 24 Wire.....459.00 Pinwriter 760 24 Wire.....679.00 Okidata Okimate 20 Color Printer.....129.00 ML-182 120 cps, 80-column.....239.00 ML-192+ 200 cps, 80-column...329.00 ML-193+ 200 cps, 132-column.479.00 Panasonic KX-1080i 144 cps, 80-column....169.00 KX-1091i 194 cps, 80-column....189.00 KX-P3131 22 cps Daisywheel....289.00 Star Micronics NX-10 120 cps, 80-column.....159.00 NX-10C 120 cps, C64 Interface.199.00 NX-15 120 cps, 132-column.....329.00 Toshiba P-321 SL 216 cps, 24-Pin.....539.00 P-351 II 300 cps, 24-Pin.....889.00</p>
 <p>Magnavox 8502 Composite \$179 Magnavox 8505 RGB/Composite.....199.00 NEC 12" TTL Green or Amber.....99.99 JC-1401P3A Multi-Sync.....549.00 Princeton Graphics MAX-12 12" Amber TTL.....149.00 Taxan Model 124 12" Amber.....119.00 Zenith ZVM 1220/1230.....(ea.) 99.99</p>	DISKETTES Maxell MD1-M SS/DD 5¼".....9.99 MD2-DM DS/DD 5¼".....10.99 MF1-DDM SS/DD 3½".....12.99 MF2-DDM DS/DD 3½".....21.99 Sony MD1D SS/DD 5¼".....8.99 MD2D DS/DD 5¼".....10.99 MFD-100 SS/DD 3½".....13.99 MFD-200 DS/DD 3½".....20.99 Hewlett-Packard Calculators 28C Scientific Pro.....199.99 18C Business Consultant.....139.95 12C Slim Financial.....74.99	

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 Fax 717-327-1217

Educational, Governmental and Corporate Organizations call toll-free 1-800-221-4283

CMO. 477 East Third Street, Dept. A212, 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.


```

CB70:00 00 9E 00 00 FE 00 00 D7
CB78:EE 00 00 C6 00 01 E7 00 C7
CB80:03 83 00 07 03 40 03 0D
CB88:C0 01 81 00 3E 00 3C 00 5B
CB90:00 FE 00 01 C2 00 01 0A 1A
CBA0:3C 00 00 44 00 00 76 00 87
CBA8:00 72 00 00 B3 00 00 BF 3A
CBB0:80 00 BF 00 00 FE 00 00 7C
CBB8:7C 00 00 3C 00 00 3C 00 CA
CBC0:00 7E 00 00 FC 00 01 D8 BA
CBC8:00 00 F4 00 00 3E 00 3C 00 69
CBD0:00 7F 00 00 43 80 00 50 B4
CBD8:80 00 80 80 00 73 00 00 96
CBE0:3C 00 00 22 00 00 6E 00 95
CBE8:00 4E 00 00 CD 00 01 FD 82
CBF0:00 00 FD 00 00 7F 00 00 46
CBF8:3E 00 00 3C 00 00 3C 00 EB
CC00:00 7E 00 00 3F 00 00 1B 4E
CC08:80 00 2F 00 3E 00 3C 00 32
CC10:00 7F 00 00 43 80 00 50 F5
CC18:80 00 80 80 00 73 00 00 D7
CC20:3C 00 00 22 00 01 6E 00 DA
CC28:03 CE 00 03 DD 00 00 FD 14
CC30:00 00 79 00 00 7F 00 00 F6
CC38:77 00 00 63 00 00 E7 80 14
CC40:00 C1 C0 02 C0 E0 03 C0 D2
CC48:C0 00 81 80 3E 00 3C 00 E4
CC50:00 7F 00 00 43 80 00 50 36
CC58:80 00 80 80 00 73 00 00 18
CC60:3C 00 02 22 00 07 6E 00 73
CC68:07 CE 00 01 C7 00 00 47 CE
CC70:00 00 5D 00 00 7F 00 00 B3
CC78:F7 00 01 C3 00 03 83 E0 5E
CC80:0B 81 F0 0F 00 30 06 00 DB
CC88:10 00 00 00 3E 00 3C 00 94
CC90:00 7F 00 00 43 80 00 50 76
CC98:80 00 80 80 00 73 00 00 58
CCA0:3C 00 04 22 00 0E 6E 00 10
CCA8:0F 4F 00 03 C3 80 00 C1 AF
CCB0:C0 00 43 80 00 7F 00 03 1C
CCB8:F7 18 07 83 BC 2E 01 E6 F4
CCC0:3C 00 C0 08 00 00 00 00 11
CCC8:00 00 00 00 3E 00 3C 00 CC
CCD0:00 FE 00 01 C2 00 01 0A 5C
CCD8:00 01 01 00 00 CE 00 00 0E
CCE0:7C 00 03 C7 80 06 82 C0 77
CCE8:0E 82 E0 0E 82 E0 07 83 50
CCF0:C0 03 83 80 00 FE 00 00 20
CCF8:EE 00 00 EE 00 00 EE 00 D6
CD00:00 EE 00 00 EE 00 01 EF C0
CD08:00 03 EF 80 3E 00 00 00 5C

```

Program 2: Leaping Larry— Apple II Version

Version by Bill Chin, Editorial
Programmer

```

6000: 4C 2F 68 A9 7F A2 00 9D 7E
6008: 00 71 E8 D0 FA AD 5F 70 0D
6010: 20 86 61 8D 60 70 18 69 E5
6018: 27 8D 61 70 A9 00 A0 01 92
6020: 8D 62 70 B9 61 70 48 AA F1
6028: B9 8C 60 9D 00 71 68 38 9D
6030: 6D 5F 70 99 62 70 AA CA 1C
6038: B9 93 60 9D 00 71 C8 C0 B8
6040: 09 D0 E0 A9 00 8D 53 70 BD
6048: A9 D5 8D 52 70 AE 53 70 7F
6050: BD 62 70 AB BD 63 70 8D 0B
6058: 54 70 AD 53 70 29 01 F0 65
6060: 05 A9 AA 8D 52 70 20 D5 A6
6068: 67 29 80 19 00 71 2D 52 3B
6070: 70 99 00 71 AD 52 70 49 C7
6078: 7F 8D 52 70 C8 CC 54 70 40
6080: D0 E4 EE 57 C0 A9 07 CD FB
6088: 53 70 D0 BC 60 7F 7E 7C 6F
6090: 79 70 60 40 01 03 07 0F 6B
6098: 1F 3F 7F AD 18 70 8D 56 77
60A0: 70 AD 28 70 8D 57 70 AD 69
60A8: 10 70 8D 5D 70 AD 28 70 FF
60B0: 8D 5E 70 BD 08 70 18 70 69
60B8: 20 70 9D 20 70 BD 08 70 56
60C0: 30 12 BD 28 70 69 00 9D 1F

```

```

60C8: 28 70 C9 18 9D 13 DE 28 2B
60D0: 70 4C E1 60 BD 28 70 E9 78
60D8: 00 9D 28 70 10 03 FE 28 BF
60E0: 70 BD 00 70 18 7D 10 70 97
60E8: 9D 10 70 C9 07 1D 30 0C
60F0: 08 E9 07 9D 10 70 4C FE C4
60F8: 60 69 06 9D 10 70 BD 00 9C
6100: 70 30 05 FE 18 70 38 60 9A
6108: DE 18 70 38 60 AD 18 70 2C
6110: C9 25 90 0C AD 56 70 8D 09
6118: 18 70 AD 5D 70 8D 10 70 D8
6120: 60 BD 18 70 30 10 C9 28 0A
6128: 90 1B AD 60 70 9D 18 70 59
6130: A9 27 9D 38 70 60 CD 60 C9
6138: 70 B0 0A A9 27 9D 18 70 8B
6140: A9 00 9D 38 70 60 AD 64 D3
6148: 61 AB B9 B1 69 18 6D 63 22
6150: 61 85 EC B9 99 69 6D 82 2E
6158: 70 85 ED AD 63 61 10 02 10
6160: C6 ED 60 24 15 BD 28 70 BF
6168: AB B9 B1 69 85 EE B9 99 AF
6170: 69 18 65 EE 85 EF 60 B9 6F
6178: B1 69 85 EE B9 99 69 18 2D
6180: 6D 82 70 85 EF 60 49 FF 94
6188: 18 69 01 60 A9 00 8D D3 14
6190: 61 8D 08 70 A9 80 8D D4 AE
6198: 61 AD 00 C0 2C 10 C0 C9 70
61A0: CC F0 1E C9 EC F0 1A C9 8F
61A8: CA F0 1C C9 EA F0 18 C9 42
61B0: CB F0 1A C9 EB F0 16 C9 8E
61B8: A0 D0 05 A9 18 8D D3 61 3B
61C0: 60 A9 02 8D 64 61 60 A9 CD
61C8: FE 8D 64 61 60 A9 00 8D 56
61D0: D4 61 60 00 80 A9 00 8D 9A
61D8: 08 70 8D 60 70 AD 20 70 2F
61E0: C9 20 D0 13 AD 28 70 18 E2
61E8: 69 03 AB 20 77 61 AC 18 EA
61F0: 70 C8 B1 EE 8D 6D 70 AD F3
61F8: 50 70 F0 4C 30 10 A9 E0 D8
6200: 8D 08 70 CE 50 70 AD 50 78
6208: 70 C9 04 9D 5B 60 A9 20 D0
6210: 8D 08 70 AD 60 70 F0 1B B0
6218: AD 28 70 CD 6F 70 B0 13 5A
6220: A9 00 8D 08 70 8D 50 70 B6
6228: AD 28 70 69 04 8D 6F 70 18
6230: 4C 68 62 AD 28 70 C9 14 07
6238: 90 D0 A9 00 8D 50 70 8D D9
6240: 08 70 A9 FF 8D 7E 70 60 02
6248: A9 00 8D 08 70 AD 6D 70 99
6250: D0 06 A9 FF 8D 50 70 60 23
6258: AD D3 61 F0 0B 8D 50 70 C3
6260: AD 28 70 69 03 8D 6F 70 48
6268: AD D4 61 C9 80 F0 29 8D A9
6270: 00 70 AD A4 61 F0 21 30 95
6278: 10 AD 84 70 09 04 8D 84 40
6280: 70 C9 06 90 13 CE 84 70 07
6288: 60 AD 84 70 29 03 8D 84 75
6290: 70 C9 02 90 03 CE 84 70 16
6298: 60 BD 28 70 8D 64 61 A9 73
62A0: FF 8D 52 70 AD 5F 70 8D 73
62A8: 53 70 BD 18 70 8D 63 61 4E
62B0: 30 11 CD 61 70 90 15 A9 3B
62B8: 27 38 ED 63 61 8D 53 70 68
62C0: 4C CC 62 20 86 61 8D 52 54
62C8: 70 CE 52 70 20 46 61 BD 65
62D0: 10 70 AB B9 62 70 18 69 DA
62D8: 00 8D EC 62 A9 71 69 00 AA
62E0: 8D ED 62 AC 53 70 BD 40 17
62E8: 70 F0 0F B9 09 71 19 48 28
62F0: 70 91 EC 88 CC 52 70 D0 D9
62F8: F2 60 20 D5 67 C9 F7 90 93
6300: 08 20 D5 67 91 EC 40 0D E9
6308: 63 A9 80 91 EC 88 CC 52 89
6310: 70 D0 E7 60 A9 17 8D 52 5D
6318: 70 AD 20 70 4A 4A 4A 4A E7
6320: 4A 8D 53 70 0A 0A 8D 54 C8
6328: 70 A9 07 38 ED 53 70 8D 21
6330: 53 70 8D 58 70 AD 84 70 A7
6338: AB B9 82 63 8D 80 63 B9 3D
6340: BA 63 18 AE 10 70 7D AB 14
6348: 63 8D 81 63 A9 BD 8D 7F 69
6350: 63 A2 00 AD 18 70 8D 63 4D
6358: 61 AD 28 70 8D 64 61 20 28
6360: 46 61 A5 EC 8D 59 70 AD 86
6368: 54 70 18 65 ED 85 ED 8D BD
6370: 5A 70 A9 04 8D C2 63 A0 D4

```

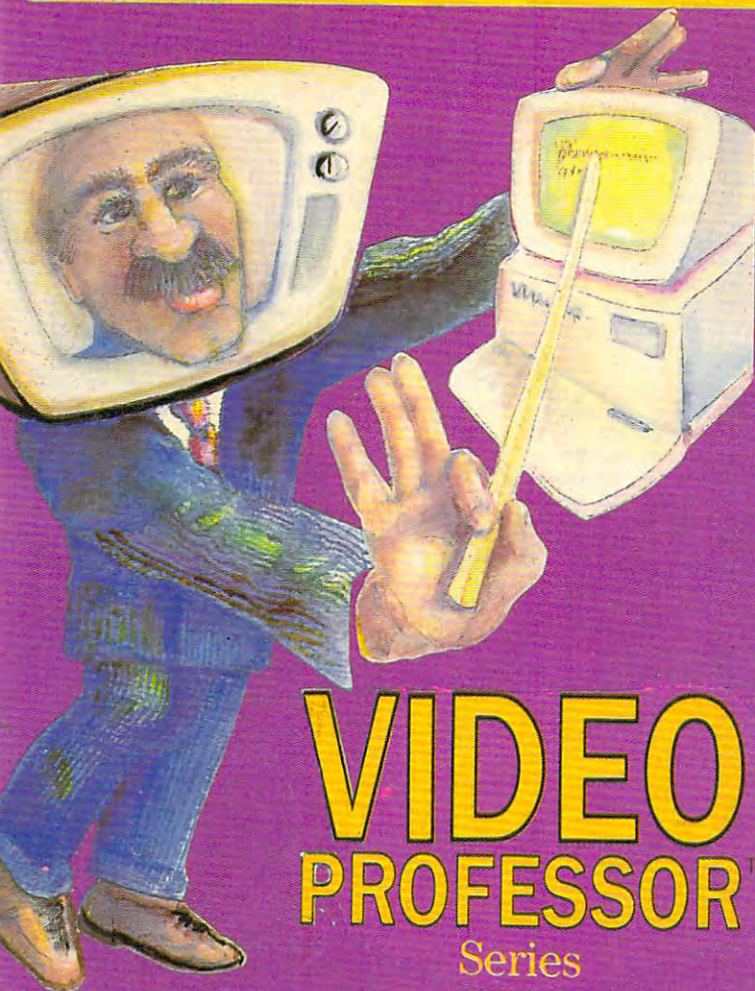
```

6378: 00 B1 EC C9 F9 F0 05 A9 2D
6380: 00 EA 91 EC C8 E8 CC C2 49
6388: 63 D0 EE A5 ED 18 69 04 14
6390: 85 ED CE 52 7E F0 13 CE D0
6398: 56 70 10 DB EE 64 61 20 D0
63A0: 46 61 A9 07 BD 53 70 4C 6F
63A8: 77 63 60 00 03 06 09 0C 5E
63B0: 0F 12 00 5C B8 B8 14 70 8A
63B8: CC 28 72 72 72 72 73 73 1D
63C0: 73 74 04 A9 17 8D 52 70 7D
63C8: AD 38 70 8D 53 70 AD 48 5B
63D0: 70 85 EC AD 40 70 85 ED 66
63D8: A9 A9 8D 7F 63 A9 00 8D D7
63E0: 80 63 A9 EA 8D 81 63 AD 8B
63E8: 58 70 8D 63 61 AD 5C 70 4C
63F0: 8D 64 61 A2 00 20 72 63 B6
63F8: AD 59 70 8D 48 70 AD 5A 8D
6400: 70 8D 40 70 AD 58 70 8D B0
6408: 38 70 AD 56 70 8D 5B 70 05
6410: AD 57 70 8D 5C 70 6A AD 7F
6418: 82 70 C9 40 A9 00 20 AA C7
6420: BD 54 C0 AD B2 70 85 E6 97
6428: 49 60 8D 82 70 60 A2 00 D1
6430: A9 03 8D 7A 64 8E 7B 64 A0
6438: A0 07 BD C9 69 4A 08 88 74
6440: D0 FB EB CE 7A 64 D0 F0 72
6448: A9 03 8D 7A 64 AE 7B 64 39
6450: A0 07 28 7E C9 6A 88 D0 F1
6458: F9 7E C9 6A BD C9 6A 29 B0
6460: 7F 9D C9 6A BD C9 69 29 41
6468: 80 1D C9 6A 9D C9 6A E8 6A
6470: CE 7A 64 D0 DB E0 DE 90 89
6478: B7 60 00 DB 20 2E 64 A9 1F
6480: 17 8D 52 70 A9 80 8D 53 47
6488: 70 A2 00 A9 00 85 EC A9 66
6490: 72 85 ED A9 69 8D A1 64 75
6498: A0 00 A9 03 8D 7A 64 BD F3
64A0: C9 6A 0D 53 70 91 EC 20 83
64A8: 3A 65 EB CE 7A 64 D0 EF E8
64B0: AD 53 70 91 EC 20 3A 65 0E
64B8: CE 52 70 D0 0A A9 17 8D 4B
64C0: 52 70 A9 80 8D 53 70 AD 54
64C8: 52 70 C9 0B B0 05 A9 00 AD
64D0: 85 53 70 E0 CF 90 C3 AD 47
64D8: A1 64 C9 69 D0 08 A2 00 47
64E0: EE A1 64 4C 9A 64 A9 02 96
64E8: 8D 7A 64 BD C9 69 91 EC 83
64F0: EB 20 3A 65 CE 7A 64 D0 CD
64F8: F2 A9 00 91 EC 20 3A 65 80
6500: A9 00 91 EC 20 3A 65 EC 36
6508: FC 90 DB A9 00 85 EC 85 01
6510: EE A9 72 85 ED 18 69 03 09
6518: 85 EF A9 04 8D 71 65 20 34
6520: 41 65 A5 EC 18 69 04 85 5C
6528: EC 85 EE A5 ED 69 00 85 9D
6530: ED 69 03 85 EF C9 88 90 4D
6538: E1 60 E6 EC D0 02 E6 ED 02
6540: 60 A0 00 18 08 28 B1 EC 16
6548: 2A 91 EE 10 04 38 4C 52 57
6550: 65 18 08 C8 CC 71 65 D0 29
6558: EC 28 A0 00 B1 EE 29 7F D2
6560: 91 EE B1 EC 29 80 11 EE 11
6568: 91 EE C8 CC 71 65 D0 EC 4D
6570: 60 04 CE 6E 70 D0 14 A9 C5
6578: 04 8D 6E 70 AD 50 70 F0 FD
6580: 0B AD 84 70 29 04 09 01 40
6588: 8D 84 70 60 AD 84 70 C9 79
6590: 02 F0 07 C9 05 B0 03 4C 53
6598: 9F 65 A9 FF 8D 84 70 EE 10
65A0: 84 70 AD 00 70 D0 09 A9 02
65A8: 02 0D 84 70 8D 84 70 60 0F
65B0: 30 09 A9 04 0D 84 70 8D 34
65B8: 84 70 60 AD 84 70 29 03 04
65C0: 8D 84 70 60 20 03 60 A2 F7
65C8: 07 BD FB 66 9D 28 70 A9 84
65D0: 00 9D 38 70 9D 48 70 9D 9D
65D8: 20 70 9D 08 70 A9 20 9D 0C
65E0: 40 70 BD 08 67 9D 48 70 03
65E8: BD 03 67 9D 10 70 A9 FF AF
65F0: 9D 30 70 BD F3 66 9D 00 F4
65F8: 70 10 09 AD 5F 70 18 69 52
6600: 01 9D 30 70 20 D5 67 29 12
6608: 1F 69 04 9D 18 70 CA 10 41
6610: 88 AD 18 70 29 01 8D 10 27
6618: 70 A9 00 8D 56 70 8D 57 47
6620: 70 AD 18 70 8D 5B 70 AD 03

```


FINALLY QUICK, EASY COMPUTER & SOFTWARE
LEARNING ... BY VIDEO

The Video Professor™ revolutionizes computer learning.



VIDEO PROFESSOR™

Series

I'll make learning as easy for you as watching TV! These videos are accurate, entertaining and very professional. *The Video Professor*

INTRODUCTION TO PERSONAL COMPUTING

Getting started with your IBM™ PC or Compatible.

- Connecting the components of a PC
- Learn basic Dos commands
- Use of the keyboard
- Avoiding common errors
- Basic computer techniques
- And much, much more

ADVANCED PERSONAL COMPUTING

Knowing the Ins & Outs of Dos

- Learn advanced Dos
- Learn subdirectories
- Learn batch files/autoexec
- Learn function keys, hot keys
- Learn fundamentals of hard drive operation

INTRODUCTION TO LOTUS 1-2-3

Getting Started With The Powerful Lotus Spreadsheet

- Learn about one of the most powerful spreadsheet programs
- Learn the basic Lotus™ commands
- Learn about cells, rows, columns
- Design a spreadsheet
- Learn to print a spreadsheet

LOTUS 1-2-3™ LEVEL II

Advanced Lotus:™ Be an Expert!

- Learn the advanced features of Lotus 1-2-3™
- Learn advanced Lotus™ commands
- Learn database commands
- Learn Macros
- Advanced Graphics

INTRODUCTION TO WORDPERFECT

Getting Started With Your Word Processor

- The basics of WordPerfect™
- How to load your software
- Make and save documents
- Using the spell checker
- Moving and deleting text
- And much, much more

WORDPERFECT:™ LEVEL II

Advanced WordPerfect:™ Be an Expert!

- Be an expert on WordPerfect™
- Learn to search and replace text
- Learn to use the automatic backup
- Change margins, spacing, tabs, etc.
- Switch or window two documents
- Learn about hidden codes
- And much, much more

d — Base III™

Getting Started With Powerful dBase

- Cursor movement with menus
- Learn dBase assistant & help
- Create and build a database
- Append, edit and browse records
- Sorting a database
- Design and print a report
- Deleting unwanted data

MAKING THE RIGHT CHOICE

Learning About Computer Hardware

- Learning what's right for you with this consumer's guide from the VIDEO PROFESSOR™
- He teaches you all about monitors, CPUs, keyboards and printers—all in a language you can understand

WORDSTAR™

Getting Started With Your Word Processor

- The basics of Word Star
- How to load your software
- Make and save documents
- Using the spell checker
- Moving and deleting text
- And much, much more

MORE step-by-step
tapes available!

SOME OF MY STOCKING DEALERS ARE:

ECC Computer Center	San Diego CA 619-272-5005	Compusat Business Computers	Lebanon IN 317-482-9541	Direct Access	Portland OR 503-254-1375
Gateway Computer, Inc.	Huntington Beach CA 714-898-0784	Sandar Computer Services	Lafayette LA 318-237-9143	Comm-Shack Electronics	Salem OR 503-393-5472
Golden State Business Sys.	Sacramento CA 916-973-0737	Falkemer Photo/Computer	Ellicott MD 310-465-7788	Metro Tech Services	Malvern PA 215-296-7450
Video Sales	Costa Mesa CA 714-241-0720	Computerland	Fredrick MD 310-695-5200	Computerland	Greenville SC 803-288-6700
House of Computers	Los Angeles CA 213-479-7745	Computer Answer	Columbia MO 314-875-8085	PC Clinic	Hurst TX 817-498-0301
Masako Holdings Ltd.	Richmond BC CD 604-271-3494	Montana Hi Tech	Dillon MT 406-683-6769	A&A Micro Systems	Carrollton TX 214-446-0022
Computech	Bristol CT 203-589-6440	DOS Computer Center	West Union NJ 210-686-0040	Friendly Computers	Friendswood TX 713-996-6030
Computerland	Orlando FL 305-851-4700	Video Plus	Albuquerque NM 505-345-7701	Bee Data Wise	Salt Lake City UT 801-484-1529
Angelia Brooks Corp.	Tampa FL 813-960-2677	Micro Age Comp Stores	Las Vegas NV 702-796-1441	Computerland	Lynchburg VA 804-237-7900
Business Suppliers	Crestwood IL 312-798-7733	Komputer Enterprise	Westbury NY 516-333-8810	University Book Store	Seattle WA 206-634-3400
Learn-A-Bit Computer	Rockford IL 815-229-9200	Alpha United Computer	Toledo OH 419-242-4404	Computer Business Services	Beloit WI 608-364-1012
Davidson Business Machines	South Bend IN 219-232-7000	Clear Skies & Rainbows	Edmond OK 405-340-6388	Applied Software Concepts	Racine WI 414-634-5233

For a Dealer in your area call The Video Professor at 1-800-225-7798

www.commodore.ca


```

6628: 2B 70 8D 5C 70 A9 20 85 BC
6630: E6 A9 40 8D 82 70 20 EA BC
6638: 67 A9 20 8D 20 70 A9 06 1C
6640: 8D 38 70 A9 04 8D 6E 70 2E
6648: 8D 50 70 AD 2D 70 8D 52 71
6650: 70 38 E9 03 A8 20 68 67 CE
6658: A0 27 A9 F9 91 EE 91 EC 6C
6660: 88 10 F9 AD 2D 70 CD 52 A8
6668: 70 D0 0F AD 28 70 8D 52 CE
6670: 70 18 69 03 8D 6F 70 4C 30
6678: 54 66 AC 7C 70 A9 00 99 2A
6680: 40 70 AD 17 20 57 67 A2 DE
6688: 00 AD 7B 70 F0 1E 0A EA F3
6690: C8 8C 6A 70 AC 6A 70 BD E6
6698: 13 67 91 EC 91 EE 88 88 AB
66A0: C0 01 D0 F3 20 5A 67 E8 89
66A8: E0 06 D0 E8 20 1C 67 A2 F2
66B0: 02 20 D5 67 29 1F 69 04 54
66B8: 9D 71 70 A9 00 9D 77 70 2F
66C0: 20 D5 67 29 07 8D 52 70 16
66C8: C9 07 D0 03 CE 52 70 AD D4
66D0: 52 70 0A 38 6D 52 70 9D DA
66D8: 74 70 A9 01 8D 76 70 A9 12
66E0: F9 8D 52 70 20 7C 67 CA EB
66E8: 10 C7 A9 00 8D 7E 70 60 8C
66F0: 01 01 13 00 02 FE 02 FE EF
66F8: 02 02 02 12 12 0F 0C 09 96
6700: 06 13 04 00 00 00 01 01 1A
6708: 00 00 01 00 80 80 00 00 FC
6710: 80 00 00 1C 1C 7F 1C 36 2E
6718: 63 6C 36 00 A0 17 20 57 73
6720: 67 20 5A 67 20 5A 67 20 C5
6728: 5A 67 AD 7A 70 F0 27 8D 7E
6730: 52 70 69 0A C9 26 90 11 2B
6738: A9 1D 8D 52 70 A9 07 8D BF
6740: 7B 70 A9 00 8D 7A 70 A9 FE
6748: 27 A8 A9 3F 91 EC 91 EE 50
6750: 88 CE 52 70 D0 F6 60 20 AB
6758: 68 67 A5 ED 18 69 04 85 BC
6760: ED A5 EF 69 04 85 EF 60 9A
6768: B9 B1 69 85 EE 85 EC B9 27
6770: 99 69 18 69 20 85 EF 69 60
6778: 20 85 ED 60 BD 74 70 AB C5
6780: 20 57 67 BD 71 70 AB C8 65
6788: AD 52 70 91 EC 91 EE 20 95
6790: 5A 67 20 5A 67 AD 52 70 17
6798: 91 EC 91 EE 60 A2 02 BD DB
67A0: 71 70 CD 18 70 D0 2A BD 58
67A8: 74 70 38 ED 28 70 C9 02 4C
67B0: 80 1F A9 00 8D 52 70 20 8B
67B8: 7C 67 EE 7A 70 20 1C 67 C8
67C0: E0 02 D0 03 EE 7E 70 A9 C6
67C8: FF 9D 77 70 A9 27 9D 71 8B
67D0: 70 CA 10 CB 60 A5 4E 0A 89
67D8: 0A 38 65 4E 85 4E 60 A9 1C
67E0: 00 8D 54 C0 8D 51 C0 4C 29
67E8: 58 FC A9 00 8D 50 C0 8D 15
67F0: 57 C0 8D 54 C0 8D 52 C0 34
67F8: 20 FE 67 4C 03 68 A9 20 76
6800: 4C 05 68 A9 40 8D 0E 68 9C
6808: A9 00 A0 20 8D 00 60 EE DF
6810: 0D 68 D0 F8 EE 0E 68 88 34
6818: D0 F2 60 A9 05 8D 80 70 84
6820: 8E 81 70 E8 EC 81 70 D0 54
6828: FA CE 80 70 D0 F5 60 20 80
6830: DF 67 A0 00 B9 60 69 F0 F1
6838: 06 99 29 04 C8 D0 F5 A0 ED
6840: 00 B9 85 69 F0 06 99 33 CC
6848: 05 C8 D0 F5 A9 DC 8D 52 75
6850: 70 20 1B 68 CE 52 70 D0 BC
6858: F8 A9 10 8D 5F 70 A9 03 FD
6860: 8D 78 70 A9 00 8D 7A 70 1B
6868: A9 06 8D 7C 70 20 C4 65 FB
6870: 20 7C 64 20 8C 61 20 D5 FE
6878: 61 20 72 65 20 9D 67 A2 8F
6880: 00 20 9B 60 20 0D 61 20 EA
6888: 14 63 A2 01 8E 83 70 BD C1
6890: 28 70 30 15 20 E1 60 90 C2
6898: 0D BD 18 70 18 7D 30 70 F0
68A0: 9D 3E 70 20 21 61 20 99 C6
68A8: 62 EE 83 70 AE 83 70 E0 23
68B0: 06 D0 DC 20 17 64 A2 00 E5
68B8: 20 C3 63 A2 01 20 65 61 D5
68C0: BD 38 70 AB A9 00 91 EE 76
68C8: EB E0 06 D0 F0 20 1B 68 BA
68D0: AD 7E 70 F0 9E AD 79 70 44
68D8: 30 0B CE 7B 70 30 2C 20 D2
68E0: CA 65 4C 73 68 AC 5F 70 53
68E8: 88 88 8C 5F 70 C0 09 B0 F0
68F0: 14 A9 08 8D 5F 70 CE 7C E6
68F8: 70 D0 0A A9 05 8D 7C 70 D9
6900: A9 11 8D 5F 70 20 C4 65 86
6908: 4C 73 68 A9 FF 8D 52 70 D0
6910: AD 00 C0 10 13 2C 10 C0 FC
6918: C9 CE F0 1F C9 EE F0 1B 9A
6920: C9 D9 F0 14 C9 F9 F0 10 D5
6928: 20 1B 68 20 1B 68 20 1B B6
6930: 68 CE 52 70 D0 DA F0 06 16
6938: 4C 59 68 4C DF 67 20 DF 16
6940: 67 A0 00 B9 4E 69 F0 C3 48
6948: 99 2F 04 CB D0 F5 D0 EC AD
6950: E1 F9 A0 E1 E7 E1 E9 EE 4E
6958: A0 AB D9 AF CE A9 BF 00 78
6960: C3 EF F0 F9 F2 E9 E7 EB C6
6968: F4 A0 B1 B9 B8 B7 A0 C3 59
6970: CF CD D0 D5 D4 C5 A1 A0 B7
6978: D0 F5 E2 EC E9 E3 E1 F4 F3
6980: E9 EF EE F3 00 C1 EC EC 2F
6988: A0 F2 E9 E7 E8 F4 F3 A0 C7
6990: F2 E5 F3 E5 F2 F6 E5 E4 57
6998: AE 00 00 01 01 02 02 03 E9
69A0: 03 00 00 01 01 02 02 03 1C
69A8: 03 00 00 01 01 02 02 03 24
69B0: 03 00 00 00 80 00 80 00 1A
69B8: 80 28 AB 28 AB 28 AB 28 CC
69C0: AB 50 D0 50 D0 50 D0 50 D4
69C8: D0 00 3E 00 00 14 00 00 1C
69D0: 15 00 00 14 00 00 14 00 97
69D8: 00 1A 00 00 3A 00 00 2E 32
69E0: 00 08 6E 01 70 6F 01 00 D6
69E8: 6B 00 00 2A 00 00 2A 00 68
69F0: 40 7F 00 60 3F 00 70 1F C3
69F8: 00 38 0F 00 18 0E 00 18 CC
6A00: 0C 00 38 38 00 14 30 00 16
6A08: 00 30 00 00 28 00 00 3E 68
6A10: 00 00 14 00 00 15 00 00 BB
6A18: 14 00 00 14 00 08 1A 00 BC
6A20: 18 7A 00 30 6A 00 60 7A 31
6A28: 00 00 3A 00 00 2A 00 00 EC
6A30: 2A 00 00 2A 00 00 7E 00 B9
6A38: 40 3F 50 70 3B 0C 3C 18 AB
6A40: 06 1C 30 03 18 40 01 18 31
6A48: 00 00 18 00 00 18 00 00 80
6A50: 14 00 00 00 3E 00 00 14 35
6A58: 00 00 15 00 00 14 00 00 20
6A60: 14 00 00 3A 00 00 3A 00 57
6A68: 00 3A 00 68 3A 00 00 3E 62
6A70: 00 20 2F 00 00 2A 00 00 DB
6A78: 2A 00 00 3E 00 00 1E 00 82
6A80: 00 1B 00 40 1B 00 60 19 D2
6A88: 00 30 30 00 60 60 00 40 34
6A90: 41 01 00 03 03 40 02 05 98
6A98: 00 00 00 00 00 00 00 00 6D
6AA0: 00 00 00 00 00 00 00 00 75
6AA8: 00 00 00 00 00 00 00 00 7D
6AB0: 00 00 00 00 00 00 00 00 85
6AB8: 00 00 00 00 00 00 00 00 8D
6AC0: 00 00 00 00 00 00 00 00 95
6AC8: 00 FF 00 00 FF FF 00 00 9D

```

```

NM 110 READ NUM:CHK=CHK+NUM
PM 120 PUT #1,NUM
BM 130 NEXT I
CM 140 IF CHK<>195025 THEN P
PRINT "ERROR IN DATA S
TATEMENTS.":END
LA 150 PRINT "FILE WRITTEN T
O DISK."
ND 1000 DATA 255,255,0,96,25
1,96,76,72
NB 1001 DATA 96,0,2,0,0,0,0,
0
JB 1002 DATA 0,0,0,0,0,0,0,0
KK 1003 DATA 0,0,2,0,83,58,1
41,71
NJ 1004 DATA 96,162,96,169,1
2,157,66,3
JC 1005 DATA 32,86,228,169,3
,157,66,3
AD 1006 DATA 169,22,157,68,3
,169,96,157
IP 1007 DATA 69,3,173,71,96,
41,240,73
ML 1008 DATA 28,157,74,3,173
,71,96,157
GG 1009 DATA 75,3,76,86,228,
0,169,17
CB 1010 DATA 32,24,96,169,25
5,141,220,98
KJ 1011 DATA 169,0,141,0,208
,160,3,185
FB 1012 DATA 192,96,145,88,2
00,192,16,208
GA 1013 DATA 246,160,43,185,
165,96,145,88
NF 1014 DATA 200,192,100,208
,246,160,124,185
IF 1015 DATA 141,96,145,88,2
00,192,135,208
KE 1016 DATA 246,173,31,208,
41,1,201,0
CH 1017 DATA 208,247,169,17,
32,24,96,160
CC 1018 DATA 40,169,13,136,1
45,88,192,20
JB 1019 DATA 208,247,160,204
,230,89,169,77
NF 1020 DATA 136,145,88,192,
184,208,247,169
JP 1021 DATA 157,160,165,145
,88,198,89,169
BK 1022 DATA 157,160,10,145,
88,160,1,169
EN 1023 DATA 16,145,88,200,1
45,88,200,145
IN 1024 DATA 88,169,2,141,20
,96,76,20
GF 1025 DATA 97,44,37,33,48,
41,46,39
BD 1026 DATA 0,44,33,50,50,5
7,35,47
CB 1027 DATA 48,57,50,41,39,
40,52,0
KL 1028 DATA 17,25,24,23,0,0
,0,35
PE 1029 DATA 47,45,48,53,52,
37,1,0
BC 1030 DATA 48,53,34,44,14,
12,0,41
BF 1031 DATA 46,35,14,33,44,
44,0,50
MF 1032 DATA 41,39,252,96,24
7,97,40,52
BI 1033 DATA 51,0,50,37,51,3
7,50,54
EL 1034 DATA 37,36,14,240,24
2,229,243,243
OH 1035 DATA 192,243,244,225
,242,244,169,128
LH 1036 DATA 141,7,212,169,4
6,141,47,2
OO 1037 DATA 169,3,141,29,20
8,169,0,160

```

Program 3: Leaping Larry— Atari Version

Version by Rhett Anderson,
Assistant Editor

```

BC 50 REM COPYRIGHT 1987 COM
PUTE! PUBLICATIONS, IN
C. ALL RIGHTS RESERVE
D.
FA 60 PRINT "{CLEAR}COPYRIGH
T 1987":PRINT "COMPUTE
! PUBLICATIONS, INC."
HA 70 PRINT "ALL RIGHTS RESE
RVED."
LB 80 FOR TT=1 TO 1000:NEXT
TT:PRINT
FB 90 OPEN #1,8,0,"D:LEAPIN"
KE 100 FOR I=1 TO 1746

```


AJ 1038	DATA 0,153,0,130,153,128,131,153	OE 1079	DATA 3,32,74,101,173,14,208,141	AK 1120	DATA 238,52,99,96,172,52,99,169
HI 1039	DATA 128,129,153,128,130,153,0,131	LL 1080	DATA 11,96,173,6,208,141,12,96	HB 1121	DATA 60,153,0,131,169,0,153,1
KL 1040	DATA 200,208,238,169,255,141,45,130	OJ 1081	DATA 173,10,208,141,13,96,173,7	HL 1122	DATA 131,153,255,130,173,51,99,141
EF 1041	DATA 141,56,130,141,67,130,141,78	EL 1082	DATA 208,141,14,96,141,30,208,173	DA 1123	DATA 2,208,173,134,99,201,1,240
GL 1042	DATA 130,141,89,130,141,34,130,141	IK 1083	DATA 13,96,41,8,240,162,169,1	LO 1124	DATA 11,173,133,99,240,3,76,39
NF 1043	DATA 173,130,141,184,130,141,195,130	PK 1084	DATA 141,135,99,141,3,96,169,15	EI 1125	DATA 100,76,17,100,173,133,99,240
MM 1044	DATA 141,206,130,141,217,130,141,162	NB 1085	DATA 141,17,96,76,50,98,72,138	NI 1126	DATA 3,76,251,99,76,229,99,172
KL 1045	DATA 130,169,60,141,143,129,141,144	BL 1086	DATA 72,238,220,98,174,220,98,189	DC 1127	DATA 52,99,162,15,189,221,98,153
PA 1046	DATA 129,141,227,129,141,228,129,169	EN 1087	DATA 207,98,141,10,212,141,18,208	KL 1128	DATA 128,131,240,99,235,100,136,202
LF 1047	DATA 66,141,145,129,141,146,129,141	CI 1088	DATA 141,19,208,189,213,98,141,0	PE 1129	DATA 16,246,173,51,99,141,3,208
ON 1048	DATA 229,129,141,230,129,169,255,141	PD 1089	DATA 208,24,109,18,96,141,1,208	DC 1130	DATA 96,172,52,99,162,15,189,237
OL 1049	DATA 147,129,141,148,129,141,231,129	BK 1090	DATA 224,5,208,5,169,255,141,220	HP 1131	DATA 98,153,128,131,136,202,16,246
LG 1050	DATA 141,232,129,169,36,141,149,129	PB 1091	DATA 98,104,170,104,64,24,54,84	PE 1132	DATA 173,51,99,141,3,208,96,172
HB 1051	DATA 141,233,129,162,100,142,7,208	AN 1092	DATA 118,152,182,0,100,80,60,160	DE 1133	DATA 52,99,162,15,189,253,98,153
HA 1052	DATA 232,232,142,6,208,232,232,142	ED 1093	DATA 20,0,0,0,60,126,245,255	HJ 1134	DATA 128,131,136,202,16,246,173,51
BE 1053	DATA 5,208,232,232,142,4,208,173	MH 1094	DATA 243,126,60,24,48,96,48,24	MP 1135	DATA 99,141,3,208,96,172,52,99
HI 1054	DATA 111,2,9,16,141,111,2,169	LH 1095	DATA 48,96,0,0,0,0,60,126	FJ 1136	DATA 162,15,189,13,99,153,128,131
LM 1055	DATA 8,141,192,2,141,195,2,169	KC 1096	DATA 245,255,244,98,239,99,243,126	FE 1137	DATA 136,202,16,246,173,51,99,141
FB 1056	DATA 0,141,194,2,169,3,141,8	EN 1097	DATA 60,56,112,56,28,112,0,0	BM 1138	DATA 3,208,96,169,60,141,170,100
BL 1057	DATA 208,141,9,208,169,160,141,0	FG 1098	DATA 60,126,175,255,207,126,60,24	NC 1139	DATA 169,1,141,133,99,32,87,99
FP 1058	DATA 2,169,98,141,1,2,173,48	HM 1099	DATA 12,6,12,24,12,6,0,0	HH 1140	DATA 96,206,170,100,240,91,173,170
OG 1059	DATA 2,133,205,173,49,2,133,206	NK 1100	DATA 0,0,60,126,175,255,207,126	AP 1141	DATA 100,201,30,144,90,169,60,56
EG 1060	DATA 169,134,160,8,145,205,160,11	EK 1101	DATA 60,28,14,28,56,14,0,172	FC 1142	DATA 237,170,100,74,170,173,52,99
HA 1061	DATA 145,205,160,13,145,205,160,15	CL 1102	DATA 52,99,162,15,189,221,98,153	FB 1143	DATA 56,253,154,100,141,52,99,173
HD 1062	DATA 145,205,160,18,145,205,160,21	HF 1103	DATA 128,131,136,202,16,246,173,51	NP 1144	DATA 134,99,201,0,240,21,173,51
FH 1063	DATA 145,205,160,19,169,21,145,88	FD 1104	DATA 99,141,3,208,96,0,0,173	DP 1145	DATA 99,201,10,240,13,173,235,100
DC 1064	DATA 165,20,248,97,243,98,197,20	LG 1105	DATA 133,99,240,3,76,75,100,32	NM 1146	DATA 73,1,141,235,100,240,3,238
LF 1065	DATA 240,252,169,192,141,14,212,169	BO 1106	DATA 40,101,173,135,99,208,67,32	NE 1147	DATA 51,99,96,173,51,99,201,48
LK 1066	DATA 32,141,18,96,169,0,141,15	AA 1107	DATA 242,100,173,132,2,201,0,208	EH 1148	DATA 240,248,173,235,100,73,1,141
LK 1067	DATA 96,32,166,101,169,2,141,3	FH 1108	DATA 8,173,10,96,208,3,76,61	FK 1149	DATA 235,100,240,238,206,51,99,96
CH 1068	DATA 96,169,104,141,52,99,141,51	NF 1109	DATA 100,173,120,2,201,7,208,16	JH 1150	DATA 1,1,1,0,1,1,1,1
MH 1069	DATA 99,169,0,141,3,96,141,135	BF 1110	DATA 173,51,99,201,200,240,9,238	JJ 1151	DATA 0,1,1,0,1,0,0,0
PL 1070	DATA 99,141,133,99,141,9,96,141	MK 1111	DATA 51,99,169,1,141,134,99,96	MA 1152	DATA 0,169,0,141,133,99,96,173
LJ 1071	DATA 13,96,141,11,96,141,12,96	AD 1112	DATA 173,120,2,201,11,208,15,173	FC 1153	DATA 11,96,41,3,240,29,169,0
BB 1072	DATA 165,20,197,20,240,252,32,13	LH 1113	DATA 51,99,201,48,240,8,206,51	FP 1154	DATA 141,133,99,141,135,99,169,15
FD 1073	DATA 102,32,75,102,238,215,98,238	JB 1114	DATA 99,169,0,141,134,99,96,0	LP 1155	DATA 141,16,96,169,3,141,10,96
GJ 1074	DATA 217,98,238,213,98,206,214,98	LC 1115	DATA 0,0,173,52,99,201,128,208	OO 1156	DATA 173,52,99,201,35,144,3,206
GC 1075	DATA 206,216,98,206,218,98,173,15	NN 1116	DATA 31,104,104,169,0,141,12,96	JM 1157	DATA 52,99,96,173,12,96,41,15
CB 1076	DATA 96,24,105,1,41,7,208,3	NL 1117	DATA 141,11,96,141,30,208,141,3	KN 1158	DATA 208,220,173,170,100,74,170,173
BJ 1077	DATA 206,214,98,32,107,101,32,53	AK 1118	DATA 96,32,251,100,32,242,101,32	CA 1159	DATA 52,99,24,125,154,100,76,102
OE 1078	DATA 99,32,178,99,173,9,96,208	LO 1119	DATA 74,101,32,61,102,76,19,98	PE 1160	DATA 100,0,236,100,231,101,0,108
				JB 1161	DATA 20,88,10,98,206,4,96,173

CO 1162 DATA 4,96,240,1,96,1
73,3,96
JB 1163 DATA 205,51,99,144,6
,206,3,96
BC 1164 DATA 206,3,96,238,3,
96,174,3
DN 1165 DATA 96,142,7,208,23
2,232,142,6
HI 1166 DATA 208,232,232,142
,5,208,232,232
LI 1167 DATA 142,4,208,173,2
0,96,141,4
MJ 1168 DATA 96,96,173,10,96
,240,4,206
BC 1169 DATA 10,96,96,173,11
,96,41,3
OK 1170 DATA 208,16,173,12,9
6,41,15,208
IH 1171 DATA 9,169,1,141,135
,99,141,3
PJ 1172 DATA 96,96,234,96,16
9,10,133,20
EH 1173 DATA 32,75,102,169,1
00,197,20,208
PC 1174 DATA 247,169,0,141,1
35,99,141,3
CC 1175 DATA 96,32,242,100,1
41,13,96,169
BK 1176 DATA 1,141,9,96,96,1
73,14,96
LP 1177 DATA 41,4,240,29,173
,52,99,201
OJ 1178 DATA 50,176,23,169,0
,160,10,145
AD 1179 DATA 88,169,10,141,1
9,96,238,15
BH 1180 DATA 96,32,166,101,1
04,104,76,19
AC 1181 DATA 98,96,169,0,230
,89,160,165

AI 1182 DATA 145,88,198,89,1
69,1,141,19
BC 1183 DATA 96,96,35,75,40,
90,20,60
BB 1184 DATA 169,157,160,10,
145,88,230,89
DN 1185 DATA 160,165,145,88,
198,89,169,0
LE 1186 DATA 141,3,96,32,251
,100,32,74
HG 1187 DATA 101,160,5,185,2
36,100,153,213
AE 1188 DATA 98,136,16,247,1
69,0,133,77
DN 1189 DATA 141,14,96,141,1
1,96,141,13
BJ 1190 DATA 96,141,12,96,14
1,30,208,141
CD 1191 DATA 170,100,206,18,
96,206,18,96
IA 1192 DATA 206,18,232,101,
179,102,96,206
NE 1193 DATA 18,96,206,18,96
,206,18,96
BB 1194 DATA 169,0,160,0,153
,128,131,153
BH 1195 DATA 0,131,200,208,2
47,173,15,96
IB 1196 DATA 201,7,208,5,169
,1,141,20
KL 1197 DATA 96,96,96,160,3,
173,19,96
GI 1198 DATA 240,248,206,19,
96,177,88,201
DF 1199 DATA 25,208,16,169,1
6,145,88,136
PA 1200 DATA 177,88,201,25,2
08,5,169,16
PC 1201 DATA 145,88,136,177,
88,24,105,1

BI 1202 DATA 145,88,96,32,74
,101,104,104
DD 1203 DATA 76,169,96,160,1
9,177,88,201
OB 1204 DATA 16,240,240,56,2
33,1,145,88
CH 1205 DATA 96,172,16,96,24
0,15,185,116
BB 1206 DATA 102,141,1,210,1
85,132,102,141
LK 1207 DATA 0,210,206,16,96
,172,17,96
DP 1208 DATA 240,15,185,148,
102,141,3,210
EB 1209 DATA 185,164,102,141
,2,210,206,17
IK 1210 DATA 96,96,224,224,2
25,226,227,228
NE 1211 DATA 229,230,231,232
,233,234,231,227
JJ 1212 DATA 224,224,20,30,4
0,50,40,30
DH 1213 DATA 40,50,40,30,40,
50,40,50
HN 1214 DATA 60,70,224,224,2
25,226,227,228
NI 1215 DATA 229,230,231,232
,233,234,231,227
MD 1216 DATA 224,224,120,130
,140,150,140,130
MD 1217 DATA 140,150,140,130
,140,150,140,150
EB 1218 DATA 160,170

©

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™

Sample of letter without Dots-Perfect

Dresselhaus



(714) 945-5600

8560 Vineyard Ave., Ste. 405, Rancho Cucamonga, CA 91730

IBM is a registered trademark of International Business Machines Corp. Grafix™ is a trademark of Epson America, Inc. Epson is a registered trademark of Epson America, Inc.

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."



This fall's hot new program stars 4 sexy Europeans and 1 American stud.



This fall's sizzling new program doesn't feature an Alexis, a Krystle, or even a Magnum, but it will have some pretty racy scenes. ♦ Meet the exotic cars of Test Drive, Accolade's incredible driving simulation. There are the legendary greats from Europe: Ferrari Testarossa, Lotus Turbo Esprit, Porsche 911 Turbo and the incomparable Lamborghini Countach. And to make Test Drive a truly international event, there's the classic American star—the Chevrolet

Corvette. ♦ Test Drive allows you to experience firsthand the awesome driving characteristics of each renowned performer. They accelerate like the real thing. They handle like the real thing. They brake like the real thing. In fact, the animation and graphics of Test Drive are so realistic, you'll swear the G-Force has you pinned to your seat. ♦ Accolade's Test Drive. It's one program that will definitely burn up the screen. ♦ Accolade. 20813 Stevens Creek Boulevard, Cupertino, CA 95014. 408-446-5757. **ACCOLADE™**

TRADEMARKS/OWNER: CORVETTE/GENERAL MOTORS CORPORATION; LOTUS/LOTUS PERFORMANCE CARS; L.P. FERRARI/FERRARI S.P.A.; PORSCHE/PORSCHE CARS INC. AND LAMBORGHINI/LAMBORGHINI CARS INC.

www.commodore.ca



Microscope

Sheldon Leemon

I picked up the 1988 Radio Shack catalog and found that the computer section reads almost like a retrospective of Tandy microcomputers. It describes not only the new and innovative line of Tandy PC-compatibles, but the entire old line of Tandy computers as well. These include the Model 4D, the Tandy 6000, the Color Computer, and the Model 102 laptop.

The catalog touts the Model 4D computer as "the perfect computer for busy managers, professionals, educators, and home users," when in fact, it's just the latest incarnation of the TRS-80—the computer that started it all for Tandy back in the late seventies. There are obviously still a few TRSDOS fans around, since Radio Shack continues to sell this 64K Z-80 machine with two 360K drives and a monochrome monitor for the amazing price of \$1,200. The same page advertises the Model 6000 as "ideally suited to today's offices." Few people remember that the 6000 was the first computer from a major manufacturer to use the 16-bit 68000 processor. Unfortunately, its vaunted multiuser office software was slow to come, and as a result, the 6000 was eventually left in the dust by other 68000 computers like the Macintosh, Amiga, and Atari ST. You can still buy a 512K Tandy 6000 complete with 15-meg hard disk and 8-inch floppy for \$3,495—about the same price as a complete Macintosh system.

The other two members of Tandy's old line of computers still have a bit more life in them. Though the Color Computer never was as big a hit as the Commodore 64, it was more sophisticated than it got credit for. Because it used the advanced 6809 microprocessor, it was able to run the powerful Unix-like OS-9 operating system years before most users ever heard of

multitasking. It continues to have a small, loyal following, which Radio Shack actively supports. The latest model, the \$200 Color Computer 3, can use an 80-column screen and up to 512K of memory, and it can even use a mouse and a hard disk.

The other member of Tandy's pre-PC lineup is the Tandy 102, successor to the Tandy 100. The original laptop computer may look a little primitive now, but it was the ground-breaking machine that led the way for today's 80286 models, with their megabytes of memory and built-in hard disks. Weighing in at 3 pounds, about a quarter as much as most other laptops, this machine is still the traveling companion of choice for many journalists on the go.

After looking over the old line of Tandy computers, it's hard to believe that the current line of aggressively competitive PC-compatibles come from the same company. Tandy's first venture into MS-DOS, the near-compatible Tandy 2000, didn't go over too well, but the company soon learned that it could be innovative and yet remain compatible. The result has been that, for the past couple of years, Tandy has managed to stay one step ahead of IBM. When IBM came out with its disastrous PCjr, Tandy answered with its very successful Model 1000, a small PC that wasn't crippled. And now, on the heels of IBM's introduction of the PS/2 line, Tandy has come up with a whole flock of interesting new machines in response, all of which feature 3½-inch drives, just like the IBM's.

On the low end, the Tandy 1000 line has grown to four models: the 1000EX, the 1000SX, the 1000HX, and the 1000TX. The EX and SX have been around a while, but their prices have dropped to \$600 and \$850, respectively. Both

are small, all-inclusive turbo PC clones with 5¼-inch drives, the major difference being that the EX is a one-piece unit, while the SX has a detached keyboard and more slots. The new \$700 HX is a one-piece like the EX, only with one built-in 3½-inch drive and room for another. A unique feature of the HX is that it contains DOS 2.1 in ROM. The HX boots immediately and allows you to operate either from a DOS prompt or a special built-in menu system. The 1000TX, at \$1,200, is actually more like an AT clone than an XT. Though it's housed in the same compact case as the SX, it uses an 8 MHz 80286 processor. Its expansion slots, however, are of the same short 8-bit variety as those of the SX, making the TX a kind of mini-AT hybrid.

Rounding out its new line, Tandy has added a 386 machine and a laptop. At \$2,600 for the base system (no hard drive or monitor), the Model 4000 is an aggressively priced 16MHz 80386 machine, which, like IBM's Model 60, comes with a 1.4-meg 3½-inch floppy. The Tandy 1400LT is a fast XT-clone laptop, with 768K RAM, two built-in 3½-inch drives, and a sharp supertwist backlit LCD display. Though at 14 pounds it's not the lightest laptop around, the \$1,600 price tag is pretty good for a full-featured portable with a state-of-the-art display.

Ironically, just as Tandy's product line seems to be well positioned, five of its key computer executives have gone over to Dell Computers, formerly known as PC's Limited. Although that company has so far sold its high-quality clones by mail-order only, it recently started to provide on-site service from Honeywell, which could make it a real contender for large corporate accounts. ©

The standard equipment on a Laser 128 is optional on most computers



Take a look at the Laser 128 Apple®-compatible computer, and beginning with its built-in disk drive and 128K RAM of memory, you start to feel that this machine was designed with you in mind. The Laser 128 is ready-to-run – plug it in, insert your program and go. Everything is built-in for you.



Choose from the largest software library in the world. The Laser 128 runs Apple IIe and IIc software, which makes it nice for you and your family, because children can use the same programs at home that they learn on in school. The Laser 128 is a computer for the whole family.

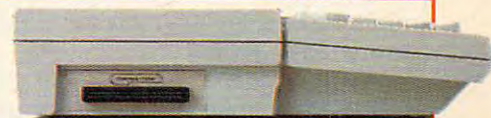


The Laser 128 has built-in interfaces for all

your peripherals, including serial and parallel printer interfaces, modem and mouse interfaces, a game port and you can hookup a



color or monochrome monitor, or even a TV to it. Only the Laser has this much built-in as standard equipment.



It's expandable, too.

The Laser 128 includes an expansion slot to let the computer grow with your increasing demands.

The Laser 128 is priced to keep money in your pocket.

The Laser is about half the price of an Apple, and is even less than a comparably equipped Commodore unit. You get a lot of computer for a little money.



Look for the attractive Laser packaging at a store near you.

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.



LASER 128®

Apple, Apple IIe and Apple IIc are registered trademarks of Apple Computer, Inc. Commodore is a registered trademark of Commodore Business Machines, Inc. ©1987

Manufactured by
VIDEO TECHNOLOGY COMPUTERS, INC.

MAKING COMPUTERS AFFORDABLE

www.commodore.ca



The World Inside the Computer

Fred D'Ignazio, Associate Editor

Black Boxes And Best Friends

My wife, my two kids, my cat, and I have just arrived in our new town of Lansing, Michigan. (That is, we've almost arrived. I'm writing this column in my hotel room just outside of town. But tomorrow night I'll be sleeping in my own bed in my new home.)

As I sit here thinking about all the things I have to do to get us settled, I can't help wishing I had my own personal black box—just like the new digital black boxes on passenger jetliners. Black boxes go out with every commercial airplane that takes off from every airport worldwide. They've become a necessary part of air transportation.

The normal black box doesn't furnish information unless something goes wrong. But I was thinking of a black box that would give me information throughout my move—a sort of travel buddy for me and my whole family.

My Best Friends

It was sad saying goodbye to all my friends in Alabama. I don't know when I'll ever see them again. I wished I could take them with me to Michigan the way I was taking my computer friends—my Apples, Tandys, Commodores, Ataris, and IBMs. The whole gang came with me—stacked to the ceiling inside my little red Toyota wagon.

Each night—in Nashville and Indianapolis—I unpacked my computers and carried them into my hotel room. I plugged them in and rejoiced when their little faces glowed and displayed their familiar greetings.

I'm a little crazy about computers, so I don't mind carrying them across state lines and lugging them in and out of hotel rooms. But wouldn't it be easier just to have a single black box to carry instead? Inside the box would be all the programs and data which you nor-

mally use, stored in solid-state or optical memory. Then, when you arrived at a motel, you would carry your little black box into the motel room and pop it into a keyboard-and-screen unit provided by the motel and bolted to the desk in the room. You would turn on the power, and instantly your favorite programs and your vital data would appear on the screen. You'd be ready to do a little word processing, play your favorite game, or sign onto a bulletin board and chat with your distant human friends.

The personal black box is an idea whose time has come because, let's face it, computers are everywhere. Every time I staggered into a hotel on our trip north, there was a terminal at the registration desk with a clerk busily tapping on its keys and peering into the computer's cantaloupe- or seaweed-colored screen. So why not a terminal in our rooms? And a black box that plugs into the terminal and personalizes it for each weary traveler who stumbles, semicomatose, into the room?

Considering how you feel after a grueling day of traveling, wouldn't it be nice to be greeted in a strange hotel room by your favorite computer program?

Lists Versus Advice

I hate lists. Lists leave me boggled and perplexed. Once a list is born, it takes on a perverse life of its own. As soon as I knock one item off a list, I find that two new items have quietly slipped into its place.

Moving is a time of lists: Lists of utilities to disconnect in your old home and utilities to connect in your new home. Lists of addresses to change. And a master list that spills over your lap and onto the floor: Pack your computer. Buy the cat her carsick pills. Get the kids' doctor and dentist records. Unpack the computer and print out the lists.

Call the paper boy. Plan your route to your new home. Make reservations. Find a new doctor. Take your car in for a check-up. Repack the computer. Whew!

Enter the portable, black-box friend. It could replace all the lists with a simple artificial intelligence program that "knows" what it takes to move a family from one state to another. Instead of a list, the friend could ask you questions and offer you advice like: "Did you remember to pack the house plants in your car?" or "You might water them before leaving, then put them on the car floor on top of a plastic garbage bag to prevent spills."

It could suggest little things like that, because those little things are why a move can drive you crazy—even if you do remember them.

The friend could come with you on your trip. And you could plug it into hotel-room terminals, or maybe right into the dashboard of your car. It could show you a map of your trip on a small display screen built into the dash—it would display only the roads you are currently on, so as not to confuse you with the big picture. And, when you arrived at your new home, the friend could tell you how to find the electric company so you could get some power for your computer, or the car-parts store that carries a windshield wiper arm for your 11-year-old Toyota, or which is the nicest vet in town, since your 15-year-old cat has OD'd on carsick pills and is acting as if she has a terrible hangover.

Your black box could get you through a move and can be your best friend—at least until you find some human friends in your new town. ©



Monthly Payments

Computers are especially helpful for calculations that you need to do repetitively. A calculator is often handier for quick calculations, but if you have a long formula that you use often, the computer might serve you better.

For example, my family and I have recently been trying to sell the house we used to live in. With all the "creative financing" schemes that buyers are using now, we seemed to be using loan payment calculations quite often. As long as I had the formula on paper, I could grab a calculator and figure out the payments. A computer, however, offers the ability to try many different combinations of numbers, without having to figure the loan-payment formula each time.

For example, let's say someone wants to borrow \$80,000 on a 20-year loan. With 14 percent interest, what would the monthly payments be? Now what if the interest rate is changed to 12 or 11 percent? What if the loan is for \$50,000? What if the loan is for 15 years? The computer can be very helpful in these "what if" situations—they make calculations quickly, producing seemingly instantaneous answers.

A Basic Model

Let's look at a simple program for finding monthly payments on a loan. You can use this program as an example for creating your own home applications programs. The program "Monthly Payments" is written in standard BASIC, so it runs on the Amiga, Apple II, Atari, Atari ST, Commodore 64/128, IBM PC/PCjr, and almost any other computer with BASIC.

Lines 130-270 simply print information about what the program does. You will also be able to use INPUT statements without error-trapping. After most of the INPUT statements in this program,

I have checked that the amount entered is greater than 0. Even with this error checking, it is possible to enter outrageous numbers and get wild answers. If you wish, add more error-trapping, making sure that all numbers entered are meaningful to the program.

Lines 280-320 ask for the amount borrowed. Lines 330-370 ask for the number of years for the loan. Line 380 multiplies the number of years by 12 for the number of monthly payments.

Lines 390-410 ask for the interest rate in percent. Enter the number as you usually think of it—a yearly interest rate such as 12, 8.75, or 10 percent. Line 420 changes the entered rate from a percent to a decimal and calculates the actual rate per pay period. For example, 12 percent becomes the decimal .12; then, to convert to the monthly rate, it's divided by 12, resulting in .01.

Line 450 calculates a factor used in the compound interest formula. The ↑ character in that line is Commodore's symbol for exponentiation; for other computers, substitute a caret (^). Line 470 uses the interest factor to calculate the monthly payment. Line 480 rounds the monthly payment value to the nearest penny. Lines 500-560 repeat the given information and print the monthly payment.

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

Monthly Payments

```

100 REM COPYRIGHT 1987 COMPUTE
! PUBLICATIONS, INC. - ALL
{SPACE}RIGHTS RESERVED.
110 REM MONTHLY PAYMENTS
112 PRINT "COPYRIGHT 1987":PRI
NT "COMPUTE! PUBLICATIONS,
{SPACE}INC."
114 PRINT "ALL RIGHTS RESERVED
."
120 PRINT "*** MONTHLY PAYMENTS
***"
130 PRINT

```

```

140 PRINT "YOU MAY ENTER A DOL
LAR AMOUNT"
150 PRINT "OF MONEY FOR AMOUNT
BORROWED,"
160 PRINT "SUCH AS 50000"
170 PRINT
180 PRINT "THEN ENTER THE NUMB
ER OF YEARS"
190 PRINT "FOR THE LOAN, SUCH
{SPACE}AS 15"
200 PRINT
210 PRINT "NEXT ENTER THE RATE
OF INTEREST"
220 PRINT "FOR THE LOAN IN PER
CENT,"
230 PRINT "SUCH AS 9.75"
240 PRINT
250 PRINT "THE COMPUTER WILL R
ETURN"
260 PRINT "YOUR MONTHLY PAYMEN
T."
270 PRINT
280 PRINT "AMOUNT BORROWED";:I
NPUT P
290 IF P>0 THEN 320
300 PRINT "ENTER AMOUNT MORE T
HAN ZERO."
310 GOTO 270
320 PRINT
330 PRINT "HOW MANY YEARS";:IN
PUT Y
340 IF Y>0 THEN 370
350 PRINT "MUST BE MORE THAN Z
ERO."
360 GOTO 320
370 N=12*Y
380 REM NUMBER OF PAYMENTS = 1
2*Y
390 PRINT
400 PRINT "WHAT IS THE INTERES
T RATE"
410 PRINT "IN PERCENT";:INPUT
{SPACE}R
420 R2=R/1200
430 REM CONVERT PERCENT TO DEC
IMAL
440 REM PER PAY PERIOD (MONTH)
450 F=(1+R2)^N
460 REM CALCULATE INTEREST FAC
TOR
470 M=P*(R2*F/(F-1))
480 M=INT(M*100)/100
490 REM CALCULATE MONTHLY PAYM
ENT
500 PRINT:PRINT
510 PRINT "$";P;" BORROWED FOR
"
520 PRINT Y;" YEARS AT ";R;" P
ERCENT"
530 PRINT
540 PRINT "MONTHLY PAYMENT = $
";M
550 PRINT:PRINT:PRINT:PRINT:PR
INT:PRINT
560 END

```


We Won't Be **UNDERSOLD**

* On items marked "No One Sells This For Less". Copy of valid ad required.

15 Day Free Trial • 90 Day Immediate Replacement Policy • Prices Expire 12-31-87

Complete Apple® Compatible System

Computer, Drive, Monitor, Printer & Software

Sale Price
\$499



List \$1228 (Add \$35.00 shipping.)*

- **Laser 128K Computer**
Video, Parallel & Serial Ports
Runs Virtually All of the
Apple II/IIc/IIe Software
- **Hi Res 12" Monochrome Monitor**
- **Big Blue 8½" Printer** With Interface
And 2 Rolls Of Paper
- **Software Package:** Word Processor,
Spreadsheet & Data Entry

**640K
System
Option
\$599**

Printer and
Color Monitor
Options
Available

**No One Sells
This System
For Less!**

Apple® is the registered trademark of Apple Computers Inc.

Professional IBM® XT Compatible System

Computer, Drive, Monitor, Printer & Software

Sale Price
\$649



List \$2495 (Add \$35.00 shipping.)*

- **512K Super Turbo XT Computer**
4.77/8 MHz; Clock/Calendar;
Parallel, Serial And Game Ports
- **MS DOS 3.2 & G.W. Basic** Included
- **Hi-Res 12" Monochrome Monitor**
- **Big Blue 8½" Printer** with Interface
And 2 Rolls Of Paper
- **Software Package:** Word Processor,
Spreadsheet & Data Base

SALE

**No One Sells
This System
For Less!**

IBM® is the registered trademark of International Business Machines, Inc.

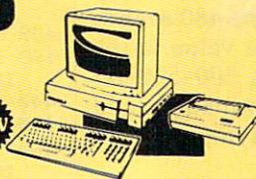
Complete Commodore 128D System

Computer, Drive, Monitor & Printer

Sale Price
\$549⁹⁵



NEW



List \$825 (Add \$30.00 shipping.)*

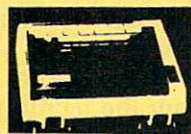
- **Commodore 128D Computer**
With Built-in 1571 Disk Drive,
128K Expandable To 640K And
Detachable Keyboard
- **Hi-Res 12" Monochrome Monitor**
With Connecting Cables
- **Big Blue 8½" Printer** with
Interface And 2 Rolls Of Paper
- **C128D Programmer's Reference Guide**

**No One Sells
This System
For Less!**

15" NLQ Business Printer Sale

Wide Carriage Star Micronics LV-1215 Printer

Sale Price
\$199⁹⁵



List \$499 (Add \$17.50 shipping.)*

- **120 CPS Print Speed**
- **Near Letter Quality Print Mode**
- **IBM Graphics Printer Compatible**
- **136 Column Wide Carriage**
- **Uses Inexpensive Spool Ribbons**

**No One Sells
This Printer
For Less!**



(312) 382-5050

We Love Our Customers!



Mail

COMPUTER DIRECT

22292 N. Pepper Road
Barrington, IL. 60010

www.commodore.ca

1st In Price, Support, & Warranty

15 Day Free Trial • 90 Day Immediate Replacement Policy • Prices Expire 12-31-87

8½" Letter Size 80 Column Printer

We Liked This Printer So Much,
We Bought Out The Factory!



Sale \$399⁹⁵ List \$199

*Add \$ 7.50 Shipping.

- Big Blue Dot Matrix Printer
- Heat Transfer • Enlarged
- Graphics (Apple, Atari, & CBM)
- Underline • Upper & Lower Case
- True Descenders • Adapters For:
- Commodore & Atari.. Sale \$19.95
- Apple IIc & Laser 128. Sale \$12.95
- RS-232 Adapter Sale \$12.95 (Please Specify Male or Female)

Pro 20 Daisy Wheel Printer

Wide Carriage Letter Quality
Daisy Wheel Printer



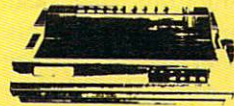
Sale \$999⁹⁵ List \$499

*Add \$10.00 Shipping.

- Daisy Wheel Printer
- 18 CPS Shannon & 22 CPS AAA Text
- Print Wheel (Courier 10) & Cartridge
- Compatible with Diablo® & Qume®
- Friction Feed • 13" Form Width
- Extra Daisy Wheels Sale \$ 9.95
- Parallel Centronics Interface (IBM®PC, Apple®IIc, Laser 128, CBM . Sale \$19.95

10" Comstar 1000 Printer

With Near Letter Quality
Best Quality In The U.S.A.



Sale \$1399⁹⁵ List \$349

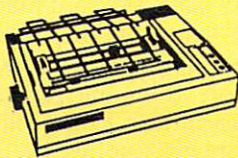
*Add \$10.00 Shipping.

- 100 CPS Draft & 20 CPS NLQ
- Serial Impact Dot Matrix • Bold
- Underline • Condensed • Italics
- Pica • Elite • Double Strike
- Dot Addressable Graphics
- Automatic Paper Loading
- Tractor & Friction Feed
- Superscript & Subscript
- Right & Left Margin Settings

No One Sells These Printers For Less!

NLQ 180 (180 CPS) Printer

Near Letter Quality
Lifetime Warranty*



Sale \$1899⁹⁵ List \$499

*Add \$10.00 Shipping.

- Near Letter Quality Selectable From Front Panel • 8K Buffer
- High Speed Dot Matrix
- Letter Quality Modes • Italics
- Elite • Pica • Condensed
- Graphics • Tractor & Friction Feed
- Lifetime Warranty on Print Head*
- 6 Month Immediate Replacement Policy For Printer

Hi-Speed LV-2010 (200 CPS) Printer

High Speed Printing (200 CPS Draft)
with Crisp Near Letter Quality



Sale \$2099⁹⁵ List \$499

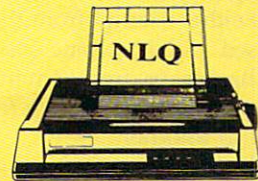
*Add \$10.00 Shipping.

- High Speed 200 CPS Draft
- IBM® Compatible • Dot Matrix
- Near Letter Quality Printing
- Standard Pull Tractor & Automatic Single Sheet Loading
- Standard Parallel & Serial Interface Ports
- Ultra High Resolution Bit Image Graphics • Continuous Underline

300 CPS Printer

300 CPS Draft - 50 CPS NLQ

Comstar 1300 High Speed Printer
With Color Printing Capabilities



Sale \$2999⁹⁵ List \$599

*Add \$10.00 Shipping.

- 300 CPS Draft - 50 CPS NLQ
- Superb Near Letter Quality
- Variety Of Characters/Graphics
- IBM & Epson Modes • 10K Buffer
- Auto Paper Loading & Ejection
- Parallel & Serial Interface Ports
- Download Character Setting
- Front Panel Margin Setting
- Optional 7-Color Printing Kit...\$99.95

COMPUTER DIRECT (A Division of PROTECTO)

22292 N. Pepper Road, Barrington, IL. 60010

Call (312) 382-5050 To Order

We Love Our Customers!

* Illinois residents add 6½% sales tax. All orders must be in U.S. Dollars. We ship to all points in the U.S., CANADA, PUERTO RICO & APO-FPO. Please call for charges outside continental U.S. or C.O.D. MAIL ORDERS enclose cashier check, money order or personal check. Allow 14 days delivery, 2 to 7 for phone orders and 1 day express mail. Prices and availability subject to change without notice. (Monitors only shipped in continental U.S.)

VISA — MASTERCARD — C.O.D.

www.commodore.ca



Christmas At The Phone Company

Christmas came early for the Bell Operating Companies (a.k.a. the local phone companies) this year. In September, Federal Judge Harold Greene ruled that the seven Bell phone companies which grew out of the Bell System's deregulation may set up facilities designed to carry online information. Although Greene's ruling did not restrain the operating companies from manufacturing and marketing communications equipment, he stopped short of granting the companies permission to set up their own information services.

Industry reaction to the ruling was mixed. Most commercial information services (which were spared the emergence of new competitors fueled from the deep coffers of telephone-service profits) maintained a cautiously optimistic public pose while privately wiping their collective brow.

On the other hand, public packet-switching network providers such as Telenet, GENet, and Tymnet were not enthusiastic at the prospect of going toe-to-toe with rivals who will be either exempt from the FCC's proposed public phone-system access charges or from paying these charges by moving money from one pocket to another.

The packet switchers are said to be even more concerned about Pacific Telesys's as-yet-unannounced Project Victoria technology. Victoria is rumored to be planned for public introduction in the latter part of 1989, and it reportedly allows several high-speed (9600 bps) data transmission links to be mixed and decoded concurrently with voice traffic on a regular telephone line. The system is intended to make high-resolution graphics, videotex, and rapid information transfer available to the home user at reasonable cost. However, marketing plans include flat

monthly fees rather than hourly access charges, so Bell-owned information services are needed. Since the Operating Companies will have to negotiate with independent service providers, the final rate structure is now up in the air.

Access Surcharges Inevitable?

One Federal Communications Commission lawyer holds little hope for the thousands of computer users who have taken the time to protest the proposed FCC rule changes that will add surcharges of up to \$5 an hour in January 1988 for accessing commercial information services. According to Ruth Milkman, attorney for the FCC's Common Carrier Bureau, the surcharges will eventually be put in place, despite overwhelming public opposition.

Milkman addressed a meeting of the Videotex Industry Association of America last September in Washington, D.C. Attendees were reportedly unhappy with Milkman's presentation, which emphasized that the current exemption from access charges enjoyed by owners of networks used by information services was never intended to be permanent. Ms. Milkman admitted that the FCC has been swamped with letters protesting the surcharges, but added that grievances which take exception to the anticipated rules changes solely on the basis of their higher rates are likely to go unheeded by the Commission.

Milkman stated that the FCC feels the impact of the surcharges will be substantially less now than it would have been three years ago, when the exemption was granted. They reason that since 1200-baud access to commercial information services averaged over \$20 in 1984, and is only about \$10 now, computer owners who end up shelling out \$15 an hour under the new

rules will still be better off than they were three years ago.

Implementation of the FCC surcharges may be delayed for a month or so, due to an extension of the deadline for public comment on the access charges, but Milkman strongly implied that the Commission views imposition of the surcharges inevitable.

In a related move, rumor has it that the Internal Revenue Service is contemplating adopting logic similar to the FCC's when dealing with future tax hikes. Government spokespersons will state that they wanted to raise the rates a long time ago, and that we're all better off with the increases delayed until the present.

Tax Dollars At Work

The FCC, obviously in a cranky mood from being asked to defend its actions every 15 minutes, has turned its collective wisdom across the waters to the Persian Gulf. It seems that many of those reflagged Kuwaiti oil tankers are not equipped with FCC-approved radio and communications gear. The Commission has apparently been adamant that ships flying the stars and stripes acquire sanctioned equipment in spite of polite requests from the Justice and State Departments to get lost. The FCC's stubbornness in this matter has prompted more than one Washington pundit to suggest that the Commissioners be sent to personally examine mines in the Straits of Hormuz to insure that the explosive devices comply with FCC Class B emission specifications. ©

COMPUTE! Publications

Presents the

NAME YOUR DREAM SWEEPSTAKES!!!

Now's the chance to win the personal computer system of your dreams!!

A \$5,000 state-of-the-art powerhouse computer, loaded with the latest peripherals and a collection of software!

Take home an amazing new Amiga 2000 multitasking computer,
capable of producing stunning stereo sound and superb color graphics
as well as running all IBM PC software!

OR

Choose a new Apple Macintosh SE computer,
the expanded, faster Mac capable of reading IBM PC software,
and a leader in the growing desktop publishing world!

OR

Receive a powerful Atari 1040ST computer system,
complete with laser printer, a terrific combination of processing power, super color graphics,
and MIDI-equipped sound output!

OR

Pick up a new IBM Personal System 50,
the 80286-based computer system with twice the computing speed of an IBM PC-AT
and new VGA graphics power!

Each of these one-megabyte dream machines comes with an appropriate mix of hard disk drive
and/or 3-1/2-inch and 5-1/4-inch floppy drives, monitor, printer, a modem for telecommunications,
and a collection of popular software programs to get you started.

OR

Put together your own custom dream computer system with \$5,000.00 in cash!

Enter today!!

1. No purchase necessary. To enter, complete the official entry form or, on a plain piece of paper, hand print your name, address, city, state, and zip code. Enter as often as you wish, but mail each entry separately to: Name Your Dream Sweepstakes, P.O. Box 537, Lowell, IN 46399. All entries must be received by July 1, 1988. Not responsible for late, lost or misdirected mail.

2. Winner will be determined in a random drawing on or before July 15, 1988, by Ventura Associates, Inc., an independent judging organization whose decisions are final. The prize is guaranteed to be awarded. Winner will be notified by mail and may be required to complete an affidavit of eligibility which must be returned within 21 days of date on notification. No substitutions for prize except as may be necessary due to availability. All taxes are the responsibility of the winner. Entry constitutes permission to use of winner's name and likeness for publicity purposes without additional compensation.

3. Approximate retail value of the prize is as follows: Grand (\$5,000.00).

4. Odds of winning are determined by the total number of entries received. Sweepstakes open to residents of the United States. Employees and their families of Capital Cities/ABC, Inc., its affiliates, subsidiaries, distributors, retailers, advertising and production agencies, and Ventura Associates, Inc., are not eligible. All federal, state, and local rules and regulations apply. Void where prohibited.

5. For the name of the major prize winner, send a stamped, self-addressed envelope before July 1, 1988 to: Name Your Dream Sweepstakes Winners, P.O. Box 773, Lowell, IN 46399.



Crosswords And Home Computers

I recently attended a meeting of the ESCAPE user's group (of Santa Cruz, California) and had the pleasure of participating in a lively discussion of programming in general, and program design in particular. I must give John Pilge credit for starting the session off with an example program that I'm still thinking so hard about. I would like to share his tough nut with all of you.

Consider a simple acrostic square, such as this:

T	O	N
A	R	E
B	E	T

There are six interlocking words in the square, three vertically and three horizontally. The problem: Given a list of three-letter words, can you write a computer program that will create an acrostic square? Better yet, given a list of five-letter words, can your program use ten of those words to create a larger acrostic square?

John did, indeed, produce a program to perform that task, but when he gave it a list of several thousand five-letter words to work with, and then performed some speed measurements, he estimated that his Atari 800 computer would take 67 years to finish! What can be done to improve that time? The most obvious answer would seem to be to move up to a faster machine. Why not? An Atari ST might even be able to do the job in just a handful of years. Hmm. . .not good enough yet? I didn't think so either.

So now we are into the meat of this month's column: How can we write programs to get the best possible performance out of our little beasts?

Speed Demons

For starters, John *did* write his program in BASIC. Now, as convenient as BASIC is, it is certainly not a

language to use when you need speed, so let's consider using another language. Typically, compiled languages will run programs from 10 to 200 times faster than interpreted BASIC (depending on what compiler you use and what kind of program you are testing).

If you are ready to resort to assembly language, you can improve those numbers by an additional factor ranging from 2 to 20. Still, that means that even at *best*, a change of languages will get us an improvement of no more than, say, 400 to 1 over BASIC. So, 67 years becomes about two months. Sigh. I'm not sure I could do without my machine for that long.

Besides changing languages or computers, there are two ways to attack the problem of a too-slow program. The first is to examine your code carefully, looking for the little things that slow down the system. For example, most of us have learned that with Atari BASIC (and indeed, with most BASICs), you can improve performance markedly if you put FOR. . .NEXT loops at the beginning of your program. Yet sometimes, even that is not enough. As I mentioned once upon a time in an article about card shuffling, the only real solution might be to find another *method* to solve the problem.

Try the listing accompanying this article, as is. Note how quickly the program finds the acrostic squares. Then, run it twice more, removing lines 1430 and 1450, in turn, to see the effect of increasing the word list even a little bit. Now, imagine the effect of having thousands of words. Worse, imagine thousands of five-letter words. Scares you a little, doesn't it?

In the same vein, consider crossword puzzles. If five-square acrostics are a tough nut for computers, imagine how long it would take your Atari computer to gener-

12 × 12 crossword. Even today, there is no *real* crossword-generating program for any personal computer. (Yes, I am aware of *Crossword Magic*, but that program only *aids* crossword makers. It doesn't even come close to being able to generate puzzles by itself.) Yet, there are humans who can produce original crossword puzzles in a matter of hours or even minutes.

For you nonprogrammers, I hope I've shown you that computers can't do everything as well as humans. There is a not-too-hidden message here as well: Program design is very important. Yes, careful implementation is important (no one wants a buggy program, of course), but sometimes a good design can make the *real* difference, hopefully producing a program that can finish its task before you nod off with boredom.

For you programmers, here is a challenge: Can you come up with a better method? I would hope so. My version is fairly simplistic (probably much more so than John's program, which I have not seen) and not too hard to follow. I do have a sneaking hunch, though, that you won't improve the program too much if you stick to BASIC—not because BASIC itself is slow (although that doesn't help)—but because BASIC is so weak when it comes to data types and structures.

Foreign Languages

And where is this leading us? Into one of my favorite topics: computer languages. More specifically, I would like to explore the strengths and weaknesses of the various languages available for Atari computers (both eight-bit and ST). Beyond that, I would like to discuss some of the more fundamental programming topics. In particular, in next month's column we will begin looking at the advantages of struc-

tured data (and no, that's *not* the same as structured programs).

In the meantime, I'm going to be giving the acrostic squares problem some thought. Certainly, if you get any brilliant ideas for solving the acrostic squares problems, please let me know. You can write to me at P.O. Box 710352, San Jose, CA, 95171-710352. Or, you can contact me in one of the Atari forums on CompuServe. (I am active in the Atari eight-bit forum, especially since they introduced the Kyan/OSS/ICD special topics areas. My PPN is 73177,2714.) And please, if your solution is a lengthy one, consider sending a disk or uploading the program.

```
AD 10 REM COPYRIGHT 1987 COM
      PUTE! PUBLICATIONS, IN
      C. ALL RIGHTS RESERVE
      D.
IP 20 PRINT "{CLEAR}COPYRIGH
      T 1987";PRINT "COMPUTE
      ! PUBLICATIONS, INC.":
      PRINT "ALL RIGHTS RESE
      RVED."
BP 30 FOR TT=1 TO 1200:NEXT
      TT:PRINT "{CLEAR}"
FJ 1000 REM THE HORIZONTAL W
      ORDS:
```

```
FK 1001 DIM H1$(3),H2$(3),H3
      $(3)
KK 1010 REM THE VERTICAL WOR
      DS:
IF 1011 DIM V1$(3),V2$(3),V3
      $(3)
MC 1020 REM A TEMPORARY AND
      MASTER WORD LIST
IA 1021 DIM T$(3),W$(3*100)
LP 1030 REM INITIALIZE THE M
      ASTER WORD LIST
HG 1040 FOR I=1 TO 1000000 S
      TEP 3
FK 1050 READ T$
HB 1060 IF T$(">") THEN W$(I
      )=T$:NEXT I
EN 1070 REM NOW BEGIN THE RE
      AL WORK
OL 1080 WCNT=I-3
OB 1090 FOR H1=1 TO WCNT STE
      P 3
OD 1100 H1$=W$(H1,H1+2)
OA 1110 FOR H2=1 TO WCNT STE
      P 3
HL 1120 IF H2=H1 THEN 1350
OJ 1130 H2$=W$(H2,H2+2)
OE 1140 FOR H3=1 TO WCNT STE
      P 3
FA 1150 IF H3=H2 OR H3=H1 TH
      EN 1330
OP 1160 H3$=W$(H3,H3+2)
FH 1170 V1$=H1$(1):V1$(2)=H2
      $(1):V1$(3)=H3$(1)
PE 1180 FOR V1=1 TO WCNT STE
      P 3
BA 1190 IF V1$(">")W$(V1,V1+2)
      THEN NEXT V1:GOTO 13
      20
FN 1200 V2$=H1$(2):V2$(2)=H2
      $(2):V2$(3)=H3$(2)
```

```
OP 1210 FOR V2=1 TO WCNT STE
      P 3
AO 1220 IF V2$(">")W$(V2,V2+2)
      THEN NEXT V2:GOTO 13
      20
BF 1230 V3$=H1$(3):V3$(2)=H2
      $(3):V3$(3)=H3$(3)
PD 1240 FOR V3=1 TO WCNT STE
      P 3
BF 1250 IF V3$(">")W$(V3,V3+2)
      THEN NEXT V3:GOTO 13
      20
BJ 1260 PRINT "FOUND ONE!"
FH 1270 PRINT
CB 1280 PRINT ,H1$
CD 1290 PRINT ,H2$
BM 1300 PRINT ,H3$
FC 1310 PRINT
MN 1320 REM (TO HERE IF VN$
      NOT IN LIST)
AB 1330 REM (END OF 'IF H3=H
      2 ...')
IC 1340 NEXT H3
AB 1350 REM (END OF 'IF H2=H
      1 ...')
ID 1360 NEXT H2
ID 1370 NEXT H1
BC 1380 STOP
LB 1390 REM
DK 1400 REM THE WORDS!
KK 1410 REM
AF 1420 DATA ARE,BET,NET,ORE
      ,TAB,TON
AM 1430 DATA $
DJ 1440 DATA TOP,PET,TAP,POT
      ,TAN,PEN
AO 1450 DATA $
ON 1460 DATA LAP,LOP,CAP,COT
      ,CAT,CAN
BA 1470 DATA $
```

MICRO WORLD ELECTRONIX



NEW 500!

512K Computer with 1 Disk Drive,
1080 Color Monitor. Includes
Software

AMIGA 500
IMEG RAM EXP
EXTERNAL DRIVE

CALL
CALL
CALL

AMIGA 2000 NOW SHIPPING!!

Peripherals now in stock:

A2088D Bridgecard
A2090 HD Controller
A2092 20MB HD W/Cont
A2052 2 MB Board
A2010 3.5" Disk Drive
A2002-23 Monitor
A1010 External Floppy

EPSON

LX800 \$175.95
FX86E \$CALL
FX286E \$CALL
EX800 \$CALL
EX1000 \$504.00
LQ800 \$LOW
LQ850 \$495.00
LQ1000 \$505.00
LQ1050 \$669.00
LQ2500 \$SAVE
GQ3500 laser \$CALL

PANASONIC

1080I MODEL II \$159.95
1091I MODEL II \$CALL
1092I \$295.00
1592 \$379.00
1595 \$CALL
3131 \$249.00
3151 \$CALL
4450 LASER \$LOW
1524 24 PIN \$SAVES

FREE

**DECEMBER SPECIAL!!! BUY ANY TWO ELECTRONIC ARTS TITLES
AND RECEIVE A FREE TEE SHIRT OR CAP!!!**

FREE

AMIGA SOFTWARE

Electronic Arts

Bard's Tale \$31.95
King's Quest I, II, III \$31.95
Space Quest \$31.95
Leisure Suit Larry \$31.95
Marble Madness \$31.95
Deluxe Paint II \$79.95
Deluxe Print \$69.95
Deluxe Music \$64.95
Deluxe Video \$79.95
Ferrari Formula I \$31.95
Earl Weaver Baseball \$31.95
Gridiron! \$42.95
Chessmaster 2000 \$29.95
Mathtalk \$31.95
Empire \$31.95

Microillusions

Faery Tale Adventure \$31.95

Mindscape

Dejavu \$31.95
Brattacus \$31.95
Defender of Crown \$31.95
SDI \$31.95
Sinbad \$31.95
King of Chicago \$31.95
Uninvited \$24.95
SAT Prep. \$39.95

Microdeal

GoldRunner \$26.95

Gamestar

Baseball \$25.95
Football \$25.95

Graphics

Sculpt 3D \$64.95
Aegis Animator \$84.95
Aegis Draw Plus \$159.00

Business Software

VIP Professional \$159.95
Superbase \$89.95
Word Perfect \$199.95
Rags to Riches Acc. \$CALL
Phasar \$CALL

64 & 128 Software

Paperclip \$39.95
Superbase \$59.95
Bard's Tale \$26.95
Bard's Tale II \$26.95
Dan Dare \$19.95
Delta Patrol \$19.95
Marble Madness \$21.95
Legacy of Ancients \$21.95
Patton VS Rommel \$21.95
Pegasus \$21.95
Pegasus ADV. Battle \$14.95
Skate or Die \$22.95
Strike Fleet \$22.95

C64 & 128 ACCESSORIES

MW-350 Parallel Printer Interface

2K BUFFER \$49.95

10K BUFFER \$59.95

C64 Power Supplies

Repairable \$39.95

Non- Repairable \$29.95

MW-256

**256K Parallel Printer Buffer
\$129.00**

MW-232 C64/128 RS232 Serial Interface \$45.00
MW-401 40/80 Column Cable for C128 \$29.95
MW-611 Universal I/O /A to D converter \$225.00



SALES: 1-800-288-8088 TECH SUPPORT: (303) 988-5907
Manufacturer's Warranty Honored. All Prices Subject to Change Without Notice.



On The Cutting Edge

Three-dimensional graphics and animation are the hottest fields in computer graphics today. Three-dimensional programs allow you to display three-dimensional objects, seen from any angle and at any distance, on your two-dimensional computer screen. The Amiga's specialized hardware makes it a natural for such advanced graphics work, and as a result, a slew of new 3-D graphics and animation software for the Amiga has recently appeared.

The concept behind these packages is more or less the same. You first define one or more 3-D objects. This can be done using a coordinate system, where the corners of each edge are specified using numbers that denote their horizontal and vertical position, as well as their depth. Or, objects may be composed of a number of basic primitive shapes, such as cubes, cones, spheres, tubes, and pyramids. Three-dimensional objects may also be created by drawing two-dimensional ones and then "spinning" them as on a lathe, or by extruding them, a process similar to forcing a lump of modeling clay through a stencil.

Once an object is defined, you must decide where to position an imaginary camera. You can choose to look at the object from any side, from any distance, and from any angle. Finally, you set the lighting, placing one or more sources of illumination around the scene to achieve the proper effect. When these preparations are completed, the program draws the desired view of the object. This drawing may be as simple as a wire-frame view, depicted as a series of connected lines, or as complex as a ray-traced view that can display such details as shadows, reflections, refraction, and surface textures.

In addition to still images, some

programs let you create a series of pictures in which the camera or the object (or both) move from scene to scene. This series of pictures can then be compressed into a file which contains only the changes that occur from frame to frame, and that can be played back at high speed, creating an animated movie a few seconds long. These scenes may be recorded serially on videotape to form longer scenes. Or, the entire animation may be recorded one frame at a time, using 16mm film or special video equipment.

New Software

Because 3-D animation is a complex field, and a relatively new one at that, there are many ways in which it may be approached. This fact is reflected in the diversity of 3-D software for the Amiga. Within a span of about two months, four new 3-D packages have appeared, each with a somewhat different emphasis. These programs are *Sculpt 3-D* from Byte by Byte, *Videoscape 3-D* from Aegis, *Forms in Flight* from Micro Magic, and *Silver* from Impulse.

Videoscape 3-D is the result of Alan Hasting's experimentation with using the Amiga to create short animated films, such as "Infinite Loop." Its object-creation facilities are by far the most primitive of any of the programs; though some object editing programs are included in the package, the manual suggests using graph paper to draw the object, and then creating a text file with the coordinates for the object. The motion of objects and camera are also controlled by text files. Color selection for the faces of the object are limited to a fixed palette. The drawing section of the program is geared more toward speed than to accuracy or detail. Despite these limitations, the program has been used to create many impressive animations. Though not the easiest to

learn or use, it gets the job done.

Somewhat similar in orientation is the program *Forms in Flight*. Like *Videoscape*, it's geared toward producing frames quickly. It, however, has a much more sophisticated object creation facility, which allows the user to enter object coordinates, draw them freehand, or use existing library objects. It also includes tools to stretch, resize, spin, and extrude objects.

3-D In Thousands Of Colors

Sculpt 3-D and *Silver* both can draw objects using any Amiga graphics modes, including the 4096-color Hold and Modify (HAM) graphics mode. This allows them to depict a wide array of surface textures, as well as properties such as reflectivity and transparency. However, their object creation philosophies are totally different. *Silver* uses only a fixed set of primitive shapes with which to construct objects. As a result, objects may be created and drawn fairly quickly, at the price of some loss of control over detail. *Sculpt*, on the other hand, has a very sophisticated object creation facility which allows objects to be created point by point with the aid of a number of "power tools." Because of the level of detail which this enables, its drawing speed in its most detailed mode is slower than that of the other programs. How this will affect animation speed is somewhat uncertain, since the animation program, *Sculpt 3-D Animator*, has not been released at the time of this writing.

All this power has its price. Though all of these packages cost under \$200, they will probably require extra RAM. *Forms in Flight* and *Silver* need a minimum of a 1 megabyte, while *Videoscape* and *Sculpt*, which can run on a 512K machine, really should have twice that for smooth operation. ©



BASIC File Dumper

A file dumper is the sort of tool that virtually every programmer needs sooner or later. What it does is display the contents of a disk file, showing every byte in both numeric and ASCII formats. That's useful any time you need to know precisely what a file contains. This month's program, written in *GFA BASIC*, lets you dump the contents of a file to either the screen or a disk file, pausing the screen display whenever you like.

The figure below shows a typical file dump. What we're looking at in this case is the word processor file containing this column, stored in *1ST Word* format. Notice how many extra bytes the file contains in addition to the printable characters. By studying this whole dump in detail, you could learn much about how *1ST Word* handles automatic line wrap and other formatting details.

Each line of the dump shows the contents of 16 bytes from the file. The line starts with a 4-digit hexadecimal number showing your position in the file. Next come 16 hex numbers showing the contents of

16 bytes. The 16 characters at the right end of the line show the ASCII equivalent for each byte. Control codes and unprintable characters are represented with a dot (.) character to avoid spoiling the display. If you don't like using hexadecimal numbers, you can easily change the program to use decimal instead (see below).

Using The Program

If you just want to take a quick peek at a file, choose the Screen option when the program begins. If you need to examine the file at length, choose the File option. The new file has the same base name as the original file, with a .HEX extension if you're in hex mode or a .DEC extension if you're not. Once the new file has been made, you can either make a hardcopy printout or load it into your favorite text editor and view it at your leisure.

While the file dump is in progress, you can pause it by pressing P if you are dumping to the screen (press any key to resume). Pressing any other key aborts the dump immediately, in either mode.

For Those Who Prefer Decimal

Hexadecimal numbers are often used in programming, but not everyone finds them useful. If you prefer decimal, you can easily change the program to suit your needs. The first non-remark line in the program contains the statement `HEXFLAG=1`. If you change the 1 to 0, all of the program's output is in decimal.

Other Languages

If you're programming in Pascal or C, converting this program to your language should be a straightforward matter. Most of the conversion is bread-and-butter work like converting to the correct FOR-loop syntax, declaring variables and procedures properly, and so forth. However, there are three *GFA BASIC* keywords that deserve special mention.

The first keyword, `ALERT`, provides a convenient way to call the GEM AES routine officially known as `form_alert`. The second keyword, `FILESELECT`, lets you call the AES routine known as `fsel_input`. Consult your manual for the proper way to call these AES routines in your language. The form of the call will be different, but you'll want to supply the same information to the routine. The last one is `EDIT`, which in *GFA BASIC* simply terminates the program and returns you to the editing screen. Replace `EDIT` with whatever is needed to terminate a program in your language.

If you're using another version of BASIC, you may need to add a line number at the beginning of each line. If your BASIC doesn't provide a way to call system routines, eliminate the lines beginning with `ALERT` and `FILESELECT`, and substitute `INPUT` statements. Replace `EDIT` with `STOP` or `END`.

```
0000: 1F 30 36 36 30 31 30 33 30 33 30 35 36 36 0D 0A .0660103030566.,
0010: 1F 39 5B 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E .9I.....
0020: 2E 7F 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E .....
0030: 7F 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E .....
0040: 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E 2E .....
0050: 2E 2E 2E 5D 0D 0A 0D 0A 53 54 1E 4F 75 74 6C 6F ...J...ST,Outlo
0060: 6F 6B 0D 0A 0D 0A 50 68 69 6C 69 70 1E 49 2E 1E ok...Philip,I.
0070: 4E 65 6C 73 6F 6E 0D 0A 0D 0A 42 41 53 49 43 1E Nelson...BASIC.
0080: 46 69 6C 65 1E 44 75 6D 70 65 72 0D 0A 0D 0A 41 File.Dumper...A
0090: 1E 66 69 6C 65 1E 64 75 6D 70 65 72 1E 69 73 1E .file.dumper.is
00A0: 74 68 65 1E 73 6F 72 74 1E 6F 66 1E 74 6F 6F 6C the.sort.of.tool
00B0: 1E 74 68 61 74 1E 76 69 72 74 75 61 6C 6C 79 1E .that.virtually
00C0: 65 76 65 72 79 1E 1C 70 72 6F 67 72 61 6D 6D 65 every...programme
00D0: 72 1E 0D 0A 6E 65 65 64 73 1E 73 6F 6F 6E 65 72 r...needs.sooner
00E0: 1E 6F 72 1E 6C 61 74 65 72 2E 1E 1C 57 68 61 74 .or.later...What
00F0: 1E 69 74 1E 64 6F 65 73 1E 69 73 1E 64 69 73 70 .it.does.is.disp
0100: 6C 61 79 1E 74 68 65 1E 63 6F 6E 74 65 6E 74 73 lay.the.contents
0110: 1E 6F 66 1E 1C 61 1E 0D 0A 64 69 73 6B 1E 66 69 .of...a...disk.fi
0120: 6C 65 2C 1E 64 69 73 70 6C 61 79 69 6E 67 1E 65 le...displaying.e
0130: 76 65 72 79 1E 62 79 74 65 1E 69 6E 1E 6E 75 6D very.byte.in.num
0140: 65 72 69 63 1E 61 6E 64 1E 41 53 43 49 49 1E 66 eric.and.ASCII.f
0150: 6F 72 6D 61 74 2E 1E 0D 0A 54 68 61 74 27 73 1E ornat...That's.
0160: 1C 75 73 65 66 75 6C 1E 1C 61 6E 79 74 69 6D 65 .useful...anytime
0170: 1E 1C 79 6F 75 1E 6E 65 65 64 1E 74 6F 1E 6B 6E .you.need.to.kn
```

A file dump from a 1ST Word word processing file.


```

PROCEDURE byte_out<
  IF hexflag=0 THEN<
    ot$=STR$(x)<
    WHILE (LEN(ot$)<3)<
      ot$="0"+ot$<
    WEND<
    GOSUB both_out<
  ELSE<
    IF x<16 THEN<
      ot$="0"<
      GOSUB both_out<
    ENDIF<
    ot$=HEX$(x)<
    GOSUB both_out<
  ENDIF<
RETURN<
'<
PROCEDURE space_out<
  ot$=CHR$(32)<
  GOSUB both_out<
RETURN<
'<
PROCEDURE ascii_out<
  FOR k=1 TO num_bytes<
    x$=MID$(lin$,k,1)<
    IF x$<CHR$(33) OR x$>"z" THEN<
      ot$=CHR$(46)<
      GOSUB both_out<
    ELSE<
      ot$=x$<
      GOSUB both_out<
    ENDIF<
  NEXT k<
RETURN<
'<
PROCEDURE offset<
  offset$=HEX$(offset)<
  IF hexflag=0 THEN<
    offset$=STR$(offset)<
  ENDIF<
  WHILE LEN(offset$)<num_digits<
    offset$="0"+offset$<
  WEND<
  ot$=offset$+": "+CHR$(32)<
  GOSUB both_out<
  offset=offset+num_bytes<
RETURN<
'<
PROCEDURE both_out<
  IF flag=0 THEN<
    PRINT ot$;<
  ELSE<
    PRINT #2,ot$;<
  ENDIF<
RETURN<

```

Amiga SuperMenus

There are a number of problems with this article from the September issue (p. 89). The *SubMenu%* in the example syntax for the *SMENU* command should instead be *SubItem%* to conform with the following description. There are also two errors in Program 1. In the *INITIALIZE* subprogram definition on page 89, the second *SHARED* statement should begin *SHARED select-image%* rather than *SHARED image%*. (This mistake doesn't actually cause a problem because *select-image%* is defined as 0.) In the *SMENUOFF* subprogram, the statement at the top of the third column on page 90 should read as follows:

```

IF PEEKL(ItemAdd + 22) > 0 AND
  PEEKL(ItemAdd + 22) <> PEEKL
  (ItemAdd + 18) THEN-

```

Fast Fractal Landscapes For IBM

Many readers with equipment combinations other than a genuine IBM PC and IBM color/graphics adapter card encountered a problem when using this program from the June issue (p. 88). Vertical spikes would appear in the display, leaving blank areas in the landscapes. We still have no simple patch for the program, but reader Derward McKinney has discovered an alternative solution. The problem does not occur if the machine language program is executed from the *DEBUG* utility provided with DOS. To use this approach, first run the BASIC program in the magazine to create the *FRACTLAND.COM* file, then make a copy of the *DEBUG.COM* file on the same disk with *FRACTLAND.COM*. (*DEBUG.COM* should be on one of your DOS master disks. For PC-DOS and most versions of MS-DOS, look on the *DOS Supplemental Programs* disk.)

To start the program, enter the

following command at a DOS prompt:

```
debug fractland.com
```

When the *DEBUG* hyphen (-) prompt appears, type a G, and then press Enter. The program will begin running, and the fractal landscapes should appear without spikes. The only disadvantage to this approach is that your system may appear frozen when you exit *Fast Fractal Landscapes*, so you must turn the computer off and back on to reboot. ©

COMPUTE! Disk Subscriptions

COMPUTE! Disks are available for the following computers:

- Apple II series
- Commodore 64 and 128
- Atari 400/800/XL/XE
- IBM PC and PCjr

Each error-free disk contains all the programs from the previous three issues of *COMPUTE!*. With a disk subscription, you'll receive one disk—for the machine you specify—every three months. To subscribe, call toll free

1-800-727-6937

Moving?

For address changes or subscription information, call toll free

1-800-727-6937



All Sass Sal

Folks who don't own computers always claim there are no home applications worthy of their time and effort. Those of us with computers know differently. Aside from the obvious choices—best sellers like *Managing Your Money* and a score of word-processing programs—there are a number of nifty lesser home applications, some of which may have escaped your attention. This month, we'll look at two of my favorites.

Learn To Type

Typing Instructor II is the Rolls Royce of typing programs. Its nine sections cover everything you need to learn to type. The first section deals with posture and finger positions. The second section has 18 lessons that teach the key locations; here you begin actual exercises. Lesson one covers the letters *a*, *s*, and *l*. It's amazing how many words—even sentences—you can make from just those letters: *All sass a lass, alas all sass Sal*, and so on.

Each exercise consists of typing the letters, words, and sentences as they appear on the screen. When you make a mistake, the program doesn't beep and raise a lot of fuss; instead it quietly clears away your erroneous keystroke and waits for you to continue.

A Typing Test

Once you've gone through all the lessons and actually learned to type—with just an hour a day, you'll be typing in two weeks—you can progress to the typing tests. Having learned to type in high school, this is where I began. I picked the easiest material for my first test. Each one is about 18 lines and 180 words long. I was rather proud of my results until a high-school typing instructor told me that 35–40 words per minute (wpm) is the minimum a student

needs to get out of his class.

Anyway, my score on the first test was 51 words per minute at 92 percent accuracy. But I would have done better if the program hadn't "taken-off" every time I used the backspace to correct an error. Corrections aren't allowed. I switched to more difficult material, a technical document, and my score fell to 40 words per minute at 80 percent accuracy. In defense, I confess I never learned the numbers across the top row of the keyboard and the program knew that. After each test it told me which keys I needed to work on—the numbers always headed the list.

The last section in *Typing Instructor II* teaches the mechanics of word processing on a computer. One feature I particularly like is the ability to select either the space bar or the enter key as the line-ending character. This means you can emulate a typewriter (which uses the enter key to end lines) or word-wrap on a word-processing program (which uses the space bar) for the tests.

Beat The Lobster

If you get tired of practice—and who doesn't—there's a game called *Lobster Sea Adventure* in which you try to type a line of words faster than a red lobster, which is sliding across the screen from left to right to devour them. You can set the lobster's speed from a snail-like 15 words per minute to an impossible 90 words per minute, and you can pick from easy material—without numbers or !#()\$%&—to difficult text.

The program can automatically record the progress on your ten most recent sessions and display the results on the screen or in a printout. It can do this for up to eight individual typists, so the whole family can learn together. *Typing Instructor II* is published by

Individual Software, Foster City, CA. Available for \$49.95, it runs on IBM PC, PCjr, and is available in 3½-inch format for the IBM PS/2.

An Intelligent Calculator

My second choice for overlooked software is an intelligent calculator called the *Lascaux1000*. This program can be installed to pop-up when you type a hot-key combination, or it can be run from the DOS-level each time you need it. The memory resident pop-up version uses more than 200K, so I recommend running *Lascaux1000* as a program.

How can a calculator take up so much memory? This one has built-in constants and units, which is why it's such an agreeable thing to have around the house.

Using the *Lascaux1000* calculator, you do not have to know any conversion factors, just press the convert key and type the name of the desired unit. The calculator has scores of built-in units and the ability to add new ones.

The calculator has over a hundred built-in constants for everything from *pi* and *e* to Planck's constant and the speed of light. And you can add your own to the table. The program reports an error when calculations are performed with incorrect units: You cannot multiply cubic feet by the speed of light, for example. A paper tape display, which keeps the most recent 150 values, can be wound backward when it scrolls off the screen.

Lascaux1000 is available from Lascaux Graphics, 3220 Steuben Ave., Bronx, NY, 10467, and sells for \$59.95. It runs on the IBM PC and compatibles with 320K memory.

Donald B. Trivette is the author of *A Quick and Easy Guide to Dow Jones News/Retrieval*, published by *Compute! Books*. ©



Computer Users As Programmers—The Next Wave

I was once told that the reason the original TRS-80 computer was shipped with BASIC was that Radio Shack felt that computers were going to be purchased only by people who wrote their own programs. In the late 1970's this was a reasonable assumption. In the first place, computer users prior to this time were largely the creators or designers of their own programs. The very first personal computer kits came with no languages at all. The hobbyists who purchased these machines had to work with machine code until higher level languages became available.

When Radio Shack, Commodore, and Apple decided to sell computers to the general public, they chose BASIC as the most English-like language available at the time in the hopes that their customers could learn to create interesting programs on their own. This decision solved the chicken and egg problem by allowing the installed base of hardware to become large enough to support a fledgling software industry.

But the real growth in computer sales came when there was enough third-party software to support people's needs. The ready availability of word processors, spreadsheets, video games, and so on, allowed and encouraged computer use by people who had no interest in writing their own programs.

Not In BASIC

Interestingly, almost none of the commercial software was written in the BASIC language provided with the computer. Most of it was created in other languages and then compiled into an efficient form for distribution in the marketplace. There are two reasons for this. First, the implementations of BASIC provided with the early personal computers were too weak to take

advantage of the computer's power. They were fine for the creation of simple programs, but not good enough for building industrial-strength software. One of the most spectacular examples of this was the BASIC shipped with the TI 99/4 that didn't even support the marvelous graphics and animation capabilities of this machine. The second reason that commercial software was not delivered in BASIC is that the user could examine and modify the program on his own. Many developers want to keep their source code private because it is virtually impossible to provide effective customer support when the customer can change the program.

As a result, two types of end users developed—those who enjoyed creating their own programs and those who saw the computer as a power tool for the mind and who had no intention of creating their own programs.

When Atari announced the 400 and 800 computers—the first popular PCs without built-in BASIC—some of us saw this as a sign of maturation in the marketplace. If some users wanted to create their own programs, languages were available. If other users didn't want to program themselves, they could buy commercial software to perform whatever tasks they wanted.

Appliance, Not Computer

The pinnacle of this view of computing came in 1984 when Apple introduced the Macintosh. While most people were struck by the technological prowess of this machine, there was another aspect of the Mac that distinguished it from its ancestors. It was the first computer to be successfully marketed as an appliance. Only one page of the thick instruction manual contained any technical information about the machine. The user was spared dis-

cussion of RAM and ROM and was instead encouraged to think of the computer in terms of the metaphors through which it interacted with its owner. And so the user learned about windows, icons, menus, and desktops, instead of RAM, ROM, FOR-NEXT loops, and the host of technical jargon that had successfully intimidated millions of potential computer users. It was for this reason that the Mac was called the "computer for the rest of us."

Instead of shipping a programming language with the machine, Apple solved the chicken and egg problem by including a word processing and graphics creation package instead. The value of the computer was seen in its responsiveness to the user's needs, not in its technological prowess. I, for one, thought that this marked the end of an era and the beginning of a new age of computing. The shipment of programming languages with computers appeared to have gone the way of hula hoops and white bucks.

I was wrong.

A New Direction

In August 1987, a scant three years after the introduction of the Mac, Apple announced that each new Macintosh was being shipped with a copy of *HyperCard*—"A personal toolkit that gives users the power to use, customize, and create new information types such as text, graphics, video, music, voice and animation." In other words, Apple decided to start shipping a programming language with the Macintosh rather than provide the user with core applications like word processors.

There are several rational explanations for this decision. First, Apple stopped including free word processing and graphics packages once there were good third-party programs on the market. This re-

flects Apple's commitment to the developer community by providing a level playing field.

The second explanation is more complex. While it is true that most computer users have no desire to create their own programs, many people want a great deal of flexibility in their programs. For many users, spreadsheets have become programming languages since they allow virtually unlimited flexibility with which the user can design and create his or her own applications. Relational database programs often provide even more flexibility, allowing users to create custom applications on their own without having to become programmers.

Such flexible environments have become indispensable to many computer owners, proving that the reluctance to program in BASIC was based more on BASIC's limitations than on a lack of desire of the user to tailor the computer to his or her unique needs.

With the inclusion of *HyperCard* (whose operation will be described next month), Apple has provided Mac users with a flexible programming environment that is powerful enough to meet the requirements of the developer community yet simple enough to allow end users to create their own programs or to modify programs written by others. However, this capability has its price. *HyperCard* requires at least 1 megabyte of RAM and two 800K disk drives. The user interface of *HyperCard* is designed to make it easy to use, and it facilitates the easy creation of programs. By providing the user with a rich repertoire of development tools, *HyperCard* applications tend to require much more memory than equivalent programs created from scratch using traditional programming languages like Forth or C.

Next month we'll take a closer look at *HyperCard* because it represents a direction for computer language development that will be felt across the broad spectrum of computers that occupy today's desks.

Dr. Thornburg welcomes letters from readers and can be reached at P.O. Box 1317, Los Altos, CA 94023. ©

SuperCount

Bert Halverson

If you've ever needed to know the number of words contained in an essay, story, report, or just about anything else you've written, then "SuperCount" fits the bill. Even if you're already using a utility like this, the speed and accuracy of this program may make you put your old word counter out to pasture. For the 128 or 64. A disk drive is required.

How many times have you needed to know the number of words you have left to write in a 500-word essay or in a 1200-word article? Or maybe you're just curious about the number of words in a document. If you ever need to know how many words a document contains, then "SuperCount," the program accompanying this article, will be a welcome addition to your writer's toolbox. Even if you already have a word-counting program, you may find you like SuperCount better. It offers lightning-fast speed coupled with amazing accuracy.

Why is SuperCount more accurate than most word-counting programs? Most programs give you only an approximate word count because they recognize the end of a word by hunting for spaces and periods. But what about words connected by dashes and ellipses (multiple periods), decimal points and commas in numbers, word processor format codes, and the like?

SuperCount handles these situations just the way you would if you were counting by hand.

Speed is SuperCount's other virtue. On a 128 with a 1571 disk drive, it will count 10,000 words—60,000 bytes—in just over 30 seconds. (If you're using a 64, times will be longer because the 1541 drive is slower than the 1571.) Some BASIC word counters may take more than 20 minutes for the same task.

Note that SuperCount will accept only sequential (SEQ) files, but that should not be a problem: Most word processors which save text in program (PRG) format also let you save sequentially. In *SpeedScript*, for example, sequential text files can be created using the print-to-disk option (SHIFT-CTRL-P).

Getting Started

Using SuperCount is straightforward. Type it in, save a copy, load it, and type RUN. SuperCount is designed to run on either a 64 or 128, but please note the following: If you save the program with a 64, and later run it on a 128, you'll get syntax errors in lines 135 and 145. This happens because the 64 will not tokenize the FAST and SLOW commands properly. To correct this (in 128 mode), put the cursor anywhere in each of the problem lines and press RETURN. Then resave SuperCount. FAST and SLOW will

not be a problem, however, if you go the other way—if you save the program on a 128 and run it on a 64. So, if you're using a 128 and want to be able to use SuperCount in both 128 and 64 modes, be sure to type it in and save it in 128 mode.

When you run the program, you'll be asked for the name of the file you want to count and if you want numbers (addresses, ages, money, and so on) counted as words. A few seconds later your document's word count will be printed on the screen.

SuperCount provides a 100-percent-accurate word count, with one exception: Words containing embedded noncharacters, like *doll\$rs* or *pre-natal*, will count as two words. But if the symbols come at either end of the word, or if the string is a number containing commas, the word count will be correct. SuperCount also recognizes apostrophes and can tell the difference between a period and a decimal point.

The program isolates a word by skipping over leading and trailing noncharacters. This takes care of spaces, dashes, quotes and so on, even if there are several in a row. When the program finds a word's first character, control is passed to a routine which looks for anything that signals the end of the word. Then the counter (memory addresses 253 and 254) is incremented, and the process starts over, unless the end of file has been reached.

Period Or Decimal?

Decimal points pose a special challenge in logic. In an early version of the program, they caused a count error because SuperCount thought the "period" meant the end of a word. For example, \$7,777.77 was counted as two words.

The problem was to teach SuperCount to distinguish between a period and a decimal point. A decimal point would be treated like any other character, but a period would signal the end of the word and increment the counter.

What SuperCount needed to do when it found a period was to check the previous byte. If that previous byte was a number, then the period was really a decimal point and could be ignored. If not, it was

determined to be a period and signaled the end of the word. A period at the end of the number could be deciphered as a decimal and thus ignored, too, since the next byte would be a space or some other noncharacter which would increment the counter.

But how could SuperCount know what the previous byte was, when it was erased each time through the read loop?

The solution was to store each byte in an unused data register until the next pass and then, whenever a period was encountered, to check the stored character. If it was a number, then the period was really a decimal point.

Program Notes

When you run SuperCount, it drops the top of BASIC to 8990, pokes a short ML (machine language) program into memory starting at 9000, and clears locations 251–254 in zero page for use as data buffers.

SuperCount is relatively short and simple because it calls the system subroutines CHKIN, CLRCH, and BASIN for the tedious chores of handling data channels and reading the disk. Files are opened and closed the easy way, too—from BASIC.

If you have a 128 and want to print a copy of the disassembled code, run the program to load the data. Then type the following:

```
OPEN 4:CMD 4:MONITOR
```

You are now in MONITOR mode. Nothing happens on the screen. Now type

```
D 2328 2391
```

When the cursor reappears, exit the monitor with the X command and type

```
PRINT#4:CLOSE 4
```

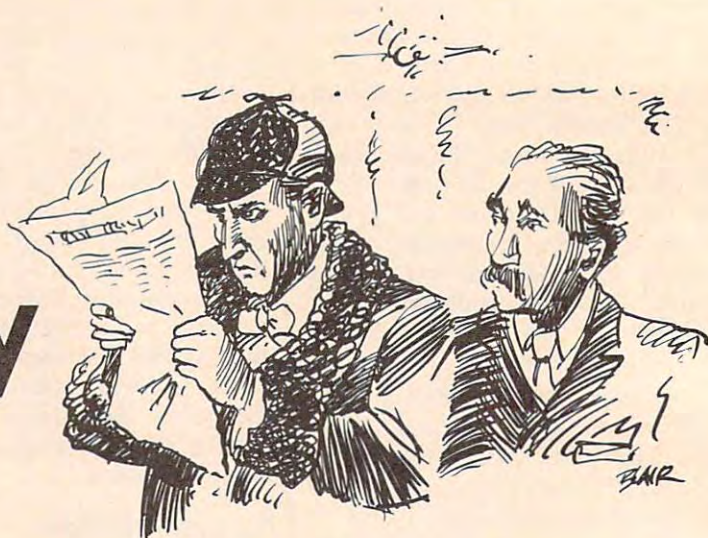
SuperCount

```
EG 5 REM COPYRIGHT 1987 COMPUTE! PUBLICATIONS, INC.
    {2 SPACES}ALL RIGHTS RESERVED.
XJ 6 PRINT"{CLR}COPYRIGHT 1987
    ":PRINT"COMPUTE! PUBLICATIONS, INC."
QK 7 PRINT"ALL RIGHTS RESERVED
    ."
MX 8 FOR TT=1 TO 1500:NEXT
HC 10 IF DS$="" THEN POKE 55,3
    0:POKE 56,35:GOTO 20
JX 15 POKE 4626,30:POKE 4627,3
    5:REM LOWER BASIC
FC 20 US$=CHR$(145):L$=CHR$(157
```

```
) :C$=CHR$(147):R$=CHR$(13)
KB 25 SS$="{10 SPACES}":REM 10
    {SPACE}SPACES
CE 30 GOSUB 110:GOSUB 130:GOSUB
    B 115
SC 35 FOR X=251 TO 254:POKE X,
    0:NEXT:REM CLR BUFFERS
KH 40 GOSUB 140
XH 45 INPUT"FILE NAME";FL$
GD 50 OPEN 1,8,15:OPEN 2,8,2,"
    0:"+FL$+",SEQ,R"
RS 55 INPUT#1,E,E$:IF E THEN P
    RINT R$"ERROR"E"-- "E$:P
    RINT:GOTO 95
PD 60 PRINT"COUNT NUMBERS AS W
    ORDS? Y ";L$;L$;L$;L$;:INPU
    T Y$
GK 65 IF Y$="N" THEN PRINT:GOTO
    80
BJ 70 IF Y$<>"Y" THEN PRINT U$;
    :GOTO 60
XB 75 POKE 251,48:POKE 252,218
    :GOTO 85:REM* LO-HI=0-9,
    A-Z
XX 80 POKE 251,65:POKE 252,218
    :REM* LO-HI=A,Z
CD 85 PRINT R$R$ "COUNTING..."
    :GOSUB 130
EB 90 SYS 9000:GOSUB 110:PRINT
    PEEK(253)+256*PEEK(254)
    "WORDS"CHR$(7)
JM 95 CLOSE 2:CLOSE 1:GOSUB 14
    0
FE 100 IF DS$="" THEN POKE 55,
    0:POKE 56,160:END
FK 105 POKE 4626,0:POKE 4627,2
    55:END:REM RESTORE MEMO
    RY
QG 110 PRINT C$R$CHR$(18)" SUP
    ERCOUNT "R$:RETURN
GR 115 FOR X=9000 TO 9105:READ
    D:C=C+D:POKE X,D:NEXT
GX 120 IF C<>14084 THEN PRINT"
    ERROR IN DATA.":GOSUB 1
    40:END
GS 125 RETURN
XB 130 IF DS$="" THEN RETURN:R
    EM C64?
RP 135 FAST:RETURN:REM C128
RJ 140 IF DS$="" THEN RETURN
GB 145 IF PEEK(215)<128 THEN S
    LOW:REM 40-COL C128?
GX 150 RETURN
PJ 155 DATA 162,2,32,198,255,1
    60,0,24
QF 160 DATA 32,207,255,166,144
    ,224,64,208
DR 165 DATA 4,32,204,255,96,19
    7,251,144
QJ 170 DATA 238,201,57,176,3,7
    6,76,35
DB 175 DATA 201,65,144,227,197
    ,252,176,223
EE 180 DATA 168,24,32,207,255,
    166,144,224
GD 185 DATA 64,208,7,32,139,35
    ,32,204
AQ 190 DATA 255,96,201,39,240,
    234,201,44
SD 195 DATA 240,230,201,46,208
    ,11,192,48
AQ 200 DATA 144,7,192,57,176,3
    ,76,80
DG 205 DATA 35,168,197,251,144
    ,7,197,252
CE 210 DATA 176,3,76,81,35,32,
    139,35
MD 215 DATA 76,47,35,230,253,2
    08,2,230
RQ 220 DATA 254,96 ©
```


Mystery Mania

David Leithauser



If you enjoy logic puzzles—especially those with an air of mystery—then “Mystery Mania” will challenge and entertain you for hours. In this game, you control the difficulty level, so there’s something to bring out the Sherlock Holmes in almost everyone, from teens to accomplished detectives. Requires BASICA for the PC, GW-BASIC for compatibles, or Cartridge BASIC for the PCjr.

“Mystery Mania” is a game for sleuths of all ages. It generates 32,001 logic puzzles in the form of murder mysteries. After presenting you with all the necessary clues, you must deduce the identity of the murderer. There are five levels of difficulty, and you can even ask for hints if you need them. The lower levels—one, two, and three—are good for teens and beginners of all ages. The higher levels—four and five—are for seasoned detectives with some solutions to their credit.

Getting Started

Mystery Mania is written entirely in BASIC. To get started, type it in, save a copy on disk, and type RUN. The first thing the program asks is which mystery (0–32000) you want to solve. Type a number between 0 and 32000. Simply pressing the Enter key plays game number 0.

After you’ve selected the game number, the program asks which

difficulty level—from 1 to 5—you want to use. Level 1 is easy, and is suitable for older children. Level 5 is very tough for beginners. Try starting at level 2 or 3 if you are not an experienced logic problem solver. For each number (0–32000), the program generates a slightly different game, depending on the difficulty level.

Next, the program asks if you want a printed copy of the story it is about to generate. It’s a good idea to do this because you can then turn off the computer, work on the puzzle at your leisure, and come back later to see if you arrived at the correct solution. (Exactly how to do this will be explained later on.)

Solving A Mystery

After selecting the game number and the difficulty level, the program presents a short story explaining the nature of the crime. This story varies only a little from game to game. At the end of the story, the program tells you to press the space bar to see the clues for this scenario just described. When you press the space bar, you are given 14 clues to the identity of the murderer. These clues are different for each game.

Each of the clues are in the form of statements like “The suspect with red hair was wearing brown shoes.” These statements enable you to determine the name of the murderer by a combination of direct deduction and the process of elimination.

After you have read the clues, the program asks you to press the space bar to make an arrest.

When you press the space bar, a menu appears. The first five choices on the menu allow you to arrest any of the five suspects. If you arrest the correct suspect, you win the game and receive a promotion. If you arrest the wrong suspect, you’re notified and asked if you want to see the solution.

The sixth choice on the menu allows you to quit the game without seeing the solution. With this option, you can turn the computer off and study a printed copy of the clues. When you think you’ve deduced the murderer’s identity, you can run the program again and replay the same game by typing the same game number and difficulty level. After seeing the familiar story and clues, you’ll return to the Arrest menu. Now you can select the suspect to arrest.

The seventh choice on the menu allows you to see the solution to the mystery. If you make this choice, the program will explain to you, step by step, how to deduce the identity of the murderer. You should choose this only if you are completely stumped, since it reveals the identity of the murderer.

Getting A Hint

The eighth choice (not available at level 1) is to get a hint. Each hint eliminates one suspect and explains

why. Then you're asked if you want another hint. If you respond by pressing Y, the program gives you another. If you respond by pressing N, you are returned to the menu and allowed to make an arrest.

If you ask for too many hints for your difficulty level, you will be given the final solution. At level 2, the program gives you one hint before it gives you the solution. At level 3, it gives you two hints, and so on.

When the game ends, the program asks you if you want to play again. Press Y to return to the beginning of the program. Press N to return to BASIC.

Mystery Mania

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

```

BD 10 ' Copyright 1987 COMPUTE!
      Publications, Inc. - All R
      ights Reserved
NA 20 DEFINT A-Z: DIM P$(9,10), M$(
      5,6), CL$(13), CG$(13), F$(4
      ), MP$(2), MW$(2)
EP 30 KEY OFF: COLOR 15,1,1: CLS
FK 40 PRINT SPC(40); SW=POS(0)+3
      9: CLS: S$="Copyright 1987 C
      OMPUTE! Publ., Inc.": GOSUB
      1460: S$="All rights reser
      ved": GOSUB 1460: PRINT: PRIN
      T
OM 50 PRINT: PRINT: S$="PRESENTING
      ": GOSUB 1460: PRINT: S$=CHR$(
      201)+STRING$(15,205)+CHR$(
      187): GOSUB 1460: S$=CHR$(1
      86)+" MYSTERY MANIA "+CHR$(
      186): GOSUB 1460: S$=CHR$(2
      00)+STRING$(15,205)+CHR$(1
      88): GOSUB 1460
DI 60 PRINT: S$="The game that ge
      nerates murder mystery": GO
      SUB 1460: S$="logic problem
      s for you to solve": GOSUB
      1460: S$="Press space bar t
      o continue.": GOSUB 1470
CN 70 S$="This game can generate
      32001 different mysteries
      , numbered 0 to 32000. You
      can play the same game re
      peatedly by choosing the s
      ame number each time you p
      lay, or you can choose a d
      ifferent mystery each time
      .": GOSUB 1360
BG 80 PRINT: INPUT "Which mystery
      story (0-32000)"; M: IF M<0
      OR M>32000 THEN PRINT "IN
      VALID ANSWER!": GOTO 80
DN 90 RANDOMIZE M
LI 100 FOR X=0 TO M MOD 99: Y=RND
      (1): NEXT X
JC 110 PRINT: S$="There are five
      difficulty levels, from 1
      to 5. Level 1 is easy, w
      hile level five would kee
      p Sherlock Holmes busy fo
      r a while. The different
      levels actually generate
      different games for the s
      ame number above.": GOSUB
      1360
LE 120 PRINT: PRINT "Difficulty 1
  
```

```

      level (1-5)?"
DK 130 S$=INKEY$: IF S$<"1" OR S$
      >"5" THEN 130
LN 140 PRINT S$: L=VAL(S$)
DK 150 PRINT: PRINT "Do you want
      hard copy of the story (Y
      /N)?" : GOSUB 1430: PR=YN: P
      RINT Y$
BJ 160 CLS
QN 170 ' Read in data
HA 180 FOR X=0 TO 9: FOR Y=0 TO 1
      0: READ P$(X,Y): NEXT Y: NEX
      T X
QJ 190 FOR X=0 TO 2: READ MP$(X):
      NEXT X: FOR X=0 TO 2: READ
      MW$(X): NEXT X
BG 200 ' Generate suspect names
EA 210 A=INT(RND(1)*11): B=INT(RN
      D(1)*11): V$=P$(0,A)+" "+P
      $(1,B): P$(0,A)="" : P$(1,B)
      ="
PH 220 FOR X=1 TO 5
GI 230 A=INT(RND(1)*11): A$=P$(0,
      A): P$(0,A)="" : IF A$="" TH
      EN 230
GD 240 B=INT(RND(1)*11): B$=P$(1,
      B): P$(1,B)="" : IF B$="" TH
      EN 240
PD 250 M$(0,X)=A$+" "+B$
HK 260 NEXT X
GP 270 FOR X=0 TO 4: F$(X)=M$(0,X
      +1): NEXT X
BB 280 FOR X=0 TO 9: A=INT(RND(1)
      *5): B=INT(RND(1)*5): SWAP
      F$(A), F$(B): NEXT X
MJ 290 S$="Six men, "+V$+"", "+F$(
      0)+", "+F$(1)+", "+F$(2)
      +", "+F$(3)+", and "+F$(4
      )+" were in "+MP$(INT(RND
      (1)*3))+ " together. Sudden
      ly, the lights went out.
      ": GOSUB 1360
JF 300 S$="When the lights came
      back on, "+V$+" was found
      "+MW$(INT(RND(1)*3))+ ".
      ": GOSUB 1360
LM 310 PRINT: S$="The other detec
      tives have investigated.
      They have questioned the
      suspects, the witnesses,
      and people who know the s
      uspects. They have collec
      ted physical evidence (ha
      ir samples, fiber samples
      , etc.) from the crime sc
      ene.": GOSUB 1360
OB 320 ' Generate suspect data
LC 330 FOR P=1 TO 5
EB 340 A=INT(RND(1)*8+2): IF P$(A
      ,0)="" THEN 340
FB 350 M$(P,0)=P$(A,0): P$(A,0)=""
      "
BJ 360 FOR Y=1 TO 5
BI 370 B=INT(RND(1)*9)+1: IF P$(A
      ,B)="" THEN 370
BJ 380 M$(P,Y)=P$(A,B): P$(A,B)=""
      "
IL 390 NEXT Y
HO 400 M$(P,6)=P$(A,10)
BC 410 NEXT P
FJ 420 PRINT: S$="They have colle
      cted 14 clues, but have n
      ot been able to solve the
      crime. Therefore, they h
      ave called in the city's
      greatest homicide detecti
      ve. That's YOU! You will
      now be given the clues, a
      nd must solve the murder.
      ": GOSUB 1360
OD 430 ' Generate clues
DG 440 K$=M$(0,6-L+(L=3)-(L=4)):
      C$=M$(4,0)+" "+M$(4,6-L+(
  
```

```

      L=3)-(L=4))
KC 450 CL$(0)=M$(0,1)+" "+M$(2,0
      )+" "+M$(2,1)
LN 460 CL$(1)=M$(0,2)+" "+M$(5,0
      )+" "+M$(5,2)
PK 470 CL$(2)=M$(0,3)+" "+M$(1,0
      )+" "+M$(1,3)
LD 480 CL$(3)=M$(0,4)+" "+M$(3,0
      )+" "+M$(3,4)
FA 490 C1=(RND(1)<.5): IF C1<>0 O
      R L=1 THEN CL$(4)=M$(0,5)
      +" "+M$(1,0)+" "+M$(1,5)
      ELSE CL$(4)=M$(0,5)+" "+M
      $(4,0)+" "+M$(4,5)
LL 500 T$="The suspect who " : N$=""
      " is not the one who "
DI 510 A1$=M$(2,0): A2$=M$(2,4): B
      1$=M$(4,0): B2$=M$(4,4): GO
      SUB 1500
PK 520 CL$(5)=T$+A1$+" "+A2$+" "
      +B1$+" "+B2$
EE 530 A1$=M$(1,0): A2$=M$(1,4): I
      F RND(1)<.5 THEN C1$=N$+M
      $(5,0)+" "+M$(5,2): GOTO 5
      60
HL 540 B1$=M$(5,0): B2$=M$(5,4)
CO 550 C1$="" "+B1$+" "+B2$
PB 560 CL$(6)=T$+A1$+" "+A2$+C1$
HI 570 A1$=M$(1,0): A2$=M$(1,4): B
      1$=M$(2,0): B2$=M$(2,4): GO
      SUB 1500
QK 580 NF=0: GOSUB 1510: CL$(7)=Q$
NE 590 A1$=M$(1,0): A2$=M$(1,2): B
      1$=M$(2,0): B2$=M$(2,2): GO
      SUB 1500
DK 600 GOSUB 1510: CL$(8)=Q$
JB 610 A1$=M$(2,0): A2$=M$(2,2): B
      1$=M$(4,0): B2$=M$(4,2): GO
      SUB 1500
PC 620 GOSUB 1510: CL$(9)=Q$
FF 630 A1$=M$(1,0): A2$=M$(1,5): B
      1$=M$(4,0): B2$=M$(4,5): GO
      SUB 1500
CB 640 GOSUB 1510: CL$(10)=Q$
JN 650 A1$=M$(1,0): A2$=M$(1,1): B
      1$=M$(4,0): B2$=M$(4,3): GO
      SUB 1500
EO 660 NF=1: GOSUB 1510: CL$(11)=Q
      $
JH 670 A1$=M$(2,0): A2$=M$(2,5): B
      1$=M$(3,0): B2$=M$(3,2): GO
      SUB 1500
FD 680 GOSUB 1510: CL$(12)=Q$
DK 690 CL$(13)="The murderer "+C
      $: S$="Press space bar to
      see clues.": GOSUB 1490
GP 700 ' Output clues
FF 710 FOR X=0 TO 13: CG$(X)=CL$(
      X): NEXT X
PJ 720 FOR X=0 TO 25: A=INT(RND(1)
      *14): B=INT(RND(1)*14): SW
      AP CG$(A), CG$(B): NEXT X
BG 730 S$="No two suspects have
      the same "+M$(1,6)+"", "+M
      $(2,6)+"", "+M$(3,6)+"", "+
      M$(4,6)+" or "+M$(5,6)+"".
      ": GOSUB 1360
CN 740 FOR X=0 TO 6: S$=CG$(X)+"".
      ": GOSUB 1360: PRINT: NEXT X
KI 750 S$="Press space bar to co
      ntinue.": GOSUB 1490
MP 760 FOR X=7 TO 13: S$=CG$(X)+"
      .": GOSUB 1360: PRINT: NEXT
      X
JC 770 S$="Press space bar to ma
      ke an arrest.": GOSUB 1490
BN 780 ' Get player's solution
MJ 790 H=0: PR=0: CLS: PRINT: PRINT
      " You may now": PRINT
EJ 800 FOR X=0 TO 4: PRINT MID$(S
      TR$(X+1),2,1) " Arrest " F
      $(X): NEXT X
LO 810 PRINT "6) Quit without se
  
```


Blipper

Patrick Parrish

Add a professional touch to your BASIC programs with this short utility that adds a beeping and blinking cursor to Applesoft. The program runs on any Apple II-series computer under either DOS 3.3 or ProDOS.

Sound can bring life to any program. "Blipper" sounds a tone and blinks the cursor to grab the user's attention. It can be engaged at all times or turned on selectively for emphasis. Use it to enhance educational programs, business programs, and games.

Typing It In

Blipper is a machine language program in the form of a BASIC loader. Since it requires accurate typing, be sure to use "The Automatic Proofreader," found elsewhere in this issue, when you enter the program. After you've finished typing, save a copy to disk. Do *not* use the filename BLIPPER when saving the BASIC program—that name is reserved for the binary file that the BASIC program creates when it is run.

Load the program and type RUN. A machine language (ML) program is POKEd into memory and then written to disk. Once the ML program is created, you don't need the BASIC loader program again except to create new copies of the BLIPPER file. The machine language begins at location 903 (\$387). This area of memory is not used by BASIC, but some other utilities may use it, making them incompatible with Blipper.

Once you have created the machine-language BLIPPER file, Blipper can be activated both in immediate mode and within your BASIC programs. In DOS 3.3, you execute it from immediate mode by typing

BRUN BLIPPER

Within a program, use the statement
PRINT CHR\$(4);"BRUN BLIPPER"

For ProDOS, use the following statement in either immediate or program mode:

```
PRINT CHR$(4)"BLOAD BLIPPER"  
:CALL903
```

With Blipper activated, type a few characters or list the program. Each character printed to the screen is preceded by the underline character and followed by a beep. Note that while Blipper is active, the left and right cursor keys act as delete keys.

A New Sound

Blipper allows you to change the pitch and the duration of the blip sound. To try out new sounds, simply POKE the value for pitch into location 974 and the value for the duration into 975. The range of legal values for both the pitch and duration is 1 to 255. A value of 1 yields the highest pitch or shortest duration, while 255 gives the lowest pitch or longest duration. The default value for the pitch is 100; for the duration, it's 79. The default numbers can be changed in the BASIC loader if you want to make your changes permanent (see the last two numbers in line 210 of the loader program).

By varying the duration of the tone, you also determine how long the blinking cursor stays on the screen. The BASIC command SPEED also has an effect on Blipper.

If you tire of Blipper's incessant blips and blinks, deactivate it with POKE 932,96. Blipper is also deactivated when you break out of a program or reset the computer. Reactivate it with POKE 932,32. By selectively deactivating and reactivating the routine, and by changing the pitch and duration of the sound, you can make your BASIC programs more appealing.

To change the character Blipper uses for its blinking cursor (currently an underline character), POKE the value of the ASCII code for the desired character, plus 128, into location 936.

How It Works

Blipper works essentially the same in both DOS 3.3 and ProDOS. The output vector that normally points to the character output routine (known as COUT1, located at 65008, or \$FDF0) is changed to point to Blipper. Blipper prints an underline character, sounds a tone, backspaces to print a space, then backspaces to print the current character. Finally, it returns to BASIC.

Blipper

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

```
BE 10 REM COPYRIGHT 1987 COMPUTE  
! PUBLICATIONS, INC. ALL  
RIGHTS RESERVED.  
C2 20 PRINT "COPYRIGHT 1987":PRI  
NT "COMPUTE! PUBLICATIONS,  
INC.":PRINT "ALL RIGHTS R  
ESERVED.":FOR X=1 TO 1200:  
NEXT  
B5 100 FOR I = 903 TO 975: READ  
A: X = X + A: POKE I,A: NE  
XT  
DC 110 IF X < > 10352 THEN PRINT  
"ERROR IN DATA STATEMENT  
S.": STOP  
DD 120 PRINT CHR$(4)"BSAVE BLIP  
PER,A903,L73": END  
ED 130 DATA 162,161,160,3,173,0,  
191,201  
7A 140 DATA 76,208,7,142,48,190,  
140,49  
03 150 DATA 190,96,134,54,132,55  
,76,234  
AE 160 DATA 3,96,32,240,253,32,7  
4,255  
FE 170 DATA 169,223,32,240,253,1  
72,207,3  
5F 180 DATA 174,206,3,173,48,192  
,202,208  
DB 190 DATA 253,136,208,244,169,  
136,32,240  
AF 200 DATA 253,169,160,32,240,2  
53,169,136  
E9 210 DATA 32,240,253,32,63,255  
,96,100,79 ©
```


Atari Trace

Norman Lin

Add a trace feature to Atari BASIC to help you debug your programs. It works in any graphics mode, constantly displaying the currently executing line number on an extra text line at the top of the screen. For all Atari eight-bit computers. Tape and disk versions are included.

Debugging a BASIC program can be a trying experience. To aid programmers, some versions of BASIC offer a trace command which prints line numbers to the screen as the program executes. "Atari Trace" goes one step further: It creates a special line at the top of the screen which constantly displays the line number being executed. This line remains in place, even when you clear the screen or change graphics modes.

Typing It In

There are two versions of Atari Trace—Program 1 for tape users, Program 2 for disk users.

If you have a tape system, turn off your computer, turn it back on, and immediately type this line in direct mode (without a line number):

```
POKE 128,60:POKE 129,33:NEW
```

Now, type in Program 1. After you've finished, save a copy of the program to tape.

These POKEs must also be entered every time you wish to load and use Atari Trace. After loading and running Program 1, type `A=USR(7936)` to start it.

If you have a disk drive, type in Program 2 and save a copy to disk. Before running Program 2, insert a disk containing the system files for DOS 2.0 or 2.5 (DOS.SYS and DUP.SYS) into the drive. Now, run Program 2, which will write an AUTORUN.SYS file to the disk. When the program is finished, turn

off the computer and boot from the newly prepared disk.

Tracing Your Programs

When Atari Trace is operating, you'll notice a new line at the top of the screen. This contains the line number that BASIC is currently executing. (If BASIC is inactive, you'll see the number 32767.) This new line is separated from the rest of the screen by one blank scan line. Note that this line remains at the top of the screen, even when you change graphics modes; it's effectively independent of the screen. Try to move the cursor onto it; you'll see that you can't.

To test Atari Trace, type in a two- or three-line program. Now type RUN. If you were watching carefully, you should have seen a flurry of line numbers being displayed. Since the lines fly by so fast that you can't possibly see what is happening, I have provided a way to slow down the computer. Run the program again. This time, press and hold down the SHIFT key before you press RETURN. The program still executes, but much more slowly than last time. You'll see the line numbers go by at a much more leisurely pace. You can use the SHIFT key to slow down the program in sections of the program you're examining. Release SHIFT to breeze past sections that are working properly.

Atari Trace offers a good idea of what your program is doing at various points, but to make it really useful, you can insert PRINT statements at various sections of your programs so that you can keep track of critical variables.

Tracing is also useful when you want to find out how someone else's program works. Among other things, you can track when the pro-

gram is going to subroutines or when a certain GOTO occurs.

Technical Considerations

You can alter the degree to which the computer slows when you hold the SHIFT key. To do this, POKE memory location 2 with numbers in the range 231-255. The higher the number, the shorter the pause. If the pause that occurs when you press the SHIFT key bothers you when you are entering program lines, type POKE 2,255. This effectively eliminates the pause. To reset the pause to its default value, type POKE 2,231.

Atari Trace disables the BASIC command DOS, which is normally used to return to the operating system. If you wish to get to DOS, you must first disable Atari Trace. Do this by pressing SYSTEM RESET while holding down OPTION. You must now reboot to reactivate Atari Trace. If you press SYSTEM RESET without holding down OPTION, Atari Trace will remain activated if it was started from disk but will be disabled if it was started from tape. Tape users can reactivate Atari Trace after a reset with the command `A=USR(7936)`.

Certain programs may conflict with Atari Trace. These include programs that use display list interrupts, vertical blank interrupts, or countdown timer routines. Since few BASIC programs use these features, incompatibility should be rare.

Program 1: Atari Trace—Tape Version

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

```
NO 1 REM COPYRIGHT 1987 COMP
UTE! PUBLICATIONS, INC.
ALL RIGHTS RESERVED.
FP 2 PRINT "(CLEAR)COPYRIGHT
```



```

1987":PRINT "COMPUTE!
PUBLICATIONS, INC.":PRI
NT "ALL RIGHTS RESERVED
."
BH 10 RESTORE :FOR I=7936 TO
8507:READ A:POKE I,A:
NEXT I:"DONE. TYPE
A=USR(7936) TO ACTIVAT
E.":END
PF 1000 DATA 104,165,12,141,
132,31,165,13,141
AM 1010 DATA 133,31,169,131,
133,12,169,31,133,13
,169,231,133,2,169
BD 1020 DATA 128,133,3,165,1
0,141,8,33,165,11,14
1,9,33,76,134
HL 1030 DATA 31,173,48,2,133
,0,173,49,2,133,1,16
5,0,56,233
EB 1040 DATA 3,133,0,176,7,1
65,1,56,233,1,133,1,
160,0,169
KC 1050 DATA 112,145,0,200,1
69,240,145,0,200,169
,66,145,0,169,20
BK 1060 DATA 200,145,0,169,3
3,200,145,0,169,128,
200,145,0,165,0
LI 1070 DATA 141,48,2,165,1,
141,49,2,169,146,141
,0,2,169,32
FB 1080 DATA 141,1,2,169,64,
141,14,212,162,32,16
0,245,169,6,76
OI 1090 DATA 92,228,32,255,2
55,173,31,208,201,3,
208,28,173,132,31
DK 1100 DATA 133,12,173,133,
31,133,13,173,8,33,1
33,10,173,9,33
LD 1110 DATA 133,11,169,0,14
1,68,2,76,116,228,16
9,60,133,128,141
KL 1120 DATA 231,2,169,33,13
3,129,141,232,2,169,
207,141,40,2,169
NM 1130 DATA 31,141,41,2,169
,1,141,26,2,160,116,
162,32,169,7
IX 1140 DATA 76,92,228,173,4
8,2,133,0,173,49,2,1
33,1,160,5
BB 1150 DATA 177,0,201,128,2
40,3,32,40,31,169,7,
133,10,169,33
GG 1160 DATA 133,11,169,0,14
1,10,33,160,0,177,13
8,141,15,33,200
BI 1170 DATA 177,138,141,16,
33,32,64,32,162,0,18
9,12,33,32,20
BF 1180 DATA 32,232,224,3,14
4,245,169,1,141,26,2
,96,141,11,33
MK 1190 DATA 152,72,173,11,3
3,74,74,74,74,9,16,3
2,53,32,173
LA 1200 DATA 11,33,41,15,9,1
6,32,53,32,104,168,1
73,11,33,96
DO 1210 DATA 172,10,33,153,3
7,33,200,238,10,33,9
6,169,0,141,12
AN 1220 DATA 33,141,13,33,14
1,14,33,162,15,248,1
4,15,33,46,16
DN 1230 DATA 33,173,14,33,10
9,14,33,141,14,33,17
3,13,33,109,13
DA 1240 DATA 33,141,13,33,17
3,12,33,109,12,33,14
1,12,33,202,16
BC 1250 DATA 220,216,96,165,
66,240,3,76,98,228,1

```

```

73,15,210,41,8
MA 1260 DATA 240,3,76,98,228
,166,2,164,3,200,208
,253,232,208,248
JL 1270 DATA 76,98,228,72,15
2,72,138,72,173,244,
2,141,17,33,173
LP 1280 DATA 197,2,141,18,33
,173,198,2,141,19,33
,169,224,162,202
DN 1290 DATA 160,148,141,10,
212,141,9,212,142,23
,208,140,24,208,169
DB 1300 DATA 203,141,0,2,169
,32,141,1,2,104,170,
104,168,104,64
IK 1310 DATA 72,152,72,138,7
2,173,17,33,172,18,3
3,174,19,33,141
MO 1320 DATA 10,212,141,9,21
2,140,23,208,142,24,
208,169,146,141,0
KL 1330 DATA 2,169,32,141,1,
2,104,170,104,168,10
4,64,169,192,141
GE 1340 DATA 14,212,169,95,1
41,34,2,169,228,141,
35,2,76,95,228
FK 1350 DATA 96,0,0,0,0,0,0,
0,0,0,0,0,0,0
LG 1360 DATA 0,0,0,0,0,0,0,0
,0,0,44,105,110,101,
26
BN 1370 DATA 0,0,0,0,0,0,0,0
,0,0,0,0,0,0,0
JK 1380 DATA 0,0,0,0,0,0,0,0

```

Program 2: Atari Trace—Disk Version

```

NO 1 REM COPYRIGHT 1987 COMP
UTE! PUBLICATIONS, INC.
ALL RIGHTS RESERVED.
FP 2 PRINT "(CLEAR)COPYRIGHT
1987":PRINT "COMPUTE!
PUBLICATIONS, INC.":PRI
NT "ALL RIGHTS RESERVED
."
FI 10 RESTORE :OPEN #1,8,0,"
D:AUTORUN.SYS":FOR I=1
TO 1.0E+97:TRAP 20:RE
AD A:PUT #1,A:NEXT I
EQ 20 CLOSE #1:"DONE.":END
JN 1000 DATA 255,255,0,31,59
,33,104,165,12,141,1
32,31,165,13,141
AM 1010 DATA 133,31,169,131,
133,12,169,31,133,13
,169,231,133,2,169
BD 1020 DATA 128,133,3,165,1
0,141,8,33,165,11,14
1,9,33,76,134
HL 1030 DATA 31,173,48,2,133
,0,173,49,2,133,1,16
5,0,56,233
EB 1040 DATA 3,133,0,176,7,1
65,1,56,233,1,133,1,
160,0,169
KC 1050 DATA 112,145,0,200,1
69,240,145,0,200,169
,66,145,0,169,20
BK 1060 DATA 200,145,0,169,3
3,200,145,0,169,128,
200,145,0,165,0
LI 1070 DATA 141,48,2,165,1,
141,49,2,169,146,141
,0,2,169,32
FB 1080 DATA 141,1,2,169,64,
141,14,212,162,32,16
0,245,169,6,76
OI 1090 DATA 92,228,32,255,2
55,173,31,208,201,3,
208,28,173,132,31

```

```

DK 1100 DATA 133,12,173,133,
31,133,13,173,8,33,1
33,10,173,9,33
LD 1110 DATA 133,11,169,0,14
1,68,2,76,116,228,16
9,60,133,128,141
KL 1120 DATA 231,2,169,33,13
3,129,141,232,2,169,
207,141,40,2,169
NM 1130 DATA 31,141,41,2,169
,1,141,26,2,160,116,
162,32,169,7
IK 1140 DATA 76,92,228,173,4
8,2,133,0,173,49,2,1
33,1,160,5
BB 1150 DATA 177,0,201,128,2
40,3,32,40,31,169,7,
133,10,169,33
GG 1160 DATA 133,11,169,0,14
1,10,33,160,0,177,13
8,141,15,33,200
BI 1170 DATA 177,138,141,16,
33,32,64,32,162,0,18
9,12,33,32,20
BF 1180 DATA 32,232,224,3,14
4,245,169,1,141,26,2
,96,141,11,33
MK 1190 DATA 152,72,173,11,3
3,74,74,74,74,9,16,3
2,53,32,173
LA 1200 DATA 11,33,41,15,9,1
6,32,53,32,104,168,1
73,11,33,96
DO 1210 DATA 172,10,33,153,3
7,33,200,238,10,33,9
6,169,0,141,12
AN 1220 DATA 33,141,13,33,14
1,14,33,162,15,248,1
4,15,33,46,16
DN 1230 DATA 33,173,14,33,10
9,14,33,141,14,33,17
3,13,33,109,13
DA 1240 DATA 33,141,13,33,17
3,12,33,109,12,33,14
1,12,33,202,16
BC 1250 DATA 220,216,96,165,
66,240,3,76,98,228,1

```


Machine Language Routines

For The Commodore 64 And 128

Todd Heimarck and Patrick Parrish

One of the best ways to learn machine language (ML) is to study programs written by someone else. And if you're a seasoned ML expert, a collection of debugged and tested routines can be a valuable tool to have around. This excerpt from Machine Language Routines for the Commodore 64 and 128 (COMPUTE! Books) features several techniques and algorithms that ML programmers can analyze and adapt for use in their own programs.

Machine Language Routines for the Commodore 64 and 128 is like a dictionary; if you need to know how to write a specific routine, you can look it up and use the subroutine as it's written or modify it to suit your needs.

The book's 200 routines cover a multitude of techniques: character input/output, sprite control, hi-res graphics, sorting and searching, disk and printer routines, integer and floating-point math, ASCII conversions, random numbers, clock routines, custom characters, sound effects, interrupt-driven programs, and redirecting vectors.

Most of the programs were written for the Commodore 64, but within the comments are notes that list changes to make them work on the Commodore 128 in 128 mode. With the exception of a few routines such as the 80-column custom character generator for the 128, all programs will run on both computers.

A brief description of each routine is followed by a prototype outlining the steps taken. A more

detailed explanation follows, discussing the techniques illustrated and the construction of the routine. Most of the routines include a framing program that shows you how to call the routine. The main routine appears in boldface type.

Assembling The Routines

The *Personal Assembly Language (PAL)* assembler for the 64 and the *Buddy-128* assembler were used to create the routines. Both are sold by Pro-Line Software (distributed in the United States by Spinnaker.) The LADS assembler from COMPUTE!'s *Second Book of Machine Language* is almost completely compatible with the PAL format. Readers who use other assemblers should note the conventions which follow.

Within equates, the equal sign assigns a numeric value (or an address) to a label. Equates are usually grouped together at the beginning of the source code. If your assembler sets up equates with the EQU pseudo-op, you'll have to make the appropriate substitution. For example, instead of `CHROUT = $FFD2`, type `CHROUT EQU $FFD2`.

If you're using a simple assembler (*Micromon* or *Supermon*, for example), you can't use labels or equates at all. For JMP and JSR instructions, look at the object code on the left. For example, `C010 20 D2 FF JSR CHROUT` would translate to `JSR $FFD2`. The address of the instruction is `$C010`, `$20` is the opcode for JSR, and `D2 FF` is the address `$FFD2` with the low byte first. For branch instructions, you'll have to

look for the address of the label specified. If LOOP1 is on line `$C11F` and you see the instruction `BEQ LOOP1`, change it to `BEQ $C11F`.

The less-than (<) and greater-than (>) characters extract the low byte and high byte of a value. `LDA #<LABEL` represents loading the accumulator with the low byte of LABEL. Splitting up low bytes and high bytes is seen most often in sections that create a pointer in zero page.

The asterisk (*) represents the current program counter. The line `* = 49152` tells PAL to start assembling at location 49152. Some assemblers use ORG instead of the asterisk. A semicolon (;) marks the beginning of a remark or comment. PAL ignores any text following a semicolon.

The pseudo-ops .BYTE, .WORD, and .ASC create tables or variables containing one-byte, two-byte, or ASCII values, respectively. They're usually associated with a label. The .BYTE and .WORD instructions default to decimal values. Hexadecimal numbers are marked by a dollar sign (\$), binary numbers begin with a percent character (%).

Readers will find both the source files (in PAL format) and executable object files on the corresponding COMPUTE! Disk. To use the source files, you must own an assembler. To run the object files, you must use a 64 (or a 128 in 64 mode). Type `LOAD "filename",8,1` and `SYS 49152`. Note that one of the examples, the CUST80 routine, is written for 128 mode. To use it, BLOAD it and `SYS 3072`.

RNDBYT

Name

Generate a random one-byte integer value (0-255)

Description

Many programs, especially games and educational programs, require randomness. Often, what is called for is a one-byte random integer in the range 0-255. This routine lets you generate such a number from the random oscillations of the noise waveform.

Prototype

In an initialization routine (RDINIT):

1. Set voice 3 to a high frequency.
2. Select the noise waveform.
3. Turn off the SID chip volume and disconnect the output of voice 3.

In RNDBYT itself:

4. Take a random byte value from voice 3's random number generator (RANDOM) and return it in .A.

Explanation

In the example program, an interesting visual effect is created by repeatedly placing a random color value somewhere in the first 256 bytes of screen color RAM. Pressing any key exits the routine.

RNDBYT is actually a two-part routine. In the first part, labeled RDINIT, voice 3 of the SID chip is initialized so as to generate random numbers in RANDOM (location 54299). This is done by setting the high byte of the frequency register for voice 3 (FREHI3) to 255 and selecting the noise waveform by setting bit 7 of voice 3's control register (VCREG3). Since we don't want to actually hear the noise, we turn off the SID chip volume and disconnect the audio output of voice 3 by storing a 128 to SIGVOL, the volume and filter select register. Selecting a frequency value high byte of 255 insures that the values in RANDOM change very rapidly.

RDINIT need be accessed only once early in your main program. After that, you can take random values as needed from RANDOM. This is exactly what RNDBYT does, returning the random byte in the accumulator.

Routine

```
C000 GETIN = 65508
; start of screen color memory
C000 COLRAM = 55296
; voice 3 frequency control register (high byte)
C000 FREHI3 = 54287
; voice 3 control register
C000 VCREG3 = 54290
; volume and filter select register
C000 SIGVOL = 54296
; oscillator 3/random number generator
C000 RANDOM = 54299
```

```
;
; Generate a random byte value from SID chip voice 3.
; Put a random color anywhere in first 256 bytes of screen.
; Quit when any key is pressed.
; initialize SID voice 3 for random numbers
C000 20 13 C0 MAIN JSR RDINIT
; get a random byte for screen offset
C003 20 21 C0 LOOP JSR RNDBYT
; store offset in .Y
```

```
C006 A8 TAY
; get random number for color byte
C007 20 21 C0 JSR RNDBYT
; store color byte randomly in first quarter
C00A 99 00 D8 STA COLRAM,Y
; check for a keypress
C00D 20 E4 FF JSR GETIN
; no keypress, so continue
C010 F0 F1 BEQ LOOP
; else, quit
C012 60 RTS
;
; Routine to initialize SID voice 3 for random numbers
; set voice 3 frequency (high byte) to maximum
C013 A9 FF RDINIT LDA #$FF
C015 8D 0F D4 STA FREHI3
C018 A9 80 LDA #%10000000
; select noise waveform and start release for voice 3
C01A 8D 12 D4 STA VCREG3
; turn off volume and disconnect output of voice 3
C01D 8D 18 D4 STA SIGVOL
C020 60 RTS
;
; RNDBYT returns a random byte value in .A.
; get single-byte random number
C021 AD 1B D4 RNDBYT LDA RANDOM
C024 60 RTS
```

See also RD2BYT (Generate a random two-byte integer value using SID voice 3), RDBYRG (Generate a random one-byte integer value in a range), RND1VL (Generate a random floating-point number using BASIC's RND(1) function)

ERRRDT

Name

Change the ERROR vector

Description

ERRRDT redirects BASIC's ERROR vector to your own routine.

Prototype

Store the address of the custom error routine into the ERROR vector; then RTS.

Explanation

When an error occurs during a BASIC program, an indirect jump is taken through the ERROR vector at location 768. This vector normally points to the ROM routine which displays the appropriate one of the familiar BASIC error messages, such as SYNTAX ERROR, ILLEGAL QUANTITY ERROR, and so forth. In some cases, however, you may want to substitute a custom error message in place of the standard one. In this case, you can change the address in the ERROR vector to point to an error message routine of your own.

For example, when you type in BASIC programs that contain many numeric DATA statements being POKEd into memory, you'll frequently get an error that's difficult to pin down. If you accidentally include a number higher than 255 and run the program, you'll get the error message ?ILLEGAL QUANTITY IN LINE xxx. But the line given as xxx is the one containing the READ statement rather than the one with the errant data. The READ works just fine (it's legal to READ numbers greater than 255), but the POKE causes the problem.

The example program relies on **ERRRDT** to solve this problem. Ordinarily, the **ERROR** vector points to a routine that prints either a **BASIC** error message or the **READY** prompt. Using the **.X** register, this routine locates the error message in a table and then prints it. If you're in program mode, the number of the line that's currently being executed is taken from **CURLIN** (location 57 on the 64; 59 on the 128) and is printed as well.

ERRRDT changes the **ERROR** vector to point to our own custom error handler at **EWEDGE**. If an error other than an illegal quantity error occurs (**.X** <> 14), normal error handling will result. But if **.X** contains a 14 upon entry into **EWEDGE**—meaning an illegal quantity has occurred—the current **DATA** line number (**CURLIN**) will be stored into the current **BASIC** line (**DATLIN**) before the normal error handler will execute. And so, in our example above, instead of telling us that the error occurred in the line with the **READ** statement, with this routine in place, **BASIC** reports the actual **DATA** line containing the typo.

Of course, this routine fails to distinguish among the many possible sources of illegal quantity errors. If your program contains a **POKE 251,257**, for instance, the error message that results will erroneously point you to the last **DATA** line that was read. Because of this, you should limit the use of this wedge to **BASIC** programs that contain many numeric **DATA** statements—primarily **BASIC** loaders of **ML** object code.

Routine

```
; error vector
C000      ERRVEC      =      768
; ERRNOR = 19775 on the 128—normal
; error-service routine
C000      ERRNOR      =      58251
; CURLIN = 59 on the 128—current BASIC
; line being executed
C000      CURLIN      =      57
; DATLIN = 65 on the 128—current data
; line
C000      DATLIN      =      63
;
; Insert a custom error routine that looks for
; an illegal quantity error.
; Assume it occurs while reading data and
; report the data line number.
;
; ERRRDT points the ERRVEC vector to our
; routine.
; low byte first
C000 A9 0B  ERRRDT    LDA  #<EWEDGE
C002 8D 00 03        STA  ERRVEC
; then high byte
C005 A9 C0          LDA  #>EWEDGE
C007 8D 01 03        STA  ERRVEC+1
; and exit the setup routine
C00A 60              RTS
;
; Upon entry, .X contains the error number.
; We let the system handle
; all errors except the illegal quantity error
; (error 14).
; is it an illegal quantity error?
C00B E0 0E  EWEDGE   CPX  #14
; if not, exit through the normal error handler
C00D D0 08          BNE  EXIT
; Otherwise, substitute the current data line
; for the current BASIC line.
; low byte first
C00F A5 3F          LDA  DATLIN
C011 85 39          STA  CURLIN
```

```
; then high byte
C013 A5 40          LDA  DATLIN+1
C015 85 3A          STA  CURLIN+1
; and execute the normal error handler routine
C017 4C 8B E3 EXIT  JMP  ERRNOR
```

See also **DISRSR** (Disable **RUN/STOP-RESTORE**), **DISTOP** (Disable the **STOP** key by changing the **STOP** vector), **RSTVEC** (Restore all **Kernal** indirect vectors)

CUST80 (128 only)

Name

Custom characters for the 80-column screen

Description

Using the routine that writes to the 128's 80-column chip, **CUST80** redefines one character. This routine can easily be expanded to create an entirely new character set.

Prototype

1. Set up registers 18 and 19 of the **VDC** chip to point to the address of the letter **A** (uppercase/graphics mode).
2. Send eight bytes to register 31 to create the new character.

Explanation

The key to accessing the 80-column **VDC** chip is writing to locations **\$D600** and **\$D601**, the gateway bytes (see **RE80CO** and **WR80CO** for more about the gateway bytes). The **STRVDC** routine at **\$0C26** below handles this task. First, the **VDC** register to be **POKEd** is stored in **\$D600**. Next, we need to wait for bit 7 of **\$D600** to turn on. At that point, **\$D601** can be **PEEKed** or **POKEd**.

The **VDC**'s uppercase/graphics character set starts at location **\$2000** within the **VDC**'s private 16K of memory. The shape for the letter **A** is found at **\$2010**. So, to change that shape, the routine must set up the address **\$2010** in registers 18 and 19. Note that, unlike most other addresses in the 128, in this case the high byte is stored ahead of the low byte. (This could be called a quirk of the **VDC**.) **STRVDC** is called twice—once to store a **\$20** into register 18, and once to store a **\$10** into 19.

When the **POKE** address has been established, the values to be sent there are stored in **VDC** register 31. The 80-column chip automatically increments the address, so it's not necessary to keep writing to registers 18 and 19. The character shape in the source code is stored in binary form, so the actual appearance can be seen. The letter **A** is replaced by a small **z** inside a box.

The character sets are stored in a rather unusual fashion. The first eight bytes (**\$2000**–**\$2007**) are the **@** character. The next eight bytes are unused. The next eight (**\$2010**–**\$2017**) are the letter **A**, followed by eight more unused bytes. This pattern continues. If you're planning to store several consecutive custom characters, remember to skip eight bytes between shapes.

Note: Both character sets can be displayed at the same time. Attribute memory determines which set is used. (See **VDCCOL** for more information about attribute memory.) The second half of each character set

contains the reversed versions of the first 128 characters. These characters are what you see when you turn reverse mode on. Now, attribute memory can be changed to display a normal or a reverse character (again, see **VDCCOL**), which means that the reverse character shapes in the character set are redundant. It is actually possible to have four character sets in memory at the same time, a total of 512 characters. To reverse any of them, write to attribute memory (which gives you 512 more, reversed characters).

Routine

```

0C00      VDCADR      =      $D600
0C00      VDCDAT      =      $D601
0C00      VRMLO       =      19
; note the high byte is first, not second
0C00      VRMHI       =      18
0C00      VRDAT       =      31
; (internal memory for the VDC)
0C00      MEM4A       =      $2010
;
; high byte of character memory
0C00 A9 20      CUST80      LDA      #>MEM4A
; register 18
0C02 A2 12      LD        #VRMHI
; set up the register
0C04 20 26 0C      JSR      STRVDC
; low byte
0C07 A9 10      LDA      #<MEM4A
; register 19
0C09 A2 13      LD        #VRMLO
; and store the value
0C0B 20 26 0C      JSR      STRVDC
;
0C0E A0 00      LD        #0
0C10 B9 1E 0C LOOP      LDA      CHAR,Y
; register 31
0C13 A2 1F      LD        #VRDAT
; store it
0C15 20 26 0C      JSR      STRVDC
; we have to move forward
0C18 C8          INY
0C19 C0 08      CPY      #8
0C1B D0 F3      BNE     LOOP
; done
0C1D 60          RTS
;
0C1E          CHAR      =      *
0C1E FF          .BYTE  %11111111
0C1F 81          .BYTE  %10000001
0C20 B5          .BYTE  %10110101
0C21 89          .BYTE  %10001001
0C22 91          .BYTE  %10010001
0C23 AD          .BYTE  %10101101
0C24 81          .BYTE  %10000001
0C25 FF          .BYTE  %11111111
;
0C26          STRVDC     =      *
; store .X in the address gate
0C26 8E 00 D6      STX     VDCADR
; and wait
0C29 AE 00 D6 WAITAD      LDX     VDCADR
; for bit 7 to click
0C2C 10 FB          BPL     WAITAD
; store the data
0C2E 8D 01 D6      STA     VDCDAT
; and quit
0C31 60          RTS

```

See also **ANIMAT** (Animation by alternating character sets), **CHRDEF** (Character redefinition), **RE80CO** (Read the 80-column video chip), **VDCCOL** (Write to 80-column video attribute memory), **WR80CO** (Write to the 80-column video chip)

INTMUS

Name

Interrupt-driven music

Description

With **INTMUS**, you can enhance any programs—especially games—by adding background music that runs automatically.

Prototype

Before entering this routine, set up a table of note values which index frequencies from **FREQTB** (**NOTES**), a table containing the relative durations for each note in **NOTES** (**NDURTB**), and a table of the two-byte frequencies needed for the tune (**FREQTB**).

In the initialization routine (**INTMUS**):

1. Disable IRQ interrupts before changing the IRQ interrupt vector.
2. Redirect the IRQ interrupt vector to the music-playing routine (**MAIN**).
3. Set a note counter (**NOTENM**) to zero.
4. Clear the SID chip with **SIDCLR** and set the appropriate parameters for the chip (volume and attack/decay).
5. Initialize a duration counter (**DURATE**) for the first pass through **MAIN**.
6. Reenable IRQ interrupts and **RTS**.

Then, in **MAIN**:

1. Decrement the duration counter.
2. If it decrements to zero, get a note to play. Otherwise, allow the note that's currently playing to continue by exiting through the normal IRQ interrupt handler.
3. Assuming the duration counter reaches zero, get the note number and index the next note's duration using it.
4. Adjust the time each note plays by multiplying its duration by some factor (here, 8).
5. Store the result in the duration counter.
6. Get a note from the **NOTES** table and use it to index the corresponding two-byte frequency value in **FREQTB**. Store the frequency taken from **FREQTB** into the frequency registers for voice 1.
7. Ungate, and then gate, the waveform (here, a sawtooth waveform).
8. Increment the note counter and determine if all notes have played. If not, continue playing the tune. Otherwise, reinitialize the note counter to start the tune over.

Explanation

The principle behind interrupt-driven music is that you let the IRQ interrupt generated every 1/60 second determine when and how long each note is played.

After redirecting the IRQ vector to a music-playing routine (**MAIN**), the SID chip is set up and several counters are initialized. One of these counts how many notes have been played (**NOTENM**) while the other keeps up with how long the current note has played (**DURATE**).

Once IRQ interrupts are reenabled, MAIN is accessed during each IRQ interrupt. The first time this happens, a note based on a reference value (in NOTES) is selected from a table of frequencies (FREQTB) and stored in the frequency register for voice 1. At the same time, a duration time for the note is taken from another table (NDURTB) and stored in the duration counter (DURATE). Before exiting, the pointer to the next note (NOTENM) is incremented and the current note starts playing.

Each time the IRQ returns to MAIN thereafter, the duration counter decrements. When it reaches zero, the next note from NOTES gets stored into the frequency register, DURATE is reset for this note's duration, and the cycle repeats itself. When all notes have played, NOTENM becomes zero, and the tune starts over again.

In setting up the note (NOTES) and frequency (FREQTB) tables, the same method used in MELODY is used here. Each number in NOTES references a two-byte frequency value in FREQTB. Again, the frequencies listed in FREQTB are taken from the table of notes in the programmer's reference guide for either the 64 or 128. Expand FREQTB to include whatever notes your song calls for. If you like, you can even have NOTETB generate a complete frequency table for you.

After you've worked out the relative time spent playing each note with the values in NDURTB, you'll need to adjust the overall tempo of the song. The three ASLs at \$C02F, for the current song, increase the tempo by a factor of eight. For each tune you play, you may need to add or take away one or more of these (ASLs) before the song sounds right.

Routine

```
; vector to IRQ interrupt routine
C000      IRQVEC      =      788
; IRQNOR = 64101 on the 128
C000      IRQNOR      =      59953
; starting address for the SID chip
C000      FRELO1      =      54272
; voice 1 high frequency
C000      FREHI1      =      54273
; voice 1 control register
C000      VCREG1      =      54276
; voice 1 attack/decay register
C000      ATDCY1      =      54277
; SID chip volume register
C000      SIGVOL      =      54296
;
; Set up an IRQ interrupt to play background music.
; disable IRQ interrupts to change the vector
C000 78      INTMUS      SEI
; store the low byte of the IRQ wedge
C001 A9 24      LDA      #<MAIN
C003 8D 14 03      STA      IRQVEC
; and the high byte
C006 A9 C0      LDA      #>MAIN
C008 8D 15 03      STA      IRQVEC+1
C00B A9 00      LDA      #0
; set pointer to first note in table
C00D 8D A1 C0      STA      NOTENM
; clear the SID chip
C010 20 A2 C0      JSR      SIDCLR
; set the volume to maximum
C013 A9 0F      LDA      #15
C015 8D 18 D4      STA      SIGVOL
; set attack/decay
C018 A9 1A      LDA      #$1A
```

```
C01A 8D 05 D4      STA      ATDCY1
C01D A9 01      LDA      #1
; initialize duration counter for first pass
C01F 8D A0 C0      STA      DURATE
; with vector changed, reenable IRQ interrupts
C022 58      CLI
C023 60      RTS
;
; MAIN actually plays the music.
; see if current note has finished playing
C024 CE A0 C0 MAIN DEC      DURATE
; if not, allow it to finish
C027 D0 36      BNE      EXIT
; index to NOTES
C029 AE A1 C0      LDA      NOTENM
; get the note's duration from a table
C02C BD 7B C0      LDA      NDURTB,X
; multiply by 8 so each note lasts eight times longer
C02F 0A      ASL
C030 0A      ASL
C031 0A      ASL
; and store it into the counter
C032 8D A0 C0      STA      DURATE
; get index for FREQTB
C035 BD 62 C0      LDA      NOTES,X
; double it since FREQTB contains two-byte addresses
C038 0A      ASL
; to index FREQTB
C039 AA      TAX
; get low byte of note's frequency
C03A BD 94 C0      LDA      FREQTB,X
; store it in voice 1
C03D 8D 00 D4      STA      FRELO1
; get high byte of note's frequency
C040 BD 95 C0      LDA      FREQTB+1,X
; store it in voice 1
C043 8D 01 D4      STA      FREHI1
; ungate sawtooth waveform
C046 A9 20      LDA      #%00100000
C048 8D 04 D4      STA      VCREG1
; gate waveform
C04B A9 21      LDA      #%00100001
C04D 8D 04 D4      STA      VCREG1
; increase note counter
C050 EE A1 C0      INC      NOTENM
C053 AD A1 C0      LDA      NOTENM
; determine if all notes have played
C056 C9 19      CMP      #NMNOTE
; if not, then continue
C058 90 05      BCC      EXIT
C05A A9 00      LDA      #0
; if yes, start again with first note
C05C 8D A1 C0      STA      NOTENM
; exit through normal IRQ interrupt handler
C05F 4C 31 EA EXIT JMP      IRQNOR
;
; table of note indexes
C062 02 02 04 NOTES .BYTE 2,2,4,4,5,5,4,5,5,4,3,2
C06E 03 02 02      .BYTE 3,2,2,4,2,1,0,0,0,0,1,1,2
; number of notes
C07B          NMNOTE      =      * - NOTES
; table of note durations
C07B 02 06 02 NDURTB .BYTE 2,6,2,6,4,3,1,2,2,1,
1,2,1,1,4,2
C08B 01 02 03      .BYTE 1,2,3,1,2,2,1,2,1,2
; table of two-byte frequency values
C094 C3 10 EF FREQTB .WORD 4291,5103,5728,6812,
7647,8583
; duration counter
C0A0 00      DURATE      .BYTE 0
; note number counter
C0A1 00      NOTENM      .BYTE 0
;
; Clear the SID chip.
; fill with zeros
C0A2 A9 00      SIDCLR      LDA      #0
; as the offset from FRELO1
```



```

COA4 A0 18      LDY #24
; store zero in each SID chip address
COA6 99 00 D4 SIDLOP STA FRELO1,Y
; for next lower address
COA9 88          DEY
; fill 25 bytes
COAA 10 FA      BPL SIDLOP
; we're done
COAC 60          RTS

```

See also **BEEPER** (Emit a beep sound), **BELLRG** (Emit a bell sound), **EXPLOD** (Produce an explosion sound), **MELODY** (Tune player), **NOTETB** (Create a table of standard frequencies: eight octaves of 12 notes each), **SIDCLR** (Clear the SID chip), **SIDVOL** (Set the SID chip volume register), **SIRENS** (Produce a siren sound)

MULSHF

Name

Multiply two unsigned integer values using bit shifts

Description

MULSHF is a little more complex—and more difficult to understand—than the routines that multiply with successive additions (**MULAD1** and **MULAD2**), but it's much faster if you have large numbers to multiply.

Prototype

1. Start with the two numbers to be multiplied in B1 and B2 (16 bits each).
2. Store zeros in the 32 bits of TOTAL.
3. Copy B2 to WORK, a temporary storage area.
4. Store the number of bits to shift in COUNTR.
5. Shift WORK to the left.
6. If the carry flag is clear, skip step 7.
7. If it's set, add B1 to TOTAL.
8. Decrement the counter. If not zero, multiply TOTAL by two with right shifts.
9. If it is zero, exit. Otherwise, branch back to step 5.

Explanation

An expanded diagram of multiplying two four-bit numbers may be helpful:

```

B1      1110
B2      1011
-----
S4      1110
S3      1110
S2      0000
S1      1110
-----
TOTAL   10011010

```

Start with the TOTAL equal to zero. Shift B2 to the left, and a one appears in the carry flag. That means it's time to add B1 to the total, which becomes S1 (00001110). There's more, so shift the total to the left (00011100). Shift B2 left again. This time there's a zero, so skip the addition, but shift TOTAL left again to become subtotal 2—S2 (00111000). Shift B2 left again, and carry is set; so add 1110 (01000110) and shift it left (10001100). Finally, shift B2 the final time, and carry is set, so add one more time (10011010), but don't shift the total to the left because it's the last addition.

By the same logic, multiplying 16-bit numbers requires 16 shifts. B1 and B2 each have 16 bits, so the total needs 32 bits. Note in the example above that

multiplying two 4-bit numbers yields an 8-bit result.

Routine

```

; four bytes
C000 A0 03      MULSHF LDY #3
; zero out TOTAL
C002 A9 00      LDA #0
; store it
C004 99 5C C0 ZOUT STA TOTAL,Y
; count down
C007 88          DEY
; and loop back
C008 10 FA      BPL ZOUT
; copy B2 to WORK
C00A AD 58 C0   LDA B2
C00D 8D 5A C0   STA WORK
C010 AD 59 C0   LDA B2+1
C013 8D 5B C0   STA WORK+1
; there are 16 shifts, so
C016 A9 10      LDA #16
; set up a counter
C018 8D 55 C0   STA COUNTR
;
; shift the low byte
C01B 0E 5A C0 MULLP ASL WORK
; into the high byte
C01E 2E 5B C0   ROL WORK+1
; if the bit is off, skip the add
C021 90 1D      BCC BIGSHF
; clear carry before add
C023 18          CLC
; low byte
C024 AD 56 C0   LDA B1
; add to TOTAL (low)
C027 6D 5C C0   ADC TOTAL
; store it
C02A 8D 5C C0   STA TOTAL
; second byte of four
C02D AD 57 C0   LDA B1+1
; add it
C030 6D 5D C0   ADC TOTAL+1
; store it
C033 8D 5D C0   STA TOTAL+1
; if carry clear, branch forward
C036 90 08      BCC BIGSHF
; else add 1 to third byte
C038 EE 5E C0   INC TOTAL+2
; if not zero, skip the fourth
C03B D0 03      BNE BIGSHF
; else, get the fourth
C03D EE 5F C0   INC TOTAL+3
;
; count down
C040 CE 55 C0 BIGSHF DEC COUNTR
; shift it if there's more
C043 D0 01      BNE SHIFIT
; else, quit
C045 60          RTS
; multiply by 2
C046 0E 5C C0 SHIFIT ASL TOTAL
C049 2E 5D C0   ROL TOTAL+1
C04C 2E 5E C0   ROL TOTAL+2
C04F 2E 5F C0   ROL TOTAL+3
; repeat it again
C052 4C 1B C0   JMP MULLP
C055 00          COUNTR .BYTE 0
C056 7D 00      B1 .BYTE 125,0
C058 58 02      B2 .BYTE 88,2
C05A 00 00      WORK .BYTE 0,0
C05C 00 00 00 TOTAL .BYTE 0,0,0,0

```

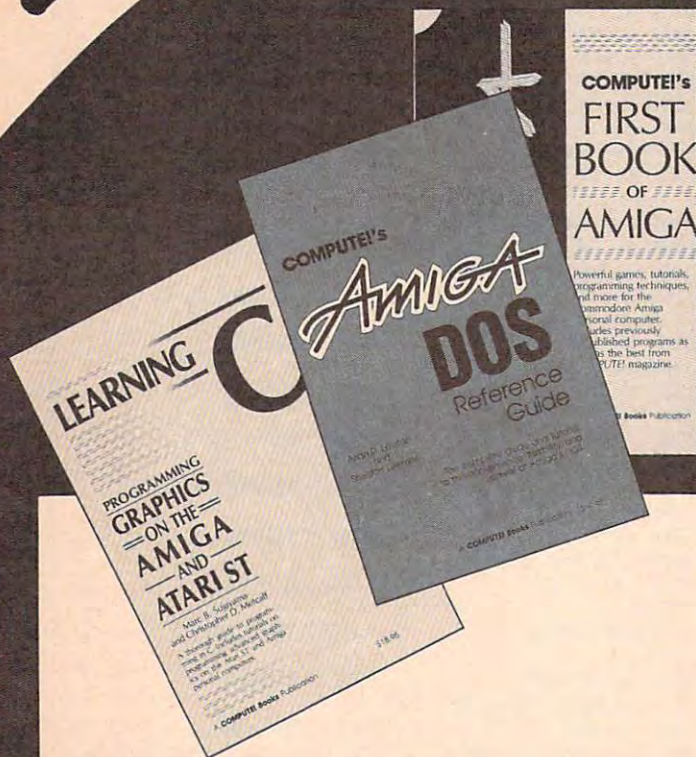
See also **MULAD1** (Multiply two numbers with successive adds), **MULAD2** (Multiply two numbers with repeated addition: optimized version), **MULFP** (Multiply two floating-point numbers)

EXPLORE!

the
potential of your

AMIGA

Learn to program—in machine language, BASIC, and C; create dazzling graphics; type in valuable applications; or entertain yourself and friends with challenging games. You can do all this, and much more, with the easy-to-use tutorials and programs in COMPUTE!'s new books for the Amiga.



COMPUTE!'s AmigaDOS Reference Guide \$16.95
Arian R. Levitan and Sheldon Leemon
ISBN 0-87455-047-5 231 pages

This clear and complete reference guide defines and illustrates all AmigaDOS commands, including version 1.2. Concise explanations show you how to create file directories, access peripherals, run batch files, and many other techniques. *COMPUTE!'s AmigaDOS Reference Guide* also thoroughly explains how to use the screen- and line-oriented text editors. A must-have book for every Amiga user.

COMPUTE!'s Amiga Programmer's Guide \$17.95
Edited
ISBN 0-87455-028-9 458 pages

This in-depth guide to the inner workings of the Amiga covers AmigaDOS, BASIC, intuition, and other important software tools which accompany the Amiga. It includes dozens of example programs, AmigaDOS command summaries, a mandelbrot program written in C, and details on accessing advanced features such as Amiga-specific graphics and sound chips. For both beginning and advanced programmers.

Learning C: Programming Graphics on the Amiga and Atari ST \$18.95
Christopher D. Metcalfe and Marc B. Sugiyama
ISBN 0-87455-064-5 420 pages

C is quickly becoming the language of choice for many professional programmers. You'll find out why with this tutorial, the perfect introduction to programming in C on the Atari ST and Commodore Amiga. Using numerous program examples, the authors explain, in plain English, how the C language can help you make the most of your ST or Amiga. An excellent resource for beginning and intermediate C programmers. *There is also a disk available which includes the programs in the book: Amiga version, 645DSK1, \$15.95; Atari ST version, 645DSK2, \$15.95.*

COMPUTE!'s First Book of Amiga \$16.95
Edited
ISBN 0-87455-090-4 226 pages

Continuing with its commitment to the full-featured Amiga, COMPUTE! Publications has collected some of its best games and applications, plus some never-before-published programs, to show off the enormous capabilities of this multitasking machine. Included are games, programming tips, and applications such as "Hex Wars," "Biker Dave," "AmigaDOS Batch Files," and "AmigaTerm." Each program has been fully tested and is ready to type in. *There is also a disk available for \$15.95 which includes the programs from the book.*

Using Deluxe Paint II \$18.95
Steven Anzovin
ISBN 0-87455-111-0 212 pages

Create the most spectacular art possible on a personal computer with this comprehensive, yet easy-to-use, guide to *Deluxe Paint II*, the state-of-the-art graphics program for the Commodore Amiga and Apple IIGS. From basic drawing skills to customizing brushes, the book gives you details that will help you get the best results possible with this remarkable software. Special color effects, tools, styles, patterning, and perspective are just some of the advanced techniques illustrated. Discover how to use each feature of *Deluxe Paint II*, from merging foreground and background to mixing graphics and text. A COMPUTE! Library Selection.

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. Customer Service hours are 10:00 a.m. to 12:30 p.m. and 1:30 p.m. to 3:00 p.m. EST, Monday through Friday.

Please include \$2.00 shipping and handling for U.S. and surface mail or \$5.00 for 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.

The Elementary Amiga

Part 1

Jim Butterfield

The Commodore Amiga comes with excellent documentation. The manuals take you gently through the first steps with careful descriptions and ample illustrations. But they don't tell you everything. This series will reveal some of the more interesting and less obvious aspects of the Amiga.

If you don't yet have an Amiga, there are a few features, and pitfalls, of which you should be aware. You undoubtedly have seen the marvelous graphics and have heard the superb sound of the Amiga. Perhaps you think of these as the essence of the machine. They are important, but there are other significant things. Perhaps the most profound is *multitasking*—the ability to have several programs, or *tasks*, running at the same time. That's rare in microcomputers, and it's very useful once you get used to it: Can you imagine running a bulletin board in one window while writing a letter (or a program) in another?

In the list of Amiga features, we should also note the high processing speed, the easy interface to peripheral devices such as printers, and the huge shareware and public domain software library that has already come into existence.

There are some limitations that may concern you, however. The Amiga, although a bargain by technical price/performance standards, is not the lowest priced computer in the marketplace. The Amiga's processing speed is fast, but its input/

output rates—especially to screen windows—are relatively sluggish. And if your idea of fun is to chop around inside a machine that has simple architecture, the Amiga is not for you. Its inner structure is quite complex, and you'll have a good deal of study ahead of you before you can take the simplest foray into the Amiga's inner space.

Your Amiga will be much more flexible and powerful with two disk drives and at least 512K of memory (only the Amiga 1000 offers less than 512K in its standard configuration). Two drives are far more useful than one. You'll find that the Workbench system disk must be in one of the drives for many operations. Without a second drive, you'll be swapping this disk in and out a great deal. You can copy much of the Workbench disk into RAM if you wish (the Amiga is very flexible), but then you're cutting into your RAM space for programs.

Multitasking gobbles up memory, so the more RAM you have to start with, the more you can do. Don't let your experience with eight-bit microcomputers mislead you: 64K is a lot of memory on the Commodore 64, Atari 800, or Apple II; but on the Amiga it's hardly worth counting.

If you can make contact with a user group, do so. There's a huge amount of public domain software available. So much, in fact, that you'll need help sorting through it all. For example, there's a series of programs available as catalogued

disks called the Fred Fish disks. These can be obtained from user groups, from dealers, or from Fred Fish himself (345 Scottsdale Road, Pleasant Hill, CA 94523, \$10 per disk). There are over 100 of these so far, with typically 20 programs per disk.

The Workbench

The manual, *Introduction to the Amiga*, that comes with the computer does a nice job of showing you how to use the Workbench. By the time you finish the tutorial, you should know how to click, double-click, select a menu, size a window, drag a window, and do many other tasks along this line. There are a few things, however, that went unmentioned or were vague.

First, it's very important to back up your disks. This is especially vital on soft logic machines like the Amiga. Much of the computer's operating system software is on disk, not in ROM. If your Workbench disk ever becomes corrupted, your computer will effectively be brain damaged. Keep your original system disks somewhere safe. Do *everything* on backup disks.

By the way, you're going to be using disks like crazy. Start with at least a box of ten. If someone offers you a bargain on a quantity of 50, don't be shy—you'll use them.

As you go through the Workbench, opening a disk, then opening a drawer within that disk, and so on, you may be surprised at the subtlety of the Workbench's file

handling. Drag a file from one disk to another, and you make a copy. Drag a file from one part of a disk to another—say, from one drawer to another—and you move it. Drag a file out of its window, to an empty area on the Workbench screen, and it stays there. Don't worry—the computer keeps careful records about where files originate. If need be, your Amiga will ask you to reinsert the appropriate disk when the wandering file is accessed again.

Using The Workbench

When the Workbench loads from disk, the drive runs for a while before the Workbench screen appears. Let it do so; don't rush in with the mouse until everything settles down. If you jump in too quickly, the computer becomes busy with two different jobs at the same time. It can handle it—multitasking is part of what the Amiga is about. But you'll waste a good deal of time (and make a good deal of noise) as the disk drive's read head goes back and forth from one track to another. Although this will not hurt the disk drive, it is best to wait it out.

There's often more on a disk than what you see in the disk's window. The Workbench only shows icons for those files that have *info* files associated with them. To see the rest, you'll need to go to the Command Line Interface (CLI). Both *info* files and the CLI will be discussed in Part 2 of this series.

If you drag something into the Trashcan, it's not actually deleted, so you do not free any disk space. That's because you're allowed to sort through the contents of the Trashcan. If you change your mind about discarding something, drag it back out of the can and put it wherever it belongs. If you're sure you will never want that item again, select the Trashcan icon, go to the Disk menu and choose the Empty Trash option. All items in the Trashcan directory are discarded, and the disk space is reclaimed.

Here's another way to throw away files: Select the item that you want to throw away, go to the Workbench menu, and choose the Discard option. This deletes the file and reclaims the disk space right away, so be careful.

Why is there an Empty drawer on the Workbench disk? To give you something to copy when you need a new drawer. To make a new drawer, select the Empty drawer, go to the Workbench menu and select the Duplicate option. Now, use the Rename option in the Workbench menu to give it the name of your choice. This new drawer may be dragged anywhere on the disk—even within another drawer.

After you've moved an icon to a desired place within a window, fix it in place by calling Snapshot on the Special menu. If you're redecorating a window and have moved several things around, log all of their new positions by performing *multiple selection*—select each item while holding down the shift key—before choosing Snapshot.

Preferences

Double-click the Preferences icon to invoke this activity. Most of the options are well described in the manual, but a few features are worth noting.

The first time you use the system, be sure to select Change Printer and set up the type of printer you are using. Click on the Save button when you're finished to make this change permanent.

On the Amiga 1000, you're asked to use Preferences to set the date and time. This seems to be unnecessary work, but it's a good idea if you want your files properly dated. On other models of the Amiga, the date and time is set for you automatically.

It's fun to customize the mouse pointer. While in Preferences, click Edit Pointer and draw your own. Maybe you'd like to add your initials to the tail of the pointer or to draw a personalized icon. Remember that the pointer has a hot spot—the actual place on the pointer where action takes place—which you can place by using the Set Point box. Try to pick a logical place for this, so that the user (you) won't be confused while using this pointer: the tip of a finger, the nose of an airplane, the bullseye of a target.

Info

If you select an icon, and then choose Info on the Workbench menu, you'll get a lot of infor-

mation. There are five types of icons, and the information you get is related to the type. The types are:

Disk. These are the physical disks that you put into a drive. The ramdisk, if it appears as an icon, is also treated as a disk. When you select Info on a disk, you get the disk's name, its capacity, and how much disk space is currently being used.

Drawer. You might think of a drawer as a filing cabinet. It may contain a number of things (including, perhaps, other drawers).

Trashcan. A special type of drawer. It can contain things, but this drawer has special properties.

Tool. A tool is what we would call a program. So when we double-click a tool, we run a program.

Project. This is data to be used by a program tool. In the case of Amiga Basic, for example, the program you write is considered by the interpreter to be data.

Projects are especially interesting, because they may be attached to certain tools. When you double-click a tool icon, the program selected loads and runs. If you double-click on a project icon, the computer loads the default tool, starts the program, and then loads the project file into the program as data. For example, double-clicking a text file causes a listing or word processing program to be called in to handle the file.

You can change the default tool entry, and sometimes you may need to do so. The most common problem is that when you copy a project to a new disk, the name of the default tool is no longer correct. With Info, you can correct it.

You'll seldom need to do anything with the Tool Types field. It supplies extra information about the selected icon. On Notepad files, for example, the Tool Types field displays the information FILE-TYPE=notepad.

Farewell To Workbench

Workbench is good for the casual user who doesn't need to learn any special commands. But to gain more understanding and control out of the Amiga, you'll need to move on to CLI. We'll do that in next month's installment. ©

Atari Persistent Ramdisk

Robert Berry

This recoverable ramdisk can survive just about any catastrophe short of a power loss. It requires a 130XE (or 800XL with memory upgrade to 128K) and DOS 2.5.

If you have an Atari 130XE (or expanded-memory 800XL) you've probably found much use for the ramdisk program that comes with DOS 2.5. It makes assembling and compiling much faster, and it places the DOS menu just where you want it—in RAM. "Atari Persistent Ramdisk" keeps the advantages you've grown accustomed to, and it adds a new feature: the ability to reset the computer without losing the contents of the ramdisk. You can even switch cartridges and find that your ramdisk files are unaffected.

Typing It In

Persistent Ramdisk is a machine language program in the form of a BASIC loader. Carefully type it in and save a copy to disk before you run it.

To create a disk with the Persistent Ramdisk on it, format a disk normally. Copy the DOS 2.5 files DOS.SYS and DUP.SYS to the disk with the WRITE DOS FILES option. Now load the Persistent Ramdisk program. Insert the new disk in the drive and type RUN. A new file named RAMDISK.COM will be written to the disk. The next time

you boot the computer using this disk, you'll see the message *Setting Up Persistent Ramdisk . . . Please Wait*. Use the new ramdisk the same way you normally use the DOS 2.5 ramdisk.

Once you have created the RAMDISK.COM file, you can copy it onto other formatted DOS 2.5 disks using the COPY FILE option on the DOS menu. This saves you the trouble of having to run the BASIC program more than once. Note that the enhanced ramdisk file has the same name as the original ramdisk program that comes with DOS 2.5. Be sure to keep a copy of the original ramdisk program on your DOS 2.5 master disk.

New Features

On Atari XL and XE models, the SYSTEM RESET button causes a complete reset, called a cold reset. This lets you recover from more lock-ups than the older 400s and 800s, which performed only a partial, or warm, reset. However, since SYSTEM RESET does not clear memory, lock-ups still occasionally occur. The only solution to lock-ups like these is to switch power to the computer off and back on. Unfortunately, you lose your ramdisk when you do this. Persistent Ramdisk provides a new feature to perform a simulated cold start without erasing the ramdisk. To do this, hold down the HELP key when you press SYSTEM RESET. (When you do this, be

sure the drive contains a disk with a copy of Persistent Ramdisk.)

Using Persistent Ramdisk, many shortcuts are possible. For instance, if you're working on a machine language subroutine for use in a BASIC program, you can assemble it with the MAC/65 assembler or Atari Assembler cartridge to the ramdisk. Then you can pull the assembler cartridge out and press RESET. As long as you have a Persistent Ramdisk disk in the drive, your ML file will be intact when you boot up in BASIC.

[Ed. Note: Although changing cartridges with the power on is a practice used by many programmers, Atari claims that inserting or removing cartridges with the power on may damage your computer or the cartridge. Follow this practice at your own risk.]

Avoiding Interference

As useful as Persistent Ramdisk can be, it is not perfect for every situation. It uses part of page 1 (the stack) for the routine which handles the SYSTEM RESET key. You should test Persistent Ramdisk with each environment you use. One program that interferes with Persistent Ramdisk is MAC/65's DDT debugger. If you're going to use DDT, don't use Persistent Ramdisk.

The AtariWriter cartridge thinks that it has encountered an error when the new RAMDISK.COM begins to load. The screen turns red, but the ramdisk is setup

as usual. The screen turns blue once the ramdisk has been initialized, so this minor problem can be ignored.

Persistent Ramdisk is short, taking up two less sectors than the original ramdisk. You should be able to find many uses for the program.

Persistent Ramdisk

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

```

OC 5 REM COPYRIGHT 1987 COMP
UTE! PUBLICATIONS, INC.
ALL RIGHTS RESERVED.
BF 6 ? "(CLEAR)COPYRIGHT 198
7":PRINT "COMPUTE! PUBL
ICATIONS, INC.":PRINT "
ALL RIGHTS RESERVED."
LP 8 FOR TT=1 TO 1500:NEXT T
FE 10 ? "(CLEAR)Insert disk
to write new RAMDISK.C
OM(4 SPACES)file to, p
ress RETURN.":?
HB 20 IF PEEK(764)<>12 THEN
20
CL 30 TRAP 100
LA 40 OPEN #1,8,0,"D:RAMDISK
.COM"
BC 50 FOR A=1 TO 755:READ B:
T=T+B:PUT #1,B:NEXT A
DE 60 CLOSE #1:IF T<>70097 T
HEN ? "(BELL)Error in
DATA statements!!!":EN
D
NE 70 ? "Now reboot with thi
s disk. Press START t
o reboot or BREAK to g
o back to(6 SPACES)BAS
IC.":POKE 764,255
PC 80 IF PEEK(53279)=6 THEN
A=USR(58487)
AK 90 GOTO 80
JI 100 ? "(BELL)Error - ";PE
EK(195)
NI 110 STOP
MN 1000 DATA 255,255,0,1,13,
1,32,255,255,173
AD 1010 DATA 220,2,201,17,24
0,1,96,76,119,228
EK 1020 DATA 0,48,251,48,0,0
,68,56,58,155
HJ 1030 DATA 68,56,58,42,46,
42,155,68,49,58
ND 1040 DATA 68,85,80,46,83,
89,83,155,68,56
NC 1050 DATA 58,77,69,77,46,
83,65,86,155,32
HJ 1060 DATA 32,68,85,80,32,
32,32,32,83
PD 1070 DATA 89,83,125,29,29
,29,29,29,29,127
OK 1080 DATA 83,101,116,116,
105,110,103,32,117,1
12
OF 1090 DATA 32,80,101,114,1
15,105,115,116,101,1
10
JJ 1100 DATA 116,32,82,65,77
,100,105,115,107,155
MH 1110 DATA 155,155,32,32,3
2,32,32,32,32,32
PN 1120 DATA 32,32,32,32,32,
80,108,101,97,115
HE 1130 DATA 101,32,119,97,1
05,116,46,46,46,155
BC 1140 DATA 169,64,141,1,1,
141,159,48,169,21

```

```

NI 1150 DATA 141,2,1,141,160
,48,169,0,141,12
PN 1160 DATA 24,133,12,169,1
,141,16,24,133,13
OA 1170 DATA 173,10,7,9,128,
141,10,7,169,255
EN 1180 DATA 133,8,32,255,25
5,162,80,169,3,157
MN 1190 DATA 66,3,169,6,157,
68,3,169,48,157
IJ 1200 DATA 69,3,169,6,157,
74,3,169,0,157
OE 1210 DATA 75,3,32,86,228,
48,117,169,1,141
KL 1220 DATA 0,48,169,0,141,
1,48,162,80,169
PG 1230 DATA 5,157,66,3,169,
128,157,68,3,169
II 1240 DATA 5,157,69,3,169,
1,157,72,3,157
OL 1250 DATA 73,3,32,86,228,
238,1,48,173,129
ND 1260 DATA 5,201,32,208,42
,32,254,48,173,0
EM 1270 DATA 48,201,1,240,20
8,76,252,48,247,49
AM 1280 DATA 27,49,160,2,185
,128,5,201,32,240
AG 1290 DATA 8,201,48,144,10
,201,91,176,6,200
BA 1300 DATA 192,13,208,236,
96,169,0,141,0,48
ON 1310 DATA 96,162,80,169,1
2,157,66,3,32,86
ML 1320 DATA 228,173,0,48,20
1,1,208,20,173,1
PP 1330 DATA 48,201,1,240,13
,76,104,50,162,80
OM 1340 DATA 169,12,157,66,3
,32,86,228,169,1
NE 1350 DATA 141,240,2,162,0
,169,11,157,66,3
AF 1360 DATA 169,48,157,68,3
,169,48,157,69,3
MC 1370 DATA 169,68,157,72,3
,169,0,157,73,3
BA 1380 DATA 32,86,228,169,0
,141,240,2,162,80
PK 1390 DATA 169,254,157,66,
3,169,2,157,68,3
NB 1400 DATA 169,48,157,69,3
,169,0,157,74,3
OL 1410 DATA 157,75,3,32,86,
228,162,80,169,3
PH 1420 DATA 157,66,3,169,13
,157,68,3,169,48
IM 1430 DATA 157,69,3,169,4,
157,74,3,169,0
JB 1440 DATA 157,75,3,32,86,
228,16,3,76,79
CA 1450 DATA 50,162,80,169,7
,157,66,3,169,205
CP 1460 DATA 157,68,3,169,50
,157,69,3,169,255
ON 1470 DATA 157,72,3,157,73
,3,32,86,228,162
CC 1480 DATA 80,169,12,157,6
6,3,32,86,228,162
PK 1490 DATA 80,169,3,157,66
,3,169,13,157,68
MK 1500 DATA 3,169,48,157,69
,3,169,8,157,74
LC 1510 DATA 3,169,0,157,75,
3,169,56,141,14
FF 1520 DATA 48,32,86,228,16
2,80,169,11,157,66
BN 1530 DATA 3,169,248,49,20
4,50,205,157,68,3
CE 1540 DATA 169,50,157,69,3
,32,86,228,162,80
CA 1550 DATA 169,12,157,66,3
,32,86,228,162,80
NF 1560 DATA 169,3,157,66,3,

```

```

169,24,157,68,3
NB 1570 DATA 169,48,157,69,3
,169,8,157,74,3
PA 1580 DATA 169,0,157,75,3,
32,86,228,162,80
CH 1590 DATA 169,11,157,66,3
,169,137,157,72,3
BK 1600 DATA 169,21,157,73,3
,32,86,228,162,80
CH 1610 DATA 169,12,157,66,3
,32,86,228,169,56
NI 1620 DATA 141,63,21,162,0
,169,11,157,66,3
DL 1630 DATA 169,0,157,72,3,
157,73,3,169,125
DP 1640 DATA 32,86,228,169,0
,133,8,96,162,80
JF 1650 DATA 169,3,157,66,3,
169,6,157,68,3
MP 1660 DATA 169,48,157,69,3
,169,6,157,74,3
PA 1670 DATA 169,0,157,75,3,
32,86,228,162,80
PP 1680 DATA 169,5,157,66,3,
169,128,157,68,3
JE 1690 DATA 169,5,157,69,3,
169,1,157,72,3
BB 1700 DATA 157,73,3,32,86,
228,173,129,5,201
AN 1710 DATA 32,208,23,162,2
,189,128,5,221,35
SH 1720 DATA 48,208,211,232,
224,13,240,3,76,171
EH 1730 DATA 50,169,56,141,6
3,21,162,80,169,12
PJ 1740 DATA 157,66,3,32,86,
228,76,79,50,226
JK 1750 DATA 2,227,2,116,48

```

©

COMPUTE! is currently looking for quality programs and articles on IBM PC and compatible machines. If you have an interesting home application, educational program, programming utility, or game, submit it to COMPUTE!, P.O. Box 5406, Greensboro, NC 27403. For information on author guidelines, see COMPUTE!'s Author's Guide elsewhere in this issue.

Total Disk Menu

Scott Rickman

With this program, long cryptic disk commands are a thing of the past. Now you can load, run, scratch, rename, and even protect and unprotect disk files—all from an easy-to-use menu. For the Commodore 64.

As anyone who has ever used a Commodore 1541 disk drive with their 64 knows, the disk operating system (DOS) commands can be difficult to remember and use. For example, to simply scratch a file you have to enter the command **OPEN 15,8,15,"S0:filename":CLOSE 15**. And believe it or not, scratch is one of DOS's simplest commands.

"Total Disk Menu" offers menu-driven access to four of the most commonly used DOS commands: load, run, scratch, and rename. You can also protect and unprotect files from accidental deletion—a feature not available in standard Commodore DOS.

Typing It In

Since Total Disk Menu is written in machine language, you must enter it using the "MLX" machine language entry program found elsewhere in this issue. When MLX asks for starting and ending addresses, respond with these values:

Starting address: 0801

Ending address: 1318

Type in the program. Before leaving MLX, be sure to save a copy to disk.

Getting Started

Load and run Total Disk Menu as you would a BASIC program. A title screen appears. At this point,

place the disk of your choice into the disk drive addressed as device 8, and press a key. At the top left of the screen, the program lists the disk's name, ID number, and DOS version number (normally 2A). Next, the computer reads in the names of all files on the disk, listing the first ten to the screen.

If your disk contains more than ten programs, the space bar allows you to flip through each group of ten files (a page). The current page and total number of pages is displayed in the upper right corner of the screen.

This program separates files into two different categories: loadable and nonloadable. Loadable files are always program files, and may be loaded or run. Filenames for loadable files are displayed on the screen normally. Nonloadable files can be sequential, relative, or user files. Nonloadable files are listed with a space preceding their filename.

Besides being loadable or nonloadable, files may also be protected (see below). A protected file is listed in reverse type. All files shown on the screen have a corresponding number 0-9. To specify a file, you must refer to it by its number.

Using The Program

Every command in this program is accessed by a single keypress. So that you won't have to memorize anything, Total Disk Menu displays your options on the screen at all times.

Here's a list of Total Disk Menu's options and corresponding keypresses:

Key	Function
L	Load program
R	Run program
S	Scratch file
N	Rename file
P	Protect file
U	Unprotect file
Space	Next page of ten files
f1	Introduce a new disk (restart program)
f2	Exit program
f8	Abort current operation

Load program. This option simply loads a program file into memory. To choose a file, enter the corresponding number (0-9). Because Total Disk Menu is located in the BASIC workspace from \$0801 to \$1311, loading BASIC programs, and certain machine language programs, causes the menu program to abort. Remember: Only program files may be loaded or run.

Run program. This option allows you to run any program file on disk. In order to properly run a machine language file, the beginning of the file must also be its entry point—the SYS address. When selected, you are asked to enter the number that corresponds to the file that you wish to run.

Scratch file. To delete a file from the disk, select this option. As with Load and Run, you must select the file to be scratched by entering its corresponding number.

reName. This option lets you rename files. After pressing N, select the file to be renamed. Next, you are prompted for the file's new name. Enter the name and press RETURN.

Protect. Although not directly supported by Commodore DOS, files can be protected from the scratch command. This option does

just that. When Protect is selected, you are asked if you wish to protect the whole disk. Answer Y or N. If you do not protect the entire disk, you must specify which file you wish to protect by entering the appropriate number. Protected files are displayed in the menu in reverse type.

Unprotect. This option is the opposite of the Protect option. As with Protect, you are asked if you wish to unprotect the whole disk. Answer positively by pressing Y, or press N and select a single file. Once a file is unprotected, it may be deleted normally with the Scratch option.

Space. Pressing the space bar lists the next page of ten programs to the screen. In order to perform an operation on a file, the file must be currently listed on the screen. If your disk contains ten or fewer programs, the space bar does nothing.

f1. Pressing f1 forces the program to read in a new disk's information. You must press f1 anytime you put a different disk in the drive.

f2. Press this to exit the program and return to BASIC. Because Total Disk Menu erases itself from memory, you must load the program again if you wish to rerun it.

f8. This is your escape key. This key allows you to abort any of Total Disk Menu's commands. So, if you accidentally press S for scratch, you can press f8 to return to the menu.

Total Disk Menu

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

```

0801:0C 08 00 00 0E 20 32 38 2B
0809:36 31 00 00 00 24 00 00 11
0811:0B 02 12 B0 60 60 60 60 1A
0819:60 60 60 60 60 60 60 60 29
0821:60 60 60 AE 00 0B 03 12 B4
0829:7D 92 54 4F 54 41 4C 20 7C
0831:44 49 53 4B 20 4D 45 4E E3
0839:55 12 7D 00 0B 04 AD 60 4C
0841:60 60 60 60 60 60 60 60 51
0849:60 60 60 60 60 60 BD 92 46
0851:00 12 06 42 59 00 0D 08 B7
0859:53 43 4F 54 54 20 52 49 24
0861:43 4B 4D 41 4E 00 0C 0A 38
0869:4F 52 4C 41 4E 44 4F 2C A1
0871:46 4C 4F 52 49 44 41 00 A4
0879:05 10 12 49 4E 53 45 52 83
0881:54 20 44 49 53 4B 20 41 2A
0889:4E 44 20 50 52 45 53 53 7C
0891:20 41 4E 59 20 4B 45 59 73
0899:92 00 00 1C 4E 41 4D 45 0C
08A1:3A 0D 49 44 3A 0D 44 56 64
08A9:3A 0D 12 50 52 45 53 53 03
08B1:92 2D 12 52 92 55 4E 2F 73
08B9:12 4C 92 4F 41 44 2F 12 B8

```

```

08C1:50 92 52 4F 54 45 43 54 70
08C9:2F 12 55 92 4E 50 52 4F 71
08D1:54 45 43 54 0D 20 20 20 54
08D9:20 20 20 12 53 92 43 52 E4
08E1:41 54 43 48 2F 52 45 12 F3
08E9:4E 92 41 4D 45 2F 12 53 21
08F1:50 41 43 45 92 3D 4E 45 A2
08F9:58 54 20 50 41 47 45 0D 13
0901:0D BF BF BF BF BF BF 20 1A
0909:12 46 49 4C 45 53 92 20 60
0911:BF BF BF BF BF BF BF BF 23
0919:BF BF BF 20 12 46 55 4E 97
0921:2E 20 4B 45 59 53 92 20 6D
0929:BF BF BF BF 0D 0D 30 2E 2A
0931:0D 31 2E 0D 32 2E 0D 33 44
0939:2E 0D 34 2E 0D 35 2E 0D B5
0941:36 2E 0D 37 2E 0D 38 2E 53
0949:0D 39 2E 0D 0F BF BF BF 6D
0951:BF BF BF BF BF BF BF BF 63
0959:BF BF BF BF BF BF BF BF 6B
0961:BF BF BF BF BF BF BF BF 73
0969:BF BF BF BF BF BF BF BF 7B
0971:BF BF BF BF 0D 00 1A 00 E3
0979:50 41 47 45 20 20 20 20 23
0981:4F 46 00 13 07 BF 00 13 48
0989:08 BF 20 12 46 31 92 3D 0E
0991:4E 45 57 20 44 49 53 4B 42
0999:00 13 09 BF 20 12 46 32 95
09A1:92 3D 45 4E 44 20 41 4E 4D
09A9:44 20 4E 45 57 00 13 0A EE
09B1:BF 20 12 46 38 92 3D 41 1A
09B9:42 4F 52 54 20 43 4F 4D 4A
09C1:4D 41 4E 44 00 13 0B BF FA
09C9:00 13 0C BF 00 13 0D BF 44
09D1:BF BF BF 20 12 46 49 4C 36
09D9:45 20 54 59 50 45 53 92 87
09E1:20 BF BF BF BF 00 13 0E 1A
09E9:BF 00 13 0F BF 20 31 2E 3E
09F1:12 50 52 4F 54 45 43 54 F2
09F9:45 44 20 46 49 4C 45 92 C0
0A01:00 13 10 BF 20 32 2E 20 1E
0A09:43 41 4E 27 54 20 42 45 38
0A11:20 4C 4F 41 44 45 44 00 06
0A19:13 11 BF 00 13 12 BF 00 53
0A21:00 00 00 00 00 00 52 87
0A29:55 4E 00 4C 4F 41 44 00 48
0A31:50 52 4F 54 45 43 54 00 11
0A39:55 4E 50 52 4F 54 45 43 54
0A41:54 00 53 43 52 41 54 43 A1
0A49:48 00 52 45 4E 41 4D 45 77
0A51:00 4E 4F 20 47 4F 00 12 6E
0A59:57 48 49 43 48 20 4F 4E 38
0A61:45 92 3F 00 4E 45 57 20 FA
0A69:4E 41 4D 45 3F 00 57 48 E3
0A71:4F 4C 45 20 44 49 53 4B 24
0A79:3F 00 4E 45 57 0D 00 23 5D
0A81:00 55 31 3A 30 32 20 30 6F
0A89:30 20 31 38 20 30 31 00 8B
0A91:55 32 3A 30 32 20 30 30 C9
0A99:20 31 38 20 30 31 00 42 9B
0AA1:2D 50 3A 30 32 20 30 39 56
0AA9:38 00 00 00 00 00 00 00 D9
0AB1:00 00 00 00 00 00 00 00 C5
0AB9:00 00 00 00 00 00 00 20 ED
0AC1:CF FF CA E0 00 0D F8 20 7A
0AC9:CF FF 20 D2 FF 88 C0 00 9A
0AD1:D0 F5 60 A9 93 20 D2 FF 35
0AD9:A0 00 B1 FB 20 D2 FF C8 4F
0AE1:C0 00 D0 02 E6 FC B1 FB 1B
0AE9:C9 00 D0 F0 C8 C0 00 D0 26
0AF1:02 E6 FC B1 FB C9 00 F0 73
0AF9:20 85 02 C8 C0 00 D0 02 F5
0B01:E6 FC B1 FB AA 84 FF A4 C9
0B09:02 18 20 F0 FF A4 FF C8 94
0B11:C0 00 D0 02 E6 FC 4C DB 61
0B19:0A C8 C8 C0 00 D0 02 E6 B9
0B21:FC 98 18 65 FB 90 02 E6 2E
0B29:FC 85 FB 60 A9 00 8D 21 42
0B31:D0 8D 20 D0 A9 0E 8D 86 4B
0B39:02 A9 08 85 FC A9 0F 85 46
0B41:FB 20 D4 0A 20 E4 FF C9 F6
0B49:00 F0 F9 20 D4 0A A0 00 EC
0B51:B9 00 13 99 E8 07 C8 C0 F5

```

```

0B59:14 D0 F5 A9 08 20 B1 FF 2B
0B61:A9 6F 20 93 FF A9 49 20 BE
0B69:A8 FF 20 AE FF 20 88 12 66
0B71:C9 01 F0 B8 A9 02 A2 08 F8
0B79:A0 02 20 BA FF A9 01 A2 5B
0B81:0E A0 08 20 BD FF 20 C0 B8
0B89:FF 20 88 12 C9 01 F0 9C AA
0B91:A2 02 20 C6 FF 18 A0 05 90
0B99:A2 00 20 F0 FF A2 8E A0 5C
0BA1:10 20 C0 0A 18 A0 03 A2 6C
0BA9:01 20 F0 FF A2 02 A0 02 C6
0BB1:20 C0 0A 18 A0 03 A2 02 23
0BB9:20 F0 FF A2 01 A0 02 20 F4
0BC1:C0 0A A2 59 20 CF FF CA AF
0BC9:E0 00 D0 F8 A9 90 85 FC 91
0BD1:A9 00 85 FB 85 FD A2 00 96
0BD9:A0 00 E8 20 B7 FF C9 00 B0
0BE1:D0 67 20 CF FF C9 55 10 1D
0BE9:15 A0 1F E0 08 D0 04 A2 D2
0BF1:00 A0 1D 20 CF FF 88 C0 26
0BF9:00 D0 F8 4C D9 0B 85 02 30
0C01:A5 F8 29 F0 18 4A 85 04 E7
0C09:4A 09 B0 A8 A5 FC 85 FE 54
0C11:A5 02 91 FD 20 CF FF 20 EE
0C19:CF FF A0 00 20 CF FF 91 FE
0C21:FB C8 C0 10 D0 F6 A0 0D 33
0C29:E0 08 D0 04 A0 0B A2 00 84
0C31:20 CF FF 88 C0 00 D0 F8 76
0C39:A5 FB 69 F0 C9 A0 D0 04 B7
0C41:E6 FC A9 00 85 FB 4C D9 CF
0C49:0B A9 02 20 C3 FF A9 00 05
0C51:85 99 A5 FB C9 00 F0 23 5A
0C59:48 A8 A9 A0 A2 00 86 FB 1D
0C61:91 FB C8 C0 A0 D0 F9 68 0B
0C69:4A 4A 4A 4A 09 B0 A8 A9 2D
0C71:00 91 FB C8 C0 BA D0 F9 86
0C79:4C 7E 0C C6 FC 18 A0 25 F3
0C81:A2 00 20 F0 FF A5 FC C9 58
0C89:8F D0 03 4C 2D 0B 18 E9 72
0C91:8E 8D FF 02 C9 0A 30 0A 55
0C99:AA A9 31 20 D2 FF 8A 18 5D
0CA1:E9 09 29 0F 09 30 20 D2 23
0CA9:FF A9 20 20 D2 FF A9 00 1C
0CB1:85 FB A9 90 85 FC A9 01 3E
0CB9:8D 86 02 A2 08 A0 02 18 83
0CC1:20 F0 FF A5 FC 85 FE A9 26
0CC9:92 20 D2 FF A9 00 85 FD E3
0CD1:8A 18 E9 07 09 B0 A8 B1 F0
0CD9:FD 48 29 F0 C9 C0 D0 05 2F
0CE1:A9 12 20 D2 FF 68 A8 09 21
0CE9:20 48 98 29 0F C9 02 F0 5E
0CF1:07 68 20 D2 FF A9 00 48 C7
0CF9:A0 00 B1 FB 20 D2 FF C8 6D
0D01:C0 10 D0 F6 68 20 D2 FF 72
0D09:A5 FB 69 10 85 FB E8 E0 F1
0D11:12 D0 AA A9 92 20 D2 FF 13
0D19:18 A2 00 A0 1F 20 F0 FF 4D
0D21:A9 02 8D 86 02 A5 FC 69 B4
0D29:01 29 0F C9 0A 30 0A 48 F9
0D31:A9 31 20 D2 FF 68 18 E9 59
0D39:09 09 30 20 D2 FF A9 20 2C
0D41:20 D2 FF 20 E4 FF C9 52 2F
0D49:F0 35 C9 4C F0 34 C9 50 63
0D51:F0 33 C9 55 F0 32 C9 53 76
0D59:F0 31 C9 4E F0 30 C9 85 B7
0D61:F0 2F C9 89 F0 51 C9 20 12
0D69:D0 D9 E6 FC AD FF 02 09 89
0D71:90 C5 FC F0 07 A9 00 85 58
0D79:FB 4C B7 0C 4C AF 0C 4C E1
0D81:26 F0 4C A6 F0 4C 13 10 46
0D89:4C 1A 10 4C 35 0E 4C 92 24
0D91:0E 4C 2D 0B A9 0F 20 C3 A9
0D99:FF A2 14 E8 18 A0 00 20 D0
0DA1:F0 FF A9 20 20 D2 FF C8 80
0DA9:C0 23 D0 F8 E0 17 D0 EB 87
0DB1:A9 00 85 FB 4C 97 0C A0 0B
0DB9:00 B9 7B 0A 99 77 02 C8 C9
0DC1:C9 00 D0 F5 A9 04 85 C6 69
0DC9:00 A9 0A 85 FE 98 48 18 EA
0DD1:A2 15 A0 00 20 F0 FF 68 C3
0DD9:A8 B1 FD 20 D2 FF C8 C9 68
0DE1:00 D0 F6 A9 0D 20 D2 FF 38
0DE9:A0 58 B1 FD 20 D2 FF C8 95

```