

COMPUTER!

The Journal For Progressive Computing™

\$2.50
October,
1981
Issue 17
Vol. 3, No. 10
63379

Extending Atari
Player Missile
Graphics

Train Your PET/CBM
To Run VIC-20
Programs

Budgeting On
The Apple
Computer

An Atari
Program Library

High Resolution
Bar Graphs For
The PET/CBM



Mountain Computer

CPS MultiFunction Card™

The Only Interface Card You Need!

Connecting a Parallel Printer?

Epson® Centronics® IDS Paper Tiger® CPS handles all these printers and others with on-board intelligence to provide paging and other features found on no other card.

Connecting a Serial Printer?

Diablo® Qume® NEC - TI 800 Series® CPS handles these printers and others with standard RS-232 interface providing selection of baud rates, handshakes, paging, and more.

Connecting a Modem or Terminal?

Hayes Smartmodem® Novation CAT® M & R Pennywhistle® CPS handles these and others with full/half duplex operation, baud rate selection, and even a transparent terminal mode which includes a dual mode feature that permits printing of text to parallel printers while 'on-line' eliminating the need for special terminal software—and more.

Connecting with the Time?

The on-board calendar/clock provides real time and date information including day of week, day, month, year, hours, minutes, and seconds for any application requiring a time stamp—battery backed-up for over two years!

Connecting with The Source?

Used with a modem, CPS provides the connection to information utilities, such as The Source®, Dow Jones, and others. Additionally, CPS provides the connection to big-time electronic mail with programs such as Micro Courier® and Micro Telegram®, and other data transfer programs.

Connect with Easy Use!

CPS has no switches to set! All functions on the card are set from a user program. Menu driven screens set up your choice of all functions on CPS and store them on-board in CMOS RAM—battery backed-up (including the clock) for over two years! To change parameters, run the set-up program again—or use special commands from your keyboard. Furthermore, most existing software programs are immediately usable with CPS. *Phantom Slot Capability* permits assignment of CPS' functions to your software's pre-defined slots.

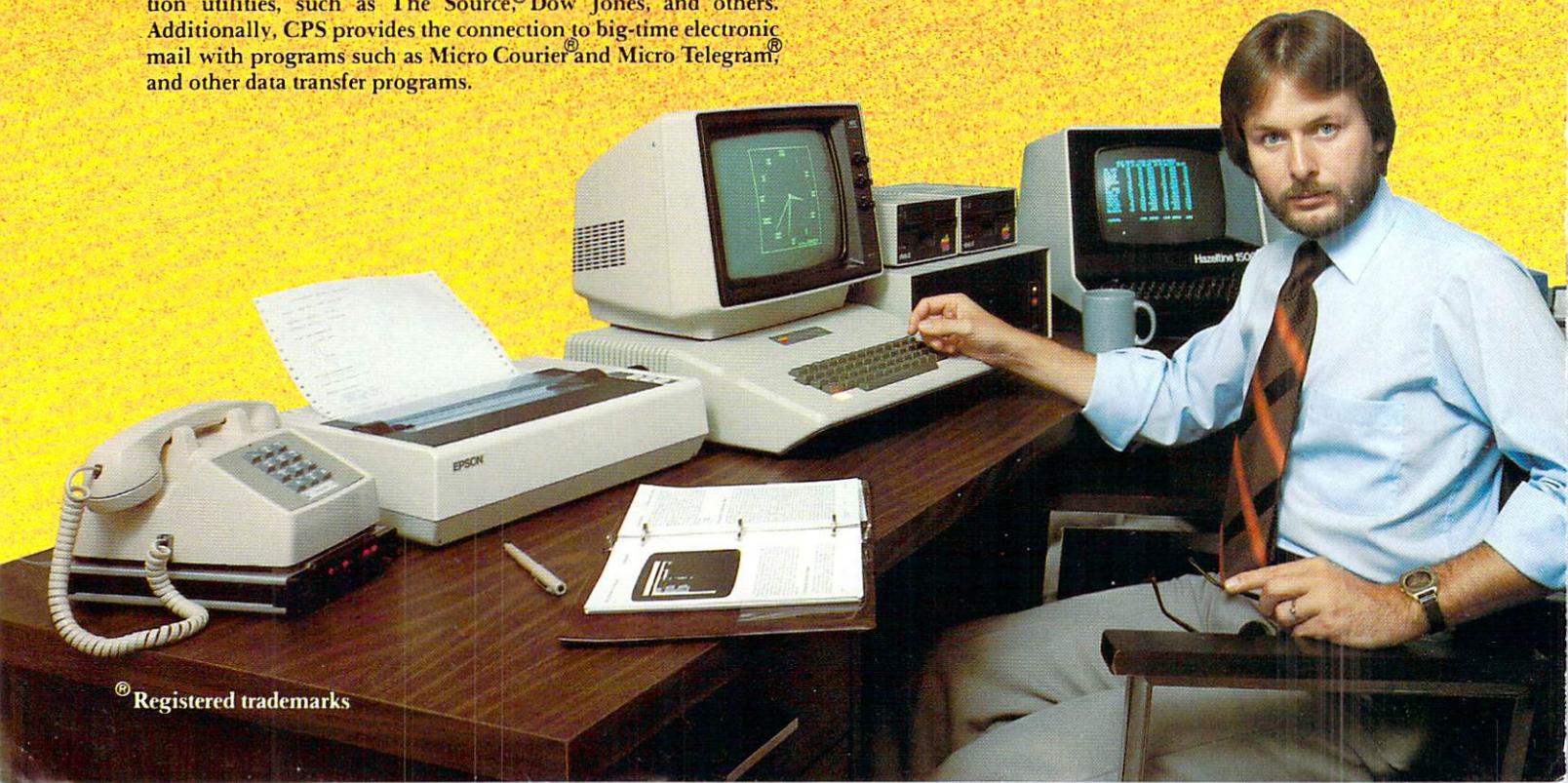
Connect with Your Apple® Dealer

Drop by your Apple dealer and see how the CPS MultiFunction Card provides the most comprehensive capabilities for RS-232C serial interface, parallel output, and real-time calendar/clock of any card available today—all on one card—at one low price—competitive with *any one* of the three or more single function cards that it replaces.



Mountain Computer
INCORPORATED

300 El Pueblo Road, Scotts Valley, CA 95066
(408) 438-6650 TWX: 910 598-4504



IF YOU'RE WAITING FOR THE PRICE OF WORD PROCESSORS TO FALL WITHIN REASON,

IT JUST DID.



Everyone expected it would happen sooner or later...with **WordPro PLUS™** it already has! Now all the marvelous benefits of expensive and advanced word processing systems are available on Commodore computers, America's largest selling computer line. WordPro PLUS, when combined with the new 80 column CBM 8032, creates a word processing system comparable to virtually any other top quality word processor available—but at savings of thousands of dollars!

New, low cost computer technology is now available at a fraction of what you would expect to pay. This technology allowed Commodore to introduce the new and revolutionary CBM 8032 Computer.

WordPro PLUS turns this new CBM 8032 Computer into a sophisticated, time saving word processing tool. With WordPro PLUS, documents are displayed on the computer's screen. Editing and last minute revisions are simple and easy. No more lengthy re-typing sessions. Letters and documents are easily re-called from memory storage for editing or printing with final drafts printed perfectly at over five hundred words per minute!

Our nationwide team of professional dealers will show you how your office will benefit by using WordPro PLUS. At a price far less than you realize.

**Invest in your office's future...
Invest in WordPro PLUS...
Call us today for the name of the
WordPro PLUS dealer nearest you.**

Professional Software Inc.
166 Crescent Road
Needham, MA 02194
(617) 444-5224
TELEX: 95 1579



BASIC-80 CP/M Z-80



Turn your Apple into the world's most versatile personal computer.

The SoftCard™ Solution. SoftCard turns your Apple into two computers. A Z-80 and a 6502. By adding a Z-80 microprocessor and CP/M to your Apple, SoftCard turns your Apple into a CP/M based machine. That means you can access the single largest body of microcomputer software in existence. Two computers in one. And, the advantages of both.

Plug and go. The SoftCard system starts with a Z-80 based circuit card. Just plug it into any slot (except 0) of your Apple. No modifications required. SoftCard supports most of your Apple peripherals, and, in 6502-mode, your Apple is still your Apple.

CP/M for your Apple. You get CP/M on disk with the SoftCard package. It's a powerful and simple-to-use operating system. It supports more software than any other microcomputer operating system. And that's the key to the versatility of the SoftCard/Apple.

BASIC included. A powerful tool, BASIC-80 is included in the SoftCard package. Running under CP/M, ANSI Standard BASIC-80 is the most powerful microcomputer BASIC available. It includes extensive disk I/O statements, error trapping, integer variables, 16-digit precision, extensive EDIT commands and string functions, high and low-res Apple graphics, PRINT USING, CHAIN and COMMON, plus many additional commands. And, it's a BASIC you can compile with Microsoft's BASIC Compiler.

More languages. With SoftCard and CP/M, you can add Microsoft's ANSI Standard COBOL, and FORTRAN, or

Basic Compiler and Assembly Language Development System. All, more powerful tools for your Apple.

Seeing is believing. See the SoftCard in operation at your Microsoft or Apple dealer. We think you'll agree that the SoftCard turns your Apple into the world's most versatile personal computer.

Complete information? It's at your dealer's now. Or, we'll send it to you and include a dealer list. Write us. Call us.

SoftCard is a trademark of Microsoft. Apple II and Apple II Plus are registered trademarks of Apple Computer. Z-80 is a registered trademark of Zilog, Inc. CP/M is a registered trademark of Digital Research, Inc.

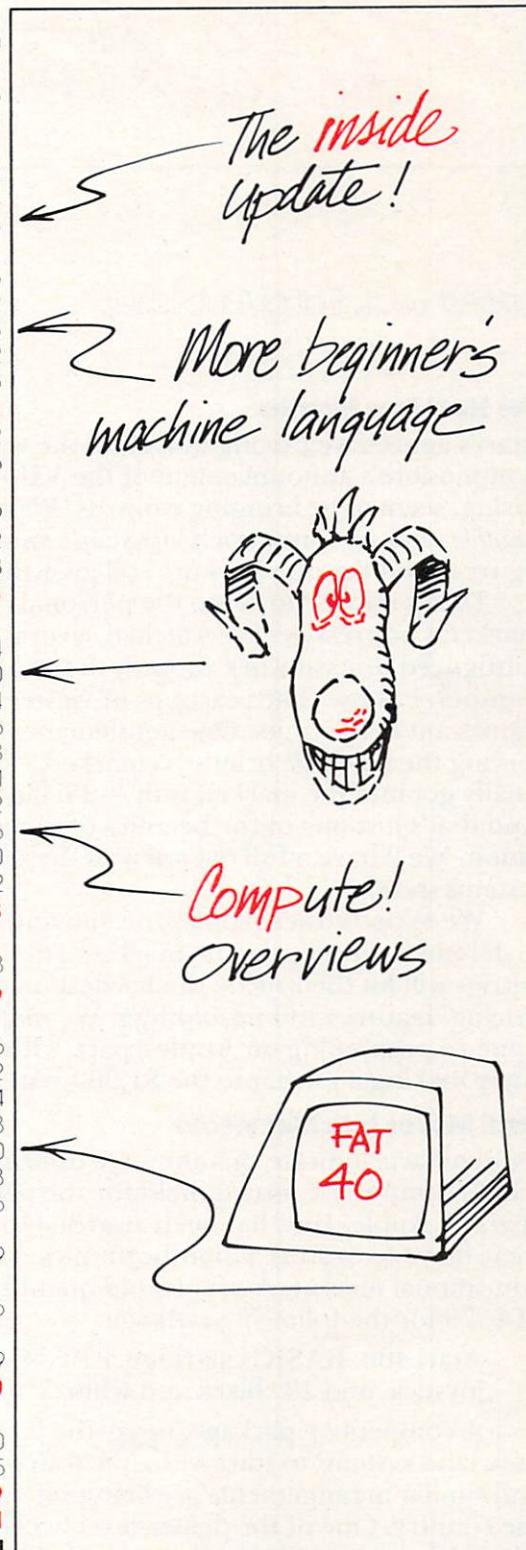
MICROSOFT
CONSUMER PRODUCTS

Microsoft Consumer Products, 400 108th Ave. N.E.,
Bellevue, WA 98004. (206) 454-1315

Table of Contents

The Editor's Notes	Robert Lock, 4
COMPUTE!'s New Listing Conventions For CBM	10
Computers And Society	David D. Thornburg, 12
Readers Feedback	16
Ask The Readers	Robert Lock, Richard Mansfield and Readers, 18
Basically Useful BASIC: Automatic DATA Statements For CBM and Atari	Dr. Harold Linder, 22
The Beginner's Page	Richard Mansfield, 24
VIC-20 News	Compiled from sources by the Editors, 28
Guest Commentary: A Software Publisher's View On Software Pricing And Service Policies	Mr. Sherwin A. Steffin, 36
What Is A MODEM, And Why Do I Need One? Part II	Michael E. Day, 42
More Machine Language For Beginners	Richard Mansfield, 48
Undeletable Lines	Michael P. Antonovich, 62
Inverting A Matrix	Brian J. Flynn, 66
The Apple Gazette	72
Budgeting On The Apple	William R. Swinyard, 72
Named GOSUB's	M. R. Smith, 76
A Tape "EXEC" For Applesoft: Loading Machine Language Programs Part II	Sherm Ostrowsky, 79
Switching Cleanly From Text To Graphics	Brian Nakagawa, 82
Interfacing The CCS 7710A Asynchronous Serial Card	Sam Basset, 83
The Atari Gazette	84
Cassette Boot-Tape Generation From DOS 2.0S Binary Load File	Raymond W. Polone, 84
Beware The RAMTOP Dragon	K. W. Harms, 90
Documented Atari Bugs	Steve Hanson, 94
Graph It On The Atari	John Malcolm Neil, 96
Extending Player Missile Graphics	Eric Stoltman, 98
Atari 400/800 Variable Name Utility	Arthur McGraw, 101
Insight: Atari	Bill Wilkinson, 102
Overview: "Letter Perfect" Wordprocessing On The Atari	106
Atari Disk File Dump	Robert W. Baker, 110
Atari Program Library	Ron and Lynn Marcuse, 112
The OSI Gazette	118
Calling BASIC Commands From Machine Language Routines	William Taylor, 118
The Pet Gazette	126
Practical Pet Printing Primer For Perplexed Programmers	Ron Gunn, 126
Odds And Ends: A Fat Forty Bug	Gordon Campbell, 132
Machine Language: What's Your Sign?	Jim Butterfield, 134
Train Your Pet To Run VIC Programs	Lyle Jordan, 138
Converting To Fat-40	Joe Ferrari, 140
High Resolution Bar Graphs For The Pet	David C. Swaim, 143
Waking Up The PET Screen	Hal Bredbenner, 146
Interfacing A BSR X-10 AC Remote Control System To Your Pet	C. W. Ward, 149
Using Non-Pin-Feed Forms In The 2022 Tractor Printer	Rev. Jack Weaver, 156
How And Why You Should Use PEEK (155) Instead Of GET	David M. Miller, 159
The SBC Gazette	160
AIM 65 BASIC Floating Point Arithmetic From Machine Language	Paul Beasley, 160
A General Purpose BCD-To-Binary Routine	Marvin L. DeJong, 165
COMPUTE! Corrections And Clarifications	169
New Products	171
Advertisers' Index	184

October, 1981, Vol. 3, No 9



COMPUTE! The Journal for Progressive Computing (USPS: 537250) is published 12 times each year by Small System Services, Inc., P.O. Box 5406, Greensboro, NC 27403 USA. Phone: (919) 275-9809. Editorial Offices are located at 625 Fulton Street, Greensboro, NC 27403.

Domestic Subscriptions: 12 issues, \$20.00. Send subscription orders or change of address (P.O. Form 3579) to Circulation Dept., **COMPUTE!** Magazine, P.O. Box 5406, Greensboro, NC 27403. Controlled circulation postage paid at Greensboro, NC 27403. Application to mail at controlled circulation rates pending at Hickory, NC 28601. Entire contents copyright © 1981 by Small System Services, Inc. All Rights reserved. ISSN 0194-357X.

**TOLL FREE
Subscription
Order Line
800-345-8112
In PA 800-662-2444**

A
Small System
Services, Inc.
Publication
COMPUTE!
The Journal for Progressive Computing

The Editor's notes...

Robert Lock, Editor/Publisher

The Next Few Months

Atari's aggressive pricing moves, in the wake of Commodore's announcement of the VIC-20 last spring, seem to be bringing rewards. We hear that *monthly* sales now approach last year's *annual* sales figures. And the numbers are still growing.

IBM's initial entry into the personal computer market is impressive. We watched several fully configured units at work recently at the Midwest Computer Show. The reactions of viewers were as significant as the units. One gentleman, after observing the machine briefly, remarked, "Well they finally got into the market, huh — I'll buy one." And that's just one of the beauties of name recognition. We'll have a full overview of these new IBM systems soon.

We expect to see Apple, Inc. moving quickly to defend their place in the market. The IBM entries will hit their niche the hardest in terms of pricing, features and positioning. We might expect some re-positioning on Apple's part, with one new entry making a push into the \$1,000 system area.

Atari Moves Into Minnesota

Our contacts indicate that the state of Minnesota school computer contract, held for the past three years by Apple, Inc., has been awarded to Atari. In their move to capture a significant piece of the educational market, Atari offered quantity prices of \$579 for the following package:

Atari 400, BASIC cartridge, 810 disk drive, joystick, and 13" black and white TV.

A competitive package, to say the least! Several thousand systems to start with, our sources say, and similar arrangements are being set up around the country. One of the dealer-level beefs we heard when Apple, Inc. was moving directly into the high volume sales markets was that dealers were being left out.

Atari, to their lasting benefit we're sure, will be selling through individual dealers in each town. The dealers will then carry through providing service, ongoing support and additional software, and peripherals as required on a local basis. We applaud this significant support of the dealer network.

10,000,000 Personal Computers

By The End of '86?

A conservative estimate if you believe some marketing plans. The systems selling for less than \$400.00 may hit that point even sooner. We expect 1982 alone to see delivery of well over 1,000,000 core units: Atari 400's, VIC-20's, and Radio Shack Color Computers.

Clarifying The Rights Of Authors

When you sell a manuscript to COMPUTE!, or one of our other publications, we purchase all rights to your manuscript, including accompanying software. The software rights are non-exclusive however, in that we freely give permission on request to original authors, authorizing the sale or distribution of their software. It is understood that such sale or distribution is non-exclusive, and subject to agreement by the author. We also retain the right to sell and distribute the software on a non-exclusive basis, subject to royalty and contractual agreement by the author.

In Their Continuing Quest To Respond To The US Market, Commodore Brings In Their Best

Commodore has been voicing a commitment to

Coming In November:

- Commodore's Super-Pet Revealed — The history and evolution of the new computer.
- An Atari Program For Writing Programs
- A Data Base Management System For The Atari
- And Much More!

ATARI® SOFTWARE

PIRACY:

THIS GAME IS OVER.

ATARI® has led the industry in the development of video games such as ASTEROIDS™ and MISSILE COMMAND™. The outstanding popularity of these games has resulted from the considerable investment of time and resources which ATARI has made in their development. We appreciate the worldwide response from the videophiles who have made our games so popular.

Unfortunately, however, some companies and individuals have copied ATARI games in an attempt to reap undeserved profits from games that they did not develop. ATARI must protect its investment so that we can continue to invest in the development of new and better games. Accordingly, ATARI gives warning to both the intentional pirate and to the individuals simply unaware of the copyright laws that ATARI registers the audiovisual works associated with its games with the Library of Congress and considers its games proprietary. ATARI will protect its rights by vigorously enforcing these copyrights and by taking the appropriate action against unauthorized entities who reproduce or adapt substantial copies of ATARI games, regardless of what computer or other apparatus is used in their performance.

We ask that legitimate software developers cooperate with us to protect our property from any form of software piracy, imitation or infringement. ATARI is currently offering copyright licenses for a limited number of its games to selected software developers. If you happen to be selling a software product which performs a game similar to any ATARI game (such as a game created for a home computer), please contact us immediately. Write to the attention of: Patent Counsel, ATARI, Inc., 1265 Borregas Ave., Sunnyvale, Calif. 94086



 A Warner Communications Company
© 1981, ATARI, INC

Robert C. Lock, Publisher/Editor
 Kathleen Martinek, Publication Assistant
 Richard Mansfield, Assistant Editor
 Charles Brannon, Editorial Assistant

Associate Editors

Jim Butterfield, Toronto, Canada
 Harvey Herman, Greensboro, NC

Contributing Editors

Charles Brannon, P.O. Box 6104,
 Greensboro, NC 27405
 Marvin DeJong, Dept. of Mathematics
 -Physics, The School of the Ozarks
 Pt. Lookout, MD 65726
 Eric Rehnke, 1067 Jadestone Lane,
 Corona, CA 91720
 David Thornburg, P.O. Box 1317,
 Los Altos, CA 94022
 Bill Wilkinson, Optimized Systems
 Software, 10379-C Lansdale, Ave.
 Cupertino, CA 95014
 Gene Zumchak, 1700 Niagara St.,
 Buffalo, NY 14207

Georgia Papadopoulos, Art Director/
 Production Manager
 Terry Cash, Typesetting/Production
 Assistant
 Harry Blair, Director, Advertising and
 Promotion
 Joretta Klepfer, Manager, North
 American Retail Sales
 Alice S. Wolfe, Manager, Foreign
 Retail Sales
 Bonnie Valentino, Circulation Assistant
 Sonja Whitesell, Office Assistant
 Dai Rees, Shipping Department

Subscription Information (12 Issue Year): **COMPUTE! Circulation Dept.**

P.O. Box 5406
Greensboro, NC 27403 USA

U.S. \$20.00
 Canada \$25.00 (U.S. funds)
 Europe: Surface Subscription, \$25.00 (U.S.
 funds)

**TOLL FREE
 Subscription
 Order Line**
800-345-8112
 In PA 800-662-2444

Canadian Retail Dealers should contact:
 Micron Distributing
 409 Queen Street West
 Toronto, Ontario M5V 2A5
 416-361-0690

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 Small System Services, Inc. No portion of this magazine may be reproduced in any form without written permission from the publisher. Entire contents copyright © 1981, Small System Services, Inc. Programs developed and submitted by authors remain their property, with the exception that COMPUTE! reserves the right to reprint the material, as originally published in COMPUTE!, in future publications. Unsolicited materials not accepted for publication in COMPUTE! will be returned if author provides a self-addressed, stamped envelope. Program listings should be provided in printed form (new ribbon) as well as machine readable form. Articles should be furnished as typed copy (upper and lower case, please) with double spacing. Each page of your article should bear the title of the article, date and name of the author. COMPUTE! assumes no liability for errors in articles or advertisements. Opinions expressed by authors are not necessarily those of COMPUTE!. PET is a trademark of Commodore Business Machines, Inc. Apple is a trademark of Apple Computer Company. ATARI is a trademark of Atari, Inc.

Advertising Sales

If you're in **Oklahoma, Texas or the Western States, we're now represented by Phoebe Thompson and Associates.**

Give them a call for space reservations, contract/insertion information or questions. You can reach them through the following office:

Phoebe Thompson and Associates

101 Church Street
 Suite 13
 Los Gatos, CA 95030
 408-354-5553
 PHOEBE THOMPSON

If you're in the East, we're now represented by **The Gentleman Company**. You can reach them through the following offices:

New England, New York State:

The Gentleman Company
 Statler Office Building
 Suite 582
 20 Providence Street
 Boston, MA 02110
 617-451-0822
 JOAN DONAHUE

The Gentleman Company

Summit Office Centre
 7266 Summit Avenue
 Fort Washington, PA 19034
 215-646-5700
 DOUG JOHNSON

New York City Metro Area,
 Mid-Atlantic and Southeastern States:
 Local Numbers:
 New York 212-567-6717
 Atlanta 404-523-1252

If you're in the **Midwest, we're now represented by GB & Associates**. You can reach them through the office of:

GB & Associates
 P.O. Box 335
 Libertyville, IL 60048
 312-362-1821
 GORDON BENSON

COMPUTE! Home Office Contacts

Advertising Sales Manager, HARRY BLAIR
 Advertising/Production Coordinator,
 ALICE S. WOLFE

Address all advertising materials to:

625 Fulton Street
 Greensboro, NC 27503 USA

Mailing address: COMPUTE!

Post Office Box 5406
 Greensboro, NC 27403 USA

Telephone: 919-275-9809

Apple World

3-D ANIMATED COLOR GRAPHICS
 Written in machine code.

The program made famous on national T.V.! by Paul Lutus

APPLE WORLD turns your Apple into a sophisticated graphics system capable of creating animated three-dimensional color images, projecting them in true perspective on the screen, rotate them, move them closer, further away, and many other exciting and imaginative things.

Draws objects with 65,000 points per side

A powerful screen-oriented text editor is included to facilitate image formation. This program was recently featured on Tom Snyder's Prime Time Saturday TV Show and is now available for sale.

APPLE WORLD's powerful editor is so easy to use that children will love it. You can now "sketch" your dream house, boat, car, or fantasy empire. Then view it as it would be seen from 10,000 feet, or you can ZOOM in until the screen is filled with a door knob. You could then go inside and move from room to room examining furniture placement as your screen rotates within the room. Images or specific parts of images can easily be saved to disk or printer.

Does all this sound like science fiction? You won't think so after you have visited Apple World.

INTRODUCTORY PRICE \$59.95

36 page manual included
 For 48K Apple II or Plus with Disk

3-D Supergraphics

& 3-D GAME DEVELOPMENT SYSTEM IN COLOR
 by Paul Lutus

Watch colorful butterflies, birds, fly across your Apple or Atari screen with true 3 dimensional perspective. Have rocket ships fly out at you in this incredible high speed graphics package. 3-D SUPERGRAPHICS™ is a 6502 machine language program that will interface to your Basic or machine language programs or games using simple "DOS-like" commands.

Features include:

- Simple image entry through editor
- Objects up to 256 points per side
- Uses all hi-res colors
- Allows mixed colored text & graphics for prompts and captions
- Translates on 3 axes
- Individual axis scales
- 21 different commands
- Rotate object 1° to 360° increments at machine speeds

FOR 48K APPLE II OR PLUS WITH DISK II \$39.95 FOR DISK

FOR ATARI 800 WITH 40K MEMORY (DISK OPTIONAL)

\$39.95 FOR TAPE

OTHER SOFTWARE

APPLE COMPUTERS

Super Space Wars	9.95
States & Capitals	9.95
Moving Point	
Average	19.95
Stock Options	24.95
Finance	12.95
Bonds	

COMMODORE PET

Stock Options	24.95
Finance	12.95
Bonds	
Stock Analyzer	22.95
Mortgage	14.95

Space Intruders ("Best

Game of 1979)	19.95
Jury/Hostage	9.95
Kentucky Derby/	
Roulette	9.95
Alien I.Q./Tank	9.95

Submarine Attack

Battle of Midway

Laser Tank Battle

Swarm

Baseball

Super Star Trek

PET Music Box

Music Composition System

Pearl Harbor Adventure

Super Gomoku

..... 19.95

Relational Query System For Management

REQUESTTM

**DATABASES: You've Heard The Hype Before...
The Truth IS... REQUEST DELIVERS!**

DATABASE MAINTENANCE—

- Uses sophisticated screen formatting & data entry, like on IBM 3270's!
- Generates its own screens automatically!
- Handles records up to 4K in length, using multiple screen "Pages"!
- Automatic data compression for increased disk capacity
- Uses Superkram (See below) access method for incredibly fast access, LESS THAN .2 SECONDS FOR A RECORD!
- Automatic index creation/maintenance
- Automatic maintenance capabilities
- "Goof-Proof" error handling
- Input can come from VISICALC™ or SOURCE™

DATABASE SELECTION—

- Uses screen masks to form query
- Provides extensive search capabilities
- Search arguments can include arithmetic/boolean functions, multi-field comparisons
- Queries can generate input for automatic database maintenance
- Queries can be stored in "Query Library" and executed from menu on demand
- Any number of fields can be queried concurrently
- Query output can be routed to disk, CRT report formatter, VISICALC™ or SOURCE™

ONLY \$225

DATABASE REPORTING—

- Automatic headlines
- Automatic field editing
- Report fields can be calculated, sub-totaled & cross-footed in any manner desired.
- Optional counter breaks may be set
- Automatic grand totals
- Automatic statistics

REQUIREMENTS

Superkram (see below) and: Commodore Pet 32K (40 or 80 col.) and 2040/4040/8050 disk OR Apple II 48K with Applesoft or language system and 2 disk drives or CORVUS.

SUPER KRAM

Now With Multi-Key Capabilities For Apple & Pet

by Ken Germann

Since KRAM™ was introduced in 1979 it has fast become known as the quickest and most powerful access method for serious Apple and Pet users. Now, after hundreds of requests we have added MULTI-KEY, MULTI-INDEX, functions, as well as increasing processing speed.

IBM/370 users have VSAM (Virtual Storage Access Method) to provide fast, flexible keyed-access to their data. Now SUPER KRAM (Keyed Random Access Method), from United Software of America, gives Apple and Pet users the same flexibility, substantially increasing the processing power of the Apple and Pet.

Until SUPER KRAM the only "random access" capability in the Apple and Pet consisted of a crude form of "relative record" processing. While this is useful for very simple applications, it fails far short of the needs of today's business and analytical applications. Using SUPER KRAM records may be processed by any one of multiple "key" values, which may consist of any kind of data: numbers, letters, special characters, etc. Even Apple's long-awaited DOS 3.3 doesn't have anything like this!!

KRAM™ 2.0 Only \$99.95

ATTENTION-EXISTING KRAM USERS

Send \$15 with original disk and ROM to United Software for improved version of Kram.

SUPER KRAM™ Only \$175

KRAM™ 2.0 Regular Features

- Written in 6502 machine code
- Basic compatible
- Create/Open a dataset
- Put record by key
- Add & delete records by key
- Get any record by Full/Partial key
- Access by any key in as little as .2 sec. (.1 sec. with Corvus disk)
- Supports multiple disks
- Read next or previous record
- Dynamic space allocation
- Dynamic space reclamation
- Dynamic index compression
- Files never need reorganization
- Compatible with language systems



SUPER KRAM'S™ Added Features

- MULTIKEY SUPPORT — Allowing simultaneous access to a KRAM file by more than one key field.
- HI-SPEED READ — This feature allows increased I/O speed up to 60% faster during processing of SUPER KRAM read next, read previous, put and delete requests.
- IMPROVED INDEX ARCHITECTURE — Allowing faster index searchers and more efficient disk space utilization.
- INTEGRATED BASIC COMMANDS — Allowing SUPER KRAM™ commands to be coded in-line with Basic, providing easier usage of KRAM than ever before.
- USER-SPECIFIABLE BUFFER POOL — Allowing the user to specify how many KRAM files are allowed open at one time, will support any number of KRAM files.
- LOGICAL RECORDS (KEYS MAY BE NON-UNIQUE) — Records added to the KRAM files are immediately accessible by any of the defined keys for the file (Automatic Upgrade).
- KRAM 2.0 files are totally compatible with SUPER KRAM

UNITED SOFTWARE OF AMERICA
 750 3RD Avenue,
 New York NY 10017
 (212) 682-0347 Telex 640055

Look for the RED-WHITE-BLUE
 United Software Display at your local
 computer dealer, or send check or
 moneyorder, plus \$3.00 shipping to:
DEALER INQUIRIES INVITED

REQUEST & KRAM are trade marks of United Software of America

strengthening their US marketing operations for some time now. We're hopeful that a recent personnel move will translate that theory into practice. Kit Spencer, the former marketing head for Commodore UK, has come over to head up US marketing operations. While in England, Kit built an organization which, at one point, held 70% of the market share. Should be interesting to see how he does here if the powers that still be let him have his go at it. You'll find a candid, exciting interview with Kit in our November issue.

The Single Board Computer Gazette — A Decision And Announcement

The December issue of **COMPUTE!** will be the last with an SBC Gazette. The gradual reorientation of **COMPUTE!**, and the changing needs of our readers, contributed to this decision. While the Gazette will go away, interest won't — we'll still have occasional and timely articles relevant to all readers. And we'll still have the continuing contributions of Marvin DeJong, Gene Zumchak's column *Nuts And Volts*, and more.

Creative Computing Acquires Computers And Programming Magazine

In the push for biggest, *Creative Computing* has made a dynamic move to leap past McGraw Hill's *BYTE* magazine as the largest circulation magazine in the industry. *Creative* bought *Computers and Programming* magazine (remember *Elementary Electronics* magazine? — that's it with a name change and an audience repositioning). *Creative*'s blending the C&P audience into their own subscriber base, ending up with a projected circulation in excess of *BYTE*'s 200,000 +.

It's an interesting marriage of reader populations and we're curious to see how it all sorts out.

Telecommunications And COMPUTE!

One of my pet frustrations has been the amount of editorial paper shuffling we end up doing around here. All of our typesetting is now done inhouse on Mergenthaler equipment. By early spring we expect to be set up editorially to serve as "store and forward" hosts to our columnists. They'll be able to call our machines (PET, Atari, Apple, etc.) and transmit columns to us directly. We'll be able to edit on-line, and then load editorial material directly into our typesetting unit, thereby saving millions of keystrokes, and two entire copy proofing steps.

It's nice to think we'll actually get to the point where we can save ourselves tremendous amounts of time using the technology we're all surrounded by!

Happy Birthday — COMPUTE! Grows On

With this issue our press run has increased to 40,000. Two years ago, we were in the midst of anxiously trying to gather our first 400 subscribers. Our first issue went out to fewer than 40 dealers,

world-wide. Now, two years later, this issue goes to readers in more than 50 countries, and a dealer/newsstand network just short of a thousand.

Our growth has been marked by constant compounding due, in large part, to you, our readers. Our recently completed reader survey included a question designed to help us identify where we find you. Or, better stated, where you find us. While the answers showed us our advertising works, and our new subscribers from retail outlets are important, the second largest source of new subscribers was you — the existing readers. Well over 30% of our new subscribers find **COMPUTE!** via a friend's recommendation. Facing page 40, you'll find our direct mail cards. Give one to a friend and sign them up. Thanks.

California Here We Come (And Michigan, New York, Boise...)

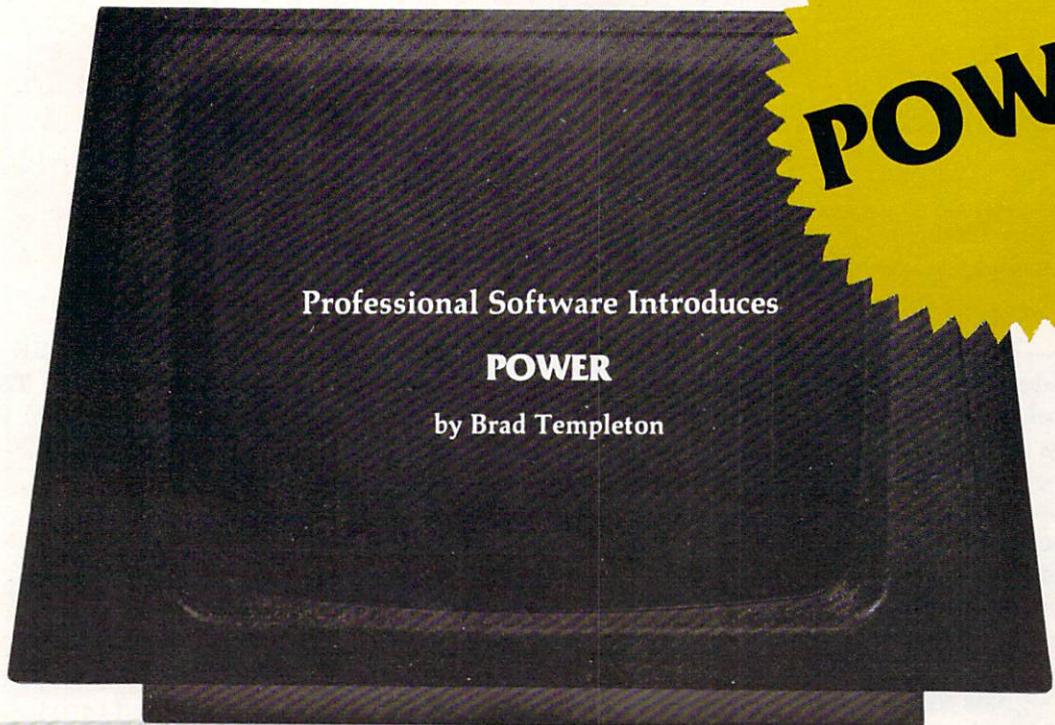
In our efforts to bring production and delivery to earlier dates, we're gradually making changes that should bring subscriber delivery to a par with store delivery. One big change we expect to implement by the December issue will involve all of you West Coast readers. Currently the mail is taking three weeks or more in some cases to get to you. As far as we can tell, there's absolutely nothing we can do with the US Postal Service to improve that delivery time. You're "Zone 8" from us, and that's that. Beginning with the December issue, we'll truck your magazines across country and mail them in California.

You should see substantially improved delivery time and be able to enjoy your **COMPUTE!** that much sooner.

COMPUTE! Books Update

Our first two books, the Atari and the PET/CBM book, were delayed during our production revamping. They are now scheduled for completion and shipping in October. Those of you who've ordered the book, and waited patiently (or not so patiently) should be assured your orders will be shipped first. In this case, we'll send them out first class mail. Sorry for the delay.

— RCL

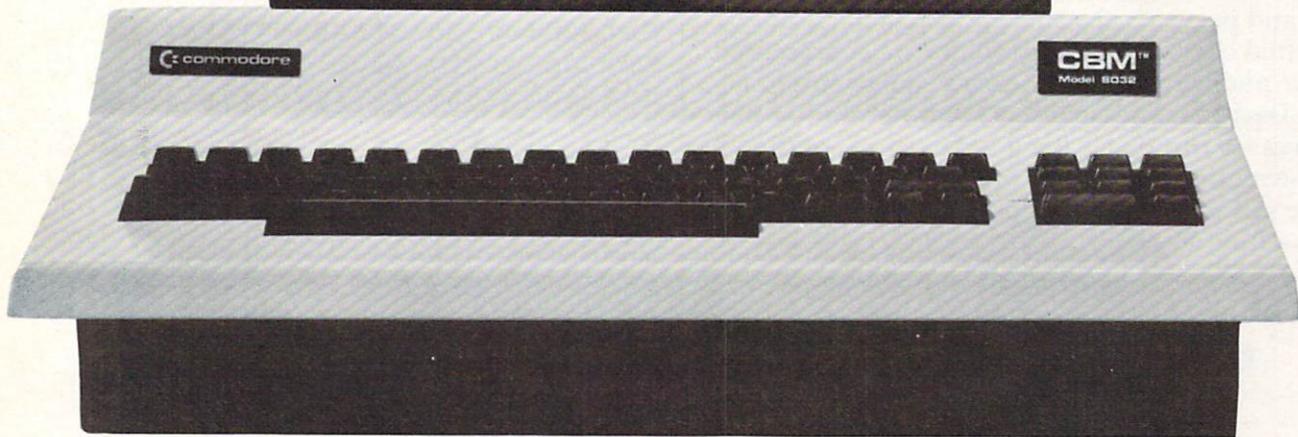


POWER

Professional Software Introduces

POWER

by Brad Templeton



ADD POWER TO YOUR COMMODORE COMPUTER \$89.95

POWER produces a dramatic improvement in the ease of editing BASIC on Commodore's computers. POWER is a programmer's utility package (in a 4K ROM) that contains a series of new commands and utilities which are added to the Screen Editor and the BASIC Interpreter. Designed for the CBM BASIC user, POWER contains special editing, programming, and software debugging tools not found in any other microcomputer BASIC. POWER is easy to use and is sold complete with a full operator's manual written by Jim Butterfield.

POWER's special keyboard 'instant action' features and additional commands make up for, and go beyond the limitations of CBM BASIC. The added features include auto line numbering, tracing, single stepping through programs, line renumbering, and definition of keys as BASIC keywords. POWER even includes

new "stick-on" keycap labels. The cursor movement keys are enhanced by the addition of auto-repeat and text searching functions are added to help ease program modification. Cursor UP and cursor DOWN produce previous and next lines of source code. COMPLETE BASIC program listings in memory can be displayed on the screen and scrolled in either direction. POWER is a must for every serious CBM user.

Call us today, for the name of the Professional Software dealer nearest you.

Professional Software Inc.

166 Crescent Road

Needham, MA 02194

Tel: (617) 444-5224 Telex #951579

COMPUTE!'s New Listing Conventions For CBM

New machines — VIC and "FAT-40" — and 4.0 BASIC have added a host of new editing functions and color control codes. To make COMPUTE!'s program listings as easy as possible for you to type in accurately, we will list CBM programs in a new, simpler way. Starting in this issue, you will see that our previous method — reconstructed cursor symbols — has been replaced by bracketed words. [DOWN] will mean the cursor-down key. [3 LEFT] will mean three cursor-lefts, and so on.

We will continue to split program lines with the ~ symbol. It signals that the line is continued below and prevents any spaces from being hidden. All shifted characters and graphics are represented by their underlined non-graphics equivalent. Line 110 in David Swaim's article, "High Resolution Bar Graphics for the PET," is a good example of the new conventions. We hope you will agree that this change will simplify your typing of programs. Let us know how you feel.

Here is a table of the new conventions:

Key To COMPUTE!'s CBM Listings

All Machines

Clear Screen	{CLEAR}
Home Cursor	{HOME}
Cursor Up	{UP}
Cursor Down	{DOWN}
Cursor Right	{RIGHT}
Cursor Left	{LEFT}
Insert Character	{INST}
Delete Character	{DEL}
Reverse field on	{RVS}
Reverse field off	{OFF}

CBM 8032/"FAT 40"

Set Window Top	{SET TOP}
Set Window Bottom	{SET BOT}
Scroll Up	{SCR UP}
Scroll Down	{SCR DOWN}
Insert Line	{INST LINE}
Delete Line	{DEL LINE}
Erase to Beginning	{ERASE BEG}

Erase to End	{ERASE END}
Toggle TAB	{TGL TAB}
TAB	{TAB}
ESCape key	{ESC}

VIC 20 Color Computer

Set color to Black	{BLK}
Set color to White	{WHT}
Set color to Red	{RED}
Set color to Cyan	{CYN}
Set color to Purple	{PUR}
Set color to Green	{GRN}
Set color to Blue	{BLU}
Set color to Yellow	{YEL}
Function One	{F1}
Function Two	{F2}
Function Three	{F3}
Function Four	{F4}
Function Five	{F5}
Function Six	{F6}
Function Seven	{F7}
Function Eight	{F8}

Any Non IMplemented Function	{NIM}
------------------------------	-------

©

COMPUTE!

The Resource

CREATE-A-BASE WITH SUPER SCAN/EDIT

CREATE-A-BASE, the ideal data management system, has added a touch of class with its new **SUPER SCAN/EDIT**. No other program gives the user such ease of operation and **Create-A-Base** still has all the other features for which you asked: interactive with WordPro, mathematic functions, sort 650 records in 19 seconds, specialized reports, merging, transferring, and duplicating files with a few easy commands.

The **Super Scan/Edit** puts the operator in control. The Scan can locate an eleven character match anywhere in a record scanning 10, 24 field records a second. Cut the fields to 8 and it will scan 21.8 records a second. Speed is of the essence, with the located record on the screen you have full Editing functions. Never again will you have to rewrite an entire line, just cursor over, make the change, add, delete, or rewrite the record with the touch of a key.

CREATE-A-BASE is here with **SUPER SCAN/
EDIT**, don't miss it!

WORDS! WORDS! WORDS?

Oh NO!, another misspelled word. Did you catch it?

WORDCHECK DID

WordCheck can find those minor errors in even the longest WordPro text file. This program was not designed to eliminate proofreading, but to be used as a utility program. The most commonly misspelled words are the ones we use all the time.

WordCheck is capable of identifying 7 to 10,000 words and will support multiple dictionaries for specialized applications such as; medical, legal, or scientific. A standard dictionary is included that can be modified at any time by the user, or duplicated to create additional dictionaries.

WordCheck lays no claims to "**FLASH AND SIZZLE**"

Just a major claim on "**WORDS!**"

Call now for your claim on "**WORDCHECK!**"

AVAILABLE

at your local **COMMODORE** dealer or
distributed exclusively in **CANADA** by

B.P.I. Micro Systems, Ltd.

80 Barbados Blvd. #14

Scarborough, Ontario M1J1K9

Special Dealer Introductory Package Available

Micro Computer Industries Ltd.

1520 E. Mulberry, Suite 170 Fort Collins, CO 80524

1-303-221-1955

Computers And Society

David D. Thornburg
Innovision
Los Altos, CA

Speculations On The Appropriateness Of Technology ...

Many years ago the Dick Tracy comic strip featured a character named Diet Smith who had invented a magnetic levitation process which allowed (among other things) interplanetary travel. His slogan was "The nation that controls magnetism controls the Universe."

The idea that new technologies can generate social change on a large scale is more common in science fiction than it is in reality. Today we seem less concerned with technology giving us control of the universe than with the question of whether certain technologies are appropriate for any use whatsoever. If we are to believe authors like Alvin Toffler and Frank Herbert, the personal computer is soon to become an indispensable part of our lives. According to these futurists, everyone will be using these marvelous machines soon.

And yet, if the personal computer is to play such an important role in our lives, it isn't at all clear just how this is going to happen. In fact, the personal computer world seems to be entering a period of some confusion at this time — a confusion born less of technology than of the question of just what the appropriate applications for this technology are.

Before 1979, most of the personal scale computer systems in the world were in the hands of hobbyists — people who eagerly became the explorers of this new field, mapping uncharted territory and reporting their findings to the more timid. These people knew exactly what they were doing, and they were in control of their computers from the first time they turned them on.

Next came people wanting to use these machines for business applications. For these people there was a large gap between the user's expectations and the limited tasks these machines appeared able to perform. The conversion of the personal computers into a useful tool didn't happen overnight. Software pioneers, working out of bedrooms, garages, and warehouse offices generated thousands of programs for these customers in the hope that the perfect application would be found. How-

ever well intentioned the effort, until recently, the personal computer simply wasn't an adequate tool. When used for inventory control, for example, the memory capacity of most micros is too small for all but the tiniest company; and most tiny companies who know enough to want to use a computer also know that they won't be tiny companies forever.

And so, after a period where many programmers appeared to be taking the role of Eddington's monkeys, thrashing at thousands of keyboards and hoping that one of them would produce a work of Shakespeare, two magnificently appropriate applications for business users were developed. These were the electronic spread sheet (of which VisiCalc is the most popular), and word processing. Each of these applications was new for the "data processing" environment normally associated with business computers — and each of them suited the size and capabilities of the personal computer very well. Each of these applications was new for the "data processing" environment normally associated with business computers — and each of them suited the size and capabilities of the personal computer very well.

Once these applications became accepted, two things happened to the industry. Business users started buying personal computers by the hundreds of thousands, and the traditional Fortune 500 computer companies made their decision to enter the fray. It took the hardware pioneers, Commodore, Apple, Tandy, Atari, and others, to qualify the market for the new entrants — notably Xerox and IBM. In the space of a year, the personal computer went from being an inappropriate tool to being an essential tool for many thousands of businesses.

And now we see several computer manufacturers making their plunge into the newest (and largest) marketing frontier of all — the mass consumer market. This is the most dangerous market of all to enter with a new technology, since many fine product concepts have lain like so many rusted Edsels on the path to the marketplace. And yet several brave manufacturers have declared their intentions to be successful in a market which has yet to define its principal application. If you doubt the seriousness of this effort, note that, last year, computers were generally sold only through computer and office product stores. This year, computers can be found in most large department stores and catalog showrooms — places from which they are being purchased in record numbers.

Even as these machines are being sold, one must ask if their purchasers realize that they too are pioneers — that the appropriate application for personal computers in the home is yet to be defined. To explore the appropriateness of the personal computer in the home, let's look at two factors: applications and ease of use.

SOFT ROM

- 4096 BYTES OF SOFT ROM
- STORE MACHINE CODE SOFTWARE BEYOND THE BOUNDARIES OF BASIC
- WRITE PROTECT RAM WITH A FLIP OF A SWITCH
- STORE VARIABLES OR INDICES OUTSIDE OF BASIC
- SOLVE THE CONFLICTING ROM PROBLEM BY SOFT-LOADING THE APPROPRIATE ROM IMAGES

The SOFT ROM is compatible with any large keyboard PET/CBM or similar 2532 EPROM systems. It may be placed in any ROM socket to give the user room for machine code. If the SOFT ROM is placed in an occupied ROM socket, the user can transfer the PET/CBM ROM into the on-board ROM socket and select between ROM and RAM to manipulate the Commodore operating system.

Since the SOFT ROM places write protectable RAM into any of the computer's

ROM sockets, it is ideally suited to use as a development tool to test ROM or EPROM based software systems before they are burned in.

Examples of software presently available for the SOFT ROM includes BASIC AID, UNIVERSAL WEDGE, SUPERMON, EXTRAMON, USER PORT PRINTER (Centronics parallel) and a buffered BACKGROUND PRINTER routine.

Installation is a simple plug-in into any available ROM socket.

\$129.00

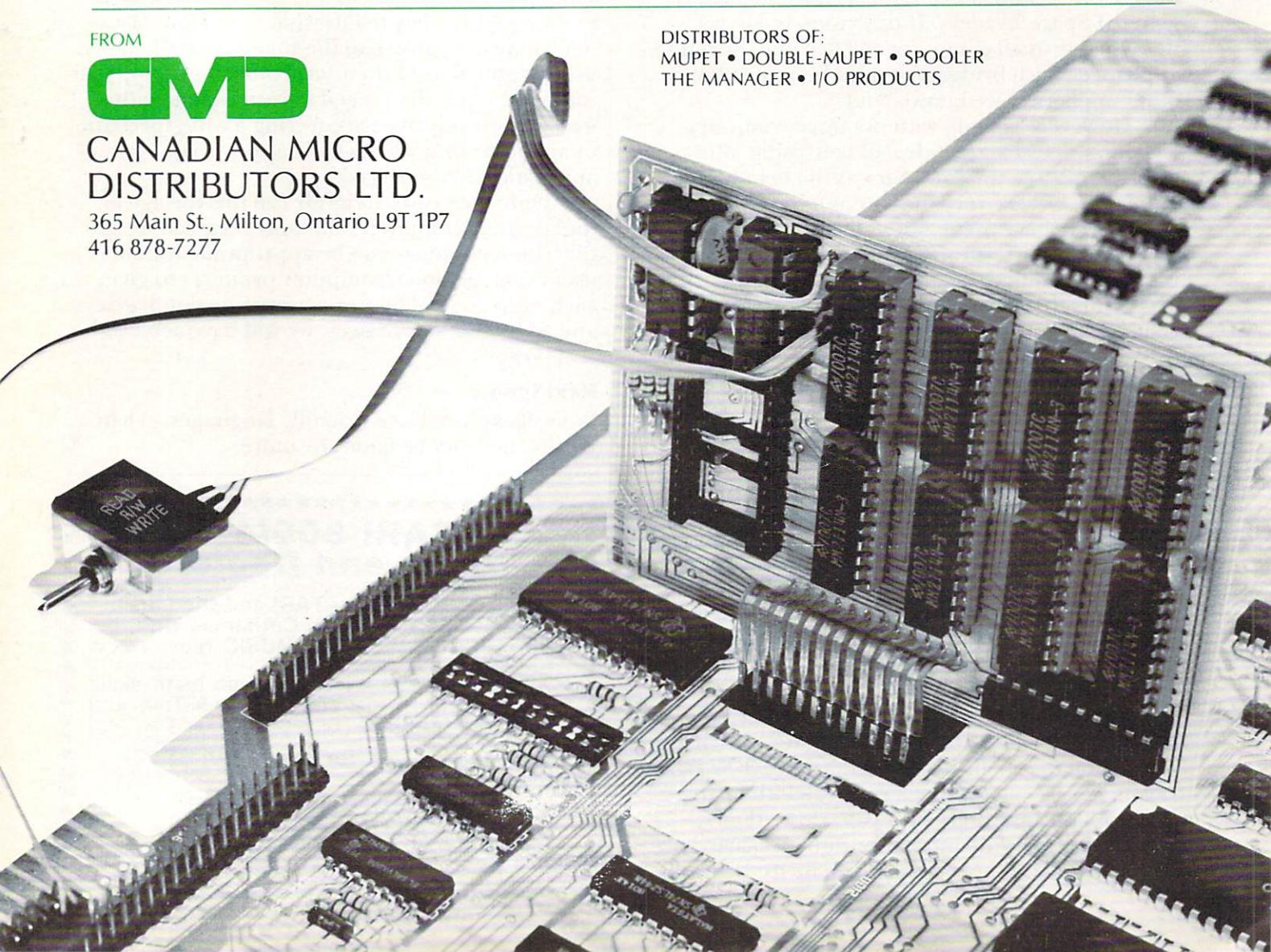
FROM

CMD

CANADIAN MICRO
DISTRIBUTORS LTD.

365 Main St., Milton, Ontario L9T 1P7
416 878-7277

DISTRIBUTORS OF:
MUPET • DOUBLE-MUPET • SPOOLER
THE MANAGER • I/O PRODUCTS



If we examine the appliances which are already in homes today, we can separate them into roughly three categories — utilitarian, communication, and entertainment. Utilitarian appliances include clothes washers, stoves, refrigerators, and other appliances which are used to maintain and serve the utility needs of the household. The only pure communication device most people have in their homes is the telephone, although one could put CB radio in this category as well. The remaining appliances — television, radio, stereo system, etc., fall under the entertainment category. These entertainment devices are overwhelmingly communications oriented. The vast majority of this equipment is designed to receive broadcast material, or to play pre-recorded material. It wasn't until the video game that a non-communications oriented entertainment appliance entered the arena.

And now we must ask where the personal computer fits into the home. Some people envision the home computer as the wonder device which serves many functions simultaneously — controlling the lawn sprinklers, receiving the latest news from the UPI wire, and challenging its owners to a fast game of Space Evaders. If this vision is correct, then the personal computer will become the home appliance which bridges the gaps between all the other appliances we know about.

However, as I talk with potential computer owners, I detect a great deal of confusion. Most of these people see the computer as the next home appliance, but are very unclear as to how this appliance will serve them. Many people seem to think that the major useful application for these machines is to serve as a high quality video game.

While there is an awareness of the educational value of having a computer around the house, there are not an overwhelming number of well designed educational programs on the market. Nonetheless, advertising which makes parents feel guilty for not getting a computer for their children has probably increased personal computer sales to families.

Communications is another legitimate application, but many potential users are not yet ready to use the computer as a replacement for the post office or the morning paper. And home financial management sounds like a great ideal until people realize the tremendous amount of labor associated with maintaining a data base.

Unless people can see some direct benefit from their purchase, they will either defer their purchase, or end up buying a computer which lies unused on the shelf. It may be hard for **COMPUTE!** readers to accept, but I will wager that there are a whole lot of computers sitting on closet floors, unused, because the purchaser didn't realize that this machine was not yet appropriate for the tasks

he or she had in mind.

Even if the magic programs were found tomorrow, computers will not be sold by the millions unless people think they are easy to use. To a consumer who is used to pushing a button on a dishwasher, or to turning two dials on a television set, a full blown computer keyboard (with keys labeled CTRL and ESC) can be quite intimidating. Also, any computer which says READY when first turned on certainly isn't ready for the average user who is used to nothing more complex than a record changer.

To be useful in the true mass market, the computer must display a list of meaningful options when it is first turned on. The user must be given as much guidance as possible. Fortunately, most of the personal computers on the market today are capable of being programmed so that a user-friendly interface program is loaded automatically when the system is powered up.

The situation is far from hopeless. Even with all its defects, the personal computer is being purchased by consumers who want to be on the leading edge of this technology. Those of us who understand these machines need to listen to these new pioneers when they tell us what they want. We need to be responsive to the suggestions of all users, regardless of their level of technical sophistication. Most of all we need to experiment with a wide variety of software covering a wide spectrum of applications until the truly appropriate "home" application is discovered.

Only then can we rightly call this the age of the personal computer, and only then can we say that this technology can be appropriate for all users. The personal computer promises to give each of us control of our informational universe — and when that day arrives, we will have achieved real power!

Next Time ...

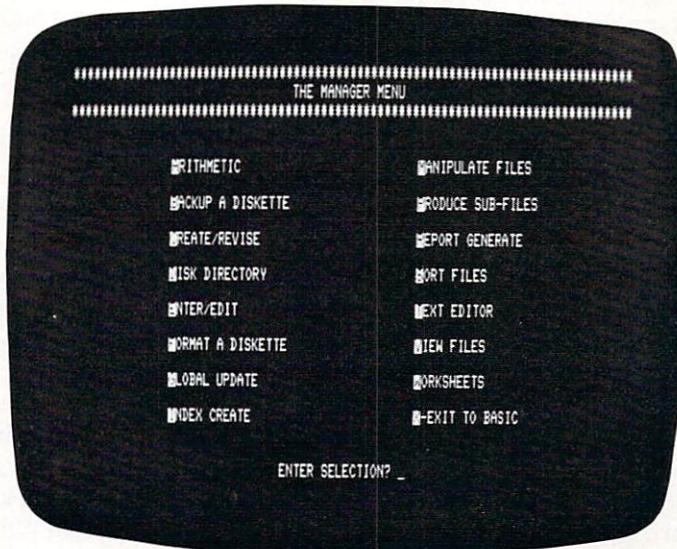
We will explore User-Friendly languages — why BASIC may not be basic any more. ©

ATARI 800/400
Users and Dealers
 Our software is available now for your computer including:
 ★ Sing along with your ATARI and the Music Composer Cartridge this Christmas with the help of our CHRISTMAS MUSIC files. Words Included. - Specify Set 1 or Set 2. 24K Disk - \$19.95, 16K Tape - \$19.95
 ★ MATHFAKS helps reinforce basic math skills with the help of the Votrax Type-N-Talk™ and ATARI 850 Interface (both optional). 24K Disk - \$24.95, 16K Tape - \$19.95
 ★ Votrax Type-N-Talk™ for above with RS-232 cable - \$39. Please add \$2 postage and handling for each item. Michigan residents add 4% sales tax
Computer's Voice™
 2370 ELLA DR. - DEPT. C-9
 FLINT, MI. 48504 - (313) 238-5585

THE MANAGER

The first truly user-friendly Database Management System available at reasonable cost.

This suite of programs is ideally suited for both the businessman and programmer, for use with the CBM 8032.



For the Business User

- Uses Menu Options – no programming experience needed.
- Lets you enter data in the form you wish, then lets you recall it using any search criteria.
- Performs predefined calculations on the record in realtime as record is displayed on the screen.
- Reports can be produced using any search criteria and/or arithmetic functions.
- Useful applications can be developed quickly.

Typical Applications include -

- Inventory Control
- Mailing Lists
- Accounting systems
- Personnel
- Costing
- Gathering test data
- Budgeting
- Scheduling
- Examples of use included on disk supplied.

As Programmers Tool

- Uses standard PET ASCII files.
- Software interface is in Basic and available to the programmer.
- No special disk formatting so that word processing or other programs can be stored on the same disk.
- No ROM Based Security thus no need to open CPU.
- Fast 'n' key Sort/Merge included.
- Full realtime intra & inter record arithmetic performed on the screen as record is displayed.
- Professional software support including unique security available.

TRY IT!
IF YOU ARE
NOT SATISFIED WITHIN 30 DAYS
WE WILL RETURN YOUR MONEY

\$250.00



CANADIAN MICRO
DISTRIBUTORS LTD.

365 Main St., Milton, Ontario L9T 1P7
416 878-7277

DISTRIBUTORS OF:
MUPET • DOUBLE-MUPET • SPOOLER
THE MANAGER • I/O PRODUCTS

Reader's Feedback

"With reference to "The World Computer," poor Mr. DeJong. He is not the first and certainly not the last person to have trouble loading a program. His real problem, however, is not software, but his perception of the entire microcomputer industry. The implication that this industry has moved out of its infancy and is maturing, or worse, has matured, is not supported by real world conditions. For example, I sold my first APPLE computer in the fall of 1976, a mere 5 years ago, a time when people didn't know APPLES from oranges (pardon the pun). BASIC was the only language, software was virtually non-existent, peripherals were few and far between, and computer literacy was a term that hadn't been coined yet. Since then great strides have been made in the field of languages, software, hardware and education, but, in spite of this progress, the industry is only approaching its infancy. Second generation computers like the ATARI, the VIC-20, the APPLE III and others from such giants as IBM and XEROX are proof of this. All of these units have expanded on the foundations laid by APPLE, Radio Shack, and others."

The driving force behind this creative work is not universality, but diversity. The opportunity to come up with a better idea, the ability to design and market a more powerful machine or program or peripheral supplies the incentive to change. The prospects of a "world computer" as described by Mr. DeJong are horrifying! First is the problem of design, with so many hands in the pie it would either end up an electronic eunuch or have so many bells, gongs and whistles that it would be frightfully expensive or be a nightmare to operate (or both).

How about an operating language? Do you use BASIC, COBOL, CP/M, SMALL TALK, FORTRAN, FORTH, or should they all be dumped in favor of a totally new language? If the latter, what happens to all the existing software? What happens to the "world computer" if the design is improved? Should any such changes be 100% compatible with older units, thus draining innovations of their potential? Lastly, why even have an APPLE, ATARI, COMMODORE, TRS-80, or any such multitude of manufacturers if, for all intents and purposes, all the machines are cast in the same mold? We could have one large, inefficient firm cranking out "generic" computers, complete with label-less white boxes. The possibility is simply too monstrous to consider seriously!" Vern L. Mastel

"Concerning Mr. Thornburg's "rebuttal" to my

article, it was never my intention to sell "drill" type programs to anyone. The whole point of the article was to allow the teacher to teach. And then use the computer to help him with his job. My remarks concerning games were asides. They were not specifically germane to the major premise of the article, except to this extent: in practice, games too often surplant meaningful work with computers in the public schools. This is even true in colleges.

Games certainly have their place in learning. Any teacher knows that. And I would suspect that this is especially true in the home environment, where the number of computers available for the task is not an overriding consideration. My high school, however, has the use of only one computer for all of mathematics and science. We simply cannot afford games. And unless a particular school is especially affluent, *neither can the average public school.*

Now about drill: here again, I was — shall we say — misunderstood. It is my contention that if basic skills are acquired as a result of computer games, it is precisely because the program had in some way made drill palatable. These are the only games in Computer Aided Instruction, (CAI,) that to me are of any consequence. These are precisely the games Mr. Thornburg decries. The "Star Treks" and "Othello" that are played and toyed with in school are the domain of the very fine students. These latter have no need of CAI. I teach them computer programming.

The notion that drill "turns a student off" was also not my idea. Quite the reverse. I was quoting the pedagogues; that pervasive philosophic tilt in education generally attributed to John Dewey, which has produced what promises to be the least educated generation in the history of this country. It is exemplified by what is sometimes called "The Sesame Street Syndrome," the notion that something of consequence — aside from various vulgarities — can be derived from a school atmosphere of fun and games.

I teach Title I classes in remedial mathematics. If there is one common thread that unites all these students — aside from their inability to do basic arithmetic — it is their almost universal lack of personal discipline. Nobody has ever required them to do anything of consequence, certainly not in academics. There is absolutely nothing theoretical about their needs. They need to be "told," first. Then they need to acquire skills; much of it by-rote type skills like multiplication and addition facts. We provide those skills. We do it with drill, individualized and scored, with the computer helping to make it all possible. Standing over it all is the most important ingredient of all — the teacher, flesh and blood type, with all the attributes of patience, concern and even empathy for his students, that brought him to the profession." Alfred D'Attore

DTL BASIC COMPILER

- Compatible with all existing Basic interpreter commands
- Accepts extensions to Basic implemented in RAM or ROM
- Provides demanding two pass syntax and logic analysis
- Improved Performance based on faster execution times
- Large Programs (16K+) will benefit from memory savings
- Security Key attaches to either cassette port

A Basic COMPILER for your Commodore Microcomputer by Drive Technology

DTL-BASIC is a Basic compiler for Commodore machines designed to convert existing programs to machine code and run them without modification. Compiled programs will run much faster and operate in exactly the same way as the un-compiled versions. Compiled code is typically 20 to 50% smaller than source code. For large programs this saving will more than offset the 4K run-time library appended to each compiled program, providing additional internal memory space.

The compiler implements true integer arithmetic as well as real arithmetic. Use of integers can lead to significant speed improvements. Special compile time options make identification and conversion of real variables to integers a simple task.

A 'Compiler' security key, which plugs into

either cassette port, is supplied together with the DTL-BASIC compiler. This key must be used in order to compile a program or to run the compiled version. In order to allow for the distribution of compiled versions of user developed programs, a second type of key known as a 'Run-Time' key is available in any required quantities. Software developers can obtain private security key sets with unique serial numbers providing comprehensive protection of their products while allowing customers to make backup copies of compiled programs.

DTL-BASIC is a disk based system requiring a 32K PET/CBM and comes complete with an in-depth user manual and a Compiler Security Key. Three versions of the compiler exist for CBM 3032, CBM 4032, and CBM 8032 machines. Please specify machine type and disk type (4040 or 8050) on which compiler is to be supplied.

DTL BASIC WITH MANUAL AND SECURITY KEY	\$350.00
RUN-TIME KEYS	\$50.00 EACH

FROM

CMD
**CANADIAN MICRO
DISTRIBUTORS LTD.**

365 Main St., Milton, Ontario L9T 1P7
416 878-7277

THE COMPANY THAT BROUGHT YOU
MUPET • DOUBLE-MUPET • SPOOLER
THE MANAGER • I/O PRODUCTS

Ask The Readers

Robert Lock, Richard Mansfield and Readers

We are grateful for the many readers who have sent questions and answers in to this column. Please keep on letting us know what your problems are and helping us solve the questions raised by other readers. Here is this month's exchange:

"My Apple II: It does not compute!" wrote to complain about excessive TV interference from his Apple II computer. Recently I've dealt with a similar problem — keeping an exceedingly noisy laser from interfering with my computer! Radio-frequency interference (RFI) can be a pesky problem, but the following measures may help the situation:

If you use your TV set for a computer display, be sure you disconnect the antenna while using the computer. This is especially important in apartment buildings, where many apartments share one antenna system! You can disconnect the antenna wires with a screwdriver, or insert an antenna/computer switch between the computer, antenna, and TV set. These switches are available at many electronics and TV repair shops.

Insert an "EMI filter" in series with the AC power cord. These filters are available from several manufacturers, notably Corcom. Interference frequently travels to other apartments through the power lines. Early Apples, with their switching power supplies, may be especially susceptible to this problem.

Try moving the computer to a different spot in the apartment, plugging it into a different AC outlet.

If desperate, you might try wrapping printer and disk cables, and perhaps the computer itself, in aluminum foil (!). Ground the foil to the computer chassis, the AC ground, or a cold water pipe.

Find out whether you're really the guilty party. I live in an apartment with a PET, and OSI, and a Motorola computer. The OSI runs with its case open much of the time, and the Motorola computer has no case. Neither machine causes perceptible TV interference." Mark Bernstein

Our thanks to INSIGHT: ATARI columnist Bill Wilkinson for the following information. McBee Barbour asked (**COMPUTE!** #15) about any AMWAY distributor software which would work

on the Apple II. We can suggest that one source of such a package is OnLine Microcenters, 5636 Blackstone, Fresno, CA 93710. The Atari package is currently available and an Apple version is planned if demand warrants it.

"I purchased an old OSI system consisting of a 500 CUP board (revision A), a model 430B I/O board, 12K of memory and a Teletype model ASR-33 terminal with tape reader. The system is also currently cassette based.

In 1977, OSI sold a video board (model 440) and two video support ROM's (65V prom monitor and 500VB prom) for use with a Black-and-White monitor. These items are no longer available from OSI.

Since I purchased the above for next to nothing purely as a learning tool in conjunction with my studies, I wish to establish a video terminal for minimum cost.

I would greatly appreciate hearing from any of you who may have had a similar situation." Frank Koell

"I have been using a Commodore Pet Computer now for some time together with a 3040 Floppy Disk Unit and was wondering whether you or one of your associates, e.g. Jim Butterfield, can answer a few questions for me. Alternatively, a source of such information would be useful.

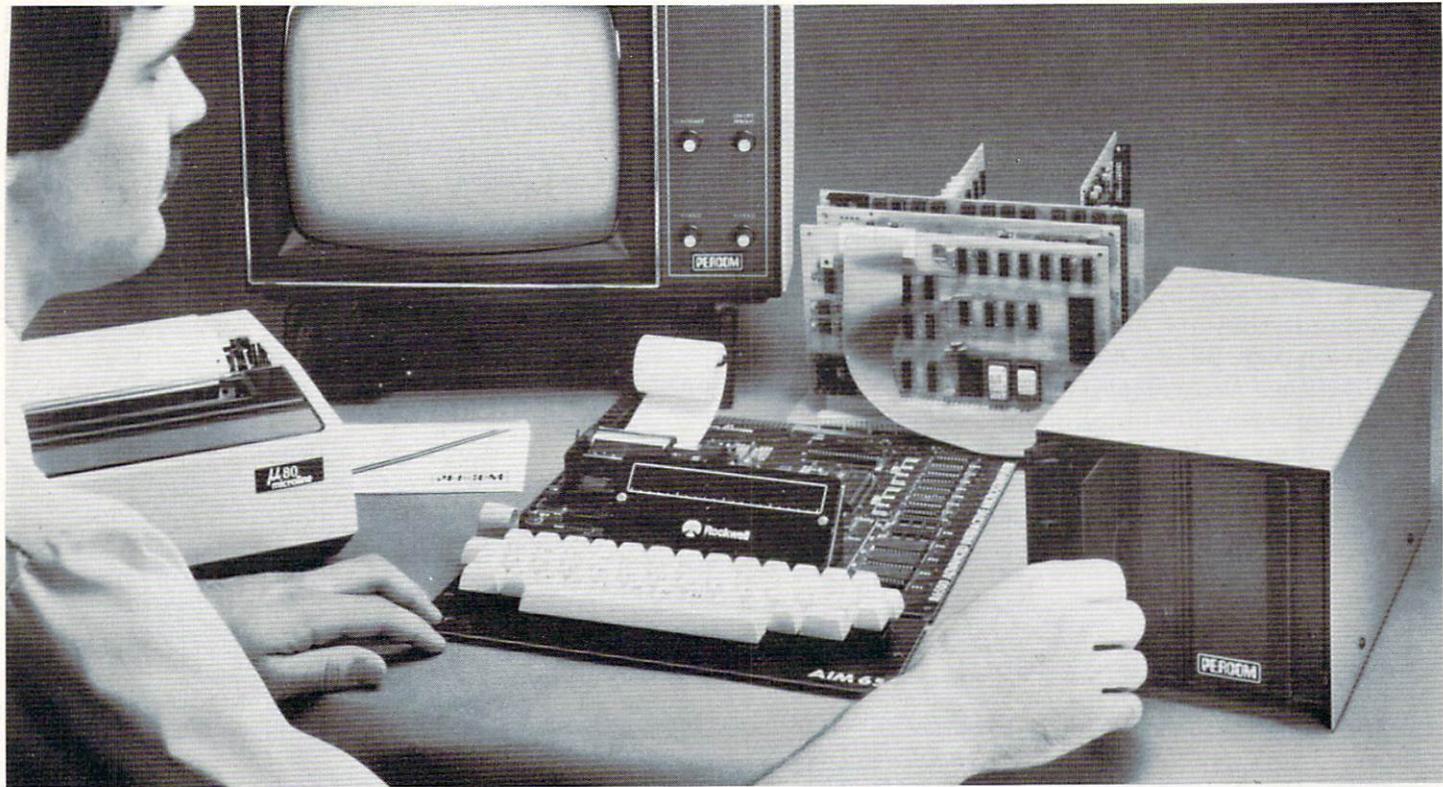
My questions concern the Disk Drive for which Commodore appears to publish very little other than the Handbook.

I think a Manual which gave some (if not all!) of the subroutines would be a useful item.

The point of most interest to me concerns the individual blocks on a formatted disk. It is possible to change the ID on a particular track & sector to be different to the main ID shown in the directory? How can one go about this? Once changed, can this be altered back again?

My other point concerns the 'U' commands. We know from the manual that 'U1' will 'READ' & 'U2' will 'WRITE,' but what other commands are there involving 'U' and what do they do which is useful. Are the routines available only by MACHINE-CODE access?

*May I say I find **COMPUTE!** the best magazine of its kind on the market, but I have great difficulty in obtaining it. I would be grateful if you would tell me if it is directly obtainable from you on a regular basis, or where the best*



Introducing the **M** line . . .

Now! Drive Systems for AIM, KIM and SYM Computers — from PERCOM.

At last. Low-cost, quality mini-disk drive systems for your AIM-65, KIM or SYM from the leader: PERCOM.

Assembled and tested systems start at only \$599.95, including the drive controller circuit card, disk-operating system, interconnecting cable, drive and comprehensive users manual.

- **The right storage capacity** – Available in 1-, 2- and 3-drive systems, with either 40- or 80-track drives.
- **Flippy storage** – Flippy drives (optional) let you flip a diskette and store data and programs on the second recording surface.
- **High Storage Capacity** – Formatted, one-side storage capacity is 102 Kbytes (40-track drive), 205 Kbytes (80-track drive).
- **Proven Controller** – The drive controller design is the same as the design used in the Percom 680X LFD mini-disk system. This system – introduced in 1977 – has given reliable service in thousands of applications. Two versions are available: the MFD-C65 for the AIM-65 expansion bus, and the MFD-C50 for the System-50 (SS-50) bus.
 - Includes an explicit data separator circuit that's reliable even at the highest bit densities.
 - Provides for on-card firmware.
 - Includes a motor inactivity time-out circuit.
 - Capable of handling up to four drives.
 - Capable of reading both hard- and soft-sectored diskettes.

PERCOM

PERCOM DATA COMPANY, INC.
211 N. KIRBY GARLAND, TEXAS 75042
(214) 272-3421

Toll-Free Order Number: **1-800-527-1592**

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.

© 1981 PERCOM DATA COMPANY, Inc.
PERCOM, MFD-C50, MFD-C65 and M-65/40 are trademarks of Percom Data Company, Inc.
AIM-65 is a trademark of Rockwell International, Inc.
KIM is a trademark of MOS Technology Corporation
SYM is a trademark of Syntel, Inc.

- **DOS included** – The MFD disk-operating system works with the AIM monitor, editor, assembler, Basic and PL/65 programs; interface is direct, through user I/O and F1, F2 keys.
- **Reliability assurance** – Drives are burned-in 48 hours, under operating conditions, to flag and remove any units with latent defects.
- **Full documentation** – Comprehensive hardware and software manuals are included with each system. These manuals cover details from design to operation and applications.

Available soon! The M-65/50 Interface Adapter. Only \$49.95. Expand your AIM-65, KIM or SYM with proven System-50 (SS-50) modules.

System Requirements: AIM-65, KIM or SYM computer with expansion bus and four Kbytes RAM (min).

Yes . . . I'd like to know more about Percom MFD drive systems.
Rush me free literature.

Send to
PERCOM DATA COMPANY, Inc., Dept. 65-C
211 N. Kirby St., Garland TX 75042

name _____

address _____

city _____ state _____

zip _____ phone number _____

MAIL TODAY!

source in London would be.

I hope you do not find my questions impertinent — they are not intended to be." M. J. Band

COMPUTE! expects to publish a program shortly which will permit easy viewing and changing of any byte on a disk including the directory, BAM, etc.). In reference to your question about the "U" commands, they are "user-defined" and described briefly on page 53 of Commodore's *User's Manual for CBM Dual Drive Floppys* (Part Number 320899).

Thanks for the compliment. **COMPUTE!** subscriptions are available from: Circulation Department, **COMPUTE!** Magazine, P.O. Box 5406, Greensboro, NC 27403 USA. The cost is \$25 surface mail anywhere in the world, \$38 airmail to Europe.

"Regarding Edward Sweeney's letter to you (in your August issue), VOTRAX has made every attempt to insure that every customer has received sufficient information to use Type-'N-Talk. We received a letter dated 7-6-81 from Mr. Sweeney and tried to contact him. Unfortunately, our attempt to reach him by phone was futile since his phone was found to be disconnected. We immediately responded to his letter by forwarding to him both the basic program lines necessary to use T-N-T with an Atari, as well as the necessary cable configuration (since Atari uses a non-standard cable). We subsequently received a letter dated 7-26-81 from Mr. Sweeney thanking us for fulfilling his requirements.

In order to eliminate connection problems that may arise, VOTRAX is and has been offering RS232C compatible cables for many of the personal computers including: Apple, Atari, Heath, Ohio Scientific, and Radio Shack models I, II, III and the color computer. As far as driving software is concerned, access to the RS232 Port (and thereby the T-N-T) is accomplished (in most systems) by using a simple print statement. In other words, if you want T-N-T to say "Hello", you simply print "Hello". Additionally, many of the major software houses are currently either converting existing programs or developing new programs to utilize this new dimension now available to virtually any computer.

If any of your readers have purchased T-N-T, or are contemplating purchasing T-N-T, technical questions should be directed to me at (313) 588-0341."

Douglas A. Porath
Applications Engineer, Votrax.

Our thanks to VOTRAX for the prompt clarification above. Here's a helpful answer from a reader:

Re: Edward Sweeny,

"Your Atari 800 is quite compatible with your Votrax Type'N Talk speech synthesizer. If the TNT is properly connected to a speaker, it should say, "SYSTEM READY," when you turn it on."

You also must have the Atari 850 interface and its initialization software. Set the baud rate switch #6 down on the TNT and plug TNT into your interface port #1.

If you have already run into trouble, contact Votrax. If you are sure that TNT and 850 are OK up to this point, the following little Atari Basic routine will get you started.

```
1 OPEN #2,8,0, "R1:"
2 XIO 36,#2,12,0, "R1:"
3 XIO 34,#2,48,0, "R1:"
4 PRINT #2; "TALK 2ME"
5 STOP
```

Jerry White

"I have been told that there is a computer device which duplicates the tossing of the coins process associated with The I Ching, Book of Changes. I imagine that the device provides a random selection of numbers from 1-64 which is basically what the procedure of tossing coins is all about.

If you have any information on such a device, I would like to hear from you about it." Robert Mahon
We know of no machine dedicated to I Ching coin tossing. Computers can do it, however, with a line similar to: $10X = \text{INT}(\text{RND}(1) * 64) + 1$.

"I saw a cryptic comment — I think in **COMPUTE!** #10: "PET Exec Hello" by Gordon Campbell. Second paragraph: POKE 59458,62 (this may damage your machine). Can I damage a PET with POKE\$?? It scared me. We just got a (used) PET—Original ROMs. I heard you have published a PET book based on old issues of **COMPUTE!**. How can I get this?" Felix Rosenthal

You can damage the computer with this POKE. Luckily, it is the only POKE which is known to be risky, as far as we know. You can POKE freely anywhere else. For a more complete explanation of this peculiarity, see the warning in **COMPUTE!** #14, pg. 63. To answer your second question: yes **COMPUTE!** is publishing two such collections, one for PET and one for ATARI. These books contain much from the early, out-of-print **COMPUTE!** issues (as well as some previously unpublished pieces). For ordering information, see the ads elsewhere in this issue.

"Is there a spelling program that checks spelling of words in a Applewriter file? Is there a mailing label program that drives files in Applewriter format?"

John Hudson Tiner



WHY THE MICROSOFT RAMCARD™ MAKES OUR SOFTCARD™ AN EVEN BETTER IDEA.

Memory — you never seem to have quite enough of it.

But if you're one of the thousands of Apple owners using the SoftCard, there's an economical new way to expand your memory dramatically.

16K ON A PLUG-IN CARD.

Microsoft's new RAMCard simply plugs into your Apple II,® and adds 16k bytes of dependable, buffered read/write storage.

Together with the SoftCard, the RAMCard gives you a 56k CP/M® system that's big enough to take on all kinds of chores that would never fit before (until now, the only way to get this much memory was to have an Apple Language Card installed).

GREAT SOFTWARE: YOURS, OURS, OR THEIRS.

With the RAMCard and SoftCard, you can tackle large-scale business and scientific computing with our COBOL and FORTRAN languages. Or greatly increase the capability of CP/M

applications like the Peachtree Software accounting systems. VisiCalc™ and other Apple software packages can take advantage of RAMCard too.

And RAMCard gives you the extra capacity to develop advanced programs of your own, using the SoftCard and CP/M. *Even with the RAMCard in place, you can still access your ROM BASIC and monitor routines.*

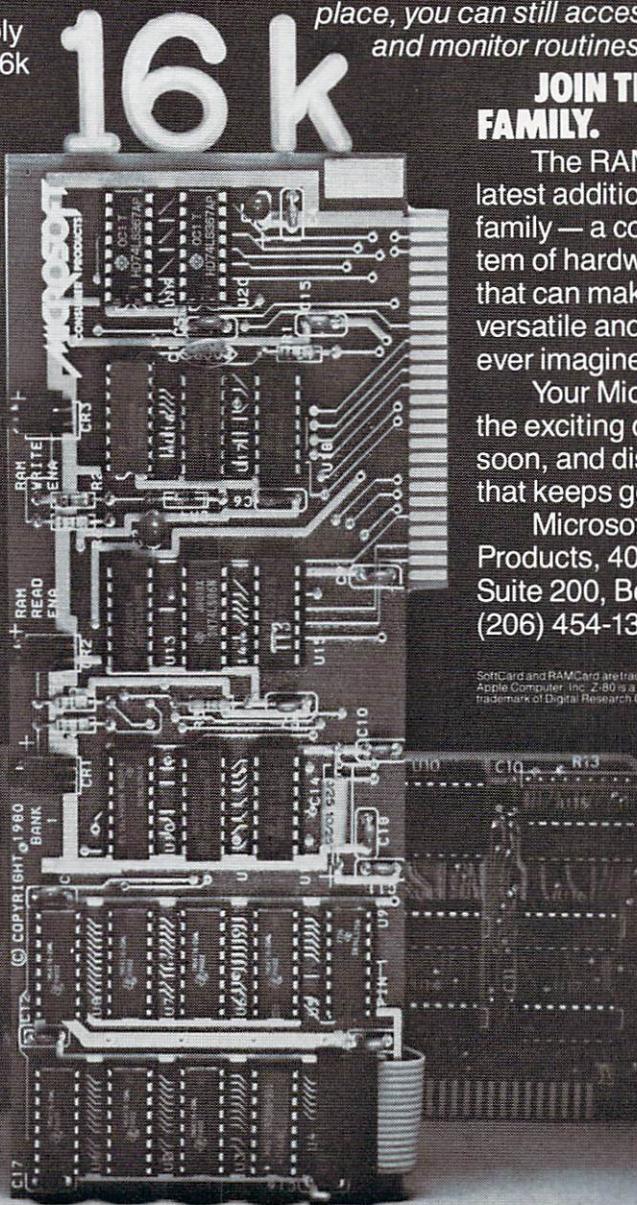
JOIN THE SOFTCARD FAMILY.

The RAMCard is just the latest addition to the SoftCard family — a comprehensive system of hardware and software that can make your Apple more versatile and powerful than you ever imagined.

Your Microsoft dealer has all the exciting details. Visit him soon, and discover a great idea that keeps getting better.

Microsoft Consumer Products, 400 108th Ave. N.E., Suite 200, Bellevue, WA 98004. (206) 454-1315.

SoftCard and RAMCard are trademarks of Microsoft. Apple II is a registered trademark of Apple Computer, Inc. Z-80 is a registered trademark of Zilog, Inc. CP/M is a registered trademark of Digital Research Corp. VisiCalc is a trademark of Personal Software, Inc.



Basically Useful BASIC Automatic DATA Statements For CBM And Atari

Dr. Harald Linder
Krefeld, West Germany

The following BASIC program converts a program from machine language into BASIC DATA statements by means of the "dynamic keyboard." For the Original PETs, the numbers 623,624,158 in the last line, must be replaced by 527,528,525.

```

1 INPUT"START ADDRESS";A:INPUT"END AD-
~DRESS";E:Z=2000
2 PRINT" {CLEAR} {2 DOWN} "Z"DATA";:IFA>E-
~THENEND
3 FORA=ATOA+15+(E<A+15)*(A+15-E)
4 PRINTMID$(STR$(PEEK(A)),2),":NEXT-
~"
5 PRINT" {LEFT} ":"PRINT"A="A":E="E":Z=-
~"Z+10":GOTO2{HOME}";
6 POKE623,13:POKE624,13:POKE158,2:END-
~"

```

Program 1. CBM Version

```

0 BEG=7*4096:FIN=BEG+759:?"{CLEAR 2 DOW
N }"
1 FOR I=BEG TO FIN STEP 6
2 ? I;" DATA ";
3 FOR J=I TO I+5
4 ? PEEK(J);",";
5 NEXT J:?"CHR$(126)
6 NL=NL+1:IF NL<15 THEN 9
7 ? "CONT":POSITION 2,0:POKE 842,13:STOP
8 POKE 842,12:NL=0:?"{CLEAR 3 DOWND"
9 NEXT I:?"CONT"
10 POSITION 2,0:POKE 842,13:STOP
11 POKE 842,12:NL=0:?"{CLEAR 2 DOWND"
12 FOR I=0 TO 12:?"I:NEXT I:?"POKE 842,
12":GOTO 10

```

Program 2: Atari Version



ATARI®, PET® or APPLE® OWNERS

BUSINESS OPPORTUNITY

**DEALER REPRESENTATIVES WANTED
PART OR FULL TIME
NO ROYALTIES, NO FRANCHISE FEE**

Exceptionally lucrative ground-floor opportunity to participate in the explosive Micro-Computer Market. The Computer Bus offers Community minded ATARI® or PET® owners the chance to develop their own successful business within a relatively short period of time with this innovative Microcomputer concept. The prognosis for success has never been better.

If you are accepted as a Computer Bus "Learning Center" Dealer you will operate your own sales and rental business from your home or office, featuring a product line of uncompromising quality and outstanding company support.

Investment required \$3,000, secured by extensive computer software and hardware. Protected territory, leads, national and regional advertising, technical support and full back-up service.

For additional information call toll free

1-800-321-3670

Ohio Residents Call Collect

1-216-255-1617

the COMPUTER BUS

personal & business - computer systems

the COMPUTER BUS, 101 River St., Grand River, Ohio 44045

Authorized ATARI® Dealer

Designing Computer Software Programs is Serious Business

ADVANCED OPERATING SYSTEMS
A Division of Howard W. Sams & Co., Inc.

Dear Software Designer:

Microcomputers, their peripherals, and software are a part of the most volatile industry in existence today.

Companies associated with this growing area come and go at a painful rate. Presently, good software is at a premium. The average computer owner is far more sophisticated than he was a year ago. He demands an ever increasing diet of faster high resolution games that can only be met by the best programmers. The day of the small businessman, who has the time to sweat through the debugging of his general ledger while on the line, is gone.

While state of the art programmers exist, they must feel confident that their efforts will be developed and marketed by a company with the experience and strength to assure complete success for their products.

Advanced Operating Systems is a division of ITT and specifically related to Howard W. Sams & Co., Inc. (Sams Books). Our professional experience goes back to the birth of the microcomputer industry. Advanced Operating Systems benefits from the strength of ITT, one of the largest companies in the world, as well.

Advanced Operating Systems is committed to helping the micro trade grow in a businesslike and professional manner. Our 150 representatives in the field will sell your product both to computer stores and direct to the consumer. You'll be represented by one of the top advertising agencies in the United States. Your product will benefit from professional package design, effective copy and layout design. You can be assured your program will receive extensive advertising in both computer and general interest magazines, as well as catalog sales.

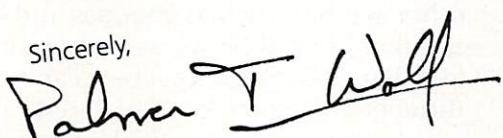
If you want the security of dealing with a company that will reliably send your royalty checks month after month, while providing you with professional, yet personal attention, write or call me to discuss your programming efforts.

We are easy people to deal with. We understand your problems, and we pay competitive royalties. Even more importantly, we can do more for you and your program than any existing software firm.

We are interested in state of the art games, business, professional and utility programs.

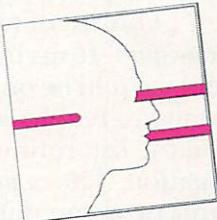
Let me hear of your work, completed or still in process. We are ready to go to work for you!

Sincerely,



Palmer T. Wolf
Software Acquisition Manager

450 St. John Road
Suite 792
Michigan City, IN 46360
(219-879-4693)



The Beginner's Page

Richard Mansfield
Assistant Editor

From Chaos To Bits

Computers are sometimes called *data processors*. Data is processed by programs. You might type in a list of all the articles in this year's **COMPUTE!** and then write a program which will show you only the articles on, say, computer music. We will write such a program next month. What we want to see now is how data can be set up in *files* to make it easier for the computer to process it.

Our list of articles, while interesting in itself, is *raw data*. It sits in the program as DATA statements (or it could be on a disk or tape *file*) — the important thing to realize is that a program will later operate on the list, refining it into more meaningful information. The *computing* (or processing) aspect of this program might be to generate a more specific list: perhaps all articles by a particular author. However, for the computer to process data, the data must be somewhat organized already.

Organizing Data

If you look at Figure 1, you will notice that there are a number of divisions, each nested within a larger division. Here is a DATA statement taken from our proposed **COMPUTE!** index program which will help to illustrate Figure 1.

500 DATA FILES-DATA STORAGE TYPES*

MANSFIELD*17

We can start from the outer ring of chaos and work inward. You make a stack of this year's **COMPUTE!** If your stack of magazines were burned to ash, the molecules of ink and paper would no longer have any meaningful relationship to each other and could not be called "information." Taken as a whole (as a stack) it is not *data*, exactly, because data is special: it is information organized so that it communicates a particular meaning. Your computer cannot read (yet), so the articles in **COMPUTE!** do not become meaningful data for the computer until you type them in as DATA statements or put them on tape or disk files.

Data is divided into files. An entire list of all year's articles is one *file*. A list of your stocks and bonds would be another file.

Within files there are *records*. Our DATA statement (line 500 above) is a record. It is a subdivision within the "**COMPUTE!** Articles File" which

refers to a single, logical grouping of information (in this case, the information on a single article). In the financial portfolio file, all the information about a particular stock would be a record. Records

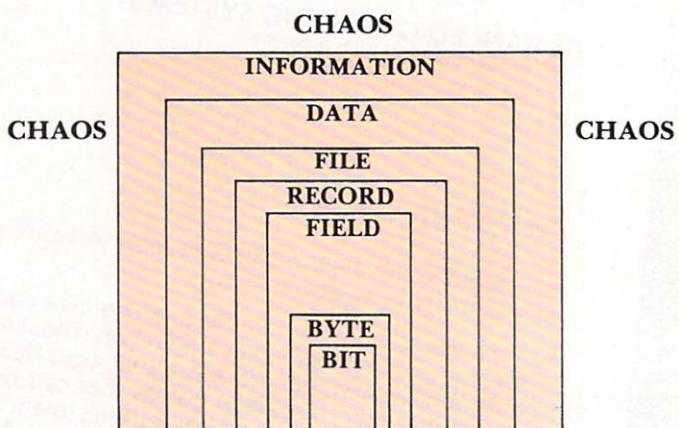


Figure 1.

are further divided into "fields" of information. We have chosen to use three fields: 1. A description of the article, 2. Author, 3. Issue Number.

As an aside, we should note that there is something special about the first word in our example record. To make it easier on the computer, one part of a record (often the first word, or part of it) is designated the *key*. Sometimes the key is a number, but we are using the first five characters of the first field ("FILES") as our key. We have decided to key this file by topics. We chose each topic name so that it would be only five letters long. FILES, MUSIC, ART , (notice the two spaces after "ART " to make it five long), ML , (machine language), BASIC, MAPS , INTER (interfacing), DISKS, TAPE , PRINT (printers), MODEM, and any other keys we want.

Bytes and Bits

Finally, the smallest units of information are individual symbols, letters, and numbers. Each single-character piece of information is called a *byte*. A byte is able to store the numbers zero through 255. Since there are 26 letters in the alphabet, 26 capital letters, and number symbols 0 to 9, and assorted other symbols such as commas and brackets — the number of symbols we use to communicate with is less than 255. So, since a byte can store up to the number 255, each byte can "hold" a number value which represents a particular letter of the alphabet, numeral, or punctuation mark. Your computer stores the number 65, not the letter "A." A code was devised (the ASCII code) which assigns the number 65 to capital "A" and 193 to small "a." Every letter is represented by a particular number. Lower case "b" is 194.

Each byte is made up of eight *bits*. Where a byte can mean the numbers from 0 to 255, a bit can

LE SHHH STICK™

Finally! The ultimate goal in microcomputer hardware, achieved.

A joystick with such remarkable realism and control that even the thought of other joysticks virtually vanish.

Inside Le Stick™ are motion detectors which will maneuver your sights in any direction you want with simple one handed movements. The large red push button on top provides a quick and accurate firing mechanism for better response time.

From Star Raiders to graphic draw programs — Le Stick™ eliminates all the frustrations you experience with the conventional two handed joysticks or keyboards.

The joystick of the future. See and test it at your Datasoft™ dealer today, or contact us for more information.

LE STICK \$39.95

FOR ATARI 400/800, ATARI VIDEO GAME, COMMODORE VIC AND THE TRS-80 COLOR COMPUTER SYSTEMS



Datasoft Inc.™

COMPUTER SOFTWARE

19519 Business Center Dr., Northridge, CA 91324
(213)701-5161

Character Generator for Atari 400/800 Computers

This new program for the Atari Computer enables you to create high resolution graphics in the text mode. Redefines a character set virtually any way you want. Ready for whatever language or graphics set you can devise — from ancient Japanese to Modern Russian.
(Diskette) \$19.95 / (Cassette) \$15.95.

Mailing List for Atari 800 Computer

Business application software for the Atari Computer. A versatile disc based system. An efficient micro format equal to those used for many large computers. Sorts by Zip Codes, Names, and stores special data for your personal use.
(Diskette) \$24.95.

Order through your local software dealer, or send check or money order plus \$2.00 shipping and handling to Datasoft.

only have two meanings: zero or one. Sometimes it is useful to think of a bit as being either *yes* or *no*, *on* or *off*, *positive* or *negative*. This "two-state" (binary) bit is often mentioned as the smallest possible unit of information. Even though they have only two states, bits can add up quickly: eight bits together make up a 256-state byte. A grouping of only two bytes can have more than 65,000 possible states — in other words, you could count up to 65,535 using only two bytes.

Processing Data

We have moved down through data from chaos to bits, from the largest to the smallest units. There are many ways to organize fields within records, records within files, and files within a large collection of data (a *database*). Some thought must go into the structure of this organization so that a program can later process the data efficiently. We decided to use the first five bytes (characters) of each of our records as the key to our **COMPUTE!** file. Next month we will build a program which will demonstrate some of the techniques of database management. This program will also illustrate the importance of those string-manipulating BASIC commands: LEFT\$, RIGHT\$, and MID\$. ©

CLEAR STAND

FOR

ATARI® 400/800*

APPLE® II**



- Beautifully polished high impact acrylic
- Holds up to 15" Dia. TV/monitor at eye level
- Open design allows maximum air flow
- Easy access to top sides & rear of processor

Dealer Inquiries Welcome

Send order
with payment to:

BYTM Systems, Inc.
389 Fifth Ave. (Suite 400)
New York, N.Y. 10016

Allow 4-6 weeks delivery

Mail the coupon today

Send _____ Clear Stand @ \$59.95
Add N.Y. Sales Tax for N.Y. Delivery

Ship to: _____

Address: _____

City: _____ State: _____ Zip: _____

*TM of Atari, Inc.

**TM of Apple Computers, Inc.

LEARN

Having trouble
learning to use
your computer?

Reference manuals don't teach. Most BASIC texts don't cover specific personal computers.

TIS solves these problems
with step-by-step books
tailored for your machine.

For PET/CBM

Understanding Your PET/CBM \$16.95
Vol 1: Basic Programming
PET Graphics \$ 6.95

For OSI C1P/C4P

Understanding Your C1P/C4P \$ 9.95
A Workbook of BASIC Exercises

For VIC

Understanding Your VIC \$13.95
Vol. 1: Basic Programming

Money Back Guarantee. VISA/MC accepted.
All prices include UPS or 1st Class postage.

TIS INC

Total Information Services, Inc.
Box 92I, Dept. C
Los Alamos, NM 87544



80/40 COLUMN SPACE INVADERS

\$29.95

Exactly duplicates the famous arcade game. Enjoy hours of challenging fun. For Commodore Computers with Release 4 of BASIC, either 40 or 80 Column Screens

COMMODORE VIC SOFTWARE

Quality Software which incorporates exciting Sound, Color, Graphics and Animation. Show off all of the many facets and capabilities of your computer.

Lunar Lander

Home Finance

Wrap

Math Drill

Breakout

Hangman

Blackjack

Yahtze

Pong

Othello

Slots

Target Moon

Alien Raiders

Shooting Gallery

Bombs Away

Capture

All of the above are priced at \$9.95 or select any three for \$27.50. Please add \$3.00 and specify the DOS release if you wish disk based software.

Send SASE to be included on our mailing list.
Add .50 shipping and handling. Thank You.

MICRO SPEC LTD

2905 Ports O'Call Ct. Plano, Tx 75075 (214) 867-1333



Remember the \$500 pocket calculator?

The same thing just happened to computer software.

Everyone remembers when pocket calculators first came out. They were so impressive and futuristic, people were happy to pay \$500 for one. But it didn't take the electronics industry long to offer a smaller, more fully-featured calculator for only \$25.

Demand and Supply.

As more and more individuals and businesses turn to small computers for their various needs, the small computer industry will turn out more and more computer software. This increased volume naturally lowers the cost per unit. And the rapid growth of the CP/M® compatible computers has meant even greater sales volume for these popular and valuable software packages.

Here is what All Systems offers:

Wordstar 3.0® \$199

Quite simply, the best word processing program for the small computer. Price shown is for the Apple system. \$249 for all others.

SuperCalc™ \$199

The state of the art in electronic worksheet programs, with features and enhancements that previous programs just did not have.

*VisAccount™ \$199

The greatest software buy in the country. It is a fully-integrated accounting package with a General Ledger, Accounts Receivable/Order Entry, Accounts Payable/Purchase Order, Payroll, Inventory, Fixed Assets, and even a Mailing List program—all for one price.

*Data Manager \$199

A powerful and professional data base management program that's wonderfully simple to operate. Features include: data base building, lists, comparative analysis (by generating history & performance reports), various file maintenance, fast assembly language (sort/merge), fast data retrieval, record selection, report writing and forms handling.

*Both VisAccount and Data Manager come with a 45-day conditional money back guarantee. We know of no other software company with the confidence to provide a similar guarantee.

All Systems offers these programs for the following computers:

Apple II Heath/Zenith
Radio Shack Models I, II & III Superbrain
Osborne I North Star
Hewlett Packard 125 IBM

Most CP/M Compatible Computers
How To Order

To find the dealer nearest you, or to order, call toll free

800-221-2486†

In New York or for further information, call 212-685-0090. You may use your **Visa, MasterCard, American Express**, or (for an additional charge) order C.O.D. Or you may send a check or money order to:



All Systems

332 East 30th St., New York, N.Y. 10016

SuperCalc is a trademark of Soreim, Inc.

24 hours, 7 days a week.

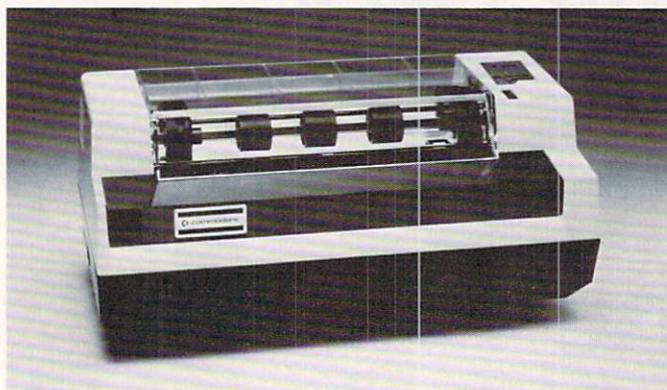
VIC-20 News

Compiled from sources by the editors.

VIC Printers, Software, Disks

Commodore has announced several software and hardware items for the VIC computer. Games, a printer, a disk drive, programmer's aid and assembly language cartridges, memory expansion modules, and an expansion interface are all coming. Release dates and prices are tentative. We expect Commodore to be shipping US produced, FCC approved, VIC-20s by October.

The new VIC Graphics Printers are expected to be released to dealers in September. It is an 80



column, twelve characters-per-inch, dot-matrix printer with 60 dots per inch (both horizontal and vertical) resolution. Its speed is 30 cps (characters per second) which means that an average typewritten page of about 275 words can be printed in about a minute.

The printer will permit the user to define his own characters. Each dot is programmable and the unit will also print the VIC graphics. It uses eight inch tractor feed paper, but can be narrowed to smaller widths for printing labels, etc.. It features a test mode and uses a ribbon cartridge (available from any Axiom distributor and soon from Commodore dealers). Seikosha manufactures the printer. Suggested retail is \$395.

The VIC Disk

Sometime after Christmas, Commodore expects to begin selling a single disk drive which will attach to the VIC serial port. In addition, the drive is planned to be compatible with the 2040 disk drives used on the PET computers. An IEEE interface cartridge has also been announced which will permit PET peripherals to be attached directly to the VIC through the expansion port or an expansion module. This module will contain six slots and accept program cartridges, memory expansion cartridges, or interface cartridges.

The memory expansion cartridges are to be available in three sizes: 3, 8, or 16K (each K is 1024 bytes of memory). With expansion memory attached, however, another cartridge cannot be used simultaneously. The screen and color memory locations are affected by the addition of the 8 or 16K cartridges. From smallest to largest, these memory expansions are predicted to be available September, October, and November (respectively) of this year.

For telecommunications — attaching VIC to The Source or Compuserve, or the Dow Jones services via phone, or calling up other computers — an RS232 Terminal Cartridge and associated software will connect to the User Port. This permits the use of a MODEM by which the VIC can make and receive calls.

Early Software

Blackjack, Slither/Superslither, Biorhythm Compatibility, Space Math, Car Chase, and Blue Meanies from Outer Space are in release and will be reviewed in the fall issue of *Home and Educational COMPUTING!*. Planned for October release are: Jupiter Lander, Superslot, Night Driver, Draw Poker, VIC Avengers, and VIC Alien, a maze game.

BASIC programming will be assisted by another projected cartridge, Programmer's Aid, which will add new commands to BASIC for plotting, sound, color, music, and high resolution graphics. It will permit the user to define his keys however he wishes, provide simple music notation, color in an enclosed area, and so forth. The commands will be permitted in both BASIC programs and the immediate mode.

For machine language programmers, November is the target for a machine language monitor cartridge which will feature a simple assembler and disassembler. An intriguing feature of this software is a facility to swap zero page out and define a virtual zero page anywhere in memory. Machine language programmers know the value of zero page addressing on the 6502 microprocessor. BASIC will, of course, need its zero page when in operation.

A book, *The Programmer's Reference Manual*, is in the works too. It will contain a memory map, machine language and BASIC specifications, VIC chip details, and schematics. The title is tentative. It might be distributed as *The VIC-20 Reference Manual*.

SOFTWARE HARDWARE FOR THE

SOFTWARE FOR THE VIC 20

TAPE CASSETTES

- **VicTerm A**

Be smart! Operate your VIC 20 as a dumb terminal.

- **viCalc I**

First in a series of useful calculator programs. 10 memorys with arithmetic, 4 stacked data. Math functions plus compound interest tables.

- **VPM**

Securities Portfolio Management. Important records on tape for 25 securities.

- **DON'T FALL**

Exciting spelling game! Parents and teachers can enter their own words.

- **SIMON**

Test dexterity and memory by repeating the flashing colors and tones—different every time.

- **PAC IT IN**

Fast action color game. Two players can ZAP ROBOTS before they "PAC IT IN."

- **SUPER ADDITION SUPER SUBTRACTION**

Blackboard feature gives useful math practice with interestenhanced by color. Correct steps shown with carries.

HARDWARE FOR THE VIC 20

- **UMI RS232 COMMUNICATIONS INTERFACE** for printers and telephone communications.
- **UMI 3K MEMORY EXPANSION** with addressable and switchable ROM slots for ROM programs to 16K.
- **UMI 8K RAM EXPANDER** provides 11775 Gytes (characters) of user memory.
- **UMI EXPANSION CHASSIS** for additional memory or program cartridges.

AVAILABLE IN OCTOBER

SOFTWARE CARTRIDGES

- **SPIDERS OF MARS**
- **SATELLITES AND METEORITES**
- **ROBOT BLASTERS**
- **ASTRO TRANSPORTERS**
- **3D INVADERS**

ORIGINAL! EXCITING! UNIQUE!

**VIC
20**
®



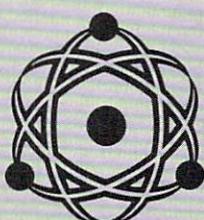
**united microware
industries inc.**
3431 H Pomona Blvd.
Pomona, CA. 91768

Please send me my FREE CATALOG
describing your Hardware
and Software Products.

DEALER INQUIRIES INVITED

Clip Coupon for **FREE CATALOG**

Catalog available in Spanish (Version Disponible en Español)
MasterCard/VISA Accepted



United Microware Industries Incorporated

3431 H Pomona Boulevard

Pomona, Calif. 91768

Phone (714) 594-1351

VIC 20 is a Registered Trademark of
Commodore Business Machines

NAME _____

ADDRESS _____

CITY _____ STATE _____

ZIP _____ COMPANY _____

Various VIC Memory Locations

Jim Wilcox, Vienna, WV

Editor's Note: A Full VIC memory map will appear in the fall Home and Educational COMPUTING! issue. Here are some PEEKs and POKEs to get you started. Descriptions in parentheses have been added. — RTM

Listed below are as many memory locations in the VIC as I could find by PEEKing around the memory. I also found out how to stop the use of the RUN/STOP key by the statement POKE788,194 and to restore the RUN/STOP key, POKE788, 191. This also stops the TI and TI\$ when POKEing 788,194. I hope these are as useful to you as they were to me.

0-2 — USR function vectors. (Here is where the memory address is placed for jumping to a machine language routine from BASIC when you want to transfer a number from BASIC to the machine language routine.)

43-44 — Start of BASIC. (These two bytes contain the address where your BASIC program starts. PEEK (43) + PEEK (44) * 256 will give the address as a decimal number.)

45-46 — End of BASIC, start of variables. (Using the formula above, you can find out where your program ends in memory. The VIC starts storing its simple variables wherever there is room just above the program.)

47-48 — Array table. (The arrays are stored here.)

49-50 — End of Arrays.

51-52 — Start of Strings. (String variables.)

55-56 — End of memory. (How much RAM is available for use in BASIC. Sometimes, machine language programs are put at the "top of available RAM." 55 and 56 must be changed to fool the VIC into thinking that it has less memory for a BASIC program so it will not "write over" the machine language program. Changing the definition of end-of-memory will "protect" the machine language.)

57-58 — Current line number. (BASIC keeps track of the program line number.)

115-138 — Charge RAM code. (There is a small machine language program placed into this location each time power comes on. It gets a character in BASIC, but machine language programmers can put a JMP in it to allow the addition of new BASIC commands. Like the clock, the keyboard, and a few other items, this routine is constantly checked by BASIC to see if anything needs to be done. It can be used, therefore, as a way to append things to BASIC. You could not append to the keyboard

checking routine, for example, because it is frozen into ROM. This part of BASIC's house-keeping is in RAM.)

145 — Run/Stop keys pressed, left shift pressed, polls every other of the bottom row of keys. (You could PEEK this to see if these keys were being pressed).

160-162 — The clock. (Write: 10 PRINT PEEK (160); PEEK (161); PEEK (162) [cursor home] to see it running.)

197 — Last key pressed. (Write: 10 PRINT PEEK (197) to see what the VIC sees when you press keys.)

198 — Number of keys pressed (cumulative).

203 — Last key pressed.

204 — Tells if cursor is to blink (0) or not (1).

205 — Countdown for blinking of cursor.

246 — Tells if SHIFT, Commodore, or CTRL keys are pressed.

512-600 — BASIC buffer. (A "storage" buffer is a temporary holding area where bytes wait until there is time to use them. BASIC itself uses this area).

631-640 — Keyboard buffer.

651-652 — Repeat keys pressed.

788-789 — Interrupt address. (Important in machine language programming.)

4096 — BASIC starts. (Where the first byte of your BASIC program starts.)

Update Floating Color Floating Screen

If you are writing software for the VIC — either professionally or for your own use — you should include a line in your program which locates the screen and color memories. As it comes from the factory, the VIC screen memory is located at addresses 7680 to 8191. Memory expansion modules are going to be available soon which can add 3 or 8 or 16K to the VIC. The 3K expansion will fill a hole from addresses 1024 to 4095, and will not affect the locations of color or screen memory. Adding an 8 or 16K memory expansion will, however, **move these important memories**.

What this means is that *any programs which manipulate color or screen data* (such as the direct POKEs to screen memory used in many games) *will not work correctly* when the larger two memory expansion modules are added to the VIC. To prevent problems later — to make your programs find VIC's floating screen and color memories — you should add the following formulae which will provide the true addresses:

4 new products from Matrix

stat

STATISTICS APPLICATIONS FOR TECHNICIANS

Here is a package that is so state-of-the-art that many of the statistical techniques implemented here are not even in the textbooks yet. STAT is a set of programs for performing a large portion of the most frequently used statistical inference methods. Data can be entered and stored on four different types of data files. These data files can be modified also. The statistical procedures available in the package include the following parametric inference procedures:

SUMMARY STATISTICS for each data file and date set, including the mean and standard deviation.

CONFIDENCE INTERVALS for the following: (1) the mean of a normal population (both with and without the variance known), (2) the variance of a normal distribution (both with and without the mean known), (3) the parameter (mean time to failure) of an exponential distribution, (4) the parameter (proportion) of a binomial distribution, (5) the difference of two normal means (for various combinations of assumptions about the variances of the populations) and (6) for the ratio of two normal variances.

TESTS OF HYPOTHESES about (1) a normal mean, with various cases corresponding to possible assumptions about the variance, (2) the difference in two normal means (various cases) and (3) the ratio of two normal variances.

TESTS OF THE EXPONENTIAL MEAN (mean time to failure) and **RATIO OF MEANS**.

TESTS OF THE BINOMIAL PARAMETER (proportion) and **DIFFERENCE OF PARAMETERS**

MULTIPLE REGRESSION, including estimation of coefficients, estimation of the error variance, and test of significance of the regression.

ANALYSIS OF VARIANCE for one-way and balanced two-way designs, including interaction.

The software is user-friendly, allowing easy recovery from errors and selection of alternate analyses, as desired. The user's interaction is entirely menu driven, with error recovery features. An extensive user's manual introduces the statistical inference procedures used, and gives worked examples for each situation considered, illustrating typical applications. These worked examples serve as a pattern and allow the reader to check his use of the programs. The user's manual gives complete documentation of the programs and procedures used in them. All formulae, algorithms and procedures are listed and referenced to commonly available statistical literature.

A notable feature of the package is inclusion of very efficient routines for the computation of probabilities and quantiles for the most common statistical distributions, including normal, binomial, chi-square, t and F. Thus the user is not required to furnish "tabular values" from outside sources when performing statistical analyses with this package. STAT complete with all documentation is \$200.

APPLE II APPLESOFT and at least one drive
APPLE II PASCAL SYSTEM
COMMODORE 32K with 4040/8050 drive
Radio Shack Mod III and CP/M compatibility by fall.

calc

MACHINE SPEED "BASIC"

CALC was designed to provide programmers of microcomputers with a portable language that combines the programming ease of the higher languages with the speed and flexibility of assembler programming. CALC is totally portable on the Commodore and APPLE II computers. This means that CALC source code written on an APPLE II will run as is on a Commodore machine and vice versa.

When possible, CALC makes direct use of the BASIC ROM machine language routines in the Commodore and APPLE II. In essence, CALC provides access to the power in the BASIC ROMs without the overhead of the BASIC interpreter. This includes floating point arithmetic and all library functions. In addition, we have added features that BASIC does not have. These include true integer arithmetic and machine speed string handling with search and replacement features.

CALC can fetch and replace BASIC variables and arrays by name. The programmer indicates what is to be done using simple keyword commands (ADD, MULT, SINE, etc.) and leaves all register set-up, bit-format and the like to CALC. The object code resulting from CALC programs is very compact and consists of direct calls to the BASIC ROMs or to the CALC runtime package.

CALC comes in 4K of PROM containing a relocatable runtime package and a very complete Trace Window feature for debugging CALC programs. CALC produces romable 6502 code that does not require the CALC development PROM to function. Programs written in CALC will run on any stock PET or APPLE. CALC comes with a 60-page manual.

CALC PROM on Commodore is \$115.; indicate 3.0 or 4.0 BASIC, 40/80 column screen and rom sockets \$9000. \$A000 or \$B000.

CALC on APPLE II via quality slot independent board is \$160.

CALC manual by itself is \$10.

CALC requires MoserMae Macro Assembler (Tape or Disk version)

sort

MULTI-KEY MACHINE LANGUAGE

A 6502 machine language in-memory sorting algorithm of commercial quality is available as part of a new utility eprom for PET and APPLE owners. Most sorts are accomplished in less than a second and very large sorts take only a few seconds. The algorithm is a diminishing increment insertion sort, with optionally chosen increments. This algorithm has the advantage of being significantly faster (but not much longer) than simpler ones, and significantly smaller (but not much slower) than more complicated ones. Moreover, unlike some of the more complicated algorithms, there are no conditions under which the performance of this sort degenerates or fails.

SORT is intelligent to the degree that almost no user set-up operations are required. SORT handles integer, floating-point and string arrays, as well as multiple dimensioned arrays with equal ease. In addition, multi-key sorting of string arrays has been enabled. The user may specify the character within a string to begin sorting on and how many characters are to be evaluated. SORT is capable of performing up to twenty of these multi-key sub-sorts (on matches found) at the same time. This multi-level 20-KEY capacity for string arrays greatly increases the uses to which SORT can be put.

SORT comes as part of a utility EPROM that also includes a hi-speed machine language text screen dump. Complete instructions for installation and use are included.

SORT is available for large-keyboard PETs Only. One ROM will work for BASIC 3.0 & 4.0, 40 or 80 column screens. When ordering you need only to indicate which ROM socket address in PET you prefer EPROM (\$9000, \$A000 or \$B000). PET SORT EPROM at hex \$9000 location if you do not specify. PET EPROM price is \$55.00 (postpaid).

SORT is available on the APPLE II via a top quality, fully socketed, EPROM board that is slot independent. The MATRIX APPLE board includes a function driver that supports up to 16 EPROM based functions in case you would like to use your own EPROM in place of ours. EPROM board with SORT, text screen dump and function driver are all slot independent and may be used in any slot except 0. Price APPLE CARD \$110.00 (postpaid).

bookkeeper

TOTAL BUSINESS SYSTEM

BOOKKEEPER was designed by a team of accountants and businessmen, and then programmed especially for microcomputers. This is not hand-me-down software from mainframe computers. BOOKKEEPER is a totally integrated management and accounting system that is available now on the more popular micro systems.

This series of interlocking programs is menu-driven and self-prompts with relative file structure implemented throughout. In some versions, machine language routines have been used to provide more efficient operation. The system employs state-of-the-art techniques and has been designed to be user-friendly. No knowledge of accounting or computers is required.

We believe the system can be operated using little more than the screen prompts. But for completeness, our MATRIX User Guide (two-inch ring binder) contains almost 200 pages of details on the BOOKKEEPER system plus a helpful introduction to business accounting principles. We suggest that you send for a more complete description of BOOKKEEPER or invest in a copy of the User Guide. There is room here only for a general description.

BOOKKEEPER is available for both SERVICE and RETAIL/WHOLESALE firms. This total business system contains the following: 375 General Ledger accounts (ten departments with accompanying revenue and expense accounts). Accounts Receivable file with maintenance and report capabilities (1000 accounts); Payroll with all federal withholding computed, state and local income tax capabilities for all fifty states (100 employees); Cash Receipts and Cash Disbursements programs that keep track of inventory sales by department, Sales Tax computations, Receipts, and Invoices; Accounts Payable file with maintenance and report capabilities (100 accounts). The system also generates and prints valuable management reports such as Departmental Budgeting, Profit and Loss Statements by Department, the traditional Chart of Accounts Summation (Trial Balance), and Financial Reports.

The Retail/Wholesale version of BOOKKEEPER includes a perpetual inventory control system and permits point-of-sale invoices.

BOOKKEEPER is available now on the COMMODORE 8032/8050, 48K APPLE II+ and RADIO SHACK Model III computers. CP/M compatible version available by September.

The BOOKKEEPER system retails at \$1000.00.

Bookkeeper manual by itself is \$20.00.

Matrix software

315 Marion Avenue, Big Rapids, MI 49307
(616) 796-2483 or 796-0381



Dealer Inquiries Invited.

S (starting address of screen memory)
 $S = 4 * (\text{PEEK}(36866)\text{AND}128) + 64 * (\text{PEEK}(36869)\text{AND}120)$
C (starting address of color memory)
 $C = 37888 + 4 * (\text{PEEK}(36866)\text{AND}128)$

To use these formulae in your programs, you should enter the two lines above as program lines at the start of your program. ($10\ S = 4 * (\text{PEEK}... \text{etc.})$) Then, whenever you are working with these memories, simply POKE to $S + X$ or $C + X$. In other words, use the **S** and the **C** instead of a numerical address. For example, to POKE to the tenth screen location, you would POKE $S + 10$.

Adding a 3K (3072 additional RAM bytes for your use) expansion module will not change any of the normal, expected locations of screen or color memories. It simply fills in a currently empty space from addresses 1024 to 4095. This results in BASIC programs starting at address 1024 (as they do in PETs) instead of the normal VIC starting point, 4096. (See Table 1.) However, adding an 8 or 16K of additional memory floats the screen down to 4096 (from 7680). BASIC RAM floats to a starting address of 4608. And, since one of the bits which governs where screen memory starts also controls color memory, it moves too.

Character Memories

The starting address of the character set memory does not float, so you need not check for it in programs. However, the ability to define alternative character sets is valuable. There are sixteen possible locations in VIC for the start of *character* set memories. Of these, eight can be used (the others are not allowed). Here's the formula to change the character memory location:

POKE 36869, PEEK(36869)AND15OR(X*16)

X will be a number from 0 to 15. Here are the starting locations in memory for several values of X:

- X=0 (32768)** this is the normal "default" starting location.
- X=1 (33792)** where the upper case reverse characters normally are.
- X=2 (34816)** normally the lower case, unreversed characters.
- X=3 (35840)** normally lower case reversed.
- X=4 to 11** (cannot be used).
- X=12 (4096)** normally the start of available BASIC RAM.
- X=13 (5020)** normally within BASIC RAM.
- X=14 (6144)** normally within BASIC RAM.
- X=15 (7168)** normally within BASIC RAM.

These last four values of X are where you would usually want to put any specially written character set you've invented.

Table 1. General VIC Map

0-1023 — Operating System and BASIC Overhead
1024-4095 — Empty memory (3K Expansion area)
4096-7679 — BASIC RAM memory
7680-8191 — Screen Memory
8192-32767 — 24K Additional expansion RAM area

©



is your source for

**VIC®
PROGRAMS**

VIC Games \$24.95

- VIC Trap
- Seawolf
- Bounce Out

Household Finance \$34.95

- Part I — Entering & Updating
- Part II — Summing & Displaying
- Part III — Budgeting & Graphing
- Part IV — Deductibles Analysis

Home Inventory \$14.95

- Part I — Entering Inventory
- Part II — Evaluating Inventory

Logic Games \$14.95

- Code Maker
- Code Breaker

Recreational/Educational I \$14.95

- Hangman
- Hangmath

Recreational/Educational II \$14.95

- Math Hurdler
- Monster Maze

Ordering Information: VISA/Mastercard, check or money order accepted. If charge, please include expiration date of card. Add \$1.50 for shipping and handling. Calif. residents add sales tax.



201 San Antonio Circle, #270

Mountain View, CA 94040

(415) 948-9595

ATTENTION COMPARISON SHOPPERS

HOW DOES A \$299 BYTEWRITER-1 STACK UP AGAINST A \$650 EPSON MX-80? YOU DECIDE!

The Only 80 Column Dot Matrix Printer Under \$300.

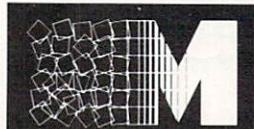
Why do we dare to compare the Bytewriter-1 to the Epson MX-80, the industry leader? Because we feel strongly that dollar for dollar, the Bytewriter-1 is tough to beat for performance and quality.

Our extensive testing has proved that the Bytewriter-1 interfaces problem-free to the TRS-80, the Apple II and the Atari 400 and 800.

We are not going to tell you that the Bytewriter-1 is better than the MX-80, but by comparison, and for half the cost, you get more than a reliable printer — you get a great value.

Call or write for more information today.

**Comparable features.
Uncomparable price.**



MICROTEK^{inc.}

9514 Chesapeake Drive
San Diego, CA 92123

(714) 278-0633

Outside CA call
TOLL FREE (800) 854-1081

TWX. 910-335-1269

TRS-80 is a trademark of Radio Shack, Div. of Tandy Corp.

Apple II is a trademark of Apple Computer, Inc.

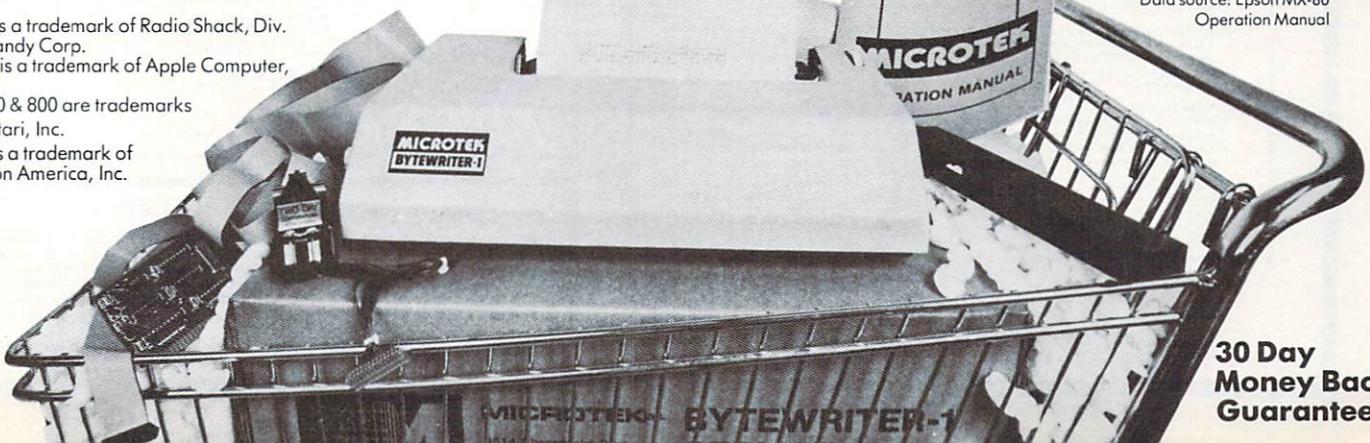
Atari 400 & 800 are trademarks of Atari, Inc.

MX-80 is a trademark of Epson America, Inc.

FEATURES BYTEWRITER-1 EPSON MX-80*

Print speed	60 lines per minute	46 lines per minute
Paper feed	Friction feed original plus 3 copies	Pin feed original plus 2 copies
Ribbon	Black, cartridge \$9.95	Black, cartridge \$14.00
Life expectancy	Printhead — 100 million char. Drive Mech. — 10 million char. Ribbon — 5 million char.	50 — 100 million char. 5 million char. 3 million char.
Dimensions	3.8" x 15" x 9"	5.2" x 14.7" x 12"
Character set	96 ASCII	96 ASCII
Interface	Parallel	Parallel
Warranty	90 days	90 days
Printhead replacement	\$29.95	\$30
Cost	\$299	\$650

*Data source: Epson MX-80
Operation Manual



**30 Day
Money Back
Guarantee**

DYNACOMP

Quality software for:*

ATARI
PET
APPLE II Plus

TRS-80 (Level II)**
NORTH STAR
CP/M Disks/Diskettes

CARD GAMES

BRIDGE 2.0 (Available for all computers)

An all inclusive version of this most popular of card games. This program both BIDS and PLAYS either contract or duplicate bridge. Depending on the contract, your computer opponents will either play the offense OR defense. If you bid too high, the computer will double your contract! BRIDGE 2.0 provides challenging entertainment for advanced players and is an excellent learning tool for the bridge novice. See the software review in 80 Software Critique. Rated #1 by Creative Computing.

HEARTS 1.5 (Available for all computers)

An exciting and entertaining computer version of this popular card game. Hearts is a trick-oriented game in which the purpose is not to take any hearts or the queen of spades. Play against two computer opponents who are armed with hard-to-beat playing strategies. HEARTS 1.5 is an ideal game for introducing the uninitiated (your spouse) to computers. See the software review in 80 Software Critique.

STUD POKER (Atari only)

This is the classic gambler's card game. The computer deals the cards one at a time and you (and the computer) bet on what you see. The computer does not cheat and usually bets the odds. However, it sometimes bluffs! Also included is a five card draw poker betting practice program. This package will run on a 16K ATARI. Color, graphics, sound. See review in COMPUTE!

POKER PARTY (Available for all computers)

POKER PARTY is a draw poker simulation based on the book, POKER, by Oswald Jacoby. This is the most comprehensive version available for microcomputers. The party consists of yourself and six other (computer) players. Each of these players (you will get to know them) has a different personality in the form of a varying propensity to bluff or fold under pressure. Practice with POKER PARTY before going to that expensive game tonight! Apple Cassette and diskette versions require a 32 K (or larger) Apple II.

CRIBBAGE 2.0 (TRS-80 only)

This is simply the best cribbage game available. It is an excellent program for the cribbage player in search of a worthy opponent as well as for the novice wishing to improve his game. The graphics are superb and assembly language routines provide rapid execution! See the software review in 80 Software Critique.

THOUGHT PROVOKERS

MANAGEMENT SIMULATOR (Atari, North Star and CP/M only)

Price: \$19.95 Cassette/\$23.95 Diskette

This program is both an excellent teaching tool as well as a stimulating intellectual game. Based upon similar games played at graduate business schools, each player or team controls a company which manufactures three products. Each player attempts to outperform his competitors by setting selling prices, production volumes, marketing and design expenditures etc. The most successful firm is the one with the highest stock price when the simulation ends.

FLIGHT SIMULATOR (Available for all computers)

A realistic flight simulator based on the physics of take-off, flight and landing. The program utilizes aerodynamic equations and the characteristics of a real airfoil. You can practice instrument approaches and navigation using radials and compass headings. The more advanced flyer can also perform loops, half rolls and similar aerobatic maneuvers. Although this program does not employ graphics, it is exciting and very addictive. See the software review in COMPUTRONICS. Runs in 16K Atari.

VALDEZ (Available for all computers)

VALDEZ is a computer simulation of super tanker navigation in the Prince William Sound/Valdez Narrows region of Alaska. Included in the simulation is a realistic and extensive 256 x 256 element map, portions of which may be viewed using the ship's alphanumeric radar display. The motion of the ship itself is accurately modelled mathematically. The simulation also contains a model for the tidal patterns in the region, as well as other traffic (outgoing tankers and drifting icebergs). Chart your course from the Gulf of Alaska to Valdez Harbor! See the software review in 80 Software Critique.

BACKGAMMON 2.0 (Atari, North Star and CP/M only)

Price: \$14.95 Cassette/\$18.95 Diskette

This program tests your backgammon skills and will also improve your game. A human can compete against a computer or against another human. The computer can even play against itself. Either the human or the computer can double or generate dice rolls. Board positions can be created or saved for replay. BACKGAMMON 2.0 plays in accordance with the official rules of backgammon and is sure to provide many fascinating sessions of backgammon play.

CHECKERS 3.0 (PET only)

This is one of the most challenging checkers programs available. It has 10 levels of play and allows the user to change skill levels at any time. Although providing a very tough game at level 4.8, CHECKERS 3.0 is practically unbeatable at levels 9 and 10.

CHESS MASTER (North Star and TRS-80 only)

Price: \$19.95 Cassette/\$23.95 Diskette

This complete and very useful program provides five levels of play. It includes castling, en passant captures and the promotion of pawns. Additionally, the board may be preset before the start of play, permitting the examination of "book" plays. To maximize execution speed, the program is written in assembly language (by SOFTWARE SPECIALISTS of California). Full graphics are employed in the TRS-80 version, and two widths of alphanumeric display are provided to accommodate North Star users.

LEM LANDER (32K Apple Disk only)

Price: \$16.95 Diskette

Pilot your LEM LANDER to a safe landing on any of nine different surfaces ranging from smooth to treacherous. The game paddles are used to control craft attitude and thrust. This is a real-time high risk challenge!

FOREST FIRE! (Atari only)

Price: \$16.95 Cassette/\$20.95 Diskette

Using excellent graphics and sound effects, this simulation puts you in the middle of a forest fire. Your job is to direct operations to put out the fire while compensating for changes in wind, weather and terrain. Not protecting valuable structures can result in startling penalties. Life-like variables are provided to make FOREST FIRE! very suspenseful and challenging. No two games have the same setting and there are 3 levels of difficulty.

NOMINES JIGSAW (Atari, Apple and TRS-80 only)

Price: \$16.95 Cassette/\$20.95 Diskette

A jigsaw puzzle on your computer! Complete the puzzle by selecting your pieces from a table consisting of 60 different shapes. NOMINES JIGSAW is a virtuous programming effort. The graphics are superlative and the puzzle will challenge you with its three levels of difficulty. Scoring is based upon the number of guesses taken and by the difficulty of the board set up. See review in ELECTRONIC GAMES.

MONARCH (Atari only)

Price: \$11.95 Cassette/\$15.95 Diskette

MONARCH is a fascinating economic simulation requiring you to survive an 8-year term as your nation's leader. You determine the amount of acreage devoted to industrial and agricultural use, how much food to distribute to the populace and how much should be spent on pollution control. You will find that all decisions involve a compromise and that it is not easy to make everyone happy.

CHOMPETO (Atari only)

Price: \$11.95 Cassette/\$15.95 Diskette

CHOMPETO is really two challenging games in one. One is similar to NIM; you must bite off part of a cookie, but avoid taking the poisoned portion. The other game is the popular board game REVERSI. It fully uses the Atari's graphics capability, and is hard to beat. This package will run on a 16K system.

*ATARI, PET, TRS-80, NORTHSTAR, CP/M and IBM are registered trademarks and/or trademarks.

**Except where noted, all model I software is available for the Model III. TRS-80 diskettes are not supplied with DOS or BASIC.

DYNACOMP OFFERS THE FOLLOWING

- Widest variety
- Guaranteed quality
- Fastest delivery
- Friendly customer service
- Free catalog
- 24 hour order phone

AND MORE...

STARTREK 3.2 (Available for all computers)

Price: \$11.95 Cassette/\$15.95 Diskette

This is the classic Startrek simulation, but with several new features. For example, the Klingons now shoot at the Enterprise without warning while also attacking starbases in other quadrants. The Klingons also attack with both light and heavy cruisers and move when shot at! The situation is hectic when the Enterprise is besieged by three heavy cruisers and a starbase S.O.S. is received! The Klingons get even! See the software review in A.N.A.L.O.G., 80 Software Critique and Game Merchandise.

BLACK HOLE (Apple only)

Price: \$14.95 Cassette/\$18.95 Diskette

This is an exciting graphical simulation of the problems involved in closely observing a black hole with a space probe. The object is to enter and maintain, for a prescribed time, an orbit close to a small black hole. This is to be achieved without coming so near the anomaly that the tidal stress destroys the probe. Control of the craft is realistically simulated using side jets for rotation and main thrusters for acceleration. This program employs Hi-Res graphics and is educational as well as challenging.

SPACE TILT (Apple and Atari only)

Price: \$10.95 Cassette/\$14.95 Diskette

Use the game paddles to tilt the plane of the TV screen to "roll" a ball into a hole in the screen. Sound simple? Not when the hole gets smaller and smaller! A built-in timer allows you to measure your skill against others in this habit-forming action game.

MOVING MAZE (Apple and Atari only)

Price: \$10.95 Cassette/\$14.95 Diskette

MOVING MAZE employs the game paddles to direct a puck from one side of a maze to the other. However, the maze is dynamically (and randomly) built and is continually being modified. The objective is to cross the maze without touching (or being hit by) a wall. Scoring is by an elapsed time indicator, and three levels of play are provided.

ALPHA FIGHTER (Atari only)

Price: \$14.95 Cassette/\$14.95 Diskette

Two excellent graphics and action programs in one! ALPHA FIGHTER requires you to destroy the alien starships passing through your sector of the galaxy. ALPHA BASE is in the path of an alien UFO invasion; let five UFO's get by and the game ends. Both games require the joystick and get progressively more difficult the higher you score! ALPHA FIGHTER will run on 16K systems.

THE RINGS OF THE EMPIRE (Atari only)

Price: \$16.95 Cassette/\$20.95 Diskette

The empire has developed a new battle station protected by rotating rings of energy. Each time you blast through the rings and destroy the station, the empire develops a new station with more protective rings. This exciting game runs on 16K systems, employs extensive graphics and sound and can be played by one or two players.

INTRUDER ALERT (Atari only)

Price: \$16.95 Cassette/\$20.95 Diskette

This is a fast-paced graphics game which places you in the middle of the "Dreadstar" having just stolen its plans. The droids have been alerted and are directed to destroy you at all costs. You must find and enter your ship to escape with the plans. Five levels of difficulty are provided. INTRUDER ALERT requires a joystick and will run on 16K systems.

GIANT SLALOM (Atari only)

Price: \$14.95 Cassette/\$18.95 Diskette

This real-time action game is guaranteed addictive! Use the joystick to control your path through slalom courses consisting of both open and closed gates. Choose from different levels of difficulty, race against other players or simply take practice runs against the clock. GIANT SLALOM will run on 16K systems.

TRIPLE BLOCKADE (Atari only)

Price: \$14.95 Cassette/\$18.95 Diskette

TRIPLE BLOCKADE is a three-player graphics and sound action game. It is based on the classic video arcade game which millions have enjoyed. Using the Atari joysticks, the object is to direct your blocking line around the screen without running into your opponent(s). Although the concept is simple, the combined graphics and sound effect lead to "high anxiety".

GAMES PACK I (Available for all computers)

Price: \$10.95 Cassette/\$14.95 Diskette

GAMES PACK I contains the classic computer games of BLACKJACK, LUNAR LANDER, CRAPS, HORSE RACE, SWITCH and more. These games have been combined into one large program for ease in loading. They are individually accessed by a convenient menu. This collection is worth the price just for the DYNACOMP version of BLACKJACK.

GAMES PACK II (Available for all computers)

Price: \$10.95 Cassette/\$14.95 Diskette

GAMES PACK II includes the games CRAZY EIGHTS, JOTTO, ACEY DUCEY, LIFE, WUMPUS and others. As with GAMES PACK I, all the games are loaded as one program and are called from a menu. You will particularly enjoy DYNACOMP's version of CRAZY EIGHTS.

Why pay \$7.95 or more per program when you can buy a DYNACOMP collection for just \$10.95?

MOON PROBE (Atari and North Star only)

Price: \$11.95 Cassette/\$15.95 Diskette

This is an extremely challenging "lunar lander" program. The user must drop from orbit to land at a predetermined target on the moon's surface. You control the thrust and orientation of your craft plus direct the rate of descent and approach angle.

SPACE LANES (North Star only)

Price: \$14.95 Diskette

SPACE LANES is a simple but exciting space transportation game which involves up to four players (including the computer). The object is to form and expand space transportation companies in a competitive environment. The goal is to amass more net worth than your opponent. The economics include stock purchases and company mergers. Watch your wealth grow!

ADVENTURE

CRANSTON MANOR ADVENTURE (North Star and CP/M only)

Price: \$21.95 Diskette

At last! A comprehensive Adventure game for North Star and CP/M systems. CRANSTON MANOR ADVENTURE takes you into mysterious CRANSTON MANOR where you attempt to gather fabulous treasures. Lurking in the manor are wild animals and robots who will not give up the treasures without a fight. The number of rooms is greater and the associated descriptions are much more elaborate than the current popular series of Adventure programs, making this game the top in its class. Play can be stopped at any time and the status stored on diskette.

SPEECH SYNTHESIS

DYNACOMP is now distributing the new and revolutionary TYPE 'N TALK™ (TNT) speech synthesizer from Votrax. Simply connect TNT to your computer's serial interface, enter text from the keyboard and hear the words spoken! TNT is the easiest-to-program speech synthesizer on the market. It uses the least amount of memory and provides the most flexible vocabulary available anywhere!

Price: \$329.95 (Please add \$4.00 for shipping and handling)

TNT Software

The following DYNACOMP programs are available for use with TNT.

STUD POKER (Atari, 24K)
NOMINES JIGSAW (Atari, 24K)
TEACHER'S PET I (Atari and North Star)
BRIDGE 2.0 (North Star)
CHOMPELO (Atari, 24K)

Please specify 'TNT' versions when ordering

ABOUT DYNACOMP

DYNACOMP is a leading distributor of small system software with sales spanning the world (currently in excess of 40 countries). During the past two years we have greatly enlarged the DYNACOMP product line, but have maintained and improved our high level of quality and customer support. The achievement in quality is apparent from our many repeat customers and the software reviews in such publications as COMPUTRONICS, 80 Software Critique and A.N.A.L.O.G. Our customer support is as close as your phone. It is always friendly. The staff is highly trained and always willing to discuss products or give advice.

BUSINESS and UTILITIES

SPELLGUARD™ (CP/M only)

SPELLGUARD is a revolutionary new product which increases the value of your current word processing system (WORDSTAR, MAGIC WAND, ELECTRIC PENCIL, TEXTED EDITOR II and others). Written entirely in assembly language, SPELLGUARD™ rapidly assists the user in eliminating spelling and typographical errors by comparing each word of the text against a dictionary (expandable) of over 20,000 of the most common English words. Words appearing in the text but not found in the dictionary are "flagged" for easy identification and correction. Most administrative staff familiar with word processing equipment will be able to use SPELLGUARD™ in only a few minutes.

MAIL LIST 2.2 (Apple, Atari and North Star diskette only)

The program is unmatched in its ability to store a maximum number of addresses on one diskette (minimum of 100 per diskette, more than 2200 for "double density" systems!). Its many features include alphabetic and zip code sorting, label printing (1, 2, or 3 up), merging of files and a unique keyword seeking routine which retrieves entries by a virtually limitless selection of user defined codes. Mail List 2.2 will even find and delete duplicate entries. A very valuable program!

FORM LETTER SYSTEM rel. 2 (Atari, North Star and Apple Diskettes only)

FORM LETTER SYSTEM (FLS) is the ideal program for creating and editing form letters and address lists. It contains an easy-to-use text editor which produces fully justified text. Special codes are used in the address list to obtain personalized salutations. Form letters are produced by automatically inserting each address into a predetermined portion of your letter. FLS is completely compatible with MAIL LIST 2.2, which may be used to manage and sort your address files.

FLS and MAIL LIST 2.2 are available as a combined package for \$59.95.

SORTIT (North Star only)

SORTIT is a general purpose sorting program written in 8080 assembly language. This program will sort sequential data files generated by NORTH STAR BASIC. Primary and optional secondary keys may be numeric or one to nine character strings. SORTIT is easily used with files generated by DYNACOMP's MAIL LIST program and is very versatile in its capabilities for all other BASIC data file sorting.

PERSONAL FINANCE SYSTEM (Atari and North Star only)

PFS is a single disk, menu-oriented system composed of ten different programs. Besides recording your expenses and tax returns, PFS can calculate your net worth and display information on expenditures by any of 26 user-defined codes by month or by pay. PFS will even produce monthly bar graphs of your expenses by category! This powerful package requires only one disk drive, minimal memory (24K Atari, 32K North Star) and will store up to 600 records per disk (and over 1000 records per disk by making a few simple changes to the programs). You can record checks plus cash expenses so that you can finally see where your money goes and eliminate guesswork and tedious hand calculations.

FAMILY BUDGET (Apple only)

FAMILY BUDGET is a very convenient record-keeping program. You will be able to keep track of cash and credit expenditures as well as income on a daily basis. You can record tax deductible items and charitable donations. FAMILY BUDGET also provides a continuous record of all credit transactions. You can make daily cash and charge entries to any of 21 different expense accounts as well as to 5 payroll and tax accounts. Data are easily retrieved giving the user complete control over all other otherwise complicated (and unorganized!) subject.

INTELINK (Atari only)

This software package contains a menu-driven collection of programs for facilitating efficient two-way communications through a full duplex modem (required for use). In one mode of operation you may connect to a data service (e.g., The SOURCE or MicroNet) and quickly load data such as stock quotations onto your diskette for later viewing. This greatly reduces "connect time" and thus the service charge. You may also record the complete contents of a communications session. Additionally, programs written in BASIC, FORTRAN, etc. may be built off-line using the support text editor and later "uploaded" to another computer, making the Atari a very smart terminal. Even Atari BASIC programs may be uploaded. Further, a command file may be built off-line and used later as controlling input for a time-share system. That is, you can set up your sequence of time share commands and programs, and the Atari will transmit them as needed; batch processing. All this adds up to saving both connect time and your time.

TEXT EDITOR II (CP/M)

This is the second release version of DYNACOMP's popular TEXT EDITOR I and contains many new features. With TEXT EDITOR II you may build text files in chunks and assemble them for later display. Blocks of text may be appended, inserted or deleted. Files may be saved on disk/diskette in right justified/centered format to be later printed by either TEXT EDITOR II or the CP/M ED facility. Further, ASCII CP/M files (including BASIC and assembly language programs) may be read by the editor and processed. In fact, text files can be built using ED and later reformatted using TEXT EDITOR II. All in all, TEXT EDITOR II is an inexpensive, easy to use, but very flexible editing system.

DFILE (Atari and North Star diskette only)

The hand program allows North Star and Atari users to maintain a specialized data base of all files and programs in the stack of disks which invariably accumulates. DFILE is easy to set up and use. It will organize your disks to provide efficient locating of the desired file or program.

FINFIT (North Star only)

This is a three-in-one program which maintains information accessible by keywords of three types: Personal (e.g. last name), Commercial (e.g. plumbers) and Reference (e.g. magazine articles, record albums, etc.). In addition to keyword searches, there are birthday, anniversary and appointment searches for the personal records and appointment searches for the commercial records. Reference records are accessed by a single keyword or by cross-referencing two or three keywords.

SHOPPING LIST (Atari and North Star only)

SHOPPING LIST stores information on items you purchase at the supermarket. Before going shopping, it will remind you of all the things you might need, and then display (or optionally print) your shopping list and the total cost. Adding, deleting, changing and storing data is very easy. Runs with 16K.

TAX OPTIMIZER (North Star only)

The TAX OPTIMIZER is an easy-to-use, menu oriented software package which provides a convenient means for analyzing various income tax strategies. The program is designed to provide a quick and easy data entry. Income tax is computed by all tax methods (regular, income averaging, maximum and alternate minimum tax). The user may immediately observe the tax effect of critical financial decisions. TAX OPTIMIZER has been thoroughly field tested in CPA offices and comes complete with the current tax tables in its data files.

EDUCATION

HODGE PODGE (Apple only, 48K Applesoft or Integer BASIC)

Let HODGE PODGE be your child's baby sitter. Pressing any key on your Apple will result in a different and intriguing "happening" related to the letter or number of the chosen key. The program's graphics, color and sound are a delight for children from ages 1½ to 9. HODGE PODGE is a non-intimidating teaching device which brings a new dimension to the use of computers in education.

TEACHER'S PET I (Available for all computers)

This is the first of DYNACOMP's educational packages. Primarily intended for pre-school to grade 3, TEACHER'S PET provides the young student with counting practice, letter-word recognition and three levels of math skill exercises.

MISCELLANEOUS

CRYSTALS (Atari only)

A unique algorithm randomly produces fascinating graphics displays accompanied with tones which vary as the patterns are built. No two patterns are the same, and the combined effect of the sound and graphics are mesmerizing. CRYSTALS has been used in local stores to demonstrate the sound and color features of the Atari.

NORTH STAR SOFTWARE EXCHANGE (NSSE) LIBRARY

DYNACOMP now distributes the 23 volume NSSE library. These diskettes each contain many programs and offer an outstanding value for the purchase price. They should be part of every North Star user's collection. Call or write DYNACOMP for details regarding the contents of the NSSE collection.

Price: \$9.95 each, \$7.95 each (4 or more)
The complete collection may be purchased for \$149.95

AVAILABILITY

DYNACOMP software is supplied with complete documentation containing clear explanations and examples. Unless otherwise specified, all programs will run within 16K program memory space (ATARIS require 24K). Except where noted, programs are available on ATARI, PET, TRS-80 (Level II) and Apple (Applesoft) cassette and diskette as well as North Star single density (double density compatible) diskette. Additionally, most programs can be obtained on standard (IBM format) 8" CP/M floppy disks for systems running under MBASIC.

STATISTICS and ENGINEERING

DIGITAL FILTER (Available for all computers)

DIGITAL FILTER is a comprehensive data processing program which permits the user to design his own filter function or choose from a menu of filter forms. The filter forms are subsequently converted into non-recursive convolution coefficients which permit rapid data processing. In the explicit design mode the shape of the frequency transfer function is specified by directly entering points along the desired filter curve. In the menu mode, ideal low pass, high pass and bandpass filters may be approximated to varying degrees according to the number of points used in the calculation. These filters may optionally also be smoothed with a Hanning function. In addition, multi-stage Butterworth filters may be selected. Features of DIGITAL FILTER include plotting of the data before and after filtering, as well as display of the chosen filter functions. Also included are convenient data storage, retrieval and editing procedures.

DATA SMOOTHING (Not available for Atari)

This data smoothing program may be used to rapidly derive useful information from noisy business and engineering data which are equally spaced. The software features choice in degree and range of fit, as well as smoothed first and second derivative calculation. Also included is automatic plotting of the input data and smoothed results.

FOURIER ANALYZER (Available for all computers)

Use this program to examine the frequency spectra of limited duration signals. The program features automatic scaling and plotting of the input data and results. Practical applications include the analysis of complicated patterns in such fields as electronics, communications and business.

TFIA (Transfer Function Analyzer)

This is a special software package which may be used to evaluate the transfer functions of systems such as hi-fi amplifiers and filters by examining their response to pulsed inputs. TFA is a major modification of FOURIER ANALYZER and contains an engineering-oriented decibel versus log frequency plot as well as data editing features. Whereas FOURIER ANALYZER is designed for educational and scientific use, TFA is an engineering tool. Available for all computers.

HARMONIC ANALYZER (Available for all computers)

HARMONIC ANALYZER was designed for the spectrum analysis of repetitive waveforms. Features include data file generation, editing and storage/retrieval as well as data and spectrum plotting. One particularly unique facility is that the input data need not be equally spaced or in order. The original data is sorted and a cubic spline interpolation is used to create the data file required by the FFT algorithm.

FOURIER ANALYZER, TFA and HARMONIC ANALYZER may be purchased together for a combined price of \$49.95 (three cassettes) and \$59.95 (three diskettes).

REGRESSION I (Available for all computers)

REGRESSION I is a unique and exceptionally versatile one-dimensional least squares "polynomial" curve fitting program. Features include very high accuracy; an automatic degree determination option; an extensive internal library of fitting functions; data editing; automatic data and curve plotting; a statistical analysis (eg: standard deviation, correlation coefficient, etc.) and much more. In addition, new fits may be tried without reentering the data. REGRESSION I is certainly the cornerstone program in any data analysis software library.

REGRESSION II (PARAFIT) (Available for all computers)

PARAFIT is designed to handle those cases in which the parameters are imbedded (possibly nonlinearly) in the fitting function. The user simply inserts the functional form, including the parameters (A11, A12, etc.) as one or more BASIC statement lines. Data and results may be manipulated and plotted as with REGRESSION I. Use REGRESSION I for polynomial fitting, and PARAFIT for those complicated functions.

MULTILINEAR REGRESSION (MLR) (Available for all computers)

MLR is a professional software package for analyzing data sets containing two or more linearly independent variables. Besides performing the basic regression calculation, this program also provides easy to use data entry, storage, retrieval and editing functions. In addition, the user may interrogate the solution by supplying values for the independent variables. The number of variables and data size is limited only by the available memory.

REGRESSION I, II and MULTILINEAR REGRESSION may be purchased together for \$51.95 (three cassettes) or \$63.95 (three diskettes).

ANOVA (Available for all computers)

In the past the ANOVA (analysis of variance) procedure has been limited to the large mainframe computers. Now DYNACOMP has brought the power of this method to small systems. For those conversant with ANOVA, the DYNACOMP software package includes the 1-way, 2-way and N-way procedures. Also provided are the Yates 2N-P factorial designs. For those unfamiliar with ANOVA, do not worry. The accompanying documentation was written in a tutorial fashion (by a professor in the subject) and serves as an excellent introduction to the subject. Accompanying ANOVA is a support program for building the data base. Included are several convenient features including data editing, deleting and appending.

BASIC SCIENTIFIC SUBROUTINES, Volume I (Not available for Atari)

DYNACOMP is the exclusive distributor for the software keyed to the popular text BASIC Scientific Subroutines, Volume I by E. Ruckdeschel (see the BYTE/McGraw-Hill advertisement in BYTE magazine, January 1981). These subroutines have been assembled according to chapter. Included with each collection is a menu program which selects and demonstrates each subroutine.

Collection #1: Chapters 2 and 3: Data and function plotting, complex variables

Collection #2: Chapter 4: Matrix and vector operations

Collection #3: Chapters 5 and 6: Random number generators, series approximations

Price per collection: \$14.95 Cassette/\$18.95 Diskette

All three collections are available for \$50.95 (three cassettes) and \$49.95 (three diskettes).

Because the text is a vital part of the documentation, BASIC Scientific Subroutines, Volume I is available from DYNACOMP for \$19.95 plus 7% postage and handling. See review in Dr. Dobbs.

ROOTS (Available for all computers)

In a nutshell, ROOTS simultaneously determines all the zeroes of a polynomial having real coefficients. There is no limit on the degree of the polynomial, and because the procedure is iterative, the accuracy is generally very good. No initial guesses are required as input, and the calculated roots are substituted back into the polynomial and the residuals displayed.

ACTIVE CIRCUIT ANALYSIS (ACAP) (48K Apple only)

ACAP is the analog circuit designer's answer to LOGIC SIMULATOR. With ACAP you may analyze the response of an active or passive component circuit (e.g., a transistor amplifier, band pass filter, etc.). The circuit may be probed at equal steps in frequency, and the resulting complex (i.e., real and imaginary) voltages at each component juncture examined. By plotting the magnitude of these voltages, the frequency response of a filter or amplifier may be completely determined with respect to both amplitude and phase. In addition, ACAP prints a statistical analysis of the range of voltage responses which result from tolerance variations in the components. ACAP is easy to learn and use. Simply describe the circuit in terms of the elements and their placement, and execute. Circuit descriptions may be saved onto cassette or diskette to be recalled at a later time for execution or editing. ACAP should be part of every circuit designer's program library.

LOGIC SIMULATOR (Apple only; 48K RAM)

With LOGIC SIMULATOR you may easily test your complicated digital logic design with respect to given set of inputs to determine how well the circuit will operate. The elements which may be simulated include multiple inputs AND, OR, NOR, EXOR, EXNOR, NAND gates, as well as inverters, JK and D flip-flops, and one-shots. The behavior of the system is available every clock cycle. Inputs may be clocked in with varying clock cycle lengths; displacements and delays may be introduced to probe for glitches and race conditions. At the user's option, a timing diagram for any given set of nodes may be plotted using HIRES graphics. Save your breadboarding until the circuit is checked by LOGIC SIMULATOR.

LOGIC DESIGNER (North Star and CP/M only)

LOGIC DESIGNER is an exceptional Computer Aided Design (CAD) program. With it you may convert a large and complicated digital truth table (the functional specification) into an optimized Boolean logic equation. This equation may then be easily converted into a circuit design using either NAND or AND/OR gates. Operationally, LOGIC DESIGNER is composed of a BASIC program which calls in a machine language routine to reduce execution time. Example: For a 7 variable by 127 line table, the processing time is only two minutes. LOGIC DESIGNER is clearly a fast and powerful tool for building digital circuitry.

ORDERING INFORMATION

All orders are processed and shipped within 48 hours. Please enclose payment with order and include the appropriate computer information. If paying by VISA or Master Card, include all numbers on card.

Shipping and Handling Charges

Within North America: Add \$1.50

Outside North America: Add 10% (Air Mail)

Quantity Discounts

Deduct 10% when ordering 3 or more programs. Dealer discount schedules are available upon request.

8" CP/M Disk

Add \$2.00 to the listed diskette price for each 8" floppy disk (IBM soft sectored CP/M format). Programs run under Microsoft MBASIC or BASIC-80.

5 1/4" CP/M Disk

All software available on 8" CP/M disks is also available on 5 1/4" disks, North Star format.

Ask for DYNACOMP programs at your local software dealer. Write for detailed descriptions of these and other programs from DYNACOMP.

DYNACOMP, Inc.

1427 Monroe Avenue

Rochester, New York 14618

24 hour phone: (716) 586-7579 recording

Office phone (9AM-5PM EST): (716) 442-8960

New York State residents please add 7% NYS sales tax.



Guest Commentary: A Software Publisher's Position On Software Pricing And Service Policies

Mr. Sherwin A. Steffin
Canoga Park, CA

I. Problem

A position paper appearing in **COMPUTE!**'s June issue advanced the views of Computer Using Educators (CUE) regarding commercial software protection and licensing policies. CUE would propose a licensing arrangement that would allow software "to be copied and used by any and all teachers in that one school regardless of the number of computer stations or type of installation."

A misperception is at work here. This organization appears to hold the fundamental view that copying computer software is a right. CUE recommends that schools should not purchase software material unless it is copyable.

II. Position

In 1980, congress amended title 17, the United States Copyright Law to include the "computer program". The amended code reads:

It is not an infringement for the owner of a copy of a computer program to make or authorize the making of another copy or adaptation of that computer program provided:

(1) that such a new copy or adaptation is created as an essential step in the utilization of the computer program in conjunction with a machine and that is used in no other manner, or

(2) that such new copy or adaptation is for archival purposes only and that all archival copies are destroyed in the event that continued possession of the computer program should cease to be rightful (17 USC 106).

The provisions of this law, capsulized in the phrases "essential step" and "archival purposes," are clear. Software copyright infringement is illegal. Complaints and rationalizations abound: that "restrictive" policies are unjust; that such policies do not "invite" teachers to respect and honor them; or that those who "beat the system" by pirating software from big corporations are to be applauded. Yet no measure of complaint will make the crime any less a crime. When a teacher permits (even encourages) children and young adults to disregard federal law and engage in illegal activities, what is that teacher undermining?

**No software publisher would
deny the necessity that
teachers have on-site
backup copies of software...**

Costly and intensive research and development are required to produce any good software system, from drill and practice to the most sophisticated computer-mediated instruction. Even the simplest program file contains a complex set of instructions. Research and development costs far exceed the trivial cost of the material, or the ultimate retail cost of the product.

No software publisher would deny the necessity that teachers have on-site backup copies of software to avoid media failures which interrupt classroom activity. Yet CAI is a tool, like any other instructional aid. The purchasing policies which govern other educational materials (books, audio-visual materials, and the like) should not be expected to undergo modification simply because a medium's format is new or unfamiliar.

No software publisher fails to understand that the computer software industry has yet to adopt consistent, balanced purchasing policies for the schools. Yet, the instigation of licensing agreements poses problems analogous to those encountered in nuclear arms limitation efforts. The geographic area involved is expansive; the diversity of management policies (even among neighboring school districts) is immense. Further, the ambiguity of relying upon individuals' ethical behavior makes an "honors system" untenable. In short, the implementation of the copying procedures which CUE proposes, even at the local district level, would be unfeasible.

III. Proposed Solution

Answers do not come easily. The problems en-

COMPETENCY EXAM PREPARATION SERIES

This comprehensive set of programs consists of simulated exam modules, a thorough diagnostic package, and a complete set of instructional programs. It is designed to teach concepts and operations, provide drill and practice and assess achievement levels through pre and post testing. The Competency Exam Preparation Series provides a structured, sequential, curriculum encompassing mathematical, reading and writing instruction.

The C.E.P.S. program is designed for individual student use or use in a classroom setting. Programs provide optional printer capability covering worksheet generation and performance monitoring. C.E.P.S. are available in three software formats.

National Proficiency Series	\$1,299.00
N.Y.S. Regents Competency Test, Preparation Series	\$1,299.00
California Proficiency Assessment Test Preparation Series	\$1,299.00

If desired separate Mathematics and Verbal packages are available for \$799.00 ea. A Spanish language version of the Mathematics Instruction Package is available at no extra charge.

COLLEGE BOARD PREPARATION SERIES 81/82

for TRS-80 NORTHSTAR™
PET, APPLE OSI

Each program confronts the user with a virtually limitless series of questions and answers. Each is based on past exams and presents material of the same level of difficulty and in the same form used in the S.A.T. Scoring is provided in accordance with the formula used by College Boards.

S.A.T., P.S.A.T., N.M.S.Q.T., set includes 25 programs covering Vocabulary, Word Relationships, Reading Comprehension, Sentence Completion, and Mathematics. Price \$149.95

EDUCATOR EDITION - includes all of the above programs plus detailed solutions and explanations. Price \$229.95

Independent Tests of S.A.T. series performance show a mean total increase of 70 points in students' scores.

Update Pack to 81/82 specs. Available to previous owners. Price \$69.95

ODYSSEY IN TIME



ISAAC NEWTON

Perhaps the most fascinating and valuable educational game ever devised — ISAAC NEWTON challenges the players to assemble evidence and discern the underlying "Laws of Nature" that have produced this evidence. ISAAC NEWTON is an inductive game that allows players to intervene actively by proposing experiments to determine if new data conform to the "Laws of Nature" in question. Players may set the level of difficulty from simple to fiendishly complex.

In a classroom setting the instructor may elect to choose "Laws of Nature" in accordance with the complete instruction manual provided.

For insight into some of the basic principles underlying ISAAC NEWTON see GODEL, ESCHER, BACH by Douglas R. Hofstadler, Chapter XIX and Martin Gardner's MATHEMATICAL GAMES column in *Scientific American*, October, 1977 and June, 1959.

\$24.95

Send \$2.00 for complete Catalogue.

\$5.00 Discount Coupon included in Catalogue.

PROGRAMS AVAILABLE FOR

TRS-80, APPLE II & PET

(unless otherwise indicated)

disk or cassette (please specify)



All programs require 16K TRS-80 programs require LEVEL II BASIC APPLE programs require APPLESOFT BASIC



TIME TRAVELER

Confronts players with complex decision situations and the demand for real time action. Using the Time Machine, players must face a challenging series of environments that include: The Athens of Pericles, Imperial Rome, Nebuchadnezzar's Babylon, Ikhnaton's Egypt, Jerusalem at the time of the crucifixion, The Crusades, Machiavelli's Italy, The French Revolution, The American Revolution, and The English Civil War. Deal with Hitler's Third Reich, Vikings, etc. At the start of each game players may choose a level of difficulty...the more difficult, the greater the time pressure. To succeed you must build alliances and struggle with the ruling powers. Each game is unique.

\$24.95

Krell Software Corp.

Send check or money order to
21 Milbrook Drive, Stony Brook, NY 11790

(516) 751-5139

NY State Residents Add Sales Tax

countered today cannot be solved by a simplistic licensing policy, and the future will present even more confounding issues. Yet the difficulties are not insurmountable. As the microcomputer industry expands and time sharing becomes commonplace, users and software publishers will have to look seriously (and cooperatively) at complex joint understandings.

Software purchase and use entails shared responsibilities: on the part of the software publisher, to provide the most trouble-free product possible; on the part of the user, to know how to use and operate that product carefully and effectively. With this in mind, we propose six components fundamental to any working policy:

1. Software publishers should be accountable for providing error-free instructional materials.

2. Software publishers should be responsible for rapid service (a two week turn around at most) when replacing defective materials.

3. Where schools have purchased multiple CPUs, software publishers may provide software at sliding scale rates. An affidavit from a responsible district administrator would certify the number of CPUs purchased, protecting all parties. This sliding scale would permit educators to utilize multiple computers in one room, in multiple rooms, among several teachers, and even among several schools within a single district.

4. When intensive disk activity is connected with the use of a given system, software publishers should allow the user to copy and archive the disk.

5. Software publishers need to make available options to the schools, offering not only the sliding rate scale, but "spare parts" (diskettes, documentation, workbooks, etc.) at a significantly reduced price. This after-sale activity could well cover little more than the costs of materials, processing, and handling. Software purchase can be made economically feasible for the school without resort to charity or criminality.

6. Software publishers need to provide free disclosure about their locked instructional systems and the policies which support them. From this, educators may choose systems appropriate to their needs.

The problems connected with software piracy, if unchecked, will create an unnecessary and unfruitful adversary relationship between software publishers and educators. This paper delineates solutions to this dilemma: better quality control of software, licensing agreements, rapid service, and available spare parts. ©

STRUCTURAL ENGINEERING PROGRAMS

For Apple II Plus DOS 3.3

1. Continuous Beams
2. Plane Frames
3. Grids
4. Trusses
5. Retaining Walls
6. Simple Beams

All finite elements with beam and axial elements.

PATTERSON ENGINEERING CORP.
Huntington Beach, CA 92649
(714) 891-0935

TRS-80
SWTP

Model EP-2A-79
EPROM Programmer

Heath H-8
ATARI



Software available for F-8, 6800, 8085, 8080, Z-80, 6502, 1802, 2650, 6809 based systems.

EPROM type is selected by a personality module which plugs into the front of the programmer. Power requirements are 115 VAC 50/60 Hz at 15 watts. It is supplied with a 36-inch ribbon cable for connecting to microcomputer. Requires 1½ I/O ports. Priced at \$169.00 with one set of software. (Additional software on disk and cassette for various systems.) Personality modules are shown below.

Part No.	Programs	Price
PM 0	TMS 2708	\$17.00
PM 1	2704, 2708	17.00
PM 2	2732	33.00
PM 3	TMS 2716	17.00
PM 4	TMS 2532	33.00
PM 5	TMS 2516, 2716, 2758	17.00
PM 8	MCM68764	35.00

Optimal Technology, Inc.
Blue Wood 127, Earlysville, Virginia 22936
Phone (804) 973-5482

At long last. A complete line of Voice I/O peripherals for Commodore computers, starting at \$119.

Let's face it. Voice I/O is a fascinating and efficient way to communicate with computers. And now, thanks to VOICETEK, Voice I/O peripherals are easily available, easy to use and very affordable.

If you own a Commodore computer, we give you a choice of three different peripherals that will enable your computer to understand your spoken commands. And two of these peripherals will talk back.

What's in a name.

We call each member of our family of Voice I/O peripherals COGNIVOX, from COGNITIVE and VOX. It helps you remember that when you talk, COGNIVOX thinks about what you say.

The top-of-the-line COGNIVOX model for the PET/CBM is VIO-1002. It offers natural sounding voice output and excellent performance as a speech recognizer. It costs only \$249.

If the quality of voice output is not important for your application, then you can save \$100 by ordering VIO-432. Priced at \$149, VIO-432 is ideal for hobbyists or persons mainly interested in speech recognition.

Finally, if you have an 8K PET, there is insufficient memory for voice response, so we offer a recognition-only COGNIVOX, model SR-100P. It costs \$119, making it the lowest priced speech recognizer ever offered for sale. Yet its performance rivals that of units selling at much higher prices.

Which brings us to the next point we would like to make, namely, why we offer so much performance for so little money.

It's the technology.

Our Voice I/O peripherals are based on a technological breakthrough that made it possible to compress the required electronics onto a single integrated circuit chip. We are the only company so far that has achieved this remarkable feat. No wonder we offer such reasonably price voice peripherals.



In addition, COGNIVOX uses an exclusive non-linear, learning pattern matching algorithm to do speech recognition. Which means more reliable performance and ease of use.

What makes it talk.

COGNIVOX digitizes and stores in memory (using a data compression algorithm) the voice of the user. This gives three major advantages:

First, there are no restrictions to the words COGNIVOX can say. If you can say it (or sing it, or whistle it for that matter) your computer can do it too. Second, It is very easy to program your favorite words: just say them in the microphone. Third, you have a choice of voices, male, female, child, accents, etc. this unprecedented flexibility offered by COGNIVOX is a must in the personal computer environment. Voice synthesizers and the "talking chips" do not offer this flexibility and therefore we feel they are not suitable for use with personal computers. In addition, voice output quality can be poor, especially for synthesizers. In that respect, VIO-1002 is clearly superior to anything else on the market and it is a must if voice quality is important (for example, business applications).



Some specifications

COGNIVOX can be trained to recognize words or short phrases drawn from a vocabulary of up to 32 entries chosen by the user.

Training COGNIVOX to your vocabulary is easy. All you have to do is repeat the words three times at the prompting of the computer.

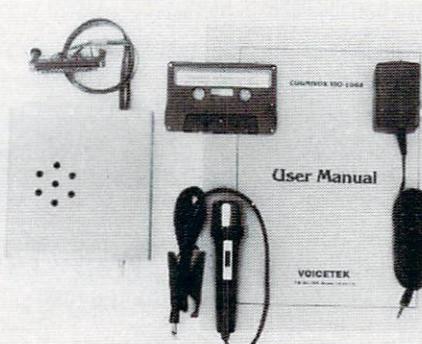
If you would like to have COGNIVOX respond to more than 32 words, you can have two or more vocabularies of 32 words and switch back and forth between them using a word.

The Voice output vocabulary can have up to 32 words phrases. Data rate is approximately 700 byte per word.

Ready to listen.

All COGNIVOX units are complete Voice I/O peripherals ready to plug in and use. They come assembled and tested and they include microphone, cassette with software and manuals. VIO units include built-in speaker and amplifier (yes, CB2 is also connected for music and sound effects).

They all plug into the user port and they receive their power from the cassette port except VIO-1002 which uses a wall transformer supplied with the unit.



Easy to use.

All you need to get COGNIVOX up and running is to plug it in and load one of the programs supplied. Load the demo program and start talking to your computer right away. Or load one of the games and discover the magic of voice control.

It is easy to write your own talking and listening programs too. A single statement in BASIC is all that you need to say a word or to recognize a word. Full instructions on how to do it are given in the manual.

Works with all versions.

COGNIVOX will work with all versions of the PET/CBM line. Old, new and newer ROMs. At least 16K of RAM is required (SR-100P will work with 8K of RAM).

If you have a disk system, you can use it to save vocabularies. Instructions are given in the manual.

Many uses.

With COGNIVOX your imagination is not the limit as the saying goes. It is the starting point. Cognivox is a super toy, an educational tool, an aid to handicapped, a data entry device while hands and eyes are busy, a foreign language translator, a sound effects generator, a telephone dialing device, an answering machine, a talking calculator. Using the IEEE 488 port you can control by voice instruments, plotters, test systems. And all these devices can talk back to you, telling you their readings, alarm conditions, even their name.

Order your COGNIVOX now.

To order by mail, give us the model number of the unit you wish to order, the make and model of your computer and your name and address. Enclose a check or money order and make sure to include \$5 for shipping and handling. CA residents please add 6% tax. You may also order by phone and charge it to your Master Charge or VISA. Our phone number is (805) 685-1854 9AM to 5PM PST, Monday through Friday. Foreign orders are welcome, please add 10% for air mail shipping and handling. Payments must be in US funds. COGNIVOX is backed by an 120-day limited warranty against manufacturing defects.

VOICETEK

P.O. Box 388, Goleta, CA 93116



NEECO

WHY BUY FROM THE BEST?

Service... Support...
Software...



MULTI-CLUSTER

For Commodore Systems, allows 3 CPU's (Expandable to 8) to access a single Commodore Disk.
MULTI-CLUSTER (3 CPU's) \$ 995
Each Additional CPU (up to 8) ... \$ 250

EPSON PRINTERS

MX-80 PRINTER	\$ 645
MX-80 FT	\$ 745
MX-100	\$ 945
MX-70	\$ 459
INTERFACE CARDS	
8141 (RS-232)	\$ 75
8150 (2K Buffered RS-232)	\$ 150
8161 (IEEE 488)	\$ 55
8131 (Apple Card)	\$ 85
8230 (Apple Card)	\$ 25
8220 (TRS-80 Cable)	\$ 35

DIABLO 630 PRINTER

DIABLO 630 - Serial - RS-232.....	\$2710
Tractor Option	\$ 250

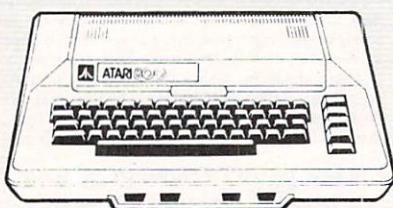
AMDEK MONITORS

Video 100 12" B+W	\$ 179
Video 300 12" Green	\$ 249
Color I 13" Low Res	\$ 449
Color II 13" High Res	\$ 999

INTERTEC COMPUTERS

64K Superbrain (360 Disk Storage), CP/M™	\$3495
64K QD Superbrain (700K Disk Storage), CP/M™	\$3995
Atari 400 (16K RAM)	\$ 399
Atari 800 (32K RAM) - good thru 8/31	\$1080
Atari 410 RECORDER	\$ 89.95
Atari 810 DISK DRIVE	\$ 599.95

*CP/M is a registered trademark of Digital Research.



ATARI COMPUTERS

Atari 400 (16K RAM)	\$ 399
Atari 800 (32K RAM) - good thru 8/31	\$1080
Atari 410 RECORDER	\$ 89.95
Atari 810 DISK DRIVE	\$ 599.95

NEECO carries all available ATARI Software and Peripherals.

NEC SPINWRITER PRINTERS

5530 (Parallel)	\$3055
5510 (Serial)	\$3055
5520 (KSR-Serial)	\$3415
Tractor Option	\$ 225



APPLE

16K APPLE II+	\$1330
32K APPLE II+	\$1430
48K APPLE II+	\$1530
APPLE DISK w/3.3 DOS ..	\$ 650
APPLE DRIVE Only	\$ 490
APPLE III 128K - In Stock! w/Monitor + Info Analystpak	\$4740



PROFESSIONAL SOFTWARE

WordPro 1 8K	\$ 29.95
WordPro 3 (40 Clm.) 16K	\$ 199.95
WordPro 3+	\$ 295
WordPro 4 (80 Clm.) 32K	\$ 375
WordPro 4+	\$ 450

JUST A SAMPLE OF THE MANY PRODUCTS WE CARRY. CALL US FOR OUR NEW 60-PAGE CATALOG.
WE WILL MATCH ANY ADVERTISED PRICE ON PRODUCTS LISTED UNDER SIMILAR "IN STOCK" CONDITIONS.

NEECO

679 HIGHLAND AVE.
NEEDHAM, MA 02194

(617) 449-1760

Telex: 951021

MON-FRI 9:00 - 5:00



MasterCharge and VISA Accepted



NEECO

INTRODUCES THE CBM VIC-20 COMPUTER!

CCommodore
breaks the
computer
price barrier —

\$299.95



**CBM VIC-20
PERSONAL
COMPUTER**

VIC-20 SPECIFICATIONS

- 8 colors - built in
- sound generation - built in
- programmable function keys
- 5K memory expandable to 32K
- standard PETBASIC in ROM
- full-size typewriter keyboard
- graphics character set
- plug-in program/memory cartridges
- low-priced peripherals
- joystick/paddles/lightpen
- self-teaching materials

* WORKS WITH ANY HOME TELEVISION



\$74.95

**C2N
TAPE CASSETTE
DRIVE**

CALL NEECO TODAY FOR ADDITIONAL VIC-20 INFORMATION . . .

As the CBM VIC-20 is a "new" product, prices and specifications are subject to change w/o notice.



NEECO

679 HIGHLAND AVE.
NEEDHAM, MA 02194

NEECO WILL MATCH ANY ADVERTISED PRICE ON CBM EQUIPMENT
FROM ANY OTHER COMPANY WITH PRODUCT IN STOCK.

(617) 449-1760

Telex: 951021

MON-FRI 9:00 - 5:00
MasterCard and VISA Accepted

Part II:

What Is A MODEM, And Why Do I Need One?

Michael E. Day
West Linn, OR

How To Use A Modem

The standard modem that the hobbyist normally encounters is the BELL 103 type modem. Additionally, the BELL 113A (originate) and the 113B (answer) are normally included in this group, with the specification of a 103 compatible modem often being used to indicate the 113A or 113B type modem. The 103 type modem is rated for speeds of 0 to 300 BPS, with most modems being able to operate up to 400 BPS, and the more expensive models being able to operate at up to 600 BPS. The maximum theoretical limit of the 103 type modem is 1000 BPS. However, due to the great amount of filtering and special line conditioning required to operate as the speed approaches this level, it becomes impractical to operate at these speeds. Due to this, 600 BPS is the maximum reliable speed that can be expected from the 103 type modem. It should be remembered, however, that 300 BPS is the maximum guaranteed speed of the 103 type modem. Speeds faster than this will not always work (depending on the phone line condition), and those modems capable of operating at greater speed generally cost twice as much as the lower speed types. The modem may be used at any speed less than 300 BPS. Dropping the speed to 150 or 110 BPS can often improve the reliability if the connection is very poor, and 300 BPS does not work.

The 103 has two modes of operation, the "answer" mode and the "originate" mode. The 113 modem will only work in one of the modes (113A for originate and 113B for answer) and not the other. Most of the acoustic coupled modems found on the surplus market are the originate type. This type of modem is what you need to talk to most of the computers that the hobbyist has access to (such as CBBS/NW). The originate modem is so named because it is used by the person or device that places the call (or originates the call) to the remote

computer or person. The answer modem is used by the person or device that receives the call (or answers the call). The two modes could be reversed, as the phone line doesn't care. They were set that way to provide a standard as to which modem should use which mode. Since the 103 is a full duplex modem (two-way communications), two separate communication links must be established, thus the two different modes. The answer modem

Of all the generally available modems, the 103 is the most forgiving.

transmits on the high frequency link and receives on the low frequency link.

A true 103 type modem will be capable of operation in either mode depending on a control function. (This could be as complex as a control sequence or as simple as a switch).

Of all the generally available modems, the 103 is the most forgiving. It will operate at any speed less than its designed maximum. It is totally transparent to any protocols that might be used as long as it is asynchronous type transmission and it requires no special handshaking (control) signals in its basic configuration. This is ideal in a portable application where it might be used in a wide variety of configurations.

PIN 1	FRAME GROUND	Tied to the modem case (if metal). Can be ignored normally.
PIN 2	TXD	Transmit Data. The data to be transmitted is presented to this pin.
PIN 3	RXD	Receive Data. The received data is present on this pin.
PIN 4	RTS	Request to send. Generally ignored by modem, it can sometimes be used to turn the transmitter on and off (1 = on; 0 = off).
PIN 5	CTS	Clear to send. This pin is normally held high (on). Alternately it can follow RTS, or DCD, or both (depending on modem).
PIN 6	DSR	Data set ready. This signal will always be on when the modem is operational (power on).
PIN 7	LOGIC GROUND	This is the common reference ground for all the signals listed.
PIN 8	DCD	Data carrier detect. This signal will be on when the communications link has been established (the carrier signal from the remote modem is being received.) On some modems this is always on.
PIN 20	DTR	Data Terminal Ready. Depending on the modem, this can be ignored, the modem on or off (1 = on; 0 = off). Also, in some turn modems, it is used in conjunction with RI to set the operating mode.

NEW!!!-THE ELECTRIC MOUTH*

for \$100, Elf II, Apple,
TRS-80 Level II*

From \$99.95 kit

Now — teach your computer to talk, dramatically increasing the interaction between you and your machine.

That's right: the ELECTRIC MOUTH actually lets your computer talk! Installed and on-line in just minutes, it's ready for spoken-language use in office, business, industrial and commercial applications, in games, special projects, R&D, education, security devices — there's no end to the ELECTRIC MOUTH's usefulness. Look at these features:

- * Supplied with 143 words/letters/phonemes/numbers, capable of producing hundreds of words and phrases.
- * Expandable on-board up to thousands of words and phrases (just add additional speech ROMs as they become available).
- * Four models, which plug directly into S100, Apple, Elf II and TRS-80 Level II computers.
- * Get it to talk by using either basic or machine language, or try to use, complete instructions with samples included.
- * Uses National Semiconductor's "Digitalizer" system.
- * Includes on-board audio amplifier and speaker, with provisions for external speakers and amplifier.
- * Adds a new dimension and excitement to programming: lets you modify existing programs and games to add spoken announcements of results, warnings, etc.
- * Installs just minutes.

* "Elf II" and "The Electric Mouth" are trademarks of Netronics II+D Ltd. "Apple" is a reg. trademark of Apple Computer Inc. "TRS-80 Level II" is a reg. trademark of Tandy Corp.

Continental U.S.A. Credit Card Buyers Outside Conn. TO ORDER CALL TOLL FREE 800-243-7428

To Order From Connecticut Or For Technical Assistance, Etc., Call (203) 354-9375

NETRONICS R&D LTD. Dept.

333 Litchfield Road, New Milford, CT 06776

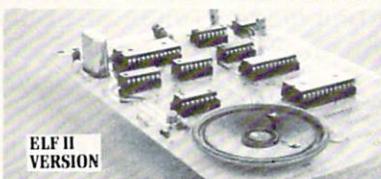
Please send the items checked below:

<input type="checkbox"/> S100 "Electric Mouth" kit.....	\$99.95
<input type="checkbox"/> Elf II "Electric Mouth" kit.....	\$99.95
<input type="checkbox"/> Apple "TRS-80 Level II" "Electric Mouth" kit.....	\$199.95
<input type="checkbox"/> TRS-80 Level II "Electric Mouth" kit.....	\$199.95

Add \$20.00 for wired & tested units. All plus \$3.00 postage & insurance. Conn. res. add sales tax.

Total Enclosed \$

ELF II VERSION



Principle of Operation The ELECTRIC MOUTH stores words in their digital equivalents in ROMs. When words, phrases, and phonemes are desired, they are simply called for by your program and then synthesized into speech. The ELECTRIC MOUTH system requires none of your valuable memory space except for a few addresses if used in memory mapped mode. In most cases, output ports (user selectable) are used.

Spoken Material Included

ONE	SEVENTY	CONTROL LEFT	POUND
TWO	EIGHTY	DANGER LENS	PULSES
THREE	NINETY	DEGREE LENSER	RATE
FOUR	HUNDRED	DEGREES	READ
FIVE	THOUSAND	DOWN LOW	READY
SIX	MILLION	EQUAL LOWER	RIGHT
SEVEN	ZERO	FEET METER	SET
EIGHT	AMPERE	FLOW MILE	SECOND
NINE	ANGSTROM	FOOT MILLE	SPEED
TEN	ATMOS	GRAM MILLE	STAR
ELEVEN	ATMOSPHERE	GALLON MINUTE	START
TWELVE	CANCER	GRAM STAR	STOP
THIRTEEN	CEMETERY	GIGA MINUTE	STOP
FOURTEEN	CENT	GREAT NUMBER	THAN
FIFTEEN	FOOTBALL FIELD	GREATER OF	THAT
SIXTEEN	FOOTBALL FIELD	GROWTH OF	TIME
SEVENTEEN	FOOTBALL FIELD	HIGH ON	TRY
EIGHTEEN	FOOTBALL FIELD	HIGHER OUT	UP
NINETEEN	FOOTBALL FIELD	HOUR OVER	UPON
TWENTY	FOOTBALL FIELD	INCHES PERCENT	WEAK
THIRTY	FOOTBALL FIELD	INCHES PERCENT	WEIGHT
THIRTY ONE	FOOTBALL FIELD	IS PLEASE	
FIFTY	CHECK	KILO POINT	
SIXTY	COMMAS		

Also, the complete alphabet, spoken letter by letter.

<input type="checkbox"/> Personal Check	<input type="checkbox"/> Cashier's Check/Money Order
<input type="checkbox"/> Visa	<input type="checkbox"/> Master Charge (Bank No. _____)
Acct. No. _____	
Signature _____ Exp. Date _____	
Print Name _____	
Address _____	
City _____	
State _____ Zip _____	

DISK DRIVE WOES?
PRINTER INTERACTION?
MEMORY LOSS?
ERRATIC OPERATION?

Don't Blame The Software!

Power Line Spikes, Surges &



Pat. #4,259,705

Hash could be the culprit!
Floppies, printers, memory & processor often interact! Our patented ISOLATORS eliminate equipment interaction AND curb damaging Power Line Spikes, Surges and Hash.

- ISOLATOR (ISO-1) 3 filter isolated 3-prong sockets; integral Surge/Spike Suppression; 1875 W Maximum load, 1 KW load any socket \$62.95
- ISOLATOR (ISO-2) 2 filter isolated 3-prong socket banks; (6 sockets total); integral Spike/Surge Suppression; 1875 W Max load, 1 KW either bank \$62.95
- SUPER ISOLATOR (ISO-3), similar to ISO-1 except double filtering & Suppression \$94.95
- ISOLATOR (ISO-4), similar to ISO-1 except unit has 6 individually filtered sockets \$106.95
- SUPER ISOLATOR (ISO-5) similar to ISO-2 except double filtering & Suppression \$94.95
- CIRCUIT BREAKER, any model (add-CB) Add \$ 8.00
- CKT BRKR/SWITCH/PILOT (CBS) Add \$16.00

AT YOUR
DEALERS

Master-Card, Visa, American Express
Order Toll Free 1-800-225-4876
(except AK, HI, PR & Canada)

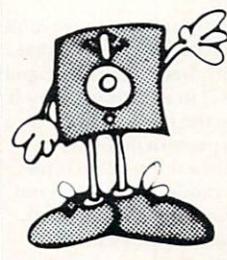
ESP Electronic Specialists, Inc.

171 South Main Street, Natick, Mass. 01760

Technical & Non-800: 1-617-655-1532

MEMOREX FLEXIBLE DISCS

WE WILL NOT BE UNDER-SOLD!! Call Free (800)235-4137
for prices and information. Dealer inquiries invited and C.O.D.'s accepted.



PACIFIC EXCHANGES

100 Foothill Blvd.
San Luis Obispo, CA
93401. In Cal call
(800)529-5935 or
(805)543-1037



VIGIL FOR THE PET/CBM

VIGIL is an exciting, new interactive language for your PET/CBM. It's easy to learn and lets you quickly create games and graphics applications.

- * More than 60 powerful commands for manipulating graphics figures
- * Double density graphics give you 80 X 50 plot positions
- * Large number displays, two timers and tone (with ext. speaker)
- * LOADING and SAVEing of VIGIL programs to cassette or diskette
- * Nine complete programs included - Breakout, Spacewar, AntiAircraft, U.F.O., SpaceBattle, Concentration, Maze, Kaleidoscope & FortuneTeller.
- * Comprehensive 50+ page manual
- * For OLD, NEW or 4.0 ROMs



VIGIL for PET/CEM on cassette or diskette w/9 programs.....\$35.....\$40
VIGIL Manual (refundable with software order).....\$10.....\$12
VIGIL Interpreter Listing (6502 Assembler Language).....\$25.....\$30
PET MACHINE LANGUAGE GUIDE (OLD, NEW, or 4.0 ROMs).....\$9.....\$11

PET & APPLE II USERS TINY PASCAL

Plus +
GRAPHICS

The TINY Pascal System turns your PET or APPLE II into a P-machine with:

- * LINE EDITOR - creates, modifies and maintains source language
- * COMPILER - produces P-code, the assembly language of the P-machine
- * INTERPRETER - executes compiled P-code. Features built-in TRACE.
- * STRUCTURED PROGRAMMING - CASE-OF, WHILE-DO, IF-THEN-ELSE, REPEAT-UNTIL, FOR-TO/DOWNTO, BEGIN-END, PROC, FUNC
- * Graphics version has more - GRAPHICS, PLOT, POINT, TEXT, IMKEY, ARS, SOR. PET/CBM has double density plotting and APPLE II has LINES and HINES (with ROM Applesoft) - COLOR, GRAPHICS, HCOLOR, HPLOT, PDL and TONE



TINY Pascal PLUS+ GRAPHICS VERSION includes manual

PET 32K NEW/4.0 ROMS diskette.....\$50.....\$60
PET 32K NEW/4.0 ROMS cassette.....\$55.....\$65
APPLE II 48K and DOS 3.2/3.3.....\$50.....\$60

TINY Pascal NON-GRAHICS VERSION includes manual

PET 16K/32K NEW ROMS diskette.....\$35.....\$45
PET 16K/32K NEW ROMS cassette.....\$40.....\$50
APPLE II 32K and DOS 3.2/3.3.....\$35.....\$45

TINY Pascal User's Manual (refundable with software order).....\$10.....\$12

TINY Pascal 6502 Interpreter Listing-GRAHICS version.....\$25.....\$30

TINY Pascal 6502 Interpreter Listing-NON-GRAHICS version.....\$15.....\$20

PET MACHINE LANGUAGE GUIDE \$ for OLD, NEW or 4.0 ROMS.....\$9.....\$11

U.S. & CANADA FOREIGN

U.S. & CANADA FOREIGN



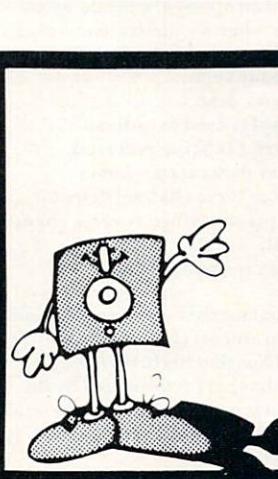
Prices include postage.

Orders must be prepaid via check, money order or bank card. Foreign orders may be paid for via international money order or bankcard: (Access, Eurocard, Barclaycard)

ABACUS SOFTWARE

P. O. Box 7211
Grand Rapids, Michigan 49510

616 / 241-5510



Dysan CORPORATION

Solve your disc problems, buy 100% surface tested Dysan diskettes. All orders shipped from stock, within 24 hours. Call toll FREE (800) 235-4137 for prices and information. Visa and Master Card accepted. All orders sent postage paid.

PACIFIC EXCHANGES

100 Foothill Blvd.
San Luis Obispo, CA
93401 (In Cal call
(805) 543-1037)

PIN 21 SQD

Signal Quality Detector.
Generally this signal is not provided. On those modems that do provide it, it indicates that a poor communications link has been established, and that there is a high probability of errors occurring.

PIN 22 RI

Ring Indicator.
Those modems that do not have mode control generally ignore this signal. Those modems that do use this signal generally use it to determine which mode to place the modem in. If the RI signal was present prior to the DTR signal, then the modem is placed in the answer mode. If the RI signal was not on prior to the DTR signal, then the modem is placed in the originate mode.

All other pins are undefined in their actions and no connections should be made to them to prevent possible malfunction of the modem.

Sometimes large amounts of data transfer is desired. With a 103 type modem limited to 300 BPS, this can get to be a bit tedious after a while. The 202 type modem serves as a compromise for this type of operation. By dropping one of the communication links, transmission speed can be boosted to 1200 BPS. This allows the data to be transmitted at a much faster rate, thereby improving the throughput.

Because of the lack of the other data link, however, the control of the communications flow becomes much more difficult. Since there is only one data link available, only one modem may transmit at a time (half duplex). This means that some sort of protocol must be decided upon to determine which modem may transmit. One of the more common ones is to send an ASCII "EOT" as the last character. This tells the receiving device that transmission is over and it may turn on its modem.

The operation of the control signals is very similar to the 103 type modem. Therefore only the differences will be discussed:

PIN 4 RTS

Request to send.

This signal is used to turn the transmitter on and off.

Clear to send.

PIN 5 CTS

This signal is generated from RTS, DCD, and an optional time delay and indicates when a valid transmission link has been established, and transmission may begin.

Data carrier detect.

This signal is used to indicate that a carrier is being received.

Secondary data carrier detect.

Optional reverse channel detector signal is present when reverse channel is present.

Secondary request to send.

PIN 19 SRTS

(On some BELL 202's this is PIN 11)

This signal turns the reverse channel carrier on and off ($1 = \text{on}$; $0 = \text{off}$). If this PIN is tied high, then the reverse channel is controlled by the request to send (when request to send is on, reverse channel is off, and vice versa).

The reverse channel option is normally used as

a circuit assurance or interrupt channel since, as long as the reverse channel is present, the transmitting modem can be assured that the data link is being maintained, and the receiving modem can use it to request an early termination of the transmission by turning it off.

The 202, like the 103, is quite flexible in its operation. It can be used at any speed up to its maximum allowable speed. It is transparent to most protocols as long as they are asynchronous. Some means must be provided, however, for turning the transmitter on and off.

Another modem that is becoming popular is the 212 modem. This modem combines the features of the 103 and 202. It has two data links (full duplex operation), yet can operate at 1200 BPS. It is, however, very limited in its operation. The transmission protocol is fixed, and the speed must be 1200 BPS exactly. For this you get full duplex operation, which means no transmitter control is required. Also, because of the transmission method used, it is inherently more difficult to build (i.e. more expensive). Transmissions between the two linked modems occur as DIBIT synchronous, and are then converted to asynchronous for transmission to and from the connected equipment. The PIN out of the 212 is the same as the 103 type modem. The operational mode (103 or 212) is determined by the signal applied to PIN 23 ($0 = 103$; $1 = 212$). 

Micro Co-op



Micro Co-op is a software co-operative. We publish a bi-monthly newsletter describing various new and useful software products as they become available. We also try to give reasonable comparisons of existing products that help you make more educated buying decisions. Our members may purchase most software through us below retail price.

For more information, write for a free copy of our newsletter.

Micro Co-op
(Specify Apple or Atari) Newsletter
P.O. Box 432
West Chicago, IL 60185
(312) 231-0912

BEYOND GAMES

SYSTEMS SOFTWARE FOR YOUR 6502 PERSONAL COMPUTER

by Kenneth Skier

Creating Programs for the Apple, Atari,
Challenger and PET Computers.

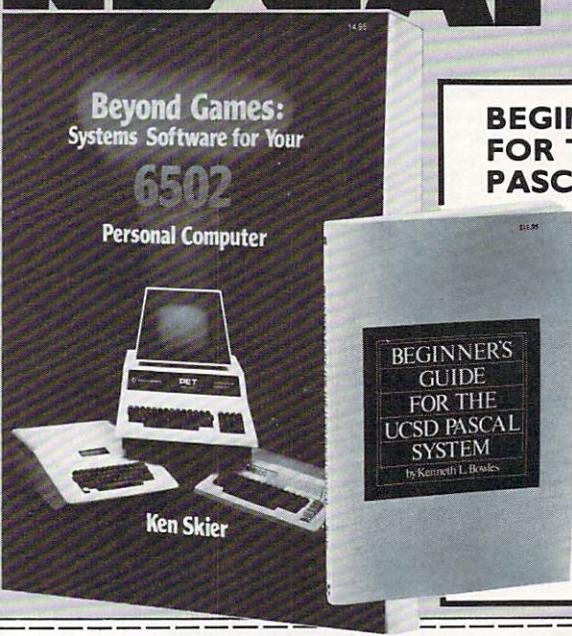
"This is a brand new book on assembly language that is fantastic! I have all the standard books on the 6502 and can't understand any of them. This book is not only beautifully written, very understandable, and takes no previous knowledge for granted . . . but it also includes many useful machine language routines such as a visible monitor, print utilities, disassembler, and a text editor. Well worth getting . . ."

M. Dunn
Editor, ACE

Atari Computer Enthusiasts Newsletter

ISBN 0-07-057860-5
440 pages softcover

\$14.95



BEGINNER'S GUIDE FOR THE UCSD PASCAL SYSTEM

by Kenneth Bowles

Written by the originator of UCSD Pascal System, this informative book is an orientation guide to the UCSD Pascal System. For the novice, this book steps through the System, bringing the user to a sophisticated level of expertise. Once familiar with the System, the reader will find the guide an invaluable reference tool for creating advanced applications.

ISBN 0-07-006745-7
204 pages
softcover

\$11.95

ORDER BY MAIL OR PHONE

CALL TOLL FREE: **800-258-5420**

Please send: **BEYOND GAMES \$14.95**

BEGINNER'S GUIDE TO PASCAL \$11.95

Add .75 per book to cover postage and handling.

Check or money order enclosed for \$_____.

Bill VISA Bill MasterCard

Acct # _____ Expires _____

Name _____

Street _____

City _____

State. _____ Zip. _____



70 Main Street.
Peterborough, NH 03458



SHADOWHAWK I

A LONE SPACE PIRATE ATTACKS THE GALACTIC EMPIRE

You are the sole surviving Naval Commander of the Free Space Confederation. The Galactic Empire has overrun the entire solar system . . . except for your remote outpost on a moon at the outer limits. Exploiting the unmatched ship SHADOW HAWK I, you prey on the Empire's merchant fleet to capture enemy material, which can be bartered for better weaponry, shielding, missiles, etc., for SHADOW HAWK I. But the Empire's interceptors, corvettes, lancers, destroyers, and cruisers are probing the galaxy for you. You must evade them and the deadly battle stations throughout. Your skill is measured by nine rankings, up to STAR LORD. Warning: You must be very, very good to reach STAR LORD rank! Very good indeed!

SHADOW HAWK I uses THREE-AXIS rotation, high resolution 3-D graphics! On **Apple II**, **DOS 3.3**, or **Atari 800**, 48K with disk drive. Joysticks required. Specify **Apple** or **Atari** on your order. Games are on **Dyson** diskettes. Game time: 15-30 min. **\$49.95** ppd. VISA & MasterCard accepted. DEALER INQUIRIES ARE WELCOME.

107 E. Main #2, Medford, OR 97501
(503) 779-0078

*Apple II DOS 3.3, and Atari 800 are registered trademarks, respectively, of Apple Computer, Inc. and Warner Communications, Inc.

The games of tomorrow for the minds of today.



SPECIALS on INTEGRATED CIRCUITS

6502	7.45	10/6.95	50/6.55	100/6.15
6502A/6512A	8.40	10/7.95	50/7.35	100/6.90
6520 PIA	5.15	10/4.90	50/4.45	100/4.15
6522 VIA	6.45	10/6.10	50/5.75	100/5.45
6532	7.90	10/7.40	50/7.00	100/6.60
2114-L200		3.75	25/3.50	100/3.25
2114-L300		3.15	25/2.90	100/2.65
2716 EPROM		7.00	5/6.45	10/5.90
2532 EPROM				14.50
6116 Hitachi 2K x 8 CMOS RAM				14.50
4116-200 ns RAM (NEC)				8 for 19
Zero Insertion Force 24 pin Socket				2.00
6550 RAM (PET 8K)				12.70
S-100 Wire Wrap Socket				2.40

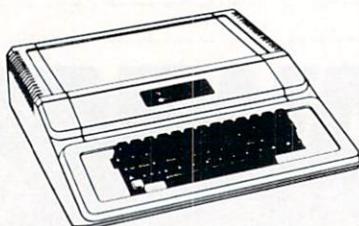
A P Products 15% OFF
A P Hobby-Blox 15% OFF

**THE STAR MODEM**

From Prentice/Livermore Data Systems

RS232 MODEM	SALE \$128
IEEE 488 MODEM	SALE \$199
RS232 CCITT	\$170
IEEE 488 CCITT	\$270

**We carry Apple II+ from
Bell & Howell**

**fullFORTH+ for Apple II**

\$75

A full-featured FORTH with enhancements. Conforms to FORTH Interest Group standards.

REVERSAL (Spracklen)	32K Apple	28.00
Data Manager (Lutus)	24K Apple	40.00
Energy Miser - PET, Apple, Zenith		24.50
Histo-Graph (Boyd)	48K Apple	24.50
Data-Graph (Boyd)	48K Apple	40.00
Apple II User's Guide (Osborne)		12.00
Introduction to Pascal (Sybex)		10.30
Pascal Handbook (Sybex)		12.00
Musical Applications of Micros (Chamberlin)		20.00
Basic FORTRAN (Coan)		7.25
CP/M Handbook (with MP/M) Zaks		11.85
Programming the 6502 - Zaks		10.00
Microprocessor Interfacing Techniques		13.00
PET/CBM Personal Computer Guide (Osborne)		12.00
PET and the IEEE-488 Bus (GPIB)		12.25
6502 Assembly Language Prog. - Levanthal		13.50
Z-80 Assembly Language Prog. - Levanthal		12.75
8080A/8085 Assembly Language Programming		12.75
Z8000 Assembly Language Programming		16.00
6809 Assembly Language Programming		13.50
6800 Assembly Language Programming		12.75
The 68000 Microprocessor Handbook		5.75
BASIC and the Personal Computer (Dwyer)		11.00

commodore

**CBM-PET SPECIALS**

8032 80 x 25 CRT, business keyboard	list \$1495	SALE \$1100
Micro Mainframe	(1995)	1600
8096 Board (extra 64K RAM for 8032)	(500)	400
8050 Dual Disk Drive - 1 megabyte	(1795)	1375
8250 Dual Disk Drive - 2 megabyte	(2195)	1760
CBM IEEE Modem	(395)	199
4016 full size graphics keyboard	(995)	795
4032 full size graphics keyboard	(1295)	999
4040 Dual Disk Drive - 330,000 bytes	(1295)	999
2031 Single Disk Drive - 165,000 bytes	(695)	560
4022 Tractor Feed Printer	(795)	630
C2N External Cassette Deck	(75)	65
VIC 20 Color Computer	(299)	269
VIC 1515 Graphic Printer	(395)	315
Used CBM/PET Computers	CALL	
8024-7 High Speed Printer	(1995)	1345

WE WILL MATCH ANY ADVERTISED PRICE***** EDUCATIONAL DISCOUNTS *****

Buy 2 PET/CBM Computers, receive 1 FREE

WordPro 3 Plus - 32K CBM, disk, printer	200
WordPro 4 Plus - 8032, disk, printer	325
OZZ Data Base System for CBM 8032	335
VISICALC for PET, ATARI, or APPLE	155
SM-KIT - Super PET ROM Utilities	40
Programmers Toolkit - PET ROM Utilities	35
PET Spacemaker II ROM Switch	36
2 Meter PET to IEEE or IEEE to IEEE Cable	40
Dust Cover for PET	7
IEEE-Parallel Printer Interface for PET	110
IEEE-RS232 Printer Interface for PET	120
The PET Revealed	17
Library of PET Subroutines	17

4 PART HARMONY MUSIC SYSTEM for PET

The Visible Music Monitor, by Frank Levinson, allows you to easily enter, display, edit, and play 4 part harmony music. Includes whole notes thru 64ths (with dotted and triplets), tempo change, key signature, transpose, etc. The KL-4M unit includes D to A converter and amplifier ready to hook to your speaker.

KL-4M Music Board with VMM Program \$60

Watanabe
Intelligent
Plotter

WATANABE WX4671 Plotter \$1195
 WATANABE WX4675 6-pen Plotter \$1445

**DISK SPECIALS**

SCOTCH (3M) 5"	10/2.75	50/2.65	100/2.60
SCOTCH (3M) 8"	10/2.80	50/2.70	100/2.65
Verbatim 5"	10/2.45	50/2.40	100/2.35
(add 1.00 for Verbatim 5" plastic storage box)			
BASF 5" soft	10/2.40	20/2.35	100/2.30

Write for prices on WABASH DISKS

WE STOCK MAXELL DISKS

Diskette Storage Pages	10	for 3.95
Disk Library Cases	8"	- 2.85 5" - 2.15
Disk Hub Rings	8"	- 50 @ 7.50 5" - 50 @ 6.00

CASSETTES - AGFA PE-611 PREMIUM

High output, low noise, 5 screw housings.
 C-10 10/5.65 50/5.00 100/4.80
 C-30 10/7.33 50/6.68 100/6.66
 All other lengths available. Write for price list.

SPECIALS

EPSON MX-80 Printer	675
EPSON MX-80 F/T Printer	
EPSON MX-70 Printer	1445
EPSON MX-100 Printer	115
Centronics 739 Printer with dot graphics	349
STARWRITER Daisy Wheel Printer	355
Zenith ZVM-121 Green Phosphor Monitor	2150
Amdek Color Monitor	2775

ALL BOOK and SOFTWARE PRICES DISCOUNTED

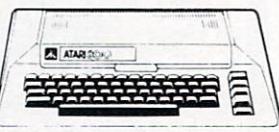
OSBORNE/McGraw-Hill, HAYDEN, SYBEX,etc.

ZENITH DATA SYSTEMS

Z19 Video Terminal (VT-52 compatible)	725
ZVM-121 Green Phosphor Monitor	115
Z89 with 48K	2150
Extra 16K RAM Board	115
Z47 Dual 8" Drive	2775

Synertek Systems

SYN-1 Microcomputer	SALE 205
SYN BAS-1 BASIC or RAE 1/2 Assembler	85
KTM-2/80 Synertek Video and Keyboard	349
KTM-3/80 Synertek Tubeless Terminal	385

**ATARI®
SPECIALS**

800 Computer	749
400 - 16K	329
810 Disk Drive	449
825 Printer	629
850 Interface	139
822 Printer	359
Paddle Pair	17
Joystick Pair	17
Atari 16K RAM Cartridge	85
Atari Assembler/Editor	46
TeleLink	20
Atari DOS 2	21
Pilot	68
Microsoft BASIC	68
Atari Educational Series	20% off
MISSILE COMMAND	32
ASTEROIDS	32
STAR RAIDERS	32
Space Invaders	17
Music Composer	45
Chess	30
Super Breakout	30
Write for prices on other Atari items	

WRITE FOR CATALOG

Add \$1.25 per order for shipping. We pay balance of UPS surface charges on all prepaid orders. Prices listed are on cash discount basis. Regular prices slightly higher. Prices subject to change.

**252 Bethlehem Pike
Colmar, PA 18915**

215-822-7727 A B Computers

KMM Pascal for PET/CBM**\$85**

A subset of standard Pascal with extensions.

- Machine language Pascal Source Editor with cursor oriented window mode
 - Machine Language P-Code Compiler
 - P-Code to machine language translator for optimized object code
 - Run-time package
 - Floating point capability
 - User manual and sample programs
- Requires 32K and disk. Please specify configuration.

EARL for PET (disk file based)**\$65****Editor, Assembler, Relocator, Linker**

Generates relocatable object code using MOS Technology mnemonics. Disk file input (can edit files larger than memory). Links multiple object programs as one memory load. Listing output to screen or printer. Enhanced editor operates in both command mode and cursor oriented "window" mode.

**RAM/ROM
for PET/CBM****4K or 8K bytes of soft ROM with optional battery backup.**

RAM/ROM is compatible with any large keyboard machine. Plugs into one of the ROM sockets above screen memory to give you switch selected write protectable RAM. Use RAM/ROM as a software development tool to store data or machine code beyond the normal BASIC range. Use RAM/ROM TO LOAD A ROM image where you have possible conflicts with more than one ROM requiring the same socket. Possible applications include machine language sort (such as SUPERSORT), universal wedge, Extramon, etc.

RAM/ROM - 4K	\$85
RAM/ROM - 8K	120
Battery Backup Option	30

SUPERSORT by James Strasma**\$35**

Supersort is an excellent general purpose machine language sort routine for PET/CBM computers. Sorts both one and two dimensioned arrays at lightning speed in either ascending or descending order. Other fields can be subsorted when a match is found, and fields need not be in any special order. Sort arrays may be specified by name, and fields are random length. Allows sorting by bit to provide 8 categories per byte. The routine works with all PET BASICs, adjusts to any memory size, and can co-exist with other programs in high memory.

SuperGraphics**\$30**

by John Fluharty

SuperGraphics provides machine language extensions to Commodore BASIC to allow fast and easy plotting and manipulation of graphics on the PET/CBM video display, as well as SOUND commands.

Animations that previously were too slow or impossible without machine language subroutines now can be programmed directly in BASIC. Move blocks (or rocketships, etc.), or entire areas of the screen with a single, easy to use BASIC command. Scroll any portion of the screen up, down, left, or right. Turn on or off any of the 4000 (8000 or 8032) screen pixels with a single BASIC command. In high resolution mode, draw vertical, horizontal, and diagonal lines. Draw a box, fill a box, and move it around on the screen with easy to use BASIC commands.

The SOUND commands allow you to initiate a note or series of notes (or even several songs) from BASIC, and then play them in the background mode without interfering with your BASIC program. This allows your program to run at full speed with simultaneous graphics and music.

SuperGraphics commands include GRAPHIC, TEXT, RVS, SET, DRAW, FILL, PLOT, MOVE, PRINT, CSET, CMOVE, DISPLAY, PUT, SWAP, PAUSE, and SOUND.

Please specify machine type and ROM version, disk or tape.



Self Calculating
DATA BASE
REPORT WRITER
MAILING LIST

FLEX-FILE is a set of flexible, friendly programs to allow you to set up and maintain a data base. Print files with a versatile Report Writer or a Mail Label routine. Programmers will find it easy to add subroutines to their own programs to make use of Data Base files.

RANDOM ACCESS DATA BASE

Record size limit is 250 characters. The number of records per disk is limited only by the size of each record and the number of records per disk is limited only by the size of each record and the amount of free space on the disk. File maintenance lets you step forward or backward through a file, add, delete, or change a record, go to a numbered record, or find a record by specified field. The Find command locates any record when you enter all (or a portion of) the desired key. Field lengths may vary from record to record to allow maximum packing of information. Files may be sorted by any field, and any field may be specified as a key. Sequential files from other programs may be converted to Flex-File format, and Flex-File records may be converted to sequential (WordPro, PaperMate, other word processors may also use Flex-File data). Maximum record size, fields per record, and order of fields may be changed at any time.

MAILING LABELS

With typical record size of 127 characters, each disk can handle over 1000 records (about 2800 with 8050 drive). Labels may be printed any number wide, and may begin in any column position. There is no limit on the number or order of fields on a label, and two or three fields may be joined together on one line (like first name, last name, and title). A "type of customer" field allows selective printing.

REPORT WRITER

Print any field in any column. For numeric fields, use decimal point justification (and round to any accuracy). Define any column as a series of mathematical functions performed on other columns. These functions include arithmetic operations and various log and trig functions. Pass results of operations such as running total from row to row. At the end of the report, print total and/or average for any column. Complete record selection, including field within range, pattern match, and logical functions can be specified individually or in combination with other parameters.

FLEX-FILE by Michael Riley**\$60**

Please specify equipment configuration when ordering.

Low Cost Disk Drive for PET/CBM

PEDISK II from cgrs Microtech is a new disk system ready to plug into your large keyboard PET/CBM.

PEDISK II offers speed, reliability, IBM compatibility.

Complete system prices with DOS and cable.

5" 40 track, 1 drive, 143K	\$525
5" 40 track, 1 drive, 286K	690
8" IBM 3740 format, 77 track, 250K	995

PROGRAM YOUR OWN EPROMS**Branding Iron for PET/CBM****\$79**

EPROM Programmer with software for all ROM versions. Includes all hardware and software to program or copy 2716 and 2532 EPROMs

CBM Software

Legal Time Accounting Package

445

Medical Accounting Package

Complete CBM Business Software Package

Can be tailored to meet most business requirements.

Technician's Investment Analysis Package

500

Dow Jones Portfolio Management

129

Personal Tax Calculator

65

Tax Preparation System

445

Wordcraft 80 Wordprocessor Package

325

Pascal Development Package

235

Assembler Development Package

99

Intelligent Terminal Emulator

30

Softpac-1 (Competitive Software)

29

FORTH for PET

BY L. C. Cargile and Michael Riley

\$50

Features include:

- full FIG FORTH model.
- all FORTH 79 STANDARD extensions.
- structured 6502 Assembler with nested decision making macros.
- full screen editing (same as when programming in BASIC).
- auto repeat key.
- sample programs.
- standard size screens (16 lines by 64 characters).
- 150 screens per diskette on 4040, 480 screens on 8050.
- ability to read and write BASIC sequential files.
- introductory manual.
- reference manual.

Runs on any 16K or 32K PET/CBM (including 8032) with ROM 3 or 4, and CBM disk drive. Please specify configuration when ordering.

Available soon:

Metacompiler for FORTH**\$30**

simple metacompiler for creating compacted object code which can be executed independently (without the FORTH system).

PaperMate
60 COMMAND
WORD
PROCESSOR
by Michael Riley



Paper-Mate is a full-featured word processor for CBM/PET. Paper-Mate incorporates 60 commands to give you full screen editing with graphics for all 16K or 32K machines (including 8032), all printers, and disk or tape drives.

For writing text, Paper-Mate has a definable keyboard so you can use either Business or Graphics machines. Shift lock on letters only, or use keyboard shift lock. All keys repeat.

Paper-Mate text editing includes floating cursor, scroll up or down, page forward or back, and repeating insert and delete keys. Text block handling includes transfer, delete, append, save, load, and insert.

All formatting commands are imbedded in text for complete control. Commands include margin control and release, column adjust, 9 tab settings, variable line spacing, justify text, center text, and auto print form letter (variable block). Files can be linked so that one command prints an entire manuscript. Auto page, page headers, page numbers, pause at end of page, and hyphenation pauses are included.

Unlike most word processors, CBM graphics as well as text can be used. Paper-Mate can send any ASCII code over any secondary address to any printer.

Paper-Mate functions with 16/32K CBM/PET machines, with any printer, and with either cassette or disk.

To order Paper-Mate, please specify configuration.

Paper-Mate on disk or tape**40.00**

Microchess	17.00
Checker King	17.00
Gammon Gambler	17.00
Time Trek	13.45
Bridge Partner	13.45
Visicalc	155.00

Hayden Software

Complex Mathematics	12.70
Engineering Mathematics	12.70
General Mathematics	12.70
MCAP.Circuit Analysis Program	21.00
Energy Miser	24.50

Jukebox Series for PET by L C Cargile

Excellent 4 part harmony music--write for list

Automated Simulations (EPYX) Fantasy Games**MICRO-REVERSEI** for PET by Michael Riley**10**

super machine language version of Othello

Tunnel Vision / Kat & Mouse by Michael Riley**10**

two excellent machine language maze programs

WRITE FOR CATALOG

Add \$1.25 per order for shipping. We pay balance of UPS surface charges on all prepaid orders. Prices listed are on cash discount basis. Regular prices slightly higher. Prices subject to change.

**252 Bethlehem Pike
Colmar, PA 18915****215-822-7727****A B Computers**

More Machine Language For Beginners

Richard Mansfield
Assistant Editor

This article has two purposes: to provide a way of insuring that private documents and programs cannot be seen or used by unauthorized persons and to explain some aspects of machine language programming. Readers who are familiar with M.L. might wish to skip the second part of the article.

The BASIC Program

The BASIC listing of Security Lock (Program 1) will run on any version PET. The M.L. routine goes into a "safe" area in the second cassette buffer, common to all ROM sets in Commodore machines, including the new 8000 series. This area is "safe" because it is below BASIC programs and is not used by PET unless a *second* cassette machine is used.

The uses of "Security Lock" are explained within the program. It is not necessary to type in the entire program. Simply copy lines 120, 130, and the DATA lines from 1000 up.

The three-letter code can be changed, as described in the program, to any combination. An additional security measure — making it virtually impossible to break into a protected program — is not in the BASIC LISTing in Program 1. The reason that it cannot be illustrated is simple: the purpose of this technique is to *prevent LISTings themselves from taking place*.

We must describe how to do this since it cannot be demonstrated via a printout. First, when you include "Security Lock" within a program, you will be using a line similar to line 130 in Program 1 (REM statement removed). If you are calling the M.L. routine at the start of the program, you might type it in as line 1, thus — 1SYS867 (or, if you are not in the "graphics" mode, 1sys867).

Now, after the last character, type in a quotation mark and hit the RETURN key —: 1SYS867"

Then, using the cursor control keys, move the cursor back up to a position directly following the quotation mark. Holding the SHIFT key down, press the INSERT key nine times. Then release the INSERT and the SHIFT keys and press the DELETE key nine times. You will see nine reverse-character "t" 's which represent nine automatic deletions. Then press the RETURN key to enter this line into the rest of the program.

As you can see, any attempt to LIST the pro-

gram will now delete line 1 from view, as if it were not part of the program. A brief flash on the screen is the only clue that something exists there, yet this line will operate normally during a RUN of the program. To eliminate the flash, you can use the quote/delete rub-out further into the program (as in line 130, Program 1) where it will be unlikely to be noticed.

Before turning to some observations on M.L. programming, it might be worthwhile to mention one modification to "Security Lock" which may prove useful. The M.L. program always prints "code?" on the screen to remind you that it is the Lock hanging up the program, not an endless loop or a hardware failure. If you simply want to freeze

... machine language routines can be listed in four ways ...

a program or file, without giving a clue as to why it's locked, eliminate the prompt word in the M.L. routine by typing in the following and then hitting RETURN:

FOR I=867 TO 880: POKE I,234: NEXT

This puts NOP (no operation) instructions into the routine, and when the SYS lands PET at 867, it slides up to 881 with no ill effects, where the input routine starts.

If you save frequently-used routines on a "Utilities" tape or disk for easy appending to future programs, this routine, like all M.L. routines, cannot be SAVED normally (as BASIC is SAVED). The following procedure will save M.L. routines which can later be LOADED in the usual way. Go into the Machine Language Monitor by typing SYS 1024. (If you have an Original PET, follow the instructions which came with your MLM tape.) Immediately after the dot, where the cursor should have landed, type —

s"Security Lock",01,035a,0399

and hit RETURN (for tape). For disk: .s"0:Security Lock",08,035a,0399. Note that the upper limit address must be one higher than the actual upper limit which was 0398 hex.

The Four Types Of M.L. Listings

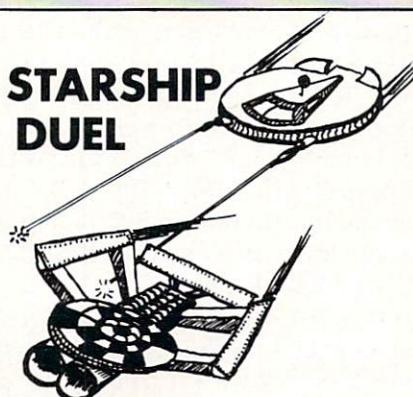
In books and magazines, machine language routines can be listed in four ways: as BASIC DATA statements (sometimes called a "BASIC loader") as a memory dump, as a simple disassembly, and as an annotated assembly. This can be confusing to the novice, so the four Programs which accompany this article illustrate the four kinds of listings possible for the same M.L. Program: Security Lock.

As a series of BASIC DATA statements (Pro-

THE PROGRAM STORE

CALL TOLL FREE
800 424-2738

STARSHIP DUEL



By John Kanopa

A two-player space game filled with action, graphics and sound. Each player starts with a fleet of starships and must destroy the opponent's fleet one-by-one. Sound easy? Not only can both ships fly around the screen, but when stopped they disappear. And if you run out of fuel during flight, your ship will explode! Four levels of difficulty will keep you occupied for many an exciting hour.

8K tape...\$19.95

Q.S. FORTH

By James Albanese from Quality Software Using FORTH programming language, you can produce programs that execute almost as fast as machine code but are much easier to write. A compiled language, this version is based on the microcomputer standard FIG-FORTH.

Included modules are: FORTH KERNEL (language for Atari), EXTENSION (added words for more power), EDITOR (to write and modify source code), IOCB (to easily set up I/O operations), and ASSEMBLER (compiles FORTH to assembler).

800, 24K 1-disk minimum...\$79.95

The QUEST^{Vol. 1}



From Survival Software

The final holocaust is over, and you find yourself among the few survivors of a ravaged planet. Savagery seems to be most of the remaining people's key to survival, and just around every corner lurks a fate worse than death. Can you discover the secret to saving what's left of Earth's population? This is the first volume of a multi-part adventure for the Atari, enhanced with graphics and sound. Completion of the adventure will require the purchase of added volumes.

24K tape...\$19.95 32K disk...\$19.95



TEXT WIZARD

By William Robinson from Datasoft Full-featured, disk-based word processing system for the Atari. With TEXT WIZARD and a suitable printer (e.g. Atari 825/Centronics 737, Epson MX-80), you can manipulate text to your heart's desire. Once you have arrived at a final version, printing commands can be imbedded into the text. Your completed copy can then be printed -- with exactly the format specifications you desire. TEXT WIZARD requires at least one disk drive and 32K of RAM; for longer text files, 48K is desirable.

32K disk...\$99.95

DUNGEON CAMPAIGN



By Clardy & Aldrich from Image

A delightful rendition of a Dungeons & Dragons scenario, full of colorful graphics and vivid sound. As you and your stalwart band of adventurers grope around the dungeon the walls in front, back and on both sides of you appear, forming an intricate maze. You must fight -- or buy off -- all manner of beasties in your quest to kill the dragon and escape with gold and jewels. Pterodactyls can lift you up and drop you in unlikely locations, poison gas can blind you, and serpents and spectres track you on your quest. Fun for all ages.

8K & 16K versions on tape...\$24.95

BASIC A+

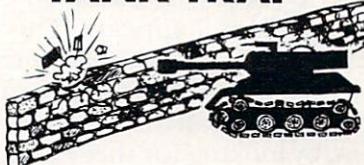
From OSS

Written by the authors of Atari Basic, BASIC A+ is fully compatible. You will be able to program much more easily and effectively with the many enhancements offered. With BASIC A+, you get full error messages, record I/O, fast binary I/O, TRACE function and direct access to player/missile graphics. Additional versatility is gained through such useful commands as PRINT USING, WHILE, and IF...ELSE. Get BASIC A+ for a whole new world of programming power and ease.

32K disk...\$79.95

THE PROGRAM STORE
Franchises Available

TANK TRAP



By Don Ursem from Quality

Imagine the horror of a sinister tank following you, with the intent of running you down. As you move to escape the ominous form, you can build a wall to fend off the tank or even trap it. This is your plight in TANK TRAP. Played with keyboard or joystick input, you must trap the tank before it runs over you. There are four levels of difficulty, each one adding new complications to your effort.

16K tape...\$12.95 32K disk...\$14.95

IRIDIS 1

From The Code Works

More than a series of programs, IRIDIS is a continuing series of useful tutorials that will enhance your understanding of the Atari and your programming skills. This first volume includes: CLOCK (a graphic clock with moving hands and chimes), ZAP (a fast-moving chase game), and two graphics demo programs (LOGO and POLYGONS).

The comprehensive booklet accompanying IRIDIS 1 gives complete listings and a line-by-line explanation of each program. Additional features include articles of interest to all Atari users from novice to experienced "hackers." A real buy!

16K tape...\$9.95

24K disk...\$12.95



By Lance Micklus from Adventure Int.

An enhanced version of Micklus' famous STAR TREK III, designed to utilize the Atari's superior graphics. This program was considered best of all the "Treks" reviewed by ANALOG Magazine.

Your mission is to explore all 192 sectors of the Omega VI region of the galaxy. You must inspect all class M planets and destroy any evil Klingons found. STAR TREK 3.5 is a complex strategy game, made very realistic with its graphic displays and sound. Fun and challenging for novice through expert.

32K tape (disk compatible)...\$19.95

Visit Our Baltimore, MD Store: W. Bell Plaza - 6600 Security Blvd



TO ORDER CALL TOLL FREE 800 424-2738

For information
Call (202) 363-9797

MAIL ORDERS: Send check or M.O. for total purchase price, plus \$1.00 postage & handling. D.C. residents, add 6% tax. Charge card customers: include all embossed information on card.

THE PROGRAM STORE
4200 Wisconsin Avenue NW, Dept. U10 Box 9609
Washington, D.C. 20016

Prices Subject to Change

gram 1), M.L. code is a part of a larger BASIC program. This gives little or no information about the nature of the M.L. section. It is typed, then RUN, as a subroutine of the host program. And the reader is frequently cautioned to type the program *exactly* as it appears. This is because a single error in M.L. will usually crash the entire program. But much typing time can be saved, if the M.L. routine is all that's wanted from the BASIC program, by looking for three things: a READ-loop, a SYS, and DATA statements. Line 120 is a READ-loop which POKEs the M.L. routine into memory and line 130 contains the SYS to enter that routine at the proper address. In BASIC, the DATA for an M.L. routine are decimal numbers.

The next step up toward clarity, though the program's meaning is still not easily recognizable, is a "memory dump" (Program 2). (This is sometimes called a "hex dump.") It is a table of hexadecimal numbers. The first number is the address of the first datum on its line. In Program 2, the "dump" shows that address 035a contains a 43, address 035b contains 4f, etc. As before, to make such a program your own, you copy in the information, being careful to copy precisely. In this case, however, you must first enter the M.L. Monitor and then type:

.M 035a 0392 (RETURN key)

This will put a memory dump on screen of what currently exists in these memory cells. To put in the new data, you just type over what appears on the screen, observing the spaces between each hexadecimal number and hitting RETURN when each line has been changed.

A third type of M.L. printout is a list of each machine language instruction in terms of its function. This is a *disassembly*, (Program 3), and resembles a LISTing in BASIC, though in a highly abbreviated form. Any series of numbers can be examined by a *disassembler*, a program which translates raw data into M.L. instruction mnemonics. A disassembler can be found on pg. 81 of **COMPUTE!** #8. If the numbers are part of an M.L. routine, the disassembler will list them as in Program 3. If it cannot make sense of what it sees (if it were examining memory which contained BASIC code for example) it would print a series of question marks.

A disassembler usually prints out four fields, or zones of information. It is easy to see that the first four characters in Program 3 represent memory addresses. This is the "address field" and is similar to the first four characters of Program 2, the memory dump, except that here the number of bytes in the second field, the "data field," can be 1, 2, or 3 — so the numbers in the address field will increase irregularly. The second, "data field," also corresponds to Program 2's dump, but there is the same irregularity as different numbers group themselves together. This grouping is then translat-

ed in the third and fourth fields — the "instruction" field and the "operator" field. These last two fields are "mnemonic" (easy to remember) representations of the information contained in the raw hex numbers of the "data field" which precedes them. The "instructions" tell the computer what to do and the "operators" tell the computer what to do to it. In the phrase, "drive a car," *drive* is the instruction, *car* is the operator. In LDY #\$00, LDY (load the Y register) is the instruction, #\$00 (zero) is the operator. The same structure exists in BASIC — POKE 32768,41 or PRINT "Hello."

The reason that the disassembly must group its information irregularly is that different instructions are designed to work with different sized operators. INY, (increase the value of the Y register by 1), has no explicit operator since the "1" is implied within the instruction itself. LDY #\$00 has a one-byte operator, 00, so it is two bytes long: LDY and 0. To instruct the computer to compare the number in the accumulator with the number in address \$0360, we need three bytes, CMP plus two bytes to represent a number as large as 0360. Any one byte can only hold a number up to 255.

Full Source Code

Finally, Program 4 illustrates the clearest way that an M.L. program can be presented: as an annotated assembly listing. (It is also called "source code.") This contains within it the four fields of the disassembly, but adds three more fields — line numbers, labels, and comments.

Such listings represent the program rather elaborately by M.L. standards. Such programs are written using an "assembler" program which accepts mnemonics such as INY, translates them, and puts them in memory. Assemblers are either "single-pass," (simple translators of mnemonics) or complex, label-oriented powerhouses. Unfortunately, the M.L. Monitor within PET does not contain a disassembler or an assembler, but the monitor can be made to include these functions (and others) with a program such as "Supermon" or "Extramon." For short routines, simple assemblers will work well. For larger jobs — an entire arcade game would be a large job — a power assembler is needed. To my knowledge, the most advanced assemblers available to PET users are "MAE" and "ASM/TED," written by Carl Moser. (Available from A.B. Computers or Eastern House Software.)

A printout from such an assembler is much easier to understand because it contains labels and comments. Using such an assembler, it is also easier to write large programs since some of the problems associated with programming in M.L. are handled automatically by the computer.

Mnemonics are easier to manipulate than numbers, but whole words (labels) are often an improvement over mnemonics, particularly when a

THE INCREDIBLE PRINTING MACHINE

TYPRINTER 221

IMAGINE a computer printer/electronic typewriter with a 100 character daisy wheel, controlled by 6 microprocessors (including 2 Z-80's) with an all-electronic keyboard...all in one machine!

THAT'S INCREDIBLE!
THAT'S THE TYPRINTER 221!

AUTOMATICALLY, IT WILL:

- Center copy.
- Line up decimal points.
- Print vertical lines (to separate columns).
- Layout columns.
- Center titles (over a column).
- Print flush right.
- Return carriage (at end of line).
- Paper feed to pre-set starting point.
- Indicate end of page.
- Set tabs from one to many.
- Clear tabs from one to all.
- Set temporary margins (wherever you like) as often as needed.
- Repeat all typing keys as needed.
- Underline copy.
- Print bold face and underline.
- Do reverse print (white on black), sort of "reverse Video".
- Allow alphabetic and decimal tabulation.
- Indent paragraphs.

- Store in non-volatile resident memory:
- Often used line formats (margins & tab stops).
- Often used phrases (up to 835 characters) in 10 "bins".
- Up to 10 complete forms (tax, medical, insurance, etc.).
- Up to 14,000 characters in an additional 26 "bins*".
- Print perfectly spaced proportional letters.
- Return to typing position after correction with relocation key.
- Allow one character to overlap another (\emptyset).
- Right margin justification.
- Print two columns with both right and left margins justified and the center ragged.
- Lift off errors (from single character to entire line).

IT WILL EVEN:

- Allow a carriage return without a linefeed or a linefeed without a carriage return.
- Allow you to pre-set an impression control for high-quality carbon copies.
- Allow both vertical and horizontal half-spacing.
- Allow cancellation of copy before printing.
- Allow express and normal backspacing.
- Print in four different sizes: 10 pitch pica, 12 pitch elite, 15 pitch micron.
- Allow insertion of a missing character in an already printed line.
- Accept paper up to 17" wide.



Backspace 1/10, 1/12, 1/15 or even 1/60 of an inch.
Buffer and print out one word at a time, or one line or as many as 10 pages*.
Print up to 198 columns.
Do 1/2 line spacing for footnotes and scientific notation.
Accepts carbon film or reusable nylon ribbons.

IT HAS:

- A lighted key to inform you that it's set to temporary margin.
- A factory installed noise reduction shield.
- A 16K buffer/automatic spooler*.
- A lighted key to indicate upper case only.
- A Centronics standard parallel interface and can be ordered with:

RS-232 Serial interface* or
IEEE (PET) interface*.

A print speed of 20 cps and (because of logic seeking circuitry) a through-put of approx. 32 cps.

A built-in anti-glare shield.

IT EVEN HAS:

- Carbon film ribbons in various colors.
- 20 character plasma readout that informs you as to:
Number of characters to end of line.
Number of lines left to end of page.
The existence of an error condition.
The contents of a memory "bin".
Number of characters left in buffer.
An automatic "feature in use" indicator (centering, storage, etc.)
With scrolling, both FORWARD and BACKWARDS.

INCREDIBLE?

THE 221 OFFERS EVEN MORE!

- It's totally compatible with all computers and software.
- It will print in English, French, Spanish, Italian and German. It will automatically switch between English and foreign keyboards*. (Under computer control).
- Scientific, mathematic, financial and legal daisy wheels available*.

- Tractor feed available*.
- Can be used as a stand-alone terminal*.
- Can be used to access both TWX and TELEX networks*.

TRY WHAT YOU'VE BEEN MISSING.
TRY THE INCREDIBLE MACHINE.
TRY THE TYPRINTER 221.

Suggested price \$2850.00

Dealer inquiries invited.
(Call for store nearest you).

Service available through the world-wide facilities of the Olivetti Corporation.



**HOWARD
INDUSTRIES**

2051 E. CERRITOS AVE., 8-C
ANAHEIM, CA 92806
714/778-3443

*Optional at extra cost.

program is lengthy. To clarify the additional fields found in large assembly programs, we can examine line 0180 (Program 4). It begins with two fields which are identical to the disassembly in Program 3, but the third field is a BASIC-like consecutive numbering of each line of the program. This allows the programmer to manipulate the instructions more easily, since renumbering can open up new space for additional instructions or whole sections of the program can be conveniently rearranged.

Following the line number is the label field, in this case the label, "START," since it is the beginning of the program. This is better than BASIC. Several locations (lines 350, 380, 410) are able to say IF THEN GOTO START, where a comparable BASIC program would need to use the line number instead of a word: IF THEN GOTO 180. This relieves the programmer of having to look up line addresses for his subroutines or major entry points as well as eliminating a frequent cause of errors.

The next two fields are the instruction and operator fields (as in a disassembly) except that now some of the operators have been replaced by labels. If, as in line 190, we see LDA (load accumulator) TEXT we can find the value or meaning of the label, TEXT, in three ways. We can look over to the second field, where the raw numbers are, we can look earlier in the program where TEXT is defined (line 80), or we can look at the end of the program in the "Label File." TEXT refers to data which starts at address \$035A and which line 80 defines as being the word "code?"

The last field holds comments which describe the function of the line where they appear (and sometimes, subsequent lines). The semi-colon is the same as REM — anything which follows it serves to document the program, but is ignored by the assembler. This makes later modifications easier, debugging faster, and also helps to reveal the meaning of the program to others.

To review, we see a progress toward clarity, from Program 1 to Program 4, largely due to the addition of new fields of information. Program 1 contains a single field: decimal data. Program 2 adds an address field. Program 3 adds fields three and four — a translation into instruction mnemonics and operators of the raw data from field two. And Program 4 adds line numbers, labels and comments — for a total of seven fields. We have now examined the *horizontal* organization of a M.L. program, from its simplest form to its most complex. Using the most complex example, (Program 4), let's twist ourselves sideways and go on to investigate the *vertical* organization of M.L. programs.

The Four Parts Of A Computer Program

All programs — in fact, all thinking — can be broken down into four essential parts: 1. Initialization and Protection, 2. Data Tables, 3. Main Loop, 4. Subroutines. Before learning a new word

(thinking), a person must: 1. not be being shot to death, 2. have a dictionary, 3. start looking up the word, and 4. move his thumbs correctly, know or guess the spelling, keep his balance, etc. The order of these elements is important. Without protection, any M.L. routine between addresses 1024 and the screen RAM at 32768 can be overwritten by a BASIC program either by a LOAD or because BASIC puts some of its variables up at the top of available RAM where M.L. programmers like to stick routines.

Protection can be achieved by telling PET that its memory size has shrunk — changing the numbers in addresses 52 and 53 (134,135, in Original ROMs). Then all BASIC activity will be confined to RAM below the address resulting from (PEEK (52)+ PEEK (53)*256). Or, a short M.L. routine can be nestled into a space where BASIC doesn't usually go, such as the second cassette buffer. BASIC protects itself, so that is not of concern in BASIC programming.

A *table* is a collection of information (data) which the program will need. In Program 4, and in M.L. generally, the tables are placed at the beginning of the program (but sometimes at the end). It is good to get into a habit of keeping tables together and putting them at the start. In line 80, instead of an ordinary mnemonic, we have a pseudo-op, .BY, (pseudo-ops are preceded by a period). A pseudo-op is a request to the assembler program to perform some task for the programmer. In this instance, the programmer is requesting that an ASCII word, CODE?, be translated into bytes and stored to be used by the program later. Line 90 contains the pseudo-op, .DE, which defines the label, SEND-CHAR, as the address in BASIC ROM which prints a character to the screen. The .DS in line 110 tells the assembler to define some storage space, three cells large, called STORAGE which the program will later use as a place to hold the codeword PET.

A main loop is a series of steps which control the program as a whole. It is distinct from subroutines in that it *calls* subroutines, they do not call the main loop. In a complicated M.L. program, the main loop can be a series of JSR (Jump to Subroutine) instructions which defines the order in which subroutines are performed. In BASIC, it can take the form of an ON GOTO list of addresses, a series of GOSUBS, or a loop. In simpler programs, the main loop is often merely implicit — each subroutine is already arranged within the program in the desired order of execution. The program runs more or less sequentially from start to finish. In such cases, a governing loop is only implied.

In Program 4, the instructions break into two divisions: initialization and subroutine. Since it is a simple program, there is only a fragment of what would be a main loop in a larger program. The initialization zone is often at the start of a main loop, and sets up whatever preconditions the pro-

INTRODUCING . . . TEACHER'S AID

DR. DALEY'S SOFTWARE is excited about our latest software release—TEACHER'S AID.

TEACHER'S AID is the grade management system you've been waiting for. Its many features mean that you can be free from the drudgery of hours of record keeping and grade reporting. Now you can devote more time to the pleasures of teaching.

TEACHER'S AID is easy to use, menu driven and features—

1. **Flexible class assignment structures.** This means that you can set up and keep records of any combination of homework, quiz, test, lab, etc. scores.
2. **Grade averaging done in a variety of ways.** Grade averages can be prepared using weighted scores, possible scores, tables, percent, or a combination of these methods.
3. **Student progress reports.**
4. **An individualized list of missing assignments.**
5. **Easy editing and additions to any of the files.**
6. **Reports on either the screen or printer.**

All of this power is yours for only \$59.95. TEACHER'S AID comes on disk complete with comprehensive, easy to read documentation, packaged in an attractive binder.

When ordering please tell us your computer configuration. TEACHER'S AID is available on these systems:

Apple II or Apple II Plus
(32K with single disk)
Pet or CBM 2000, 3000, or 4000 series
(16K with 2040 or 4040 disk)

TEACHER'S AID will be ready soon on the Atari 800 and TRS-80 Model I or Model III.

Call or write for details of our other software offerings.

NOTE OUR NEW ADDRESS

DR. DALEY'S SOFTWARE

Water Street

Darby, MT 59829

Phone: (406) 821-3924

(Hours: 10 a.m. to 6 p.m. Mountain Time)



Introducing a totally new world in professional software for the Apple II and Commodore Pet.

Until recently, the tremendous explosion in micro-computer technology left an unfilled void in real quality software. MicroCraft Systems is totally dedicated to filling that void for the Apple II and the Commodore Pet. With powerful, elegant and versatile software.

Beyond the software house. To a complete 6502 development system.

More than a software distributor or discount house, MicroCraft Systems now provides you with access to a whole new spectrum in software systems. MicroCraft software includes: MacroLink, a complete macroassembler for the 6502, SuperEdit, a full-screen editor with a superb range of powerful capabilities plus, DiskScreen, a screen-oriented disk utility. Complete System \$200/\$40

MacroLink

\$125/\$20

Uses text files for source code • Links source code or object code programs • Fully nestable file include capability • Recursive macros • Nestable conditional assembly • Over 50 error messages • File I/O macros • Sample programs • Disk assembler: source code need NOT fit in memory.

SuperEdit

\$75/\$20

Full Screen Editor • Single keystroke commands • Uses standard text files • Move cursor by character, line or page • Block move and copy • Search and replace • Macro capability • Plus extra software: SuperEdit '56 x 27' provides 56 x 27 character screen for Apple II • And more!

DiskScreen

\$40/\$10

Displays a complete sector in hex and ASCII • Completely visual and interactive • Sector move and copy • To change byte value, move cursor and type.

NOTE: All programs require single disk drive. MacroLink also requires 48K. First price: software and manual. Second price: manual only (applied toward purchase of software).

Call or write for our complete MicroCraft Systems catalog at no extra charge. Other programs include: S.T.A.R. Reading Program • "C" Compiler • Graphics Development Systems • Programs in ROM • SuperEdit for 80 x 24 video cards



MicroCraft Systems, Inc.
In software systems, a name to remember.

188 Kerby Road
Grosse Pointe Farms, MI 48236
(313) 881-3089

Source I.D. CL0472

MicroNet I.D. 70270, 222

VISA or MasterCharge accepted. Inquire at your local computer store or order direct.

gram will later expect (including protection). In this case, the word *code?* must be printed to the screen until the correct code is entered and the loop can be exited.

The phrase "cold start" refers to an entrance into a program at the very beginning of the initialization section. This will reset all flags, pointers, counters, etc. to their virgin condition. A "warm start" enters the mail loop beyond initialization, so that various kinds of information, modified during a program RUN, are left undisturbed. There is some ambiguity to these terms since initialization is sometimes unnecessary, or is sometimes refreshed on every entrance to the main loop (the warm start and the cold start would then be identical), or other anomalies. It is valuable, however, to develop a sense that a program has two distinct active parts and one passive part. The main loop *governs* the action of the subroutines. Data tables are passive zones of information which perform no tasks. And, before all else, an M.L. program must protect itself from a BASIC invasion. (M.L. can also require protection from interruptions, but this concept is outside of the purview of this article.)

How Security Lock Works

The main loop begins at line 180 (Program 4) and sets the Y register to zero so that it can act as an "offset" to the address called "TEXT" (a little table holding the word "CODE?"). This is much simpler than it sounds. "Offset" means *add this number to a fixed number*. TEXT has already been defined as a fixed address (035A) which is the start of the table holding the word "CODE?". So, in line 190, we LDA (load the accumulator register, a temporary resting place for bytes of data) with whatever is in the address TEXT + Y. Since Y was just loaded with a zero (LDY #0), the byte that we are putting into the accumulator will be at \$035A itself. Line 200 tests to see if the whole word, CODE?, has been printed. BEQ means branch if you just loaded (LDA) a zero into the accumulator. But we didn't. Since address 035A has a 43 in it, now the accumulator also has the 43. We will only branch (go somewhere else) if it's a zero. So the branch is ignored and we continue to line 210 which jumps to a subroutine (JSR) in BASIC ROM which puts the character in the accumulator on the screen. The 43 (letter "C") will then appear and the control of the computer is returned to line 220, as in a BASIC RETURN command. Line 220 increases (increments) the number in the Y register by 1 (INY). It was a zero, so now it's a 1. Then, like a GOTO, line 230 jumps (JMP) to the line we've labeled LOOP (line 190) where the value of TEXT and Y are again added together to give the address where we will find what to put into the accumulator. This time, however, since Y now equals 1, the "effective" address is 035B, where the letter "O" is waiting to be picked up. After looping this way for a while, increasing the address each time by increasing the

value of Y, we will eventually pick up a zero which we thoughtfully placed in address 035F, the end of our TEXT table (see line 80). This is a "delimiter" to let the loop know that we are finished and that it should now BEQ (branch if equal to zero) to COMPARE, line 270.

Here we load the accumulator with the code letters and put them into the previously defined (line 110) storage area within our tables. This time, rather than setting up a loop and a delimiter, we add the offset directly to the labels: STORAGE + 1, STORAGE + 3. At line 330 we again jump to subroutine in BASIC ROM which will input a single letter from the human and leave it in the accumulator, returning from the subroutine to line 340. Here, we compare (CMP) this letter in the accumulator with the first letter in the STORAGE zone, a "P." If the accumulator does not match "P," then the instruction in line 350 (BNE, branch if not equal) takes effect and the computer is thrown back to START. If it was equal, we "fall through" to line 360 where the same comparison is done for "E." Any failure of equality causes a branch to START. If all three letters match, the instruction RTS (return from subroutine) puts us back into BASIC just beyond the SYS which threw us into the M.L. routine in the first place. SYS is merely a GOSUB to M.L. subroutines.

Program 1: BASIC Loader

```

100 REM           SECURITY LOC~  

    ~K BY RICHARD MANSFIELD  

110 POKE59468,14:PRINT" {CLEAR}";  

120 FORI=858TO920:READR:POKEI,R:NEXT  

130 REM   SYS 867           /ON-SCREE~  

140 REM  
    ~N INSTRUCTIONS/  

150 PRINT" {02 DOWN}      {REV} THIS IS ~  
    ~A SECURITY LOCK "  

160 PRINT" {05 DOWN}FROM 858 TO 920 IN~  
    ~ YOUR MEMORY  

170 PRINT"IS A MACHINE LANGUAGE PROGR~  
    ~AM WHICH  

180 PRINT" WILL NOT ALLOW THE PROGRAM ~  
    ~TO PROCEED  

190 PRINT"UNTIL THE WORD 'PET' IS TYP~  
    ~ED."  

200 PRINT  

210 PRINT" {DOWN} {05 RIGHT}THIS CAN BE~  
    ~ USED TO INSURE THAT  

220 PRINT"A FILE OR DIARY IS PROTECTE~  
    ~D FROM  

230 PRINT"PRYING EYES.  

240 PRINT"   IN ORDER TO DEMONSTRATE ~  
    ~THIS...  

250 PRINT"SIMPLY ELIMINATE THE REM ~  

260 PRINT"FROM LINE 130 AND THEN TRY ~  
    ~TO RUN  

270 PRINT"THE PROGRAM WITHOUT TYPING ~  
    ~IN 'PET'  

280 PRINT" {DOWN} {16 RIGHT}PRESS ANY K~  
    ~EY"

```

80 COLUMN GRAPHICS



The image on the screen was created by the program below.

```
10 VISMEM: CLEAR
20 P=160: Q=100
30 XP=144: XR=1.5*3.1415927
40 YP=56: YR=1: ZP=64
50 XF=XR/XP: YF=YP/YR: ZF=XR/ZP
60 FOR ZI=-Q TO Q-1
70 IF ZI<-ZP OR ZI>ZP GOTO 150
80 ZT=ZI*XP/ZP: ZZ=ZI
90 XL=INT(.5+SQR(XP*XP-ZT*ZT))
100 FOR XI=-XL TO XL
110 XT=SQR(XI*XI+ZT*ZT)*XF: XX=XI
120 YY=(SIN(XT)+.4*SIN(3*XT))*YF
130 GOSUB 170
140 NEXT XI
150 NEXT ZI
160 STOP
170 X1=XX+ZZ+P
180 Y1=YY-ZZ+Q
190 GMODE 1: MOVE X1,Y1: WRPIX
200 IF Y1=0 GOTO 220
210 GMODE 2: LINE X1,Y1-1,X1,0
220 RETURN
```

The Integrated Visible Memory for the PET has now been redesigned for the new 12" screen 80 column and forthcoming 40 column PET computers from Commodore. Like earlier MTU units, the new K-1008-43 package mounts inside the PET case for total protection. To make the power and flexibility of the 320 by 200

bit mapped pixel graphics display easily accessible, we have designed the Keyword Graphic Program. This adds 45 graphics commands to Commodore BASIC. If you have been waiting for easy to use, high resolution graphics for your PET, isn't it time you called MTU?

K-1008-43M Manual only \$10 (credited toward purchase)
k-1008-43 Complete ready to install package \$495

Mastercharge and Visa accepted

Write or call today for our full line catalog describing all MTU 6502 products, including our high speed 8" Floppy Disk Controller for up to 4 megabytes of PET storage.



NOW 80 COLUMN PETs CAN HAVE MTU HIGH RESOLUTION GRAPHICS

```

290 GOSUB710
300 GETA$:IFA$=""THEN300
310 PRINT" {CLEAR}"
320 PRINT" {DOWN} {05 RIGHT} OF COURSE, ~
~ THEN THEY COULD
330 PRINT" TYPE LIST, TO SEE YOUR PROG~
~RAM,
340 PRINT" AND NOTICE THAT SUSPICIOUS ~
~SYS YOU'VE
350 PRINT" GOT AT THE BEGINING...AND T~
~HEN,
360 PRINT" WITH ENOUGH WORK, EXTRACT T~
~HE
370 PRINT" CODE WORD FROM THE DATA STA~
~MENTS.
380 PRINT" BUT THE ACCOMPANYING ARTICL~
~E GOES
390 PRINT" FURTHER YET. IT DEMONSTRAT~
~ES A WAY
400 PRINT" TO EVEN HIDE THE SYS STATEM~
~ENT FROM
410 PRINT" ANY LISTING OF THE PROGRAM.~
420 PRINT" {DOWN} WHAT'S MORE, YOU C~
~AN GO STILL
430 PRINT" DEEPER INTO A PARANOIAC'S W~
~ONDERLAND.
440 PRINT" BY USING THIS LIST-PREVENTI~
~ON TRICK
450 PRINT" TO ELIMINATE ANY OTHER PART~
~S OF A
460 PRINT" PROGRAM FROM LISTINGS...INC~
~LUDING
470 PRINT" THE DATA STATEMENTS THEMSEL~
~VES.
480 PRINT" ANYBODY WHO CAN GET TO YOUR~
~ DIARY
490 PRINT" AFTER ALL THIS SECRECY IS S~
~O
500 PRINT" BRILLIANT THAT THEY DESERVE~
~ TO
510 PRINT" READ IT!
520 PRINTSPC(19); "ANY KEY"
530 GETA$:IFA$=""THEN530
540 PRINT" {CLEAR} SINCE 'PET' IS PE~
~RHAPS AN OBVIOUS
550 PRINT" CODE, YOU MAY USE ANY OTHER~
~ 3 LETTERS
560 PRINT" BY POKEING DIFFERENT VALUES~
~ INTO ADDRS:
570 PRINT" 882, 887, & 892. (A=65...Z~
~ =90)
580 PRINT" {DOWN}"SPC(19); "ANY KEY"
590 GETA$:IFA$=""THEN590
600 PRINT" {CLEAR}{03 DOWN} ANOTHER~
~ USE WOULD BE TO LOCK
610 PRINT" UP YOUR PET WHEN YOU ARE NO~
~T THERE.
620 PRINT" SIMPLY LEAVE THE SECURITY P~
~ROGRAM
630 PRINT" IN ITS LOCATION (NO PROGRAM~
~ YOU WRITE
640 PRINT" WILL DISTURB IT, NOT EVEN T~
~YPING NEW)

```

```

650 PRINT" WHEN YOU WANT TO LOCK, JUST~
~ TYPE SYS867
660 PRINT" (THE () ARE UNNECESSARY) AN~
~D WALK
670 PRINT" AWAY...NOBODY CAN GET INTO ~
~THE PROGRAM
680 PRINT" EXCEPT YOU.
690 PRINT" {DOWN} NOW, PLEASE REMOVE ~
~THE REM FROM 130
695 PRINT" AND THEN RUN THE DEMONSTRAT~
~ION."
700 LIST 130:REM ----- START/GRAP~
~HICS -----
710 FORI=33767TO32925STEP-40:POKEI,30~
~:POKEI+40,32:FORB=1TO95:NEXTB:NEX~
~TI
720 FORI=32927TO32917STEP-1:POKEI,31:~
~POKEI+1,32:FORT=1TO2:NEXTT:NEXTI
730 FORI=32917TO32925:POKEI+1,31:POKE~
~I,32:FORT=1TO50:NEXTT:NEXTI:X=X+1~
~TI
740 IFX<3THEN720
750 POKEI,32
760 FORI=32925TO33767STEP40:POKEI,30:~
~POKEI-40,32:FORT=1TO100:NEXTT:NEX~
~TI
770 REM ----- END/GRAP~
~HICS -----
780 RETURN
1000 DATA 67,79,68,69,63,0,0,0,0
1100 DATA 160,0,185,90,3,240,7,32,210~
~,255,200
1200 DATA 76,101,3,169,80,141,96,3,16~
~,9,69
1300 DATA 141,97,3,169,84,141,98,3,32~
~,207
1400 DATA 255,205,96,3,208,219,32,207~
~,255
1500 DATA 205,97,3,208,211,32,207,255~
~,255
1600 DATA 205,98,3,208,203,96
READY.

```

Program 2: Memory Dump

```

+
.. 035a 43 4f 44 45 3f 00 00 00
.. 0362 00 a0 00 b9 5a 03 f0 07
.. 036a 20 d2 ff c8 4c 65 03 a9
.. 0372 50 8d 60 03 a9 45 8d 61
.. 037a 03 a9 54 8d 62 03 20 cf
.. 0382 ff cd 60 03 d0 db 20 cf
.. 038a ff cd 61 03 d0 d3 20 cf
.. 0392 ff cd 62 03 d0 cb 60 58
+

```

LDA STA IDX STX LDY STY

(LABEL), Y (LABEL,X) LABEL + INDEX-1

6502 Assembler/Editor

- APPLE
- ATARI
- PET
- KIM
- SYM

SET IFM IFP IFE

Before you buy that off-brand Assembler/Text Editor, note that EHS is the only company that provides a line of compatible ASM/TED's for the PET/APPLE/ATARI/SYM/KIM and other microcomputers.

When you make the transition from one of these 6502-based microcomputers to another, you no longer have to relearn peculiar Syntax's, pseudo ops, and commands. Not only that, EHS ASM/TED's are the only resident 6502 Macro Assemblers available and they have been available for several years. Thus you can be sure they work. Our ASM/TED's may cost a little more but do the others provide these powerful features: Macros, Conditional Assembly, String Search and Replace, or even up to 31 characters per label? Before you spend your money on that other ASM/TED, write for our free detailed spec sheet.

MACRO ASM/TED

- For APPLE/ATARI/PET/SYM/KIM
- Other than our MAE, no other assembler is as powerful.
- Macros/Conditional Assembly.
- Extensive text editing features
- Long Labels
- Designed for Cassette-based systems.

\$49.95

MAE ASM/TED

- For APPLE/ATARI/PET
- The most powerful ASM/TED
- Macros/Conditional and Interactive Assembly
- Extensive text editing features
- Long Labels
- Control files
- Designed for Disk-based Systems.

\$169.95



EASTERN HOUSE SOFTWARE

3239 Linda Drive
Winston-Salem, N. C. 27106 USA
(Dealer Inquiries Invited)

PHONE ORDERS
(919) 924-2889
(919) 748-8446



.EN

.BY

.OS

.BA

.DE

.CE

LETTER QUALITY WORD PROCESSOR PRINTER/TYPEWRITER
FOR APPLE, ATARI, COMMODORE, NEC

OLYMPIA ES100

- 92 character electronic keyboard
- 8 character buffer memory
- Dual pitch, 10 and 12
- 17.5 C.P.S.
- All settings from keyboard
- Auto. correction
- Daisy type print mechanism
- Cartridge ribbons
- 14 1/8 inches writing line
- 1400 dealers nationwide

REN TEC ES

- Installation in 15 minutes using existing ES100 cables
- CMOS logic for minimal drain on ES100 power supply
- Hi or low true status bits
- Accepts RS232 serial with 7 crystal controlled Baud rates
- Accepts Centronics parallel interface
- Selectable auto. line feed



\$1495.00* TYPEWRITER & INTERFACE

\$295.00* INTERFACE



**RENAISSANCE
TECHNOLOGY
CORPORATION**

3347 VINCENT ROAD
PLEASANT HILL, CALIFORNIA 94523
(415) 930-7707

RENAISSANCE TECHNOLOGY'S PRODUCTS FOR ATARI

Atari 850 to Diablo 1640/1650, 3 meter, serial cable	60.00
Atari 850 to Diablo 630, 3 meter, serial cable	60.00
Atari 850 to Epson 800, 3 meter, serial cable	60.00
Atari 850 to Anadex, 3 meter, serial cable	60.00
Atari 850 to Anadex, parallel cable	90.00
Atari Joy Stick Ports to Anadex, parallel cable	90.00
Atari 850 to Diablo 1640/1650, parallel cable	90.00
Atari Joy Stick Ports to Diablo 1640/1650, parallel cable	90.00
Atari 850 to Watanabe Miplot, parallel cable	90.00
Atari Joy Stick Ports to Watanabe Miplot, parallel cable	90.00

Atari 400 & 800 10-Key Accounting Pad	124.95
Atari 850 Parallel to Olympia ES100 Interface	295.00
Parallel Cable (required for above)	60.00

DEALER INQUIRIES WELCOME

Program 3: Disassembly

035a 43	???	0373 8d 60 03	sta \$0360
035b 4f	???	0376 a9 45	lda #\$45
035c 44	???	0378 8d 61 03	sta \$0361
035d 45 3f	eor \$3f	037b a9 54	lda #\$54
035f 00	brk	037d 8d 62 03	sta \$0362
0360 00	brk	0380 20 cf ff	jsr \$ffcf
0361 00	brk	0383 cd 60 03	cmp \$0360
0362 00	brk	0386 d0 db	bne \$0363
0363 a0 00	ldy #\$00	0388 20 cf ff	jsr \$ffcf
0365 b9 5a 03	lda \$035a,y	038b cd 61 03	cmp \$0361
0368 f0 07	beq \$0371	038e d0 d3	bne \$0363
036a 20 d2 ff	jsr \$ffd2	0390 20 cf ff	jsr \$ffcf
036d c8	iny	0393 cd 62 03	cmp \$0362
036e 4c 65 03	jmp \$0365	0396 d0 cb	bne \$0363
0371 a9 50	lda #\$50	0398 60	rts
		+	

Program 4: Assembler Source Code

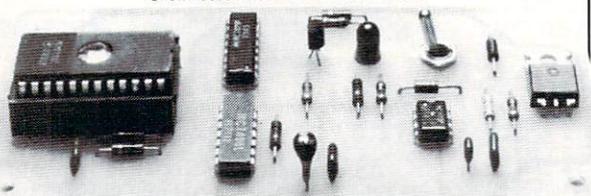
```

0010 ; ----- SECURITY LOCK ASSEMBLY -- MAE -----
0020 ;
0030 .BA 858 ;START ASSEMBLY AT ADDRESS
0040 .OS ;PUT ASSEMBLED CODE THERE.
0050 ;
0060 ; ----- T A B L E S -----
0070 ;
035A- 43 4F 44 0080 TEXT .BY 'CODE?' 0 ;DEFINE TEXT
035D- 45 3F 00
0090 SENDCHAR .DE $FFD2 ;OUTPUT CHARACTER
0100 FINDCHAR .DE $FFCF ;GET CHARACTER INPUT
0360-
0110 STORAGE .DS 3
0120 ;
0130 ;
0140 ; ***** START OF INSTRUCTIONS *****
0150 ;
0160 ;*** INITIALIZATION ***
0170 ;
0363- A0 00 0180 START LDY #0 ;INITIALIZE COUNTER
0365- B9 5A 03 0190 LOOP LDA TEXT,Y ;GET A LETTER
0368- F0 07 0200 BEQ COMPARE ;IF ZERO, TEXT FINISHED
036A- 20 D2 FF 0210 JSR SENDCHAR ;PRINT ON SCREEN
036D- C8 0220 INY ;INCREASE COUNTER
036E- 4C 65 03 0230 JMP LOOP ;GET NEXT CHARACTER
0240 ;
0250 ;*** SUBROUTINE ***
0260 ;
0371- A9 50 0270 COMPARE LDA #$50 ;PUT "P" INTO STORAGE
0373- 8D 60 03 0280 STA STORAGE
0376- A9 45 0290 LDA #$45 ; "E"
0378- 8D 61 03 0300 STA STORAGE+1
037B- A9 54 0310 LDA #$54 ; "T"
037D- 8D 62 03 0320 STA STORAGE+2
0380- 20 CF FF 0330 JSR FINDCHAR ;GET A CHARACTER FROM HUMA
0383- CD 60 03 0340 CMP STORAGE ;IS IT A "P" ?
0386- D0 DB 0350 BNE START ;NO? START OVER AGAIN
0388- 20 CF FF 0360 JSR FINDCHAR
038B- CD 61 03 0370 CMP STORAGE+1 ;IS IT AN "E" ?
038E- D0 D3 0380 BNE START
0390- 20 CF FF 0390 JSR FINDCHAR
0393- CD 62 03 0400 CMP STORAGE+2 ; "T" ?
0396- D0 CB 0410 BNE START
0398- 60 0420 RTS ;CORRECT! GOTO BASIC.
0430 .EN ;END OF ASSEMBLY

```

EPROM PROGRAMMER KITS

Shown assembled. EPROM not included.



For single supply 2516, 2716 & 2758 EPROMS. Verify erased. Program - entire or partial. Auto verify after programming. Transfer contents to RAM for modifying or duplicating.

Select Documentation for:

	Use with:
6502	6820 PIA or 6522 VIA
6800	6820 PIA
6809	6820 PIA
8080/8085/Z80	8255 PPI

Documentation includes schematic, instructions for construction, check-out and use, and software listing for specified MPU.

Complete kit of parts (includes

Welcon 24 pin ZIF socket).....	\$ 39.95
Bare PC board and Documentation.....	\$ 15.00
Software listings for additional MPUs (with purchase of Kit or PC board).	\$ 5.00

Ordering: Specify MPU. Add \$1 for postage & handling. Overseas add \$2. Ariz. residents add 5% sales tax. Check or Money Orders for U.S. Phone orders ship C.O.D. 602-839-8902.

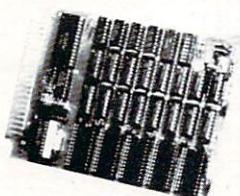
Micro Technical Products

814 W. Keating Ave., Dept. M • Mesa, Arizona 85202

NEED MORE MEMORY?

32K BYTE DYNAMIC RAM & ROM EXPANSION BOARD

Expand Your 4K/8K PET
SYM/KIM/AIM -65 to 32K



- Easily connected to your computer via the expansion connector.
- Build huge and complex programs!
- Need 64K of RAM? Buy two boards, on board configuration circuitry will allow you to expand to 64K easily!
- New dynamic RAM technology brings you more memory in less space and at a lower cost!
- RAM chips are upgraded, compatible with the new 64K RAM chips for future expansion!
- Operates on +5 volts only, supplied from your computer power supply, no on board generators to go bad.
- Requires A LOT less power than static RAM!
- Has full invisible refresh operation, does not interfere with processor operation.
- Fully buffered DATA BUSS.
- 5 on board sockets for 2716/2732 (2K/4K) type EPROMS, addressable anywhere.
- Great for designing a two board computer system, (CPU I/O-RAM, ROM).
- Other specifications: Disable any 4K block of RAM for I/O, place RAM above or below 8000 HEX. KIM-4 BUSS COMPATIBLE FOR CARD RACKS. Adapter cables available for non rack use.
- All these features on a 6 x 4.5" board!

ASSEMBLED & TESTED BOARDS—GUARANTEED FOR 6 MONTHS
PURCHASE PRICE IS FULLY REFUNDABLE IF RETURNED
UNDAMAGED WITHIN 14 DAYS

List Price — \$289.88

Introductory Price — \$269.88

Include \$2.00 for S&H — Allow 4 weeks for delivery

Full informative documentation included with all our products.
C.O.D. Orders Accepted (702) 361-6331 Mail Order Only.

PROTRONICS
COMPUTER INNOVATIONS

1516 E. Tropicana, Suite 7A
Las Vegas, Nevada 89109

OCTOBER SUPER SAVERS

Verbatim Diskettes

- "Datalife" series
- 40 track tested
- 5 1/4", soft sector
- Single sided, double density
- Built-in hub rings
- For Apple®, TRS-80®, Atari®

Cat No. 1147



\$29 / box(10)

Lexicon LX-11 Acoustic Modem

Now is the time to get that modem you've been wanting. The LEX-11 acoustic modem operates at 300 baud with originate, answer, test modes and full or half duplex selection and power and ready indicators.

Cat No. 2930 **\$119.95**

How to Order

Mention this ad and we pay UPS ground shipping & handling, (USA only). Pay by check, M.O., Visa, M/C or COD. (COD's \$1.40 addl.) Write or phone TODAY! Offer expires Nov. 1, 1981.

Send for our FREE catalogue. Page after page of hardware and software products for your Apple®, Atari® and TRS-80®.

HW ELECTRONICS
(formerly Hobbyworld Electronics)

19511 Business Center Dr.,
Dept. G10
Northridge, CA 91324

(800) 423-5387 (Outside Calif.)
(213) 886-9200 (In Calif.)

HUNTINGTON COMPUTING

PROGRAMS LISTED BELOW ARE ON DISK:

EDUCATION

Compu-Math Arithmetic	\$49.95 now	\$44.99
The Linguist	\$40.00 now	\$33.99
Serendipity Grade Book	\$169.00 now	\$143.59
Dynacomp's Teacher Pet	\$14.95 now	\$12.69
Spanish Hangman	\$29.95 now	\$26.99
French Hangman	\$29.95 now	\$26.99
Clock (Hartley)	\$29.95 now	\$26.99
Dr. Daley's Software Library	\$79.95 now	\$69.99
Physics I	\$24.00 now	\$21.49
J&S Chemistry	\$150.00 now	\$139.99
J&S Chemistry/Biology Demo		\$5.00
Cook's Touch Typing	\$14.95 now	\$13.49
Masterytype	\$34.95 now	\$29.69
Compak Math Grade by Concept	\$495 now	\$445.49
Statistics (Edu-Ware)	\$29.95 now	\$25.39
Algebra I (Edu-Ware)	\$39.95 now	\$33.99
Microsoft Typing	\$19.95 now	\$16.99
Basic Tutor 1-8 (each)	\$32.00 now	\$28.79
Milliken Math Sequences	\$450.00 now	\$405.00
CompuPoem		\$15.95
The Learning System	\$150.00 now	\$127.49
Snake Eggs II	\$24.95 now	\$21.19
Android Nim	\$24.95 now	\$21.19
Hartley Cass Control Device	\$79.95 now	\$71.95
Alicia-Bilingual Reader	\$29.95 now	\$25.39
EAI Critical Reading	\$39.95 now	\$35.99
EAI Reading Comprehension	\$39.95 now	\$35.99
Chemistry (Ed. Courseware)	\$32.00 now	\$28.79
American History	\$32.00 now	\$28.79
Spelling (Ed. Courseware)	\$32.00 now	\$28.79
Astronomy	\$32.00 now	\$28.79
Biology	\$32.00 now	\$28.79
Statistics 3.0	\$29.95 now	\$25.39
Compu-Read 3.0	\$29.95 now	\$25.39
ESP		\$12.69
Compu-Math Decimals	\$39.95 now	\$33.89
Compu-Math Fractions	\$39.95 now	\$33.89
Prescriptive Math (Hartley)	\$79.95 now	\$71.95
Word Search (Hartley)	\$14.95 now	\$13.49
Letter Recognition	\$19.95 now	\$17.99
Spelling Bee (Edu-Ware)	\$29.95 now	\$25.39
Dracula (Pendulum Press)	\$34.95 now	\$29.69
Moby Dick (Pendulum Press)	\$34.95 now	\$29.69
Time Machine (Pendulum Press)	\$34.95 now	\$29.69
Black Beauty (Pendulum Press)	\$34.95 now	\$29.69
PDI Analogies	\$23.95 now	\$20.29

UTILITIES

Visicalc Utility #3	\$129.95 now	\$99.99
Program Line Editor	\$40.00 now	\$34.99
Super Kram	\$175.00 now	\$143.59
Super Disk Copy III	\$30.00 now	\$25.39
Hayden AS Compiler	\$200.00 now	\$159.00
Expediter II	\$99.95 now	\$84.99
Pascal Programmer	\$125.00 now	\$106.19
S-C Assembler II (V. 4.0)	\$55.00 now	\$46.69
Verscale	\$100.00 now	\$84.99
Quicktrace	\$35.00 now	\$29.69
Tiny Pascal (Programma)	\$49.95 now	\$42.89
Tiny Pascal Plus - (Abacus)	\$50.00 now	\$42.49
Apple-Cillin	\$29.95 now	\$25.39
Micro Apple 1 (incl. Book)	\$24.95 now	\$22.99
Pascal Graphics Editor	\$114.95 now	\$97.69
P.L.E. in ROM	\$60.00 now	\$50.99
Disk Fixer	\$28.95 now	\$24.39
Super Sound	\$16.95 now	\$14.39
Memory Management System	\$39.95 now	\$33.89
Super Disk Copy (Sensible)	\$29.95 now	\$25.39
Disk Recovery	\$29.95 now	\$25.39
Multi-Disk Catalog	\$24.95 now	\$21.19
Double Dos Plus	\$24.95 now	\$21.19
Aplus	\$24.95 now	\$21.19
Disk Organizer	\$24.95 now	\$21.19
Quickloader	\$24.95 now	\$21.19
Apple Doc	\$34.95 now	\$29.59
Z-Term	\$99.95 now	\$84.99
Ace	\$29.95 now	\$25.39
Co-op Complete Graphics Sys	\$59.95 now	\$50.89
P-Lisp Interpreter (Pegasys)	\$99.95 now	\$89.89
Lisa	\$49.95 now	\$42.39
Apple Forth (Programma)	\$49.95 now	\$42.39

WORD PROCESSORS

Apple Writer	\$65.99	
Magic Window	\$100.00 now	\$84.99
Easy Writer Professional	\$250.00 now	\$219.00
Letter Perfect	\$150.00 now	\$127.49
Super Text	\$150.00 now	\$127.49
Superscribe	\$129.95 now	\$110.39
Apple Pie (All Versions)	\$129.95 now	\$99.99
Executive Secretary	\$250.00 now	\$212.49
Apple Wordstar	\$375.00 now	\$286.00
Hebrew II	\$60.00 now	\$50.99
Apple Writer Extended	\$29.95 now	\$25.39

GAMES

Hi-Res Soccer	\$29.95 now	\$25.39
Apple-Oids	\$29.95 now	\$23.39
Wurst of Huntington Computing	\$24.95 now	\$21.19
Gobbler	\$39.95 now	\$33.89
Ultima	\$29.95 now	\$25.39
Autobahn	\$44.95 now	\$38.19
Battle Cruiser Action	\$39.95 now	\$33.89
Gorgon	\$39.95 now	\$33.89
Super Stellar Trek	\$39.95 now	\$33.89
Hellfire Warrior	\$39.95 now	\$33.89
Gamma Goblins	\$39.95 now	\$33.89
Mission Asteroid	\$39.95 now	\$33.89
Wizardry	\$39.95 now	\$33.89
Star Mines	\$39.95 now	\$33.89
Warp Factor	\$39.95 now	\$33.89
Wizard and the Princess	\$39.95 now	\$33.89
Flight Simulator	\$39.95 now	\$33.89
Odyssey	\$39.95 now	\$33.89
Sargon II	\$39.95 now	\$33.89
Space Eggs	\$39.95 now	\$33.89
Hi-Res Cribbage	\$39.95 now	\$33.89
Lords of Karma (cass.)	\$39.95 now	\$33.89
Oh Shoot	\$39.95 now	\$33.89
ABM	\$39.95 now	\$33.89
Computer Conflict	\$39.95 now	\$33.89
Computer Air Combat	\$39.95 now	\$33.89
Temple of Apshai	\$39.95 now	\$33.89
Zork	\$39.95 now	\$33.89
All Nibble Software	\$39.95 now	\$33.89
Robot Wars	\$39.95 now	\$33.89
Cranston Manor	\$39.95 now	\$33.89
Dragon's Eye	\$39.95 now	\$33.89
Computer Acquire	\$39.95 now	\$33.89
Twala's Last Redoubt	\$39.95 now	\$33.89
Snoggle	\$39.95 now	\$33.89
Alien Rain	\$39.95 now	\$33.89
Alien Typhoon	\$39.95 now	\$33.89
Raster Blaster	\$39.95 now	\$33.89
3-D Skiing	\$39.95 now	\$33.89
Creature Venture	\$39.95 now	\$33.89
Galaxy Space War I	\$39.95 now	\$33.89
Hodge Podge	\$39.95 now	\$33.89
Meteoroids in Space	\$39.95 now	\$33.89
Dragon Fire	\$39.95 now	\$33.89
Pool 1.5	\$39.95 now	\$33.89
Orbitron	\$39.95 now	\$33.89
Galactic Attack	\$39.95 now	\$33.89
Swordthrust I	\$39.95 now	\$33.89
Swordthrust II	\$39.95 now	\$33.89
Swordthrust III	\$39.95 now	\$33.89
Enchanted Island/Atlantis	\$39.95 now	\$33.89
Original Adventure	\$39.95 now	\$33.89
Mad Venture	\$39.95 now	\$33.89
Crown of Arthane	\$39.95 now	\$33.89
Orbitron	\$39.95 now	\$33.89
Pulsar II	\$39.95 now	\$33.89
Sneakers	\$39.95 now	\$33.89
Invasion Force	\$39.95 now	\$33.89
Wizard's Mountain	\$39.95 now	\$33.89
Kaves of Karkhan	\$39.95 now	\$33.89
I.F. Six Micro Stories	\$39.95 now	\$33.89
Milestones	\$39.95 now	\$33.89
Inferno	\$39.95 now	\$33.89
A2-3D/A Saturn Navigator	\$39.95 now	\$33.89
Black Hole	\$39.95 now	\$33.89
The Shattered Alliance	\$39.95 now	\$33.89
Space Warrior (Broderbund)	\$39.95 now	\$33.89
OO-Tops	\$39.95 now	\$33.89
Monty Plays Scrabble	\$39.95 now	\$33.89
Poker Tournament	\$39.95 now	\$33.89
Star Thief	\$39.95 now	\$33.89
Apple Panic	\$39.95 now	\$33.89

List \$200.00

now **\$139.00**

(Offer expires 12-30-81)

SUPER DISCOUNTS



SOFTWARE



HUNTINGTON COMPUTING

Post Office Box 787
Corcoran, California 93212

Order by Phone 800-344-4111
In California (209) 992-5411

We take MasterCard or VISA (Include card # and expiration date). California residents add 6% tax. Include \$2.00 for postage. Foreign and hardware extra. Send for free catalog. Prices subject to change.

STOCK PROGRAMS

\$75.00 now **\$63.69**

\$129.95 now **\$110.39**

\$99.95 now **\$89.99**

\$99.95 now **\$84.99**

\$190.00 now **\$161.49**

\$300.00 now **\$254.99**

BUSINESS APPLICATIONS

\$200.00 now **\$149.00**

\$26.95 now **\$22.89**

\$29.95 now **\$25.39**

Microsoft Fortran

\$200.00 now **\$165.69**

Microsoft Cobol-80

\$750.00 now **\$637.49**

Business Pac 100

\$99.95 now **\$84.99**

Desktop Plan II

\$200.00 now **\$149.00**

Visicalc 3.3 Special

\$200.00 now **\$149.00**

Visplot

\$179.95 now **\$152.89**

Visrend/Visplot

\$259.95 now **\$220.89**

Visterm

\$149.95 now **\$127.39**

PERSONAL/HOME

\$19.95 now **\$16.99**

\$19.95 now **\$16.89**

\$29.95 now **\$25.39**

Decision Master

\$44.95 now **\$38.19**

Diet Planning

\$24.95 now **\$21.19**

Win at the Races

\$39.95 now **\$33.89**

Pro Football (SDL)

\$26.95 now **\$22.89**

College Football (SDL)

\$26.95 now **\$22.89**

Grocery List

\$19.95 now **\$16.89**

Financial Management System II

\$39.95 now **\$33.89**

Creativity Tool Box

\$44.95 now **\$38.19**

Home Money Minder

\$34.95 now **\$29.69**

MISCELLANEOUS

Memorex Disks

10 for **\$24.99**

Verbatim Datafile-plain w/hubs

10 for **\$27.99**

10 for **\$49.99**

Dysans

\$29.95 now **\$26.99**

Scotch Disk Cleaner

\$29.95 now **\$26.99**

E-Z Port

\$24.94 now **\$21.19**

Atari/TRS-80/Pet

Write for information

HARDWARE

D.C. Hayes Micromodem

\$375.00 now **\$299.00**

D.C. Hayes Smart Modem

\$279.00 now **\$249.00**

MX-80 Printer/Cable/Card

\$755.00 now **\$75.00**

MX-80FT Replacement Head

\$39.00 now **\$34.99**

MX-100FT with Graftax

\$995.00 now **\$799.00**

MX-80FT with Graftax

\$795.00 now **\$669.00**

460G Paper Tiger

\$1094.00 now **\$961.99**

560G Paper Tiger

\$1394.00 now **\$1225.00**

Tiger Trax

\$16.95 now **\$15.25**

Mark IV DOS Boot Switch

HUNTINGTON COMPUTING

ONE OF THE WORLD'S LARGEST INVENTORIES

Now Selling Atari, PET, TRS-80 Software

Atari

ADVENTURE INTERNATIONAL

Adventureland (cass.)	\$19.95 now	\$16.74
Pirate's Adventure (cass.)	\$19.95 now	\$16.74
Mission Impossible (cass.)	\$19.95 now	\$16.74
Voodoo Castle (cass.)	\$19.95 now	\$16.74
The Count (cass.)	\$19.95 now	\$16.74
Strange Odyssey (cass.)	\$19.95 now	\$16.74
Mystery Fun House (cass.)	\$19.95 now	\$16.74
Pyramid of Doom (cass.)	\$19.95 now	\$16.74
Ghost Town (cass.)	\$19.95 now	\$16.74
Savage Island I (cass.)	\$19.95 now	\$16.74
Savage Island II (cass.)	\$19.95 now	\$16.74
Angle Worms/Cronin Div. (cass.)	\$9.95 now	\$8.54
Deflection (cass.)	9.95 now	\$8.54
Mountain Shoot (cass.)	9.95 now	\$8.54
Sunday Golf (cass.)	9.95 now	\$8.54
Galactic Empire (cass.)	\$19.95 now	\$16.74
Star Trek 3.5 (cass.)	\$19.95 now	\$16.74
Lunar Lander (cass.)	\$19.95 now	\$16.74

ARTSCI

Poker Solitaire (cass.)	\$14.95 now	\$12.74
Gomoku (cass.)	\$19.95 now	\$16.94
Reversi (cass.)	\$19.95 now	\$16.94
Cypher Bowl (cass.)	\$29.95 now	\$25.44

AUTOMATED SIMULATIONS

Rescue at Rigel (cass.)	\$29.95 now	\$25.44
Star Warrior (cass.)	\$39.95 now	\$33.94
Invasion Orion (cass.)	\$24.95 now	\$21.24
Datestones of Ryn (cass.)	\$19.95 now	\$16.94

AVALON HILL GAME COMPANY

Empire of the Overmind (disk)	\$35.00 now	\$29.74
Conflict 2500 (cass.)	\$15.00 now	\$12.74
Empire of the Overmind (cass.)	\$35.00 now	\$29.64
Tanktics (cass.)	\$24.00 now	\$20.44

DATASOFT

Atari Mailing List (disk)	\$24.95 now	\$21.24
Atari Character Generator (disk)	\$19.95 now	\$16.94
Text Wizard (disk)	\$9.95 now	\$8.44
Atari Character Gen. (cass.)	\$15.95 now	\$13.54
Le Stick	\$39.95 now	\$33.94

ON-LINE SYSTEMS

HI-RES Adv #2 - Wiz & Princess (disk)	\$32.95 now	\$27.94
---------------------------------------	-------------	----------------

PERSONAL SOFTWARE

Visicalc (disk)	\$199.95 now	\$164.44
Checker King (cass.)	\$19.95 now	\$16.94
MicroChess (cass.)	\$19.95 now	\$16.94

UNITED SOFTWARE OF AMERICA

Survival/Adventure (disk)	\$24.95 now	\$21.24
3-D Supergraphics (disk)	\$39.95 now	\$33.94
3-D Supergraphics (cass.)	\$39.95 now	\$33.94

OTHER

Mind-Bogglers I (disk)	\$19.95 now	\$16.94
Mind-Bogglers I (cass.)	\$15.95 now	\$13.54
VersaWriter Graphics Tablet	\$300.00 now	\$254.44
Hidden Words	\$17.50 now	\$15.44
Spatial Relations	\$17.50 now	\$15.44
Word-Scramble	\$15.00 now	\$13.54
Preschool Fun	\$15.00 now	\$13.54
Fastgammon (cass.)	\$19.95 now	\$16.94
Assembler (cass.)	\$24.95 now	\$21.14
6502 Disassembler (cass.)	\$11.95 now	\$10.14
6502 Disassembler (disk)	\$14.95 now	\$12.64
Tank Trap (cass.)	\$11.95 now	\$10.14
Tank Trap (disk)	\$14.95 now	\$12.64
Tari Trek (cass.)	\$11.95 now	\$10.14
QS Fort (disk)	\$79.95 now	\$67.94
Starbase Hyperion (disk)	\$22.95 now	\$19.44
Name That Song (cass.)	\$14.95 now	\$12.64

Pet

AVALON HILL GAME COMPANY

B-1 Nuclear Bomber (cass.)	\$15.00 now	\$12.77
Midway Campaign (cass.)	\$15.00 now	\$12.77
No Atlantic Convoy Raider (cass.)	\$15. now	\$12.77
Nukewar (cass.)	\$15.00 now	\$12.77
Conflict 2500 (cass.)	\$15.00 now	\$12.77
Planet Miners (cass.)	\$15.00 now	\$12.77
Computer Acquire (cass.)	\$20.00 now	\$16.97
Lords of Karma (cass.)	\$20.00 now	\$16.97

AUTOMATED SIMULATIONS

Introductory 3-Pack (disk)	\$49.95 now	\$39.97
(Rescue, Morloc s, and Datestones)		
Rescue at Rigel (cass.)	\$29.95 now	\$25.47
Temple of Apshai (cass.)	\$39.95 now	\$33.97
Hellfire Warrior (cass.)	\$39.95 now	\$33.97
Starfleet Orion (cass.)	\$24.95 now	\$21.27
Invasion Orion (cass.)	\$24.95 now	\$21.27
Morloc's Tower (cass.)	\$19.95 now	\$16.97
Datestones of Ryn (cass.)	\$19.95 now	\$16.97

PERSONAL SOFTWARE

VisiCalc (disk)	\$199.95 now	\$167.77
Checker King (cass.)	\$19.95 now	\$16.97
Gammon Gambler (cass.)	\$19.95 now	\$16.97
MicroChess (cass.)	\$19.95 now	\$16.97
Bridge Partner (cass.)	\$19.95 now	\$16.97
Time Trek (cass.)	\$19.95 now	\$16.97

UNITED SOFTWARE OF AMERICA

KRAM (disk)	\$99.95 now	\$84.97
Super KRAM (disk)	\$175.00 now	\$148.77
Request (disk)	\$225.00 now	\$191.27
Thinker (disk)	\$495.00 now	\$420.77
Space Intruders (cass.)	\$19.95 now	\$16.97
All MICRO-ED		10% OFF List
All Microcomputer Workshops		15% OFF List

\$149.00

Special for Pet, Atari & Apple

Regular \$200.00 List

\$149.00

TRS-80

BIG FIVE SOFTWARE

Super Nova (cass.)	\$15.95 now	\$13.58
Galaxy Invasion (cass.)	\$15.95 now	\$13.58
Attack Force (cass.)	\$15.95 now	\$13.58
Cosmic Fighter (cass.)	\$15.95 now	\$13.58
Meteor Mission II (cass.)	\$15.95 now	\$13.58

BRODERBUND SOFTWARE

Galactic Trilogy (disk)	\$39.95 now	\$33.98
Galactic Empire (cass.)	\$14.95 now	\$12.68
Galactic Trader (cass.)	\$14.95 now	\$12.68
Galactic Revolution (cass.)	\$14.95 now	\$12.68
Tawala's Last Redoubt (cass.)	\$19.95 now	\$16.98

DATASOFT

Iago (disk)	\$24.95 now	\$21.18
Football Classics (disk)	\$24.95 now	\$21.18
Arcade-80 (disk)	\$24.95 now	\$21.18
Iago (cass.)	\$19.95 now	\$16.98
Football Classics (cass.)	\$19.95 now	\$16.98
Arcade-80 (cass.)	\$19.95 now	\$16.98
Sigmon (COLOR) (cass.)	\$29.95 now	\$23.38
SECS (COLOR) (cass.)	\$29.95 now	\$23.38

ACORN SOFTWARE

Invaders From Space (disk)	\$20.95 now	\$17.78
Duel-N-Droids (disk)	\$20.95 now	\$17.78
Pinball (disk)	\$20.95 now	\$17.78
Pigskin (disk)	\$20.95 now	\$17.78
Quad (disk)	\$20.95 now	\$17.78
Basketball (disk)	\$20.95 now	\$17.78
Gammon Challenger (disk)	\$20.95 now	\$17.78
Everest Explorer (disk)	\$20.95 now	\$17.78
SuperScript (disk)	\$29.95 now	\$23.38
System Savers (cass.)	\$14.95 now	\$12.68
Invaders From Space (cass.)	\$14.95 now	\$12.68
Duel-N-Droids (cass.)	\$14.95 now	\$12.68
Pinball (cass.)	\$14.95 now	\$12.68
Quad (cass.)	\$14.95 now	\$12.68
Basketball (cass.)	\$14.95 now	\$12.68
Gammon Challenger (cass.)	\$14.95 now	\$12.68
Everest Explorer (cass.)	\$14.95 now	\$12.68
All Adventure International		15% Off List
All Automated Simulations		15% Off List
All Sybex Courses		15% Off List
Win at the Races	\$39.95 now	\$33.99
Disk Prep	\$25.00 now	\$21.19
PLE Chip	\$60.00 now	\$50.99

We maintain a huge inventory of Apple software and hardware. Call us toll free (outside Calif.) for the latest programs. We also stock a large supply of computer books. Visit us in person at our new 3300-square foot store at 1945 South Dairy in Corcoran, Calif.

Apple

SUPER DISCOUNTS



HUNTINGTON COMPUTING

Post Office Box 1235
Corcoran, California 93212

Order by Phone 800-344-4111
In California (209) 992-5411

MasterCard or VISA. Include card # and expiration date. California residents add 7% tax. Include \$2.75 for postage. Payment and hardware extra. Send for free catalog. Prices subject to change.

Undeletable Lines

Michael P. Antonovich
Wyomissing, PA

Editor's Note: Though described for Applesoft, this crafty technique works on CBM computers as well. For PETs, type SYS1024. Then .M 0400 041F and hit RETURN (where the author mentions CALL-151). — RTM

Did you ever wish that you could put your name into a program in such a way that the average computer user could not delete it and claim the program as his own? Well you can. In APPLESOFT, you normally cannot enter program lines greater than 63999, but I will show you how you can. First we have to see how the APPLE stores your program lines in memory.

The APPLE stores APPLESOFT program lines beginning at memory location \$800. (The '\$' sign before a number indicates that the number is in hexadecimal). Let's enter the following small program to illustrate the way a program is stored.

```
1 REM
2 A=8
3 PRINT A
4 END
```

To see how the APPLE stores this program, we have to enter the monitor with a CALL -151. However, before we list the program, there is one other piece of information that we need to determine. To add lines to an existing program, you need to know where the current program ends in memory. You can accomplish this in one of two ways. You can page through the memory to find the program's last byte. (Hint: This is the hard way.) The APPLE also stores the location of the last memory byte in locations \$69 and \$6A. Let's enter the monitor now to check our program.

```
CALL -151
*69.6A
0069-1E 08
*800.81F
0800-00 07 08 01 00 B2 00 0F
0808-08 02 00 41 D0 38 00 16
0810-08 03 00 BA 41 00 1C 08
0818-04 00 80 00 00 00 FF FF
```

Although you may not recognize it, the above listing is a memory dump of your program. Let's examine how our BASIC lines were translated to the above hex dump.

The first byte \$00 at location \$800 has no special meaning to our program. In fact, location \$800 will always contain \$00. The program lines begin after this point. Each line is prefixed by four bytes. The first pair of bytes stores the starting byte

address of the next line. In our example, locations \$801 and \$802 indicate that the next line will begin at memory location \$807. (Remember that the location is split into two bytes which are stored in what seems, to us humans, to be in reversed order.)

The second pair of bytes contains the line number assigned to the program line. In our ex-

... though described for
Applesoft, this crafty
technique works on
CBM computers as well.

ample we started with the line number "1." Thus memory locations \$803 and \$804 indicate that the first line number is "1." In addition to the four bytes which prefix each line, each line is ended with single byte '00' to separate it from the next line. Therefore, there is a five byte overhead for each program line used. If multiple statements are combined with a colon (using one byte) on a single line, you can save four bytes for each extra line you eliminate. If you have any doubts, try it yourself with the above program.

The second program line begins at memory address \$807. The first four bytes indicate that the next statement will begin at location \$80F and will have statement number "2." The next three bytes "41 D0 38" represent the tokens for the equality: A = 8. The information we will need to understand these tokens is found in Appendix F and Appendix K of the APPLESOFT Reference Manual. I'll wait while you go get your copy.

Appendix F lists the decimal tokens for all of the keywords used by the APPLE. However, when we are in the monitor, we need the hexadecimal equivalent of the tokens. For example, the hex equivalent for END is \$80, REM is \$B2, and PRINT is \$BA, etc. You might want to take the time now to write the hexadecimal equivalents next to the decimal values for all of the tokens.

Variable names, numbers and strings are not listed in Appendix F. These must be constructed by using the individual ASCII character representations. Appendix K lists the ASCII character set with the decimal and hexadecimal codes. Again, we are interested in the hexadecimal codes. In our example, we need the "A" or \$41 and the "8" or \$38.

CRYSTAL CARE



APPLE

48K-w/disk

THE FINEST IN FANTASY GAME SOFTWARE



ATARI

40K-w/disk

At Crystal we are doing our best to provide the finest state-of-the-art graphic adventure software in the world. Our list of credits include the first indoor-outdoor graphic adventure, the first multi-disk graphic adventure, and now for the Atari, the first graphic adventure in the world which includes screen scrolling and animation. The era of the text adventure and games which are simple combinations of static graphics and text is rapidly drawing to a close. We attempt to utilize the full potential of your computer. True, many of our games use up to 48K and we only deal in disk products, but there are a lot of users out there who have worked hard to upgrade their systems to the max and we think they deserve games that will give their computer system a run for its money.

★★★ ADVENTURE GAMES ★★★

1-THE HOUSE OF USHER- Haunted house type adventure game with scrolling in the Atari version. Wander the creepy hallways of the three story castle based on Edgar Allen Poe's short story of the same name. Written in graphics, of course, with animation and sound. We have introduced a new mystery for another \$100 prize. \$29.95/1 disk

2-FANTASYLAND 2041 A.D.- The largest disk based adventure game in the world (that we know of). Enter the Hall of Heroes and prepare yourself for the greatest fantasy-role-playing game you will see for years to come. To win you must survive Congoland, Arabia, King Arthur, Captain Nemo, Olympus (a sea voyage), and Dante's Inferno (Hell itself). In both the Atari and Apple versions it takes up more than 400,000 bytes of memory and uses more than 400 hires screens. The winner of the contest described in the manual with this game will receive \$1000.00 and a bronze trophy. We have pushed the award date forward to February 1982 to allow more people to participate in the contest. \$59.95/6 disks

3-GLAMIS CASTLE- Yes, Pat and I are on our way to Britain to stay in the dreaded Glamis Castle. If we survive our real life adventure, we'll be measuring it and will be able to provide you with a 3-D game based on this ancient haunted site where King Duncan met his end at the hands of Macbeth. Our good friend, Mark Benioff, after much research, said there's a mystery room that has never been found in this castle and a half beast, half-man creature that guards a treasure therein. Our stay will be covered by the British media and we hope to share our experience with you through the writing of this game. \$49.95/2 disks

4-BENEATH THE PYRAMIDS- You are an archaeologist in 1932 and must find your way through the perilous chambers beneath the pyramids to discover a golden statue of the cat goddess Bast. This game is in hires graphics, includes sound, your little man actually moves through the corridors which you can see on the screen. The monsters are animated and very aggressive. There is a new \$100 prize for the first to solve the mystery; which is a toughie! \$29.95/1 disk

★★★ SPACE GAMES ★★★

5-GALACTIC QUEST- An excellent combination of Star Trek and Space Trader. Battle the animated Vegan fighters as you warp from galaxy to galaxy. At the same time, you may land on and trade with hundreds of planets. Super hires graphics and lots of sound. This has been one of our most popular games. \$29.95/1 disk

6-SANDS OF MARS- Take an exciting voyage to the planet Mars via the Starship Herman. This game compared to the rest, is second only to Fantasyland 2041 A.D. It includes scrolling on the Atari and hundreds of full screen graphics. You can move your little man through the terrain of Mars; if, of course, you survive the exciting journey to Mars, which occupies the whole first disk. There is a new mystery and another \$100 prize just waiting for some clever adventurer out there. Good luck! \$39.95/2 disks

★★★ WAR GAMES ★★★

7-WORLD WAR III- You Atari gamers will have to see this in the Atari version to believe it! If you tired of war games which take 15 minutes a move and have a manual the size of a telephone book; but still want a complex, real-time action war game-this is it! It is designed for two arm-chair generals which may maneuver up to 128 separate types of units at a time. The game displays a map of Iran & Iraq in the first scenario and later on you will find yourself moving nuclear submarines and battleships through two world wars. This is not a boring copy of a board based game but an original war game which takes a lot of skill and may take weeks to play. \$29.95/1 disk

8-WATERLOO II- If you had been Napolean would you have done a few things differently? Well as you approach this final battle you are equipped with the same forces, face the same opposition, and survey the same terrain which he did. We have done a great deal of research to make this historically accurate as well as extremely complex. Even the angle of sight, fatigue of the individual soldier, and his psychological profile are included in the calculations. Oh by the way, your opposition is no slouch. You may find it more difficult to change the course of history than you think! \$49.95/2 disks

★★★ ARCADIA ★★★

9-LASAR WARS- Hires-3d space war simulation. Protect the earth from alien invaders. \$29.95

10-LITTLE CRYSTAL- The first of our line of education software, which will be completed by December. It includes a very fine version of Hangman, Mr. Music, which transforms the computer into a piano, Gunk-a hilarious shoot-em up game, and Storytime-an anthology of bedtime stories featuring Herman, the cat, Oscar, the Hamster, and of course, Little Crystal. \$39.95

11-IMPERIAL WALKER- A fine game pack written by our Atari programmer, Michael (graphics) Potter. Includes the Walker animation which is superb, Gunfight, and Lasar Nim, a game of 'how many robots'. \$29.95

12-ADVENTURE PACK- (#1-4) \$112

14-THE WARRIOR- (#7-8) \$64

13-SPACEOUT- (#5-6) \$58

15-ARCADE- (#9-11) \$60

Special Note! For those of you who live near beautiful scenic Silicon Valley, we'll be opening up a store called Country Computer at 7453 Monterey St. in Gilroy. Hopefully, we'll be carrying a full line of Apple and Atari products and invite you to drop in for our Grand Opening on September 15.



(408) 778-2966

Our order lines are open 24 hrs. a day 7 days a week.

CRYSTAL COMPUTER

17429 Bluejay Dr., Morgan Hill, CA 95020



I have now explained all of the hex codes used in our example except one, the equal sign (=). The problem is that both Appendix F and K contain an equal sign, but each has a different hex code. Which one is correct? We need a rule which will guide us with this and similar problems, so here it is. To construct a variable name, number, or string of characters, use Appendix K. Any symbol used in an arithmetic expression (such as =, (,), etc.) should be taken from Appendix F.

Finally, even though we end our program with an END statement, the APPLE does not know that this is the end of the program (for, indeed, it does not have to be). The end of the program is indicated by the byte pair '00 00' in the locations where it expects to find the next line number.

Now that we know how the APPLE interprets our APPLESOFT program and stores it in memory, we are ready to begin adding lines to our program which will be undeletable to the average APPLE user.

Normally, only program line numbers from 0 to 63999 can be used and referenced in an APPLESOFT program. Converting 63999 to hexadecimal we get \$F9FF, but we can write larger hexadecimal numbers than in two bytes. In fact, we should be able to use the numbers from \$FA00 through \$FFFF or 64000 through 65536. Even though the APPLE will prevent us from entering these line numbers through the keyboard, we know enough about how the APPLE stores program lines to sneak them in.

Let's keep this example simple and assume that I just want to store my name and the date as remark statements. We could just as easily make them PRINT statements if we wanted to. The statements we want are:

```
64000 REM MICHAEL P. ANTONOVICH
64001 REM JUNE 28, 1981
```

Now enter the monitor (CALL -151) and type the following:

```
81C:37 08 00 FA
820:B2 4D 49 43 48 41 45 4C
828:20 50 2E 20 41 4E 54 4F
830:4E 4F 56 49 43 48 00 4A
838:08 01 FA B2 4A 55 4E 45
840:20 33 30 2C 20 31 39 38
848:31 00 00 00
```

Before you return to APPLESOFT, we must reset the end of program pointer. If we do not do this, the first time you run your program, any variables you store will write over the new lines you just added. Our program now ends at memory location \$84C. This information must be put into locations \$69 and \$6A.

69:4C 08

We can now reenter APPLESOFT using CNTL-C RETURN, and list the program. There are lines 64000 and 64001 at the end. Try to delete them. HA! You cannot touch them. You can SAVE

this program, reload it, RUN it, and copy it, and still those two lines will be there. In fact the only way to get rid of them is to enter the monitor, find where you want the program to end, change the last two bytes to "00 00," and change the program ending location in addresses \$69 and \$6A. It's easy, but only if you know how.

Remarks are not the only things that you can put into undeletable lines. You can store anything you want from program lines using tokens and character strings to machine language programs using this method.

I would like to clear one thing up before anyone gets the wrong idea. The tokens we have been using above are NOT machine language. All microcomputers use tokens to store keywords. All BASIC program lines are stored in the above manner, not in machine language. The program lines must be interpreted each and every time that they are run. However, there is a lot that you can do with undeletable lines.

[Manipulating BASIC using your monitor can also hide lines from LISTing, but they will RUN normally. To make this program print the 8, but without line 3 appearing in the program LISTing — simply change the one hexadecimal number to 16 like this:

```
.. 0800 00 07 08 01 00 B2 00 16
      Apple Version
.. 0400 00 07 04 01 00 8F 00 16
      PET Version
```

Also notice that PET and Apple versions are similar (both are Microsoft BASICs), but the hex number for REM is \$B2 for Apple, \$8F for PET. The location of the last BASIC memory byte (the top of a BASIC program) is different in the PET, too. For Original PETs, this address is found in \$007C, \$007D. For Upgrade and 4.0 PETs: \$002A, \$002B. Another difference is that Apple starts its BASIC programs at \$0800, where PET starts at \$0400. You will notice this reflected in the line links which contain the starting byte address of the next line. (In PET, the first links are at \$0401 and \$0402, and they point to \$0407 where the next link points up the chain once again. It is this \$0407 (or Apple's \$0807) which we changed to skip over line three in our "hidden line" technique above. Here is the complete program as it would appear in the PET:]

```
.. 0400 00 07 04 01 00 8F 00 0F
.. 0408 04 02 00 41 B2 38 00 16
.. 0410 04 03 00 99 41 00 1C 04
.. 0418 04 00 80 00 37 04 00 FA
.. 0420 B2 4D 49 43 48 41 45 4C
.. 0428 20 50 2E 20 41 4E 54 4F
.. 0430 4E 4F 56 49 43 48 00 4A
.. 0438 04 01 FA B2 4A 55 4E 45
.. 0440 20 33 30 2C 20 31 39 38
.. 0448 31 00 00 00 AA AA AA AA AA
```

Agricultural Software from Cyberia™

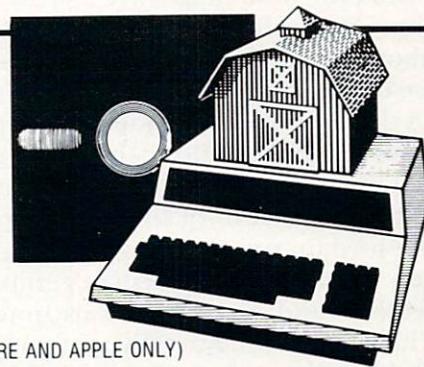
Farmer's Workbook™

Now available for Commodore, Apple and TRS-80. The most powerful management tool ever for the agricultural producer. Farmer's Workbook combines the power of Visicalc® * with the knowledge of a major midwestern university. The Farmer's Workbook is a collection of templates that are designed to be run on the Visicalc® program. The templates include labels, formulas, sample data, test cases and full documentation. Template titles include: Cattle Feeder, Pig Production, Sheep Production, Grain Management, Loan Payments, Market Average, Land Purchase and many others.

Cyber-Farmer™ The complete accounting package for today's farm operations

- Records, sorts, combines and prints the results of the farm operation.
- Account headings and numbers are pre-assigned for nearly every type of farm income or expense, but any account may be deleted, altered or added.
- Keeps personal, family and house-hold accounts as well.
- Cyber-Farmer management tools include cash-flow analysis, depreciation schedules, inventory and budget reports.
- No computer experience is necessary to operate this system.

(COMMODORE AND APPLE ONLY)



*Visicalc is a trademark of Personal Software, Inc.
MasterCard, VISA and C.O.D. orders accepted. Dealer inquiries invited.

CYBERIA INC. 515-292-7634
2330 LINCOLN WAY, AMES, IOWA 50010

Perfectly Balanced



educational software

from
MICRO-ED
for

PET® and **VIC®**

Send for our free catalog*

*please specify PET or VIC

MICRO-ED, Inc. • P.O. Box 24156

Minneapolis, MN 55424

or telephone us at (612) 926-2292



PET and VIC are the registered trademarks for Commodore Business Machines.

Inverting A Matrix

Brian J. Flynn
Vienna, VA

Editor's Note: Although this is programmed for the TRS-80, the ideas can be quickly adapted to any computer. RM

Have you ever wanted to solve a set of simultaneous equations, or perform regression analysis, or learn a bit about how these routines work? Well, the essence of such procedures is inverting a matrix. And in doing this, an accurate and dependable routine is desirable. One such algorithm is named for the king of 19th century mathematics, Carl Friedrich Gauss, and for his French counterpart, Camille Jordan, pronounced "zhôf dâñ." Gauss, you may recall, was the German genius who at age two detected and corrected an arithmetic slip that his father was making in tallying up a payroll. And he did this without the assistance of even a hand-held calculator!

A Level II BASIC program for Gauss-Jordan matrix inversion is presented here. The algorithm uses complete pivoting to minimize round-off error and to insure that every invertible matrix is in fact inverted, within limits of the TRS-80's computing capability.

A matrix is a rectangular array of numbers or variables, usually displayed in brackets. A square matrix is 2-dimensional with, as you guessed, as many rows as columns. And an identity matrix is square with 1's in the principal diagonal and 0's everywhere else. The principal diagonal is the line segment running from the upper left corner to the lower right corner of the matrix. Only a square matrix can be inverted, with the inverse equal to that array which when multiplied by the original matrix gives an identity matrix. In symbols, this is:

$$X \cdot X^{-1} = I.$$

X is the original matrix. X^{-1} is its inverse. And I is the identity matrix. The dot between the two X's means multiplication. For example:

$$X = \begin{bmatrix} 1 & 4 & 8 \\ 2 & 1 & 3 \\ 6 & 9 & 4 \end{bmatrix}, \text{ and } X \cdot X^{-1} = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

To calculate X^{-1} :

Tack onto matrix X an identity matrix of equal size:

$$\left[\begin{array}{ccc|ccc} 1 & 4 & 8 & 1 & 0 & 0 \\ 2 & 1 & 3 & 0 & 1 & 0 \\ 6 & 9 & 4 & 0 & 0 & 1 \end{array} \right]$$

$\underbrace{}_{X} \qquad \qquad \qquad \underbrace{}_{I}$

The dotted line separates or partitions what is now a 3 row x 6 column matrix into two smaller matrices of equal size, X and I. The partition, in this case, is like the equator: it enables us to talk more easily about the halves of a whole.

Is the matrix nearly inverted?

"Not yet, not yet!" the Rabbit hastily interrupted. "There's a great deal to come before that!"

Namely:

Transform the left portion of the 3x6 matrix into I, using row and column operations on the entire matrix to do this. What is initially the identity matrix will emerge as X^{-1} . In more detail, the following three steps are performed for as many times (iterations) as there are rows in X:

1. Search would-be key elements, illustrated below, for the one of highest absolute value.
2. Place this element in the pivot position, if it is not already there, by switching rows or columns. The pivot position for iteration #1 is the first spot in the principal diagonal, going from upper left to lower right. For iteration #2 it is the second spot, and so on.

Keep track of columns that switch place, and interchange corresponding rows in the next-to-final form inverted matrix.

3. Make the diagonal element in a column equal to 1, and make the other elements in the same column equal to 0.

For example:

Step 1:
Would-be key elements are circled.

$$\left[\begin{array}{ccc|ccc} \textcircled{1} & \textcircled{4} & \textcircled{8} & 1 & 0 & 0 \\ \textcircled{2} & 1 & 3 & 0 & 1 & 0 \\ \textcircled{6} & 9 & 4 & 0 & 0 & 1 \end{array} \right]$$

$\underbrace{}_{X} \qquad \qquad \qquad \underbrace{}_{I}$

Module 2 in the computer program tacks I onto X. The solid circle is the position to pivot on in the first iteration. Would-be key elements, besides 1, are in the dashed circles. They are the members of X that can be moved into the pivot position by switching a row or column.

Module 3 identifies 8 as the would-be key element of highest absolute value.

JINSAM™ 8.0

space
age
micro
software

Used at NASA,
Kennedy Space Center
With Multiple Applications Related
to the Columbia Space Shuttle Project

JINI MICRO-SYSTEMS, Inc.

DATABASE MANAGEMENT SYSTEM DESIGN

BOX 274 KINGSBRIDGE STN., RIVERDALE, N.Y. 10463 (212) 796-6200

Step 2:

Old Column 3	Old Column 1			
$\begin{bmatrix} 8 \\ 3 \\ 4 \end{bmatrix}$	$\begin{bmatrix} 4 \\ 1 \\ 9 \end{bmatrix}$	$\begin{bmatrix} 1 \\ 2 \\ 6 \end{bmatrix}$	$\begin{bmatrix} 1 & 0 & 0 \end{bmatrix}$	

To place 8 in the pivot position, columns 1 and 3 are switched (lines 3120 and 3130). Vector M "remembers" the column interchange.

Step 3:

$$\left[\begin{array}{ccc|ccc} 1 & 0.5 & 0.125 & 0.125 & 0 & 0 \\ 3 & 1 & 2 & 0 & 1 & 0 \\ 4 & 9 & 6 & 0 & 0 & 1 \end{array} \right] \quad \text{Row 1 divided by 8.}$$

The pivot element becomes 1 by dividing the first row in the entire matrix by 8 (lines 3140 to 3190). Next, the second and third elements in column 1 become 0's:

$$\left[\begin{array}{ccc|ccc} 1 & 0.5 & 0.125 & 0.125 & 0 & 0 \\ 0 & -0.5 & 1.625 & -0.375 & 1 & 0 \\ 0 & 7 & 5.5 & -0.5 & 0 & 1 \end{array} \right]$$

This is done by multiplying row 1 by -3 and adding the product to row 2, and by multiplying row 1 by -4 and adding the product to row 3. Lines 3200 to 3270 accomplish this.

This completes the first cycle of steps 1, 2, and 3. The circle is the new position to pivot on. The process continues as before. Skipping a few steps:

```

10 REM GAUSS-JORDAN MATRIX INVERSION; B. FLYNN; WINTER 1981
20 REM MODULE 1:ENTER DATA
30 GOSUB 1000
40 REM MODULE 2:TACK IDENTITY MATRIX ONTO DATA MATRIX
50 GOSUB 2000
60 REM MODULE 3:BEGIN INVERTING MATRIX
70 GOSUB 3000
80 REM MODULE 4:SWITCH ROWS IN THE NEXT-TO-FINAL-FORM MATRIX, IF APPROPRIATE
90 GOSUB 4000
100 REM MODULE 5:DISPLAY INVERSE MATRIX
110 GOSUB 5000
120 END

1000 REM MODULE 1
1010 DEFINT I-R:DEFDBL B,C,D,H,X
1020 CLS:PRINT"GAUSS-JORDAN MATRIX INVERSION WITH COMPLETE PIVOTING."
1030 INPUT"PLEASE ENTER THE NUMBER OF ROWS (COLUMNS) IN THE MATRIX":K
1040 DIM X(K,K),M(K)
1050 REM ENTER DATA
1060 FOR I=1 TO K

```

Step: Pentultimate

$$\left[\begin{array}{ccc|ccc} 1 & 0 & 0 & 0.11 & 0.13 & -0.06 \\ 0 & 1 & 0 & 0.09 & -0.39 & 0.12 \\ 0 & 0 & 1 & -0.20 & 0.50 & 0.04 \end{array} \right]$$

This matrix finally emerges. Recall, however, that columns 1 and 3 were interchanged in the second step of the first cycle. Hence, rows 1 and 3 must now be switched (module 4):

Step: Last

$$X^{-1} = \begin{bmatrix} -0.20 & 0.50 & 0.04 \\ 0.09 & -0.39 & 0.12 \\ 0.11 & 0.13 & -0.06 \end{bmatrix}$$

Module 5 is easily changed to display X^{-1} differently, e.g., to show more decimal places or to accommodate a large number of rows and columns, say 8 or more.

Finally, as an example of the routine's speed, inverting a 10 by 10 identity matrix takes about 45 to 50 seconds. This is not very fast. However, some of the algorithm's time is spent checking columns for the highest key element and for switching rows, when necessary, in the next-to-final-form inverted matrix. Some programs omit this check. But when they do, a danger arises that X will not be inverted when it really can be. And further, the elements of the inverted matrix may be of lessened precision. The preference here is for effectiveness rather than speed. But Gauss, always the perfectionist whose motto was "Few, but ripe," might challenge us: "Can't we have both?"

'Lewis Carroll, Alice's Adventures in Wonderland.

Introducing:

Smart WareTM

(LISP) 1.7 & 2.0

Introducing
LISP. The language
that can think for itself.

With SmartWare, your micro-computer possesses intelligence. Solves problems like never before. Actually can learn from its mistakes. And educates itself in much the same way your brain operates. It's a new concept in the way information is handled in microcomputers.

We appropriately called our version of LISP, SmartWare. Because it's as limitless as the human imagination, mind, memory.

An advanced, high-level language, LISP was first developed for use in artificial intelligence on large computers. And now, LISP is available from Datasoft for use on the Apple II and Atari Computers.

Store multiple programs in memory. It can take it. Program other languages into LISP. It's no problem. Because LISP offers greater capacity and power. And, it's a faster, more streamlined language. For example, just 2 lines in LISP could equal hours of BASIC programming.

The fact: Relational data base capabilities. User and program definability. Pattern-directed

invocation language. Uses syntax and data structures upon which esoteric applications may be implemented. Remembers data along with "relationships affecting it." Offers

REAL power to micros. At MIT, they say LISP is the language of the future.

At datasoft, we say, why wait. Ask your local computer dealer for SmartWare. Right now! And turn your computer on to thinking.

SmartWare by
Datasoft Inc.^{T.M.}

COMPUTER SOFTWARE
19519 Business Center Dr., Northridge, CA 91324
(213)701-5161

```

1070 CLS:PRINT"PLEASE ENTER DATA."
1080 PRINT"ROW #":I$":"
1090 FOR J=1TO K
1100 PRINT"COL #":J:INPUT X(I,J)
1110 NEXT J,I
1120 RETURN
2000 REM MODULE 2
2010 REM ASSIGN 1, 2, . . . , K TO VECTOR M
2020 FOR I=1TO K
2030 FOR J=I TO K
2040 X(I,K+J)=0:X(J, I+K)=0
2050 NEXT J
2060 X(I, K+I)=1:M(I)=I
2070 NEXT I
2080 RETURN
3000 REM MODULE 3
3010 FOR Q=1TO K
3020 IF Q=K THEN 3140
3030 REM SEARCH WOULD-BE KEY ELEMENTS FOR HIGHEST ABSOLUTE VALUE
3040 HE=ABS(X(Q,Q)):HROW=Q:HCOLUMN=Q
3050 FOR I=1TO K-Q
3060 DUMMY=ABS(X(Q+I,Q)):IF DUMMY>HE THEN HE=DUMMY:R=Q+I
3070 DUMMY=ABS(X(Q, Q+I)):IF DUMMY>HC THEN HC=DUMMY:C=Q+I
3080 NEXT I
3090 IF HE>=HR AND HE>=HC THEN 3140
3100 REM SWITCH ROWS, IF APPROPRIATE
3110 IF HR>=HC:FOR J=1TO 2*K:HOLD=X(R,J):X(R,J)=X(Q,J):X(Q,J)=HOLD:NEXT J
3120 REM SWITCH COLUMNS, IF APPROPRIATE
3130 IF HR<HC:FOR J=1TO K:HOLD=X(J,C):X(J,C)=X(J,Q):X(J,Q)=HOLD:NEXT J:H1=M(Q):M(Q)=M(C):M(C)=H1
3140 REM ADJUST KEY ROW
3150 B=X(Q,Q)
3160 IF B=0 PRINT"SINGULAR MATRIX":END
3170 FOR J=Q TO 2*K
3180 X(Q,J)=X(Q,J)/B
3190 NEXT J
3200 REM ADJUST REMAINING ROWS
3210 FOR L=1TO K
3220 IF L=K AND K=Q THEN 3260
3230 IF L=Q THEN L=L+1
3240 D=X(L,Q)
3250 FOR J=Q TO 2*K
3260 X(L,J)=X(L,J)-D*X(Q,J)
3270 NEXT J
3280 NEXT L,Q
3290 RETURN
4000 REM MODULE 4
4010 FOR I=1 TO K
4020 C=0
4030 FOR J=1 TO K
4040 IF M(J)=I THEN C=J
4050 NEXT J
4060 IF C>I THEN FOR L=1TO K:HOLD=X(I,K+L):X(I,K+L)=X(C,K+L):X(C,K+L)=HOLD:NEXT L:H1=M(I):M(I)=M(C):M(C)=H1
4070 RETURN
5000 REM MODULE 5
5010 CLS
5020 FOR I=1TO K
5030 FOR J=1TO K
5040 PRINT USING"##.## ";X(I,K+J);
5050 NEXT J:PRINT
5060 NEXT I
5070 RETURN

```

Osborne AWAKENS the ATARITM and Puts it to Work.

All too often, computer users who've been used to entertainment programs have trouble coming up with ideas for **practical** computing. Your computer plays space games well enough, but when you have a down to earth problem like the future of an investment or federal withholding taxes, can it perform? It can now.

Osborne/McGraw-Hill introduces **Some Common BASIC Programs for the Atari™**. This book contains 76 short, brilliantly documented programs that you can key directly into your **Atari™ 400 or 800** computer. You'll get a lot of math power including personal finance, taxes, and statistics. All the programs are listed below.

Future of an Investment	Angle Conversion: Radians to Degrees	Poisson Distribution
Future Value of Regular Deposits (Annuity)	Angle Conversion: Degrees to Radians	Normal Distribution
Regular Deposits	Coordinate Conversion	Chi-square Distribution
Regular Withdrawals from an Investment	Coordinate Plot	Chi-square Test
Initial Investment	Plot of Polar Equation	Student's t-distribution
Minimum Investment for Withdrawals	Plot of Functions	Student's t-distribution Test
Nominal Interest Rates on Investments	Linear Interpolation	F-distribution
Effective Interest Rate on Investments	Curvilinear Interpolation	Linear Correlation Coefficient
Earned Interest Table	Integration: Simpson's Rule	Linear Regression
Depreciation Rate	Integration: Trapezoidal Rule	Multiple Linear Regression
Depreciation Amount	Integration: Gaussian Quadrature	Nth Order Regression
Salvage Value	Derivative	Geometric Regression
Discount Commercial Paper	Roots of Quadratic Equations	Exponential Regression
Principal on a Loan	Real Roots of Polynomials: Newton	System Reliability
Regular Payment on a Loan	Roots of Polynomials: Half-Interval Search	Average Growth Rate, Future Projections
Last Payment on a Loan	Trig Polynomial	Federal Withholding Taxes
Remaining Balance on a Loan	Simultaneous Equations	Tax Depreciation Schedule
Term of a Loan	Linear Programming	Check Writer
Annual Interest Rate on a Loan	Matrix Addition, Subtraction, Scalar Multiplication	Recipe Cost
Mortgage Amortization Table	Matrix Multiplication	Map Check
Greatest Common Denominator	Matrix Inversion	Day of the Week
Prime Factors of Integers	Permutations and Combinations	Days Between Two Dates
Area of a Polygon	Mann-Whitney U Test	Anglo to Metric
Parts of a Triangle	Mean, Variance, Standard Deviation	Alphabetize
Analysis of Two Vectors	Geometric Mean and Deviation	
Operations on Two Vectors	Binomial Distribution	

Some Common BASIC Programs ed. by Lon Poole:

- Atari™ edition - #53-5, \$14.99
PET/CBM™ edition - #40-3, \$14.99
TRS-80™ level II edition - #54-3, \$14.99
Generalized BASIC edition - #06-3, \$14.99

Practical BASIC Programs ed. by Lon Poole
Contains 40 additional programs with a wide range of home and business applications. (Generalized BASIC edition only) #38-1, \$15.99

Make check payable to: OSBORNE/McGraw-Hill
630 Bancroft Way, Berkeley, CA 94710 Dept. G8

Phone: (415) 548-2805

TOLL FREE: 800-227-2895 Outside California

Name _____

Address _____

City/State/Zip _____

Plus .75/item 4th class \$1.50/item UPS \$2.50/item Air Mail \$10.00/item Overseas
(California Residents add applicable tax.) Please send me your free catalog.

Total amount enclosed \$_____ or charge my Visa Mastercard #_____ Exp. Date _____

Signature _____



THE CHIPPIE GAZETTE



Budgeting On The Apple

William R. Swinyard
Provo, UT

When I sat down at one of the University's dozens of Apples six weeks ago, someone had to show me where the on/off switch was. But I learned fast and, within a few weeks, I was doing pretty well at what I believed the Apple to be best at. I had maintained several "high score" records on Apple Invaders ... I was terrific at judging angle and wind-speed in the Bombs game ... and I was even learning how to back away from brick walls in Maze. But I had not entered even one real line of programming.

One other thing I did discover, though, was how ... well, *nice* the Apple is. True, I had spent a little programming time on our DEC installation (and a *lot* of time on it using canned analytical software packages), but I always felt inhibited about getting too intimate with that machine because of its so formal, even intimidating, way of speaking — or should I say "shouting" — back. "FATAL PROCESSING ERROR. ILLEGAL CHARACTER IN DATA (K) [OCTAL 113] UNIT=8/ACCESS= SEQUIN/MODE= ASCII," was typical of the helpful way the DEC had about it. What a contrast with the Apple! It almost seemed to *invite* me to stay with it just a bit longer, and even to try running a few little programs on it.

And so I did. This article is about one of the first. It simply permits the user to enter a monthly income figure then displays a budget, along with the discrepancy between the budget and the income. It has a few nice touches, I think. Program requests for budget changes are highlighted in a new budget display, there is a short subroutine to align the decimal points, and percentages of total budget are also displayed.

Briefly, here are what the sections of the program do:

Line 115 — Displays the title of the program on an otherwise blank screen for a few seconds.

Line 120 — Requests monthly income information.

Lines 240-570 — Lists out, with illustrative budget figures, the items appropriate for my

budget. Yours may be different, and you will need to change the program listing where appropriate.

Lines 600-680 — Prints the output headings, the budget name and corresponding value, the total budget figure, and the deviation between income and budget.

Lines 690-775 — The above information is displayed for about 10 seconds, followed by requests for updated expenditures originating in these lines. If updates are made, a new display table is printed which highlights (with underlining) the updated expenditure figure.

Lines 780-830 — A subroutine for lining up the decimals.

Lines 835-900 — Prints out the fully revised expenditures table, but accompanied this time with percentage allocations of budget, if requested.

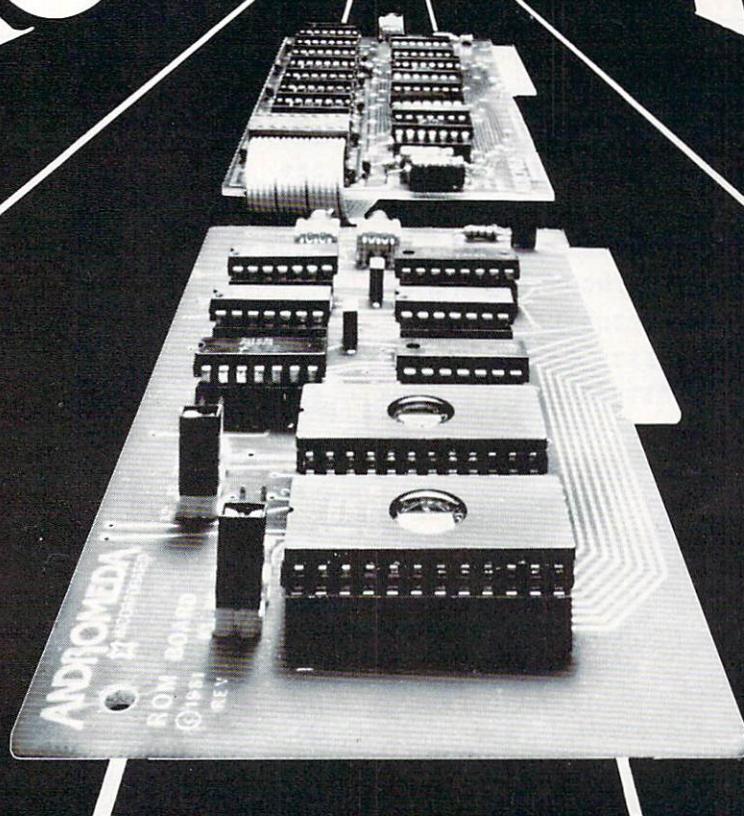
The tabular display has been arranged to just fit into the Apple screen, so a line printer is unnecessary to get full use of this program.

Several refinements to the program might make it yet more appealing for your use, but seemed like overkill for me. With little modification the program could be designed to display budget values and percentages in the first tabular display — only one extra FOR-NEXT loop would be required. The program could easily be rewritten to make it interactive in budget-area development, though this seems unnecessary for a family whose budget allocations typically fall into the same areas each month. Or the program could be easily modified to accommodate input of *gross* monthly income, and incorporate federal and state tax withholding information, FICA withholding, tax-deferred income, etc. by building in the appropriate withholding proportions (income level, number of exemptions, and claimed marital status would be required as input values). However, since Uncle Sam has been changing the FICA rates annually, I passed this improvement by in favor of the relative permanency of the program as it now stands. Still, if you are interested in simulating the effect of increasing or decreasing your number of exemptions, this modification could be worthwhile.

Figure 1 shows the initial output display after entering a net monthly income figure. Figure 2 shows the output following the program's request for any changes. You can see that the change was

A BRIGHT NEW STAR FROM
ANDROMEDA!

ROM RAM



NEW ROM BOARD FOR THE APPLE II* \$125.00 WITH UTILITY ROM.

With Andromeda's new ROM Board, you can plug many useful utility programs into your Apple II. Because ROM memory never forgets, you can access these utilities instantly without having to load them from disk.

The ROM Board comes with the utility ROM, which gives you five powerful options to apply to your Applesoft* programs. With the Utility ROM, you can do automatic line numbering, control a program list with a page mode, restore a crashed Applesoft* program in memory, alphabetize a disk catalogue and create a disk without DOS, giving you an extra 8K on your disk. Any of Soft Control Systems' other ROMS can be used, such as the Dual DOS in ROM, and Your'ple ROM.

You can install 2K PROMS, 4K PROMS, or even 2K RAM chips in each of the two memory sockets. So you can even have the Read - Write capability of RAM to develop PROM Programs yourself, or just have an extra 2K RAM for your machine - Language programs. Two 2732 PROMS allow a total of 8K of memory on the Board.

Now with One Year Warranty.

Don't forget the Andromeda 16K RAM Expansion Board \$195.00

ANDROMEDA



INCORPORATED

P.O. Box 19144
Greensboro, NC. 27410
919 852-1482

Distributed By:



P.O. Box 696
Amherst, NH. 03031
603 673-7375

*Apple II and Applesoft are trademarks.

made ("Med. and Dent.") and was highlighted with a short underline. After all changes have been made, the program gives you the option of requesting percentage breakdowns by budget area. This table is shown in Figure 3, which concludes the budgeting routine.

There is nothing very sophisticated about any of this, but the program has been a useful one for our family; there is nothing quite so engaging as seeing an inanimate "object" spring to life at your bidding. And the program was just a lot of fun to write. Let me know of your improvements of it.

Program 1.

```

10 REM ****
20 REM *HOME BUDGETING PROGRAM*
30 REM *CREATED JUNE 10, 1981 *
40 REM *BY WILLIAM R. SWINYARD*
50 REM *SHOWS AND CALCULATES *
60 REM *DISTRIBUTION OF INCOME*
70 REM *INTO BUDGET CATEGORIES*
80 REM *INCLUDING REQUESTS FOR*
90 REM *UPDATED EXPENDITURES &*
100 REM *FOR PERCENTAGE DISPLAY*
110 REM ****
115 HOME : PRINT : PRINT : PRINT
      : PRINT : PRINT : PRINT TAB(
      10)"HOME BUDGETING PROGRAM":
      FOR I = 1 TO 1000: NEXT I: HOME
120 INPUT "WHAT IS NET MONTHLY I
      NCOME? ";SALARY
130 PRINT
232 DIM DD(17),DD$(17)
236 REM **BUDGETED ITEMS IN LIS
      TING **
237 REM **TO CHANGE BUDGET YOU
      MUST ACCESS THE LISTING DIRE
      CTLY**
240 DD$(1) = "HOUSING"
250 DD(1) = 500
260 DD$(2) = "HEAT"
270 DD(2) = 50
280 DD$(3) = "LIGHTS"
290 DD(3) = 35
300 DD$(4) = "DONATIONS"
310 DD(4) = 50
320 DD$(5) = "TELEPHONE"
330 DD(5) = 35
340 DD$(6) = "LOAN PAYMNTS"
350 DD(6) = 100
360 DD$(7) = "MED & DENT"
370 DD(7) = 35
380 DD$(8) = "GROCERIES"
390 DD(8) = 300
400 DD$(9) = "AUTO MAINT."
410 DD(9) = 25
420 DD$(10) = "GASOLINE"
430 DD(10) = 100
440 DD$(11) = "INSURANCE"
450 DD(11) = 50
.
470 DD$(12) = "CLOTHING"
480 DD(12) = 50
490 DD$(13) = "EDUCATION"
500 DD(13) = 20
510 DD$(14) = "HOME REPAIR"
520 DD(14) = 50
530 DD$(15) = "RECREATION"
540 DD(15) = 60
550 DD$(16) = "SAVINGS"
560 DD(16) = 50
570 DD$(17) = "OTHER"
580 REM ***PRINT OUTPUT***
590 HOME
600 PRINT "MONTHLY INCOME",SALARY
605 PRINT "===== "
610 SUM = 0
620 FOR I = 1 TO 17
630 GOSUB 790: PRINT TAB( A)I, TAB(
      4)DD$(I); TAB( B)DD(I)
635 IF I = TT THEN PRINT TAB(
      18)"---"
640 SUM = SUM + DD(I)
650 NEXT I
660 PRINT
670 PRINT "TOTAL BUDGETED = ",SUM
680 PRINT "NET AFTER BUDGET = ";
      SALARY - SUM
685 IF Q = 1 THEN GOTO 910
690 FOR X = 1 TO 10000: NEXT X
700 PRINT ****
710 REM ***CHANGES***
730 INPUT "WAS SPENDING OTHER TH
      AN ABOVE? ";B$
740 IF B$ = "N" THEN GOTO 840
750 INPUT "TYPE ITEM NUMBER, ACT
      UAL EXPEND. ";I,X
760 TT = I
770 DD(I) = X
775 GOTO 600
780 REM SUBROUTINE FOR DECIMAL PLACEMENT
790 A = 2:B = 19:C = 25
800 IF I > 9 THEN A = A - 1
810 IF DD(I) < 10 THEN B = B + 1
820 IF DD(I) > = 100 AND DD(I) <
      1000 THEN B = B - 1
825 IF DD(I) > = 1000 THEN B =
      B - 2
827 IF PC > 9 THEN C = C - 1
830 RETURN
835 REM ROUTINE TO COMPUTE & PRINT %'S
840 INPUT "WANT %'S OF BUDGET? ";C$
850 IF C$ = "N" THEN GOTO 910
855 PRINT : PRINT
860 FOR I = 1 TO 17

```

```

865 Q = 0
870 PC = (DD(I) / SUM) * 100
880 GOSUB 790: PRINT TAB(A)I, TAB(
  4)DD$(I); TAB(B)DD(I), TAB(
  C) INT (PC); "%"
890 NEXT I
895 Q = 1
900 GOTO 660
910 END

```

Figure 1.

HOME BUDGETING PROGRAM
WHAT IS NET MONTHLY INCOME? 1600

MONTHLY INCOME 1600

```

=====
1 HOUSING      500
2 HEAT          50
3 LIGHTS        35
4 DONATIONS     50
5 TELEPHONE     35
6 LOAN PAYMNTS 100
7 MED & DENT    35
8 GROCERIES     300
9 AUTO MAINT.   25
10 GASOLINE      100
11 INSURANCE     50
12 CLOTHING      50
13 EDUCATION      20
14 HOME REPAIR    50
15 RECREATION     60
16 SAVINGS        50
17 OTHER          0

```

TOTAL BUDGETED = 1510

NET AFTER BUDGET = 90

Figure 2.

WAS SPENDING OTHER THAN ABOVE? Y
TYPE ITEM NUMBER, ACTUAL EXPEND. 7,75
MONTHLY INCOME 1600

```

=====
1 HOUSING      500
2 HEAT          50
3 LIGHTS        35
4 DONATIONS     50
5 TELEPHONE     35
6 LOAN PAYMNTS 100
7 MED & DENT    75
8 GROCERIES     300
9 AUTO MAINT.   25
10 GASOLINE      100
11 INSURANCE     50
12 CLOTHING      50
13 EDUCATION      20
14 HOME REPAIR    50
15 RECREATION     60
16 SAVINGS        50

```

17 OTHER 0

TOTAL BUDGETED = 1550
NET AFTER BUDGET = 50

Figure 3.

WAS SPENDING OTHER THAN ABOVE?

WANT %'S OF BUDGET? Y

1 HOUSING	500	32%
2 HEAT	50	3%
3 LIGHTS	35	2%
4 DONATIONS	50	3%
5 TELEPHONE	35	2%
6 LOAN PAYMNTS	100	6%
7 MED & DENT	75	4%
8 GROCERIES	300	19%
9 AUTO MAINT.	25	1%
10 GASOLINE	100	6%
11 INSURANCE	50	3%
12 CLOTHING	50	3%
13 EDUCATION	20	1%
14 HOME REPAIR	50	3%
15 RECREATION	60	3%
16 SAVINGS	50	3%
17 OTHER	0	0%

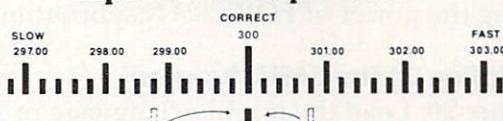
TOTAL BUDGETED = 1550
NET AFTER BUDGET = 50



Bugs in your Apple?

DDT

Disco-Tech's Disc Drive Timer program
zaps disc drive problems!



Analyze disc drive motor speed on a routine basis with an adjustable real-time speedometer. Accurate to one-tenth of one r.p.m. out of 300 r.p.m.

Fine-tune disc drive motor speed yourself. All you need is DDT, two screwdrivers, and five minutes' time.

\$29⁹⁵

Postpaid
California residents add 6% tax.

Diskette & complete manual.

Engineering
Architecture
Surveying
Business
Utilities

Also available for TRS-80 Model I.

To order or for more information,
write or call

disco
tech
T.M.

microcomputer
products
a division of
Morton Technologies, Inc.
600 B Street
P.O. Box 11129 • Santa Rosa, CA 95406
707/523-1600
Dealer inquiries invited.



Named GOSUB's

M.R. Smith

In a previous article, (**COMPUTE! #12**), I showed how to use the Ampersand instruction in Applesoft to permit instructions of the form:

```
10 FIRST=1000
20 DEUX=2000
30 THIRD=3000
40 & GOSUB FIRST
50 & GOTO THIRD
```

In Applesoft BASIC, named GOSUB's and GOTO's are not normally allowed.

The machine language program given in that article did not allow the use of names in ON...GOSUB or ON...GOTO statements. The following machine language program rectifies that problem.

The following statements are now permitted:

```
60 FOURTH=4000
70 NUM=INT(1+RND(2))
80 & ON NUM GOSUB FIRST, DEUX
90 & ON NUM GOTO THIRD, FOURTH
```

Using statements of this form makes it much easier to follow programs containing a large number of subroutines. In addition, it is much easier to remember the name of a subroutine rather than its number.

I am presently working on an extension to these statements to allow the passing of variables to a subroutine. That means statements of the form:

```
& GOSUB CALCULATE(A, B, C)
```

allowing the power of FORTRAN subroutine calls.

Description Of The BASIC Program

Line 20. Load the machine language program.

Line 20–100. Demonstrates the & GOSUB and & GOTO statements.

Line 110–180. Demonstrates the & ON...GOSUB and & ON...GOTO statements.

Lines 1000–3500. Demonstration subroutines and statements.

Lines 5000–6160. This subroutine loads and checks the machine language program. Every 17th number is the simple sum of the previous 16 numbers. This allows the entry of the numbers to be checked. The machine language program can be saved using the instruction:

```
BSAVE NAMED.GO,A$300,L$88
```

and called into your programs using the instruction:

```
10 PRINT CHR$(4);“BRUN NAMED.GO”
```

before any call to the ampersand (&) statements are made.

APPLE II* SOFTWARE FROM **POWERSOFT**

PEGASUS

(a PASCAL based data base system)

PEGASUS—is a filing and retrieval system using the PASCAL programming language providing a general means for storing data in an orderly fashion. PASCAL code runs three to five times faster than BASIC code designed for a similar application.

Data stored in the PEGASUS data base may be modified, retrieved, and formatted into convenient reports. Three types of data are supported: character, real, and integer. Each PEGASUS data base record may contain up to 20 fields.

Data may be entered either interactively from the console or as a batch from a text file. Records may be modified after they have been entered or deleted from the data base entirely. PEGASUS may also be used to select groups of records based on the values of one or more fields. Output may be to the CRT screen, a printer or a text file. Thus, PEGASUS may be used to create printed reports, examine data on-line, or interface with the input or output of other PASCAL programs. Requirements: Apple II, Plus, or III and two 5 1/4" disk drives. Or an 8" or Winchester type drive. USCD Pascal Language System.....

5 1/4" Disk Only/\$199.95

INCOME STATEMENT SYSTEM

INCOME STATEMENT SYSTEM—(Summarized Reports including Budget Figures Based on Super Checkbook III transactions.)—An excellent program complement to SUPER CHECKBOOK III. The system provides for up to 100 income and expense codes. For each code the system maintains a total for the current month, current budget, current year-to-date, and three prior year-todates. Income codes may have up to six corresponding expense codes. A "sort code" feature allows account codes to print in a user defined sequence.

Updates to the accounts include current month, end-of-month, and end-of-year. Gross and Net Income Statements may be printed in either account code or sort code sequence. The Account Master File List may be printed by sort code, account code, or alphabetically by account name. Detailed transactions for each code are printed and totaled, one code per page, in code number order.

This system is designed to run in conjunction with the SUPER CHECKBOOK III program described below. Requirements: 48K, two disk drives, printer card, Applesoft Disk Only/\$49.95

SUPER CHECKBOOK III

SUPER CHECKBOOK III—A vastly improved version of our popular selling program. With new features such as: simplified but powerful transaction entry and modification routines, new reconciliation routines, additional features such as 30 percent increase in the total number of checks handled, posting of interest from interest bearing checking accounts, automatic teller transactions, bullet proof error handling, and smart disk routines. Plus the program still contains the options of bar graphs, sorting, activities, and account status. See INCOME STATEMENT SYSTEM described above.

Disk Only/Applesoft \$49.95

Dealer Inquiries Invited

Visa and MasterCard, Check or Money Order include \$2.00 for shipping and handling. C.O.D. \$2.00 additional.

*Apple II and Applesoft are registered trademarks of APPLE COMPUTER INC.

POWERSOFT
P. O. BOX 157
PITMAN, NEW JERSEY 08071
(609) 589-5500

Program 1.

300.387

```

0300- A9 4C 8D F5 03 A9 10 8D
0308- F6 03 A9 03 8D F7 03 60
0310- C9 B0 F0 0D C9 AB F0 29
0318- C9 B4 F0 31 A2 10 4C 12
0320- D4 20 B1 00 A9 03 20 D6
0328- D3 A5 B9 48 A5 B8 48 A5
0330- 76 48 A5 75 48 A9 B0 48
0338- 20 B7 00 20 44 03 4C D2
0340- D7 20 B1 00 20 7B DD 20
0348- 52 E7 4C 41 D9 20 B1 00
0350- 20 F8 E6 48 C9 B0 F0 0D
0358- C9 AB F0 09 C9 AF D0 EC
0360- 68 20 B1 00 48 C6 A1 D0
0368- 04 68 4C 10 03 A5 A1 48
0370- 20 B1 00 20 7B DD 20 52
0378- E7 20 B7 00 C9 2C D0 05
0380- 68 85 A1 D0 E0 68 68 60
*
```

Program 2.

```

1 REM M. R. SMITH
2 REM MAY 1981
3 REM
10 REM LOAD THE ROUTINE - NORMAL
   GOSUB
20 GOSUB 5000
30 REM ESTABLISH NAMES OF THE SUBROUTINES
40 FIRST = 1000:DEUX = 1500:THIRD = 2000
50 FOURTH = 2500:FVTH = 3000:SIXTH = 3500
60 REM DEMONSTRATE NAMED GOSUB'S
70 & GOSUB FIRST
80 & GOSUB DEUX
90 REM DEMONSTRATE NAMED GOTO
100 & GOTO FOURTH
110 REM DEMONSTRATE NAMED ON...GOSUB
120 NUM = INT (1 + 3 * RND (1))
130 & ON NUM GOSUB FIRST,DEUX,THIRD
140 REM DEMONSTRATE NAMED ON...GOTO
150 FOR J = 1 TO 1000: NEXT : REM DELAY
160 NUM = INT (1 + 3 * RND (1))
170 & ON NUM GOTO FOURTH,FVTH,SIXTH
180 STOP
190 REM
970 REM DUMMY SUBROUTINES AND LINES
980 REM
990 REM FIRST SUBROUTINE
1000 PRINT : PRINT "IN SUBROUTINE FIRST": RETURN
1490 REM SECOND SUBROUTINE
1500 PRINT : PRINT "IN A DIFFERENT NAMED SUBROUTINE"
1510 PRINT "IN SUBROUTINE DEUX": RETURN
1990 REM THIRD SUBROUTINE
2000 PRINT : PRINT "IN SUBROUTINE THIRD": RETURN

```

CLASS OF '82... BOOT UP!

ASSISTANT PRINCIPAL - Whether you're too small for a big computer or if you just want to bring your administrative duties under your control, the "Assistant Principal" is just what you need. It prints school rosters, allows you to input teacher grades, prepare report cards, and maintain student master records. You should have no more trouble with student scheduling, grade averaging or recording of student grades. For Apple II and Apple II Plus, two disk drives, 48K Memory and an 80 column printer. Item M-3839-11, Price \$500.00.

ROLL CALL - Let this program keep track of that all important attendance data. Whether you need information on an individual's tardy, absence history or need to prepare attendance reports for the board or your state funding agency, this complete system will make the task easy work. The system will create its own data base or work off the Assistant Principal's files. For Apple II or Apple II Plus, two disk drives, 48K Memory, and an 80 column printer. Item M-52. Price \$250.00.

SYSTEMS ANALYST PLUS - Whether you're a novice computer student, teacher or principal, you will find this program most helpful. Even the advanced programmer should find these seventeen teaching sessions on programming useful for brushing up on the language and commands. For Apple II or Apple II Plus with Applesoft, one disk drive, and 32K Memory. Item M-40. Price \$69.95.

Call our toll free number for a
free catalog on professional,
business, accounting and
educational programs.

(800) 854-0561
In Ca. (800) 432-7257
Ext. 802 or write:

MONUMENT COMPUTER SERVICE

Village Data Center

P.O. Box 603
Joshua Tree, California 92252

```

2490 REM LINE CALLED FOURTH
2500 PRINT : PRINT "LINE CALLED FOURTH": GOTO 120
2990 REM LINE CALLED FVTH
3000 PRINT : PRINT "LINE CALLED FVTH": GOTO 150
3490 REM LINE CALLED SIXTH
3500 PRINT : PRINT "LINE CALLED SIXTH": GOTO 150
4980 REM
4990 REM LOAD IN MACHINE LANGUAGE PROGRAM
5000 LOW = 768:HIGH = 903
5010 OK = 1
5020 REM LOAD IN GROUP OF SIXTEEN
5030 FOR J = LOW TO HIGH STEP 16
5040 CHECK = 0
5050 FOR K = J TO J + 15
5060 READ IT
5070 CHECK = CHECK + IT
5080 NEXT K
5090 REM CHECK IF CHECKSUM OKAY
5100 READ SUM
5110 L$ = "OKAY": IF CHECK < > SUM THEN L$ = "BAD":OK = 0
5120 PRINT L$
5130 NEXT J
5140 IF OK = 0 THEN STOP
5150 REM THINGS ARE OKAY - LOAD INTO MEMORY
5160 RESTORE : FOR J = LOW TO HIGH STEP 16
5170 FOR K = J TO J + 15: READ IT: POKE K,IT: NEXT K
5180 READ IT: NEXT J
5190 PRINT "LOAD OKAY": PRINT : PRINT
5200 REM SET THE AMPERSAND VECTOR
5210 REM NOT NEEDED IF CALLED BY BRUN STATEMENT
5220 CALL 768: RETURN
6000 DATA 169,76,141,245,3,169,16,141,246
6010 DATA 3,169,3,141,247,3,96,1868
6020 DATA 201,176,240,13,201,171,240,41,201
6030 DATA 180,240,49,162,16,76,18,2225
6040 DATA 212,32,177,0,169,3,32,214,211
6050 DATA 165,185,72,165,184,72,165,2058
6060 DATA 118,72,165,117,72,169,176,72,32
6070 DATA 183,0,32,68,3,76,210,1565
6080 DATA 215,32,177,0,32,123,221,32,82
6090 DATA 231,76,65,217,32,177,0,1712
6100 DATA 32,248,230,72,201,176,240,13,201
6110 DATA 171,240,9,201,175,208,188,2605
6120 DATA 104,32,177,0,72,198,161,208,4
6130 DATA 104,76,16,3,165,161,72,1553
6140 DATA 32,177,0,32,123,221,32,82,231
6150 DATA 32,183,0,201,44,208,5,1603
6160 DATA 104,133,161,208,224,104,104,96,0,0,0,0,0,0,0,0,1134

```

©

Dealers — Reserve your copies of
COMPUTE!'s first Atari and PET/CBM books
 today. Call 919-275-9809 for ordering information.

Part II:

A Tape "EXEC" For Applesoft: Loading Machine Language Programs

Sherm Ostrowsky
Goleta, CA

Loading ML With BASIC

This has been an example of the simplest kind of EXEC file; it merely loads and runs a single ML program. Let's extend the procedure a bit more, now, and load both a ML program and an Applesoft program together. One of the most effective advanced programming tools has always been to combine higher level language (e.g., Applesoft) and lower level language (i.e., machine language) routines so that each does the jobs for which it is best suited. But it has long been a problem, much debated and written about in computing magazines, to get them both into the computer from external storage (i.e., cassette tape in this case).

Short ML routines can be included in DATA statements in your Applesoft program and POKE'd into memory by a READ - POKE loop. The Lam technique, using strings rather than DATA statements, has also been used to accomplish this. But for ML subroutines of any significant length, this process takes an excruciatingly long time. Some articles have suggested "hiding" long ML routines in front of or behind Applesoft programs by changing certain "pointers" in memory before saving and after loading, to fool Applesoft into believing that they are all parts of one long BASIC program. For one reason or another, none of these techniques has proven very satisfactory.

With the advent of disk systems, this problem was at least solved for disk owners. They just write an EXEC program that loads an Applesoft program and ML subroutines individually stored on the disk. The EXEC program and DOS know where to find them (on the disk) and where to put them (in memory). It is all done automatically. Very simple — if you have a disk system. If not ... well, until now you were just sort of out of luck.

Now we cassette users can do the same kind of thing. It takes longer to load, named files are not available, and a little more work is required to arrange everything on the tape and set up the EXEC file (i.e., the loader) to read them and put

them where they need to go, but this only has to be done once for any given set of cooperating programs. Thereafter, loading the whole group is just as simple as typing LOAD.

Let me give an example based on a previous article of mine "Clearing the Apple II Low-Resolution Graphics Screen," COMPUTE! #10. For those who may not have access to this issue, I'll give all the essential details as they are needed.

Consider the following short Applesoft program that simply calls a subroutine to fill the Low-Resolution screen with a random pattern of colors, asks you to select one of the sixteen low-res color numbers (0-15), then calls a ML subroutine which clears the screen to the selected color in an instantaneous flash. Here is the program:

**... load both a ML program
and an Applesoft program
together.**

```

10 REM FLASH-CLEAR DEMO
20 GOSUB 1000
30 VTAB 23
40 INPUT "SELECT COLOR (0-15):" ;C
50 COLOR=C
60 CALL 800
70 FOR PAUSE = 0 TO 2000: NEXT: GOTO 20
80 END
1000 GR
1010 FOR I=0 TO 39
1020 FOR J=0 TO 39
1030 COLOR=1 + INT (15 * RND (1))
1040 PLOT J,I
1050 NEXT J,I
1060 RETURN

```

Briefly, line 20 calls subroutine 1000 which fills the screen with random color squares. Line 30 positions the cursor in the text area below the graphics screen. Line 40 asks for your selection and line 50 sets it up to be used in the clearing operation which is performed when line 60 calls the ML subroutine which begins at location (decimal) 800. Line 80 pauses briefly and then loops around to try it all again.

In the original version, the flash-clear subroutine at 800 was stored as DATA within the main program and POKE'd into memory using a READ - POKE loop; it's short enough so that this procedure is really quite adequate. But, for the purpose of this demonstration, we will have the Exec-Loader read the ML program in from tape and put it into memory where it is supposed to be. To see how to create the total tape package, you'll have to get the ML program into memory first somehow. The easiest way is to use the Monitor. Do this first, before you enter either the Applesoft loader or the Applesoft demo program. Type CALL - 151, and when you see the asterisk prompt ("*") type:

```
320:A5 30 A0 78 20 2D 03 A0 50 20 3D 03
60 88 99 00 4 99 80 4 99 00 5 99 80 5 D0
F1 60 88 99 00 6 99 80 6 99 00 7 99 80
7 D0 F1 60 (return)
```

Do it exactly as written, with a space between each pair of digits. Just keep right on typing, past the ends of lines, without stopping until you reach the end. The ML program is now in its place in memory. But where we want it to be is on tape.

The order in which things have to go on the tape is this: first the Applesoft loader, then the ML subroutine, and finally the Applesoft demo program. The demo program has to come last because, after the Exec-Loader program (which I will present below) has executed a LOAD for an Applesoft program (here, the demo), it will automatically be deleted out of memory. It is a standard part of an Applesoft LOAD to clear out any pre-existing Applesoft programs first and, although this can be circumvented, there is no reason to go to the trouble of doing so in this case. So the demo must be loaded last because the loader will cease to exist in memory at that time.

This loader is an extension of the one shown before, but with most of the "bells-and-whistles" left off to make it shorter. Aside from changing the memory locations in string Y\$ to correspond to the present ML subroutine, the only other change made from the previous loader is the addition of a LOAD command for the demo program.

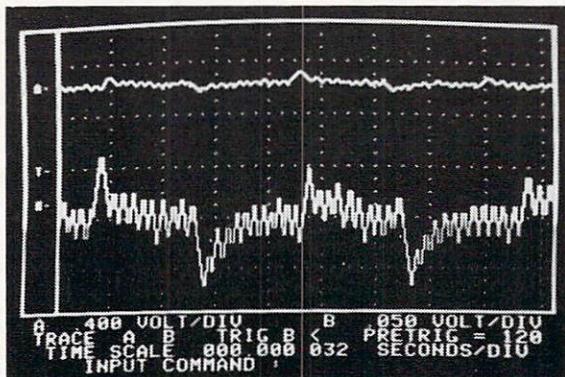
```
10 REM ML + AS LOADER
20 Y$="320.34CR D823G"
30 FOR I=1 TO LEN(Y$): POKE 511+I, ASC
(MID$(Y$,I,1)) + 128: NEXT
40 POKE 72,0: CALL -144
50 POKE 214,85
60 LOAD
70 END
```

This version has no unnecessary features. If there's a loading error, you'll find out about it when the system prints "ERR" on the screen. Since it takes only a short time to load these little programs, there is no need to give you a message so you'll know what is going on during the loading process.

Now here's the procedure, written down in the form of an algorithm: a series of listed steps to be followed one by one.

1. Make sure that the ML subroutine is in memory locations 320 through 34C, as indeed it will be if you typed it in using the Monitor as described above.
2. Go into Applesoft (from the Monitor, type CONTROL-C (return)), and type in the Loader program, as given above.
3. Type: POKE 82,128
4. Start your cassette recorder in RECORD mode and type SAVE (ret). When the loader has been saved, stop the tape, but *do not rewind*.
5. Back to the Monitor (CALL -151). Type: 320.34CW restart recorder in

DIGITAL STORAGE OSCILLOSCOPE INTERFACES



APPLESCOPE

Interface for the Apple II Computer

The APPLESCOPE system combines two high speed analog to digital converters and a digital control board with the high resolution graphics capabilities of the Apple II computer to create a digital storage oscilloscope. Signal trace parameters are entered through the keyboard to operational software provided in PROM on the DI control board.

- DC to 3.5 Mhz sample rate with 1024 byte buffer memory
- Pretrigger Viewing up to 1020 Samples
- Programmable Scale Select
- Continuous and Single Sweep Modes
- Single or Dual Channel Trace
- Greater than or less than trigger threshold detection

Price for the two board Applescope system \$595

*Dealer Inquiries Invited

Combine an Apple II or S100 based computer system with our interface circuit boards to create a digital storage oscilloscope at a fraction of the cost of other storage scopes.

The S100 interface provides an additional 1024 bytes of buffer memory in place of the PROM. The user must supply the graphics display and driving software. Price of the single board is \$495.

The SCOPEDRIVER is an advanced software package for the Applescope system. It provides expanded waveform manipulation and digital signal conditioning. The SCOPEDRIVER is available on 5 1/4" floppy disks for \$49.

For further information contact:

RC Electronics Inc.
7265 Tuolumne Street
Goleta, CA 93117
(805) 968-6614

Apple Authors:

COMPUTE! is looking for good applications articles on Apple.

RECORD mode, then press (return). Stop recorder when finished, but again do not rewind.

6. Back to Applesoft. Type NEW. Type in the demo program. SAVE it in the regular way.

That's it. To check it out, rewind the tape, turn your Apple off and back on (to make sure memory is cleared out), and LOAD the tape in the usual Applesoft manner. You'll hear five beeps before it finishes loading, but, in the end, it stops just the

**... we have just written
the tape equivalent of
an EXEC file which performs
the equivalent of a BLOAD.**

same as any regular Applesoft tape. You run the program by typing RUN.

Does this seem like a lot of trouble to go through just to load a short machine language subroutine along with an Applesoft program? Of course it is. But suppose the ML program were a lot longer. I have a "Print Using" subroutine that is over 1000 bytes long. Have you any idea how many DATA statements it would need to POKE all that into memory from within my calling program, and how long it would take to do it? The fact is that, before the method I have been demonstrating came along, there was no good way at all for a tape user to put long ML subroutines into his Applesoft programs. Only disk users could have that convenience, with their "BLOAD" and "EXEC" commands. Well, we have just written the tape equivalent of an EXEC file which performs the equivalent of a BLOAD. And that's far from all. The possibilities seem endless. I don't want this article to seem the same, so I'll mention just one more idea and then leave you to enjoy cooking up others on your own.

Protecting Programs In Memory

COMPUTE! #11 had an article (page 76) on resolving the memory conflicts between Applesoft programs and the locations of the two hi-res graphics screen memories. The problem is that a really long Applesoft program, starting at its usual location of \$0801 (which is decimal 2049) can easily grow to overflow into the first hi-res screen starting at \$2000 (decimal 8192), and some can even intrude into the second hi-res screen starting at \$4000. An equivalent problem can occur if you want to make use of the second page of lo-res graphics (did you know that there is a second page?) which unfortunately starts at \$0800 and thus always conflicts with an Applesoft program.

Among the solutions mentioned in the article, the one which seems to me to be the most flexible is to move the whole Applesoft program, variables and all, to a starting location above the memory region you want to protect from interference. For example, if you just want to use page two of lo-res graphics, it would suffice to move the program up so that it begins at \$0C01 (decimal 3073). If you want to use both hi-res graphics pages, on the other hand, you'd have to move the program all the way up to \$6001 (decimal 24566), assuming you even have that much memory to play around with.

As a matter of fact, you don't actually "move" an Applesoft program around in memory. Although this can be done, it would require doing some repair work on pointers and relinking the program lines which is too technical for most casual users to bother with. It isn't necessary. All you have to do is arrange to have the program go directly into the desired memory locations at the time it is being read in from tape. That is a much simpler procedure, requiring only a couple of POKEs from the keyboard before typing LOAD. Even so, that puts us right back into the situation we were in with ML programs: you can't just type LOAD — you have to refer to a set of written directions in order to get the program to load right. At least you do if your memory is as poor as mine is at recalling such details without notes. And there's another point: if the program is to be usable by a non-computerist, how would you instruct such a person in the loading procedure?

So, here's another job for the Tape-EXEC, alias a loader program. Let the loader do the POKEs for you. That way, once you have gone to a little extra trouble to set the tape up right to begin with, you (or anybody) can forever after just type LOAD and let the computer handle the details. If you think it likely that you might want to use the program more than once or twice, then the extra preparations are worth the trouble in the long run.

A loader for a single Applesoft program, to be entered into memory starting at (say) \$0C01, would look something like this:

```
10 REM HIGH MEMORY LOADER
20 POKE 104,12: POKE 3072,0
30 POKE 214,85
40 LOAD
50 END
```

The algorithm for preparing the loader-leader and tape is similar to the one given for the Applesoft/ML conjunction; just omit steps two and five.

If you want the program to load above hi-res page 1, just change line 20 to:

```
20 POKE 104,64: POKE 16384,0
```

If you want it to load above hi-res page 2, change line 20 to:

```
20 POKE 104,96: POKE 24576,0
```

Switching Cleanly From Text To Graphics

Brian Nakagawa
Fresno, CA

It is very distracting to watch the Apple II switch from TEXT to GRAPHICS mode or vice versa. Colored squares and grey lines appear briefly when switching from TEXT to LORES graphics while a screen full of inverse characters, usually @ signs, appear when switching from LORES graphics to TEXT. In going from TEXT to HIRES graphics, one sometimes sees the previous HIRES display flash on the screen then dissolve away. In most programs, the extra flash of graphics or characters is merely a distraction. However, to switch cleanly between TEXT and GRAPHICS mode would give the appearance of a more polished program.

This article will show the routines that switch cleanly from TEXT to LORES or HIRES graphics using Applesoft commands and machine level routines already available on the Apple II.

The commands given below can be typed in the immediate mode or run in a program.

TEXT To HIRES Graphics

The simplest way to turn on page 1 of HIRES graphics is to use the command HGR. This first turns the screen to that page then erases the graphics displayed. Type in the following sequence of commands to see this.

```
VTAB 24
HGR
HCOLOR=3
HPLOT 40,140 TO 240,60 TO 40,60 TO 240,140 TO
    140,20, TO 40,140
TEXT
HGR
```

Notice that when you typed in the last HGR the star reappeared briefly then was erased.

Now try these commands. (It is assumed that you are still in HIRES graphics.)

```
HPLOT 40,140 TO 240,60 TO 40,60 TO 240,140 TO
    140,20 TO 40,140
TEXT
POKE 230,32: CALL 62450: HGR
```

Notice that the screen went blank without the brief appearance by the star.

POKE 230,32 sets the HIRES page pointer to page one without changing the current screen display. CALL 62450 is a machine language routine in APPLESOFT that clears the HIRES page indicated by memory location 230. HGR then turns on page one of HIRES graphics.

HIRES page two can be switched to using similar commands. Use the above example and substitute "HGR2" for "HGR" and "POKE 230,64" for "POKE 230,32". Be aware that the text window at the bottom will not be seen.

Switching from HIRES graphics, page one or two, TEXT is easily accomplished typing in the "TEXT" command. If you wish to clear the text page first then use "HOME: TEXT".

TEXT To LORES Graphics

Fill the TEXT screen with text then type in the command "GR". The distracting display of grey lines and colored squares when switching from TEXT to LORES graphics can be avoided with the following commands. Fill the text screen with text before typing in the commands.

POKE 230,32: CALL 62450: HGR: CALL -1994: GR

If you wish to clear the text window at the bottom of the screen, type in "HOME" or add it to the end of the string of commands as follows:

**POKE 230,32: CALL 62450: HGR: CALL -1994:
 GR: HOME**

Notice that it is first necessary to clear HIRES page one and go into that page just as was done in the TEXT to HIRES discussion. CALL -1994 changes the text page to inverse @ signs and GR put the screen into LORES page one.

If you are still in LORES graphics type in "TEXT: HOME" which will return you to a clear TEXT page. Did you notice the flash of inverse @ signs? This does not happen all the time so it may be necessary for you to go back into LORES page one with the "GR" command then type in "TEXT: HOME" again.

To avoid this, type in the following commands:

**GR
 HOME: HGR: POKE 34,0: HOME: TEXT**

GR puts the screen into LORES page one, HOME then clears the text window at the bottom, HGR puts the screen into HIRES page one which is assumed to be clear, POKE 34,0 sets the top of the text window to the top of the screen, HOME clears the text page, and TEXT puts the screen into text mode.

Disadvantages

The code to switch from text to graphics takes more memory and executes slower. You may have noticed the pause when switching between TEXT and GRAPHICS. In a program that switches between TEXT and GRAPHICS often, one can put the switching code in a subroutine to save memory.

The additional code and slightly slower execu-

tion speed to switch cleanly is a very small price to pay for the more polished appearance of a program.

References

All of the above commands are documented in the *Applesoft Basic Programming Reference Manual*. Selected commands and the page number they appear on are listed below. POKE 230,32 and POKE 230,64 are documented as general use high resolution graphics locations on page 141. Decimal location 230 is equal to hexadecimal \$E6. CALL 62450 and CALL -1994 are on page 134 and POKE 34,0 is on page 29. ©

Interfacing The CCS 7710A Asynchronous Serial Card

Sam Bassett
San Francisco, CA

The following is a list of the connections needed to set up the DT127 to work with the California Computer Systems' 7710A Asynchronous Serial Interface Card for the Apple II:

Pin on the Male DB-25P Connector		DT127 25 pin Molex		
Color Pin	Name	Name	Pin	Recommended
3	RD ----->	RD ----->	1	No contact
6	DSR ----->	DSR ----->	2	Red
5	CTS ----->	CTS ----->	3	Green
20	DTR ----->	RTS	4	Brown
4	RTS ----->	DTR	5	Blue
2	TD< ----->	TD	6	White
1,7	GND< ----->	GND	7	Orange
			8	Black
			9-25	No Contact

The CCS Asynchronous Board is defined as a Data Communications Equipment (DCE) terminal, and the signals at its DB-25S (female) connector are defined in the same way that a modem's would be.

The CCS board transmits its *outgoing* signal on Pin 3 (RD). This must be connected to the DT-127's *incoming* signal connector on the CCS board — Pin 2 (TD).

So far so good — we have information signals being passed back and forth from the printer to the

Apple. There is a possible problem, however — the printer can only print so fast, and the Apple can generate and send characters much faster than the printer can print them. Most printers run from 10 to 55 characters per second, which is equivalent to 100 to 550 baud. The Apple can transmit at well over 20,000 baud — 2,000 characters per second. The DT127 has a 625 character buffer built in (expandable to 16K), but if the Apple is sending characters faster than the NEC can print (55 cps), the buffer gets full, characters are lost, and weird things happen to the text that was to be printed.

All is not lost, however — the definition of RS-232 includes several hardware "handshaking" signals, and the CCS 7710A (unlike the Apple Inc. Serial and Intelligent Interface Boards) is set up to recognize and use these signals. When the Printer signals that it has enough characters in its buffer, the CCS board will stop sending characters until the printer sends an "OK" signal.

The DT-127 signals that it is OK to send characters to its input on Pin 2 (RD) by making Pin 6 (Data Terminal Ready — DTR) on the Molex connector high — +3 to +12 volts. The CCS board monitors Pin 4 (Request To Send — RTS) to see if the peripheral is ready to receive another character. If Pin 4 goes Low (-3 to -12 volts), the 7710A will *not* send another character until it goes High again.

The CCS 7710A board signals the peripheral that it can accept a character through its Pin 2 (TD) by making its Pin 5 (Clear To Send — CTS) High. The DT-127 watches its Pin 4 (CTS) to see if it is OK to send a message to the computer. If this signal goes Low, it will not send any characters until it goes High again.

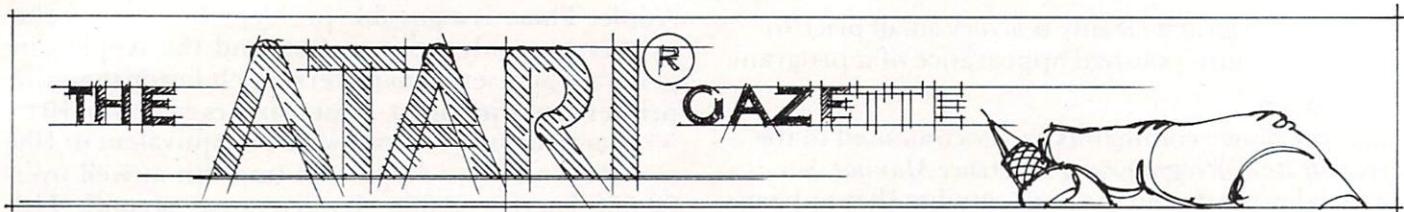
Pins 1 & 7 on the RS-232 connector are connected to Ground, so Pin 8 of the Molex must be connected to one or both of them.

The last two signals are not absolutely necessary, but it is well to hook them up so that nothing is left hanging, or unconnected.

The DT-127's Pin 5 (Request To Send — RTS) is not implemented — it should be High at all times. It should be connected to the CCS board's Pin 20 (Data Terminal Ready — DTR), which tells the Apple: "Yeah, boss, there is somebody out there."

The CCS board's Pin 8 is also permanently at +12 volts, so it should be left unconnected, so that it does not accidentally short to ground and shut down the Apple's power. Pins 9 to 25 (except 20) are not implemented on the CCS board, so they should not be connected to anything.

The CCS board can transmit at any baud rate from 50 to 19,200, and matches the DT-127 perfectly — be sure to check Page 2-1 in the CCS manual for the correct Baud Rate Selector Switch settings, and Page 5 of the DT-127 manual, so that the baud rates being used by both your Apple and your Sellum are the same. ©



Cassette Boot-Tape Generation From DOS 2.0S Binary-Load File

Raymond W. Polone
SYZYGY Microware of Texas

The binary-load file is a very easy-to-use method of accessing 6502 machine code instructions for ATARI users. The Model CXL4003 ASSEMBLER EDITOR User's Manual provides a method, using BASIC, to enter object code from a cassette tape. This article introduces a BASIC program technique that permits a user to generate a short-inter-record gap bootable cassette tape from a binary-load file. Such a tape then provides the option of using a language cartridge (i.e. BASIC or ASSEMBLER) or booting in the program with no cartridge — and no DOS!

Program 1 is the ASSEMBLER/EDITOR text listing of an appropriate handler-record that must be written on the bootable tape. The initial byte of zero at statement 40 is a flag byte used by the OS in the cassette boot operation. I have assembled the second byte as a value one, but the BASIC program must provide the correct value. This byte is a count of 128 byte records in the boot process (i.e. a value of 1 indicates the boot is 128 bytes). A value of zero indicates the boot is 128*256 or 32,768 bytes. The BASIC program in Program 2 generates the correct SIZE value in statement 26. The object code of Program 1 is contained in DATA statement 56 of the BASIC program. (The BASIC program reads the DATA into BUF\$ at statement 2.) The correct 128 count is then saved in BUF\$ at statement 27.

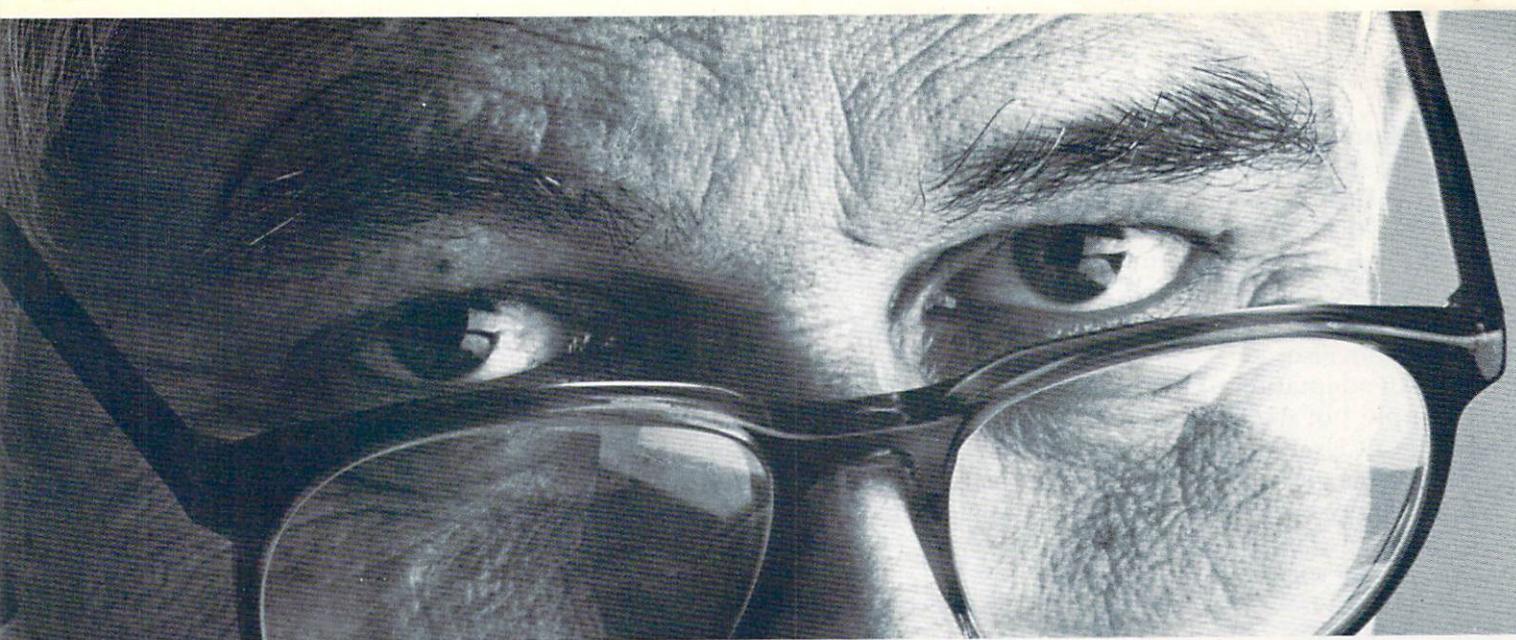
The BASIC program must also provide the correct cassette boot load address in the value at statement 50 of Program 1. This BOOT value is calculated in statement 9 after the program has detected the two flag bytes of 255 (\$FF) in the binary-load file. BUF\$ is updated at statement 21

(the length of the boot-handler is subtracted from the binary-load file RAM location — this means that the boot-handler is appended in RAM at the beginning of the binary-load data).

The COLDSTART address or binary-load file-run address is provided to the value at statement 60 of the assembler routine by the BASIC program at statement 25 if the binary-load file is not load-and-go (no RUN-address appended to the binary-load file in locations \$2E0 and \$2E1). The user is prompted to enter the decimal value in statement 22. \$A000 entered as decimal 40960 will result in the BASIC or ASSEMBLER cartridge gaining control (they must be resident, of course) following the cassette boot. The binary-load INIT address in \$2E2 and \$2E3 are not supported in this BASIC program, however, if the RUN-address has been appended to the file — that address will be used in statement 45 (RAY is a switch that indicates RUN-address has been found). The binary-load file must be a series of increasing RAM addresses! If there is a gap of addresses, the cassette boot will include the required block of zero RAM (ATARI hearts). (It may be desirable to DIMension BUF\$ as the last variable in statement 1 to reduce the possibility that RAM used in the cassette put-character XIO operation will write extraneous data.) The only exception is the RUN-address which will not be included in the RAM block. (This cassette boot is not multistage.)

The remainder of Program 1 is the routine that will get control as a result of the cassette boot (POWER-ON with START depressed). BOOT? at RAM location 9 is set to 2 to indicate the cassette vector at RAM locations 2 and 3 is to be used on a SYSTEM-RESET. COLDSTART at RAM location \$244 (decimal 580) is set to zero so that a SYSTEM-RESET will not result in a re-boot. The OS cassette-boot firmware stored the RUN-address at RAM vector locations \$C (12) and \$D (13). The reader may elect to modify the cassette SYSTEM-RESET vector to point to some WARM-START location or use the DOS vector at \$A (10) and \$B (11) by setting RAM location 9 to value 1. Additional features can be implemented by continuing the boot process to DOS by appropriate jumps to an OS location such as DOBOOT at \$F2ED (62189).

DATA statement 57 in the BASIC program is the USR 6502 machine language routine that is used in statement 55. The ATARI IOCB use is adapted from the INTERFACE MODULE Opera-



TAKE A HARD LOOK AT OUR SOFTWARE.

Introducing CYBERSOFT™ custom ATARI® programs. The Grand Masters of programming at a mail order price.

Now that you own ATARI®, the finest, most versatile, most powerful home computer on the market, you should have the software to make your ATARI sit up and really function.

We have the "best of the best" programs from the Grand Masters of micro-computer software: Automated Simulations, Crystal, Swifty Software, Adventure International, Datasoft, Personal Software, and Dynacomp. All sold by mail. And, with the CYBERSOFT ironclad guarantee*.

Space Chase (Swifty Software) 16K Nifty eye-hand coordination tests... If you clear one galaxy of "planets" and avoid destruction at the hands of an alien ship you are rewarded by an attack by two aliens and then three. Game keeps score and displays high score. Colorful graphics and good playing. Cassette \$14.95

Fastgammon™ (Quality Software) 8K The best of the computer backgammon games. You can repeat games with the same dice rolls to try different strategies. You roll dice or let computer roll for you. This machine language program challenges experienced and beginners alike. Underutilizes ATARI® graphics but playing quality more than makes up. Cassette \$19.95

Invasion Orion™ (Automated Simulations) 32K You are the fleet commander pitted against the Klaatu somewhere in space. You play the leading role in a number of carefully crafted scenarios. This game takes more skill than luck in order to be successful. The documentation is superb. Create your own scenarios. Excellent graphics, good sound. Cassette \$24.95

Rescue at Rigel (Automated Simulations) 32K Ten people from the Orion colony at Ultima Thule (including your favorite female) have been captured. Your mother ship must leave in 60 minutes. As "Sudden" Smith, you must find and release them, but it won't be easy in the maze of corridors, rooms and levels. Oh, by the way, the place is crawling with bad guys. Cassette \$29.95

Sands of Mars (Crystal) 40K This is the one gamesters are all talking about. A two diskette game, with diskette one putting you in command of the "Starship Herman". You must stock her, select her crew, command the launch and negotiate your way through the hazards of the Universe. Diskette two holds your adventures on the Sands of Mars. The game is saveable. Two Diskettes \$39.95

Star Trek 3.5 (Adventure International) 24K Lots of color, lots of action as you hyperwarp through the quadrants in your search for Klingons. This program will satisfy the "trekkie" in us all. Cassette \$14.95

Text Wizard™ (Datasoft) 32K ATARI owners have waited a long time for a high quality, full blown word processor. Text Wizard was well worth the wait. This easy-to-use and comparatively inexpensive program has received raves from user groups across the country. This program fully utilizes the unique ATARI keyboard and ease of cursor movement. Justifies right, left and center. Pagination. Word search and substitute. Diskette and ATARI 825, Centronics 737 or Epson MX-80 printer. \$99.95

Adventureland (Adventure International) 24K Designed for the novice at adventuring and a great way to get hooked on the world of adventure. As you make your way through an enchanted world you will encounter wild animals, spell-ridden critters and more. Your task is to avoid the perils as you try to collect the 13 lost treasures. Cassette \$14.95

Mission Impossible (Adventure International) 24K Another adventure from the great Scott Adams. Beginning "Good morning, your mission is...", your task is to save a nuclear reactor from destruction. No magic help in this one. Addiction is possible. Cassette \$14.95

Bridge 2.0 (Dynacomp) 24K Now you can practice your bridge at home before you have to embarrass yourself at the neighbors. Bridge 2.0 bids (Goren) and plays both contract and duplicate bridge. It even doubles if you get carried away with your bidding. No graphics, but clearly arranged format makes playing easy. Cassette \$17.95

Visicalc™ (Personal Software) 32K If you use your ATARI for any business purpose or for your personal finances, you will want Visicalc. It probably sold more computers than any program other than Star Raiders. Visicalc creates a very large accountants ledger pad upon which you write with your ATARI. The fundamental difference is, if you change any figure(s) the balance of the figures are automatically adjusted. Extensive documentation outlines the full features of this fantastic business tool. Diskette \$199.95

Nominoes Jigsaw (Dynacomp) 24K A 60 piece jigsaw puzzle you complete on your screen. Three levels of difficulty to confound you. Scoring is a function of how many tries and how difficult the puzzle. Cassette \$17.95

cybersoft

tor's Manual C015953 and modified for cassette so that the short-inter-record gap tape can be written. BASIC USR function is explained in detail in BASIC REFERENCE MANUAL C015307 along with some information on XIO PUT CHARACTERS. The C016555 User's Manual is of tremendous assistance in understanding the ATARI operation, also.

An adaptation of the Exclusive-Or function in Example 1 of Appendix 9 in the ASSEMBLER EDITOR User's Manual is used to illustrate the BASIC program of Program 2 in this article. The following program will generate a binary load-and-go file that will perform the logic function.

```

10 OPEN#1,8,0,"D:LOADNGO.BIN"
20 FOR I=1 TO 30:READ X:PUT#1,X:NEXT I
30 CLOSE#1
40 END
50 DATA 255,255,0,6,17,6
60 DATA 104,104,133,205,104,133,204,104,69
70 DATA 205,133,213,104,69,204,133,212,96
80 DATA 224,2,225,2,0,160

```

The DATA statement 50 is binary-load information

Program 1. Cassette boot from binary load file assembler/editor text listing.

0000	20	.PAGE
0000	30	*= \$2100
2100 0001	40 HERE	.WORD \$100
2102 0021	50	.WORD HERE
2104 0021	60	.WORD HERE
2106 A93C	70	LDA #\$3C
2108 BD02D3	80	STA PACTL
210B A902	90	LDA #\$2
210D 8509	0100	STA \$9
210F A900	0110	LDA #0
2111 8D4402	0120	STA COLDST
2114 A50C	0130	LDA \$C
2116 8502	0140	STA \$2
2118 A50D	0150	LDA \$D
211A 8503	0160	STA \$3
211C 6C0000	0170	JMP (\$C)
D302	0180 PACTL =	\$D302
0244	0190 COLDST =	\$244

;BASIC PROVIDES CASSETTE BOOT ADDRESS
;ZERO FLAG - BASIC PROVIDES 128 BLOCK
;CASSETTE BOOT LOAD ADDRESS
;BASIC PROVIDES COLDSTART ADDRESS
;STOP CASSETTE

;INDICATE CASSETTE BOOT
;ENABLE CASSETTE SYSTEM RESET @ BOOT?

;DISABLE COLDSTART
;OS SAVED COLDSTART DOSINI
;PREPARE SYSTEM RESET

Program 2.

```

1 DIM RSTART$(7),YN$(3),NAME$(15):CORE=INT(0.89*FRE(0)):DIM BUF$(CORE),A$(114):AY=0
2 FOR I=1 TO 31:READ X:BUF$(I)=CHR$(X):NEXT I
3 GRAPHICS 0:A$="DOS 2.05 BINARY-LOAD-DISK TO BOOT-TAPE by R. Polone (SYZYGY MIC
ROWARE OF TEXAS) REV1.0 1981":GOSUB 35
4 IOCB=16*2:FOR I=1 TO 7:READ X:RSTART$(I)=CHR$(X):NEXT I
5 TRAP 5:A$="PLEASE ENTER BINARY LOAD FILE NAME i.e. D1:LOADNGO.BIN (RETURN)":GOSUB 35:INPUT NAME$:TRAP 40000
6 TRAP 7:OPEN #2,4,0,NAME$:GOTO 8
7 ? :? "ERROR ";PEEK(195);" FILE ";CHR$(34):NAME$:CHR$(34):CLOSE #2:END

```

that indicates the program will load at RAM location \$600 (1536). Statements 60 and 70 are the BASIC USR function machine language program. Statement 80 is the RUN-address information for the load-and-go \$A000 RUN-address for BASIC or ASSEMBLER cartridge. It is only necessary to RUN this program to generate an input file for the BASIC program in Program 2.

If the resulting cassette-boot tape is used with the BASIC cartridge, the familiar READY will appear on the screen after a successful cassette-boot "START, POWER-ON, RETURN" sequence. A BASIC direct POLONE = USR(1536,65535,0) :?POLONE and RETURN will provide the response "65535". If the cassette-boot sequence is used with the ASSEMBLER cartridge, it will be possible to disassemble the machine language code that was booted-in around \$600 using the DEBUGGER. This illustration is only a very elementary use of the cassette-boot tape that can be generated from a binary-load file.

```

8 TRAP 40000:GET #2,X:GET #2,Y:IF X>255 OR Y>255 THEN A$="FILE NOT BINARY SAVE FORMAT":GOSUB 35:CLOSE #2:END
9 GET #2,X:GET #2,Y:FIRST=X+256*Y:BOOT=FIRST-LEN(BUF$):GET #2,X:GET #2,Y:LAST=X+256*Y:IF FIRST=736 AND LAST=737 THEN GOTO 0 43
10 FOR I=FIRST TO LAST:GET #2,X:BUF$(LEN(BUF$)+1)=CHR$(X):NEXT I
11 TRAP 18:GET #2,X:GET #2,Y:FIRSTA=X+256*Y:IF FIRSTA=65535 THEN GOTO 11
12 IF FIRSTA=LAST AND FIRSTA>736 THEN GOTO 17
13 IF FIRSTA=736 THEN GET #2,X:GET #2,Y:LASTA=X+256*Y:IF LASTA=737 THEN GOTO 44
14 IF FIRSTA=736 THEN GOTO 17

```



Star Warrior: Slay the Dictator and Save the Civilized People

You owe yourself some fun time and you have just loaded the new **Star Warrior** into your computer. Suddenly, you are one of the Furies ... and retribution is your business.

The Interstellar Union of Civilized People has been annexed by a soul-crushing dictator ship. You have been given the mission to assassinate the military governor and then destroy the installation. That's Scenario 2.

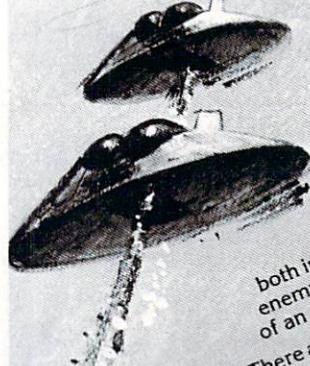
In Scenario 1, you are on a diversionary mission for the assassination attempt. You want to do as much damage to the enemy units as possible.

The terrain is dangerous and difficult; the enemy forces are powerful and varied. (You may not see the enemy even when you are attacked by an invisible enemy.) There is always the chance

of two scenarios and five levels of difficulty... level five times for Scenario 2; you play until you are killed. But you can even set a fixed playing time in Scenario 1.

You have the choice of suits and equipment, and of movement, combat and special commands.

In other words, like all Epyx games, there are enough variations in the game so that you will never tire of playing. Each game is different and fresh. You will never get bored playing the game. Not in your or your computer's lifetime.



Star Warrior. Another bug-free, fantastic game from Epyx. With the unique Epyx life-time warranty: If anything happens to your cassette or disk at any time and for any reason, send it back with just \$5.00 for shipping and handling and we will send you a brand new one.

(Of course, there is also our 30-day unconditional guarantee: if your Epyx game has any defect whatsoever; if your Epyx game has any reason, return it to us or your dealer and we will replace it free. No questions asked.)

Visit your dealer now and pick up **Star Warrior** in its good-looking, protective box with one of the best instruction books you ever read. Now available on disk for the Apple II (48K RAM (32K RAM), and on cassette for the TRS-80 (Level II, 16K) and the Atari (32K). Only

\$39.95 on disk or cassette.

If your dealer is out of stock and you can't wait, order directly from Automated Simulations. \$39.95 plus \$2.00 for shipping and handling (and sales tax if you are in California).

Enclose your check. Or if you order by Visa or MasterCard, use our toll-free phones: In the United States: operator 861 (800) 824-7888; In California: operator 861 (800) 852-7777; In Hawaii and Alaska: operator 861 (800) 824-7919.

Order today. You and your computer deserve the fun.

AUTOMATED SIMULATIONS, INC.
Dept. SW4, P.O. Box 4247
1988 Leghorn Street
Mountain View, CA 94040

COMPUTER
GAMES
THINKERS
PLAY
EDYX

```

15 FIRST=FIRSTA:X=FIRST-LAST-1:Y=LEN(BUF$)
16 IF X<0 THEN BUF$(Y+X,Y+X)=CHR$(0)
17 GET #2,X:GET #2,Y:LAST=X+256:Y:X=LAST
-FIRST:IF X>0 AND LEN(BUF$)+X<=CORE THE
N GOTO 10
18 TRAP 40000:A$="LOGICAL RECORD ERROR!""
:GOSUB 35:CLOSE #2:END
19 IF PEEK(195)=136 THEN TRAP 40000:GOTO
21
20 ? CHR$(155); " ERROR "; PEEK(195):END
21 CLOSE #2:X=INT(BOOT/256):Y=BOOT-256*X
:BUF$(3,3)=CHR$(Y):BUF$(4,4)=CHR$(X):IF
RAY=255 THEN GOTO 26
22 TRAP 22:A$="BINARY FILE IS NOT LOAD-A
ND-GO (NO RUN-ADDRESS APPENDED TO FILE)!"
PLEASE ENTER DECIMAL-ADDRESS":GOSUB 35
23 A$="#$A000 HEX IS 40960 DECIMAL.":GOSU
B 35:INPUT AD
24 TRAP 40000:IF AD<0 OR AD>65534 THEN G
OTO 22
25 X=INT(AD/256):Y=AD-256*X:BUF$(5,5)=CH
R$(Y):BUF$(6,6)=CHR$(X)
26 SIZE=INT(LEN(BUF$)/128):IF SIZE*128<>
LEN(BUF$) THEN SIZE=SIZE+1
27 BUF$(2,2)=CHR$(SIZE)
28 A$="WRITE PREPARE BOOT TAPE! BEEPS R
EQUIRE RETURN":GOSUB 35
29 AUX2=128:SI0=11:RW=8:LETH=INT(LEN(BU
F$)/128)*128+128:BUF=ADR(BUF$):GOSUB 46:
CLOSE #2
30 TRAP 30:A$=" ANOTHER COPY OF BOOT TAP
E? Y N RETURN":GOSUB 35:INPUT YN$:IF
YN$(1,1)>"Y" AND YN$(1,1)>"N" THEN GOT
O 30
31 TRAP 40000:IF YN$(1,1)="Y" THEN GOTO
28
32 TRAP 32:A$="ANOTHER BINARY DISK FILE?
Y N RETURN":GOSUB 35:INPUT YN$:IF YN
$(1,1)>"Y" AND YN$(1,1)>"N" THEN GOTO
32
33 TRAP 40000:IF YN$(1,1)="Y" THEN RUN
34 END
35 X=PEEK(83)-PEEK(82)+1:I=X+1:Y=0:IF LE
NK(A$)<1 THEN RETURN
36 IF LEN(A$)=X THEN ? A$:A$="":POKE 84,
PEEK(84)-1:RETURN
37 IF LEN(A$)>X THEN ? A$:A$="":RETURN
38 YN$=A$(I,I):IF YN$=" " OR YN$=CHR$(15
5) THEN I=I-1:? A$(1,I):A$=A$(I+2,LEN(A$))
:Y=255
39 IF Y=255 AND I=X THEN POKE 84,PEEK(84
)-1:GOTO 35
40 IF Y=255 THEN GOTO 35
41 I=I-1:IF I=0 THEN ? A$(1,X):A$=A$(X+1
,LEN(A$)):GOTO 35

```

```

42 GOTO 37
43 GOSUB 45:GOTO 9
44 GOSUB 45:GOTO 11
45 GET #2,X:BUF$(5,5)=CHR$(X):GET #2,X:B
UF$(6,6)=CHR$(X):RAY=255:RETURN
46 IF RW=8 THEN TRAP 47:LPRINT
47 TRAP 40000:OPEN #2,RW,AUX2,"C:"
48 POKE 832+10CB+2,SI0
49 POKE 832+10CB+4,BUF-(INT(BUF/256)*256
)
50 POKE 832+10CB+5,INT(BUF/256)
51 POKE 832+10CB+8,LETH-(INT(LETH/256)
)*256)
52 POKE 832+10CB+9,INT(LETH/256)
53 POKE 832+10CB+10,RW
54 POKE 832+10CB+11,AUX2
55 RSTART=ADR(RSTART$):POLONE=USR(RSTART
,I0CB):RETURN
56 DATA 0,1,0,33,0,33,169,60,141,2,211,1
69,2,133,9,169,0,141,60,2,165,12,133,2,1
65,13,133,3,108,12,0
57 DATA 104,104,104,170,76,86,228
58 REM
59 REM - FIGURE 2. BASIC PROGRAM
TO GENERATE CASSETTE BOOT
60 REM - FROM DOS 2.05
BINAY LOAD FILE

```

©



CAPTIVITY
the most advanced maze game available to the
ATARI® owner

A new game by Craig Patchett which uses machine language routines, 5-color, high-resolution graphics and sound effects.

The player's goal is to guide an imaginary robot through and out of a 3-dimensional maze.

20 game variations insure countless hours of enjoyment.

CAPTIVITY can be used with any ATARI® computer with at least 24K. It is available in cassette format only. Price is \$24.95 plus \$2.00 shipping and handling.

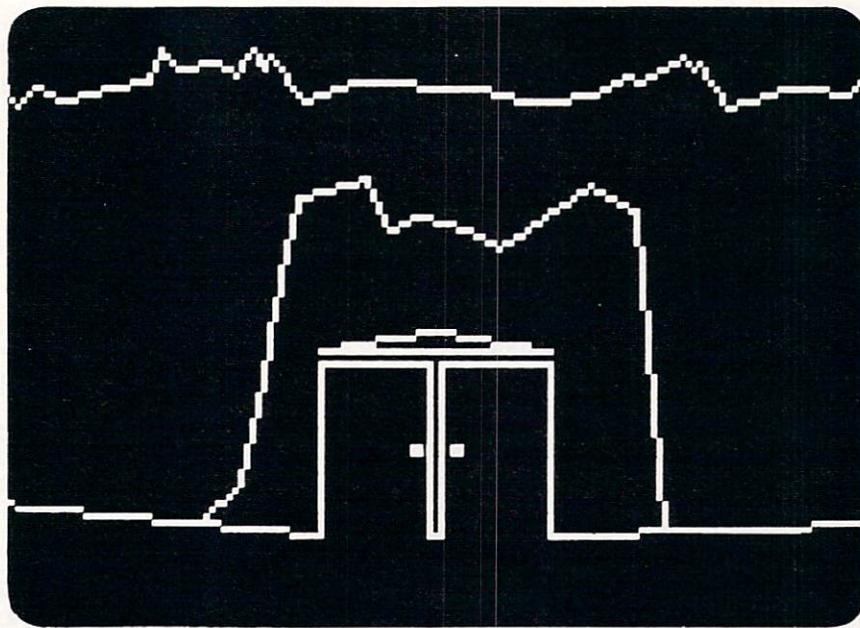
Available at fine computer stores or write us directly.



Program Design, Inc. 11 Idar Court Greenwich, CT 06830
203-661-8799

ATARI® is the registered trademark of ATARI, Inc.

AND NOW BEHOLD THE ENTRANCE TO THE PLACE KNOWN AS DEVIL DWELL!



COMPUTER AGE SOFTWARE

CA001 "Atari Epson Screen Dump" is a screen dump program that dumps a screen image (up to GR.7) to the Epson proportionally.

CA003 "Atar-Renum" is a general utility that will renumber any tokenized BASIC program that is co-resident in RAM. Requires only 3565 bytes of RAM.

CA004 "InfoFile" is a program designed to act as an electronic file cabinet. A "dynamic keyboard" moves the user quickly through this menu driven program. This is a "fast" database program. Use it to create, add, delete, edit, print, selectively search, and store your custom files. All files can be secured w/ code.

CA005 "Binary Load Cassette to Disk" is a utility that will take binary load cassette files like SPACE INVADERS (TM) and allow their transfer to disk.

CA006 "Ork Attack" has been renamed previous to release as "DEVIL DWELL." This adventure program is not easily beaten, has good graphics, and an excellent user dialogue.

CA007 Our long awaited "Smart Terminal Emulator Program" has also had a name change. We are very happy to announce that "DOWNLOADER" is now available. This fine piece of software allows you to download information to: Disk, Cassette, or Printer.

SWEDE 1 is a package of four programs (3-D, LUNAR LANDER, ALIEN ATTACK, and SPACE BATTLE) which is meant to be studied as well as enjoyed. It covers mainly the mysterious world of Player/Missile Graphics. By studying the programs you will learn how to smoothly move an object, such as a space capsule, horizontally, vertically, and diagonally. You will also learn how to make the player fire and rotate 360 degrees. Also included are sections on the Cursor, the ESCape key and conversions of other BASICs into Atari BASIC.

COMPUTER AGE SOFTWARE

9433 GEORGIA AVE.
SILVER SPRING, MD 20910
(301) 588-6565

Atari is a registered trademark of Atari, Inc.

Beware The RAMTOP Dragon

K W. Harms
Danville, CA

You've just had a brilliant idea for a program which requires some protected memory. Perhaps a special display list or character set is needed, or maybe a direct access memory "file." This article explains how to set aside that memory so that nothing will fiddle with it. Further, we'll reveal the generally unknown habits of the RAMTOP Dragon and show you three ways to make sure he doesn't gobble up your data.

The Atari offers a simple way to control how memory is internally managed by the operating system. The *Atari Connection* (Premier Issue) discussed "moving" the top memory boundary. Jim Clark in **COMPUTE! #14** showed how to move the lower boundary. Both methods protect memory from BASIC programs.

The map gives a very simple picture of Atari's memory management. Fixed memory boundaries are presented in decimal "addresses," but boundaries which vary according to the amount of memory in your machine or the program loaded at a particular time are given names such as "ramtop." The 400 and 800 both use the same system.

When you turn on the Atari with a BASIC cartridge, it takes a few seconds before "READY" to check out the machine and enter values for the boundaries into specific locations. PEEK allows you to look at those values. For instance, the value for RAMTOP is stored in address 106. The instruction "? PEEK(106)" will tell you where the Atari thinks the end of RAM is. Appendix I of the *Basic Reference Manual* explains that the value in 106 is in "pages" of 256 bytes. Multiplying number of pages times 256 gives the last address BASIC thinks it can use (e.g., a PEEK(106) of "32" equals an address of 8192 or "8K").

The 400/800 always places the display list and display data immediately below RAMTOP. If you alter the value in RAMTOP, the Atari will push the display list and display data "downward" in RAM. This reduces the space available for your program, but leaves free RAM above the new (fake) RAMTOP. Since the Atari doesn't know about this space, it doesn't use it, usually. This is the space usually considered "reserved" for you.

Program 1 shows how to lower RAMTOP by 4 pages (1024 bytes). Remember to issue a GRAPH-

ICS command immediately after moving RAMTOP so that the display list and data are moved below the new RAMTOP. Since line 60 will clear the screen, write down the old amount of free RAM and RAMTOP. Comparing them to the new numbers from lines 80 and 90 will show that RAMTOP is now lower and that less space is available for programs. That extra memory is now above RAMTOP and "reserved" for your exclusive use. RAMTOP is reset only by the RESET switch (and powering down/up), so that successively RUNning Program 1 will keep lowering RAMTOP until you run out of memory.

Program 1.

```

10 ? "FREE RAM = ";FRE(0)
20 RAMTOP=PEEK(106):? RAMTOP= ";"RAMTOP
;" PAGES":? "LAST ADDRESS = ";RAMTOP*256
30 FOR W=1 TO 1000:NEXT W
40 SMALLRAM=RAMTOP-4
50 POKE 106,SMALLRAM
60 GRAPHICS 0
70 RAMTOP = PEEK(106)
80 ? "NEW FREE RAM = ";FRE(0)
90 ? "NEW RAMTOP = ";"RAMTOP:" PAGES":
? "LAST ADDRESS = ";RAMTOP*256
100 ? "RESERVED MEMORY BEGINS AT ";
RAMTOP*256 + 1

```

Although others have described ways to use the reserved space, they have not warned you about the RAMTOP Dragon who will periodically visit your reserved RAM and gobble up memory. Extensive field observations have revealed that Dragon visits upper memory on three occasions:

1. A GRAPHICS command clears the visible screen and also the first 64 bytes above RAMTOP.
2. A CLEAR command (or "PRINT CHR\$(125)") clears the first 64 bytes above RAMTOP.
3. Scrolling the *text window* of a graphic mode 3 to 8 screen clears up to 800 bytes above RAMTOP.

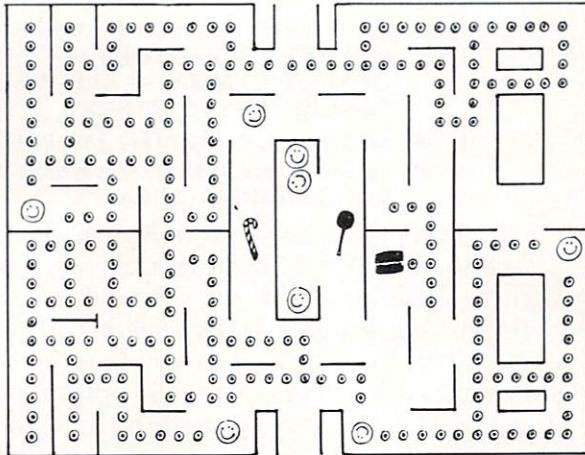
Program 2 lets you play with the RAMTOP dragon. Lines 100 to 140 move down RAMTOP and reset the display list and data. Answer "NO" for all except the first pass or the program will lower RAMTOP each time until you are out of memory.

After an initial questioning, the next section (lines 200 to 290 first turns off the "direct memory access" for the ANTIC processor so that the program will operate faster (see **COMPUTE! #11**). It then fills the 900 bytes after RAMTOP with a sequence of values between 1 and 255. Note that the values will remain there as long as there's power to the CPU (and nothing clears them). Therefore, it's not necessary to repeat this step on subsequent RUNs.

The "Choose Action" section (lines 300 to 340) GOSUBs to the three major program sections.

ON-LINE systems

Presents



For The ATARI 400/800

This arcade game takes you to the candy store for a wild game of tag with some of the rowdiest playmates you'll find anywhere. If you can eat all the sweets, the bratty kids will stop bothering you and after a quick stop and a brushing of the teeth, it's off to the store for another day of sweets and tag.

- Full Color Hi-Res Graphics
- Automatically Escalated Skill Level
- Quick Moving Animation

Jaw Breaker runs on any ATARI 400/800 with at least 24K of memory and is available now for \$29.95 on disk from your local computer store or you may order directly from us.

ORDERS MAY BE CHECK, VISA, MASTERCHARGE OR C.O.D.

DEALER INQUIRIES INVITED

ON-LINE SYSTEMS — 36575 Mudge Ranch Road — Coarsegold, CA 93614 — 209-683-6858

Santa Cruz Educational Software * Tricky Tutorials * Santa Cruz Educational Software * Tricky Tutorials * Santa Cruz Educational Software * Tricky Tutorials *

ATARI™ GRAPHICS MADE EASY? YES?

FINALLY — SOMEONE HAS WRITTEN A SERIES OF PROGRAMS THAT DO ALL THE DIFFICULT CALCULATIONS FOR YOU WHILE DEMONSTRATING THE SPECIAL "TRICKS" THAT THE ATARI IS CAPABLE OF

Santa Cruz Educational Software * Tricky Tutorials * Santa Cruz Educational Software * Tricky Tutorials *

TRICKY TUTORIALS(tm)

#1: DISPLAY LISTS — This program teaches you how to alter the program in the ATARI that controls the format of the screen. For example: when you say graphics 8 the machine responds with a large graphics 8 area at the top of the screen and a small text area at the bottom. Now, you will be able to mix the various modes on the screen at the same time. Just think how nice your programs could look with a mix of large and small text, and both high and low resolution graphics. This program has many examples plus does all of the difficult calculations!

#2: HORIZONTAL/VERTICAL SCROLLING — The information you put on the screen, either graphics or text, can be moved up, down or sideways. This can make for some nice effects. You could move only the text on the bottom half of the screen or perhaps create a map and then move smoothly over it by using the joystick.

#3: PAGE FLIPPING — Normally you have to redraw the screen every time you change the picture or text. Now you can learn how to have the computer draw the next page you want to see while you are still looking at the previous page, then flip to it instantly. You won't see it being drawn, so a complicated picture can seem to just appear. Depending on your memory size and how complicated the picture, you could flip between many pages, thus allowing animation or other special effects with your text.

#4: BASICS OF ANIMATION — Shows you how to animate simple shapes using the PRINT and PLOT commands, and also has a nice little PLAYER/MISSILE Graphics demo to learn. This would be an excellent way to start making your programs come alive on the screen.

#5: PLAYER MISSILE GRAPHICS — This complex subject will be demonstrated by starting with simple examples, and building up to a complete game and also an animated business chart on multiple pages! As always, the computer does most of the calculations. Ready Nov. 1981. Requires 32 K disk or tape and costs 29.95 (extensive manual included)

Tricky Tutorials (except #5) require 16k memory for cassette orders and 24k for disk. The price is \$14.95 each. You may order 1,2,3, & 4 for \$49.95!

MASTER MEMORY MAP(tm) — is really the key to using the ATARI's capabilities. We start out by explaining how to PEEK and POKE values into memory so that even new programmers can use this. Then: we give you over 15 pages of the memory locations that are the most useful. The information is condensed from both the ATARI's Operating System Manual and various articles and programs. It is, of course, useful even for experienced programmers as a reference. Also, we highly suggest that dealers offer this Memory Map to customers who request to be told how to use the power of the machine. We guarantee it will answer many of the questions you have about the machine. **\$5.95**

THE GRAPHICS MACHINE!! — Turn your computer into an incredible graphics tool with advanced commands like circle, box, fill, polygon, line, help, etc. 3 colors in graphics 8 with instant text!!! Create colorful business charts or beautiful drawings and then save or retrieve them from disk in 5 SECONDS. YES, it's that fast! Needs all 48k, disk, and costs **\$19.95**

MINI-WORD PROCESSOR — This is for those of you who have a printer, but don't need to spend \$100 or more for a

fancy word processor. It is suitable for simple editing of text, accepts most control characters for your printer, and text is stored on disk for easy retrieval. The amount of text held depends on memory. Requires disk and 32k for **\$14.95**

BOB'S BUSINESS — 14 small business type programs for home or office, all chosen from a nice menu. Supports printed output. 169 sectors of programs require 32k, tape or disk. **\$14.95**.

KID'S #1 — Includes the following: 1) TREASURE — search for the lost treasure while trying to keep from falling into the sea. Nice graphics if you find it! 2) DIALOGUE — talk back to the computer about four subjects. 3) MATH QUIZ — Nice musical and graphical rewards for good scores. Parents input the level of difficulty.

KID'S #2 — A spelling quiz, a "scrabble" type game, and a version of Touch with the computer giving all the directions! Both Kid's programs require 16k or 24k disk and cost **\$14.95** each.

See your local Dealer, or send check to:

SANTA CRUZ EDUCATIONAL SOFTWARE

5425 Jigger Dr., Soquel, CA 95073

C.O.D. orders call (408) 476-4901

*Include \$2.00 postage (\$0.75 for Memory Map)

*In Calif. include 6% tax

Santa Cruz Educational Software * Tricky Tutorials * Santa Cruz Educational Software * Tricky Tutorials * Santa Cruz Educational Software * Tricky Tutorials

Santa Cruz Educational Software • Tricky Tutorials • Santa Cruz Educational Software

The "Screen Play" routine (lines 1000 to 1100) exercises all three of the actions which call the Dragon. It clears the screen, changes graphic modes and scrolls text windows. To scroll a window, enter graphic mode 3 to 8 and then enter numerical responses for as long as you wish to scroll (the amount of scrolling appears to affect the amount of memory cleared).

The "Check Memory" routine (lines 2000 to 2100) prints addresses for the first and last positions of reserved memory and requests the starting and ending addresses you wish to check. This section allows you to look at different ranges of locations to see how much memory has been cleared by displaying these memory addresses and their values. Knowing that Dragon always leaves 0's in his path, and remembering that we loaded memory with values between 1 and 255, 0's will appear only in areas he visited. (Actually, I'm not sure whether Dragon is a he or a she.) When you're done checking and want to enter a different set of actions, an "0,0" entry will return you to the "Choose Action" section.

The "Neat Trick of the Week" is found in lines 2055 and 2075. The memory address at 53775 can be used to tell you whether a key on the keyboard is being pressed at the time you PEEK it. If a key (any key) is depressed, 53775 contains the value 251. When the key is released, 53775 will show a 255. Line 2055, then stops the program whenever any key is pressed and restarts it when the key is released. The POKEing 764 with a 255 (line 2075) clears the "halt" character so that future INPUTs, GETs, etc. aren't confused.

How can one avoid the Dragon anyway? There are many ways. You could never change graphic modes or clear or scroll the screen. This is difficult if you have any significant screen output. However, since the screen clear erases only 64 bytes, you could always clear the screen before the text window scrolls and never use that first 64 bytes. Or you could skip the first 800 bytes after RAMTOP and allow both scrolls and clears. Taking the other path, you could move the bottom of memory up and use memory below the new bottom (see Jim Clark's article). However, this requires using a (simple) machine language subroutine.

If you are using the reserved memory in a *stable* program (one with no further coding), you have another choice. Program 3 shows how to use memory below RAMTOP as your special area instead of reserving memory above RAMTOP. In your program, wait until after *all* strings and arrays are dimensioned. Then, go to the highest resolution graphic mode and PEEK at the top of your BASIC program (line 10000). Since the Atari saves data on GOSUB and FOR/NEXT statements as it encounters them in a dynamic "stack" at the top of a program, you must provide some room for this storage.

Figure on 4 bytes for each *active* GOSUB (one which hasn't been RETURNed) plus 16 bytes for each *active* FOR/NEXT (while it's FORing and NEXTing). Add this allowance to the previous address (line 10010) and use the total as the *bottom* of your reserved area.

Next, PEEK at MEMTOP, the top of RAM available for BASIC programs (line 10100), and use that number as the *top* of your area.

Program 3.

```

10000 PROTOP = PEEK(14) + 256*PEEK(15)
10010 MEMSTART = PROTOP + 24 + 1: REM START
          OF YOUR MEMORY — ALLOWS FOR 2
          GOSUBS PLUS 1 FOR/NEXT
10100 MEMTOP = PEEK(741) + 256*PEEK(742)
10110 MEMFINISH = MEMTOP: REM END OF
          YOUR MEMORY AREA

```

This method gives you the greatest possible amount of RAM without special code, but brings three general risks. If your BASIC program grows (by encountering an unexpected DIM or FOR/NEXT, for instance) after you have set the lower boundary, it will gnaw into the bottom of "your" memory. If the graphic mode is changed to a higher resolution mode after the upper boundary is set, the display list will push down into the reserved memory. Last, a program loaded after the boundaries are set may be larger and run into the set aside memory.

The next time you see the RAMTOP Dragon, you'll be ready!

Atari Memory Management

57344–65535	ROM for character set, OS, etc.	
55296–57343	ROM, Floating Point ROM	
53248–55295	ROM, Hardware Registers ROM	
Unused space(!)		
40960–49151	CARTRIDGE ROM for BASIC, etc.	
RAMTOP	END of RAM	PEEK (106)
Display List and Display Data (usually 1K in Graphics 0, around 8K in Graphics 8).		
MEMTOP	Top of RAM usable by BASIC programs.	PEEK(741) + 256*PEEK(742)
PROTOP	Program top for the current BASIC program	PEEK(14) + 256*PEEK(15)
Free RAM used for programs, data storage, etc.		
BASIC LOMEM	Start of BASIC program	
Operating System, various buffers, hardware registers, etc.		
0	Start of RAM addresses	

Program 2.

```

50 REM SET UP VARIABLES FOR CALLS
60 CHECK=1000:SCREEN=2000:QUIT=3000:DIM AN$(10)

100 REM MOVE RAMTOP DOWN
110 RAMTOP=PEEK(106)
120 ? "MOVE RAMTOP DOWN";:INPUT AN$:IF AN$(1,1)="N" THEN 200
130 RAMTOP=RAMTOP-5:POKE 106, RAMTOP
140 GRAPHICS 0

200 REM FILL 900 BYTES ABOVE RAMTOP
210 FIRST=RAMTOP*256+1:LAST=RAMTOP*256+900
220 ? "FILL MEMORY ABOVE RAMTOP";:INPUT AN$:IF AN$(1,1)="N" THEN 300
230 POKE 559,0:REM TURN SCREEN REFRESHER OFF
240 FOR POSITION=FIRST TO LAST
250 IF VALUE=255 THEN VALUE=0
260 VALUE=VALUE+1
270 POKE POSITION,VALUE
280 NEXT POSITION
290 POKE 559,34:REM TURN SCREEN ON

300 REM CHOOSE ACTION
310 ? "WHAT ACTION? 1 TO CHECK RAM, 2 TO PLAY WITH SCREEN, 3 TO QUIT"
320 INPUT ACTION
330 ON ACTION GOSUB SCREEN,CHECK,QUIT
340 GOTO 300

1000 REM SCREEN PLAY
1010 ? "CLEAR SCREEN":INPUT AN$
1020 IF AN$(1,1)="Y" THEN ? CHR$(125)
1030 ? "CHANGE GRAPHICS MODE";:INPUT AN$
1040 IF AN$(1,1)="Y" THEN ? "WHAT MODE";:INPUT MODE:GRAPHICS MODE
1050 IF MODE<>0 THEN ? "ENTER ANSWERS TILL DONE, THEN NO";:INPUT AN$
1060 IF AN$(1,1)<>"N" THEN GOTO 1050
1070 IF MODE <> 0 THEN GRAPHICS 0
1100 RETURN

2000 REM CHECK MEMORY
2010 ?:? "FIRST POSITION = ";FIRST:?:? "LAST = ";LAST:?:? "ENTER POSITIONS TO
CHECK OR 0,0 TO RETURN"
2020 INPUT START, FINISH:IF START=0 THEN GOTO 2100
2030 POKE 82,7:POKE 201,11:?:REM MOVE MARGIN, SET TAB
2040 FOR POSITION=START TO FINISH
2050 VALUE=PEEK(POSITION):? POSITION;"=";VALUE,
2055 HALT=PEEK(53775):IF HALT=251 THEN GOTO 2055
2060 NEXT POSITION
2070 POKE 82,2:REM RESTORE MARGIN
2075 POKE 764,255
2080 GOTO 2000
2100 RETURN

3000 REM QUIT
3010 ?"NORMAL END OF JOB":END

```

Documented Atari Bugs

Steve Hanson
Madison, WI

Although Atari has on the whole done an admirable job in getting out a bug-free computer system (at least compared to most of the other machines), there are a few bugs in the Atari computer software. This article is simply intended to be a list of bugs in operating system and BASIC software. It is intended mainly to be a guide to help you understand what is going on when unexplained things happen in your computer. Atari is aware of all of these bugs, and they will be corrected in the future.

Bugs In Atari BASIC

The Atari BASIC cartridge has a few problems. The currently known bugs include the following:

- A.** An input statement with no variable is not flagged as an error when input.
- B.** LPRINT loops cannot be stopped by hitting BREAK (This is not actually a bug in BASIC, but a bug in the OS cartridge.)
- C.** PRINT A = NOT B locks up the keyboard.
- D.** DIM L (10) generates DIM L10) as code. You must not leave a blank between a variable and its dimension or it will be interpreted incorrectly.
- E.** The following functions have wrong values:

LOG(0)
CLOG(0)
LOG(1)
CLOG(1)

MOST EXPONENTS (as an example, try to evaluate $2 \uparrow 3$). This problem is inherent in the polynomial expansion algorithm used. It is not likely to cause problems as the errors are very small, but will be noticeable when the expected value is something which is known. This is a simple rounding error, and can be handled by rounding the result when a non-integer result would be bothersome.)

E. Problems with BASIC boundary routine. This manifests itself in two bugs on the machine. Sometimes when doing line editing the

machine will lock up. This usually occurs when deleting multiple lines from a program. The other problem is that any string which is an exact multiple of 256 bytes long will end up in the wrong place if moved in memory. This causes some very weird inexplicable errors in programs. It is hard to catch because it occurs when a string is a multiple of 256 bytes long, and only then. Please notice that it does not depend on the dimensioned length of a string, but on its actual length. Therefore, it cannot be avoided by never dimensioning strings to these values. Fortunately it rarely shows up since most strings are shorter than 256 characters.

F. A printed Control-R or Control-U is treated as a semicolon. I'm glad I finally found out about this as it was the cause of a great deal of trouble in a graphics dump routine I wrote.

G. You cannot use a function within a USR call line. That is, you cannot use a function to define an address for a user call or any of its parameters. You can do this if you evaluate them in a separate line, however.

H. You can dimension arrays larger than the available memory size without creating an error. Of course, there will be problems galore and error messages when you try to run the program.

These errors should mainly be corrected when the next revision of the BASIC cartridge is released. Errors caused in the operating system will be fixed with a new release of the operating system cartridge. Atari has no definite plans as to when these will come out.

Errors In OS Cartridge

There are a few errors on the OS cartridge ROM in the Atari computer. These are the ones I know about:

As mentioned above, there is a bug in the OS which prevents the break key from interrupting LPRINT loops in BASIC.

There is another bug which you disk users have almost certainly noticed. A problem in the OS makes your disk drive "go to sleep" for a few seconds occasionally. Yes, there is a reason for this strange behavior. The same bug in the operating system is also the culprit responsible for the system occasionally re-transmitting a block to the printer. Have you ever gotten a duplicate line or part of a duplicate line out to your printer (using the 850 interface)? This is due to a bug in the OS cartridge and, at the moment, there isn't much you can do about it. However, Atari will have a fix for this eventually.

LETTER PERFECT

T.M. LJK

WORD PROCESSING FOR THE *ATARI — 800^{T.M.}

MAIN - MENU

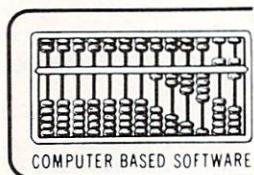
CURRENT DRIVE NUMBER #1

- Editor
- Change Drive #
- Load
- Save
- Merge
- Screen Format
- Printer
- Lock
- Unlock
- Delete
- Format Disk
- Data Base Merge
- Quit

Press '<' or '>' to move cursor
Press [Return] for selection

USE: EPSON MX-80
and ATARI -825
PRINTERS

DEALER
INQUIRIES
INVITED



COMPUTER BASED SOFTWARE

EASY TO USE: LETTER PERFECT is a character orientated word processor with the user in mind. The program (machine language) is very fast. It is a menu driven program that is very easy to operate. The program is a single load program and can work with one or more disk drives. It requires a minimum of 16K of memory and a single disk drive. With the Artari 825 printer you can print text with right hand justification. You may also use different type fonts (10 and 17 character per inch) within the body of the text itself. Boldface is printed as expanded print font. Underlining can be done as well as sending Escape characters within the body of the letter itself. All the formats are a default but you can change them all to desired values if you wish. Right Margin, left margin, top of form, line spacing, etc. are easily changed. Data Base Merge works with the sister program LETTER PERFECT—DATA BASE MANAGER. User may use this program to create mailing lists, and completely develop your own data base for your personal needs. All text packed before storage to diskette for greater storage capacity. Large Buffer allows you to pick up and move up to one full page of screen text and move it to any location in the text. Merge more than one file together for easy editing. Screen Format allows you to see on the video screen exactly how the text will appear on the printer. Automatic page numbering, headers and footers are easily accomplished. This program is easy to use because of its meaningful and easily mastered commands. Fully documented with a users manual that explains in simple language 'how to' completely use the program.

All this and more, for \$149.95.

Features:

FULL CURSOR CONTROL

- Home Cursor
- Scroll Page Forward
- Scroll Page Backward
- Pause Scroll
- Scroll Line at Time
- Scrolling Speed Control
- Move Cursor Down
- Beginning of Text

MULTIFUNCTION FORMAT LINE

- Standard Formats a Default
- Formats Easily Changed
- Right Justification
- Left Margin
- Page Width
- Line Spacing
- Lines Per Page
- Form Stop
- Set Page#
- Top Margin
- Bottom Margin

- Delete a Character
- Insert a Character
- Delete a Line

Insert a Line

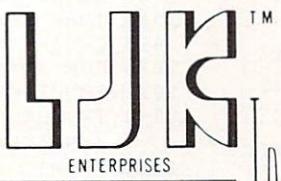
- Headers and Footers
- Shift Lock and Release
- Global and Local Search and Replacement
- Underlining and Boldface
- Automatic Centering
- Horizontal Tabs
- Special Print Characters
- Split Catalog
- Page Numbering up to 65535
- Prints up to 255 Copies of Single Text File
- Non Printing Text Commenting

FUNCTIONS

- Delete All Text
- Delete All After Cursor
- Delete All Before Cursor
- Delete Next Block
- Delete Buffer
- Move Next Block to Buffer
- Add Next Block to Buffer
- Insert Block From Buffer
- Merge Text Files



This program also available on the Apple in 40/80 Video (Super'R' Term, Smarterm, Videx, Bit-3). You may use any printer type. The Hays Micromodem II can be used to send files. Can be Reconfigured at any time to use different printer, 80 column board, or standard 40 column video. Much, Much, More!



FREE CONTROL PAGE

LJK ENTERPRISES INC.,

P.O. Box 10827

St. Louis, MO 63129

(314) 846-6124

Graph It On The Atari

John Malcolm Neil
Portland, OR

One application for which the Atari is suitable is drawing accurate plots and graphs. With a minimum of programming effort, one can create graphs of any function — a handy aid for algebra and trigonometry homework.

The following listing is a 2K program to plot functions in graphics mode eight. It will run on either the Atari 400 or 800, providing that you have at least 16K of memory. A major feature of the program is that the user can look at any part of the Cartesian plane. One is not limited to the range of the graphics mode (320x160) when making graphs.

Line 500 sets the default limits for the range and domain of the function:

-20< x < 20, -10 < y < 10

This region is the user's *window* on the coordinate plane. To change these values, enter your own window when the computer prints "WINDOW?" in the form:

x₁,x₂,y₁,y₂

Where x₁ and x₂ are the minimum and maximum range, and y₁ and y₂ are the minimum and maximum domain.

To use the default values, just press RETURN.

The prompt "INTERVAL?" asks you to enter the interval at which to draw the tic marks. The default values are set in line 500 to one.

Enter the interval in the form:

x₁,y₁

Where x₁ is the interval on the x-axis, and y₁ on the y-axis.

Press RETURN to use the default values.

The relative positions of the x and y axes are drawn in lines 600-700; lines 800-890 draw the tic marks. The actual plotting of the function (lines 1000-1080) is rather unimpressive. The total range (Y2-Y1) is divided into 320 points, and the value at each is plotted. Should an error occur (divide by zero, cursor out of range), the program skips over that point.

Line 1030 contains the function to be graphed.

To graph another, simply change it to read:

FUNCTION=(your function)

Any variables in it must be "X".

Now you are ready to graph! Try the functions in Appendix E for starters, and this one:

1030 FUNCTION=PEEK(53279)

Press some of the console keys (START, SELECT, OPTION). Wow!

A few words of warning — functions like f(x)=0 will not be visible because the x-axis is drawn on zero. Also, if it is essential that your graph not be distorted, make sure that the range is twice the domain.

One idea I have for improvement is to couple this program with a machine language routine to dump the screen to a printer. I'm working on that one right now. In the meantime, happy graphing!

```

400 GRAPHICS 0
410 REM *** INITIAL CONSTANTS ***
500 X1=-20:X2=20:Y1=-10:Y2=10:XIN=1:YIN=1
510 LIST 1030
520 PRINT "WINDOW (X1,X2,Y1,Y2)";
530 TRAP 550
540 INPUT X1,X2,Y1,Y2
545 IF X2-X1=0 OR Y2-Y1=0 THEN 520
550 PRINT CHR$(125); "INTERVAL (X AXIS, Y AXIS)";
560 TRAP 590
570 INPUT XIN,YIN
580 IF XIN<=0 OR YIN<=0 THEN 550
590 GRAPHICS 8:SETCOLOR 2,0,0:SETCOLOR 1,0,
10:COLOR 1:POKE 752,1
595 REM *** DRAW AXES ***
600 XTOP=Y2/(Y2-Y1)*159
610 IF Y2<0 THEN XTOP=0
620 IF Y1>0 THEN XTOP=159
630 YSIDE=ABS(X1)/(X2-X1)*319
640 IF X1>0 THEN YSIDE=0
650 IF X2<0 THEN YSIDE=319
700 PLOT 0,XTOP:DRAWTO 319,XTOP:PLOT YSIDE,0:
DRAWTO YSIDE,159
710 REM *** DRAW TIC MARKS ***
800 TIC1=XTOP-1*(XTOP>0):TIC2=XTOP+1*(XTOP<159)
810 FX=INT(X2/XIN)*XIN
820 XV=(FX-X1)/(X2-X1)*319:IF XV<0 THEN 850
830 PLOT XV,TIC1:DRAWTO XV,TIC2
840 FX=FX-XIN:GOTO 820
850 TIC1=YSIDE-1*(YSIDE>0):TIC2=YSIDE+1*
(YSIDE<319)
860 FY=INT(Y2/YIN)*YIN
870 YV=(Y2-FY)/(Y2-Y1)*159:IF YV>159 THEN 1000
880 PLOT TIC1,YV:DRAWTO TIC2,YV
890 FY=FY-YIN:GOTO 870
900 REM *** GRAPH FUNCTION ***
1000 PRINT CHR$(125):LIST 1030
1005 TRAP 2000
1010 C=0:FLAG=1
1020 FOR X=X1 TO X2 STEP (X2-X1)/319
1030 FUNCTION=SIN(X)
1040 IF FLAG THEN PLOT C,(Y2-FUNCTION)/(Y2-Y1)
*159:FLAG=0:GOTO 1060
1050 DRAWTO C,(Y2-FUNCTION)/(Y2-Y1)*159
1060 C=C+1
1070 NEXT X
1080 POKE 752,0:GOTO 520
1090 REM *** ERROR HANDLER ***
2000 TRAP 2000:FLAG=1
2010 GOTO 1060

```



Auto-dial / Auto-answer

for Atari 400/800*

Our MICROCONNECTION™ for the Atari*

comes in two versions — the RS232

MICROCONNECTION™, for

use with the 850* Interface

Module (Autodial / Autoanswer

optional), and the Atari* buss-

decoding MICROCONNECTION™,

which plugs directly into the com-

puter's data buss (Autodial optional).

The MICROCONNECTION™ for the

Atari* — the obvious answer.



Prices start at \$199.50.

To order your MICROCONNECTION,
or for more information, write or phone:



the microperipheral corporation

2643 151st Pl. N.E., Redmond, WA 98052 (206)881-7544

* Indicates trademarks of Atari, Inc.

ATARI 800/400
SOFTWARE
BY
MED SYSTEMS!

SOFTWARE AUTHORS!

Join the company of best-selling authors at Med Systems. We have an **established** market spanning the free world and royalties second to none. We seek **excellent** games, utilities and applications packages. Only the best are accepted! If you have authored software you feel is publishable, submit it to Med Systems, Software Review Section.

KNOSSOS You wander a gigantic, 3-D perspective cave, seeking the only door out. Somewhere, the minotaur seeks you for a grizzly meal. The cave is graphically represented **as though you are actually there!** Extensive graphics, sound effects.

Atari 400/800 16K BASIC cassette

\$14.95

Atari 400/800 32K BASIC disk

\$19.95

Scott Adams Adventures 1-9 for 24K Ataris. What can we say? These are some of the best!

Atari 400/800 24K cassette

\$18.95 each

(The higher numbers are the harder adventures)

COMING SOON FOR THE ATARI: Rat's Revenge, Deathmaze 5000, Labyrinth, Asylum

ATARI SOFTWARE: Star Raiders \$34.95, Chess \$34.95, Basketball \$24.95, Asteroids \$34.95, Missile Command \$34.95, Space Invaders \$16.95, Super Breakout \$34.95, Joystick Pair \$16.00.

CALL FOR OUR INCREDIBLE HARDWARE PRICES!

MED SYSTEMS has been publishing and distributing software worldwide since 1979. We publish only the best! We ship within 5 days, whenever possible, usually within 2! We **don't** wait for "checks to clear." We know how hard it is to wait for that perfect program. **We even guarantee satisfaction!** If you don't like our software, return it within 14 days for a prompt, cheerful refund. If you have a problem, call us 10-6 EST. We are here to serve you.



MED SYSTEMS

Box 2674-C1, Chapel Hill, NC 27514
(919) 933-1990



Extending Player Missile Graphics

Eric Stoltman
San Antonio, TX

One of the best features of the Atari is Player Missile Graphics. Since it has been introduced, many people have started using it in their programs, (some improving upon it, such as Larry Isaacs). This article and example program will explain how to create excellent animation, such as a walking figure or a rotating ship, with just one player.

One way to perform animation is to alternate players back and forth, but problems arise. What if the player is moved up? The other players also have to be moved up. This takes time. Another method is to alternately POKE data into the player, thus changing its shape. This can be done slowly in BASIC or quickly and easily in machine language. This program will compare both the BASIC and machine language method for changing the data of a player.

After a player is set up, additional data for other shapes must be stored in RAM. I prefer to use memory locations 256 to 511, since they are empty and are protected. This data can be manipulated by setting up pointers in an array. A subroutine can then easily retrieve this data and place it in the player's data area. This can be done in BASIC:

```
C=0: A=PMBASE+512+Y TO PMBASE+519+Y:  
POKE A, PEEK(POINTER(FACING)+C) :C=C+1:  
NEXT A
```

POINTER(FACING) = Array containing addresses of data.

EXAMPLE: POINTER(1)=260, POINTER(2)=268, etc.

Or in machine language:

```
A=USR(XXX,PMBASE+512+Y,POINTER(FACING))  
XXX=Address of Machine Language subroutine.
```

The machine language method is not only easier, but also executes 11 times faster and provides smoother motion.

The machine language code is relocatable and can easily be modified by changing the 22nd data element so more or less data can be poked into the player's data area. For machine language programmers, I have included the machine language listing:

* = \$0600

CHANGE	PLA	STA \$CC
	PLA	STA \$CB

```
PLA
STA $CF
PLA
STA $CE
LDY #$00
LDA ($CE),Y
STA ($CB),Y
INY
CPY #$08
BNE LOOP
RTS
```

Line Numbers	Explanation
110-130	Poke machine language subroutine for changing player into player.
140-170	Poke data for additional shapes into memory.
180-190	Set up pointers to data.
200-250	Set up player
270-330	If trigger is pressed change player by machine language.
340-400	If trigger is not pressed change player by BASIC.

In addition to providing animation, this subroutine can move a player up or down when the vertical value changes greatly. To do this, point to an empty area of RAM (thus erasing the player) and then change the vertical value and point to the desired data. An example would be if a player went off the top of the screen and, using the method mentioned above, quickly reappeared at the bottom.

I should point out that many false players, that is, data for alternate shapes, may be stored and rotated among the four players to provide excellent animation.

```
10 REM BY ERIC STOLTMAN
20 REM THE 'I' IN POINTER SHOULD BE A '1'
' SINCE 'POINT' IS A RESERVED WORD
100 REM ** INITIALIZATION **
110 FOR A=1536 TO 1560:READ I:POKE A,I:NEXT A:REM POKE DATA FOR MACHINE LANGUAGE
SUBROUTINE INTO MEMORY
120 REM ** MACHINE LANGUAGE DATA **
130 DATA 104,104,133,204,104,133,203,104
,133,207,104,133,206,160,0,177,206,145,2
03,200,192,8,208,247,96
140 REM ** ADDRESS OF PLAYER DATA **
150 FOR A=260 TO 323:READ I:POKE A,I:NEXT A:REM POKE DATA INTO PROTECTED RAM
155 REM ** PLAYER DATA **
160 DATA 28,62,62,28,73,127,73,65,7,23,3
9,88,154,36,8,16,240,38,47,127,47,38,240
,0,16,8,36,154,88,39,23,7
170 DATA 65,73,127,73,28,62,28,8,16,3
6,89,26,228,232,224,15,100,244,254,244,1
00,15,0,224,232,228,26,89,36,16,8
180 REM ** POINTERS TO DATA **
190 DIM POINTER(8):FOR A=1 TO 8:READ I:POINTER(A)=I:NEXT A:DATA 260,268,276,284,
292,300,308,316
200 REM ** SETUP PLAYER ***
210 GRAPHICS 0:POKE 752,1:POKE 710,0:POKE 559,46
220 A=PEEK(106)-8:POKE 54279,A:POKE 5327
7,3:PMBASE=256:A:POKE 53256,1:X=124:Y=48
```

NEW

ATARI® SOFTWARE

By PMS

MULTI-PURPOSE BUSINESS PACKAGES FOR ATARI® 800

- General Ledger

Receipts, Disbursements, Balance Sheet, Income Statements, General Journal, and more for small to medium businesses

- Cashier - Inventory Control

Point-of-sale retail cashier with inventory control in one powerful package — or use Inventory Control alone!

- Accounts Payable and Receivable

Subsidiary Journals to integrate with General Ledger

***PMS can help design a complete business system specifically for you - call for details!**

DISTRIBUTED BY

IMAGE WORKS SOFTWARE

MC - VISA Accepted
\$2.00 shipping & handling
add \$1.00 for COD

3124 South Parker Road
Suite C-222
Aurora, CO 80044

(303) 690-6372
Orderline 9-7 MST
Free catalog on request

• Atari is the Trademark of Atari, Inc.

Colorado residents add appropriate tax

Dealer inquiries invited

OCTOBER SPECIALS

good thru 11/15/81

25% OFF ANY CRYSTALWARE (Atari 800 / 48k disk) in stock

Fantasyland \$45.00 • WWIII \$22.00 • Mars \$30.00 • call for others

ALSO INTEC & AXLON MEMORY BOARDS!

32K INTEC \$145.00 • 48K INTEC \$245.00 • 128K AXLON \$CALL



Software for Personal Computers

A collection of 10 challenging programs created to provide a unique entertainment value — and 2 personal/business programs with broad functional value. In disk and/or cassette as indicated.

GAMES	• HELICOPTER BATTLE	Req. — 16K RAM/Cassette	\$ 9.95
		— 16K RAM/Disk	14.95
	• HORSE RACING	Req. — 16K RAM/Cassette	9.95
		— 16K RAM/Disk	14.95
	• KENO	Req. — 8K RAM/Cassette	9.95
		— 16K RAM/Disk	14.95
	• LIGHTNING BOLTS	Req. — 16K RAM/Cassette	9.95
	and REACTION	— 24K RAM/Disk	14.95
	• THE MAD MARBLE	Req. — 8K RAM/Cassette	9.95
		— 16K RAM/Disk	14.95
	• MUSIGAME (2 Games)	Req. — 16K RAM/Cassette	9.95
		— 24K RAM/Disk	14.95
	• SUPERMASTER	Req. — 8K RAM/Cassette	9.95
		— 16K RAM/Disk	14.95
	• TAG	Req. — 16K RAM/Cassette	9.95
		— 16K RAM/Disk	14.95
	• TRACTOR BEAM	Req. — 8K RAM/Cassette	9.95
		— 16K RAM/Disk	14.95
	• WAR AT SEA	Req. — 16K RAM/Cassette	14.95
		— 24K RAM/Disk	19.95
BUSINESS	• CCA Data Management System	Req. — 48K RAM/Disk	99.95
	• LETTER WRITER	Req. — 24K RAM/Disk	19.95
		Mastercard & VISA Accepted	



DIVISION OF CUSTOM ELECTRONICS, INC.
SOFTWARE

238 Exchange St., Chicopee, Massachusetts 01013
(413) 592-4761

• Dealer And Distributor Inquiries Invited
• Closed Mondays — Open Daily 'Til 5:30 — Fridays 'Til 8

SOFTWARE for the ATARI 800* and ATARI 400*

from **QUALITY SOFTWARE**



STARBASE HYPERION™

By Don Ursen

Become absorbed in this intriguing, original space simulation of war in the far future. Use strategy to defend a front line Star Fortress against invasion forces of an alien empire. You create, deploy, and command a fleet of various classes of space ships, while managing limited resources including power generators, shields and probes. Real time responses are sometimes required to take advantage of special tactical opportunities. Use of color, sound, and special graphics

add to the enjoyment of this program. At least 24K of RAM is required.

On Cassette — \$19.95

On Diskette — \$22.95

NAME THAT SONG

By Jerry White

Here is great entertainment for everyone! Two players listen while the Atari starts playing a tune. As soon as a player thinks he knows the name of the song, he presses his assigned key or joystick button. There are two ways to play. The first way requires you to type in the name of the song. Optionally, you can play multiple choice, where the computer asks you to select the title from four possibilities. The standard version requires 24K of RAM (32K on diskette) and has over 150 songs on it. You also get a 16K version that has more than 85 songs. The instructions explain how you can add songs to the program, if you wish. Written in BASIC.

On Diskette — \$17.95



QS FORTH

By James Albanese

Want to go beyond BASIC? The remarkably efficient FORTH programming language may be just for you. We have taken the popular fig-FORTH model from the FORTH Interest Group and expanded it for use with the Atari Personal Computer. Best of all we have written substantial documentation, packaged in a three ring binder, that includes a tutorial introduction to FORTH and numerous examples. QS FORTH is a disk based system that requires at least 24K of RAM and at least one disk drive. Five modules that may be loaded separately from disk are the fig-FORTH kernel, extensions to standard fig-FORTH, an on-screen editor, an I/O module that accesses Atari's operating system, and a FORTH assembler.

Diskette and Manual — \$79.95

Manual Only — \$39.95

FOR OUR COMPLETE LINE OF ATARI SOFTWARE
PLEASE WRITE FOR OUR CATALOG



QUALITY SOFTWARE

6660 Reseda Blvd., Suite 105, Reseda, CA 91335
(213) 344-6599

ASK FOR QUALITY SOFTWARE products at your favorite computer store. If necessary you may order directly from us. MasterCard and Visa cardholders may place orders by calling us at (213) 344-6599. Or mail your check or bankcard number to the address above. California residents add 6% sales tax. Shipping Charges: Within North America orders must include \$1.50 for shipping and handling. Outside North America the charge for airmail shipping and handling is \$5.00. Pay in U.S. currency.

*Indicates trademarks of Atari.

```

230 FOR A=PMBASE+512 TO PMBASE+640:POKE
A,B:NEXT A
240 POKE 53248,124:POKE 704,12:FACING=1
250 C=0:FOR A=PMBASE+512+Y TO PMBASE+519
+Y:POKE A,PEEK(P01NTER(FACING)+C):C=C+1:
NEXT A
270 REM ** MACHINE LANGUAGE CHANGE **
275 IF STRIG(0)=1 THEN 340
280 POSITION 5,5:? "MACHINE LANGUAGE";
285 J=STICK(0)
290 IF J=15 THEN 270
300 IF J=11 THEN FACING=FACING-1:IF FACING<1 THEN FACING=8
310 IF J=7 THEN FACING=FACING+1:IF FACING>8 THEN FACING=1
320 D=USR(1536,PMBASE+512+Y,P01NTER(FACING))
330 GOTO 270
340 REM ** BASIC CHANGE **
345 IF STRIG(0)=0 THEN 270
350 POSITION 5,5:? "BASIC"
355 J=STICK(0)
360 IF J=15 THEN 270
370 IF J=11 THEN FACING=FACING-1:IF FACING<1 THEN FACING=8
380 IF J=7 THEN FACING=FACING+1:IF FACING>8 THEN FACING=1
390 C=0:FOR A=PMBASE+512+Y TO PMBASE+519
+Y:POKE A,PEEK(P01NTER(FACING)+C):C=C+1:
NEXT A
400 GOTO 340

```

educational software for the ATARI® educational software for the APPLE II+™ educational software for the ATARI®

HIDDEN WORDS

A word-search program for the ATARI®. Move your character over the letters that spell your word. Words may be read from left, right, up, down, or diagonally.



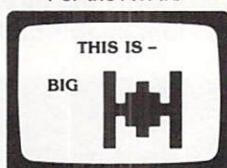
- For one or two players
- Four levels of play
- Comes with word base of the most frequently misspelled words.
- Requires JOYSTICKS

24K BASIC, Grades 1-8+ ... \$17.50

SPATIAL RELATIONS

Designed to help the child learn words that indicate size and placement. Units cover: big/small, tall/short, right/left, high/low, over/under, in/out. Requires one joystick. Minimal reading. SIDE TWO REQUIRES NO READING - Use with Type-'N-Talk™ speech synthesizer. 16K BASIC, Preschool-1 ... \$17.50

For the ATARI®



Type-'N-Talk™*** speech synthesizer (VOTRAX).

Let your computer talk with one of the easiest to use speech synthesizers on the market. Requires RS-232 interface. \$375.00

T.H.E.S.I.S.

P.O. Box 147 • Garden City, MI 48135
or call (313) 595-4722 for C.O.D.

Some T.H.E.S.I.S. software is now available for the APPLE II+

DEALER INQUIRIES WELCOME

Please add: \$1.50 shipping/handling, \$1.50 for C.O.D., Mich. res. add 4% sales tax.

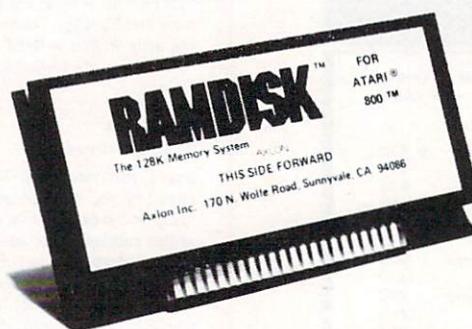
WRITE FOR FREE CATALOG

*ATARI is trademark of Atari, Inc. **APPLE is trademark of Apple Computer, Inc. ***Type-'N-Talk is trademark of Votrax.

the ATARI® educational software for the APPLE II+™ educational software for the ATARI® educational software for the ATARI®



ATARI® 800* OWNERS



PLUG IN AND GO !

The Axlon RAMDISK Memory System provides 128K of RAM memory which can be utilized as an additional disk device or bank selectable RAM memory! The DOS supplied with the system allows you to utilize the RAMDISK Memory System as a disk device in conjunction with your Atari 810*. The system is up to 20 times faster than the Atari 810 and is compatible with existing Atari 800 software. As user memory, the RAMDISK Memory System is organized as eight (8) 16K banks. The system is installed with two 16K RAM modules giving you a 160K Atari 800 system. Drop by your local computer store for a demonstration or contact Axlon Inc. for more information.

- Plug-in Compatibility
- 128K Bytes of RAM Memory
- Compatible with existing Atari 800 Software
- Can be utilized as an additional disk - function for function, up to 20 times faster than the Atari 800
- Includes DOS Memory Management Software
- Can be utilized as Bank Selectable User Memory
- Gold Plated Contacts
- 90 Day Warranty

170 N. Wolfe Road
Sunnyvale, CA 94086
(408) 730-0216



* Indicates Trademark of Atari, Inc.

Atari 400/800 Variable Name Utility

Arthur McGraw
Whitehall, OH

For compactness, Atari BASIC stores the ATASCII strings of variable names in a table called the variable name table. The program needs only a one byte reference to the variable name table to determine the desired variable name. This allows the programmer to use long descriptive variable names as the ATASCII string is stored only once, regardless of the number of times that variable name is used in the program.

When studying a program it is sometimes desirable to know what variable names are already in use. This utility will display the contents of the variable name table.

User Instructions

1. Clean out the computer's memory using the "NEW" command.
2. Type in the variable name table dump utility using line numbers that you do not normally use in writing BASIC programs. Modify the GOTO statements in lines 6 and 7 if you do not use my numbering scheme.
3. Save the utility on tape or disk using the "LIST" command.
4. Read in the desired BASIC program.
5. Read in the variable name table dump utility using the "ENTER" command. This will overlay your program with the utility program.
6. Start the utility by entering "GOTO x" where "x" is the first line number of the utility.
7. Observe the variable name table as it prints on the screen. The last character of each variable name will be printed in inverse video.

```

1 POKE 1664,PEEK(130):POKE 1665,PEEK(131)
2 IF PEEK(1664)=PEEK(132) THEN IF PEEK(1665)
   =PEEK(133) THEN ?: STOP
3 ? CHR$(PEEK(PEEK(1664)+256*PEEK(1665)));
4 IF PEEK(PEEK(1664)+256*PEEK(1665))>127
   THEN PRINT " ";
5 IF PEEK(1664)=255 THEN POKE 1664,0: POKE
   1665,PEEK(1665)+1: GOTO 2
6 POKE 1664,PEEK(1664)+1: GOTO 2

```

Address List

- | | |
|---------|---|
| 130,131 | Contains the address of the start of the variable name table. |
| 132,133 | Contains the address of the end of variable name table + 1. |

1664,1665 Pointer used by variable name table dump routine. The pointer is stored in memory that is not used either by the operating system or by BASIC.

	Line Description
1	Set up pointer.
2	Check if done.
3	Print one character of variable name.
4	Print space if last character of variable name.
5-6	Increment two byte pointer.

Notes

1. Normally, the variable name table contains names no longer used by the program. Because these variable names occupy memory area, it would be desirable to remove them. Unused variable names can be removed from the variable name table by saving the program with the "LIST" command, clearing memory using the "NEW" command, and then reloading the program using the "ENTER" command.

2. If you do not have room to add this utility, you can delete as many lines of your program as needed by typing in their associated line numbers followed by RETURN. Deletion of program statements in this manner will have no effect on the variable name table.



World Class

Your **ATARI** is a world class personal computer. But you need great software in order to exploit its capabilities. And you need information about how it all works.

IRIDIS is a series of software packages that will help you enjoy and understand your **ATARI** more fully. The programs are outstanding, just as you would expect from the people who have published 23 issues of the widely acclaimed **CURSOR Magazine** for the Pet since 1978. But **IRIDIS** is more than just a collection of excellent programs. **IRIDIS #2** comes with a 56-page manual that has clear, detailed explanations of how each program works. The explanations tell you line-by-line what each program does, and how it does it.

IRIDIS and your **ATARI**: A winning team. World Class!

IRIDIS #2-Fondedit and Knotwork programs.

Includes 56 page User Manual.

\$15.95 Cassette, \$18.95 disk.

Mastercharge and Visa welcome.

Published By:

THE CODE WORKS

Box 550
Goleta, CA 93116
805-683-1585

Insight: Atari

Bill Wilkinson
Optimized Systems Software
Cupertino, CA

Last month we explored the possibilities inherent in the fact that Atari BASIC supports addressable DATA statements. This month we will tackle a related subject. It will be fairly obvious that the techniques presented in these two articles can help one write a fast yet complex adventure game on the Atari. However, it would be most interesting to me to see what other uses you readers make of these ideas, so start those cards and letters coming!

Nonexistent Subroutines ... Or Having Fun While GOSUBing Nowhere

Purists should probably not read this section: we will plumb depths that advocates of structured programming would never sink to. Just as Atari BASIC allows the code RESTORE <expression>, we can also use GOTO <expression> and GOSUB <expression>. (Don't worry about the notation: <anything> just means that "anything" is an English language word instead of a reserved BASIC word.) Allowing GOTO and GOSUB to refer to arbitrary expressions instead of absolute line numbers is unusual in BASICs (and well nigh impossible in most other languages), so perhaps the power of this capability has never been fully realized. We will try to make a few inroads.

Before we get into the more exotic part of our discussion, let us note the most obvious advantage of "line number expressions": self-documenting code. How much more meaningful it is to be able to code GOSUB CALCULATEPAY instead of GOSUB 13250 !! Admittedly, with Atari BASIC one must first have written LET CALCULATE-PAY = 13250 ; but that is a small price to pay for the added readability. Fair warning: there is one drawback to this trick. Atari BASIC allows only 128 different variable names. Normally that is a very big number, but naming every subroutine or section of code can eat up variables in a hurry. Be judicious in your choice of which routines are worth naming.

Now it is time for our main topic. And, thus, time for an example program. Study the example carefully before continuing with this text.

Lines 1000-1030 are simply set-up and initialization, one time operations. Lines 2000-2260 constitute the main loop of the program (in fact, in this simplistic example, this is an endless loop). First, the user is asked for a verb. If the INPUT verb matches one in the DATA list, it is assigned an appropriate verb number. The process is repeated for a noun. In an actual adventure game, the user would presumably be asked for "VERB NOUN" via a single INPUT; the program would then have to parse the request into the separate words.

At line 2200-2260 we exhibit the trick that this article is all about. To understand what happens, let us follow through what would happen if the user had requested "KISS BABY." "KISS" is verb number 2 and "BABY" is noun number 3, so at line 2220 we attempt to GOSUB to line 10000 + 2 * 1000 + 3 * 10; that is we attempt to GOSUB 12030. Lo and behold, line 12030 causes the message "YOU HAVE JUST BEEN ELECTED MAYOR" to print out. When the routine RETURNS, we GOTO LOOP and do this all over again.

But wait: suppose the user had typed "LOOK BABY." That phrase evaluates to verb 1 and noun 3, so we try to GOSUB 11030 (10000 + 1 * 1000 + 3 * 10). But there is no line 11030! All is not lost: note that on line 2210 we first TRAPped to line 2250. The attempt to GOSUB 11030 will trigger the TRAP and we indeed will continue execution at line 2250. Here, we attempt to GOSUB to line 10000 + 1 * 1000, effectively ignoring the noun. We succeed in executing line 11000, the "default" routine for the verb "LOOK," and find that the computer sees "NOTHING SPECIAL" about this baby.

The power implicit here is perhaps not obvious. But consider how easy it is to add new verbs and nouns to this program. Consider how easy it is to provide for as many or as few special verb-noun combinations as you wish. And, finally, look how little code is used!

Note that this program expects there will be a routine for each valid verb (it's only sensible: why have a verb in the DATA if it doesn't do anything)? Another TRAP statement, at line 2250, could allow for omitted verbs. By the way, with the program written as it is, there is no way to get to line 2250 with the error TRAP system still active. Atari BASIC always resets any TRAP when it is triggered (this is so that you can't accidentally fall into endless TRAP loops).

The techniques discussed in this and prior articles have actually been used to write a "PICO-ADVENTURE." The most amazing aspect of the program is the speed with which it responds: it seems as fast or faster than even machine language adventures. Try it. Let us know about your efforts.



Drawing Tablet

VersaWriter operates on a simple principle, but produces graphics which match or exceed those of other digitizers. Its rugged yet precision construction makes it easy to use and trouble free. Operation is mastered in minutes. It plugs directly into your ATARI personal computer.

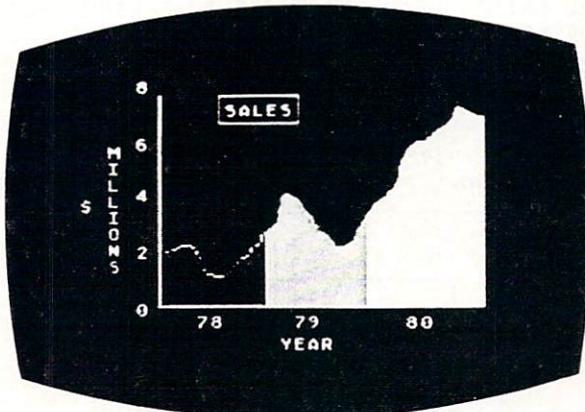
VersaWriter

FOR ATARI PERSONAL COMPUTERS

Suggested Price \$299.00

Graphics Software

Easily the most capable, complete, and usable graphics software for ATARI personal computers available. Designed for hobbyists, but engineers, artists, doctors, and educators are also finding exciting ways to expand their computer's value with VersaWriter.



UNIQUE OFFER

Send us YOUR disk and \$1. We will promptly return the disk with a slide package of 10 color pictures drawn with VersaWriter.

- Enclosed is \$1 and my disk.
Send me the slide package.
 - ATARI APPLE II
 - Send more information including
VersaWriter dealers in my area.
- DEALER INQUIRIES INVITED.*

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

Unreadable Programs

There follow two program lines that can be added to any existing Atari BASIC program and which, when executed, will make a program virtually unLISTable. The first line simply changes the names of all your variables to RETURN characters, and can be used with or without the second line. The second line actually produces a BASIC SAVED program that can only be RUN — not LISTed, LOADed, etc.

Atari BASIC version:

```
32766 FOR I=PEEK(130)+256*PEEK(131) TO
    PEEK(132)+256*PEEK(133) : POKE I,155 :
    NEXT I
32767 POKE PEEK(138)+256*PEEK(139)+2,0 : SAVE
    "<filename>" : NEW
```

BASIC A+ version:

```
32766 for i=dpeek(130) to dpeek(132) : poke i,155 :
    next i
32767 poke dpeek(138)+2,0 : save "<filename>" :
    new
```

To use these gems, simply enter them and then type GOTO 32766. The line numbers are not important, but the second line must be the last line of the program. To use the resulting program, simply type RUN "<filename>". The program should *not* end with STOP or END; instead, it should exit via NEW (yes, "NEW" can be used from within a program). The <filename> may be "C:", but CLOAD will not work (you must use RUN"C:").

VARIABLE, VARIABLE, VARIABLE

Perhaps one of the more common mistakes when using the long variable names allowed by Atari BASIC is to make a typo when entering the name (I tend to leave off the plural, "s"). How to know you have committed this sin? Try the following program segment:

Using Atari BASIC:

```
32700 I=0 : FOR J=PEEK(130)+256*PEEK(131) TO
    PEEK(132)+256*PEEK(133)-1
32710 IF PEEK(J) < 128 THEN PRINT CHR$(PEEK
    (J)) ; : GOTO 32730
32720 PRINT CHR$(PEEK(J)-128) : I=I+1
32730 NEXT J : PRINT : PRINT I ; " VARIABLES
    IN USE" : STOP
```

Using BASIC A+:

```
32700 i=0 : for J=dpeek(130) to dpeek(132 + 1 : print
    chr$(peek(j) & 127) ;
32710 if peek(j) > 128 : print : i=i+1 : endif : next j
32720 print : print i ; "variables in use" : stop
```

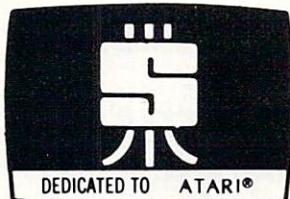
It would be advisable to LIST this program segment to DISK or CASSETTE and then ENTER

it into any program that needs it. To use, simply type GOTO 32700 ; all your variables will be listed and a count displayed. Obviously, this output could be sent to the printer by first OPEN #7,8,0, "P:" and then replacing all the PRINTs with PRINT #7. If you do this, it is advisable to CLOSE #7 before the STOP.

```
1000 REM ***** SET UP *****
1010 DIM VERB$(4), NOUN$(4), TEST$(4)
1020 VERB$DATA=9000:NOUN$DATA=9100
1030 LOOP=2000
2000 REM ***** MAIN LOOP *****
2010 PRINT "GIVE ME A VERB ";:INPUT VERB$
2020 RESTORE VERB$DATA:VERB=0
2030 FOR CNT=1 TO 3:REM CHANGE TO MATCH DATA
2040 READ TEST$
2050 IF TEST$=VERB$ THEN VERB=cnt:CNT=99
2060 NEXT CNT
2070 IF NOT VERB THEN PRINT "INVALID VERB";
    GOTO LOOP
2100 REM VERB DONE, DO NOUN
2110 PRINT "GIVE ME A NOUN ";:INPUT NOUN$
2120 RESTORE NOUN$DATA:NOUN=0
2130 FOR CNT=1 TO 3:REM CHANGE TO MATCH DATA
2140 READ TEST$
2150 IF TEST$=NOUN$ THEN NOUN=CNT:CNT=99
2160 NEXT CNT
2170 IF NOT NOUN THEN PRINT "INVALID NOUN";
    GOTO LOOP
2200 REM ***** THE TRICKY STUFF *****
2210 TRAP 2250
2220 GOSUB 10000+VERB*1000+NOUN*10
2230 GOTO LOOP
2240 REM WE GET TO 2250 ONLY ON TRAP
2250 GOSUB 10000+VERB*1000
2260 GOTO LOOP
9000 REM A LIST OF ALL VERBS
9010 DATA LOOK,KISS,DROP
9100 REM A LIST OF ALL NOUNS
9110 DATA ROOM,BEAR,BABY
10000 REM *****
10010 REM * THE VERB-NOUN ACTION *
10020 REM *****
11000 REM >>> LOOK <<<
11001 PRINT "I SEE NOTHING SPECIAL":RETURN
11010 PRINT "I SEE A WINDOW AND A DOOR":RETURN
12000 REM >>> KISS <<<
12001 PRINT "THAT'S SILLY...BUT SMACK":RETURN
12020 PRINT "BEAR BITES OFF YOUR LIPS":RETURN
12030 PRINT "YOU HAVE JUST BEEN ELECTED
    MAYOR":RETURN
13000 REM >>> DROP <<<
13001 PRINT "HOW? I COULDN'T HAVE LIFTED
    THAT.":RETURN
13030 PRINT "IT'S A BOUNCING BABY BOY!!"
    :RETURN
```

©

**TOLL FREE
Subscription
Order Line
800-345-8112
In PA 800-662-2444**



PREMIUM SOFTWARE FOR YOUR ATARI

ARCADE GAMES 24K disk; 16K cassette; Joystick required

Add these HIGH RESOLUTION, REAL-TIME, ANIMATED games to your software arsenal. Get FAST ACTION and FULL SOUND GRAPHICS that take advantage of the unique features of your ATARI. Enjoy challenge that requires strategy and skill.

SPACE CHASE Fly against intelligent invader clones. Arm Yourself with Nuclear Defense Charges and play with or without Defense Shields. Enjoy this action-packed multicolor space odyssey. Displays top score, number of planets saved and number of galaxies conquered. \$14.95 cassette; \$19.95 disk

TIMEBOMB Meet the challenge of this fast moving animated race against time, enemy aircraft and enemy bombs as you attempt to disarm timebombs set to explode ammunition depots. Avoid aircraft of varying sizes and speeds — and their bombs. Choose one of ten Day or Night Missions. Use from one to four Joysticks. Any number can play; top players listed on scoreboard. \$14.95 cassette; \$19.95 disk

DATA MANAGEMENT

FILE-IT With this startup database system you can file and manage personal information and data. Use this database system to create, sort, store, and manipulate information such as appointment calendars, address or telephone data, credit or charge card records, stock investments, medical or prescription information, hobby, coupon or other types of collection information...and more. With a printer you get 1 or 2 across mailing labels, disk jacket inventory covers and neatly written copy of all your data files. Comes with well documented instruction manual explaining basics of computer filing. Fast and easy to use. Holds 100+ records in 24K and over 300 in 40K. Requires minimum of 24K and one disk drive. Printer optional. \$34.95 (Disk Only)

FILE-IT 2 An expanded database system which extends FILE-IT, provides the following additional capabilities. User controlled data selection for creating subfiles from main data files. Random access file updating for label and financial data files. Financial entry and report generator programs provide data selection by code(s) and/or date(s). Monthly bar graph program generates visual pictures of selected data on screen/printer. Requires 1 disk drive, minimum of 24K RAM, and an 80 column printer. Supports single or multiple disk drives. Includes detailed documentation, users manual and utility programs. \$49.95

EDUCATIONAL/ENTERTAINMENT

MY FIRST ALPHABET Will give your youngster an unparalleled learning experience. Complete with melodies and thirty-six professional drawings, children see pictures and hear tunes with letters and numbers of their own choosing or the ones you choose to show. Package includes a GRAPHICS EDITOR for creating, editing and VIEWING your own custom drawings in real time. Use drawings with any basic program or as part of MY FIRST ALPHABET. Instruction manual included. Minimum of 24K and disk required. \$29.95

WORDGAMES This package is jam-packed with hours of fun and challenge. Wordgames contains GUESSIT, WORDJUMBLE and POSSIBLE. GUESSIT, a deductive alphabetic reasoning game for 1 or 2 players can also be used for teaching or learning dictionary look-up skills. Comes with 60 word vocabulary. WORDJUMBLE is a multiple word scrambling puzzle with play-on-word hints and mystery answers. Comes with 20 puzzles. Instructions show how to substitute your own words and clues. Use POSSIBLE as a word game tool to assist creating or playing word or letter scrambling games by showing all combinations of letters you supply. If you like word games you will love this package. 16K cassette \$14.95; 24K disk \$19.95

UTILITIES

PROGRAMMING AIDS PACKAGE I Is four utility programs to help increase programming efficiency and learn more about your computer. RENUMBER handles references and even variables. Generates Diagnostic Tables for programming error detection. PROGRAM DECODER, DECIMAL TO BCD and BCD TO DECIMAL programs give you a practical way of studying internal program representation and ATARI number-conversion procedures. Comes with comprehensive users manual. 16K cassette \$14.95; 24K disk \$19.95

SWIFTY UTILITIES Make programming time more efficient; increase programming productivity. Includes all of PROGRAMMING AIDS I plus has REM Remover, Variable Lister, Disklist, DOS Caller (access DOS Utilities with program in core), MENU/SELECTOR (to run programs in either saved or listed format) and Custom Print (for preparing condensed and indented program listings on either EPSON MX-80's or ATARI 825 printers). (Listings skip page perforations and title and number pages.) Minimum of 24K disk system required. \$29.95

DISKETTE INVENTORY SYSTEM Use this system to gain control of your expanding disk/program inventory. Quickly get locations of single or multiple copies of your programs and all your valuable files. An invaluable tool, this system is easy and convenient to use and to update. 24K disk system required. \$24.95 Printer suggested.

GRAPHICS EDITOR (refer to MY FIRST ALPHABET.)

SWIFTY DATALINK High Quality Smart Terminal Communications program. Easy to use Multi-Option, Menu Driven. Full performance uploading/downloading. Printer dump, screen dump and disk search options. Use as remote terminal. Send/receive and store programs and data files. Save on connect time charges with commercial services.....\$34.95
Requires: 24K RAM, 810 disk drive, 850 Interface or equivalent, 630 or other 300 baud modem. (Printer Optional)
SEND CHECK OR MONEY ORDER TO:

SWIFTY SOFTWARE, Inc.
P.O. Box 641 Melville, New York 11747 (516) 549-9141
N.Y. Residents add 7 1/4% sales tax
SEND FOR FREE CATALOGUE



Computer Software

HORSEWORD DERBY™

†Player against the computer
†Action graphics
†Attractive colors and sounds
†Four levels of play

\$19.95

AVOID "THE BEST PLAYER WINS"

1 or 2 Player ACTION SPACE GAME
†Great color, sound, graphic combination
†5 play variations
†Keep ship in quadrant while trying to blast everyone. (including opponent)

\$19.95

TRIBOMB ACTION GAME

†1 or 2 player game...just try to beat the computer. 5 levels of play
*ATARI REGISTERED TRADEMARK OF ATARI, INC.
ALL ATARI 2600, 800 & 400 CARTRIDGES &
SOFTWARE, HARDWARE, JOYSTICKS,
PADDLES ETC. SEND FOR CATALOG.

*Requires 16K RAM ADD \$1.50 SHIPPING

COMPUTER MAGIC LTD.
176 Main St. Port Washington, N.Y. 11050

Dealer Inquiries
516 883-0094



MAILING LIST MANAGER FOR ATARI COMPUTERS

A FAST WORKING MAILING LIST MANAGER FEATURING

- UP TO 26 SEPARATE FIELD CODES
- AUTOMATIC ZIP CODE SORTING
- FAST SELECTION OF DATA BY NAME, FIELD CODE, ZIP CODE OF ENTIRE LIST
- USE OF ATARI 820 PRINTER OPTIONAL
- SUPPORTS USE OF OVER 1,000 NAMES (DEPENDENT ON MEMORY CAPACITY)
- FULLY DOCUMENTED WITH PROGRAM CUSTOMIZING INFORMATION
- REQUIRES MINIMUM OF
16 K CASSETTE
24 K DISK

FOR SAME DAY DELIVERY SEND CERTIFIED CHECK OR MONEY ORDER FOR \$30.00 (CASSETTE)* OR \$45.00 (DISK)*
TO

MUTTONTOWN SOFTWARE
RFD 1876
SYOSSET, N.Y. 11791

*ADD \$3.00 FOR SHIPPING OUTSIDE U.S.A. OR CANADA
DEALER INQUIRIES INVITED

Overview:

"Letter Perfect" Wordprocessing On The Atari

This is the first **COMPUTE!** Overview. We feel that our readers deserve the most objective, comprehensive analysis of new products possible. We have established review panels, each consisting of three reviewers whose background qualifies them to analyze new items of software or hardware.

To better prepare you for your buying decisions, and to present fair reviews, we collect the three independent opinions of our panelists into one Overview. Lawyers will test legal packages in the environment of a legal office, doctors will test medical systems, and this issue's Overview panel is made up of professional writers. We believe that you will find **COMPUTE!** Overviews complete, informative, and balanced. — KEM

The "LETTER PERFECT" program by LJK Enterprises, Inc. is one of the first word processor programs for Atari. It requires 24K of memory and one disk drive and costs \$149.

The program is very well documented, and easily followed, with 85 pages of instruction and indexing. This material is supplied in a handsome binder.

As the manual states, the control functions are relatively simple to remember (Control A for "go to beginning of a line," for example, or Control Z for "go to the end of a line," and control T for "go to the top of the page"). This doesn't mean you can remember all 42 functions after one sitting, of course, but the letters are not just utilized arbitrarily and it doesn't take long to catch on. (See Table 1).

In its present format, Letter Perfect is configured for the Atari 825 Printer and the Epson MX 80.

The Epson will not permit underlining, subscripts or superscripts, but the program does permit use of standard, condensed, and enhanced fonts. On the Atari 825, you may use standard, boldface or proportional fonts, although you will not get right hand justification when you use the proportional font.

Printer Considerations

It seems clear that anyone considering the purchase of a printer would do well to check on just what Word Processing systems are currently available that support the various printers, and what they do. In that context, Ken Leonhardi of LJK Enterprises, who puts out Letter Perfect, says that

improvements are planned that include the capability of using Letter Perfect with just about any printer on the market.

It is very flexible in the format of the print and allows the user to set the format several times within the text. This could be used to single space for quotations in a double spaced letter or to indent a list of items within a manuscript.

Other printout features include auto page numbering, header and footer capability, auto line centering and all the standard features such as single/double line spacing and left margin adjust.

An Unusual Disk Capability

Letter Perfect also has its own disk operating system, which for some uses could be a disadvantage. Leonhardi says, however, a utility program will be released that will enable the program to be used with the Atari DOS.

Future disk versions of Letter Perfect will be available at a small additional cost for those who buy the current version.

One small warning: there are some early Atari disk drives on which Letter Perfect won't operate. This is apparently true for only a handful of the first Atari 810s that were released, but, if you've had one for some time, there could be a problem in running this program.

There are good and bad points to the unusual requirement that disks be specially formatted for Letter Perfect text storage. The manual describes "packing" — removing unnecessary spaces (such as the spaces between the period which ends one paragraph and the start of the next paragraph). This permits more text on a given disk. WordPro, for the Commodore machines, for example, saves every space to the disk. On the other hand, few of us are novelists, nor would we care very much about saving great amounts of text to individual disks. If you were writing a book, you might find that such packing saved a little time, but normal word processing uses do not benefit much from any special disk storage efficiency. The manual also suggests that such storage prevents problems should Atari change its DOS in the future. The special Letter Perfect formatting takes about 1 minute per disk. However, you usually need to format only rarely in word processing application.

Text Entry

First, some mechanics.

When you first load the program you are given a menu of commands, such as Editor, Load, Save, Printer, Delete, Lock, Unlock, etc. You go to the Editor command to begin writing, and can return to the menu by hitting the escape key.

All of the Letter Perfect processing functions are done by using the Atari control key. This works out quite well, since most Atari users already are practiced at using the up, down, right and left

GREAT GAMES FOR ATARI Gin Rummy 3.0

The classic computer Gin Rummy game now available for Atari, with color graphics and sound. Plays a regulation game, and a tough game that will hold its own against anyone. Keeps score to game level. Disk version keeps a running score in disk file so you can start another session where you left off. 24K Cass. IGR/C \$19.95, Disk IGR/D \$24.95.

Casino Blackjack/Counter

Play at a very realistic casino table — learn to beat the house at its own game, or just play for fun following the recommended bets. You play one of five hands (the computer plays the others), and practice card counting as the cards are dealt. Choose up to 6 decks to play against, and set the dealing speed to slow, medium or fast. 16K Cass. IBJ/C \$19.95, Disk IBJ/D \$24.95.

Concentration

Excellent full-color graphics, great fun to play on the screen. Where was that sailboat you saw two turns ago? Choose up to 15 pairs of figures — a smaller game is fascinating for children, and 15 pairs will challenge anyone. For 2 players. 16K Cass. ICO/C \$14.95.

Atari 3-Game Pack

These three great Atari games — Gin Rummy, Blackjack and Concentration — on a single disk, and at less than the cost of the three separately. \$49.95.

ALL PROGRAMS OPERATE WITH JOYSTICKS

AT YOUR DEALER OR DIRECT FROM:

MANHATTAN SOFTWARE

POST OFFICE BOX 1063
WOODLAND HILLS, CA 91365

California residents add 6% sales tax
24-hour Visa and MasterCard order line:

(213) 704-8495

A Revolutionary Concept In Software
For The ATARI® 400 and 800 Computers

The Interactive Storybook

Sammy The Sea Serpent

A Storybook Program For Children Ages 4 to 7.

Sammy The Sea Serpent

is the story of an imaginary sea creature who is lost and trying to find his way home. The story is read aloud to your child by a professional actress. While the tale is being told, the child uses the joystick to help Sammy out of some tight spots.

The A side of the cassette contains the interactive story; the B side contains games that the child plays with Sammy.

The program uses voice, sound effects, music, color and mixed graphics.

Sammy The Sea Serpent

can be used with either the ATARI 400 or 800 and requires 16K. It is available in cassette format only. Price is \$16.95 plus \$2.00 shipping and handling.

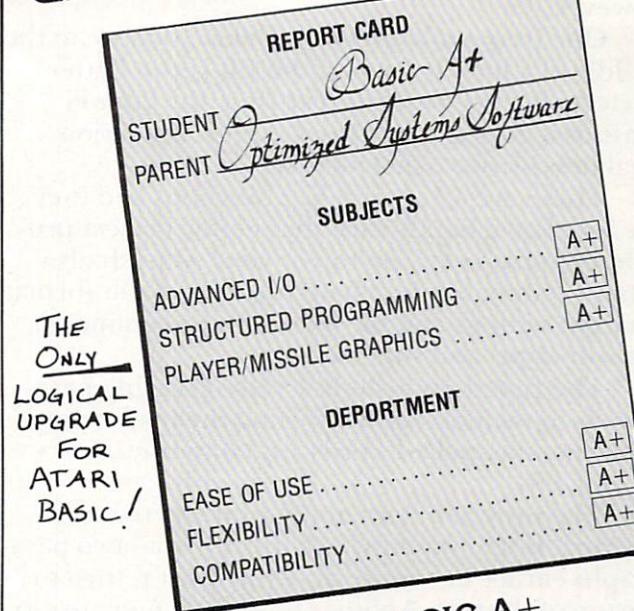
Also available at fine computer stores.



Program Design, Inc./11 Idar Court Greenwich, CT 06830
203-661-8799

Atari is a reg.™ of Atari, Inc.

UPGRADE YOUR ATARI®



**GRADUATE TO BASIC A+
FROM THE AUTHORS OF ATARI BASIC!**

BASIC A+

BASIC A+ will rate an A+ from any Atari user! Upward compatible with Atari Basic, it adds statements and features that enhance the Atari 800's real power, flexibility, and ease of use: Superior I/O features for business and other applications. Additional file manipulation commands. Significant help in program development and debug. Structured programming aids. And MORE! A partial list of the enhancements of BASIC A+ includes:

RPUT/RGET (record I/O) BPUT/BGET (binary I/O) ERASE
PRINT USING SET TAB INPUT "... DIR PROTECT RENAME
TRACE WHILE...ENDWHILE IF...ELSE...ENDIF
SUPERB PLAYER/MISSILE GRAPHICS

BASIC A+ requires a disk and 32K bytes of RAM. Since no cartridge is used, BASIC A+ will take advantage of all the RAM (48K bytes) in a maximum Atari 800 system (recommended) \$80

OS/A+

Completely compatible with Atari's DOS (version 2), but with an advanced, command-driven console processor. Simple. Flexible. Powerful. With an easy-to-use BATCH capability. OS/A+ INCLUDES all the following utilities (and more):

EASMD (Editor/ASSEMBLER/Debug) is our upgraded all-in-one assembly language development package for the 6502 microprocessor. The editor — with such features as FIND and REPLACE — can even edit BASIC A+ programs. The assembler can include multiple source files in a single assembly.

DUPDSK and FORMAT create master or slave disks. Make sector by sector copies of any OS/A+ disk.

COPY a simple, single file copy utility.

All of this power is included in our OS/A+ package \$80

For the utmost in capability and flexibility, our combination system — BASIC A+ and OS/A+ — is available \$150

**SOFTWARE IN A CLASS BY ITSELF
AVAILABLE NOW THROUGH LOCAL DEALERS**

Optimized Systems Software, Inc.
10379 Lansdale Ave., Cupertino, CA 95014,
(408) 446-3099



arrows and the insert and delete functions, and they operate in Letter Perfect just as you would normally use them to write a program on your Atari. There are some things to watch out for, however.

One frequently uses the tab key to move to the middle of a line. If you use the tab key in Letter Perfect on a line that has text on it, the tab will erase as it goes along. This was seen as a serious weakness by two panel members.

There are 42 control key functions and they are listed on a handy card that Letter Perfect provides that fits neatly on top of your Atari. It also lists 13 commands for changing the default format (margin settings and the like) and the commands for subscripts and superscripts.

The functions include scrolling, saving paragraphs in memory, and inserting them afterward, replacing misspelled words automatically, tab setting, etc.

The program does not permit you to scroll upward. If you want to back up and read two paragraphs earlier in your text — you must return to the top of the text. Another time consuming feature is the fact that whenever you go from a main menu function (such as disk access) back to the text mode for writing, you must wait for the entire text to scroll down the screen in front of you. Such features quickly become tiresome when you are forced to wait for them.

The Atari screen permits only $\frac{1}{2}$ page (a standard, typewritten $8\frac{1}{2} \times 11$ sheet) to appear at one time. Though the panel felt that this was not fatal, it was seen as a constraint for many wordprocessing applications. In general, the more text available to you at a time, the easier it is to edit and review.

One of the primary differences between using a typewriter versus a wordprocessor is that, on the latter, you do not hit a carriage return until you reach the end of a *paragraph*. The computer will later break your text into individual lines when printing it on paper. Typing becomes more convenient and faster.

Related to this is a "parsing" feature whereby a word will not break at the rightmost side of the screen. If you type through the right side (your word flows onto the next line), Letter Perfect jumps the entire word down to the start of the next line. Some word processors parse, some do not. It is sometimes thought that parsing makes it easier to read a video text since no words are ever broken in half. The majority of our panelists felt, however, that the jumping action during typing is more distracting than the minor inconvenience created by randomly hyphenated words on screen. What is more, parsing wastes screen space.

After, or during, text entry a process called editing is used to correct errors, change wording, move paragraphs, etc. Editing using "LETTER

PERFECT" is a simple process identical to editing BASIC programs. The cursor is moved using both the control key and a cursor direction key. Then characters are inserted/deleted using the control and insert/delete keys.

More sophisticated editing capabilities are also provided:

Search — Automatically searches for a specific text string. Allows easy location of certain area of text.

Search/Replace — Automatically searches for a specific string and replaces it with another string. Very useful for changing misspelled names, etc.

Scroll 1 Page — Automatically displays the next complete page of text. This is more convenient than line scrolling which is also available.

Go To End/Beginning Of Line — Moves the cursor to the end/beginning of the current line. This saves time in moving the cursor.

Also provided is the ability to edit blocks (paragraphs or as much as two pages) of information. This allows moving paragraphs within the text without retyping. This capability is useful.

The General Overview

•**Panelist #1:** "This is my first use of a word processor as a writer. What do I think of it? On that score, the only thing I can say is sensational."

After this first effort, I am fully prepared to kiss those old manual Underwoods and Royals goodbye.

But, remember, I am doing this review from the standpoint of a professional writer, not a businessman or an engineer. For the kind of final polishing I want to do, the editing functions of this program are everything I could ask for. Formatting is not particularly important to me, since most of the writing I do consists of fairly simple blocks of text.

For writing articles, papers, simple business letters, and the usual run of home uses, I find the Letter Perfect program to be quite adequate. It also happens to be fun to use, something which is a lot more important than it sounds.

Like many people who get paid for writing, I find one of the hardest things in the world to do, and one of the easiest things to avoid, is just plain sitting down and writing. Since I've had this program in my home, I've discovered that whenever a new idea comes to me, I can't wait to get at it."

•**Panelist #2:** "I feel that Letter Perfect (with exceptions such as parsing, no upscrolling, etc.) makes extensive and positive use of the computer as a writing tool. I would wonder, though, if the Atari, with its $1/2$ printer-page screen limitation, would be the best computer to use for lengthy writing

tasks. However for shorter, more common, word processing (essays, letters, mailings and the like), Letter Perfect on the Atari does an admirable job."

•Panelist #3: "Space does not permit a discussion of all the features of "LETTER PERFECT" or a complete description of the keystrokes necessary to accomplish the functions. However, let me say that "LETTER PERFECT" is a very powerful word processor which has been written with ease of operation in mind and should be considered by Atari owners with word processing applications."

Letter Perfect

LJK Enterprises, Inc.,

P.O. Box 10827

St. Louis, MO 63129

\$149.00

An Overview of Textwizard is currently being prepared. Watch for it in an upcoming issue of **COMPUTE!**

Letter Perfect Atari Functions

KEY	FUNCTION
CTRL A	GO TO BEGINNING OF LINE
CTRL B	BOLDFACE TOGGLE
CTRL C	CENTER NEXT LINE
CTRL D	DELIMITING CHARACTER
CTRL E	(END) GO TO END OF TEXT
CTRL F	FORMAT LINE
CTRL G	FOOTER
CTRL H	HEADER
CTRL I	IMPROVE TEXT
CTRL J	(JOIN) ADD TO BUFFER
CTRL K	(KILL) DELETE BUFFER
CTRL L	(LIFT) INSERT FROM BUFFER
CTRL M	MOVE TO BUFFER
CTRL N	(NEXT) DELETE NEXT BLOCK
CTRL O	(ON, ON, ON) CONTINUOUS SCROLL
CTRL P	FORCED END OF PAGE
CTRL Q	SCROLL ONE PAGE FORWARD
CTRL R	(REPLACE) SEARCH AND REPLACE
CTRL S	(SEARCH) SEARCH ONLY
CTRL T	(TOP) GO TOP OF SCREEN
CAPSLOWR	SHIFT LOCK
CTRL U	UNDERLINE TOGGLE
CTRL V	SPECIAL PRINT CHARACTERS
CTRL W	DELETE ALL BEFORE CURSOR
CTRL X	DELETE ALL TEXT
CTRL Y	DELETE ALL AFTER CURSOR
CTRL Z	GO TO END OF LINE
ESC	EXIT EDITOR
CTRL ↑	MOVE CURSOR UP
CTRL ↓	MOVE CURSOR DOWN
CTRL ←	MOVE CURSOR TO LEFT
CTRL →	MOVE CURSOR TO RIGHT
(RETURN)	INSERT CARRIAGE RETURN
sft-DEL	DELETE NEXT LINE
sft-INS	INSERT LINE AT CURSOR
CTRL TAB	CLEAR TAB AT CURSOR
sft-TAB	SET TAB AT CURSOR
CTRL DEL	DELETE A CHARACTER
CTRL INS	INSERT A CHARACTER
sft-CLEAR	GO TO BEGINNING OF TEXT
DEL	DELETE LAST CHARACTER
TAB	TAB TO NEXT TAB STOP

ATARI SOFTWARE at DISCOUNT PRICES from COMPUTER HOUSE

Adventure International

	Sug. retail	Our Price
Adventures 1 thru 10 each (C)	19.95	16.00
Star Trek 3.5 (C)	19.95	16.00
Angleworms (C)	14.95	11.95
Sunday Golf (C)	14.95	11.95
Mountain Shoot (C)	14.95	11.95
Deflection (C)	14.95	11.95

Automated Simulations

Datestones of Ryn (C)	19.95	16.00
Invasion Orion (C)	24.95	20.00
Rescue at Rigel	29.95	24.00

The Code Works

Iridis - 1 (C)	9.95	7.95
(D)	12.95	10.35
Iridis - 2 (C)	15.95	12.75
(D)	18.95	15.15

Crystal Computer

Galactic Quest (D)	29.95	23.95
House of Usher (D)	24.95	20.00
Imperial Walker (D)	29.95	23.95
Lazar Wars (D)	29.95	23.95
Little Crystal (D)	39.95	31.95
Sands of Mars (D)	39.95	31.95
Summer 4000 BC (D)	19.95	15.95

Dynacomp, Inc.

Valdez (C)	14.95	11.95
(D)	18.95	15.15
Flight Simulator (C)	17.95	14.35

Optimized Systems Software

Basic A* (D)	80.00	70.00
OS/A (formerly CP/A) (D)	80.00	70.00

Personal Software

Visicalc Atari	199.95	149.00
----------------	--------	--------

Program Design, Inc.

Bowling (C)	16.95	13.55
Code Breaker (C)	16.95	13.55
Mini Crossword (C)	16.95	13.55
Preschool QBuilder (C)	16.95	13.55
Word Search: Spanish	16.95	13.55

Quality Software

Assembler (C)	24.95	20.00
6502 Disassembler (C)	11.95	9.95
Fastgammon (C)	19.95	15.95
Tank Trap (C)	11.95	9.55
(D)	14.95	11.95
Tari Trek (C)	11.95	9.55
(D)	14.95	11.95
QS Forth	79.95	63.95

Swiftly Software

Programming Aids I (C)	14.95	11.95
(D)	19.95	15.95
File-It (D)	34.95	27.95
File-It 2 (D)	49.95	39.95

T.H.E.S.I.S.

Word Scramble (C)	15.00	12.00
Spellbound (C)	15.00	12.00
SB Data Tapes 1 thru 10 each tape	5.00	4.00
All 10	50.00	36.00

(C) Cassette (D) Diskette

IF YOU DON'T SEE IT, write and ask!

Send orders to:

COMPUTER HOUSE

P.O. Box 369, Dept. 10 Mammoth Lakes, CA 93546

(714) 934-6538

Terms: FOR FAST DELIVERY, send certified checks, money orders or Visa or MasterCard number and expiration date. Personal checks require 3 weeks to clear. ADD \$1.50 for postage. Orders over \$100 we pay shipping. All foreign orders add \$10.00 CALIFORNIA residents add 6% tax. Prices subject to change.

SPECIAL PRINT CHARACTERS

* SUBSCRIPT \$n PRINT STRING n
 ^ SUPERSCRIPT #n PRINT NUMBER n

FORMAT REPRESENTATIONS DEFAULT VALUES

d	default values	d	(no number needed)
r	reset standard	r	(no number needed)
t	top margin	t	5 spaces
m	left margin	m	10 spaces
j	justification	j	1 (justify)
w	set line width	w	64 characters
l	line spacing	l	1 (single spacing)
p	printed lines/page	p	56 lines
s	stop	s	0 (no stop)
f	set type font	f	0 (10 cpi)
a	margin adjust	a	0 (no adjust)
b	bottom margin	b	5 spaces
n	set page number	n	0 (not printed)

Editor's Note: The manufacturer provided the following updates, now included in the standard Letter Perfect 2.0. Our review panelists did not work with version 2.0.

— RTM

Manufacturer's Update

Letter Perfect Version 2.0 differs from the earlier version in the following manner:

1. Fonts — The following enhancements have been made with regard to the two different printers supported by this program.

A. Atari 825 Printer and Centronics 737-739 have the following changes. The PROPORTIONAL FONT of this printer is not the default font in the program. The PROPORTIONAL FONT is right justified as a default value. Font 1 is the condensed font of 16.7 characters per inch and Font 2 is now the 10 character per inch font. All of these fonts are right justified as a default value, and can be used as indicated in the manual. Boldface or expanded print can now be used within the body of a line without regard to other types of fonts also appearing in that line. Right justification will remain in effect. The left margin is now set at a default value of 12 and the width defaults to 78. The use of the adjusted margin may cause minor difficulties. The left justification of the adjusted margin may cause some variance because all spaces in the margin are twelve dots wide. This font allows for variation in the individual character and therefore the alignment may not be as straight as desired. To obtain optimal results it is best to experiment.

B. Epson MX-80, MX-100, GRAFTRAX — These printers may now be used with this program with the following changes noted. If you have the new GRAFTRAX Proms as sold by Epson, you may use the additional characteristics of Italics characters. Italics are turned on by using the superscript command (CTRL-V) as described in the manual. Italics are turned off by doing a subscript (CTRL-V*). Underlining may be performed on short words by using the underline toggle (CTRL-U). If an excess number of characters are underlined the printer may time out. Boldface may now be used in the main body of the text.

2. Header and Footer Spacing — The spacing between headers and footers and the main body of the text is now variable. The defaults are 4 spaces for headers and 4 spaces for footers. They may be changed by entering a lower case h followed by the spacing for a header in a format line (starting with a CTRL-F) and footer spacing can be changed by using a lower case z in a format line. ©

Atari Disk File Dump

Robert W. Baker
 Atco, NJ

Here's another handy utility program for the Atari 800, for anyone with an 810 or 815 disk drive. It provides a hexadecimal dump of *any* disk file along with an ASCII representation of any valid ASCII characters. With this program you can quickly examine how Atari BASIC stores programs and data on diskette. This could be extremely valuable when debugging programs that write or read disk data files.

The program was written to provide only printed output, since most dumps would be too large for the display. Also, the printed output was formatted for the 80-column Atari 825 printer. If you only have the 40-column Atari 820 printer, the program can be easily modified for the shorter line length. Simply shorten the heading lines in program lines 302 and 310, stopping at "7." Then change the loop count in line 600 from 16 to 8 to print eight bytes per line instead of 16. You might also want to shorten the filename printout and remove the CHR\$(15) and CHR\$(14) from line 300. That should be all you have to change for the 40-column format.

To use the program, enter the filename for the disk file to be dumped, such as: FILEDMP.BAS. The drive number always defaults to 1. The filename will be printed at the top of the listing along with a byte count heading. The dump will then follow with 16 bytes per line. At the end of each line is the ASCII representation of any data that is a valid ASCII character. All unprintable characters are printed as periods in the ASCII field.

As the dump is being printed you can press any key on the keyboard to halt the output. Then press "C" to continue the dump, "R" to restart and select another file to be dumped, or "S" to stop the program and terminate the dump.

If the end of the disk file is reached, the program will indicate on the dump the end of file (EOF) was reached. You may want to note the TRAP statement in program line 228. When an error is detected, the program branches to line 900. A PEEK of location 195 checks for error number 136. If an end of file (error #136) was detected, the program returns to ask for another filename. Otherwise, the detected error is indicated on the display and the program terminates after closing all files.

```

10 REM *****
25 REM HEX DISK FILE DUMP
35 REM BY: ROBERT W. BAKER
40 REM 15 WINDSOR DR, ATCO NJ 08004
60 REM *****
70 GRAPHICS 0
100 DIM H$(16),S$(16),F$(16)
110 H$="0123456789ABCDEF"
130 F$="D1:"
150 OPEN #1,4,0,"K"
200 PRINT CHR$(125);"H E X F I L
E D U M P ":"? :?
210 PRINT "ENTER DISK FILE NAME"
220 INPUT S$:F$(4,14)=S$
225 IF S$="" THEN 800
228 TRAP 900
230 OPEN #5,4,0,F$
280 OPEN #2,8,0,"P"
290 PRINT CHR$(125);"DEPRESS ANY KEY TO
HALT PRINTER";PRINT #2
300 PRINT #2;CHR$(15);"HEX DUMP OF FILE
--> ";F$:CHR$(14);PRINT #2
302 PRINT #2;"BYTE# 0 1 2 3 4 5 6
7 8 9 A B C D E F "
310 PRINT #2;"-----"
320 POKE 764,255
370 V=INT(A/256):GOSUB 1000

```

```

375 U=A-(U*256):GOSUB 1000
380 PRINT #2;" ";
400 S$=""
600 FOR X=1 TO 16:GET #5,U
610 GOSUB 1000:PRINT #2;" ";
615 S$(X)=".":IF (U>31) AND (U<123) THEN
S$(X)=CHR$(U)
620 A=A+1:NEXT X:PRINT #2;" ";S$
640 IF PEEK(764)=255 THEN 370
650 GET #1,X
700 POKE 752,1:PRINT
705 PRINT "CONTINUE, RESTART, OR STOP (C
,J,R,S) ?";
710 GET #1,X:IF X=67 THEN 290
730 IF X=82 THEN 990
740 IF X>83 THEN 710
800 POKE 752,0:CLOSE #1:CLOSE #2:CLOSE #
5:END
900 U=PEEK(195):IF U>136 THEN PRINT "ER
ROR# ";U:GOTO 900
910 FOR A=X TO 16:PRINT #2;" ";:NEXT A
920 PRINT #2;" ";S$:PRINT #2:PRINT #2
;"EOF"
990 CLOSE #2:CLOSE #5:GOTO 200
1000 H=INT(U/16):L=U-(H*16)
1010 PRINT #2;H$(H+1,H+1);H$(L+1,L+1);
1020 RETURN

```

©

SOFTWARE STREET PRESENTS

SOFTWARE

ADVENTURE INTERNATIONAL	
All Scott Adams' Adventures (each)	15.95
ATARI	
Music Composer	50.96
Kingdom	12.71
Hangman	12.71
Energy Czar	12.71
Blackjack	12.71
Space Invaders	16.96
Basketball	33.96
Video Easel	33.96
Super Breakout	33.96
Computer Chess	33.96
3D Tic Tac Toe	33.96
Star Raiders	48.96
Scram	16.96
Asteroids	33.96
Missile Command	33.96
Mailing List	16.95
Mortgage & Loan Analysis	12.71
Bond Analysis	21.21
Stock Analysis	21.21
Stock Charting	21.21
Calculator	25.46
Financial Management System	60.00
Dow Jones Invest. Eval.	79.95
Accounts Receivable System	399.00
General Accounting System	399.00
Inventory Control	399.00
Word Processor	129.95

CRYSTALWARE

All Talk & Teach Cassettes	25.95
Invitation To Prog 1,2,3 (each)	16.96
Touch Typing	21.21
Conv. Span, Fren, German (each)	50.96
Statistics	16.96
Educ. Sys. Master Cartridge	19.95
States & Capitals	12.71
European Countries & Caps.	12.71
Graph It	16.96
Assembler/Editor	50.96
Telelink I	21.21
Microsoft BASIC	74.95
Pilot	74.95
Fantasyland	49.95
House Of Usher	19.95
Gallactic Quest	24.95
Sumer	16.95
World War II	25.95
Laser Wars	25.95
Sands Of Mars	35.95
Beneath The Pyramids	25.95
Little Crystal	35.95
Waterloo II	44.95
DYNACOMP	
Poker Party	15.95
Valdez	13.95
Flight Simulator	15.95
Monarch	10.95
Intruder Alert	14.95
Giant Slalom	12.95

HARDWARE

ATARI 800 16 K	739.00
ATARI 400 16 K	339.00
ATARI 410 Recorder	65.00
ATARI 810 Disk Drive	439.00
ATARI 815 Dual Disk	1049.00
ATARI 820 Printer	349.00
ATARI 822 Printer	349.00
ATARI 825 Printer	699.00
ATARI 830 Modem	159.00
ATARI 850 Int. Mod.	169.00
8K Ram	49.00
16K Ram	99.00
Paddles (pr)	17.00
Joystick (each)	9.00
Blank Diskettes (5)	22.50

FREE CATALOG AVAILABLE

SOFTWARE STREET

3392 Clipper Dr.

Chino, CA 91710

(714) 597-6959

ATARI IS A REGISTERED
TRADEMARK

\$2.00 minimum shipping

AND MUCH MORE!!

prices subject to change

Atari Program Library

Ron and Lynn Marcuse
Freehold, NJ

One of the most difficult aspects of owning a home/personal computer is maintaining an accurate catalog of programs and data files. We first attacked this problem through the use of a home-grown data base which handled the program library in addition to other data. But, alas, it became too time consuming to manually update the data base as new programs were added or changes made. The logical extension to this concept was to automate the cataloging process. To accomplish this, one must compare the index of the disk to the program library file, adding or deleting records on the file as the comparison warrants. The ease of OPENing the ATARI's DOS directory from BASIC greatly facilitated the programming, but more on this later.

Besides the automatic cataloging function, other required features were:

1. Listing the directory from the program.
2. Cataloging Non-DOS disks.
3. Inquiry, Browse and formatted Print output of catalog records.
4. Maintaining other data not supplied by the disk directory (source, description, type, and date).
5. Sorting the file on any field (in machine language, for speed).
6. An auto-locate function to RUN any program.
7. Variable search criteria to locate any program.
8. Creating an internal label to

Table 1. List of variables.

NAME	SIZE	DESCRIPTION
AP\$	21	"ATARI PROGRAM LIBRARY"
REC\$	62	Program Library Record
VOL\$	4	Disk (or other) Volume Number
DSN\$	12	Data Set Name (Filespec)
DES\$	22	Description
TYP\$	7	Type (Game, Data, etc.)
SRC\$	7	Source
DAT\$	6	Date (Entry, Version, etc.)
SEC\$	3	Number of Sectors
X\$	var	Input String (Main Prog and Sort)
IN\$	20	Temporary String Storage
PL\$,PC\$		Filespecs (D:PROGLIB.DB & D:DISK.CAT)
SV\$	20	Search Value
SS,SE		Search (and Sort) Start, End Positions
SK		Search Key
B		Transaction Type
R		Return Line Number from TRAPPED Error
ST		IOCB STATUS Value
I,J,L,N		Counting for Loops, Lines, etc.
NP		Number of Files in Directory
IO		Input/Output Type
SEC,BYT		Sector, Byte values for NOTE, POINT
P		Output Type (1=Inqy, 2=Browse, 3=Print)
EOF		Record Counter

Table 2. Key conversion (Epson MX-80 printer).

SYMBOL	ASCII VAL (Dec)	KEY SEQUENCE (ATARI)	DESCRIPTION
[A]	0	CON; , (comma)	Null; End of Tab Set Seq
[B]	9	CON; I	Horizontal Tab
[C]	14	CON; N	Print Double Width Characters
[D]	27,68	ESC;ESC;D	Set Tab (followed by Tab Positions and NULL Char)
[E]	253	ESC;CON;2	Console Bell
[F]	125	ESC;CON;CLR	Clear Screen
[G]	29	ESC;CON; =	Move Cursor Down
[H]	10	CON; J	Line Feed

Note: The string of X's in line 3090 are the printer tabs.
Type the ASCII characters for these decimal values:
6,20,39,53,62,70 (i.e. 6 is CON;F)

Program 1.

```

10 DIM AP$(21),PC$(10):AP$="ATARI PROGRAM LIBRARY"
12 REM ** RON MARCUSE, FREEHOLD NJ **
30 OPEN #2,4,0,"K:";POKE 82,0,:? "[E]"
50 DIM REC$(62),VOL$(4),DSN$(12),DES$(22),TYP$(7),SRC$(7),DAT$(6),SEC$(3)
60 DIM X$(500),IN$(20),SV$(20),PL$(12):PC$="D:DISK.CAT":PL$="D:PROGLIB.DB"
100 GRAPHICS 0:POKE 16,64:POKE 53774,64:?:AP$?:,[6] CATALOG OPTIONS"
110 ?: [6] 1 AUTO CATALOG      5 UPDATE RECORD"
120 ?: 2 LIST DIRECTORY      6 SORT LIBRARY"
130 ?: 3 ADD DISK (NON DOS)  7 RUN PROGRAM"
140 ?: 4 INQUIRY/LIST        8 END SESSION"
160 GOSUB 6900:TRAP 16:B=VAL(CHR$(A)):TRAP 40000:IF B<1 OR B>8 THEN 160
170 B=B+1:IF B>3 THEN 500
180 ?: IF B=3 THEN 300
190 ?: INSERT DISK TO BE CATALOGED:GOSUB 6910
200 TRAP 240:OPEN #3,4,0,PC$:TRAP 40000:INPUT #3,IN$
210 IF LEN(IN$)<14 OR IN$(1,10)>PC$ THEN ?: ERROR- ";PC$:GOTO 250
220 B=1:VOL$=IN$(11,14):GOTO 290
240 CLOSE #3:R=200:STATUS #3,ST:IF ST<>170 THEN 9000
250 ?: ENTER DISK # (DNNN) =>;:INPUT VOL$:IF LEN(VOL$)=0 THEN 100
260 R=260:TRAP 9000:OPEN #3,8,0,PC$?:#3,PC$:VOL$
290 CLOSE #3:X10 35,#3,0,0,PC$
300 R=300:TRAP 9000:OPEN #3,6,0,"D:#.##":L=0
310 TRAP 400:INPUT #3,IN$:TRAP 40000
320 IF LEN(IN$)<17 THEN 400
330 IF B=3 THEN ?,IN$:L=L+15:GOTO 310

```

automatically identify a disk. All of these goals were achieved in the program which, incidentally, requires at least 24K RAM, one disk drive (810 or 815) and DOS II.

You did notice that there is a "II" after "DOS." ATARI has finally released the new version and, to say the least, it is a vast improvement. Not that we were unhappy with its predecessor, but it did tend to hide whenever one walked by with a can of "RAID" or "BLACK FLAG." Yes, there are bugs in DOS I, one of which leads the NOTE and POINT commands (needed to update any record) somewhere into *the twilight zone*. This program can be modified to work under DOS I, but the explanation would probably take up the rest of the magazine. If you plan to do any serious file processing, it would be advisable to pick up a copy of DOS II.

There are other advantages as well, such as less RAM used through the auto-swap feature (the program and DOS share the same area).

The three listings represent the main program, the sort program and the machine language sort routine. The sort program is executed by a RUN statement, allowing the DIMensioning of the rather large string necessary to sort the file in. It loads the file into X\$ and calls the machine language sort through the USR function in line 70. You may POKE the routine into storage using the third BASIC program. You must do a BINARY SAVE (DOS II function "K") with AUTORUN.SYS as the file name, 0600 and 066D (hex) as the starting and ending addresses. A possible alternative to this would be to key the FOR/NEXT loop and DATA statements into the BASIC sort program, with the loop as line 14.

The main program begins with the DIMensioning of strings and OPENing of the keyboard in lines 30-60. The strings and other variables are detailed in the ac-



GALACTIC CHASE™

The aliens have swept undefeated across the galaxy. You are an enterprising star ship captain—the final defender of space.

As the aliens attack, you launch a deadly barrage of missiles. Flankers swoop down on your position. Maneuvering to avoid the counterattack, you disintegrate their ships with your magnetic repellers. As your skill improves, the attackers increase their speed. And as a last resort, the aliens use their invisible ray to slow the speed of your missile launcher.

GALACTIC CHASE provides Atari owners with the most challenging one or two person game in the galaxy.



Atari 400/800 16k. Written in machine language. Requires joysticks.

Payment: Personal Checks—allow three weeks to clear.

American Express, Visa, & Master Charge—include all numbers on card. Please include phone number with all orders. 24.95 for cassette or 29.95 for disk plus 2.00 shipping. Michigan residents add 4%.

Check the dealer in your local galaxy. Dealer inquiries encouraged.

Galactic Chase © 1981 Stedek Software.

SPECTRUM
COMPUTERS

Dept C.
26618 Southfield
Lathrup Village, MI. 48076
(313) 559-5252

companying table. Graphics mode 0 is set and the <BREAK> key is disabled (POKE 16,64:POKE 53774,64) in line 100. This begins the start of the primary option menu as well. An option (from 1 to 8) is selected and held in variable B. Note that B is increased by 1 in line 170, allowing "Auto-catalog" to split into two functions depending on whether or not the disk has already been cataloged. A "D:DISK.CAT" file, containing the volume number, is written on each as an internal label. If this file is found on any disk, the volume number is retrieved and a "re-catalog" function is performed. If not found, a new disk is assumed and the volume number is requested in line 250. One important note: there is a liberal use of subroutines in the program and, for expediency, we will get into them later.

The options that do not require a DOS directory ($B > 3$) are shunted to line 500. Those that do are sent through the routine (lines 300-430) that OPENS the disk directory ($IO = 6$) and stores it as substrings of X\$. The file name is translated into the more familiar format FILENAME.EXT in lines 340-360. File names equal to DOS.SYS, DUP.SYS, MEM.SAV or DISK.CAT are dropped at this point (Why catalog them?). Line 500 (ON B GOTO) then transfers program control to the routine that will process the requested option.

The "Re-catalog" function ($B = 1$, lines 1000-1110), after OPENing the library file for both input and output operation ($IO = 12$), extracts all records having that volume number. These are then compared to the directory string (X\$). Changes and deletions are posted to the file using the NOTE and POINT commands. An asterisk (*) is moved to each directory member that was successfully matched to the library. At the conclusion of this procedure, control is passed to "Auto-catalog."

The "Auto-catalog" function

```

340 FOR I=3 TO 10:IF IN$(I,I)<>" " THEN NEXT I
350 DSN$(1,8)=IN$(3,10):DSN$(9,9)=" ";DSN$(I-1)=IN$(11,13)
360 IF DSN$(I-1)<>" " THEN DSN$(I-2,I-2)="."
370 IF DSN$="DOS.SYS" OR DSN$="DUP.SYS" OR DSN$="MEM.SAV" OR DSN$="DISK.CAT" THEN 310
380 X$(L+1,L+12)=" " :X$(L+1,L+12)=DSN$
390 X$(L+13,L+15)=IN$(15,17):L=L+15:GOTO 310
400 CLOSE #3:NP=L/15
410 ? :? " FILES FOUND= ";NP;," FREE SPACE= ";IN$(1,3)
420 IF B<3 THEN ? " DISK IS # ";VOL$:" INSERT D:PROGLIB.DB"?
430 GOSUB 6910:IF NP=0 THEN 100
500 ON B GOTO 1000,1200,100,2000,3000,4000,5000,5500,900
900 GRAPHICS 0:END
950 GOSUB 6250:GOTO 100
960 POP :GOTO 100
990 FOR I=1 TO 300:NEXT I:RETURN
1000 REM ## RE-CATALOG
1010 ID=12:GOSUB 6200:SV$=VOL$:SK=1:SS=1:SE=4:EOF=0:L=0
1020 GOSUB 7000:IF SK=9 THEN 1190
1030 FOR N=1 TO NP:IF X$(N#15-14,N#15-3)=DSN$ THEN 1100
1040 NEXT N:REC$(62)="D":? " ";DSN$;" DELETED ON ";VOL$:GOTO 1110
1100 REC$(59,61)=X$(N#15-2,N#15):X$(N#15,N#15)="*":L=L+1
1110 POINT #3,SEC,BYT: #3:REC$:GOTO 1020
1190 GOSUB 6250:IF L=NP THEN 100
1200 REM ## AUTO CATALOG
1210 ID=9:GOSUB 6200
1220 FOR N=1 TO NP:IF B=1 AND X$(N#15,N#15)="*" THEN 1240
1230 DSN$=X$(N#15-14,N#15-3):SEC$=X$(N#15-2,N#15):GOSUB 6800
1240 NEXT N:GOTO 950
2000 REM ## MANUAL ADD
2010 ID=9:GOSUB 6200:GOSUB 6800:GOTO 950
3000 ? "[F][G] ";AP$;" - INQY/LIST":N=8:GOSUB 6500:?
3020 ? " OUTPUT:","1. INQUIRY":? , "2. BROWSE":? , "3. LISTING"
3040 GOSUB 6900:TRAP 3040:P=VAL(CHR$(A)):TRAP 4000:IF P<1 OR P>3 THEN 3040
3050 L=0:ID=4:GOSUB 6200:EOF=0:IF P<3 THEN 3100
3090 R=3090:TRAP 9020:OPEN #4,B,0,"P":TRAP 4000: #4;"[D]XXXXXX[A]""
3100 GOSUB 7000:L=L+1:IF SK>8 THEN 3300
3110 ON P GOTO 3120,3160,3200
3120 GOSUB 7600:?
3130 L=0:?" (E=END) OR":;GOSUB 6910:IF CHR$(A)="E" THEN 950
3140 GOTO 3100
3160 IF L=1 THEN ? "[F][G]VOL FILE ID      DESCRIPT":?
3170 ? VOL$;" ";DSN$;DES$:IF L=19 THEN 3130
3180 GOTO 3100
3200 IF L>1 THEN 3220
3205 ? #4;"[B][C]      ATARI PROGRAM LIBRARY[H]""
3210 ? #4;"DISK#[B]PROG/FILE ID[B] DESCRIPTION[B]TYPE[B]SOURCE[B]DATE SECTORS[H]""
3220 ? #4;VOL$;"[B]";DSN$;"[B]";DES$;"[B]";TYP$;"[B]";SRC$;"[B]";DAT$;"[B]";SEC$"
3230 IF L>55 THEN L=0:?" #4;CHR$(12)
3240 GOTO 3100
3300 IF P=3 THEN CLOSE #4
3310 IF P=2 THEN GOSUB 6910
3320 GOTO 950
4000 ? "[F][G] ";AP$;" - RECORD UPDATE":N=8:GOSUB 6500
4010 ID=12:GOSUB 6200:EOF=0
4020 GOSUB 7000:IF SK>8 THEN 950
4030 GOSUB 7600:?" TYPE FIELD # TO UPDATE, D TO DELETE"
4050 GOSUB 6910:IF CHR$(A)="D" THEN REC$(62)="D"
4060 TRAP 4300:C=VAL(CHR$(A)):TRAP 4000:IF C<1 OR C>7 THEN 4300
4100 RESTORE 9910:FOR I=1 TO C:READ IN$:NEXT I:?
4110 ? " ENTER NEW":GOSUB 6040+C:GOTO 4030
4300 GOSUB 6100:POINT #3,SEC,BYT: #3:REC$:GOTO 4020
5000 ? "[F][G] ";AP$;" - SORT/COMPRESS":N=7:GOSUB 6500

```

(lines 1200-1240) OPENS the file for output (append, IO=9) operation. All new entries, as per the X\$ directory, are shuffled through the proper subroutines and then added to the file. Option 1 (B=1 or 2) travels this route, with (1) being "Re-cataloged" first. The significance of the asterisk on matched directory members becomes apparent in the bypass on line 1220. The file is then CLOSEd and we return to the option menu.

Option 2 (B=3) consists of displaying the DOS directory and then returning to the menu. The remaining options (B>3), not requiring any help from the directory, go straight into their respective procedures. Option 3 (B=4) handles the manual addition of library records to the file. This could be utilized for Non-DOS disks or even cassette tapes. Line 2010, helped by several subroutines, does all of the processing.

The inquiry and print option (B=5) is handled in lines 3000-3320. The search strategy (GO-SUB 6500) and output mode are selected, the file is OPENed for input (IO=4) and, if applicable, the print tabs are set. The file is actually read in the subroutine at line 7000, with only the records matching the search key being passed back. An inquiry goes to line 3120, the browse (19 records per screen) to line 3160 and print (55 records per page) to line 3200. For the multiple record options, the variable L is the line counter. When end of file is reached at line 7010, the search key (SK) is set to "9" indicating completion, the file and printer are closed, and we are back at the menu.

The Update option (B=6, lines 4000-4300) would be used for changing or deleting library records. The search key is selected, file OPENed (IO=12) and records read like the inquiry, but here only the full record is displayed. At this point (line 4030), typing the field number will cause

```

5010 ? " TYPE Y TO SORT ON FIELD # ";SK:GOSUB 6910
5020 IF CHR$(A)<>"Y" THEN 100
5040 POKE 207,SS-1:POKE 208,SE-1
5050 ? " LOADING SORT PROGRAM":RUN "D:PROGSORT"
5500 REM RUN PROG
5510 ? :? " [ENTER PROG ID] ==>;:INPUT SV$:IO=4:IF LEN(SV$)=0 THEN 100
5520 GOSUB 6200:EOF=0:SS=5:SE=4+LEN(SV$):SK=2:GOSUB 7000:IF SK=9 THEN 950
5530 ? :? " [INSERT DISK] ";VOL%;" TO RUN ";DSN$
5540 ? :? " TYPE 'Y' TO RUN":GOSUB 6910:IF CHR$(A)<>"Y" THEN 950
5550 IN$(3)=DSN$:IN$(1,2)="D:"
5560 ? :? " LOADING ";IN$:TRAP 5570:RUN IN$:TRAP 40000
5570 ? :? " ";IN$;" NOT ON DISK":GOSUB 990:GOTO 950
6000 ? "[F][G] TO ADD ";DSN$;," ENTER:"
6010 RESTORE 9910:FOR I=1 TO 7:READ IN$
6020 IF B<3 AND (I=1 OR I=2 OR I=7) THEN 6040
6030 ? :GOSUB 6040+I
6040 NEXT I:RETURN
6041 ? "-----";IN$:INPUT VOL$:RETURN
6042 ? "-----";IN$:INPUT DSN$:RETURN
6043 ? "-----";IN$:INPUT DES$:RETURN
6044 ? "-----";IN$:INPUT TYP$:RETURN
6045 ? "-----";IN$:INPUT SRC$:RETURN
6046 ? "-----";IN$:INPUT DAT$:RETURN
6047 ? "-----";IN$:INPUT SEC$:RETURN
6100 FOR I=1 TO 61:REC$(I,I)="":NEXT I
6110 REC$(1,4)=VOL$:REC$(5,16)=DSN$:REC$(17,38)=DES$:REC$(39,45)=TYP$
6120 REC$(46,52)=SRC$:REC$(53,58)=DAT$:REC$(59,61)=SEC$:RETURN
6200 R=6200:TRAP 9000:IF IO<>4 THEN X10 36,$3,0,0,PL$
6210 OPEN #3,IO,0,PL$:TRAP 40000:RETURN
6250 R=6250:TRAP 9000:CLOSE #3
6260 IF IO<>4 THEN X10 35,$3,0,0,PL$
6270 TRAP 40000:RETURN
6500 ? "[G] KEY":RESTORE 9910
6510 FOR I=1 TO N:READ IN$;? ,I;" ";IN$:NEXT I:?, "E END":GOSUB 6900
6540 TRAP 960:SK=VAL(CHR$(A)):TRAP 40000:IF SK<1 OR SK>N THEN 960
6550 IF SK=8 THEN 6590
6560 RESTORE :FOR I=1 TO SK:READ SS,SE:NEXT I:IF B=7 THEN 6590
6570 ? " ENTER VALUE";:INPUT SV$:IF LEN(SV$)<1 THEN 960
6580 IF SS+LEN(SV$)-1>SE THEN 6570
6585 SE=SS+LEN(SV$)-1
6590 RETURN
6800 GOSUB 6000:GOSUB 6100:REC$(62)="*":GOSUB 7600
6810 ? "[G] TYPE 'Y' IF OK":GOSUB 6910:IF CHR$(A)<>"Y" THEN 6800
6820 ? #3,REC$:RETURN
6900 ? :? " [SELECT OPTION] ==>;:GET #2,A:? CHR$(A):RETURN
6910 ? " PRESS ANY KEY TO CONTINUE"::GET #2,A:? CHR$(A):RETURN
7000 IF B=1 OR B=6 THEN NOTE #3,SEC,BYT
7010 TRAP 7060:INPUT #3,REC$:TRAP 40000:IF REC$(62)="D" THEN 7000
7020 IF SK=8 THEN 7040
7030 IF SV$<>REC$(SS,SE) THEN 7000
7040 EOF=EOF+1:VOL$=REC$(1,4):DSN$=REC$(5,16):DES$=REC$(17,38):TYP$=REC$(39,45)
7050 SRC$=REC$(46,52):DAT$=REC$(53,58):SEC$=REC$(59,61):RETURN
7060 SK=9:?:? " RECORDS FOUND= ";EOF:GOSUB 990:RETURN
7600 ? "[F][G]";:RESTORE 9910:FOR I=1 TO 7
7610 READ IN$;? " ";I;" ";IN$;:GOSUB 7610+I:NEXT I:RETURN
7611 ? VOL$:RETURN
7612 ? DSN$:RETURN
7613 ? DES$:RETURN
7614 ? TYP$:RETURN
7615 ? SRC$:RETURN
7616 ? DAT$:RETURN
7617 ? SEC$:RETURN

```

updating of that field and "D" the deletion of the record. Any other character will write (using POINT) the record.

The sort (B = 7, lines 5000-5050), as stated earlier, is executed through a RUN "D:PROGSORT" statement. Before this is done, the sort key is selected and its offset (beginning and ending positions) is POKEd into locations 207 and 208 (decimal) for use by the machine language program. These addresses, as well as those on page 6 (1536-1791) containing the sort program, are safe from the ravaging effects of RUN, LOAD and NEW. The RUN PROGRAM option (B = 8, lines 5500-5570) adds a little touch of class to the library. By inserting the program name when requested, it will tell you which disk to load and will then RUN it. Obviously, it will only function with BASIC programs that have been SAVED on disk. The final option (B = 9) terminates the system. The BREAK key, disabled in line 100, could have disastrous effects on the file if used to end the program at the wrong time.

A few notes on the subroutines that do most of the work in the program. The routine starting at line 6000 is used for the input of data for both adding and updating records. The labels for the individual fields, being DATA statements, are READ during the FOR/NEXT loop in line 6010. The library record (REC\$) is built from the individual fields at line 6100. Lines 6200 and 6250 OPENS and CLOSES the file. The search and sort keys are built at line 6500, using the same DATA statements as above for the headings. The positions of the fields are contained in another DATA statement. Lines 6900 and 6910 are prompts. The library record is READ and moved into its elements in line 7000-7060. The variables SV\$, SS, SE and SK are used in the search process. The full screen display of the record is taken care of by 7600-7617, once again using the

```
9000 STATUS #3,ST:CLOSE #3:? "CHECK DISK DRIVE" ERROR ";ST:GOSUB 6910:GOTO R
9020 STATUS #4,ST:CLOSE #4:? "CHECK PRINTER" ERROR ";ST:GOSUB 6910:GOTO R
9900 DATA 1,4,5,16,17,38,39,45,46,52,53,58,59,61
9910 DATA [DISK #], [PROG ID], [DESCRIP], [TYPE], [SOURCE], [DATE], [SECTORS], ALL RECORDS
```

Program 2.

```
10 REM ** ATARI PROGRAM LIBRARY SORT **
11 REM ** R MARCUSE
15 A=FRE(0)-800
20 DIM X$(A),REC$(62),AP$(12):AP$="D:PROGLIB.DB":? " LOADING FILE"
30 TRAP 130:OPEN #3,4,0,AP$:N=0
40 TRAP 60:INPUT #3,REC$:TRAP 40000:IF REC$(62)="D" THEN 40
50 N=N+1:X$(N#62-61,N#62)=REC$:GOTO 40
60 CLOSE #3:? " RECORDS LOADED= ";N;," BEGIN SORT"
70 IF N>1 THEN A=USR(1536,ADR(X$),N)
80 ? "[E] SORT FINISHED, SAVING FILE"
90 XIO 36,#3,0,0,AP$:OPEN #3,8,0,AP$
100 FOR I=1 TO N:REC$=X$(I#62-61,I#62):? #3;REC$:NEXT I
110 CLOSE #3:XIO 35,#3,0,0,AP$
120 ? "[E] LOADING PROGLIB":RUN "D:PROGLIB"
130 STATUS #3,ST:CLOSE #3:? "CHECK DISK" ERROR ";ST
140 ? " PRESS RETURN TO CONTINUE":INPUT REC$:GOTO 30
```

Program 3.

```
10 REM ** PROGLIB MACHINE LANG SORT **
11 REM ** R MARCUSE
12 REM BINARY SAVE WITH FILESPEC=AUTORUN.SYS
20 FOR I=0 TO 109:READ A:POKE 1536+I,A:NEXT I
100 DATA 104,104,133,216,104,133,215,104,133,213,104,133,212,169,0,133,209,133
110 DATA 214,162,1,165,215,133,205,165,216,133,206,24,165,205,133,203,105,62
120 DATA 133,205,165,206,133,204,105,0,133,206,164,207,177,205,209,203,144,11
130 DATA 240,2,176,28,196,208,176,24,200,144,239,169,1,133,209,160,62,136,177
140 DATA 205,72,177,203,145,205,104,145,203,192,0,208,241,232,224,0,208,2,230
150 DATA 214,228,212,208,188,165,213,197,214,208,182,165,209,201,0,208,160,96
```

heading DATA statements. Finally, the error routines for the disk drive and printer are found at lines 9000 and 9020. The variable R is the return line number.

As there are several unprintable characters in the programs, we have substituted others in their place in the BASIC listings. Take a peek at the conversion table before typing. For a better visual effect, the characters enclosed by a box should be typed in reverse video. The two programs call each other by name, so please

save them by the names "D:PROGLIB" and "D:PROGSORT". Some last thoughts: The machine language sort routine will not be in storage unless you put it there by either powering up (AUTORUN.SYS will boot in) or doing a DOS binary load. Create the PROGLIB file by typing (in direct mode):

```
OPEN #3,8,0, "D:PROGLIB.DB"
CLOSE #3:XIO 35,#3,0,0,
"D:PROGLIB.DB".
```

Good luck. ©

MATCH — A Game Of Memory And Timing

Ron Walker
Smithville, Ontario

There are nine different skill levels to this game, with level one being the most difficult and nine being the easiest.

The object of the game is to repeat a pattern of musical notes and cursor positions that are randomly selected by the computer. Sounds simple, but at the highest level, the notes occur so rapidly that only the sharpest of minds can cope with it. Try it.

NOTE: Any numbers in brackets in quotes in the program listing are the number of blank spaces to leave. The "rvs" means leave one reverse space. Also, any words on brackets are what they say they are. e.g. PRINT "(clear)" means to clear the screen (esc-shift-clr) etc. Good luck.

```

100 OPEN#1,4,0,"K:"
110 GRAPHICS 0:POKE752,1:DIM NT(4),HOR(4)
   ,VIR(4),CHIME(50)
120 DIMA$(40):A$="      (39)      "
130 POSITION15,6:PRINT"MATCH"
140 POSITION10,16:PRINT"ENTER LEVEL (1-9)
   "
150 GET#1,VAR:TRAP510:LEVEL=VAL(CHR$(VAR)
   )*10
160 FORX=1TO4:READ A,B,C:NT(X)=A:HOR(X)=B
   :VIR(X)=C:NEXTX
170 DATA 10,19,4,50,9,12,100,29,12,150,19
   ,21
180 PRINT " (CLEAR)": FORX=5TO20:POSITION
   19,X:PRINT"/":NEXTX
190 FORX=10TO20:POSITIONX,12:PRINT"-":NEX
   TX:POSITION 19,12:PRINT"+"
200 POSITION2,0:PRINT"HERE ARE THE NOTES:
   ":FORDELAY=1TO500:NEXTDELAY:POS
   TION2,0:PRINT$
210 FORX=1TO4:POSITION HOR(X),VIR(X):PRIN
   T"RVS":GOSUB470:POSITIONHOR(X),V
   IR(X):PRINT" "
215 NEXT X
220 POSITION2,0:PRINT"PRESS BUTTON TO STA
   RT WITH YOUR FIRST NOTE":SOUND0,
   0,0,0

```

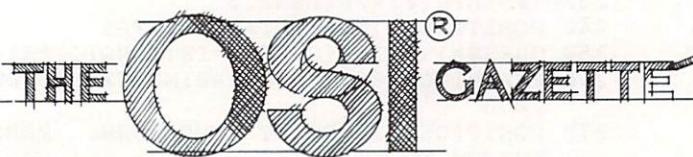
```

230 IFSTRIG(0)<>0THEN230
240 POSITION 0,0:PRINTA$:PRINTA$
250 GUESS=1:CHIME(GUESS)=INT(RND(1)*4)+1
260 FORX=1TOGUESS:GOSUB440:NEXTX:SOUND0,0
   ,0,0
270 POSITION1,22:PRINT"YOUR TURN.  PRESS
   BUTTON TO START"
280 IF STRIG(0) <>0THEN280
290 POSITION 1,22:PRINT"(DELETE LINE)  ENT
   ER NOTES"
300 FORX=1TOGUESS:POKE77,0
310 TONE=STICK(0):SOUND0,0,0,0
320 IFTONE=14THENTONE=10:GOTO370
330 IFTONE=13THENTONE=150:GOTO370
340 IFTONE=7THENTONE=100:GOTO370
350 IFTONE=11THENTONE=50:GOTO370
360 GOTO310
370 IFNT(CHIME(X))=TONE THEN GOSUB 440:GO
   TO400
380 GOTO410
400 NEXTX:GOTO480
410 PRINT" (CLEAR)NOT QUITE RIGHT.  YOU GO
   T";GUESS;" NOTES IN A ROW":PRINT
   "TRY AGAIN?"
420 GET#1,VAR:IFVAR=89 THEN GRAPHICS 0:EN
   D
430 GOTO180
440 SOUND0,NT(CHIME(X)),10,10
450 POSITIONHOR(CHIME(X)),VIR(CHIME(X)):P
   RINT"RVS":FORDELAY=1TOLEVEL:NEXT
   DELAY
460 POSITIONHOR(CHIME(X)),VIR(CHIME(X)):P
   RINT" ":RETURN
470 SOUND0,NT(X),10,10:FORDELAY=1TO500:NE
   XTDELAY:RETURN
480 GUESS=GUESS+1:SOUND0,0,0,0:POSITION1,
   22:PRINTA$
490 POSITION1,0:PRINT"OK SO FAR.  NOW I A
   DD ANOTHER ONE":CHIME(GUESS)=INT
   (RND(1)*4)+1
500 FORDELAY=1TO500:NEXTDELAY:POSITION0,0
   :PRINTA$:GOTO260
510 PRINT"A NUMBER!":FORDE=1TO500:NEXTDE:
   PRINT"(UP) (14)":GOTO140

```

©

Using your computer
in an interesting
application?
Write it up for
other **COMPUTE!**
readers to use.



Calling BASIC Commands From Machine Language Routines

William Taylor
Leavittsburg, OH

While working on a tape operating system (TOS) for my OSI C1P and a Stringy Floppy tape drive, many unknown, but desired, features were needed to interface ROM BASIC and the TOS. First, I wanted the TOS to always have command of BASIC's LOAD and SAVE routines. Second, I wanted always to return to the TOS whenever a BASIC program had been loaded into the BASIC workspace. Third, I wanted to go directly from the TOS and RUN a BASIC program that was in the BASIC workspace. In addition, I wished to exit the TOS to the ML Monitor; write a file directory; store the directory on tape; retrieve the directory; and write or load language tapes into the C1P using file marks.

Since the Stringy Floppy tape drives require that all programs stored on tape have file marks or numbers, I needed to free the C1P from ROM BASIC in order to create files on the tape for all programs stored on the tape. The TOS could be written in machine language. The TOS would generate the file numbers under the control of the user, but interfacing the TOS to ROM BASIC was the problem that I faced and pondered for several weeks. How the OSI ROM BASIC and the TOS were interfaced brought several interesting points to light that could be useful in other programming tasks.

Let me summarize. First, calling BASIC commands and executing BASIC programs can be handled from machine language routines. Also, we may LIST, SAVE, LOAD, and exit BASIC to our machine language routines without any USR function call. How these commands can be executed from a machine language routine will become clear with some new knowledge of how BASIC's interpreter works. Let's start with some facts about the BASIC interpreter and how BASIC commands are executed.

Let's look at BASIC's LOAD and SAVE flags and see how they are used to determine if BASIC programs are to be listed to the CRT or to the Cassette port and if the keyboard or the Cassette input port will be the input device.

BASIC's Immediate Mode Commands

BASIC commands are usually executed when input from the keyboard is entered. For example, when you type RUN followed by a carriage return any BASIC program in the workspace will be executed or start to run, starting at the first line of the program. Notice that I said type RUN! This type of command is known as an immediate mode command. If you had typed a number before the RUN command the C1P would have responded with OK. The program would not run but the line of text would have been saved or entered into the program memory. To understand what happens in either the programming mode or the immediate mode we must know how BASIC interprets the code input by the operator. To do this let's look inside BASIC and examine some of what happens during the course of any type of code execution.

At the beginning of system memory is what has become known as zero page. This memory area consists of the first 256 locations of low memory. OSI BASIC uses this area of memory as a scratch pad. OSI BASIC uses page locations \$0013 through \$005A as what is known as the BASIC Input Line Buffer. What is the Input Line Buffer? This area of low memory is used by BASIC to temporarily store any input code from the user. The code input by the user in the Input Line Buffer will be examined by BASIC to determine what the code's destiny will be. When the user terminates a line of code with a carriage return, the destination of the code input by the operator depends on two factors. First, if the code began with a line number

OSI**AARDVARK****OSI**

NOW MEANS BUSINESS!

WORD PROCESSING THE EASY WAY— WITH MAXI-PROS

This is a line-oriented word processor designed for the office that doesn't want to send every new girl out for training in how to type a letter.

It has automatic right and left margin justification and lets you vary the width and margins during printing. It has automatic pagination and automatic page numbering. It will print any text single, double or triple spaced and has text centering commands. It will make any number of multiple copies or chain files together to print an entire disk of data at one time.

MAXI-PROS has both global and line edit capability and the polled keyboard versions contain a corrected keyboard routine that make the OSI keyboard decode as a standard typewriter keyboard.

MAXI-PROS also has sophisticated file capabilities. It can access a file for names and addresses, stop for inputs, and print form letters. It has file merging capabilities so that it can store and combine paragraphs and pages in any order.

Best of all, it is in BASIC (OS65D 5 1/4" or 8" disk) so that it can be easily adapted to any printer or printing job and so that it can be sold for a measly price.

MAXI-PROS — \$39.95

NEW-NEW-NEW TINY COMPILER

The easy way to speed in your programs. The tiny compiler lets you write and debug your program in Basic and then automatically compiles a Machine Code version that runs from 50-150 times faster. The tiny compiler generates relocatable, native, transportable machine code that can be run on any 6502 system.

It does have some limitations. It is memory hungry — 8K is the minimum sized system that can run the Compiler. It also handles only a limited subset of Basic — about 20 keywords including FOR, NEXT, IF THEN, GOSUB, GOTO, RETURN, END, STOP, USR(X), PEEK, POKE, -=,*./,(),() Variable names A-Z, and Integer Numbers from 0-64K.

TINY COMPILER is written in Basic. It can be modified and augmented by the user. It comes with a 20 page manual.

TINY COMPILER — \$19.95 on tape or disk

THE AARDVARK JOURNAL

FOR OSI USERS — This is a bi-monthly tutorial journal running only articles about OSI systems. Every issue contains programs customized for OSI, tutorials on how to use and modify the system, and reviews of OSI related products. In the last two years we have run articles like these!

- 1) A tutorial on Machine Code for BASIC programmers.
- 2) Complete listings of two word processors for BASIC IN ROM machines.
- 3) Moving the Directory off track 12.
- 4) Listings for 20 game programs for the OSI.
- 5) How to write high speed BASIC — and lots more —

Vol. 1 (1980) 6 back issues - \$9.00

Vol. 2 (1981) 2 back issues and subscription for 4 additional issues - \$9.00.

ACCOUNTS RECEIVABLE — This program will handle up to 420 open accounts. It will age accounts, print invoices (including payment reminders) and give account totals. It can add automatic interest charges and warnings on late accounts, and can automatically provide and calculate volume discounts.

24K and OS65D required, dual disks recommended. Specify system.

Accounts Receivable. \$99.95

* * * SPECIAL DEAL — NO LESS! * * *

A complete business package for OSI small systems — (C1, C2, C4 or C8). Includes MAXI-PROS, GENERAL LEDGER, INVENTORY, PAYROLL AND ACCOUNTS RECEIVABLE — ALL THE PROGRAMS THE SMALL BUSINESS MAN NEEDS. \$299.95

P.S. We're so confident of the quality of these programs that the documentation contains the programmer's home phone number!

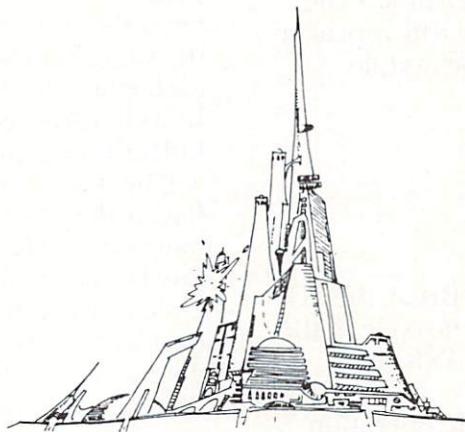
SUPERDISK II

This disk contains a new BEXEC* that boots up with a numbered directory and which allows creation, deletion and renaming of files without calling other programs. It also contains a slight modification to BASIC to allow 14 character file names.

The disk contains a disk manager that contains a disk packer, a hex/dec calculator and several other utilities.

It also has a full screen editor (in machine code on C2P/C4)) that makes corrections a snap. We'll also toss in renumbering and program search programs — and sell the whole thing for — SUPERDISK II \$29.95 (5 1/4") \$34.95 (8").

AND FUN, TOO!



BOOKKEEPING THE EASY WAY — WITH BUSINESS I

Our business package 1 is a set of programs designed for the small businessman who does not have and does not need a full time accountant on his payroll.

This package is built around a **GENERAL LEDGER** program which records all transactions and which provides monthly, quarterly, annual, and year-to-date PROFIT AND LOSS statements. **GENERAL LEDGER** also provides for cash account balancing, provides a **BALANCE SHEET** and has modules for **DEPRECIATION** and **LOAN ACCOUNT** computation.

GENERAL LEDGER (and MODULES) \$129.95.

PAYROLL is designed to interface with the **GENERAL LEDGER**. It will handle annual records on 30 employees with as many as 6 deductions per employee.

PAYROLL - \$49.95.

INVENTORY is also designed to interface with the general ledger. This one will provide instant information on suppliers, initial cost and current value of your inventory. It also keeps track of the order points and date of last shipment.

INVENTORY - \$59.95.

GAMES FOR ALL SYSTEMS

GALAXIAN - 4K - One of the fastest and finest arcade games ever written for the OSI, this one features rows of hard-hitting evasive dogfighting aliens thirsty for your blood. For those who loved (and tired of) Alien Invaders. Specify system — A bargain at \$9.95

NEW — NEW — NEW

LABYRINTH - 8K - This has a display background similar to MINOS as the action takes place in a realistic maze seen from ground level. This is, however, a real time monster hunt as you track down and shoot mobile monsters on foot. Checking out and testing this one was the most fun I've had in years! — \$13.95.

NIGHT RIDER - You've seen similar games in the arcades. You see a winding twisting road ahead as you try to make time and stay on the road. **NIGHT RIDER** uses machine code to generate excellent high speed graphics - by the same author as MINOS.

NIGHT RIDER — \$12.95 cassette only

THIEF - Another machine code goody for the C1P cassette only. You must use mobile cannon to protect the valuable jewels in the middle of the screen from increasingly nasty and trigger happy thieves. Fast action and fun for one or two players. **THIEF** \$13.95 on C1 cassette only!

SUPPORT ROMS FOR BASIC IN ROM MACHINES — C1S/C2S. This ROM adds line edit functions, software selectable scroll windows, bell support, choice of OSI or standard keyboard routines, two callible screen clears, and software support for 32-64 characters per line video. Has one character command to switch model 2 C1P from 24 to 48 character line. When installed in C2 or C4 (C2S) requires installation of additional chip. C1P requires only a jumper change. — \$39.95

C1E/C2E similar to above but with extended machine code monitor. — \$59.95

Please specify system on all orders

This is only a partial listing of what we have to offer. We now offer over 100 programs, data sheets, ROMS, and boards for OSI systems. Our \$1.00 catalog lists it all and contains free program listings and programming hints to boot.

AARDVARK TECHNICAL SERVICES, LTD.
2352 S. Commerce, Walled Lake, MI 48088
(313) 669-3110

**OSI****OSI**

this signals BASIC that the code must be saved as a BASIC program line. Second, if the code in the Input Line Buffer does not start with a numeral, then the code represents a BASIC immediate command or some error that the user made while typing at the keyboard. In either of the latter cases, the code will be immediately executed. If the code was a valid command, the command will be executed. If the input was an error, BASIC will respond with Syntax Error.

To demonstrate and reveal the format of the code placed in the Input Line Buffer, please examine the following example of an input line which will be considered a BASIC line of program text: 10 LIST. On examination of the Input Line Buffer, it would reveal the following code if no carriage return were typed after the line of text. Type in the line of code: 10 LIST. Do not enter a carriage return. BREAK the C1P. Call up Monitor Mode by typing M. Call address mode. Call memory location \$0013. You will find that the code listed in the next example will reside at memory locations starting at \$0013.

```
0013 31 = ASCII 1
0014 30 = ASCII 0
0015 20 = ASCII space
0016 4C = ASCII L
0017 49 = ASCII I
0018 53 = ASCII S
0019 54 = ASCII T
```

On examination of the code in the Input Line Buffer you will find that all the code will be the hexadecimal ASCII equivalent of the text entered at the keyboard.

The code stored in the Input Line Buffer will have a different appearance if you terminate the line with a carriage return. The code will appear in the Input Line Buffer as in the next example.

```
0013 99
0014 00
0015 20
0016 00
0017 49
0018 53
0019 54
```

Try entering the line 10 LIST (CR). Break the computer. Call \$0013 and examine the code in the Input Line Buffer. As you can see BASIC has converted its contents.

Now let's try an Immediate Mode operation and examine the Input Line Buffer. First, clear BASIC workspace. Type NEW (CR). Next type LIST (CR). Break the computer and call Monitor Mode. As before, call \$0013 and examine the code stored in the buffer. On examination you should find the following code:

```
0013 99
0014 00
0015 53
0016 00
0017 00
```

This data spells out the LIST command. The byte \$99 is a Token for the keyword LIST. What is a Token? It is a single byte that represents a command or keyword. OSI BASIC has a Token for all BASIC keywords. Tokens are used by BASIC in immediate Mode or they are stored in all BASIC programs stored in the BASIC program workspace or BASIC source code table. For the sake of this article let's say that a Token describes to BASIC a keyword. A keyword is an indicator to BASIC as to what function BASIC must perform in the case of \$99 (LIST) BASIC is told to LIST all the source code in the BASIC workspace.

The point that we have made with the examples indicates that, for BASIC to know what is expected, the proper code must be in the Input Line Buffer starting at \$0013. We can use the facts just presented to make BASIC think an operator has entered an Immediate Mode command, but the command can be initiated from a machine language routine as you will see. We are not ready yet to use our new knowledge about the Input Line Buffer and Tokens as commands called from machine language routines. First we must learn some more facts about BASIC.

How does BASIC execute the code for commands in the Input Line Buffer? The code must be read by the BASIC Interpreter. On examination of a Zero page memory map, you will find a machine language routine which starts at \$00BC. This routine is called a "PARSER." It is used to read a line of code, character by character, stored in the line buffer or code stored in a program line in the BASIC workspace. The Parser routine at \$00BC looks at the first character of code in the buffer to see if the character is an ASCII numeral or not. If the first character were a numeral, the Parser tests each character until a non-numeral is found. If the first character is a numeral, the line of code in the buffer is recognized as a line of source code and will be stored in the source code table. When the Parser detects a non-numeral, the Parser routine hands the code to a routine that "Tokenizes" the line before the line is placed in the source code table or back into the input line buffer. If the first character in the buffer is a non-numeral, the parser determines that the input code must be an immediate mode command. If you recall the earlier examples, we demonstrated the keyword LIST entered as a program source line. First we examined the buffer without a carriage return. It was evident that the code was ASCII. Next, we entered a line of text ending with a carriage return and examined the data in the buffer. At this point, we found that the data was in a Tokenized form. As you can see, the BASIC interpreter had, in fact, converted the ASCII to a condensed (or Tokenized) line of code.

To understand how the parser routine interprets the source code (or the code in the Input

Line Buffer) please refer to Listing 1. The machine language parser routine shown in Listing 1 shows that memory locations \$00C2, 00C3, and 00C4 contain an LDA direct instruction or AD 13 00. This instruction causes the 6502 accumulator to be loaded with the code at the first address of the Input Line Buffer. On initialization, (BASIC Cold Start) address \$00C2, 00C3, and 00C4 will point to \$0013 (the beginning of the Input Line Buffer). If you type RUN in Immediate Mode without a program in the BASIC workspace, address \$00C2, 00C3, and 00C4 will contain AD 00 03. As you can see, the Parser now points to the beginning of the BASIC workspace.

At this point, enough knowledge about the Input Line Buffer and the parser routine has been presented to allow us to explore the possibility of implementing and executing BASIC Immediate Mode commands called from outside ROM BASIC using machine language routines.

Let us now experiment with the Input Line Buffer and the parser routine to see if we can actually call a BASIC Immediate Mode command from a machine language program. As I mentioned at the beginning of this article, I needed to call BASIC's LOAD and SAVE commands. Let's begin with these. First, let's try the SAVE command to demonstrate how it can be called from a machine language routine.

To use the SAVE command we must learn yet more facts about how BASIC functions. When the user wishes to save a program that is stored in the BASIC workspace, the SAVE command must be used. What happens when you type SAVE? When the command, SAVE, is entered at the keyboard and ended with a carriage return, the code will, of course, be placed in the Input Line Buffer as ASCII. When the carriage return is entered, BASIC examines the code and recognizes that this is an Immediate Mode command. The code in the Input Line Buffer will be Tokenized and placed back in the Input Line Buffer. The Input Line Buffer would not contain:

\$0013 94 = TOKEN FOR SAVE

\$0014 00 = NULL

\$0015 53

\$0016 00 = NULL

Now, on examination of the Parser routine at address \$00C2, 00C3, and 00C4, you will find that the Parser has read the code located at address \$0013 and found a Token for the keyword SAVE, and that BASIC has executed the command. When the SAVE command was executed, BASIC performed the task of setting what is called the SAVE flag. This flag tells the computer that any data sent from BASIC will be sent to the cassette port and to the screen. The SAVE flag is located at \$0205. If the contents of \$0205 are set to \$00, then output from BASIC will be listed to the screen.

If the SAVE flag contains \$01 then the cassette port along with the screen will be activated.

We may use these facts to call the BASIC SAVE command from a machine language routine. Let me demonstrate with an example. Enter the machine language routine (Listing 2) into the computer. Now write a BASIC program into the computer. This program can be any program that you may have on hand, but a single program line will do for the demonstration. Exit BASIC and call the address of the machine language routine of Listing 2. Run the machine language routine. As you can see, the BASIC program that you entered into the computer was LISTed out to the screen of your monitor. Also, the program will be sent to the cassette port.

On examination of the Assembly Listing, notice that we have loaded the Input Line Buffer at \$0013 with the Token for LIST (\$94). Also notice that, in the Listing, we are setting the SAVE flag at \$0205 to the value of \$01. We have set address \$00C3 and \$00C4 in the Parser routine to point to the beginning of the input line buffer. Finally, we call a routine in the BASIC interpreter located at \$A4B5. This routine is called the LIST routine and will execute the LIST command when called by a BASIC program, Immediate Mode, or by a machine language calling routine. As you can see, we have programmed a SAVE and a LIST

OSI * NEW * **OSI**

FROM THE PRETZELAND ARCADE

HUMANOID DEFENDER

AS DEFENDER OF THE HUMANOID COLONIES, YOU'VE GOT TO STOP THE ALIEN LANDERS THAT ARE TRYING TO PICK US UP AND MUTATE THE HUMANOID. IF A LANDER PICKS UP A HUMANOID, YOU HAVE TO BLAST THE LANDER, THEN CATCH THE HUMANOID IN MID-AIR AND LOWER IT SAFELY TO THE GROUND FOR A BONUS! EVERY NOW AND THEN, A BAITER SHIP APPEARS OUT OF HYPERSPACE TO KEEP THINGS INTERESTING! WITH COLOR AND LOTS OF SOUND! 8K CASSETTE.....\$9.95
SPECIFY YOUR SYSTEM!

OUR MOONBASE IS BEING ATTACKED BY ALIENS! IN RESPONSE TO THEIR CALL FOR HELP, YOUR MOTHERSHIP HAS GONE INTO LUNAR ORBIT OVERHEAD. NOW YOU'VE GOT TO LAND AND RESCUE THE MOONBASE CREW, YOUR TWO MAN RESCUE CRAFT WILL HAVE TO MAKE SEVERAL TRIPS TO GET THEM ALL OUT. ONCE YOU'VE MANEUVERED THROUGH THE ASTEROID BELT, AVOIDED THE MOUNTAIN PEAKS AND LANDED SAFELY, THE REAL TROUBLE STARTS! THE ALIENS REVEAL THEMSELVES AND YOU'VE GOT TO BLAST YOUR WAY BACK TO THE MOTHERSHIP! A LOT OF ACTION, WITH COLOR AND SOUND. BY JOHN WILSON 8K CASSETTE....\$9.95

LUNAR »»» RESCUER

BUY BOTH NEW SOFT PRETZELS ABOVE FOR THE SPECIAL PRICE OF ONLY \$17.95

OR, SEND \$1.00 FOR ILLUSTRATED CATALOG AND GET A \$1.50 CREDIT GOOD ON YOUR FIRST ORDER!

ALL GAMES SUPPORT SOUND ON C1P!
ALL PROGRAMS AVAILABLE ON CASSETTE ONLY

Pretzelland Software
2005 A WHITTAKER RD.
YPSILANTI, MI. 48197

Program 1.

```

10 0000      ;
20 0000      ;
25 0000      ;
30 0000      ;
40 0000      ;      PARSER CODE
50 00BC      *=+$BC
60 00BC E6C3  S0 INC $C3 INCREMENT LOW ADDR. BYTE
70 00BE D002  BNE S1
80 00C0 E6C4  INC $C4 INCREMENT HIGH ADDR. BYTE
90 00C2 ADFFFF S1 LDA $FFFF LOAD WITH CODE CHARACTER
100 00C5 C93A  CMP #'': CHECK FOR COLON (STATEMENT END)
110 00C7 B00A  BCS S2 IF YES BRANCH TO START NEW LINE
120 00C9 C920  CMP #' ' IS IT A SPACE
130 00CB F0EF  BEQ S0 IF YES GET NEW CHARACTER
140 00CD 38    SEC SET CARRY FLAG
150 00CE E930  SBC #$30 SUBTRACT $30
160 00D0 38    SEC SET CARRY FLAG
170 00D1 E9D0  SBC #$D0 SET C FLAG FOR ASCII NUMBERS
180 00D3 60    S2 RTS END ROUTINE. CHARACTER NOW IN A

```

Program 2.

```

10 0000      ;
20 0000      ;
30 0000      ;
40 0000      ;
50 0000      ;      BASIC SAVE COMMAND CALL
60 0000      ;
70 0000      ;
80 0000      ;
90 0000      ;
100 1000      *=+$1000
110 1000 A981  START LDA #$01 VALUE SAVE FLAG=ON
120 1002 8D0502  STA $0205 STORE IN SAVE FLAG
130 1005 A999  LDA #$99 TOKEN LIST
140 1007 8513  STA $13 PUT IN LINE BUFFER
150 1009 A900  LDA #$00 NULL
160 100B 8514  STA $14 PUT BUFFER+1
170 100D 8516  STA $16 PUT BUFFER +3
180 100F A953  LDA #$53
190 1011 8515  STA $15 PUT BUFFER+2
200 1013 A914  LDA #$14 PARSE SCAN START LOW BYTE
210 1015 85C3  STA $C3 PUT IN PARSE
220 1017 A900  LDA #$00 PARSE SCAN HIGH BYTE
230 1019 85C4  STA $C4 PUT IN PARSE
240 101B 4C85A4  JMP $A485 GOTO BASIC LIST ROUTINE

```

command into BASIC from outside ROM BASIC and caused its execution.

In a similar manner, let's call and execute a LOAD command from a machine language routine. Enter Listing 3 into the computer. Next bring up BASIC in Warm Start. (Type NEW (CR).) Exit BASIC. Call up the machine language routine for the LOAD command. Place a BASIC program tape into your cassette recorder, execute the machine language routine, and start your recorder on play. Your BASIC program will load into the computer as if called directly under BASIC.

On examination of Listing 3, you will find that the implementation of the LOAD command was very simple. We only need to set the LOAD flag to turn the system on for a BASIC load and jump to the Warm Start of BASIC.

Listing 4 will be used to implement the BASIC RUN command from a machine language program. As before, enter the machine language program into memory and then load a BASIC program into the BASIC workspace. Exit BASIC and call the machine language routine. Start the machine language program. The computer will jump to the BASIC program and run.

On close examination of Listing 4, you will see that we have used the same procedure to force a BASIC RUN command that we used in the SAVE and LOAD routines. We loaded the input line buffer with the Token for RUN, set the Parser scanner to start reading the code in the Input Line Buffer at \$0013. With the RUN command it was found that two BASIC interpreter routines were needed to force the computer to execute the RUN command. These were the conversion routine at \$A3A6 and the execution routine located at \$A5F6.

At the beginning of this article, I said that an executive TOS could be written in machine language that could call BASIC commands. Also, it was mentioned that in order for the TOS to be truly an executive, we must devise some means of exiting BASIC and returning to the TOS. I have shown how BASIC commands could be executed from machine language routines. But, how do we exit BASIC to our machine language routines? At first, it appears that ROM BASIC can only be exited with a BREAK or through a USR function call. This is true unless we can devise some means of patching into BASIC at some point and make BASIC think there is some new form of keyword present in the interpreter. Well, implementing new Keywords is not possible with ROM BASIC, so some other method must be devised.

An article which appeared in *Micro* described interception of BASIC Syntax error codes when printed on the monitor screen. A patch devised to intercept a Syntax error can be utilized to direct an exit from BASIC and force a return to a calling

machine language program. The machine language patch routine shown in Listing 5 can be used to force an exit from BASIC during a running BASIC program, and in Immediate Mode or when a BASIC program has finished loading from cassette into the BASIC workspace. Listing 5 is a routine that has been revised for the purpose of exiting BASIC. The routine appeared in an article titled "Stop Those S' Errors" published in the November 1980 issue of Micro Magazine (*Micro*, 30:37).

The patch code for the BASIC exit routine utilizes a vector location in zero page. The vector is located at \$03 and \$04. Normally, this vector points to the string output routine of the BASIC interpreter at \$A8C3. If we replace this jump with a call to our patch routine, we may use the pointer and our patch routine to exit BASIC on command. Listing 5, shows the Exit patch routine that is loaded into memory starting at \$0240. To use the patch routine, replace the jump at \$03 and \$04 with the start of the exit patch routine. That is, load \$40 into memory location \$03 and \$02 into location \$04. This can be done in BASIC using the POKE command: POKE 3, 64 : POKE 4, 2. Once the address for the patch code has been loaded into the pointer at \$03 and \$04 the pointer will not have to be changed unless the computer has been reset.

IF YOU'VE GOT OS!

We've got great products for you!

OS-65D V3.2 DISASSEMBLY MANUAL 60 page manual, complete with cross reference listing. Fully commented. **\$25.95**.

REF COMMAND UNDER BASIC Lists line numbers, variables, constants for 65D or 65U. **\$31.95**.

SPOOLER-DESPOLLER UTILITY Super fast. Freed up screen, feeds data to serial or parallel printers. **\$69.95**.

FIG FORTH UNDER OS-65U Runs under multi-user, hard disk systems with all the extras. **\$89.95**.

VIDEO ROUTINE Convenient control of variable screen parameters. May be connected to graphics resolution booster. **\$25.95 or \$29.95**.

GRAPHICS RESOLUTION BOOSTER Hardware to boost screen resolution by 8 times to 128 x 128. **\$49.95**. With video routine and software extensions **\$79.95**.

Write or call for free product catalog and get all the details.

**SOFT
WARE
CONSULTANTS**

**6435 Summer Ave.
Memphis, TN. 38134
901/377-3503**

Program 3.

10	0000	;	
20	0000	;	
30	0000	;	
40	0000	;	
50	0000	;	BASIC LOAD COMMAND CALL
60	0000	;	
70	0000	;	
80	0000	;	
90	0000	;	
100	1100	**=\$1100	
110	1100 A9FF	START LDA #\$FF	VALUE LOAD FLAG =ON
120	1102 8D0302	STA \$0203	PUT IN LOAD FLAG
130	1105 4C74A2	JMP \$A274	GOTO BASIC WARM START

Program 4.

10	0000	;	
20	0000	;	
30	0000	;	
40	0000	;	
50	0000	;	*** BASIC RUN COMMAND CALL ***
60	0000	;	
70	0000	;	
80	1150	**=\$1150	
90	1150	;	
100	1150 A952	LDA #\$52	GET RUN TOKEN
110	1152 8513	STA \$13	PUT IN LINE BUFFER
120	1154 A900	LDA #\$00	NULL
130	1156 8514	STA \$14	PUT BUFF+1
140	1158 8516	STA \$16	PUT BUFF+3
150	115A 85C4	STA \$C4	PUT PARSER HIGH BYTE
160	115C A94E	LDA #\$4E	
170	115E 8515	STA \$15	PUT BUFFER+2
180	1160 A913	LDA #\$13	GET PARSER START LOW
190	1162 85C3	STA \$C3	PUT PARSER LOW
200	1164 20A6A3	JSR \$A3A6	GO BASIC CONVERSION RTN.
210	1167 4CF6A5	JMP \$A5F6	GO TO BASIC EXECUTION (RUN)

Program 5.

10	0000	;	
20	0000	;	
30	0000	;	
40	0000	;	
50	0000	;	
60	0000	;	BASIC EXIT PATCH ROUTINE
70	0000	;	
80	0000	;	
90	00F0	**=0240	
100	00F0	;	
110	00F0 48	PHA	SAVE PRT CHRACTER IN ACC.
120	00F1 AD65D3	LDA \$D365	GET CHRACTER FROM SCREEN
130	00F4 C93F	CMP #\$3F	TEST FOR ERROR(?)
140	00F6 D008	BNE OUT	NO NOT ERROR GO PRINT CHR.
150	00F8 A900	LDA #\$00	YES ERROR GET READY TO EXIT
160	00FA 8D0302	STA \$0203	RESET LOAD FLAG
170	00FD 4CFFFF	JMP \$FFFF	RETURN TO CALLER(\$FFFF DUMMY
180	0100 68	OUT PLA	ADDRERESTORE CHARACTER TO ACC
190	0101 40C3A6	JMP \$A8C3	GO PRINT CHR. RETURN TO BASIC

The patch routine at \$0240 tests memory location \$D365 for a question mark (\$3F) for each character printed out to the monitor screen. In the event of an error, such as ? Sn Error, the question mark will be loaded into video RAM at \$D365. The routine tests \$D365 for \$3F. If there should be any type of error, the question mark code will appear at \$D365. On detection of the error code, the patch routine will cause an exit to your machine language routine. Under normal program execution, the data to be printed is passed to the string printing routine of BASIC as if the patch routine did not exist.

The exit patch code routine was implemented into my TOS to detect an error at the end of a program loading from tape. My Stringy Floppy tape unit sends \$8F when all the program on tape has been sent to the C1P. This hex byte, when seen by BASIC, will send back a Syntax error which will be detected by the patch routine causing an automatic exit to the TOS. While in BASIC, if the user types any key followed by a carriage return. It will cause a Syntax error and force a return to any

calling routine. In addition, programming a line of illegal code at the exit point of the BASIC program will force a return to the calling machine language routine. An example line of illegal code could be: 10/ or 10 EXIT etc...

This article has presented some ways of implementing BASIC commands and calling these commands from machine language programs. Through these efforts, I have further expanded the ways in which we may use OSI BASIC and machine language programs as a means of system development. In my case, I have a TOS that functions like a disk operating system (DOS). With the information presented in this article, you may also be inspired to develop new programming techniques. Although this article was developed around OSI 6502 BASIC, the concepts should apply to other systems using similar BASIC such as, PET, and APPLE. Of course, tokens and interpreter routine addresses may need changing but the basic principles still apply.

References:

OSI BASIC In ROM, Edward H. Carlson

"Stop Those S' Errors," *Micro Magazine*, November 1980. ©

COMPUTE! Back Issue Collection

Our back issues, normally \$3.00 each (including shipping and handling) are a valuable addition to your library. To celebrate our second birthday, we're offering the following special to **COMPUTE!** readers.

COMPUTE!'s Birthday Special

JANUARY-JULY, 1981. ALL SEVEN ISSUES \$15.00, AND WE'LL PAY SHIPPING.

Credit Card Orders Only
Call TOLL FREE 800-345-8112
IN PA CALL 800-662-2444

Please allow three weeks for delivery. Offer expires November 15, 1981. Offer good for these seven issues only and may not be prorated for partial orders. Orders accepted subject to availability. You must include a street address for shipping.

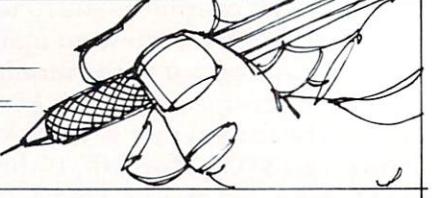
Please send me the **COMPUTE! BIRTHDAY SPECIAL**, January-July 1981 Issues for \$15.00.

NAME _____

STREET ADDRESS _____

CITY _____ STATE _____ ZIP _____

SEND TO: **COMPUTE!** Birthday Special, P.O. Box 5406, Greensboro, NC 27403, USA. Please enclose check or money order.



THE PET GAZETTE

Practical Pet Printing Primer For Perplexed Programmers

Ron Gunn
Livermore, CA

When you first connect a printer to your PET, it is for one primary purpose: to obtain program listings so you can see enough code at one time to rescue yourself from the latest paradox in your programming. As eminently useful as this is, it soon becomes but a step in the utilization of the printer for the output of data from your programs in an organized and permanent form.

Organizing data on a printed sheet implies just that; organizing. You don't want it scattered randomly and capriciously all over the page. Columns with labels are often desired, and so you find that the convenient TAB functions for the PET screen don't work on the printer. It is then that you perhaps start to reduce your data to strings, add blanks, and then partition these longer strings with the LEFT\$, RIGHT\$, and MID\$ functions to make neatly justified columns.

Universal Printing

We are assuming that you are interested in programming that will allow you to print on any printer that will give a listing, a PET, Epson, or whatever. This kind of coding will be the subject of this article. Many printers, including Commodore's, have proprietary ways of handling this problem and I say more about the PET printer's formatting later. These proprietary methods will normally work only on that one make of printer.

You will be able to take the kind of code we are discussing here over to Joe's house and it will work on his PET, Anadex or Kung-Fu papergobbler.

The Answer That Creates A Problem

Here is a sample of code that outputs 3 variables in neat columns on any printer that will LIST. It is intended to illustrate how the string technique mentioned in paragraph two works in practice.

There is a problem with this, especially in PET ROM sets earlier than 4.0, and it is not recommended for large data bases or more than a page of print for reasons we will get into.

```

2200 FOR I = 1 TO 30
2210 P$ = ""
2220 Q$ = "      " + STR$(K%(I))
2230 P$ = RIGHT$(Q$,8)
2240 Q$ = "      " + STR$(L(I))
2250 P$ = P$ + RIGHTS$(Q$,8)
2260 Q$ = "      " + STR$(M%(I))
2270 P$ = P$ + RIGHTS$(Q$,8)
2280 PRINT#4,P$
2290 NEXT

```

This code is reasonably concise and straightforward and will produce neat columns of numbers of varying length, all nicely right-justified. What, then, is the problem? It is a lot like watching a centipede on a treadmill. There is an awful lot going on, but not much progress. Concatenating strings and then printing them out is potentially very slow. As you increase the number of columns, the string handling becomes appreciably slower than the printer.

When you add to this the fact that enormous numbers of throwaway strings are created, and that pre-4.0 PETs can take many seconds to collect garbage, you have a serious problem. (See Butterfield, "Learning About Garbage Collection," COMPUTE! #10.) If you have not experienced this yet, try the experimental listing at the end of this article for an eye opener.

This code example is print test #1 in the sample listing, and 100 seconds and more were required on my 32N to run it. This is admittedly an extreme example, but points up the trouble you can get into with a program that is large for your machine when you get heavily into string handling.

A Partial Answer

As the referenced article discussed, you can reduce the garbage collection, and you can get the printer to print while the computer is computing, with the following changes. If you have existing print routines that are structured like the above, and which could use some speeding up, then the following substitute coding will help:

```

2300 FOR I = 1 TO 30
2310 Q$ = "      " + STR$(K%(I))
2320 PRINT#4,RIGHT$(Q$,8);
2330 Q$ = "      " + STR$(L(I))
2340 PRINT#4,RIGHT$(Q$,8);
2350 Q$ = "      " + STR$(M%(I))
2360 PRINT#4,RIGHT$(Q$,8)
2370 NEXT

```

PET? SEE SKYLES ... CBM/PET?

"They laughed when I sat down at my PET and immediately programmed in machine language... just as easily as writing BASIC."

With the new Mikro, brought to you from England by Skyles
Electric works, always searching the world for new products for PET/CBM owners. A 4K machine language assembler ROM that plugs into your main board. At just \$80.00 for the Mikro chip, it does all the machine language work for you; all you have to do is start laying down the code.

The Mikro retains all the great screen editing features of the PET...even all the Toolkit commands. (If you own a Toolkit, of course.) Sit down and write your own machine language subroutine. The program you write is the source code you can save. And the machine language monitor saves the object code. The perfect machine language answer for most PET owners and for most applications. (Not as professional as the Skyles Macro-TeA...not as expensive, either.)

A great learning experience for those new to machine language programming but who want to master it easily. Twelve-page manual included but we also recommend the book, "6502 Assembler Language Programming," by Lance A. Leventhal at \$17.00 direct from Skyles.

Skyles guarantees your satisfaction: if you are not absolutely happy with your new Mikro, return it to us within ten days for an immediate, full refund.

Skyles Mikro Machine language assembler.....\$80.00
"6502 Assembler Language Programming" by Leventhal.....17.00
Shipping and Handling.....(USA/Canada) \$2.50 (Europe/Asia) \$10.00
California residents must add 6%/6½% sales tax, as required.



Skyles Electric Works
231E South Whisman Road
Mountain View, California 94041
(415) 965-1735

Visa/Mastercard orders: call tollfree
(800) 227-9998 (except California).
California orders: please call (415)
965-1735.

SEE SKYLES...CBM/PET? SEE SKYLES

WATCH

THIS

SPACE

...CBM/PET? SEE SKYLES ... CBM/

PET? SEE SKYLES ... CBM/PET?

"Look how fast I create these great graphic displays on my PET with the new PicChip... it's like home movies."

PicChip, the new ROM that took Europe by storm, available only from Skyles Electric Works in the U.S. and Canada.

PicChip, a ROM extension of the BASIC version III, BASIC 4.0 or BASIC 8032 interpreter that offers over 40 commands that allow you to create programs with dynamic graphics displays: plots, bar graphs, pictures; and rolling, scrolling, shifting and inverting. All instantly and easily added to your BASIC program.

The address for the 2000/3000 (which would require PicChip module PC2), for the 4000 (PC4), and for the 8000(PC8) is \$A000...unless you have a Mikro, WordPro III or IV, or Jinsam, which occupy that same address. In those cases, you will need the PicChip on an interface board that would reside in address B800...for the 2000/3000 series (PCB2), above the Toolkit. For the 4000 (PCA4) and 8000 (PCA8), the Mikro or WoodPro would be switchable manually using the Skyles Socket-2-ME.

Skyles guarantees your satisfaction: if you are not absolutely happy with your new PicChip return it to us within ten days for an immediate, full refund.

PicChip from Skyles Electric Works (Please indicate PC2, PC4, PC8).....\$60.00
Complete with interface board (Please indicate PCB2, PCA4, PCA8).....80.00
Shipping and Handling.....(USA/Canada) \$2.50 (Europe/Asia) \$10.00
California residents must add 6%/6½% sales tax, as required.



Skyles Electric Works
231E South Whisman Road
Mountain View, California 94041
(415) 965-1735

Visa/Mastercard orders: call tollfree
(800) 227-9998 (except California).
California orders: please call (415)
965-1735.

...CBM/PET? SEE SKYLES ... CBM/

SEE SKYLES...CBM/PET? SEE SKYLES

The change, of course, is that an intermediate variable is not created and then concatenated. The variable is created as a string and is packed with blanks to the maximum needed length on the same line. It is then immediately printed using the appropriate string handling function to make it the correct number of spaces to fit the column you are creating.

You have saved in two ways. The forever concatenated P\$ is not created; an advantage as pointed out by the redoubtable Mr. Butterfield. In addition, the printer can process each output while the next gets a head start.

This is print test #2 in the sample listing. Run times on my machine ran some 50 seconds, about half the total time required for test #1.

Columns Of Names

These examples have been right justified. If you need to print a column of names, you will want to left justify it. This is not necessarily because it is better, it is just that it will be considered a bug or a product of indifference if you do not. Sample coding to do this is:

```
2800P$=N$+" "
2810PRINT#4,LEFT$(P$,20)
```

In this case, the necessary blanks have been added after the name, and the resulting oversized string has been printed out starting with the left-most character using the LEFT\$ function. Always add enough blanks to insure that the space is filled even if N\$ turns out to be a null string. This insures that other columns will not be disturbed if that happens.

When you have strings to print, you have to print strings. You can avoid extra string creation as shown by tacking on the necessary blanks at once. Then print immediately using the LEFT\$ function in the print statement.

Hints And Kinks

If you have a lot of fill blanks to add, it saves memory to create space variables as a substitute for the blanks-within-quotes as shown on line 2220. Create these handy variables when the program initializes:

```
6000S4$="      ":S5$="      ":S6$="      "
6010S7$="      ":S8$="      "
6020RETURN
```

Use a gosub to do this when the program runs. GOSUB6000 in the first line of a program would set up the space variables shown above for use later.

The eight blanks in a line like 2310 could then be added to each string as:

```
2310P$=S8$+STR$(K%(I))
```

Another point; you already know that the TAB function doesn't work on the printer. Well, the SPC function does. You may have wondered what the differences between these two seemingly similar functions are. This is one of those dif-

ferences. We will see an example of use later.

WHAT #0\$!* APPROACH WORKS?

That second word was copied verbatim from the cover of COMPUTE! #7. Anyhow, there is a way to get whole numbers into printed columns without having to cope with slow string handling. It may sound silly, but the way to do it is to keep it as data (numerical data that is). We will now examine the techniques that may allow you to avoid string renderings of data altogether. You will then put the data out as fast as the printer can handle it; all day if necessary and always in neat columns.

The Basic Idea

Let's say you want to print out a number that will range between 0 and 999 in a column eight spaces wide. Using the integer variable K%, we might write:

```
2900IFK% = 0 THEN PRINT #4,S8$;:GOTO2950
2910IFK% < 10 THEN PRINT #4,S5$K%;:GOTO2950
2910IFK% < 100 THEN PRINT #4,S4$K%;:GOTO2950
2930 PRINT #4,S3$K%;:
2950REM NEXT COLUMN
```

Here we have covered the full range from 0 to 999. If the number goes over 999 it will disturb the columnation unless another line of code is added to catch numbers less than 9999 to realign it. Only one of these print statements will actually execute. If you expect a lot of larger numbers then this routine would go faster with the larger numbers first, as fewer comparisons would take place before the correct line was found and executed. This code will place one column on the sheet. The next column would require a repeat of the whole routine, so coding this way could get long. It is fast, however, and it is effective and straightforward if only a few columns are needed.

In this example, zero is not printed, eight spaces are printed instead. A single digit, including zero if you want it to print, takes three spaces. The <10 or single digit line (line 2910) has 5 spaces placed first, then the sign space, the numeral itself, then a space after. If you want 0 to print, then put in REM at the start of line 2900 to neutralize it. (Don't eliminate it as it is a GOSUB target line).

Note that the carriage return suppress semi-colon is used on all of these lines. This leaves the printer poised on the start of the next column on the same line. A PRINT# statement must be added at the end of the line to go smoothly to the next line, as we will see in the next example. It is like bowling, where the tenth frame is handled differently to wrap things up.

The GOSUB Variable Width Column Maker

Now that the principle has been covered, let's go to some code that will produce an unlimited number of columns of varying width using a reusable subroutine for each column desired. This routine will compete in size with string handling code and is as fast as you'll want.

NEW!

IBM COMPATIBLE 8" FLOPPY DISK for CBM/PET*, Aim, Sym



PEDISK II

LOW COST – HIGH PERFORMANCE FLOPPY DISK

5½" MINI FLOPPY DISK SYSTEMS:

Model 540-1 Single Drive, Double Density (143K) \$595.00
 Model 540-2 Dual Drive, Double Density (286K) \$895.00
 Model 580-1 Single Drive, Quad Density (286K) \$795.00
 Model 580-2 Dual Drive, Quad Density (572K) \$1,195.00

8" MINI FLOPPY DISK SYSTEMS:

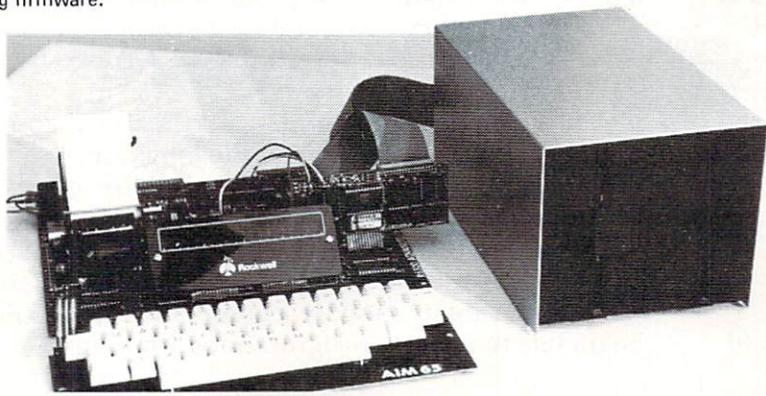
Model 877-1 Single Drive, IBM standard (295K) \$1,095.00
 Model 877-2 Dual Drive, IBM standard (590K) \$1,695.00

Payable in U.S. Dollars

PEDISK II is a high performance mass storage peripheral to enhance your computer's storage capability. Total storage to 850K bytes is available. The PEDISK II system consists of a small disk controller electronic board that mounts inside the computer and an external disk drive assembly. PEDISK II offers the fastest mass storage system available for the Commodore PET. With a data transfer rate of 250000K bits per second, the PEDISK II loads data directly to memory. This is up to four times faster than any 488 bus-type mass storage device.

One, two, or three drives connect to the PEDISK controller board. The user can choose 5½" or 8" disk drives. An important feature of the PEDISK II system is its ability to exchange data with other computers. The standard 8" IBM 3740 format allows data exchange with large computers. Data files, mail lists, etc. available on large computers can be processed by the PET/PEDISK system. Remote PET/PEDISK computers can provide data entry for large machines.

PDOS II software links directly to the standard BASIC and operates with BASIC-type commands for easy interfacing. A full set of disk utility commands completes the powerful disk operating firmware.



fullFORTH +

INTERPRETER — can be executed directly in an interpretive mode to speed testing and debugging.

CROSS-COMPILER — words can be individually compiled and tested, the entire program can also be cross-compiled for maximum efficiency.

COND. ASSEMBLER — Machine language modules can be intermixed and conditionally assembled to fullFORTH.

SPECIFY PEDISK II, PET 2040 or 4040 DISK, OR APPLE \$75.00

cgrs

MICROTECH

DEALER INQUIRIES INVITED

FULL FEATURE "FORTH" FOR 6502 SYSTEMS

STRING HANDLING — variable length constants and variables are allowed. Processes compare, move, concatenate and sub-string words.

FLOATING POINT — process 5 or 9 digit integer and floating point numbers for arithmetic operations.

SCREEN EDITOR — contains a unique full cursor visible screen editor.

FOR INFORMATION, SEE YOUR DEALER OR:

P.O. BOX 102 • LANGHORNE, PA 19047 • (215) 757-0284
 U.S.A.

*PET IS A TRADEMARK OF COMMODORE

```

2400FOR I=1 TO 30
2410P=K%(I):S=6:GOSUB2460
2420P=L(I):GOSUB2460
2430P=M%(I):S=8:GOSUB2460
2440PRINT#4
2450NEXT
2460IFP=0THENPRINT#4,SPC(S);:GOTO2510:
REM BLANK WHEN P=0
2470IFP<10THENPRINT#4,SPC(S-3)P;:GOTO2510
2480IFP<100THENPRINT#4,SPC(S-4)P;:GOTO2510
2490IFP<1000THENPRINT#4,SPC(S-5)P;:GOTO2510
2500PRINT#4,SPC(S-6)P;
2510RETURN

```

Any practical number of columns can be created by reusing the GOSUB at 2460 over and over. The width of each separate column is determined by the variable S, set at line 2410 for six spaces for K%(I) and L(I), and then set again for eight spaces for the variable M%(I).

When the last column has been printed out, the carriage return suppress is cleared with a final PRINT# statement on line 2440. Any additional columns would be added after line 2430 and before 2440, so the PRINT# statement would still be last.

This is print test #3. It prints in about 16 seconds with no pauses. My 80 cps printer is apparently running at its full speed through the whole test.

Check the data that you are printing to make sure that there is a printing line for each possible number that will be sent to the printing subroutine. Any number that is out of range will skew the columnation. You may have to exclude numbers that are too small or too large, or which contain negative or decimal quantities.

Lines, sometimes a number of them, may have to be carefully added to care for everything that you want to include in your printout. Remember the words of Gerald Weinberg in *The Psychology of Computer Programming*: "To detect errors, the programmer must have a conniving mind, one that delights in uncovering flaws where beauty and perfection were once thought to lie."

The Commodore Answer

I have not seen an in-depth review on the PET 2022 printer, but I have worked with a number of them. Commodore has provided a neat way to format printed information using a format file which you instruct as needed to produce columns, with many useful options. This works only with PET printers and then with reservations, as explained below.

There are two ROM sets for the 2022. The early set is noteworthy for the fact that it supplies a carriage return for every linefeed. When it pages or passes blank lines, the print head moves clear across for each line. That is the bad news. The good news is that the formatting works, and works well.

The newer ROM set will give linefeeds without

the time-consuming full carriage scan. There is a bug, however, that causes the machine to go into permanent lower-case mode when more than a few columns are sent to the format file and then printed to. This is a fatal error, as nothing short of a power down will restore normal operation. Complex formatted output that prints perfectly on the older ROM set cannot be made to run on the new set.

I have not been able to locate a corrected ROM, although it has been on the horizon for a year. I have not yet had a chance to try the new PET/MX-80 printer.

Epson

The standard MX-80 was built for use with the TRS-80 and contains the Radio Shack character set to prove it. It does not have the same logic regarding carriage return/linefeed that the PET printer does. With the switch set for listings, KEYPRINT (**COM-PUTE! #7**) will not work. Wordpro 3 required an added lf1 (linefeed) in every file header, and so on. Hoo Boy!

There is a switch that adds linefeeds, but it is buried inside the machine. I almost had my cover trained to jump off when I snapped my finger, when I finally added an external SPST switch in parallel with switch 2-3. When that SPST wears out I will have to replace it.

David Lein's late 1980 manual does a good job of explaining and demonstrating printer features. Appendix D on using the unit with other than the TRS-80 is very brief and touches on the Apple only.

The important features like double width letters, variable line spacing, and double strike work from the keyboard and under program control if you leave those pernicious JPET controls on the IEEE interface board OFF.

I hope that these samples and the discussion will help you to avoid some of the long hours otherwise required to find out how to efficiently use your printer. Some of these problems had me almost carrying my head around under my arm a few times. Remember Weinberg's words; "Any fool without the ability to share a laugh on himself will be unable to tolerate programming for long."

The Demonstration Program Listing.

```

1000 M=PEEK(51000):J=140
1450 IFM=0THENL=PEEK(135):POKE135,26:GOTO2000
1500 L=PEEK(53)
1510 POKE53,26
2000 DIMA$(J),B$(J),C$(J),D$(J),K%(30),L(30),M%(30)
2020 FORI=1TOJ
2030 A$(I)="TRY":B$(I)=A$(I)+"THIS":C$(I)="OUT":D$(
(I)=C$(I)+"TO SEE"
2040 NEXT
2050 FORI=1TO30
2060 K%(I)=RND(1)*9
2070 L(I)=INT((K%(I))†2)
2080 M%(I)=(L(I))†2
2090 NEXT
2100 OPEN4,4
2110 T1=TI

```

The SM-KIT is a collection of machine language firmware programming and test aids for BASIC programmers. SM-KIT is a 4K ROM (twice the normal capacity) which you simply insert in a single ROM socket on any BASIC 4 CBM/PET—either 80 column or 40 column. Includes both programming aids and disk handling commands.

ERROR DETECTION: the SM-KIT automatically indicates the erroneous line and statement for any BASIC program error.

LINE NUMBERING: the SM-KIT automatically numbers BASIC statements until you turn the function off.

SCREEN OUTPUT: the commands FIND, DUMP, TRACE and DIRECTORY display on the CRT while you hold the RETURN key (display pauses when the key is released). Continuous output is selected with shift-lock.

OUTPUT CONTROL TO DISK OR PRINTER: in addition to displaying on the CRT, you can direct output to either disk or printer.

HARDCOPY: allows screen displays to be either printed or stored on disk.

FIND: searches all or any part of a program for text or command strings or variable names. Either exact search or wild card search supported.

RENUMBER: the SM-KIT can renumber all or any part of a program. The selective renumbering allows you to move blocks of code within your program.

VARIABLE DUMP: displays the contents of floating point, integer, and string variables (both simple and array). Can display all variables or any selected variables.

TRACE: SM-KIT can trace program execution either continuously or step by step starting with any line number. Selected program variables can be displayed while tracing.

DISK COMMANDS: as in DOS Support (Universal Wedge), the "shorthand" versions of disk commands may be used for displaying disk directory, initializing, copying, scratching files, load and run, etc.

LOAD: SM-KIT can load all or part of BASIC or machine language programs. It can append to a program in memory, overwrite any part of a program, load starting with any absolute memory location, and load without changing variable pointers.

MERGE: allows merging all or any part of a program on disk with a program in memory.

SAVE and VERIFY: SM-KIT provides one step program save and verification. It also

allows you to save any part of a program, or any address range.

Developed by (and available in Europe from) SM Softwareverbund-Microcomputer GmbH, Scherbaumstrasse 29, 8000 Munchen 83, Germany

252 Bethlehem Pike
Colmar, PA 18915

215-822-7727 A B Computers

WRITE FOR CATALOG.

Add \$1.25 per order for shipping. We pay balance of UPS surface charges on all prepaid orders. Prices listed are on cash discount basis. Regular prices slightly higher.



ONLY
\$40
**A 4K ROM with both
programming and disk
handling aids.**

**NEW
PRODUCT**

JUST PLUG IT IN

- No soldering • No messy wires

SOFTWARE SELECTABLE

1. Software select one of two operating systems.
(BASIC 2.0 / BASIC 4.0)
2. Software select utility ROMs at conflicting addresses.

\$125⁰⁰ (U.S.)

(\$150.00 Canadian)

Add \$3.00 shipping to all points outside Canada.



Master Charge and
VISA accepted.



SWARM-100



For 24 Pin ROM Machines Only.

**BATTERIES
INCLUDED**

Village by the Grange
71 McCaul Street
Toronto, Ontario
Canada M5T 2X1
(416) 596-1405

```

2120 PRINT"PRINT TEST NUMBER (1, 2, OR 3)"
2130 INPUTB:ONBGOSUB2200,2300,2400
2135 T=(T1-T1)/60
2140 PRINT#4,T
2180 CLOSE4
2190 PRINT"THAT TOOK" T "SECONDS TO PRINT"
2192 PRINTFRE(0)
2193 IFM=0THENPOKE135,L:END
2195 POKE53,L:END
2200 FORI=1TO30
2210 P$=""
2220 Q$="" "+STR$(K%(I))
2230 P$=RIGHT$(Q$,8)
2240 Q$="" "+STR$(L(I))
2250 P$=P$+RIGHT$(Q$,8)
2260 Q$="" "+STR$(M%(I))
2270 P$=P$+RIGHT$(Q$,8)
2280 PRINT#4,P$
2290 NEXT:RETURN
2300 FORI=1TO30
2310 Q$="" "+STR$(K%(I))
2320 PRINT#4,RIGHT$(Q$,8);
2330 Q$="" "+STR$(L(I))
2340 PRINT#4,RIGHT$(Q$,8);
2350 Q$="" "+STR$(M%(I))
2360 PRINT#4,RIGHT$(Q$,8)
2370 NEXT:RETURN
2400 FORI=1TO30
2410 P=K%(I):S=6:GOSUB2460
2420 P=L(I):GOSUB2460
2430 P=M%(I):S=8:GOSUB2460
2440 PRINT#4
2450 NEXT:RETURN
2460 IFP=0THENPRINT#4,SPC(S)::GOTO2510:REM THIS
LINE LEAVES BLANK SPACE ON 0
2470 IFP<10THENPRINT#4,SPC(S-3)P::GOTO2510
2480 IFP<100THENPRINT#4,SPC(S-4)P::GOTO2510
2490 IFP<1000THENPRINT#4,SPC(S-5)P::GOTO2510
2500 PRINT#4,SPC(S-6)P;
2510 RETURN
READY. 13

```

©

Odds And Ends:

A Fat Forty Bug

Gordon Campbell, Willowdale, Ont.

Some machine language programs which work just fine in PETs with BASIC 4.0 and 9-inch screens will yield odd results on the new 12-inch, 40-column machines. Occasionally, it will appear as if the program has responded inaccurately to the key which was pressed.

This is due to a very subtle difference in the ROM. If the machine language program happens to be in decimal mode when an interrupt occurs, the keyboard decode is completely inaccurate. Even if a key is still pressed from a previous character, it will be decoded as a different character, so, instead of getting one character, you get three (the original correct one, one that is wrong, and probably the original one again).

The problem is well illustrated by the program listing attached. If you assemble the program as shown, then from the monitor type: G 0800 you can type on the keyboard and see what character the PET thought was pressed. By the way, to get out of the program, press the RVS key. Now change the SED (set decimal mode) to a NOP. The program gives accurate keyboard decode. Now the STOP key will get you out.

The way to get around this bug, if you must use decimal mode, is to precede the routine with an SEI (disable interrupts) instruction, and follow it with a CLI (enable interrupts).

0010	.BA	\$0800
0020	.OS	
0030	; TEST KEYBOARD DECODE	
0040	; WITH DECIMAL MODE SET!	
0050	GET	.DE \$FFE4
0060	PRINT	.DE \$FFD2
0070	;	
0800- F8	0080	STRT
	0090	;
0801- CA	0100	DLLLOOP
0802- D0 FD	0110	BNE DLLLOOP
0804- 88	0120	DEY
0805- D0 FA	0130	BNE DLLLOOP
	0140	;
0807- D8	0150	CLD
0808- 20 E4 FF	0160	JSR GET
080B- C9 00	0170	CMP #0
080D- F0 F1	0180	BEQ STRT
080F- C9 03	0190	CMP #3
0811- F0 06	0200	BEQ STOP
0813- 20 D2 FF	0210	JSR PRINT
0816- 4C 00 08	0220	JMP STRT
0819- 00	0230	BRK
	0240	.EN

LABEL FILE: [/ = EXTERNAL]

/GET=FFE4	/PRINT=FFD2	STRT=0800
DLLLOOP=0801	STOP=0819	
//0000,081A,081A		

©

80 × 25

On The
Built-in
Display

PET/CBM™ 2000/3000/4000 Series

\$275.00 *

Select either **80 × 25** or **40 × 25** display format

From the keyboard or program

Features the same memory map and subroutines from the Basic ROMs [specify which version of Basic when ordering] **, for standard programming. You also gain the use of **1023** extra memory locations in the 40 column mode, or **47** extra locations in the 80 column mode. [These locations are available only to machine language programs, or peek & poke from Basic].

Displays the full, original character set, including graphics characters in either mode.

All utility software, firmware, like Toolkit™, Dos Support [Wedge], Extra-mon, etc., is compatible in both modes of operation.

The complete enhancement consists of: 1 dual 24-pin socket [one socket for the 40 column screen editor, and one for the 80 column screen editor], and a circuit board that replaces the existing screen RAM. Each circuit board is registered to the original owner. There is also an 80 column reference ROM that plugs in one of the expansion sockets [specify the address when ordering]. An option board is available [\$25.00] that allows the ROM to be used with any other 2K ROM, in any of the expansion sockets.

Available from your local dealer or:

EXECOM CORP.

1901 Polaris Ave.
Racine, WI 53404
Ph. 414-632-1004

* Plus appropriate installation charges. This requires some circuit modification.
[available from the factory for \$75.00 plus shipping]

** If power-on message = ### COMMODORE BASIC ### you have 3.0 Basic.
[Available only for Basic 3.0 & Basic 4.0 at the present].

PET™ & CBM are trademarks of Commodore Business Machines.

We will ship via Master Charge, VISA, C.O.D., or pre-paid.

Toolkit™ is a trademark of Palo Alto IC's, Inc.

Installation may void your Commodore 90 day warr.

The Execom™ board is guaranteed for 1 year.

Machine Language: What's Your Sign?

Jim Butterfield
Toronto, Canada

Beginning programmers learn very quickly that a memory location has eight bits capacity, so that it may hold a number from zero to 255, or 00 to FF in hexadecimal. That's the range of values that you are allowed to POKE and that you will see with a PEEK. These numbers all seem to be positive. Why, then, do some of them set the N (negative) flag when loaded? More generally — how do you handle signed numbers?

As Humpty Dumpty almost said: "When I use a number, it means just what I choose it to mean — neither more nor less". As programmers, we can choose to treat a memory location value as if it were unsigned, a number from 0 to 255; or signed, a number from -128 to +127. We can view the value in many other ways, too: as part of a bigger number, as an ASCII character, as two or more small numbers packed together, and so on. For the moment, let's concentrate on the signed number aspect.

Sign Posts

The N (negative) flag is tied to the most significant bit of the value under consideration. For example, if we load into a register a value of hexadecimal C8 which would PEEK as 200 decimal, the N flag is turned on. Why? If we write C8 in binary we get 11001000. The first bit (called the high-order bit or the most significant bit) is one, and that's what kicks the N flag on. If we mean the number to be unsigned, we may ignore the N flag; but if we mean the number to be signed, the N flag tells us that it is negative. We can tell what negative value is represented in an 8-bit location by subtracting its unsigned value from 256, so that C8 (unsigned 200) has a signed value of -(256-200) or -56.

This method of representing signed numbers is called two's-complement and it works well once you get used to it. There are a few special rules to keep in mind when you add, subtract, multiply, and compare, but most things are quite straightforward. You'll quickly learn that FF or decimal 255 has a signed value of -1; that the highest 8 bit

signed value is hex 7F or +127 and the lowest is hex 80, or -128.

Overflow: My Byte Runneth Over...

When we add unsigned numbers, we need to watch for a leftover Carry (C flag) after the addition is complete. If the C flag is on, it means that the addition has generated a result that is too large to fit the space available. Similarly, when we subtract unsigned numbers, we look for the inverse: the C flag being off means that we have tried to subtract a bigger value from a smaller one — and that's illegal if we want unsigned results.

The rules are different when we add and subtract signed numbers. The problem we must look for here is a "sign switch": for example, adding +100 to +100, two positive numbers, will generate a value of 200 — which is a negative value if placed in a single byte. This type of error is called "overflow," and the 6502 conveniently provides us with an overflow indication (the V flag) to warn us of difficulty in signed addition or subtraction. A BVS (Branch Overflow Set) will detect the fault and allow us to code an appropriate error or warning routine.

Remember that both Carry and Overflow are set with each Add and Subtract command you execute. It's up to you to choose which flags are important: you know which numbers are signed and which are not.

Multiplication: Sign Of The Times?

General multiplication of signed numbers calls for careful testing of both signs and quite a bit of work. For the moment, we'll concentrate on simple multiplication routines: multiplying by a fixed value of say four or five.

We multiply a number by two by using an ASL command. If we were doubling an unsigned number, we once again test the C flag to make sure that the new value fits into the space provided. For signed numbers, it's a little more work: we must make sure that doubling the number hasn't caused the sign to change. The overflow flag won't help us here (I wish it did) since it is unaffected by Rotates and Shifts. The usual coding method is to check that the C flag, which holds the previous sign, matches the N flag, which holds the current sign.

To multiply by four, we use two ASL commands, and we must carefully check for errors after each one. If we wish to multiply by five, we multiply by four and then add the original value — hopefully stored somewhere — and make the final overflow check on the addition.

Comparison: Getting the High Sign...

Comparing signed numbers can't be done with a single flag or a single test. The C flag gives you a valid comparison if the two signs are the same, but not if they differ. You could pre-check the signs: for example LDA VALUE1 : EOR VALUE2 would

UPGRADE SYSTEM

(UPSYS) is an intelligent RAM-Expansion for the COMMODORE COMPUTER. With UPSYS you can add 256K-, 128K- or 64K-Byte RAM to your CBM-Computer.

UPSYS is available for the Commodore Computers with BASIC 2.0 and for BASIC 4.0 i.e. 4032N, 4032B or 8032.

ORGANIZATION

UPSYS is organized in banks, 32K RAM, each, addressed from 0000 to 7FFF (0-32767). The OPERATING-SYSTEM (OS) is located in E900-EFFF and is installed in EPROM inside the UPGRADE SYSTEM.

With these locations it will not conflict with any other EPROM (VISICALC, WORDPRO, CREATE-A-BASE...)

WHAT can I do with UPGRADE SYSTEM?

You can use the different banks of UPSYS for programs (Basic or Machine Code) and/or for datafiles. The OS (Operating System) of UPSYS will allow bankswitch (jump from one 32K bank to another 32K bank), by a simple SYS-command. SYS60419 #1 means to jump from one bank into bank# 2.

You can switch to another bank with or without sharing the variables by OVERLAY. This allows a fast calculation from programs needing more than 32K of RAM area without reloading from floppy (and destroying the first program in the memory), for you are able to keep two, three or four, depending on the type of UPSYS you use, in the different 32K banks.

DATAFILES with UPGRADE SYSTEM

You can also set up one or more of the 32K banks for datafile banks.

The OS from UPSYS will allow up to 6 different datafiles in each 32K bank. A total of up to 31 different datafiles in various banks will be allowed. Maximum string length is 255 bytes. It is marvellous to access from a Basic program to any datafile bank containing, for example, 30K bytes of data in direct access with RAM-SPEED without lowering the RAM area in the user's Basic program.

Syntax of read-access:

SYSr# fn;sn,r\$

That means: read in datafile # fn the string with the # sn into the variable r\$.

Another advantage of UPGRADE SYSTEM is that there is no restriction in the number of open-files at the same time.

You can access up to 31 various datafiles without opening or closing them!!!

Included in the OS of UPSYS is a command allowing you to find, with lightning speed, a specified string matching with a preset string.

This command and all other OS-commands are written in the machine-code of the 6502.

COMMAND SYNTAX:

SYS fi#fn,sp,r\$,sn

this will look for a match with r\$ in the specified datafile # fn (for example, in a customer list or in inventory list) beginning in the sp-string position (i.e. mid\$(x\$,sp,len(r\$)), starting with the sn-th string in the datafile. If a match occurs, the position number of the match string will be placed in sn.

The advantage of this command is its high speed matching string in every given string-position, without presorting the strings. With this fast access you do not have to keep a lot of different indices of your datafiles to find a specified string. You are able to define your search- or match-field with complete freedom!!!

All these functions will not lower your program space in memory, for the data-files are in another bank in the UPSYS.

Programs with UPSYS

Another advantage of UPSYS is to keep different programs in different banks (you could use a few PETs with various programs). Of course, all of these programs are able to access to one or more of the defined datafiles.

To switch into another program-bank only needs a

mighty wings

UPGRADE-SYSTEM

3064
4064
8064



simple SYS command.

SYNTAX:

SYS jp#bn

That means: SYS 60419 (jp-for jump is set in your program to 60419) into bank # bn. With UPSYS 8256 you will have up to 8 additional programbanks plus one bank from your Commodore Computer itself. With UP 8064 you will have up to two additional 32K banks plus one bank from the PET itself.

The command above will switch into the specified bank without sharing the variables. If you want to switch in another bank with the OVERLAY of the variables you use:

SYS jp#bn,val

with this command the variables from the first program are *overlaid* into the bank # bn.

If you switch out of a program, the program will remain in the statement following the SYS command, as if "frozen."

If you switch back, your program will "wake up" and continue with the statement following the switch command.

Of course: you are able to switch back with or without *overlaiding* the variables.

UPGRADE SYSTEM comes complete in a separate cabinet with all necessary cables, connectors, OPERATING SYSTEM in EPROM (inside the UPSYS cabinet). With the installation and operation manual, UPGRADE SYSTEM is easy to install.

PRICING:

UPGRADE SYSTEM with 64K	.....	usd 792.00
UPGRADE SYSTEM with 128K	.....	usd 1184.00
UPGRADE SYSTEM with 192K	.....	usd 1390.00
UPGRADE SYSTEM with 256K	.....	usd 1576.00
Manual separate	.....	usd 10.00

Please specify which Commodore Computer (BASIC 2 or BASIC 4) you have. Delivery is from stock.

DEALER INQUIRIES are invited from all countries.

UPGRADE SYSTEMs are available from spima computer in WEST GERMANY. For more information, contact:

Bernd H. Ruf
201 Hackberry 1213
CLUTE, TX 77531
(713) 265-5625

Contract Trade Ltd.
788-790 Finchley Rd.
LONDON NW 11 7UR
ENGLAND

spima
COMPUTER

Turbinenstr. 4
6800 Mannheim 31
West Germany
Tel. 0 (06 21) 72 15 15
Telex 4 63 708 spima d

turn the N flag off if the signs were the same, or on if they were different. If the signs were identical, a normal Compare would settle the matter; if not, the positive number must be the biggest one.

Frank Covitz offers the following elegant signed compare:

```

TEST1: SEC
    LDA N1      ;Get 1st number
    SBC N2      ;Compare vs. 2nd number
    BVC TEST2   ;Branch on overflow clear
    BIT N1      ;Else test sign of 1st number
TEST2: BPL GTE ;If plus, branch to Greater Than
                  ;or Equal
                  ..          ;(code for less than)
GTE: ..        ;(code for greater than or equal)

```

Note that two tests are performed: the SBC (which is used to set flags rather than calculate results) and the BIT test. The N flag is brought into play here—it's unusual to see it doing a useful job in a comparison situation.

Odd Signs

When signs are used as part of large numbers, the sign bit appears only in the most significant byte. So if you allocate 32 bits (four bytes) to a value, only one

— the highest order — gives the sign.

It's possible to sign decimal numbers. If the numbers are held in BCD for decimal addition and subtraction, the sign works out rather oddly. The high bit is still the most convenient to use—but this causes positive values to be those starting with the digits 0 through 7, and negative values to begin with digits 8 and 9 only. This "unbalanced" arrangement of numbers is often satisfactory and allows the N and V flags to perform their proper roles. If, on the other hand, you need to balance the range of positive and negative decimal values, you'll want positive numbers to start with digits 0 through 4 and negative values with 5 through 9. In this case, you have to do most of your own sign work. As a last resort, you can keep the sign as a completely separate flag—but beware of additions and subtractions that cross the positive-negative boundary.

Signing Off...

Most machine language work is in unsigned integers: you'll need to deal with signed numbers only rarely. But when you do, it's essential to know how to handle them ... you might say that it's one of the signs of good programming. ©

QUALITY ACCOUNTING SOFTWARE for the CBM COMPUTER

THE GENERAL LEDGER SYSTEM \$150.00

All entries are made via formatted, fill in the blanks, screens. There is a separate check stub format disbursements entry screen and eight digit account numbers to allow sub coding as required. Up to fifty user designated journals are available. All data is verified on input with balance enforced. All journals are available for print at any point in the accounting cycle. Any printout may be printed by department. The general ledger prints: balance forward, full detail of each transaction, total credits, total debits, and end balance for each account. Available reports include: journals, disbursements register, current trial balance, audit trial balance, budget trial balance, income statement, balance sheet, cash flow analysis, and comparison of budget vs. actual amounts for year to date, or the current period.

FUND ACCOUNTING SYSTEM \$200.00

The perfect accounting system for the municipal utility district, and the small city or school district. The system includes all features of the general ledger system with the added ability of printing all reports, and the general

ledger, by fund as well as by department.

CLIENT ACCOUNTING SYSTEM \$200.00

The accounting tool kit for the public accountant. This system includes all features of the general ledger system with the addition of a payroll check stub formatted screen for payroll check input. Also included are: a payroll disbursement register, a 1099 register, 941 reports, and W-2's.

INTERLOCKING MODULES

The following modules are available for any of the general ledger based systems:

Accounts Payable	\$ 75.00
Accounts Receivable	\$ 75.00
Payroll	\$ 75.00
Job Cost Payroll	\$100.00
Utility Billing System	\$100.00

Accounting software may be reviewed at your dealer, or via mail. Full catalog, demo disc, sample operations manual, (please specify which system), and a \$20. credit coupon — only \$20.00

DEALERS! Please Write for Dealers Pack

Expanded Software Catalog Free on Request

BASIC SOFTWARE SERVICE

P.O. BOX 181, LA PORTE, TX., 77571
Phone Area Code 713/470-1857

BackPack

Standard Features:

- Full power to PET/CBM for a minimum of 15 minutes
- Installs within PET/CBM cabinet
- No wiring changes necessary
- Batteries recharged from PET/CBM integral power supply

Specifications:

- **Physical Size:** 5.5" x 3.6" x 2.4"
- **Weight:** 4.5 lbs.
- **Time to reach full charge:** 16 hours
- **Duration of outputs:** Minimum of 15 min.
- **Voltages:** +16, +9, -12, -9
- **Battery Life Expectancy:** 3 to 5 years
- **Battery On-Off Switch**

For Use With:

- Commodore PET/CBM 2001 and 4000 series computer
- Commodore PET/CBM 8000 series computer (screen size will not be normal on battery back-up)
- Commodore C2N Cassette Drive

BATTERY BACKUP SYSTEM

FOR COMMODORE PET/CBM COMPUTERS

Never again lose valuable data because of power shortages or line surges. **BackPack** supplies a minimum of 15 minutes reserve power to 32K of memory, the video screen and tape drive. **BackPack** fits inside the PET/CBM cabinet and can be installed easily by even the novice user. **BackPack** is recharged during normal operation and has an integral on-off switch.

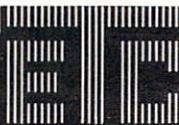
BackPack comes fully assembled and tested. Instructions included.

BackPack is a trademark of ETC Corporation
CBM/PET are trademarks of Commodore Business Machines

Designed and manufactured by:

ELECTRONIC TECHNOLOGY CORPORATION
P.O. Box G, Old N.C. 42
Apex, North Carolina 27502
Phone: (919)362-4200 or (919)362-5671

Electronic Manufacturing
Technical Design and Development
Computer System Technology



ELECTRONIC TECHNOLOGY CORPORATION

Train Your Pet To Run VIC Programs

Lyle Jordan
Maple Grove, MN

Have you already wished for the capability to re-number your VIC program, or to get a print-out, or to save it on a disk?

This could be especially frustrating if you have a PET, a printer, and a disk sitting idly nearby.

Or how about satisfying the desire to "upload" your VIC program into a PET? This article will give you a couple of quick and easy ways to do just that.

The PET BASIC programs start to occupy memory at location 1025 decimal or \$0401 hex. For the VIC, programs will start at 4097 decimal or \$1001 hex. To make things compatible, start by putting a one line program into your PET (example: 1 REM). Now load your VIC program by typing "load". The VIC program will load just fine, but will have a starting location of \$1001 hex and if you do a LIST, it won't show up at all. You will see only your one line program, 1 REM.

To get to the VIC program, you will need to change the forward linking pointers. This can be accomplished by doing a SYS 54386 (to get into the machine language monitor) and then by changing two memory locations.

First look at memory locations \$0400 to \$0407, by typing:

M 0400,0407

The PET will display the following:

**.M 0400,0407
.0 0400 00 07 04 01 00 8F 00 00**

Next list memory \$1000 to \$1007 and see:

**.M 1000,1007
.0 1000 AA 18 10 0A 00 99 22 56**

This display will vary depending on the first line of your VIC program. My first line was 10 PRINT "VIC-20".

Now you can change the '07' and the '04' at locations \$0401 and \$0402. You want this to point to the location of the first forward pointer of the

VIC program, so the '07' becomes '01' and the '04' is changed to '10'. Make the changes, press RETURN, and cursor down to the last line displayed, type 'x', and then press return again. When the PET gives the "READY", you are back in BASIC and can do a LIST. What appears is the one line, 1 REM, followed by the VIC program.

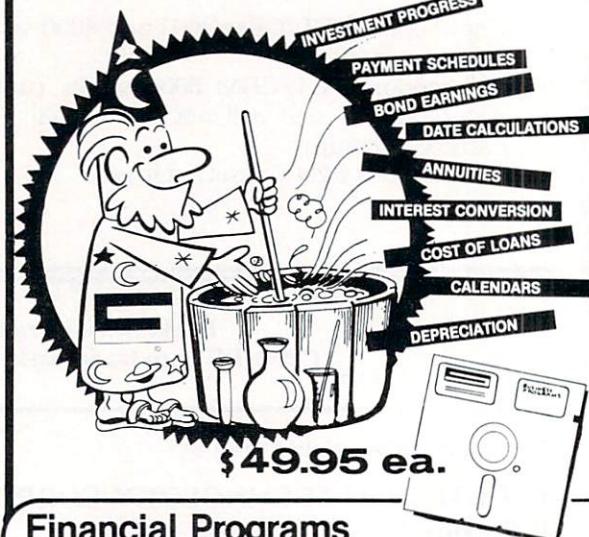
Having served its purpose, line one can now be removed, and the VIC program will be copied into the normal start of PET BASIC at location 1025 decimal or \$0401 hex.

If you have The BASIC Programmer's Toolkit from Palo Alto IC's, this entire procedure can be replaced by simply activating the Toolkit, and typing "APPEND".

I will have a lot of use for both of these procedures. Some that come to mind immediately are such things as getting a VIC program listing on a PET printer, renumbering a VIC program, and compacting a program so as to make the best possible use of the VIC's 3.5K of memory. I hope that this simple procedure will prove useful to others. ©

Introducing The FINANCIAL WIZARD

Diskette Programs for 16K PET/CBM



Financial Programs

The Wizard helps you quickly calculate 12 major types of Financial Transactions with ease and accuracy.

Created for businesses and individuals, this DISK PACKAGE has 9 programs plus instructions. The Wizard delivers answers on the screen or printer.

CASCADE COMPUTERWARE • (206) 355-6121
Box 2354 • Everett, WA 98203 Dealer inquiries invited

PETTERM™



Use your PET as an intelligent terminal. Access timeshare systems and networks such as the Source or Telenet. This is an interrupt driven system with buffered input/output. Unlike dumb terminals, the PET can do other tasks instead of having to wait for incoming data. This flexibility allows many advanced features.

These are complete assembled hardware and software packages. All include line editing/resend, auto-repeat, shift lock, output to IEEE printer and much more. Delivered on cassette or disk. Also, available for Commodore 8010 modem or Livermore Star 488 modem.

Terminal Program

Intelligent Communication

Uploads and Downloads

In Machine Language

PETTERM I All features above	\$ 80.00
PETTERM II All features of I, plus local text editor with down-loading capability	90.00
PETTERM III All features of II, plus 80/132 column scrolling window for viewing formatted outputs wider than 40 columns	100.00

FORTH

A Programming Revolution

FORTH Interactive high level compiler and operating system 5–10 times faster than PET BASIC. High level block structured language. This is a true fig-FORTH implementation for 16 and 32K PETs.

fig-FORTH, with editor, assembler \$50.00
with floating point and strings \$60.00
with floating point, strings, macro-assembler .. \$70.00
cassette and disk interface available.

DEALERS INQUIRE

software for small computers

1903 Rio Grande
Austin, Texas
78705

1-512-477-2207

P.O. Box 8403
Austin, Texas
78712

Source: TCE995



VISA®

Converting To Fat-40

Joe Ferrari
Commodore Canada

The addition of some new features to the 40 column PET has brought about some problems with program compatibility between the 4032 ten inch and 4032 twelve inch CRT display machines. In some cases, the program changes required for proper operation on the "Fat Forty" may be trivial and in other cases the conversion may be next to impossible. I will attempt to cover areas where failure can occur and what changes need implementing.

Level 1

Programs Loading Below BASIC (\$0400)

Standard BASIC programs should work without any modification, unless they employ PEEKs and POKEs or if the program loads into memory below BASIC. The latter problem can be a bit tricky to spot unless you know specifically what to look for. If the program does load below BASIC (say \$033A), but does not use locations \$03E9-03F9, one method that will correct the problem is:

- 1) get the program into memory (don't execute)
 - 2) SYS to the monitor (SYS 4)
 - 3) display hex \$03E9-03F9
 - 4) modify these registers with the following values
- [\$03E9: 10,10,09,10,00,00,00,00,00,00,00,00,00,00,00,00,00,00]
- 5) resave the program via the monitor

Tape Unit #2

Another area where the standard BASIC program can fail is in the utilization of the second cassette unit for sequential file access. If any program calls files from tape unit #2, unpredictable effects can result depending on the data coming into the buffer. In this case, nothing can be done to resolve the problem. The 12 inch 4032 has rendered the operation of the second tape unit virtually useless.

PEEKs And POKEs

Decimal location 151, often used to check if a particular key has been pressed, is still the same on the 12 inch, but the value of the keys has changed and therefore expected values for certain keys will return false information. The following table will assist in the conversion of a program with this problem.

KEY	OLDV	NEWV	KEY	OLDV	NEWV
@	15	64	A	48	65
C	31	67	D	47	68
F	39	70	G	46	71
I	53	73	J	45	74
L	44	76	M	29	77
O	60	79	P	52	80
R	55	82	S	40	83
U	61	85	V	23	86
X	24	88	Y	54	89
1	26	49	2	18	50
4	42	52	5	34	53
7	58	55	8	50	56
0	10	48			

KEY	OLDV	NEWV
B	30	66
E	63	69
H	38	72
K	37	75
N	22	78
Q	64	81
T	62	84
W	56	87
Z	32	90
3	25	51
6	41	54
9	57	57

When POKEs to this problem area are used for saving byte variables (whatever purpose), they must be moved to a free spot elsewhere in memory. If a space is free just below \$03E9, this could be a good area for relocating the byte variables.

Level 2

BASIC Programs With Machine Language Utilities

BASIC programs using machine language utilities that reside in the second cassette buffer can work properly provided they don't use the taboo area of the buffer (namely decimal 1001-1017). Again, if the utility uses this area, the space must be relinquished to the PET operating system in order to obtain successful execution of the program. Usually, in the case of small machine language utilities, it shouldn't be too difficult to understand and relocate it to an area of memory that is free.

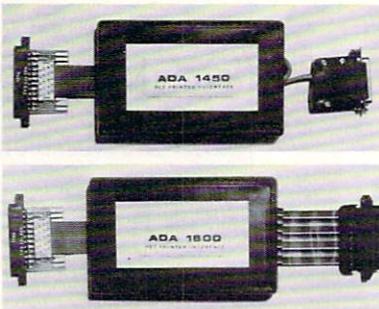
Level 3

Machine Language Programs

This will be the most difficult area to troubleshoot. If you are going to attempt to modify this type of program, be prepared to spend a good deal of time. Making the necessary changes to get the program working will most likely require a considerable amount of effort — which I personally don't recommend.

If you are really desperate, here are a few helpful hints that may assist you:

CBM/PET INTERFACES



RS-232 SERIAL PRINTER INTERFACE – addressable – baud rates to 9600 – switch selectable upper/lower, lower/upper case – works with WORDPRO, BASIC and other software – includes case and power supply.

MODEL – ADA1450 149.00

CENTRONICS/NEC PARALLEL INTERFACE - addressable – high speed – switch selectable upper/lower, lower/upper case – works with WORDPRO, BASIC and other software – has Centronics 36 pin ribbon connector at end of cable.

MODEL – ADA1600 129.00

CENTRONICS 730/737 PARALLEL INTERFACE – as above but with Centronics card edge connector at end of cable.

MODEL – ADA730 129.00

COMMUNICATIONS INTERFACE WITH SERIAL AND PARALLEL PORTS – addressable – software driven – true ASCII conversion – selectable reversal of upper/lower case – baud rates to 9600 – half or full duplex – X-ON, X-OFF – selectable carriage return delay – 32 character buffer – centronics compatible – much more.

MODEL – SADI 295.00

ANALOG TO DIGITAL CONVERTER – 16 channels – 0 to 5.12 volt input voltage range – resolution is 20 millivolts per count – conversion time is less than 100 microseconds per channel.

MODEL – PETSET1 295.00

REMOTE CONTROLLER WITH CLOCK/CALENDAR – controls up to 256 devices using the BSR X10 remote control receivers – 8 digital inputs, TTL levels or switch closure – 8 digital outputs, TTL levels.

MODEL – PETSET2 295.00

All prices are in US dollars for 120VAC.

Prices on 220 VAC slightly higher.

Allow \$5.00 shipping & handling, foreign orders add 10% for AIR postage.

Connecticut residents add 7½% sales tax.

All prices and specifications subject to change without notice.
Our 30 day money back trial period applies.

MASTER CHARGE/VISA accepted.

MENTION THIS MAGAZINE WITH YOUR ORDER
AND DEDUCT 5% FROM TOTAL.

IN CANADA order from: Batteries Included, Ltd., 71 McCaul Street, F6 Toronto, Canada M5T2X1, (416)596-1405.
IN THE USA order from your local dealer or direct: Connecticut microComputer, Inc., 34 Del Mar Drive, Brookfield, CT 06804, (203)775-4595.

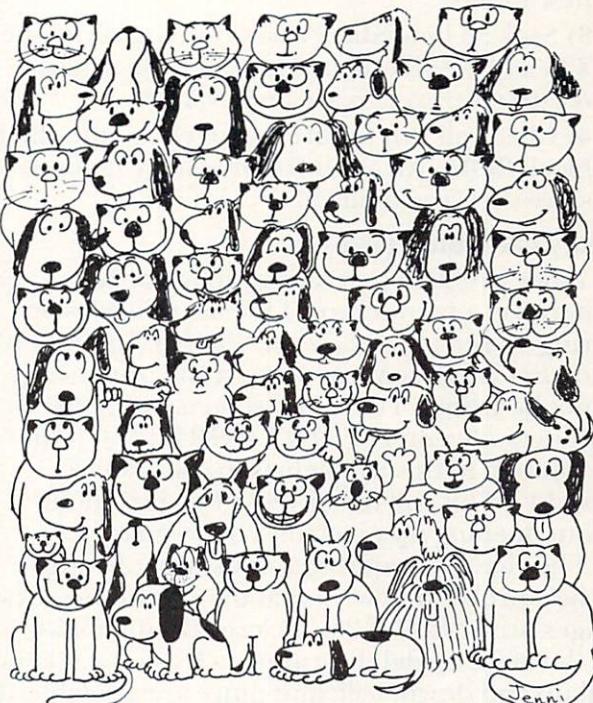
Dealer inquiries invited.



Connecticut microComputer, Inc.

34 Del Mar Drive, Brookfield, CT 06804
203 775-4595 TWX: 710 456-0052

Every PET Needs a Friend.



CURSOR is the best friend your Commodore PET will ever have. Since July, 1978 we have published 150 of the most user-friendly programs for the PET available anywhere. When we write or edit a program, we spend lots of time fussing about how it will treat you. We pay attention to lots of little things that help make using a computer a pleasure instead of a pain.

Naturally, **CURSOR** programs are technically excellent. Each program that we purchase is extensively edited or re-written by a professional programmer. But *imagination* is just as important as being user-friendly and technically good! We delight in bringing you off-beat, unusual programs that "show off" the abilities of your PET or CBM.

CURSOR is user-friendly, technically great and full of imaginative programs. And every issue of **CURSOR** is still available! We continue to upgrade previously published programs so that they'll work on the three varieties of Commodore ROM's (Old, New, and 4.0). New issues also work on the 80 column CBM.

For only \$4.95 you can buy a sample issue and judge for yourself. Or send \$18 for a four-issue subscription. Each **CURSOR** comes to you as a C-30 cassette with five programs and a graphic Front Cover, ready to LOAD and RUN on your PET.

Who knows? After your PET meets **CURSOR**, things may never be the same!

AUTHORIZED DISTRIBUTORS:

Great Britain
AUDIOGENIC, Ltd.
P.O. Box 88
Reading, Berkshire

Holland
COPYTRONICS
Bergmeester
Van Suchtelenstraat 46
7413 XP Deventer

Japan
SYSTEMS FORMULATE CORP.
Shin-Makicho Bldg. 1-8-17
Yaezu, Chuo-ku, Tokyo 103

Australia
**MICROCOMPUTER
HOUSE, LTD.**
133 Regent Street
Chippendale, Sydney
N.S.W. Australia 2008

**THE CODE
WORKS**

Box 550
Goleta, CA 93116
805-683-1585

High Resolution Bar Graphs For The Pet

David C. Swaim
Atlanta, GA

One of the reasons I chose the PET when I bought my computer was its excellent graphics capabilities. The PET/CBM graphics character set can be used to make "double density" or "high resolution" graphs without resorting to additional hardware. The highest resolution can be achieved when using bar graphs. Bar graphs can be found regularly in the financial section of the newspaper and are used to illustrate everything from the yearly rise in prices to the yearly production of wheat. You can draw bar graphs on your PET easily. What I want to describe in this article is a method I use.

How It Was Done

The first program I wrote to draw a bar graph used the reversed space to draw the bar. These bars looked fine but there were only about 20 steps vertically or 35 horizontally (allowing some space for labels). I wanted higher resolution than that for my graphs. It is possible to increase the resolution by a factor of eight either horizontally or vertically. All I had to do was use the other characters needed along with my reversed spaces. I put the needed graphics characters in an array. First I needed to plot the proper number of whole spaces for the bar. This was done by dividing the value to be plotted by the value I chose to be the maximum allowable value (the value that would give me a complete solid bar). This gave me a fraction that I multiplied by 20 (my vertical bar is 20 lines tall) and the result was truncated to an integer value, i.e., the fractional part was dropped (in my "low resolution" program the result was rounded to the nearest integer). This is an important difference. This integer corresponded to the number of times I would print a reversed space. The graphics character to be used for the last space was found by taking the fractional part from the original calculation of length and multiplying it by eight. This number was rounded to the nearest integer value and used as the index of my character array. Thus the proper character was printed to finish the bar.

The Program

The program listed here is a general purpose bar graphing program illustrating the high resolution bars. The bar graph is loaded into an array first before it is plotted on the screen. This is done for flexibility. To switch from vertical to horizontal

graphs requires rewriting only the print routine (lines 1000 and up) and putting the appropriate graphics characters in the array X\$ (lines 110 and 115). The rest of the program remains the same. You can change the data plotted by retyping the DATA statement (line 150) and changing the heading in K\$ (line 160). You do not need to worry about the maximum value of the data. The program calculates (on line 280) a maximum bar length so that the largest data value is plotted nine-tenths of the maximum allowable bar length. If you prefer line 280 can be changed to set a definite ceiling. Be careful though. The program is not protected against data larger than the maximum bar length.

Figure 1 shows the bar graph displayed on the screen by the program. This particular graph shows the seasonal or monthly variation of my natural gas bills last year. During September and October my securing deposit was refunded as a credit on my bills so I paid no bills for those months. I put a dollar in September and a dollar and a half in October to illustrate the high resolution available with this program. This is a resolution of about half of a percent (maximum bar length would represent around \$100). Figure 2 illustrates the same data printed with a horizontal format. Try it and I'm sure you'll never be satisfied with "low resolution" graphs again.

```

10 REM ****
60 REM ****
100 DIM M$(11,20),Y(12),X$(8)
105 REM X$ CONTAINS GRAPHICS CHARACTERS
106 REM FOR MAKING THE BAR
110 X$(1)=" ":"X$(2)="o":X$(3)="y":X$(4)="b":X$(5)="{REV}x{OFF}":X$(6)={REV}w{OFF}"
115 X$(7)="{REV}c{OFF}":X$(8)="{REV}{OFF}"
119 REM MOVE CURSOR DOWN CHARACTERS
120 P$="#24 DOWN"
125 REM HOME AND UP, BACK CHARACTERS
130 H$="{HOME}":U$="{UP}{LEFT}"
140 REM DATA TO BE PLOTTED ON THE BAR
150 DATA 75.36,91.53,61.29,39.56,21.7
8,11.4,11.39,10,1,1.5,24.69,35.67
155 REM K$ IS THE TITLE OF THE GRAPH
160 K$="NATURAL GAS BILLS"
190 REM READ THE VALUES TO BE PLOTTED
200 FOR X=1 TO 12
210 READ Y(X)
220 NEXT X
230 Y(0)=Y(1)
250 FOR X=2 TO 12
260 IF Y(X)>Y(0) THEN Y(0)=Y(X)
270 NEXT X
275 REM SET MAXIMUM BAR LENGTH, Y(0),
276 REM TO BE 10/9 TIMES LARGEST VALUE
280 Y(0)=10*Y(0)/9
300 FOR M=1 TO 12
301 N=M-1
305 REM CALCULATE THE NUMBER OF PRINT
306 REM LINES LONG THE BAR WILL BE
310 Z=Y(M)*20/Y(0)
315 REM Z% IS NUMBER OF WHOLE LINES
316 REM TALL THEN BAR IS
320 Z%=INT(Z)
325 REM R% IS NUMBER OF RASTER LINES
326 REM TO BE PRINTED ON THE Z%+1

```

```

330 R% = INT((Z-Z%)*8)
336 IF Z% = 0 THEN 530
500 FOR P=1 TO Z%
510 M$(N,P) = X$(8)
520 NEXT P
530 IF R% = 0 THEN 550
540 M$(N,Z%+1) = X$(R%)
550 NEXT M
1000 REM PRINT THE BAR GRAPH
1004 PRINT" {CLEAR}"
1005 REM WRITE THE GRAPH TITLE
1006 PRINT SPC(20-LEN(K$)/2);K$
1009 REM PUT BAR IDENT. AT BOTTOOME OF SCREEN
1010 PRINT "{HOME}";P$;" J F M A~"
    M J J A S O N D";

```

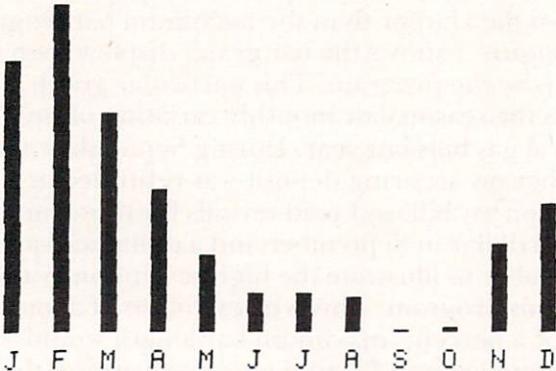


Figure 1: Natural gas bills are plotted to illustrate vertical bars. Note the fine resolution between September and October.

```

1020 FOR M=1 TO 12
1021 N=M-1
1025 REM POSITION CURSOR READY TO DRAW
1026 REM THE NEXT BAR
1030 PRINT HS;LEFTS(P$,21);SPC(3*M);
1035 REM DRAW THE ENTIRE BAR INCLUDING
    BLANKS
1040 FOR B=1 TO 20
1050 PRINT M$(N,B);U$;
1060 NEXT B
1070 NEXT M
1080 GETA$:IFA$=""THEN1080
1100 END
READY.

```

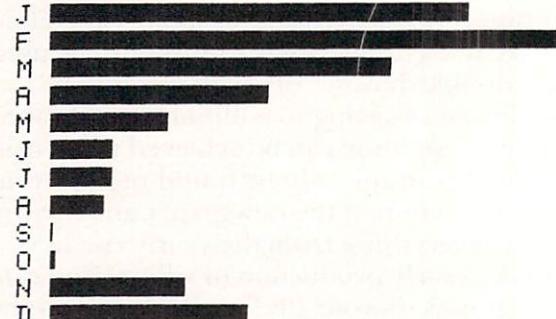


Figure 2: The same data as in Figure 1 is plotted horizontally. The only program changes made were to lines 110 and 115 and the print routine beginning on line 1000.

MATHEMATICS, BASIC SKILLS EXPLICITLY PRODUCED EXERCISES IN ARITHMETIC

For use with *PET/2040 Disk Drive/2022 or 2023 Printer

Computer programs designed for use by the classroom teacher as a primary source of exercises in mathematics, basic skills. Through simple question and answer, and with the use of only one computer system, a teacher may satisfy all individualized, in-class and homework requirements for drill in arithmetic. Students work directly upon exercise sheets. Difficulty level is easily adjustable. Answers are always provided. 23 programs included, covering integers, decimals, fractions, percent and much more.

ON DISK \$99.99

ALGEBRA EXPLICITLY PRODUCED EXERCISES IN ALGEBRA

Sixteen programs in linear and fractional equations, simultaneous equations, quadratics, signed and complex number arithmetic.

ON DISK \$99.99

(Arizona residents, please add 4% sales tax.)
Please add \$1.50 for postage and handling.

T'AIDE SOFTWARE COMPANY
P.O. BOX 65
EL MIRAGE, ARIZONA 85335

- Inquiries Invited -

*PET is a trademark of Commodore Business Machines, Inc.

QUALITY PRODUCTS FOR PET/CBM COMPUTERS

SOFTWARE BY MICRO SOFTWARE SYSTEMS

Memory	Program name	Description	Price
8k *	Checkbook-check	Balance checkbook easily ("best")	\$ 9.95
8k *	Math-calc	Extended math, trig functions	\$ 9.95
8k *	Metric-calc	RPN calculator, conversions	\$ 9.95
8k *	Finance-calc	Loans, savings, mortgage!	\$ 9.95
16k *	Super-calc	Math, financial-all you need!	\$19.95
32k *	Macro-calc	Math, finance, AND metric conv	\$29.95
8k	Bi-digital Clock	Attractive, bis, 12/24-hour	\$ 5.95
8k	Billboard	"lines square" display ("best")	\$19.95
8k	Software Kit I	Add utilities to your program	\$19.95
8k	Mem-Explorer	See how your program is stored	\$ 9.95
16k	Var-Dict/Xref	Variable dictionary, cross-ref	\$19.95
8k *	Swee-Ping	Create patterns, test reactions	\$ 5.95

For programs marked with *, please specify Version 1 (Basic 2.0) or Version 2 (Basic 3.0) ROMs. Write for availability of programs for Version 3 (Basic 4.0) ROMs and 80 column displays. MSS Disk programs available soon. More are on the way, write for latest list.

ACCESSORY INTERFACE DEVICES

All interfaces are assembled, tested, and guaranteed. No software is required, simply plug in and use. Many satisfied customers know that our lower prices mean better quality!

TU-ESC Interface PET/CBM to Centronics, NEC, Xytec, or other industry standard parallel printers. Simply plug in to computer and printer... no software required. Works with disk, other IEEE devices attached. \$129.95

TU-6514 Interface PET/CBM to RS-232 (serial) printers, such as the popular Heathkit H-14. 1200 baud (other rates available on request). No software required. Power pack included. \$79.95

TU-PUE Video Expansion for PET/CBM allows plug-connection of your computer to an external video monitor or TU converter. Unique connectors allow attachment of other cables, peripherals via contact extensions. \$29.95

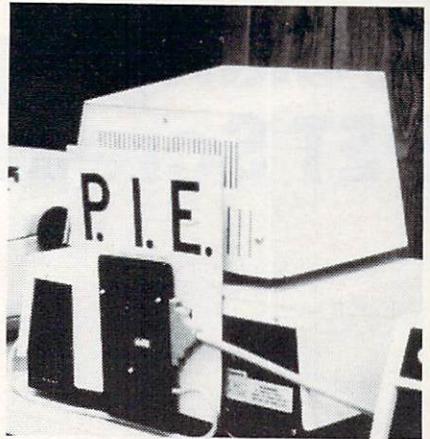
TU-8014 Interface TRS-80 to RS-232 printers such as the Heathkit H-14. Plugs into printer. Radio Shack expansion interface. No software required; allows printer to run at its maximum speed. Nothing else to buy! \$69.95

Virginia Micro Systems
1408 Idaho Street, Woodbridge, Virginia 22191
(703) 494-4057

U.S.A./MC
UR add 4%
Dealer
Inquiries
Invited

PIE-C

PET/CBM * IEEE-488 TO PARALLEL PRINTERS By LemData Products



P.I.E.-C MEANS—Professional design, Indispensable features, Excellent quality and Cost effectiveness. You can't buy a better parallel interface for your PET/CBM.

Our P.I.E.-C will interface your PET/CBM through the IEEE-488 bus to

the NEC Spinwriter, the C. Itoh Starwriter, printers by Centronics, Epson, Anadex, Escon Products, the Paper Tigers by IDS, the MIPILOT by Watanabe, the DIP printers, the AJ-841, the OKIDATA printers, plus ALL OTHER parallel ASCII printers.

Assembled with custom case, CBM-TO-ASCII code converter and appropriate cable, the **P.I.E.-C** is only \$119.95 (+ \$5 S&H). Md. Res. +5% tax. Specify printer and CBM models.

LemData Products, P.O. Box 1080, Columbia, Md. 21044 Phone (301) 730-3257

*PET/CBM are trademarks of Commodore Business Machines



EDUCATORS....

CAN YOUR SOFTWARE PASS THIS TEST?

IMMEDIATE
DELIVERY

DOES IT OFFER:

1. PROGRAMMABILITY via Educator Interactivity for ALL Subjects?
2. MULTIPLE CHOICE, FILL-IN or TRUE & FALSE at Educator's request?
3. STACKED or SIDE-BY-SIDE answers at Educator's request?
4. Choice of displaying incorrectly answered Questions again?
5. Choice of displaying correct answer if students reply is wrong?
6. AUTOMATIC creation of Data Statements into program from Screen?
7. FREE MEMORY status on Screen as tests are created?
8. Auto-Erase of Data Creation portion to conserve memory?
9. Capability of SAVING created tests to Disk or Cassette for later use?
10. Individual Student Summary to Screen or Printer of Date, Name & Score?
11. Automatic printer commands, no opening or closing ports manually?
12. Incorrect Entry protection? A RETURN alone defaults to a WRONG answer?
13. Updated progress report to student as test is running?
14. Upward compatibility with ALL ROM SETS including latest 4.0?
15. Two safeguards to Insure program Integrity? Teachers own personal SECURITY ACCESS CODE, changeable at each test-session? Protection from STUDENT STOPPING or LISTING program?
16. Copies for BOTH 40 & 80 Character Screens? Operation in 8 to 32K?
17. Full-featured MEMORY TEST to allow you to check your PET/CBM out?
18. BACK-UP copies provided FREE with order? White POLY Notebook with 30+ Pages of Documentation & Program Listings?

OUR SCHOOLPAC-1 PACKAGE DOES ALL THIS AND MORE!

CBM/PET?

SEND \$1 FOR
CATALOG AND
\$5 OR \$10
OFF OF YOUR
NEXT ORDER!

SCHOOL PAC-1 Disc or Tape—ONLY \$34.95

ADD \$2 FOR S/H to ALL ORDERS! WE ACCEPT VISA & MC Orders!

COMPETITIVE

SOFTWARE
21650 Maple Glen Drive
Edwardsburg, MI 49112

Waking Up The PET Screen

Hal Bredbenner
Raleigh, NC

An active screen display is always an asset to any business or recreational program and there are many ways to animate or otherwise liven-up a drab display of information. Most active screens make use of special graphic characters, machine code routines, or special hardware functions such as a character blink mode generated by a video processor. This article describes a software routine that provides reverse field blinking anywhere on the screen at variable blink rates. The routine uses BASIC only and no special hardware is required. The PET jiffy counter, TI, is referred to by the program, however its contents are not modified. The TI jiffy counter is standard in the PET (all versions, all ROMs) and if another system is used, any Real Time Clock (RTC) can be used as a reference.

The Blinking GET Routine, shown in Listing 1, is useful for prompting the system operator during program execution. When called, the subroutine will display, at the bottom center of the screen, the words "HIT ANY KEY." The displayed words will then blink from normal to reverse video at a rate programmed in line 160. Each jiffy in the PET is 1/60th of a second and since line 160 waits for 15 jiffies the display will blink every quarter of a second. If you don't yet understand how this timing works, I will describe it further in the next paragraph. The subroutine continues blinking the words until a key is depressed, at which time the routine returns to the main calling program with string variable S\$ equal to the input key. The routine is very straightforward in its operation and, although it is not very classical in its construction, it is efficient and can be easily understood and adapted for use in other programs.

This paragraph gives a line-by-line description of the actual operation of the routine and, if you have advanced in your BASIC programming skills, perhaps you will find it a little boring. When you are just getting started though, a line-by-line description can really be a help. Line 120 places the cursor at the bottom of the screen, however this could be modified with the cursor movement characters to place the cursor at any screen location. X\$, in lines 130 and 140, is used as a switch to

alternately hold the REVERSE FIELD ON or REVERSE FIELD OFF character. Initially X\$ holds the REVERSE FIELD ON character, line 130, and a jump to line 150 is made. After the cursor is moved over thirteen spaces by the TAB function, the reverse field is either turned on or off by printing X\$. Since X\$ initially holds the REVERSE FIELD ON character the reverse field function is turned on and then the words "HIT ANY KEY" are printed. A cursor up character is also printed to leave the cursor on the line just printed. The last task done in line 150 is to set variable H equal to the current value of TI, the jiffy counter. In line 160 a comparison is made to see if 15 jiffies have elapsed since the words were printed on the screen. This is done by comparing the number of jiffies in TI at the time the words were printed, which we called H, to the present value of TI. Any time a program refers to TI, the current value is returned and this is what makes a realtime clock a very nice feature. If the time elapsed is less than 15 jiffies then line 170 checks to see if a key is depressed. If any key is pressed its value is assigned to the string variable S\$ and a return to the calling program is made. If no key is pressed line 180 redirects the routine back to line 160. This loop continually checks the elapsed time and the state of the keyboard. After 15 jiffies have elapsed line 160 will redirect the program to line 190. If X\$ is equal to the REVERSE FIELD ON character a branch is made to line 140 that changes X\$ to the REVERSE FIELD OFF character. If X\$ was equal to the REVERSE FIELD OFF character then it alternates to the REVERSE FIELD ON character by jumping to line 130 from line 200. After this, the words "HIT ANY KEY" are printed again with the REVERSE FIELD being opposite from the previous time, causing the words to blink. The program continues in this loop until a key is depressed and a return is made through line 170.

Listing 2 is a simple demonstration program using the blink routine in a slightly different manner. The three Blinking Message Subroutines are called by a main program that is printing the current time at the top of the screen. Each subroutine checks to see if it is time for it to blink and, if so, it reverses the field of its message. If the blink time has not been reached, then the subroutine immediately returns to the main program. Notice that the GET statements have been dropped and that each routine must reposition the cursor before printing its message. Each subroutine prints a different message in a different screen location and blinks at a different rate in this DEMO program. Notice also that the blink rate (25 in line 270) could be made a variable that could be modified elsewhere in a program to increase or decrease the blink rate of certain messages. A very large number could be used to turn the blink function

Let Us...

flick your VIC

Vic 20 memory expansion — you get 8k and 176x176 graphics for only \$59.95

12VDC Power Converter — use the Vic in your car, camper, etc. \$49.95

Brass Pounder — learn morse code the new and exciting way! \$5.95

Music Machine — play songs from sheet music using the Vic's sound. \$5.95

Vic Monitor — lets you do machine code programming on the Vic! \$6.95

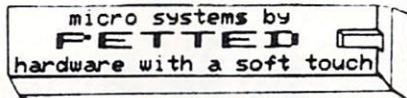
Talking Vic — lets the Vic speak the numbers one to ten! \$8.95

Joysticks \$24.95, **Schematics** \$7.95

OSI Rip Off 4 \$5.95, **Battle Zone** \$5.95, **Adventure Game** \$9.00

TRS-80 Robot Simulator program \$7.95

Add \$2.50 per order to cover shipping and handling.



P.O. Box 21851,
Milwaukee, Wisconsin 53221

DataMax

For CBM 8032 Computer-8050 Drive
3049 Cleveland Ave., Fort Myers, FL 33901

MAILMAN — Mail List Management System
by: Randy Stack — DataMax Software

Options available:

1. Enter a new file
 2. Modify an existing file
 3. Display an existing file
 4. Delete a file
 5. List entries by category
 6. Generate mailing labels
 7. Initialize a new data disk
 8. Exit program
- Enter your choice.

File Name - "Mail List Data"

Drive 0 - 1200 per file
Max 7.000 using
both drives

S. Sort entries alphabetically
W. Create **WordPro** file
Z. Labels for a range of zip codes

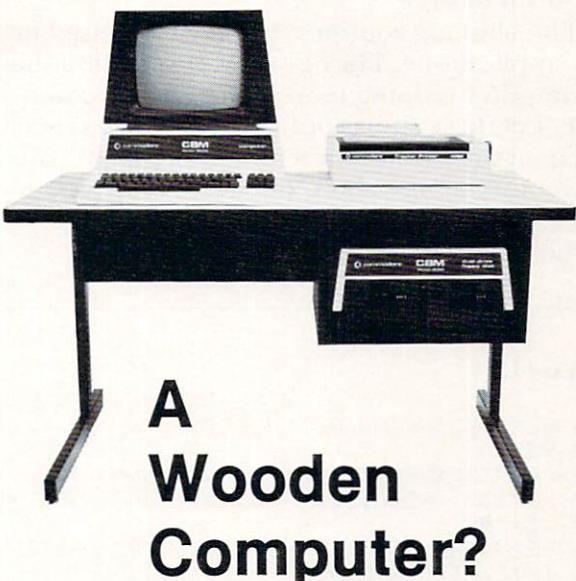
This program will accept 5 or 9 digit zip codes.

- Links to **WordPro 4** word processor for printing form letters, billings, statements, etc.
- Our program disk may be removed after loading for extra storage.
- Unlimited files on multiple disks with up to 1200 records per file.
- Seven individual fields of information including: name, company name, address, phone, code and 25 character comment field.
- Sorts entries alphabetically for easy modification, i.e. to delete duplicate names, etc.
- Prints reports or mailing labels by any field or in order of zip codes for mass mailings.
- Customization for your specialized needs is available at a nominal fee.

Price: \$150 plus \$5 shipping and handling:
Visa and Mastercharge accepted.



Call: (813) 332-7556 for immediate shipping.



A Wooden Computer?

Not from Commodore!

So why should the desk look like wood? A pleasant cream and charcoal trimmed desk looks so much better with Commodore systems. One look and you'll see. Interlink desks are right. By design.

The specifications only confirm the obvious:

- Cream and charcoal color beautifully matches the Commodore hardware and blends with your decor.
- An ideal 710 mm (28") keyboard height yet no bumping knees because a clever cutout recesses the computer into the desktop.
- High pressure laminate on both sides of a solid core for lasting beauty and strength.
- Electrostatically applied baked enamel finish on welded steel legs—no cheap lacquer job here.
- Knocked down for safe, inexpensive shipment.
- Patented slip joints for quick easy assembly.
- Leveling glides for uneven floors.
- Room enough for a Commodore printer on the desk, yet fits into nearly any den or office niche—H: 660 mm (26") W: 1170 mm (46") D: 660 mm (26").
- Matching printer stand available with slot for bottom feeding.

Price: \$299

In short, as Commodore dealers, we won't settle for anything that looks good only in the catalog! Our customers won't let us. They don't buy pictures. And neither should you. This is why **we will let you use one of our desks for a week** and then decide. If for any reason you don't like it, just return it in good condition for a cheerful refund.

If your Commodore dealer doesn't carry our desks yet, send a check for \$299 and we will ship your desk freight paid!

Name _____

Address _____

City _____ St _____ Zip _____

Interlink, Inc., Box 134, Berrien Springs, MI 49103

Master Charge and Visa welcome. Call our order line:
616-473-3103

on or off if desired.

The blinking routines shown can be used in many applications. They give the impression that the computer is doing more than one operation at a time. Let these short routines tell your secretary to turn on the printer, or let them highlight when an inventory item is about depleted, or, most importantly, let them warn of unseen Klingons and those inoperative phasor banks!

Program 1.

```

100 REM BLINKING GET ROUTINE
110 REM
120 PRINT "SIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII"
130 X$="3": GOT0150
140 X$="": 
150 PRINTTAB(13):X$;"HIT ANY KEY":H=TI
160 IF TI<H+15 THEN 190
170 GETS$: IF S$<>" " THEN RETURN
180 GOT0160
190 IF X$="2" THEN 140
200 GOT0130
READY.

```

Program 2.

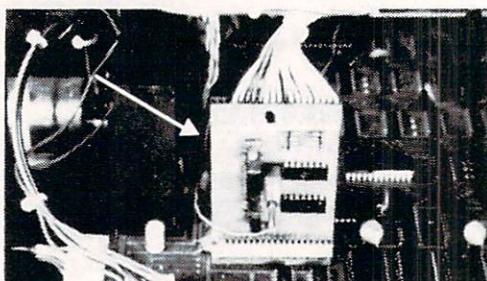
```

10 PRINT "D"
20 PRINT "THE TIME IS ";LEFT$(TI$,2)":";
" ;MID$(TI$,3,2)"; ":";RIGHT$(TI$,2)
30 GOSUB100:GOSUB200:GOSUB300
40 GOT020
50 REM
100 REM BLINKING MESSAGE SUBROUTINES
110 REM
120 IF H1<0 THEN 170
130 X1$="3": GOT0150
140 X1$="":
150 PRINT "SIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII"
160 PRINT X1$;"TIME IS PASSING":H1=TI
170 IF TI<H1+15 THEN RETURN
180 IF X1$="2" THEN 140
190 GOT0130
200 REM
210 REM
220 IF H2<0 THEN 270
230 X2$="3": GOT0250
240 X2$="":
250 PRINT "SIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII"
260 PRINT TAB(15):X2$;"TIME HAS PASSED":H2=TI
270 IF TI<H2+25 THEN RETURN
280 IF X2$="2" THEN 240
290 GOT0230
300 REM
310 REM
320 IF H3<0 THEN 370
330 X3$="3": GOT0350
340 X3$="":
350 PRINT "SIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII"
360 PRINT TAB(25):X3$;"TIME IS GONE":H3=TI
370 IF TI<H3+45 THEN RETURN
380 IF X3$="2" THEN 340
390 GOT0330
READY.

```

©

NOW YOU CAN HAVE A REPEATING CURSOR
JUST LIKE THE NEW PETs

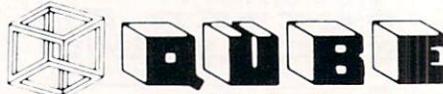


IF YOU HAVE A 2001 CBM/PET, ONE KEYBOARD FUNCTION THAT THE 8032 AND VIC-20 HAS IS CURSOR CONTROL KEYS THAT AUTOMATICALLY REPEAT CURSOR MOVEMENT WHEN THE KEY IS KEPT DEPRESSED AFTER MOMENTARY HESITATION. WE'VE GONE ONE BETTER: WITH OUR **REPEATER** BOARD, ANY KEY WILL REPEAT MAKING PROGRAMMING OR GRAPHICS A BREEZE. THE **REPEATER** PLUGS ONTO THE MAIN BOARD WITHOUT DRILLING OR SOLDER. NO SOFTWARE NEEDED AND CAN BE DISABLED WITH THE SWITCH PROVIDED. YOU'LL LIKE THE **REPEATER**.

INTRODUCTORY PRICE
INCLUDES SHIPPING

\$3900

& ORDERS ACCEPTED BY PHONE (716)625-8200



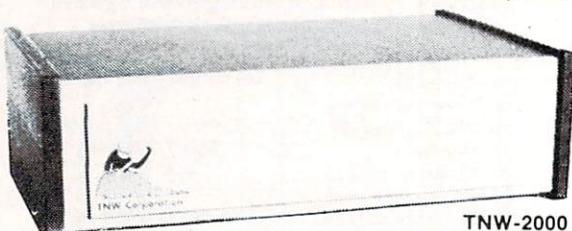
INTERNATIONAL

DEPT. C9

P.O. BOX 151, NO. TON., N.Y. 14120

IEEE-488 BUS SYSTEM BUILDING BLOCKS

For Commodore PET/CBM and other computers...



TNW-2000

TNW-1000 Serial Interface: \$129

1 channel output only

TNW-2000 Serial Interface: \$229

1 channel input and output

TNW-232D Dual Serial Interface: \$369

2 channels input and output plus RS-232 control lines

TNW-103 Telephone Modem: \$389

Auto answer / auto dial Use with DAA

SOFTWARE

PLUS Most popular computers
disks, printers, etc

PTERM: A program that turns your PET into a terminal
(Use with TNW-2000, TNW-232D, or TNW 103)

SWAP: Allows storage of up to 8 programs in PET
memory at once. Run them in any order

PAN: A sophisticated electronic mail program
(use with TNW-103)

Write or call for information today:



TNW Corporation
3351 Hancock Street
San Diego CA 92110

(714) 225-1040

Interfacing A BSR X-10 AC Remote Control System To Your PET

C. W. Ward
Hazelwood, MO

The January 1980 issue of BYTE magazine published an article by Steve Ciarcia entitled "Computerize a Home." In this article Mr. Ciarcia described a method of expanding his home security system to include control of all the lights and AC outlets in the house. In his words, "*This expansion seems to be a contradiction considering previous concern over wiring costs. It would appear that every AC outlet would have to be directly wired to the computer through relays or some remote control capability would have to be added to each light and appliance.*"

It is this latter approach that is the basis for this and Mr. Ciarcia's article: more specifically, interfacing a BSR X-10 AC Remote Control System to a computer. His approach differs however, in that it proposes building a relatively simple, but not so inexpensive, hardware interface between his computer (a Radio Shack TRS-80 Model I) and the BSR X-10 command console. This article proposes a software oriented solution. In terms of hardware, it requires no more than the connection of an ultrasonic transducer (2 wires) to the appropriate pins of the PET's user port, thus resulting in an even lower cost. It should be noted that the concept applies to any system with an available output port (one line). The machine language program would require rework depending upon the speed of the system's clock (the PET has a 1 megahertz clock) and the number of cycles per instruction.

The BSR X-10 system consists of a group of electronic devices that control the electrical environment inside and outside of your house. Lights can be turned on and off, dimmed or brightened. Plug-in appliances, television sets, and stereos can be turned on or off. No special wiring or complex installations are involved. The system is expandable by adding more modules, a cordless controller or other command consoles. The system is shown in photo 1 and photo 2. The components are: The command console, the wall switch module, the appliance module, and the lamp module. A cordless

controller (not shown) is available, but is not an integral part of the system being presented in this article.

The BSR X-10 system is marketed by Sears, Penneys and Radio Shack, to mention just a few, under slightly different product names. The components of one vendor's system are interchangeable with those of another, with one very notable exception. There are two different types of command consoles: one model (X10-014301) that can be remotely controlled with a hand held cordless controller, and one model that cannot! The command console that can be controlled by the hand held cordless controller is a requirement. The buyer should make certain that the BSR X-10 system purchased includes this particular model.



Photo 1: The BSR X-10 command console, appliance module and lamp module.



Photo 2: The wall switch module replaces the standard wall light switch. As with all the remote modules, it can be locally activated without the command console.



Photo 3: The 40K Hertz transducer, shielded cable and receptacle for the PET's parallel user port.

The BSR X-10 components are quite inexpensive when compared to the cost of the alternatives. The command console sells for \$39 while each remote module sells for \$15.

The command console of the system operates by sending coded signals through the house wiring to the lamp, appliance, and wall switch modules. Each remote module monitors these transmissions and responds only when its particular code is sent. The coded signals sent by the command console can be initiated by physically pressing a key on the console or by the receipt of a series of tone bursts in the proper sequence through the ultrasonic receiver section. This series of tone bursts would typically be transmitted by the hand-held cordless controller as a result of pressing one of its twenty-two keys. Its keyboard contains sixteen unit keys, numbered one through sixteen, each corresponding to the number set (or dialed) on the remote lamp, appliance, or wall switch module. The keyboard also contains six command keys labeled and defined as follows:

ON	Sends "TURN ON" command to selected module.
OFF	Sends "TURN OFF" command to selected module.
DIM	Sends "DIM" command to selected lamp or wall switch module.
BRIGHT	Sends "BRIGHTEN" command to selected lamp or wall switch module.
ALL LIGHTS ON	Sends "TURN ON" command to all lamp and wall switch modules simultaneously. (Does not affect appliance modules.)
ALL OFF	Sends "TURN OFF" command to every module, including appliance modules.

The user then selects a given lamp, appliance or wall switch module by pressing the appropriately

numbered unit key and initiates the desired function by pressing the appropriate command key. This action actually transmits two separate messages to the command console.

Figure 1 describes the format of the coded messages (tone bursts) sent by the cordless controller to the command console via ultrasonic communication. Each of the twenty-two keys on the controller has a unique 5-bit binary code (see table 1). A single message is made up of a start-of-message (SOM) code, one 5-bit binary code, the logical inversion of that 5-bit binary code, and an end of message (EOM) code. One message is approximately 100 ms in length and is composed of thirteen segments. Each segment is 8 ms in length. The start of message segment consists of a 4 ms 40K hertz tone followed by a 4 ms period of silence. Each segment of the data (5-bit binary code or inverted 5-bit binary code) consists of a 4 ms 40K hertz tone for a logic 1 or a 1.2 ms 40K hertz tone for a logic 0, followed by a silent period of the appropriate length. The end of message code consists of two 8 ms segments, each containing a 40K hertz tone for the complete duration. All messages use exactly the same format; only the 5-bit binary data codes vary.

Safety is the primary consideration. There is no hazard in using the controller or any of the remote modules as long as their cases remain intact. The BSR X-10 is Underwriters Laboratories listed. The PET must remain electrically isolated from the command console at all times. This is accomplished with communication in the form of ultrasonic sound transmitted through space by the transducer attached to the PET's user port. In essence, the PET software will simulate the activity of the hand-held cordless controller.

The hardware task consists of soldering the two wires of an output transducer to pin C (PAO) and pin A (GND) of a receptacle for the PET's parallel

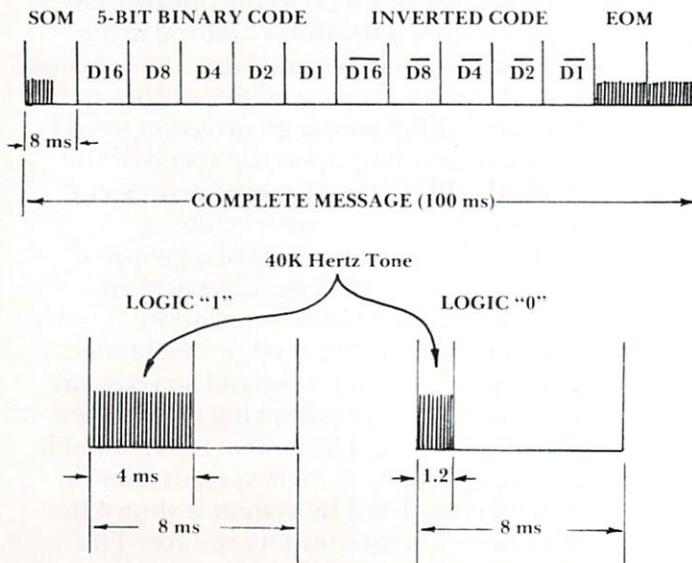


Figure 1: Description of coded message sent from cordless controller to the command console.

"STOCK BRIEF"

For Commodore Pet

A USER-FRIENDLY disk based file system for your securities
BUY / SELL / EVALUATE / EDIT / LIST / DIRECTORY

- Formatted reports to any IEEE interfaced printer
- Directory display of multiple stock files
- "Wild Card" search for stock name
- Dividend Yield calculated
- Automatic dating on all reports
- Automatic alphabetical stock name sort
- Automatic update of disk file when necessary

REQUIRES 16K MEMORY AND COMMODORE DISK UNIT

DISK & MANUAL \$50.00 Post Paid

MYSTIC SOFTWARE

P.O. BOX 218 LEDYARD, CT 06339

Jinsam 8.0

has broken the sort limit. Sorts are now unlimited — you may sort to any desired depth: 3, 4, 5, 6, 7 ...

We now have:
unlimited record length, unlimited fields, and unlimited sorts, and limitless applications.

See our ad elsewhere in this issue.

NEED EXTRA RAM SPACE?

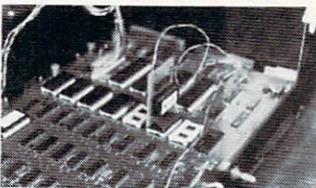
Running out of places to put your protection ROM's?

Or perhaps you are looking for protected RAM space to develop your Machine Language Program in? Then you will be interested in our RAM Boards

We have RAM Boards with 1K bytes of RAM, 2K bytes and 4K bytes of RAM, that will plug in to any empty socket in your Pet or CBM computer with 24 pin sockets.

For those who are looking for utility programs in EPROM (without empty sockets to put them in), we have a Board that plugs into the E900 (UD8) socket. It replaces the original ROM, which then plugs back into our little Board. This gives an additional 1 1/4 K of M/L instructions to your machine. Such as DOS (wedge), screen dump, sort routine, upper lower case toggle, screen color invert, repeat key on all keys, etc., with single keystroke commands. The E900 Board can also be used as either a 1K or 1 1/4 K RAM, with a simple move of a jumper.

All Boards are shipped with all IC's and RAM or EPROM in place ready to run, fully documented. All our Boards



can be daisy chained for even more RAM.

Please specify whether 3.0 or 4.0 ROM's and 40 or 80 column machine. And in the case of the E900 Boards, whether 1K, 2K, RAM or EPROM.

Prices are: 1K RAM - \$35.00; 2K RAM - \$65.00; 4K RAM - \$120.00. E900 Board with 1K RAM - \$55.00; with 1 1/4 K RAM - \$70.00; with EPROM only \$65.00.

For orders or further information contact:

LAR MICROTRONIX
12987 - 96A Avenue

Surrey, B.C. Canada V3T 1A1
Tel. (604) 588-8967

Sorry, no charge cards accepted at this time.

ASERT yourself... with CFI's new Database Retrieval System

WHO CAN USE ASERT?

libraries
personnel departments
dating services



schools
employment agencies
accountants

ANY BUSINESS THAT KEEPS RECORDS CAN USE ASERT TO:

- Create up to 21 fields per record
- Restructure fields at any time
- Sort on any field at any time
- Use FREE-TEXT area for comments
- Create up to 90 searchwords
- Search & retrieve on any combination of 90 searchwords
- Search with MUST HAVE, MAY NOT HAVE and OPTIONAL operators
- Print out hardcopy including labels
- Output to any word processor
- Compile summary statistics
- Maintain 1900 records per disk with "virtual" 5K record length

ASERT — Aid for Search & Retrieval of Text — \$495 complete

For the 8032 CBM and 8050 disk drive — Commodore Approved Software

OTHER CFI SOFTWARE

Federal Income Tax Preparation System*
Personal Tax Calculator*
Emergency Control Program*
VIC Animation Tutorial

*Distributed for CFI under the Commodore label

ALL CFI SOFTWARE AVAILABLE

from your local Commodore dealer
or direct from CFI

CFI . . . computer solutions, 875 West End Ave., New York, NY 10025

user port. The cable between the transducer and the receptacle is typically shielded (see photo 3).

Several sources for obtaining the 40K hertz transducer follow:

MASSA Laboratories Inc.

Hingham, MA
Part number TR-89

The Micromint

917 Midway
Woodmere, NY 11598
Part number 1002

The transducer shown in photo 2 was obtained from a local electronics surplus store, giving reason to believe that the 40K Hertz transducer is relatively common. Another possible source would be the service department of a local TV dealer. Most remote TV controllers today make use of ultrasonic transducers.

The effective range of the transducer is approximately twenty feet. When testing, various distances from the command module should be tried. Experience with several different transducers has shown that some failed to activate the console if positioned extremely close while others worked only in such a position.

Program 1 shows a simple BASIC driver program that serves only to demonstrate how the machine language sub-program should be used. Line 100 requests the user to enter the decimal data code for a given remote unit or a given function. If valid, the value is poked into location zero and the machine

language program is executed. This is repeated several times to ensure success. During testing, this loop count should be increased. The REM statements in the program merely document the unit and function codes. If the program is listed just prior to running, the codes will be readily available (displayed on the PET screen) during the demonstration.

Program 2 is an assembled version of the 6502 machine language program required to generate the thirteen 8 ms segments that make up a single message. The routine begins by initializing the data direction register (E843₁₆) for VIA data output port A (E84F₁₆). PA0 is defined as an output line and PA1 through PA7, although not actually used, are defined as input lines. The remainder of the mainline routine is subdivided into segments containing calls to appropriate subroutines to produce the 8 ms segment in question. Labels on each of the subdivisions correspond to the field labels in figure 1 describing the complete message. The 40K hertz tone on the transducer is produced by alternating the logic value (0 or 1) of pin C (PA0) of the user port at a rate of 40,000 cycles per second. This is accomplished by the machine language subroutine labeled "X40KHZ". The period of time that a given 40K hertz tone is produced is determined by the number of times the subroutine continues to loop. The calling program sets register X accordingly. The periods of silence are accomplished by calling the machine language subroutine labeled "DELAY". Again, the

UNIT CODE	5-BIT BINARY CODE					DECIMAL EQUIVALENT
	D16	D8	D4	D2	D1	
1	0	1	1	0	0	12
2	1	1	1	0	0	28
3	0	0	1	0	0	4
4	1	0	1	0	0	20
5	0	0	0	1	0	2
6	1	0	0	1	0	18
7	0	1	0	1	0	10
8	1	1	0	1	0	26
9	0	1	1	1	0	14
10	1	1	1	1	0	30
11	0	0	1	1	0	6
12	1	0	1	1	0	22
13	0	0	0	0	0	0
14	1	0	0	0	0	16
15	0	1	0	0	0	8
16	1	1	0	0	0	24

COMMAND	5-BIT BINARY CODE					DECIMAL EQUIVALENT
	D16	D8	D4	D2	D1	
ALL OFF	0	0	0	0	1	1
ALL LIGHTS ON	0	0	0	1	1	3
ON	0	0	1	0	1	5
OFF	0	0	1	1	1	7
DIM	0	1	0	0	1	9
BRIGHT	0	1	0	1	1	11

Table 1: Cordless controller push-button codes and decimal equivalents.

```

100 INPUT"ENTER CODE":C
110 IF C<>0ORC>30THENPRINT"INVALID CODE"
   :GOTO100
120 FOR I=1TO3:POKE0,C:SYS(31744):NEXT
140 GOTO100
197 REM -----
198 REM ****
199 REM -----
200 REM   UNIT   CODE   UNIT   CODE
201 REM -----
202 REM   1      12     9      14
203 REM   2      28     10     30
204 REM   3      4      11     6
205 REM   4      20     12     22
206 REM   5      2      13     0
207 REM   6      18     14     16
208 REM   7      10     15     8
209 REM   8      26     16     24
210 REM -----
211 REM   FUNCTION CODE   FUNCTION CODE
212 REM -----
213 REM   ALL OFF    1  ALL LITES ON  3
214 REM   ON        5  OFF          7
215 REM   DIM       9  BRIGHT       11
216 REM -----
217 REM ****
218 REM -----
READY.

```

period of time is determined by the number of loops. The instruction timings are given in the comments field of the assembled instructions in each subdivision.

The machine language program, as assembled, will load into the high address end of RAM (1C0016). It should be loaded and BASIC's upper memory limit reset prior to loading and executing the BASIC driver program (see a previous COMPUTE! article).

The approach used to time the various functions (ie. the program loops and sequences of

instructions to produce the desired periods) does not interfere with the PET's clock nor does the clock interrupt handling software produce any undesired effects on these timing sequences. Turning on a table lamp, then, is as simple as poking a value and executing a machine language program. A sophisticated BASIC program can now be developed using the PET's time-of-day clock. Remote BSR X-10 modules can be placed around the home to control a variety of appliances and lights, and all at a much lower cost!

```

        ORG  X'0000'
* PAGE ZERO WORKING STORAGE
0000  CODE    DS   1X      CALLING PARAMETER
0001  ONE     DS   1X
0002  TEMP    DS   1X
* SYSTEM EQUATES
IDREG   EQU  X'E843'  DATA DIRECTION REGISTER
PORT    EQU  X'E84F'  VIA DATA OUT PORT A
        ORG  X'1C00'
1C00 A901  START   LDX  #1
1C02 8D43E8  STA   IDREG
1C05 8501  STA   ONE
*-----SEGMENT 1-----
1C07 A2A0  S0M    LDX  #160
1C09 20631D  JSR   X40KHZ  4000,8
1C0C A24F    LDX  #79    2
1C0E 20791D  JSR   DELAY  6,3962
1C11 0502  ORA   TEMP    3
*-----SEGMENT 2-----
1C13 A500  D16    LDA   CODE   3
1C15 2910  AND   $10    2
1C17 F00D  BEQ   OVER1  3*
1C19 A2A0  LDX   #160   2
1C1B 20631D  JSR   X40KHZ  6,4,4000,8
1C1E A24F    LDX   #79    2
1C20 20791D  JSR   DELAY  6,3962
1C23 4C331C  JMP   D8     3
1C26 A230  OVER1   LDX   #48    2
1C28 20631D  JSR   X40KHZ  6,4,1200,8
1C2B A287  LDX   #135   2
1C2D 20791D  JSR   DELAY  6,6762
1C30 4C331C  JMP   D8     3
*-----SEGMENT 3-----
1C33 A500  D8     LDA   CODE
1C35 2908  AND   $08    (TIMINGS SAME AS ABOVE)
1C37 F00D  BEQ   OVER2
1C39 A2A0  LDX   #160
1C3B 20631D  JSR   X40KHZ
1C3E A24F    LDX   #79
1C40 20791D  JSR   DELAY
1C43 4C531C  JMP   D4
1C46 A230  OVER2   LDX   #48
1C48 20631D  JSR   X40KHZ
1C4B A287  LDX   #135
1C4D 20791D  JSR   DELAY

```

1C50	4C531C	JMP	D4	
*				SEGMENT 4-----
1C53	A500	D4	LDA	CODE
1C55	2904		AND	\$04
			BEQ	OVER3
1C57	F00D		LDX	#160
1C59	A2A0		JSR	X40KHZ
1C5B	20631D		LDX	#79
1C5E	A24F		JSR	DELAY
1C60	20791D		JMP	D2
1C63	4C731C		LDX	#48
1C66	A230	OVER3	JSR	X40KHZ
1C68	20631D		LDX	#135
1C6B	A287		JSR	DELAY
1C6D	20791D		JMP	D2
1C70	4C731C		*	SEGMENT 5-----
1C73	A500	D2	LDA	CODE
1C75	2902		AND	\$02
			BEQ	(TIMINGS SAME AS ABOVE)
1C77	F00D		LDX	OVER4
1C79	A2A0		JSR	#160
1C7B	20631D		LDX	X40KHZ
1C7E	A24F		JSR	#79
1C80	20791D		JMP	DELAY
1C83	4C931C		LDX	D1
1C86	A230	OVER4	JSR	#48
1C88	20631D		LDX	X40KHZ
1C8B	A287		JSR	#135
1C8D	20791D		JMP	DELAY
1C90	4C931C		LDX	D1
*				SEGMENT 6-----
1C93	A500	D1	LDA	CODE
1C95	2901		AND	\$01
			BEQ	(TIMINGS SAME AS ABOVE)
1C97	F00D		LDX	OVER5
1C99	A2A0		JSR	#160
1C9B	20631D		LDX	X40KHZ
1C9E	A24F		JSR	#79
1CA0	20791D		JMP	DELAY
1CA3	4CB31C		LDX	NOTD16
1CA6	A230	OVER5	JSR	#48
1CA8	20631D		LDX	X40KHZ
1CAB	A287		JSR	#135
1CAD	20791D		JMP	DELAY
1CB0	4CB31C		LDX	NOTD16
*				SEGMENT 7-----
1CB3	A500	NOTD16	LDA	CODE
1CB5	2910		AND	\$10
1CB7	D00D		BNE	OVER6
1CB9	A2A0		LDX	#160
1CBB	20631D		JSR	X40KHZ
1CBE	A24F		LDX	#79
1CC0	20791D		JSR	DELAY
1CC3	4CD31C		JMP	NOTD8
1CC6	A230	OVER6	LDX	#48
1CC8	20631D		JSR	X40KHZ
1CCB	A287		LDX	#135
1CCD	20791D		JSR	DELAY
1CD0	4CD31C		JMP	NOTD8
*				SEGMENT 8-----
1CD3	A500	NOTD8	LDA	CODE
1CD5	2908		AND	\$08
				(TIMINGS SAME AS ABOVE)

1CD7 D000		BNE	OVER7
1CD9 A2A0		LDX	#160
1CDB 20631D		JSR	X40KHZ
1CDE A24F		LDX	#79
1CE0 20791D		JSR	DELAY
1CE3 4CF31C		JMP	NOTD4
1CE6 A230	OVER7	LDX	#48
1CE8 20631D		JSR	X40KHZ
1CEB A287		LDX	#135
1CED 20791D		JSR	DELAY
1CF0 4CF31C		JMP	NOTD4

*-----SEGMENT 9-----

1CF3 A500	NOTD4	LDA	CODE
1CF5 2904		AND	\$04
1CF7 D000		BNE	OVER8
1CF9 A2A0		LDX	#160
1CFB 20631D		JSR	X40KHZ
1CFE A24F		LDX	#79
1D00 20791D		JSR	DELAY
1D03 4C131D		JMP	NOTD2
1D06 A230	OVER8	LDX	#48
1D08 20631D		JSR	X40KHZ
1D0B A287		LDX	#135
1D0D 20791D		JSR	DELAY
1D10 4C131D		JMP	NOTD2

*-----SEGMENT 10-----

1D13 A500	NOTD2	LDA	CODE
1D15 2902		AND	\$02
1D17 D000		BNE	OVER9
1D19 A2A0		LDX	#160
1D1B 20631D		JSR	X40KHZ
1D1E A24F		LDX	#79
1D20 20791D		JSR	DELAY
1D23 4C331D		JMP	NOTD1
1D26 A230	OVER9	LDX	#48
1D28 20631D		JSR	X40KHZ
1D2B A287		LDX	#135
1D2D 20791D		JSR	DELAY
1D30 4C331D		JMP	NOTD1

*-----SEGMENT 11-----

1D33 A500	NOTD1	LDA	CODE
1D35 2901		AND	\$01
1D37 D000		BNE	OVER10
1D39 A2A0		LDX	#160
1D3B 20631D		JSR	X40KHZ
1D3E A24F		LDX	#79
1D40 20791D		JSR	DELAY
1D43 4C531D		JMP	EOM
1D46 A230	OVER10	LDX	#48
1D48 20631D		JSR	X40KHZ
1D4B A287		LDX	#135
1D4D 20791D		JSR	DELAY
1D50 4C531D		JMP	EOM

*-----SEGMENT 12 & 13-----

1D53 A2FF	EOM	LDX	#255
1D55 20631D		JSR	X40KHZ
1D58 A2FF		LDX	#255
1D5A 20631D		JSR	X40KHZ
1D5D A282		LDX	#130

```

1D5F 20631D      JSR    X40KHZ
1D62 60          RTS

* GENERATE A 40K HERTZ FREQUENCY ON VIA PORT A BIT 0
* FOR A LENGTH OF TIME DETERMINED BY REGISTER X

1D63 A900  X40KHZ   LDX   #00      2
1D65 EA           NOP      2
1D66 8D4FE8  LOOP1   STA    PORT     4
1D69 6901         ADC    #1       2
1D6B D8           CLD      2      | 13
1D6C D8           CLD      2      |
1D6D 8502         STA    TEMP     3
1D6F 8D4FE8
1D72 6501         ADC    ONE      3  | 12
1D74 CA           DEX      2      |
1D75 D0EF         BNE    LOOP1    3*
1D77 EA           NOP      2
1D78 60           RTS      6

* DELAY FOR A LENGTH OF TIME DETERMINED BY
* THE VALUE IN REGISTER X

1D79 0502  DELAY    ORA    TEMP     3
1D7B 0D0200
1D7E 20901D  LOOP2    JSR    RETURN   6,6
1D81 20901D
1D84 20901D
1D87 0502  ORA    TEMP     3  | 50
1D89 0D0200
1D8C EA           NOP      2
1D8D CA           DEX      2
1D8E D0EE         BNE    LOOP2    3*
1D90 60           RTS      6
1D91  RETURN
END-----©

```

Using Non-Pin-Feed Forms In The 2022 Tractor Printer

Rev. Jack Weaver
Homestead FL

Most of the forms we use in our operation are punched for our 2022 Tractor Feed CBM Printer. However there are some things we need to print out on our printer, things for which we could not justify the high cost of having printed. We would use relatively few over a year's time. Two examples that come to mind are Bank Deposit Slips and payroll checks. In my son's business we write three payroll checks each week and we have about 50 to 75 checks to deposit in the bank each week.

We have been using a very easy and unique way to print on standard checks and standard bank deposit forms using our 2022 printer. We have found it very exact and that it can be perfectly registered each time the forms are used.

Basically the method we use is as follows: We take one or more sheets of blank white fan-fold pin feed paper and very carefully lay the proposed forms out on the paper — tracing the outline of each one on the pin-feed paper. The corners of each form are clearly marked in black ink.

The pin-feed paper is then taken and laid on a flat surface outside and carefully sprayed with #1301 KRYLON brand Crystal Clear Acrylic spray coating. We mention this brand because we have found that it will be less likely to crack or peel. After the one side is completely dry — turn it over and spray the back side. Repeat for a total of four or five coats — allowing time for each coat to fully dry.

When the paper is completely dry you will in effect have a plastic sheet — perforated for your pin feed printer.

It is very important that you use a transparent type opaque cellophane tape and tape the tear perforations so it will not separate as it is being used. The tape should also be taped over the side

and top margins of each form outline — so each form can be taped to the page and then removed without doing damage to the plasticized paper.

If you are very careful in drawing your outline of the forms — and careful in the format programming of the printer — you can make each copy exactly like the previous one.

Very important — It is necessary to draw a line on the plasticized sheet at the bottom of the lever on the right hand pin-feed mechanism. This will let you know where to start your printing to get perfect registration each time.

The tape on each form is almost unnoticeable

since we use only a square one half-inch square at top and bottom of each form — which, when removed from the plasticized paper form holder, is simply folded over to the back side.

Our bank tellers were impressed and could not figure out how we had done it. When making Bank Deposits we use the form in conjunction with a program which credits the check to the customer while at the same time makes a very neat Bank Deposit Slip.

The possibilities for this are unlimited. We have been using one sheet for 6 months and it is still going strong — maybe for another 6 months!!

Begin run with bottom
of tractor clamp here.

CHECKING ACCOUNT DEPOSIT TICKET 63-158 670 DATRON SYSTEMS, INC. DIXIE NATIONAL BANK OF DADE COUNTY MIAMI, FLORIDA 33156 02/05/81 DOLLARS CENTS <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">DATE</td> <td style="width: 10%;">CURRENCY</td> <td style="width: 80%;"></td> </tr> <tr> <td>1001 AGOSTA ANDREW</td> <td>12.00</td> <td></td> </tr> <tr> <td>1002 ALACCA TONY</td> <td>15.00</td> <td></td> </tr> <tr> <td>1003 ALLEN VIRGINIA</td> <td>42.00</td> <td></td> </tr> <tr> <td>1000 '5 10</td> <td>5.00</td> <td></td> </tr> <tr> <td>1005 ANDERSON BRENT</td> <td>16.00</td> <td></td> </tr> <tr> <td>1006 ANSBACHER ROBER</td> <td>10.00</td> <td></td> </tr> <tr> <td>1010 ATHERTON BELIND</td> <td>13.00</td> <td></td> </tr> <tr> <td>1008 AVILA ENRIQUE</td> <td>125.00</td> <td></td> </tr> <tr> <td>1009 BAKER BOBBY</td> <td>56.75</td> <td></td> </tr> <tr> <td>1011 BAUDEN JACQUES</td> <td>48.00</td> <td></td> </tr> <tr> <td>1011 BAUDEN JACQUES</td> <td>56.00</td> <td></td> </tr> <tr> <td>1012 BAZZANI RICK</td> <td>56.95</td> <td></td> </tr> <tr> <td>1013 BEATUS LARRY</td> <td>35.00</td> <td></td> </tr> <tr> <td>1014 BELL HOWARD</td> <td>15.00</td> <td></td> </tr> <tr> <td>1015 BENITEZ RAPHAEL</td> <td>65.00</td> <td></td> </tr> <tr> <td>1019 BLAIR CLAY</td> <td>25.00</td> <td></td> </tr> <tr> <td>1021 BLAKISTON HENRY</td> <td>5.00</td> <td></td> </tr> <tr> <td>1020 BOARDWINE JACK</td> <td>65.00</td> <td></td> </tr> <tr> <td>1022 BOOHER D.B.</td> <td>6.54</td> <td></td> </tr> <tr> <td>1018 CLINTON BRUCE</td> <td>33.68</td> <td></td> </tr> <tr> <td>1004 COHN HARLAN</td> <td>9.00</td> <td></td> </tr> <tr> <td>1007 CONNER C.L</td> <td>22.00</td> <td></td> </tr> <tr> <td>1017 CORBETT CHARLES</td> <td>36.00</td> <td></td> </tr> <tr> <td>1016 FALK VICTOR</td> <td>7.50</td> <td></td> </tr> <tr> <td>25</td> <td></td> <td></td> </tr> <tr> <td>26</td> <td></td> <td></td> </tr> <tr> <td>27</td> <td></td> <td></td> </tr> <tr> <td colspan="2">TOTAL FROM OTHER SIDE OR ATTACHED LIST</td> <td></td> </tr> <tr> <td colspan="2">TOTAL</td> <td>795.67</td> </tr> <tr> <td colspan="3" style="text-align: center; font-size: small;">Checks and other items are received for deposit subject to the provisions of the Uniform Commercial Code or any applicable collection agreement.</td> </tr> </table>	DATE	CURRENCY		1001 AGOSTA ANDREW	12.00		1002 ALACCA TONY	15.00		1003 ALLEN VIRGINIA	42.00		1000 '5 10	5.00		1005 ANDERSON BRENT	16.00		1006 ANSBACHER ROBER	10.00		1010 ATHERTON BELIND	13.00		1008 AVILA ENRIQUE	125.00		1009 BAKER BOBBY	56.75		1011 BAUDEN JACQUES	48.00		1011 BAUDEN JACQUES	56.00		1012 BAZZANI RICK	56.95		1013 BEATUS LARRY	35.00		1014 BELL HOWARD	15.00		1015 BENITEZ RAPHAEL	65.00		1019 BLAIR CLAY	25.00		1021 BLAKISTON HENRY	5.00		1020 BOARDWINE JACK	65.00		1022 BOOHER D.B.	6.54		1018 CLINTON BRUCE	33.68		1004 COHN HARLAN	9.00		1007 CONNER C.L	22.00		1017 CORBETT CHARLES	36.00		1016 FALK VICTOR	7.50		25			26			27			TOTAL FROM OTHER SIDE OR ATTACHED LIST			TOTAL		795.67	Checks and other items are received for deposit subject to the provisions of the Uniform Commercial Code or any applicable collection agreement.			CHECKING ACCOUNT DEPOSIT TICKET 63-158 670 DATRON SYSTEMS, INC. DIXIE NATIONAL BANK OF DADE COUNTY MIAMI, FLORIDA 33156 02/05/81 DOLLARS CENTS <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 10%;">DATE</td> <td style="width: 10%;">CURRENCY</td> <td style="width: 80%;"></td> </tr> <tr> <td>1001 AGOSTA ANDREW</td> <td>12.00</td> <td></td> </tr> <tr> <td>1002 ALACCA TONY</td> <td>15.00</td> <td></td> </tr> <tr> <td>1003 ALLEN VIRGINIA</td> <td>42.00</td> <td></td> </tr> <tr> <td>1000 '5 10</td> <td>5.00</td> <td></td> </tr> <tr> <td>1005 ANDERSON BRENT</td> <td>16.00</td> <td></td> </tr> <tr> <td>1006 ANSBACHER ROBER</td> <td>10.00</td> <td></td> </tr> <tr> <td>1010 ATHERTON BELIND</td> <td>13.00</td> <td></td> </tr> <tr> <td>1008 AVILA ENRIQUE</td> <td>125.00</td> <td></td> </tr> <tr> <td>1009 BAKER BOBBY</td> <td>56.75</td> <td></td> </tr> <tr> <td>1011 BAUDEN JACQUES</td> <td>48.00</td> <td></td> </tr> <tr> <td>1011 BAUDEN JACQUES</td> <td>56.00</td> <td></td> </tr> <tr> <td>1012 BAZZANI RICK</td> <td>56.95</td> <td></td> </tr> <tr> <td>1013 BEATUS LARRY</td> <td>35.00</td> <td></td> </tr> <tr> <td>1014 BELL HOWARD</td> <td>15.00</td> <td></td> </tr> <tr> <td>1015 BENITEZ RAPHAEL</td> <td>65.00</td> <td></td> </tr> <tr> <td>1019 BLAIR CLAY</td> <td>25.00</td> <td></td> </tr> <tr> <td>1021 BLAKISTON HENRY</td> <td>5.00</td> <td></td> </tr> <tr> <td>1020 BOARDWINE JACK</td> <td>65.00</td> <td></td> </tr> <tr> <td>1022 BOOHER D.B.</td> <td>6.54</td> <td></td> </tr> <tr> <td>1018 CLINTON BRUCE</td> <td>33.68</td> <td></td> </tr> <tr> <td>1004 COHN HARLAN</td> <td>9.00</td> <td></td> </tr> <tr> <td>1007 CONNER C.L</td> <td>22.00</td> <td></td> </tr> <tr> <td>1017 CORBETT CHARLES</td> <td>36.00</td> <td></td> </tr> <tr> <td>1016 FALK VICTOR</td> <td>7.50</td> <td></td> </tr> <tr> <td>25</td> <td></td> <td></td> </tr> <tr> <td>26</td> <td></td> <td></td> </tr> <tr> <td>27</td> <td></td> <td></td> </tr> <tr> <td colspan="2">TOTAL FROM OTHER SIDE OR ATTACHED LIST</td> <td></td> </tr> <tr> <td colspan="2">TOTAL</td> <td>795.67</td> </tr> <tr> <td colspan="3" style="text-align: center; font-size: small;">Checks and other items are received for deposit subject to the provisions of the Uniform Commercial Code or any applicable collection agreement.</td> </tr> </table>	DATE	CURRENCY		1001 AGOSTA ANDREW	12.00		1002 ALACCA TONY	15.00		1003 ALLEN VIRGINIA	42.00		1000 '5 10	5.00		1005 ANDERSON BRENT	16.00		1006 ANSBACHER ROBER	10.00		1010 ATHERTON BELIND	13.00		1008 AVILA ENRIQUE	125.00		1009 BAKER BOBBY	56.75		1011 BAUDEN JACQUES	48.00		1011 BAUDEN JACQUES	56.00		1012 BAZZANI RICK	56.95		1013 BEATUS LARRY	35.00		1014 BELL HOWARD	15.00		1015 BENITEZ RAPHAEL	65.00		1019 BLAIR CLAY	25.00		1021 BLAKISTON HENRY	5.00		1020 BOARDWINE JACK	65.00		1022 BOOHER D.B.	6.54		1018 CLINTON BRUCE	33.68		1004 COHN HARLAN	9.00		1007 CONNER C.L	22.00		1017 CORBETT CHARLES	36.00		1016 FALK VICTOR	7.50		25			26			27			TOTAL FROM OTHER SIDE OR ATTACHED LIST			TOTAL		795.67	Checks and other items are received for deposit subject to the provisions of the Uniform Commercial Code or any applicable collection agreement.		
DATE	CURRENCY																																																																																																																																																																																										
1001 AGOSTA ANDREW	12.00																																																																																																																																																																																										
1002 ALACCA TONY	15.00																																																																																																																																																																																										
1003 ALLEN VIRGINIA	42.00																																																																																																																																																																																										
1000 '5 10	5.00																																																																																																																																																																																										
1005 ANDERSON BRENT	16.00																																																																																																																																																																																										
1006 ANSBACHER ROBER	10.00																																																																																																																																																																																										
1010 ATHERTON BELIND	13.00																																																																																																																																																																																										
1008 AVILA ENRIQUE	125.00																																																																																																																																																																																										
1009 BAKER BOBBY	56.75																																																																																																																																																																																										
1011 BAUDEN JACQUES	48.00																																																																																																																																																																																										
1011 BAUDEN JACQUES	56.00																																																																																																																																																																																										
1012 BAZZANI RICK	56.95																																																																																																																																																																																										
1013 BEATUS LARRY	35.00																																																																																																																																																																																										
1014 BELL HOWARD	15.00																																																																																																																																																																																										
1015 BENITEZ RAPHAEL	65.00																																																																																																																																																																																										
1019 BLAIR CLAY	25.00																																																																																																																																																																																										
1021 BLAKISTON HENRY	5.00																																																																																																																																																																																										
1020 BOARDWINE JACK	65.00																																																																																																																																																																																										
1022 BOOHER D.B.	6.54																																																																																																																																																																																										
1018 CLINTON BRUCE	33.68																																																																																																																																																																																										
1004 COHN HARLAN	9.00																																																																																																																																																																																										
1007 CONNER C.L	22.00																																																																																																																																																																																										
1017 CORBETT CHARLES	36.00																																																																																																																																																																																										
1016 FALK VICTOR	7.50																																																																																																																																																																																										
25																																																																																																																																																																																											
26																																																																																																																																																																																											
27																																																																																																																																																																																											
TOTAL FROM OTHER SIDE OR ATTACHED LIST																																																																																																																																																																																											
TOTAL		795.67																																																																																																																																																																																									
Checks and other items are received for deposit subject to the provisions of the Uniform Commercial Code or any applicable collection agreement.																																																																																																																																																																																											
DATE	CURRENCY																																																																																																																																																																																										
1001 AGOSTA ANDREW	12.00																																																																																																																																																																																										
1002 ALACCA TONY	15.00																																																																																																																																																																																										
1003 ALLEN VIRGINIA	42.00																																																																																																																																																																																										
1000 '5 10	5.00																																																																																																																																																																																										
1005 ANDERSON BRENT	16.00																																																																																																																																																																																										
1006 ANSBACHER ROBER	10.00																																																																																																																																																																																										
1010 ATHERTON BELIND	13.00																																																																																																																																																																																										
1008 AVILA ENRIQUE	125.00																																																																																																																																																																																										
1009 BAKER BOBBY	56.75																																																																																																																																																																																										
1011 BAUDEN JACQUES	48.00																																																																																																																																																																																										
1011 BAUDEN JACQUES	56.00																																																																																																																																																																																										
1012 BAZZANI RICK	56.95																																																																																																																																																																																										
1013 BEATUS LARRY	35.00																																																																																																																																																																																										
1014 BELL HOWARD	15.00																																																																																																																																																																																										
1015 BENITEZ RAPHAEL	65.00																																																																																																																																																																																										
1019 BLAIR CLAY	25.00																																																																																																																																																																																										
1021 BLAKISTON HENRY	5.00																																																																																																																																																																																										
1020 BOARDWINE JACK	65.00																																																																																																																																																																																										
1022 BOOHER D.B.	6.54																																																																																																																																																																																										
1018 CLINTON BRUCE	33.68																																																																																																																																																																																										
1004 COHN HARLAN	9.00																																																																																																																																																																																										
1007 CONNER C.L	22.00																																																																																																																																																																																										
1017 CORBETT CHARLES	36.00																																																																																																																																																																																										
1016 FALK VICTOR	7.50																																																																																																																																																																																										
25																																																																																																																																																																																											
26																																																																																																																																																																																											
27																																																																																																																																																																																											
TOTAL FROM OTHER SIDE OR ATTACHED LIST																																																																																																																																																																																											
TOTAL		795.67																																																																																																																																																																																									
Checks and other items are received for deposit subject to the provisions of the Uniform Commercial Code or any applicable collection agreement.																																																																																																																																																																																											

CBM/PET? SEE SKYLES ... CBM/PET?

PET? SEE SKYLES ... CBM/PET? SEE

"Should we call it Command-O or Command-O-Pro?"

That's a problem because this popular ROM is called the Command-O-Pro in Europe. (Maybe Command-O smacks too much of the military.)

But whatever you call it, this 4K byte ROM will provide your CBM BASIC 4.0 (4016, 4032) and 8032 computers with 20 additional commands including 10 Toolkit program editing and debugging commands and 10 additional commands for screening, formatting and disc file manipulating. (And our manual writer dug up 39 additional commands in the course of doing a 78-page manual!)

The Command-O extends Commodore's 8032 advanced screen editing features to the ultimate. You can now SCROLL up and down, insert or delete entire lines, delete the characters to the left or right of the cursor, select TEXT or GRAPHICS modes or ring the 8032 bell. You can even redefine the window to adjust it by size and position on your screen. And you can define any key to equal a sequence of up to 90 key strokes.

The Command-O chip resides in hexadecimal address \$9000, the rightmost empty socket in 4016 and 4032 or the rearmost in 8032. If there is a space conflict, we do have Socket-2-ME available at a very special price.

Skyles guarantees your satisfaction: if you are not absolutely happy with your new Command-O, return it to us within ten days for an immediate, full refund.

Command-O from Skyles Electric Works.....	\$75.00
Complete with Socket-2-Me.....	95.00
Shipping and Handling	(USA/Canada) \$2.50 (Europe/Asia) \$10.00
California residents must add 6% / 6½% sales tax, as required.	



Skyles Electric Works
231E South Whisman Road
Mountain View, California 94041
(415) 965-1735

Visa/Mastercard orders: call tollfree
(800) 227-9998 (except California).
California orders: please call (415)
965-1735.

SEE SKYLES...CBM/PET? SEE SKYLES

WATCH

THIS

SPACE

... CBM/PET? SEE SKYLES ... CBM/

CBM/PET? SEE SKYLES ... CBM/PET?

"You mean this one little Disk-O-Pro ROM will give my PET twenty-five new commands?"

And for just \$75.00? Why, that's only \$3.00 a command!"

The Disk-O-Pro in any PET with Version III (BASIC 2.0) ROMs (## COMMODORE BASIC ##) will give 19 software compatible disk instructions*: 15 identical with the new BASIC 4.0 (or with 8032 ROMs) compatible with both old and new DOS. Plus 4 additional disk commands...including appending (MERGE), overlaying (MERGE #_____) and PRINT USING, allowing formatting output of strings and numbers on the PET screen or on any printer.

*NOTE: Old DOS doesn't recognize three of the commands.

Those are just 3 of the important commands—and there are 7 more beauties—on your Disk-O-Pro that have never been available previously to PET/CBM users. (Skyles does it again!)... Beauties like the softtouch key (SET) which allows you to define a key to equal a sequence of up to 80 keystrokes; like SCROLL whereby all keys repeat as well as slow scrolling and extra editing features; like BEEP which allows you to play music on your PET.

The Disk-O-Pro is completely compatible with the BASIC programmer's Toolkit. The chip resides in the socket at hexadecimal address \$9000, the rightmost empty socket in most PETs. And for the owners of "classic" (or old) PETs, we do have interface boards.

(For those owning a BASIC 4.0 or 8032, even though the Disk-O-Pro may not be suitable, the Command-O is. Just write to Skyles for additional information. Remember, we have never abandoned a PET owner.)

Complete with 84-page manual written by Greg Yob...who was having so much fun that he got carried away. We had expected 32 pages.

Skyles guarantees your satisfaction: if you are not absolutely happy with your new Disk-O-Pro ROM chip, return it to us within ten days for an immediate full refund.

Disk-O-Pro from Skyles Electric Works.....	\$75.00
Complete with interface board (for "classic" PETs).....	95.00
Shipping and Handling	(USA/Canada) \$2.50 (Europe/Asia) \$10.00
California residents must add 6% / 6½% sales tax, as required.	

Skyles Electric Works
231E South Whisman Road
Mountain View, California 94041
(415) 965-1735

Visa/Mastercard orders: call tollfree
(800) 227-9998 (except California).
California orders: please call (415)
965-1735.

... CBM/PET? SEE SKYLES ... CBM/

SEE SKYLES...CBM/PET? SEE SKYLES

WATCH

THIS

SPACE

How And Why You Should Use PEEK(155) Instead Of GET

David M. Miller, Howard Beach, NY

In many two player action games, one player has a keyboard-screen control advantage over the other. By this I mean if player A holds down the "2" key for instance, and player B presses the "W" key, the PET will only acknowledge the depression of the "2." But if player B holds down the "W" first and player A presses the "2," the PET will again only be aware of the depression of the "2." This problem arises when you use the GET command. To illustrate this problem more clearly for those of you who are not familiar with it, type in the following program:

```
10 GET A$:IF A$="2" THEN 10
20 PRINT A$:GOTO 10
```

If the "2" and "W" are pressed together (in action games it is likely that two keys may at the same time be depressed) the PET prints only the "2." Even if the "W" is pressed first, and then the "2," in the end, when both are depressed the PET will only print the "2." That, of course, gives player A a large advantage in the game.

The easiest way to overcome this unfairness is to use the memory content of PEEK(155) in Upgrade ROMs. I think it is PEEK(512) in Original ROMs, but I did not test it. Using this instead of GET gives both players an equal keyboard-screen control over his "man."

The only drawback using this method is that each player has control over only two keys each, so this feature would only be advantageous in certain games.

QUALITY SOFTWARE For The Commodore Pet

DISK CATALOGER (16, 32K)* \$19.95

DISK UTILITY PAC (16, 32K)* \$34.95

Disk cataloger and disk restore

* Specify 3.0, 4.0 (40 col), 4.0 (80 col)

32K SIMULATED DISK (for tape based systems) \$12.95

Fill 32K with basic programs
Built-in directory will allow immediate
execution of any program
Entire library can be saved to tape

Send for Software Catalog, or order from:

CompuSoft, Inc.

P.O. BOX 997 - TROY, MI 48099

The left player must use the RVS key and SPACE key; the right player must use the left carat <, and left bracket [.

Memory 155 has a value of 255 unless one or more of the four keys mentioned above are depressed. When 2, 3, or all 4 keys are depressed independently or simultaneously, memory 155 has a special value which is given in the chart below.

Key(s) Depressed	Value of PEEK(155)
NONE	255
RVS	254
SPACE	251
<	247
[.....	253
RVS, SPACE	250
RVS, [.....	252
RVS, <	246
SPACE, [.....	249
SPACE, <	243
[, <	254
RVS, SPACE, [.....	242
RVS, SPACE, <	241
RVS, SPACE, [, <	240

Note: PEEK(155) never has a value of 244.

Using these values in your program you can branch off to a step which will carry out the required function. To illustrate how you can use this in a game situation, consider a game in which two players have two guns each. Part of the program may look as follows:

```
10 IF PEEK(155)=254 THEN REM SHOOT TOP
LEFT GUN
20 IF PEEK(155)=249 THEN REM SHOOT TOP
RIGHT AND BOTTOM LEFT GUN
30 IF PEEK(155)=240 THEN REM SHOOT ALL
FOUR GUNS
```

Using PEEK(155) in place of GET makes the keyboard-screen control, and, in effect, the entire game, fair and equal for both players. I hope you can take advantage of this feature in programming your next interactive action game, or revising an old one. If you have any comments on this idea, please send them directly to me.

David Miller

149-45 83 St.
Howard Beach, NY 11414



NEW PET/CBM SOFTWARE

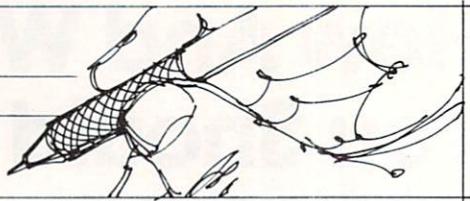
ASTROIDZ-Based on the popular arcade game and now you can play it for hours at home on your PET/CBM. Save the galaxy from the invading ASTROIDZ. Four levels of play and great graphics with moving ASTROIDZ CASS 8K \$9.95

MUNCHMAN-Based on the Pac-Man arcade game. Its you against the computer munchers ZIP and ZAP. Can you clear out the maze first or will they get you? Wait until you see the fantastic graphics on this game. CASS 8K \$9.95

**ALL OUR SOFTWARE RUNS IN 8K
OLD-NEW ROM
WRITE FOR CATALOG**

ComputerMat, Box 1664E, Lake Havasu, AZ 86403

THE SBC GAZETTE



AIM 65 BASIC Floating-Point Arithmetic From Machine Language

Paul Beasley,
Mobile, AL

Writing floating-point operations in machine language on a microprocessor is a "messy" proposition. I avoid it like the plague unless I absolutely must do it. But I have discovered how to use the floating-point routines in the AIM 65 BASIC ROM's. It's so easy even I do not mind floating-point applications any more.

AIM 65 BASIC Floating-Point Numbers

For those who are unfamiliar with floating-point numbers, particularly on the AIM 65, I'll describe the floating-point number format. Floating-point representations are similar to scientific notation. An example of a number written in normalized, scientific notation is $.27 \times 10^2$ ($= 27$). Computers commonly use a similar scheme except instead of 10 as a base, the base 2 is used (e.g., $27 = .84375 \times 2^5$). By storing the sign, the exponent of 2, and the mantissa of the number, a broad range of values can be efficiently represented. In the AIM 65, this is accomplished by storing each floating-point number in five consecutive bytes as follows:

1	2	3	4	5
E	M3	M2	M1	M0

S = bit 7

E = exponent
M3,M2,M1,M0 = mantissa
S = sign

Note: Bits in a byte are numbered 0 (LSB) to 7 (MSB).

The exponent, E, is a power of 2 and is biased so that E = \$80 actually corresponds to a power of 0, E = \$7F corresponds to -1, E = \$81 corresponds to +1, etc. When a floating-point number is normalized, the mantissa is shifted so that the first 1 bit of the mantissa falls in bit position 7 of M3. This means that bit 7 of M3 will always be 1 and the exponent reflects the number of bits that the mantissa was shifted in order to have the implied decimal in front of the first 1 bit. E = \$80 means no shifts were required; E = \$81 means the mantissa was shifted right one bit; E = \$7F means the mantissa was shifted left one bit; etc.

Since bit 7 of M3 is always 1 using the above method, it is stripped off and restored only when performing arithmetic operations (this process is explained later). So, when a number is stored in memory, this bit position is used to store the sign of the number — 0 for positive and 1 for negative. (Incidentally, the floating-point representation of 0 is all five bytes equal \$00.) My previous example of the number 27 would be stored in memory as follows:

85 58 00 00 00

AIM 65 BASIC Floating-Point Accumulators

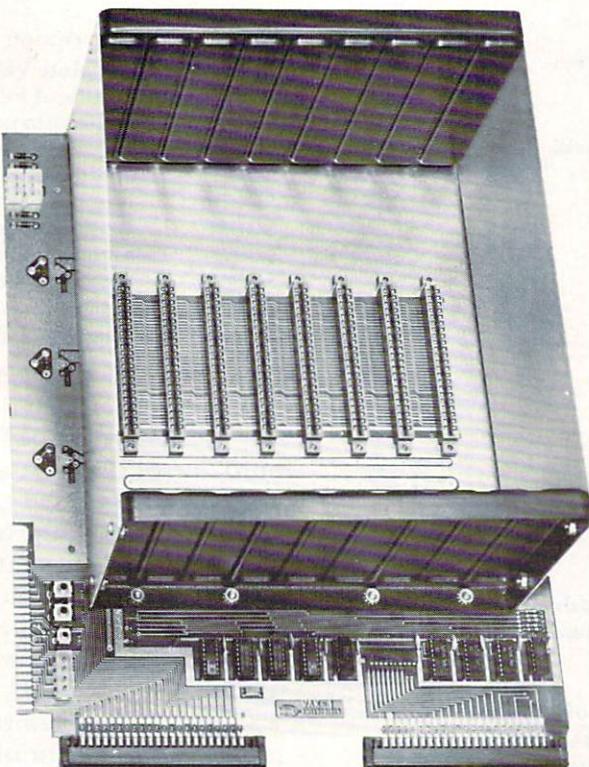
In order to use floating-point numbers in arithmetic operations, BASIC reserves twelve bytes in Page 0 to provide two floating-point accumulators. Accumulator 1 (FPAC1) is in locations \$A9 through \$AE and accumulator 2 (FPAC2) is in locations \$B1 through \$B6. Each accumulator spans six bytes and has the following format:

1	2	3	4	5	6	S = \$00 for +	S = \$FF for -
E	M ₃	M ₂	M ₁	M ₀	S		

As I mentioned earlier, when numbers are stored into memory, the sign is put into bit 7 of M3. Technically, this is accomplished as follows:

$(M_3 \wedge \$7F)$ strips off most significant bit of M3	$(S \wedge \$80)$ strips off all bits except leftmost bit	\vee denotes logical OR \wedge denotes logical AND
--	--	---

VAK-1 MOTHERBOARD



We also carry:

SYM-1 \$229⁰⁰
AIM-65 w/1K 389⁰⁰
AIM-65 w/4K 439⁰⁰

We also do custom hardware and software for the 6502 microprocessor

*Special price for prepaid
customers only (including
Master Card and Visa. EXP. 11/30
\$119⁰⁰)*

PRICE: \$139⁰⁰

Call or write for
shipping charges
and our complete
catalog.

The VAK-1 was specifically designed for use with the KIM-1, SYM-1 and the AIM 65 Microcomputer Systems. The VAK-1 uses the KIM-4* Bus Structure, because it is the only popular Multi-Sourced bus whose expansion boards were designed specifically for the 6502 Microprocessor.

SPECIFICATIONS:

- Complete with rigid CARD-CAGE
- Assembled (except for card-cage). Burned in and tested.
- All IC's are in sockets
- Fully buffered address and data bus
- Uses the KIM-4* Bus (both electrical Pin-out and card size) for expansion board slots
- Provides 8 slots for expansion boards on 1" centers to allow for wire-wrap boards
- Designed for use with a Regulated Power Supply (such as our VAK-EPS) but has provisions for adding regulators for use with an unregulated power supply.
- Provides separate jacks for one audio-cassette, TTY and Power Supply.
- Board size: 14.5 in. Long x 11.5 in. Wide x 8 in. High
- Power requirements; 5V.DC @ 0.2 Amps.

*KIM-4 is a product of MOS Technology/C.B.M.

 RNB ENTERPRISES
INCORPORATED

4030 N. 27th Avenue
Suite D.
Phoenix, AZ 85017



Table 1. Calling sequences for floating-point operations.

OPERATION	CALLING SEQUENCE			
1. Load FPAC1	LDA AL source address LDY AH JSR \$C8E1			
2. Load FPAC2	LDA AL source address LDY AH JSR \$C7CB			
3. Store FPAC1	LDX AL destination address LDY AH JSR \$C913			
4. Copy FPAC1 to FPAC2	JSR \$C94B			
5. Copy FPAC2 to FPAC1	JSR \$C93B			
6. Convert fixed-point to floating-point	LDY IL LDA IH (result in FPAC1)			
7. Convert floating-point to fixed-point	Load FPAC1 with floating-point value JSR \$C536 (result right-justified in M3-M0 of FPAC1)			
8. Addition	Load FPAC1 with operand 1 LDA AL source address LDY AH for minuend JSR \$C58F (Addressed value is loaded into FPAC2, FPAC1 is subtracted from FPAC2 and result in FPAC1; FPAC2 unchanged.)			
10. Multiplication	Load FPAC1 with operand 1 Load FPAC2 with operand 2 JSR \$C76F (result in FPAC1; FPAC2 unchanged.)			
11. Division	Load FPAC1 with divisor Load FPAC2 with dividend JSR \$C851 (result in FPAC1; FPAC2 unchanged.)			
12. Power operation	Load FPAC1 with exponent Load FPAC2 with base number JSR \$CC7F (FPAC2 is raised to the power in FPAC1; result in FPAC1; FPAC2 unchanged.)			
13. Multiply FPAC1 by 10;	JSR \$C821			
14. Divide FPAC1 by 10	JSR \$C83D			
15. Add .5 to FPAC1	JSR \$C588			
16. Convert floating-point number to ASCII string	Load FPAC1 with number JSR \$CB1C (result at \$0200)			
17. Compare FPAC1 to memory	LDA AL source address of number in memory LDY AH JSR \$C99A Branch to xxxx if: memory < FPAC1 memory = FPAC1 memory > FPAC1 LABEL . . .			

Note: Resulting ASCII string starts at location \$0200. The first character is a space, followed by the ASCII digits and ended with a \$00 byte.

Table 2. Intrinsic Function Subroutine Addresses

Basic Function	Address	Description
ABS	\$C997	Absolute Value of FPAC1
COS	\$CDD2	Cosine of FPAC1
EXP	\$CCF1	Raises e to power in FPAC1
INT	\$CA0B	Integer portion of FPAC1
LOG	\$C729	Natural logarithm of FPAC1
NEG	\$CCB8	Negation of FPAC1
RND	\$CD96	Generates random number
SGN	\$C978	Sign function of FPAC1
SIN	\$CDD9	Sine of FPAC1
SQR	\$CC75	Square root of FPAC1
TAN	\$CE22	Tangent of FPAC1

The logical OR places the sign bit into M3.

When a number is loaded into one of the accumulators, the sign bit is separated out and made the sixth byte of the accumulator (as shown above) so that bit 7 of M3 can be restored to 1. This makes arithmetic operations easier and explains why the accumulators are six bytes each. My example of the number 27 would appear in an accumulator as:

85 D8 00 00 00 00

In addition to the accumulators, there are two other bytes in Page 0 that you should know about. These are the overflow (at \$B0) and underflow (at \$B8) bytes. The underflow byte is used for rounding M0 of FPAC1. The overflow byte becomes non-zero when a computational result becomes too large. It is important that these two bytes be initialized to zero before the first floating-point operation is performed. In relation to this, I must give a word of caution. The BASIC floating-point routines still "think" they are operating in the context of a BASIC program. This means that any computation error (e.g., overflow) which is normally trapped by BASIC will still be caught and your program terminated. The termination message may look peculiar since the BASIC statement and variable pointers in Page 0 probably contain meaningless values.

Performing The Floating-Point Operations

I have prepared Table 1 as a

— AIM 65 —

P/N		QTY 1-9
A65-1	AIM-65 w/1K RAM	\$399
A65-4	AIM w/4K RAM	\$439
A65-A	Assembler ROM	\$ 85
A65-B	BASIC ROMS	\$100
A65-PL	PL/65 ROMS	\$125
A65-F	FORTH ROMS	\$150

SPECIALS

A65-4AB	AIM-65 w/4K RAM, Assembler & BASIC	\$599
A65-4B	AIM-65 w/4K RAM, BASIC	\$529

Power Supplies (AIM-65 Compatible, Industrial Quality Open Frame)

PRS3	+5V at 3A, +24V at 1A w/mfg hardware, cord, etc	\$ 75
PRS4	+5V at 2A, +24V at .5A w/mfg hardware, cord, etc	\$ 60
PRS5	+5V at 2A, +24V at .5A, ± 12V to ± 15V at .4A	\$ 75
PRS6	+5V at 3A, +24V at .5A, + 12V at 2A	\$ 85

From The Enclosure's Group

ENC1	AIM-65 case	\$ 45
ENC1A	AIM-65 case w/space for one expansion bd	\$ 50

Cases With Power Supplies (for ENC1A Add \$5)

ENC3	ENC1 w/PRS3 mounted inside	\$125
ENC4	ENC1 w/PRS4 mounted inside	\$110
ENC5	ENC1 w/PRS5 mounted inside	\$125
ENC6	ENC1 w/PRS6 mounted inside	\$135

From Optimal Technology

ADC1	A/D eight channels, D/A 2 channels, requires ± 12V to ± 15V at 100 MA & 2-I/O Ports from AIM-6522 w/Cable for AIM-65	\$126 \$150
------	--	----------------

From The Computerist

MCP1	Mother Plus™ Dual 44 pin mother card & card cage, fully buffered, 5 expansion slots underneath the AIM	\$150
MEB1-2	DRAM Plus™ 32K RAM, 16K PROM sockets, 2-6522 I/O chip and programmer for 5V EPROMS	16K RAM \$325 32K RAM \$395
PTC1	Proto Plus II™ Prototype card same size as KIM-1, MEB1-2, VIB1 (Bare Bd \$60)	assembled \$ 75
VIB1	Video Plus™ bd with 128 char, 128 user char, up to 4K display RAM, light pen and ASCII keybd interface	\$325
CBL1	CABLE for MEB1-2, VIB1, PTC1	\$ 25

NEW PRODUCTS! CUBIT featuring a 4½x6½ AIM-65* for \$195 *less monitor, printer, display & keybd.

APPLIED BUSINESS COMPUTER featuring
64K RAM Board - \$495
80 column Video Controller - \$325
5½" Disk Controller w/ADOS™ - \$485

From Seawell MicroSystems	
MCP2	Little Buffered Mother™ Single 44 pin (KIM-4 style) mother card. Has on board 5V regulator for AIM-65, 4 expansion slots. Routes A&E signals to duplicates on sides with 4K RAM \$199
MEB2	SEA 16™ 16K static RAM bd takes 2114L with regulators and address switches \$250
MEB2-3	CMOS RAM, realtime clock, EPROM bd, up to 8K RAM, 16K EPROM. (w/1k CMOS, 7K NMOS) \$395
PGR2	Programmer for 5V EPROMS with ROM firmware, regulators, low force sockets, up to 8 EPROMS simultaneously, can execute after programming \$299
PIO2	Parallel I/O bd with 4-6522's \$260
PTC2	Proto/Blank™ Prototype card that fits MCP2 \$ 49
PTC2A	Proto/Pop™ with regulator, decoders, switches \$ 99
FDC2	Floppy disk controller bd & DOS, up to four 8" drives, double sided, double density (DD/DS) \$425
SBC2	SBC/CPU card, 9K RAM, 18K EPROM, 3 serial ports, 1 parallel port, audio tape interface \$495

From Micro Technology Unlimited (MTU)

DAC3	8 bit DAC bd	\$ 49
FDC3	Floppy disk controller bd & DOS, up to four 8" drives, double sided, double density, 16K DRAM, Boot PROM \$595	
MCP3	Card file w/4 slot expansion mother bd w/keybd brackets \$ 85	
MEB3-2	Banker Board™, low power, 32K DRAM \$450	
PIO3	24K PROM, 4-8 bit I/O ports w/RS-232 port to 4800 bps, PROM Programmer. \$295	
VIB3	8K DRAM bd, low power, w/composite video out in 200 lines 320 dot/line format \$240	
PTC3	Prototype Bd w/regulators \$ 42	
MPS3	AIM-65 Power Supply w/12V for MTU Bds, can drive one 8" disk drive. \$ 65	
CBL3	Cable for MEB3-2, VIB3, FDC3 \$ 25	

All MTU Software Available For These Products

Miscellaneous

TPT3	Approved Thermal Paper Tape, 3/165' rolls	\$7.50
MEM6	6/2114 RAM Chips	\$ 45
CAS1	Audio Cassette Recorder	\$ 40
CAS1-1	CAS1 w/cable	\$ 65
2716	16K 5V EPROM	\$ 10
2532	32K 5V EPROM	\$ 35
A65-P	Printer	\$ 70
A65-DM	Display Module-DL1416	\$ 30
FDD8	QUME Data Trak 8, DD/DS Disk Drive/up to 1 Megabyte	\$650
FD8C-1	Cable set for 1 drive w/AC cord	\$ 50
FD8C-2	Cable set for 2 drives w/AC cords	\$ 65
MON1	9" composite video monitor w/80 char line resolution, Requires 12V DC only at .8A	\$125

All AIM-65 Spare Parts Are Available

All "Microflex" Products Available

COMING SOON!

AIM-65/40 w/32K RAM- \$1395

ASSEMBLED & TESTED SYSTEMS

We have been specializing in assembled and tested systems made from the above items for over 2 years. Normally, the price will be the total of the items, plus \$5 for handling; shipping is extra on all COD's or invoiced orders. Please call or write for exact prices or if questions arise. **Six month warranty on all systems.**

Higher quantities quoted upon request, COD's accepted, shipping will be added. Add \$5 for shipping, insurance, and handling on prepaid orders. Minnesota residents add 5% sales tax. Prices subject to change without notice.

July 1, 1981

Mail Check or Money Order to:

**Educational Computer Division
EXCERT INCORPORATED**

- SALES
- SERVICE
- INSTALLATION
- CONSULTING

P.O. Box 8600
White Bear Lake, MN 55110
(612) 426-4114

reference for the fundamental floating-point operations along with their appropriate machine language calling sequences. All operations are executed with the subroutine jump instruction (JSR) plus minimal parameter set-up. In preparing the table I used the following notation:

AL – Address Low; the least significant 8 bits of the source or destination memory address.

AH – Address High; the most significant 8 bits of the source or destination memory address.

IL – Integer Low; the memory address of the least significant 8 bits of a 2-byte integer value.

IH – Integer High; the memory address of the most significant 8 bits of a 2-byte integer value.

FPAC1 – Floating Point Accumulator 1.

FPAC2 – Floating Point Accumulator 2.

In addition to the fundamental operations in Table 1, the BASIC intrinsic functions may also be used. The common calling sequence for these functions is as follows:

```
load FPAC1 with the argument
value
JSR $xxxx (select function
address from Table 2)
(result in FPAC1)
```

The entry point address for each of the functions is given in Table 2.

Sample Program

In order to illustrate what I have just described, I have included the following sample program. It is a very simple calculation of the volume of a cylinder using the formula $V = \pi r^2 h$, where r = radius and h = height. I know that r^2 can be computed as r times r very efficiently, but I used the power function to illustrate its use. When the program finishes (successfully), it will display $V = 88357.2935$. Another tidbit I'll point out is that the floating-point representation for 2π is at location \$CE53 of the BASIC ROM's.

Sample Program: Calculate Volume of Cylinder ($V = \pi r^2 h$)

```
*=$0220
COMIN=$R1A1
EQUAL=$E7D8
OUTPUT=$E97A
CRLOW=$EA13
FMUL=$C76F
CONVIF=$C0D1
CONVFA=$CB1C
FST1=$C913
FLD2=$C7CB
CPY12=$C94B
FDIV=$C851
FPWR=$CC7F
PI2=$CE53

START LDY R
LDA #0
STA $B8
STA $B0
; initialize underflow
; and overflow bytes

JSR CONVIF
LDX #<TEMP
LDY #>TEMP
JSR FST1
LDY #2
LDA #0
JSR CONVIF
LDA #<TEMP
LDY #>TEMP
JSR FLD2
JSR FPWR
LDX #<TEMP
LDY #>TEMP
JSR FST1
LDY H
LDA #0
JSR CONVIF
LDA #<TEMP
LDY #>TEMP
JSR FLD2
JSR FMUL
LDY #>TEMP
JSR CPY12
LDY #2
LDA #0
JSR CONVIF
JSR FDIV
JSR CONVFA
JSR CRLOW
LDA #V'
JSR OUTPUT
JSR EQUAL
LDX #0
LABEL1 LDA $0200,X
BEQ LABEL2
JSR OUTPUT
INX
JMP LABEL1
LABEL2 JSR CRLOW
JMP COMIN
R .BYTE 25
H .BYTE 45
TEMP .BYTE 0,0,0,0,0,.END
; monitor entry for command input
; output "=" to display/printer
; output char. in A to display/printer
; output CR & LF to display/printer
; floating-point multiply
; convert fixed-point to floating-point
; convert floating-point to ASCII string
; store FPAC1
; load FPAC2
; copy FPAC1 to FPAC2
; division
; power operation
; 2*
; get radius
; store R in TEMP
; exponent 2 in FPAC1
; load R in FPAC2
; raise R to power 2
; store R squared in TEMP
; height H in FPAC1
; load FPAC2 with R squared
; FPAC1 = H times R squared
; load 2* into FPAC2
; FPAC1 = H times R squared times 2
; save FPAC1 in FPAC2
; FPAC1 = 2
; divide by 2
; resulting volume in FPAC1
; display 'V'
; display '='
; fetch & display ASCII digits
; radius = 25
; height = 45
```

A General Purpose BCD-To-Binary Routine

Marvin L. De Jong

Department of Mathematics-Physics
The School of the Ozarks
Pt. Lookout, MO

A number of routines have been published^{1,2,3} that will convert either a two-digit number or a four-digit number in BCD code to a binary number, and Butterfield⁴ has published a routine to handle a six-digit BCD number. The routine described here can be easily modified to handle any number of BCD digits. It is a 6502 assembly language interpretation of an algorithm found in Peatman's⁵ book. The BCD-to-binary routine assumes its importance from the fact that human beings usually input numbers to a computer in a decimal representation. A number of scientific instruments have BCD outputs that may be interfaced to a microcomputer, requiring some kind of conversion routine before the data from such a device can be processed. Finally, if you want to interface some of the calculator chips to a microprocessor in order to do more complex arithmetic, you will very likely need a BCD-to-binary routine somewhere in your software. A 6502 assembly language routine to go the other way (binary-to-BCD) can be found as a subroutine in reference six at the end of this article.

The BCD-to-binary routine is based on a familiar technique for converting a base-ten number to a base-two number. The decimal number is successively divided by two, and the remainders are noted as either a one or a zero. Each division gives the next more significant binary digit or bit. Example 1 illustrates the process.

Example 1. Convert 59_{ten} to a binary number.

Solution: Successively divide 59_{ten} by two, with the divisions beginning from the right and proceeding to the left.

0	1	3	7	14	29
2	1	2	3	2	7
0		2		6	14
1		1		0	1

$$59_{\text{ten}} = 111011_{\text{two}}$$

Referring to Example 1 it can be seen that the algorithm requires that the BCD number be suc-

cessively divided by two and the remainders are saved to become the binary number. The first division remainder is the least significant bit, while the remainder from the last division is the most significant bit. If in Example 1 we wanted to convert 59_{ten} to an eight-bit binary number, namely 0011 1011, we would simply perform two more divisions than shown, providing the two leading zeros in the eight-bit representation.

If you are mildly familiar with BCD numbers you will recall that each digit requires four bits (or one nibble). So an eight-digit decimal number requires four memory locations. Conversely, four memory locations can represent a decimal number as large as 99999999, which is more easily expressed as 10⁸-1. Question: How many bits are needed to represent a given number of decimal digits? Let N be the largest number of decimal digits that we need for our particular application, so the largest decimal number is (10^N-1). Let n be the number of binary digits (bits) needed to represent the same number. By analogy, the largest binary number that can be represented by n bits is (2ⁿ-1). Since we wish to represent the same number, we may equate (10^N-1) and (2ⁿ-1) and then solve for n. Thus, with some mathematical magic, the answer to the question posed above is

$$N = N/\log 2 = N/0.30103$$

where a base ten logarithm is implied.

If N = 8 then n = 26.6 which becomes n = 27 when rounded upward (fractional numbers of bits are not allowed as answers for this problem). Twenty-seven bits can be handled quite nicely by four bytes, but please do not create your own theorem that the number of memory locations needed to represent a number in binary is equal to the number of memory locations to represent the same number in binary-coded decimal (BCD). Use the equation, and be sure to allocate enough memory to handle the number in either binary or BCD representations. Note that, in the program described by Listing 1, we assume an eight-digit decimal number is being converted to a binary number that will also be stored in four memory locations. The program is easily modified to handle situations where the number of memory locations needed for the BCD number is different than the number of memory locations needed for the binary number. Using the immortal words of many authors, "we leave this problem for the student."

So we know how many memory locations to assign to represent the number, and we have a simple algorithm (divide by two and store the remainder) to perform the conversion. Enter some corollary to Murphy's Laws: "nothing is as simple as it seems." Dividing by two is neat and easy for a binary number: successive shifts to the right (LSR or ROR) give successive divisions by two. Dividing by two is considerably more complex for a BCD

number. Fortunately, Peatman⁵ has pointed out a few tricks that accomplish division-by-two for a BCD number.

The eight bit "weights" in a byte of memory that represent a binary number are 1, 2, 4, 8, 16, 32, 64, and 128, proceeding from the right-most bit to the left-most bit. Clearly, shifting the number to the right divides each bit weight by two. That is why an LSR or an ROR instruction may be used to divide a binary number by two. However, if the same memory location represents a BCD number, then the bit weights are 1, 2, 4, 8, 10, 20, 40, 80. consequently, a shift-right or a rotate-right instruction results in division-by-two only for bits zero, one, two, three, five, six, and seven. Shifting bit four (with a weight of ten) to the right changes its weight to eight. Eight is three more than five, the number you usually get when you divide ten by two. So, the trick to dividing a BCD number by two is to shift right or rotate right as usual, but if a one is shifted from bit four to bit three, then you must subtract three from the shifted-right result to get the correct answer. That's it folks. I wish I could say it was my idea, but I found it in Peatman's⁵ book.

If the BCD number is to be represented by several bytes, an added complication occurs. Bit seven in the least-significant byte has a weight of 80. Bit zero in the next most significant byte has a weight of 100. Clearly, shifting a one from bit zero of this byte to bit seven of the least-significant byte does not result in a division-by-two because $100/2$ is not 80. However, if we subtract 30 after the shift we do get the correct answer. When performing a divide-by-two operation on a multi-byte BCD number, each byte in the number must be tested to see if a one was shifted into either bit three or bit seven, and then the appropriate remedies must be applied if the tests are positive. In short, if a one is shifted into the most-significant bit position of any of the N nibbles used to represent the N digits in BCD, then the nibble must be corrected by subtracting three.

One other point remains to be made. From Example 1 it is clear that we are interested in the remainder after division-by-two. When dividing by two, the remainder is either zero (even dividend) or one (odd dividend). The remainder will be found in the carry flag after a shift-right operation.

BCDNUM	= \$0000;	Base address of the BCD number to be converted to binary. The most-significant digit of an N digit BCD number is in the high-order nibble of BCDNUM.	
BINUM	= \$0010;	Base address of the binary number whose most-significant byte will be in BINUM.	
BYTE	= \$FC;	Two's complement of the number of bytes needed to hold the BCD number; in this program four bytes (\$0000 - \$0003) are used.	
\$ 0D00 D8	START	CLD	Clear decimal mode.
0D01 A9 00		LDA #00	Clear locations that will hold the binary number.
0D03 A2 FC		LDX #BYTE	
0D05 95 14	BACK	STA BINUM + 4,X	
0D07 E8		INX	
0D08 D0 FB		BNE BACK	Locations have been cleared.
0D0A 38		SEC	
0D0B A2 FC	THERE	LDX #BYTE	Rotate the binary number right, moving the remainder from the BCD division into the binary number.
0D0D 76 14	RETURN	ROR BINUM + 4,X	
0D0F E8		INX	If the carry is set, the conversion is complete.
0D10 D0 FB		BNE RETURN	Start the division-by-two by shifting BCD number right.
0D12 B0 2B		BCS OUT	Remainder will be in carry flag so save it on the stack.
0D14 A2 FC		LDX #BYTE	Test bit three of each byte to see if a one was shifted in.
0D16 76 04	AGAIN	ROR BCDNUM + 4,X	
0D18 E8		INX	If so, subtract three.
0D19 D0 FB		BNE AGAIN	If not, no correction needed, so test bit seven of each byte to see if a one was shifted in.
0D1B 08		PHP	
0D1C A2 FC		LDX #BYTE	
0D1E 38		SEC	
0D1F B5 04	LAKE	LDA BCDNUM + 4,X	
0D21 29 08		AND #08	
0D23 F0 06		BEQ FORWD	
0D25 B5 04		LDA BCDNUM + 4,X	
0D27 E9 03		SBC #03	
0D29 95 04		STA BCDNUM + 4,X	
0D2B B5 04	FORWD	LDA BCDNUM + 4,X	Here bit seven is checked.
0D2D 29 80		AND #\$80	
0D2F F0 06		BEQ ARND	No correction.
0D31 B5 04		LDA BCDNUM + 4,X	Correction: subtract 30.
0D33 E9 30		SBC #\$30	
0D35 95 04		STA BCDNUM + 4,X	
0D37 E8	ARND	INX	Repeat for all N bytes.
0D38 D0 E5		BNE LAKE	Get the carry back because it held the remainder.
0D3A 28		PLP	
0D3B B0 CE		BCC THERE	Go back and put it in the binary number. Then finish. ©
0D3D 90 CC		BCC THERE	
0D3F 60	OUT	RTS	

ATTENTION! AIM 65 USERS AND OTHER 6500 MICRO PROCESSORS Convert Your 65 Into A More Useful Tool With The New And Reasonable VD640 VIDEO INTERFACE

Save Expensive Thermal Paper • Save Time • Save Money

FEATURES

- Uses 2K 2716 or 1K 2758 E Prom
- 1K Ram
- Pin compatible with AIM expansion connector. Can be pin adapted to fit Kim & Sim.
- Single +5 volt from connector.
- Reverse video & switch to reverse field.
- Upper & lower case characters.
- Uses standard T.V. with optional modulator.
- 7x11 Dot Format
- 40 characters X 16 lines.
- 32 special graphics characters.
- Software switch for programmable hardware screen flashing.
- Uses Motorola MC6845 CRTC
- Operating system in EPROM interacts with AIM monitor.
- Component layout silkscreened on P.C. Board.
- Full operating instructions and schematic with each kit.
- VD640 Silkscreened P.C. board w parts list only \$ 39.00 each
- VD640 Kit-incl. Silkscreened P.C. board with sockets, all components and Programmed EPROM. (P.C. Connector Board & mod. opt.) \$ 119.00 each
- VD640 Fully assembled with sockets all components and connectors, tested and guaranteed 1 year. (modulator optional) \$ 149.00 each
- Optional R.F. Modulator (allows use of std. T.V.) \$39.00
- Optional P.C. Connector Board \$ 15.00

Insert quantity wanted in box next to kit desired and mail with check or money order to:
Sierra Pacific, 1112 Wellington Dr., Modesto, CA 95350. (Calif Residents add 6% sales tax.) (Allow 4 to 6 weeks delivery.)

FACTORY PRICING

IN STOCK!

IMMEDIATE DELIVERY!

ALL MOS TECHNOLOGY MPS 6500 ARRAYS—

PLUS

KIM-1
MICROCOMPUTER
NOW
AVAILABLE

MMS
6508
MICRO MODULE
FAMILY

- MPS 6550 RAM for PET
- MPS 6530-002, -003 for KIM-1
- MANUALS
- KIM-3 8K STATIC RAM MEMORY BOARD
- KIM-4 MOTHERBOARD
- KIM PROMMER
 - KIM-1 & 4 Compatible Eprom Programmer
- KIMATH
 - Chips with Listing
- KIMEX-1 EXPANSION BOARD
 - KIM-1 Plugable PROM, Ram and I/O Board
- RS-232 ADAPTER
 - For KIM-1
- POWER SUPPLIES

STANDARD MICROSYSTEMS

★UART's ★FLOPPY DISC CONTROLLERS
★BAUD RATE GENERATORS ★CRT CONTROLLERS

FALK-BAKER ASSOCIATES

382 FRANKLIN AVE. • NUTLEY, NEW JERSEY 07110
(201) 661-2430

WRITE OR CALL FOR CATALOG

Although the comments should make most of the routine understandable, a brief explanation follows. The first instruction in Listing 1 is not needed if the program is already in the binary mode, in which case the routine starts by clearing the locations used to store the binary number. Rather than inserting some kind of loop counter to keep track of the number of divisions-by-two (refer to Example 1), the carry is set by the instruction location at \$0D0A, and the remainders are rotated into the binary number until the carry bit that was initially set has rotated through the binary number and into the carry flag once more. Thus, the conversion stops at the BCS OUT instruction at location \$0D12. The division-by-two routine takes up the remainder of the program. Note that the carry flag holds the remainder, and it is stored on the stack while the division-by-two routine is finished, after which it is rotated into the binary number in the RETURN loop.

Very likely some improvements in the speed of the routine could be made. In most cases the number of bytes needed for the binary number

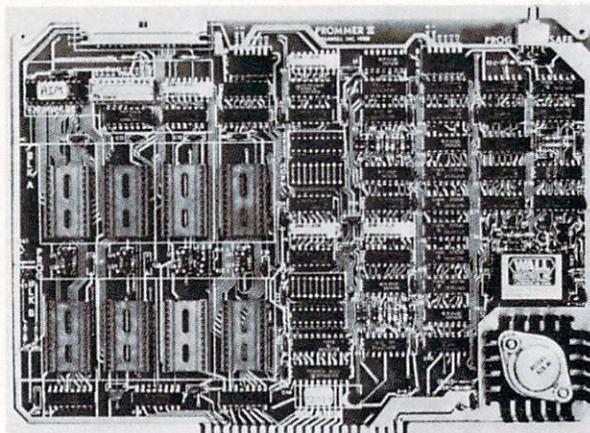
will be sufficiently close to the number of bytes occupied by the BCD number that no modification will be needed on that score. Remember, BYTE is the *twos complement* of the number of bytes used to represent the BCD number and the binary number. The BCD number is stored in locations \$0000 - \$0003 in Listing 1, in the sense that the least-significant digit is in the low-order nibble of location \$0003 and the most-significant digit is in the high-order nibble of location \$0000. These locations must be filled before the routine is called.

REFERENCES

1. **Programming and Interfacing the 6502, With Experiments**, De Jong, Marvin L., Howard W. Sams & Co., Inc., Indianapolis, 1980, p 129.
2. **6502 Assembly Language Programming**, Leventhal, Lance A., Osborne/McGraw-Hill, Inc., Berkeley, 1979, p 7-9.
3. **6502 Software Design**, Scanlon, Leo J., Howard W. Sams & Co., Inc., Indianapolis, 1980, p 147.
4. "Multi-Mode Adder," Butterfield, Jim, **6502 User Notes**, No. 13, p 23.
5. **Microcomputer-Based Design**, Peatman, John B., McGraw Hill, New York, 1977, p 400.
6. "A Floating-Point Binary to BCD Routine," De Jong, Marvin L., **COMPUTE!**, 1981, in press.

©

SEAWELL PROMMER II -- There's Nothing Like It!



- Two independent blocks of 4 EPROM sockets
- KIM, SYM or AIM programming firmware
- Programs 1, 2 or 4K 5-Volt EPROMS: TMS2508, 2516, 2532 and 2758, 2716, 2732
- Read-Only/Deselected/Read-Program for each socket
- Program-protect toggle switch for whole board
- Provision for remoting 4 sockets
- On-board generation of programming voltage.

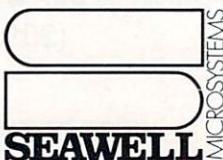
The Seawell PROMMER II is a general purpose EPROM tool designed for use in a development/production environment. Connects to a KIM, SYM or AIM with a Seawell LITTLE BUFFERED MOTHER motherboard, or to a SEA-1 single-board computer. The PROMMER II is all you need to read, program and execute 1, 2 or 4K 5-Volt EPROMs.

The PROMMER II allows you to put as little as 1K or as much as 32K of EPROM on the bus. You never have to give up address space to empty sockets. Each socket can be enabled to READ only, READ and PROGRAM, or can be DESELECTED entirely. Simply moving a shunt sets one block of 4 sockets to 1, 2, or 4K. The other block can be set independently.

Addresses are selected by piano-type switches on the top edge of the board. The whole board can be program-protected by a toggle switch on the top right corner of the board. A separate one-page ROM containing relocatable firmware for KIM, SYM or AIM is provided which can be set to any page in memory in either of two banks or deselected entirely. A satellite board with four sockets and program-protect switch will be available soon.

PROMMER II EPROM PROGRAMMER — \$299

OTHER SEAWELL PRODUCTS:	
SEA-1.....	SINGLE BOARD COMPUTER
SEA-16.....	16K RAM BOARD
SEA-FDC8.....	DOUBLE DENSITY 2-SIDED DISK CONTROLLER
SEA-FDC8.....	\$325
SEA-DEBUG.....	HARDWARE BREAKPOINTS AND TRIGGERS
SEA-FDC8.....	\$310
SEA-PROMMER II	EPROM PROGRAMMER
SEA-PROTO	COMPLETELY DECODED PROTOTYPING BOARD
SEA-PROTO	\$99
SEA-CMOS.....	8K CMOS RAM, 16K EPROM, DAY/DATE CLOCK
SEA-CMOS.....	\$370
SEA-PIOB.....	4 FULLY-BUFFERED 6522S
SEA-PIOB.....	\$260
SEA-ISDC.....	8 SERIAL PORTS WITH LOCAL PROCESSOR & DUAL PORT RAM
SEA-ISDC.....	\$595
SEA-LBM.....	LITTLE BUFFERED MOTHER FOR KIM, SYM, AIM, SEA-1
SEA-MOTHERS	\$199
SEA-MOTHERS	4-SLOT MOTHERBOARD
SEA-MOTHERS	\$50.00
SEA-MOTHERS	10-SLOT MOTHERBOARD
SEA-MOTHERS	\$125
ALL PRODUCTS ASSEMBLED. NO KITS	ADDITIONAL CONFIGURATIONS MASTERCHARGE/VISA ACCEPTED



P.O. Box 20367
Seattle, Washington 98102, U.S.A.
(206)322-3123

CAPUTE!

Corrections And Clarifications

COMPUTE! #14, pg. 68 — To clarify Mr. Victor's comments on conversions:

In Applesoft BASIC, "DIM A\$(40)" means that memory should be reserved for the string variables A\$(0), A\$(1),...,A\$(40). (Note: this is 41 variables, not 40, a quirk of BASIC.) The variable "A\$" is another variable (the 42nd) used to store the various strings discussed in the article. The statement "DIM A\$(40)" at the start of the programs in the article does not mean that A\$ will be 40 characters long. The DIM statement does not refer to A\$, it refers to the subscripted variable A\$(i).

COMPUTE! #15, pg. 80 — the Editor's Note on halting the dynamic mode should have read POKE 842, 12.

COMPUTE! #15, pg. 64 — at the bottom of the page, following the words "clears the flag," this paragraph was omitted:

But is this efficient? Of course! How could you possibly reduce such a trivial, two-line program segment? Well, maybe you can! Consider the following alternative:

```
SEC
ROR ALFALK      ;Enable Alpha-Lock Mode
sets the flag, and
LSR ALFALK      ;Disable Alpha-Lock Mode
clears the flag.
```

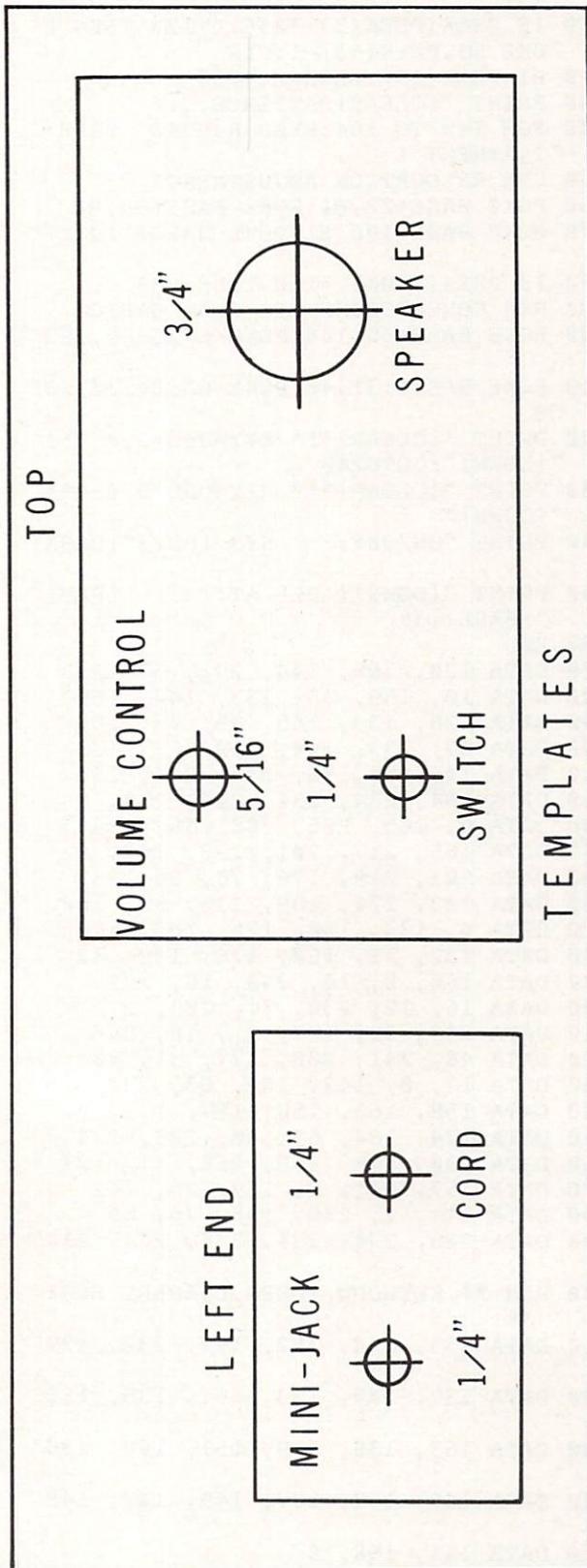
COMPUTE! #15, pg. 99 — the following program was not printed:

```
10000 REM DEFINE A LINE
10010 GRAPHICS 8+16:SETCOLOR 4,5,10
10020 POKE 204,COLUMN:POKE 205,COLUMNH
10030 FOR I=1600 TO 1636
10040 READ X:POKE I,X:NEXT I
10050 X=USR(1600)
10060 DATA 104,120,166,205,141,10,212,14
1,24,208,200,177,204,141,23,208,200,208,
2,230,205,173,11
10070 DATA 212,201,16,16,4,160,0,134,205
,177,204,24,144,223
```

COMPUTE! #16, pg. 86 — To permit "SHOOT" to run on the new (Revision B) ROMs, change line 201 to: BUF\$(589,589) = CHR\$(95):BUF\$(590,590) = CHR\$(228). To permit it to run on black and white TVs, change line 202 to: BUF\$

(97,97)=CHR\$(0):BUF\$ (98,98)=CHR\$(0).
The source code correction is: 124B 4C 5F e4 JMP
SYS VBV.

COMPUTE! #15, pg. 79 — these templates should have appeared full-size:



COMPUTE! #15, pg. 120 — Charles Brannon has improved his "Keyword" program to cancel the keyword action in the quote mode and to permit it to be deactivated.

```

100 REM KEYWORD LOADER SEPTEMBER 8, 1~  

~981  

110 IF PEEK(PEEK(53)*256)<>120 THEN P~  

~OKE 53,PEEK(53)-1:CLR  

120 HI=PEEK(53):BASE=HI*256  

130 PRINT "{CLEAR}PATIENCE..."  

140 FOR I=0 TO 164:READ A:POKE BASE+~  

~I,A:NEXT I  

150 REM RELOCATION ADJUSTMENTS  

160 POKE BASE+22,HI:POKE BASE+58,HI  

170 POKE BASE+100,HI:POKE BASE+110,HI~  

~  

180 IF PEEK(50003)=160 THEN 230  

190 REM CONVERSIONS FOR 3.0 BASIC  

200 POKE BASE+65,146:POKE BASE+69,192~  

~  

210 POKE BASE+131,46:POKE BASE+132,23~  

~0  

220 PRINT "{CLEAR}*** KEYWORD 3.0 ***~  

~{DOWN}":GOTO240  

230 PRINT "{CLEAR}*** KEYWORD 4.0 ***~  

~{DOWN}"  

240 PRINT "ON/OFF: SYS {REV}";BASE~  

~  

250 PRINT "{DOWN}TABLE AT: {REV}~  

~";BASE+138  

260 END  

270 DATA 120, 165, 144, 201, 37, 208  

280 DATA 10, 169, 85, 133, 144, 169  

290 DATA 228, 133, 145, 88, 96, 169  

300 DATA 37, 133, 144, 169, 63, 133  

310 DATA 145, 88, 96, 234, 234, 234  

320 DATA 234, 234, 234, 234, 234, 0  

330 DATA 0, 165, 205, 208, 89, 234  

340 DATA 165, 217, 201, 193, 144, 82  

350 DATA 201, 219, 176, 78, 56, 233  

360 DATA 193, 170, 189, 138, 63, 162  

370 DATA 0, 134, 158, 170, 160, 178  

380 DATA 132, 31, 160, 176, 132, 32  

390 DATA 160, 0, 10, 240, 16, 202  

400 DATA 16, 12, 230, 31, 208, 2  

410 DATA 230, 32, 177, 31, 16, 246  

420 DATA 48, 241, 200, 177, 31, 48  

430 DATA 17, 8, 142, 164, 63, 230  

440 DATA 158, 166, 158, 157, 111, 2  

450 DATA 174, 164, 63, 40, 208, 234  

460 DATA 230, 158, 166, 158, 41, 127  

470 DATA 157, 111, 2, 169, 20, 141  

480 DATA 111, 2, 230, 158, 76, 85  

490 DATA 228, 234, 234, 234, 234~  

~  

500 REM ** KEYWORD TOKEN LIBRARY HERE~  

~**  

510 DATA 153, 194, 152, 157, 132, 129~  

~  

520 DATA 137, 200, 133, 161, 135, 155~  

~  

530 DATA 163, 130, 159, 151, 160, 138~  

~  

540 DATA 148, 167, 187, 149, 147, 148~  

~  

550 DATA 141, 158, 0

```

READY. ©

COMPUTE! Back Issue Collection

Our back issues, normally \$3.00 each (including shipping and handling) are a valuable addition to your library.

To celebrate our second birthday, we're offering the following special to **COMPUTE!** readers.

COMPUTE!'s Birthday Special

JANUARY-JULY, 1981
ALL SEVEN ISSUES \$15.00, AND
WE'LL PAY SHIPPING

Credit Card Orders Only
**Call TOLL FREE 800-345-8112
IN PA CALL 800-662-2444**

Please allow three weeks for delivery. Offer expires November 15, 1981. Offer good for these seven issues only and may not be prorated for partial orders. Orders accepted subject to availability. You must include a street address for shipping.

Please send me the **COMPUTE! BIRTHDAY SPECIAL**, January-July 1981 Issues for \$15.00.

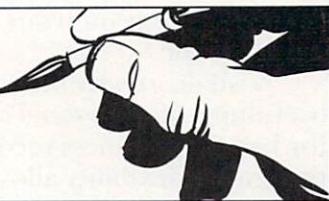
NAME _____

STREET ADDRESS _____

CITY _____ STATE _____ ZIP _____

SEND TO: **COMPUTE!** Birthday Special, P.O. Box 5406, Greensboro, NC 27403, USA. Please enclose check or money order.

New Products



AUTO-CAT ... The Automatic Answer Direct Connect Modem

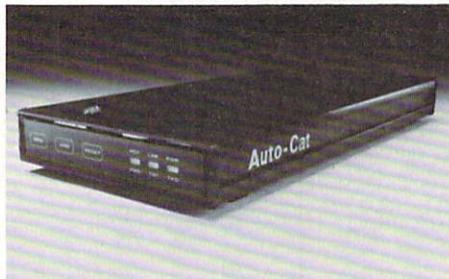
An auto answer, FCC approved, direct connect 300 baud modem, is now available from Novation, Inc., Tarzana, California.

The Bell 103 compatible AUTO-CAT will communicate at 300 baud over dial-up telephone lines using a standard modular jack. It has three data modes: automatic answer, manual answer, and manual originate. It will operate in either full or half-duplex, and features both local and remote-loopback test functions. The interface between computer and modem is the EIA RS-232.

Pressure sensitive switches on the end of the AUTO-CAT case select its answer or originate functions. LED's give a constant indication of the unit's operational status. The compact 10", 4.7", 1.2" modem uses a separate AC power supply that eliminates heat and voltage hazards.

In addition to communication over standard telephone lines, the AUTO-CAT will also automatically answer each call. This feature offers users the benefits of unattended operation for personal and business computers and terminals. Data can be made available 24 hours-a-day. Using AUTO-CAT, executives can communicate with their office computers in the evenings, on week-ends, even on holidays or vacations, and hobbyists can access their home computers from just about any location with a phone.

The AUTO-CAT is priced at \$249.00 for quantity one and is available throughout the country



from authorized Novation distributors, dealers, computer stores, and retail electronic outlets. The AUTO-CAT provides the user with access to data banks, and the ability to swap personal programs with other computer users. The AUTO-CAT is designed to maximize the potential of communications with any computer or terminal.

For further information contact Novation, Inc., 18664 Oxnard St., Tarzana, CA 91356. Telephone 213-996-5060.

TV/Monitor Stand For Atari And Apple II

BYTM Systems, Inc. announces the introduction of a new TV/Monitor stand for ATARI 400/800™ and Apple II™ consoles.

The stand is made of clear polished high-impact acrylic. It securely holds a TV/Monitor up to 15 inches (diagonal) in screen size. Its open design allows maximum air flow around the console and provides easy access to top, sides and rear for cable or ROM cartridge insertion.

The use of the stand reduces workspace crowding while raising the TV/Monitor to eye level.

For ATARI 400/800 owners with ATARI 810™ Disk Drives, it also provides a simple means of minimizing the potential problem identified by ATARI that:

Placing the ATARI 810 Disk Drive within 12 inches of a television set or monitor causes alteration of the data. Use the disk drive a minimum of 12 inches from the TV or monitor.

The CLEAR STAND raises the TV/Monitor 10 inches above the table level and makes leaving a diagonal space of 12 inches from the disk drive an easy problem to solve.



CLEAR STAND is available for \$59.95 from BYTM Systems, Inc., 389 Fifth Avenue (Suite 400), New York, New York 10016.

VisiFile Program Simplifies Electronic Filing

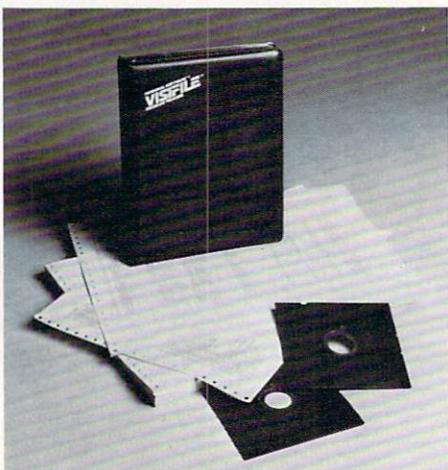
Sunnyvale, CA — September 1, 1981 — File management on a personal computer — record filing, searching, sorting, printing reports and mailing labels — is fast and simple with the new

VisiFile™ program from Personal Software Inc.

VisiFile greatly increases the usefulness of a personal computer for keeping business records. The program's flexibility allows many different applications — inventory, client lists and records, sales information, medical records and other word or numerical data — to be stored, sorted and printed in a variety of formats.

"The 'human interface' of the program makes it extremely easy to use," said Ed Esber, director of merchandising. "Even people who are unfamiliar with computers will be able to master the program and begin to use it right away. Instructions are simple and direct and are selected from an easy-to-understand 'menu' system."

The VisiFile FlexFormat™ feature makes it easy to change, rearrange and add unforeseen information to records, or combine business records into new



files. This means that record keeping can adapt quickly as business information needs change. For example, the change from a five-digit to nine-digit zip code could be handled without rekeying all the data. Users may also create a "partial file definition" for extremely fast data entry of specific portions of records.

The ability of VisiFile to communicate with other Personal

Software products (such as the VisiCalc®, VisiPlot™ and VisiTrend™/VistPlot™ programs) makes it part of an information management software system for personal computers. This ability to exchange data reinforces the power of the total software system; information created or stored by one program need not be rekeyed in order to be used by another.

VisiFile records (and information stored by the other "Visi" products) may be transferred over phone lines by Personal Software's VisiTerm™ program.

Moving Cursor Menu

VisiFile is controlled by a "moving cursor menu" with prompting, similar to the kind of user interface in other Personal Software products. Information entry is simple and allows the user to custom design a "form-like" format on screen for input. Machine language sorting routines and multiple keyed-field indexes assure information retrieval within three seconds.

Mailing labels up to five across and reports may be printed with VisiFile. When ready to print a report, the user may use a simple "row-and-column" format, or develop a custom format area six rows deep by the width of the paper. Elements of each record may be arranged in that area to suit the user. Records may be selected for printing (in addition to being sorted or indexed): for example, all customers from Kansas with orders greater than \$10,000 may be selected at the time the report is printed.

All reports can be easily set up, saved with the program. Arithmetic calculations, including column totals, also can be handled in reports.

VisiFile runs on the Apple® II (with language card or Applesoft Basic card) and Apple II Plus personal computers with 48K minimum memory and one disk drive; two disk drives and a printer are recommended. Suggested retail price of the program is \$250 (U.S. price only). It will be

PET? SEE SKYLES ... CBM/PET?

PET owners everywhere sing ♪♪ Thanks for the Memories ♪♪ to good old Bob Skyles

...they should...because Bob Skyles is the only complete source for memory boards for *any* PET ever sold. Old Bob won't forget you.

And the Skyles memory systems have the highest quality control of any computer product ever. Over 100 million bits of Skyles memory boards are already in the field; you can count the total number of failures on the fingers of one hand. First quality static and dynamic RAMS, solid soldered on first quality glass epoxy. That is why they are guaranteed — *in spite of the new lower prices* — for a full two years.

The boards connect directly to the data bus on your board with ribbon cable and 50 pin connectors that keep the data bus open to the outside world. Installs in minutes without special tools or equipment...just a screwdriver.

Because of our new dynamic memory design, and to celebrate the **Skyles' Third Annual Survival Anniversary**, here are the smashing new prices:

The 8K Memory System originally \$250.00 now \$200.00 Save \$50.00

The 16K Memory System originally \$450.00 now \$300.00 Save \$150.00

The 24K Memory System originally \$650.00 now \$400.00 Save \$250.00

...For any PET ever made. When ordering, just describe your PET by model number and indicate the amount and type (or brand) of memory currently in the unit.

Shipping and Handling(USA/Canada) \$3.50 (Europe/Asia) \$15.00

California residents must add 6%/6½% sales tax, as required.



Skyles Electric Works
231E South Whisman Road
Mountain View, California 94041
(415) 965-1735

Visa/Mastercard orders: call tollfree
(800) 227-9998 (except California).
California orders: please call (415)
965-1735.

PET? SEE SKYLES ... CBM/PET?

SEE SKYLES ... CBM/PET? SEE SKYLES

CBM/PET? SEE SKYLES ... CBM!

we beat the price...

Exclusive One Year Warranty Included



800™ \$779

WITH ONE YEAR EXTENDED WARRANTY



ATARI®
Computers
for people.™

ATARI 810 DISC DRIVE



\$444

Available without warranty for even less.

ATARI SOFTWARE

CX401 General Accounting	\$399.00	CX6001 U.S. History	\$23.00
CX402 Accounts Receivable	\$399.00	CX6002 U.S. Government	\$23.00
CX403 Inventory Control	\$399.00	CX6003 Supervisory Skills	\$23.00
CX404 Word Processor	\$119.00	CX6004 World History	\$23.00
CX405 PILOT	\$68.00	CX6005 Basic Sociology	\$23.00
CX413 MICROSOFT BASIC	\$68.00	CX6006 Counseling Proced.	\$23.00
CX4101 Invitation to Programming 1	\$17.00	CX6007 Principal of Act.	\$23.00
CX4102 Kingdom	\$13.00	CX6008 Physics	\$23.00
CX4103 Statistics	\$17.00	CX6009 Great Classics	\$23.00
CX4104 Mailing List	\$17.00	CX6010 Business Comm.	\$23.00
CX4105 Blackjack	\$13.00	CX6011 Basic Psychology	\$23.00
CX4106 Invitation to Programming 2	\$20.00	CX6012 Effective Writing	\$23.00
CX4107 Biorhythm	\$13.00	CX6014 Principles of Econ.	\$23.00
CX4108 Hangman	\$13.00	CX6015 Spelling	\$23.00
CX4109 Graph II	\$17.00	CX6016 Basic Electricity	\$23.00
CX4110 Touch Typing	\$20.00	CX6017 Basic Algebra	\$23.00
CX4111 Space Invaders	\$17.00	CX8106 Bond Analysis	\$20.00
CX4112 States & Capitals	\$13.00	CX8107 Stock Analysis	\$20.00
CX4114 European Countries & Capitals	\$13.00	CX8108 Stock Charting	\$20.00
CX4115 Mortgage & Loan Analysis	\$13.00	CXL4001 Education System Master	\$21.00
CX4116 Personal Fitness Prog.	\$59.00	CXL4002 Basic Computing Language	\$46.00
CX4117 Invitation to Programming 3	\$20.00	CXL4003 Assembler Editor	\$46.00
CX4118 Conversational French	\$45.00	CXL4004 Basketball	\$24.00
CX4119 Conversational German	\$45.00	CXL4005 Video Easel	\$24.00
CX4120 Conversational Spanish	\$45.00	CXL4006 Super Breakout	\$30.00
CX4121 Energy Czar	\$13.00	CXL4007 Music Composer	\$45.00
CX4125 Conversational Italian	\$45.00	CXL4009 Chess	\$30.00
		CXL4010 3-D Tic-Tac-Toe	\$24.00

CXL4011 Star Raiders	\$32.00
CXL4012 Missile Command	\$32.00
CXL4013 Asteroids	\$32.00

CXL4015 TeleLink	\$20.00
Compuhome	\$74.95
Visicalc	\$149.00
Letter Perfect (Word Processor)	\$119.00
Source	\$89.00

Atari® Peripherals:

400 16K	\$329.00
410 Recorder	\$59.00
822 Printer	\$359.00
825 Printer	\$CALL
830 Modem	\$159.00
850 Interface	\$ CALL

Atari® Accessories

New DOS 2 System	\$21.00
CX70 Light Pen	\$64.00
CX30 Paddle	\$18.00
CX40 Joy Stick	\$18.00
CX853 16K RAM	\$89.00
Microtek 16K RAM	\$75.00
Microtek 32K RAM	\$169.00

CBM Software

WordPro3 Plus	\$199.00
WordPro4 Plus	\$299.00
Commodore Tax Package	\$399.00
Visicalc	\$149.00
EBS Accts. Rec./Inventory Interactive System	\$595.00
BPI General Ledger	\$329.00
OZZ Information System	\$329.00
Dow Jones Portfolio	\$129.00
Pascal	\$239.00
Legal Time Accounting	\$449.00
World Craft 80	\$289.00
Word Check	\$180.00
Create-A-Base	\$219.00
Power	\$89.00
Socket-2-Me	\$20.00
Jinsam	Call

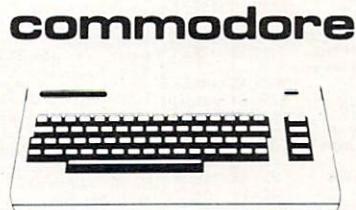
Disks

CX8100 Blank Disk (5)	\$22.00
Sycom Blank Disk (10)	\$29.00
Maxell Blank Disk (10)	\$36.00
Maxell Blank Disk (10)	\$46.00

Printers

Epson MX-70	
Epson MX-80	
Epson MX-80 FT	}
Diablo 630	
Nec 5530	
TEC 1500 Starwriter 25cps	\$2495.00
TEC 1500 Starwriter 45cps	\$1495.00
TEC 1500 Starwriter 45cps	\$1795.00

Call for Prices



VIC 20

\$259

CBM 8032 \$1099

4016	\$799.00
4032	\$999.99
8096	\$1795.00
CBM4022 Printer	\$629.00
Tally 8024	\$1699.00
CBM C2N Cassette Drive	\$69.00
CBM4040 Dual Disk Drive	\$999.00
CBM8050 Dual Disk Drive	\$1349.00

Vic-TV Modual	\$19.00
Vic Cassette	\$69.00
Vic Disk Drive	\$ Call
Vic 6 Pack program	\$44.00

**No Risk, No Deposit On Phone Orders, COD or Credit Card,
Shipped Same Day You Call ***

* on all in stock units

IN PA, CALL (717) 327-9575

(800) 233-8950

COMPUTER MAIL ORDER
501 E. 3RD ST., WILLIAMSPORT, PA 17701

To Order:

Phone orders invited (800 number is for order desk only). Or send check or money order and receive free shipping. Pennsylvania residents add 6% sales tax. Add 3% for Visa or M.C. Equipment is subject to price change and availability without notice. Please call between 11 AM & 6 PM.



available in October.

Atari Sponsors Research Efforts In Education

Sunnyvale, CA — The founding of the Atari Institute for Educational Action Research, an organization that will foster the innovative, yet practical, use of personal computers in education, was announced today by Raymond E. Kassar, chairman and chief executive officer of Atari®, Inc.

The Institute will provide grants of Atari computer products and/or cash stipends to selected institutions, individuals or organizations able to develop and promulgate new uses for computers in education, whether that usage will take place in established institutions, in community programs or in the home.

Dr. Ted M. Kahn, 32, formerly an education consultant to the computer division of Atari, has been named executive director of the institute, which will be located in the company's headquarters here. Kahn has been active in research and development in the use of computers in education for more than ten years.

Grants totaling more than \$250,000 in cash and equipment will be given during the Institute's first year of operation. Initially, all support will be for domestic U.S. programs, and not for those from overseas.

"The use of personal computers is fast becoming an integral part of the mainstream of American culture," Kassar said. "We feel we should take an active role in supporting those who are working to push the computer to its full potential as a learning tool. We are looking for applications which will appeal to and serve

broad sectors of society."

"Atari has, within the past year, already given major cash and equipment grants to projects at the Lawrence Hall of Science Computer Education Project (University of California at Berkeley); the future center at the Capital Children's Museum (Washington, D.C.); and the I.E.C. Mobile Computer Van (Santa Clara County, co-sponsored by the Industry Education Council and the Computer-Using Educators of California)," Kassar added. "The Institute will give us a formal channel through which to focus our efforts in this area."

One key program is the support of a small number of model schools or alternative learning centers to act as "centers of excellence: to illustrate various uses of computers in education."

For further information contact J. Peter Nelson at Atari, Inc., 1265 Borregas Ave., P.O. Box 427, Sunnyvale, CA 94086.

Olympic Sales Company

SERVING YOU SINCE 1947

Main Showroom & Offices:
216 South Oxford Avenue
Los Angeles, CA 90004



WE HONOR
VISA and MASTERCHARGE

TELEX: 67 34 77

ORDER DESKS open 7 Days a Week!
7:00 AM to 7:00 PM Mon thru Sat
Sunday Noon to 5:00 PM

Order Desks: (213) 739-1130

TOLL-FREE TOLL-FREE
(outside Calif.) (within Calif.)
800-421-8045 800-252-2153

Write & request our FAMOUS Catalog!
Hundreds & hundreds of products from many
manufacturers such as SONY, CASIO, VICTOR,
CODE-A-PHONE, MATTEL, SHARP, CANON,
and on and on... too many to list here!

All goods subject to availability; this ad supersedes all previous ads; we are not responsible for typographical errors; we will meet or beat any advertised prices if the competition has the goods on hand.
Minimum shipping and handling \$4.95.
All orders subject to verification and acceptance.

HEWLETT PACKARD

	Retail Your Cost
HP-85 Microcomputer	3250.00 2595.00
HP-83 Microcomputer	2250.00 1795.00
16K Exp-Memory Module	295.00 259.95
Graphics Plotter 7225	2450.00 2089.95
Personality Mod. for 7225	750.00 679.95
2631B Impact printer/bvy dty	3950.00 3295.00
Option 020 for 2631B	150.00 129.95
8 Disk Drives to choose from	1300.00 1149.95
9895A 8" Dual Drive	6850.00 5595.00
Graphics Tablet 911A	2050.00 1699.95
HP-41CV New 2.2K bytes mem	325.00 259.95
HP-41C Calculator	250.00 188.95
Card Reader for 41CV/C	215.00 168.95
Printer for 41CV/C	385.00 284.95
Optical Wand for 41CV/C	125.00 97.95
Quad Ram equals 4 Mem. Mods	95.00 84.95
Memory Modules for 41C	26.95
HP-97 Programble Printer	750.00 579.95
HP-67 Programble Calculator	375.00 297.95
HP-34C Programble Scientific	150.00 117.95
HP-38C Programble Bus. R/E	150.00 119.95
HP-32E Adv. Scientific	55.00 48.95
HP-37E Business Mgmt.	75.00 58.95

We carry a large inventory of Libraries, accessories and supplies.

apple computer

We are an AUTHORIZED SERVICING APPLE DEALER

the best price in America!

16K-32K-48K-96K-128K

Drive with controller DOS 3.3 and others...

80 column cards

Dow Jones & Quoted Reporter

DC Hayes Micromodem II and others...

Graphics Tablet

Pascal and Fortran

Languages

VisiCalc and more and more

APPLE III 96K and 128K "CALL US!"

Ask for Package One to Three Special Prices!

Texas Instruments

TI-99/4 Home Computer	950.00 \$379.95
10" Color Monitor for 99/4	650.00 319.95
32K Exp. Mem. Module	399.95 314.95
Extended Basic, a MUST for 100.00	75.00
32K Module	
Speech Synthesizer	150.00 129.95
Disk Memory Drive	500.00 397.95
RF Modulator	69.50 49.50
Telephone Coupler (Modem)	225.00 189.95
Printer (solid state)	400.00 319.95
TI-59 Programble Calculator	295.00 199.95
TI-58C Programble Calculator	130.00 93.95
PC 100C Prnter/Plotr for 59/58	225.00 149.95
TI-57 Scientific Calculator	99.95 39.95
MBA Finance & Business	70.00 51.95
TI Investm Analyst	65.00 46.95
TI-55 Slide Rule	40.00 32.95
TI-Program Hexidecm/Octal	65.00 48.50

We carry a large inventory of software, accessories and supplies.

OHIO SCIENTIFIC

Professional Computers

Retail Your Cost

C8PDF-4BK 3495.00 3195.00

• Dual 8" Drives • 64 col x 32 line/color

• .7 MIPS - FAST! • Many more standard features

Fortran & Pascal available

Many other OSI products available

—at discounted prices, of course!

WE ALSO HAVE . . .

• NOVATION Modems

Retail Your Cost

CAT 199.95 159.95

D-CAT 199.95 159.95

APPLE-CAT Direct connect 349.95 314.95

SANYO MONITORS High resolution

13" Color (new) high quality 550.00 419.95

12" Green phosphorous 360.00 259.95

12" Black & white 340.00 239.95

15" Black & white 370.00 259.95

9" Black & white-(the best seller) 235.00 169.95

AMDEK (Leedex) High Quality Monitors

100 12" B/W, 12 MHz 179.00 139.95

100-G 12" Green, 12 MHz 199.00 174.95

300-G 12" Green, 18 MHz 249.00 199.95

Color I 13" Color, NTSC comp. input, 449.00 339.95

audio amp & speaker

Color II 13" Color, RGB input, hi res graphics, speaker 999.00 699.95

HAZELTINE Video Display Terminals

• SHUGART Disk Drives

• DEC VT100 & VT103

Call us for your DISCOUNTED price TODAY!

NEW! From TI-Series 10 Personal Information Terminal Retail 995.00 Your Cost 795.00

HEWLETT-PACKARD • TI • DIABLO • PAPER TIGER • APPLE • ATARI • OSI

COMPUTER CENTER

31 East 31st Street • New York, N.Y.
(between Madison & Park Avenues)

480 Lexington Avenue • New York, N.Y.
(American Brands Bldg., between 46th & 47th St.)

presenting the LARGEST SELECTION OF SOFTWARE EVER ASSEMBLED...

**for ATARI® • APPLE® • PET® • and other Microcomputers
at SUPER DISCOUNT PRICES!**

ATARI

☐ ATARI 800 COMPUTER	775.00
☐ ATARI 400 COMPUTER	319.00
☐ PHYSICS (AT)	24.50
☐ GREAT CLASSICS (AT)	24.50
☐ BASIC PHYSIOLOGY (AT)	24.50
☐ PRINCIPLES OF ECONOMICS (AT)	24.50
☐ SPELLING (AT)	25.50
☐ BASIC ELECTRICITY (AT)	24.50
☐ BASIC ALGEBRA (AT)	24.50
☐ 32 K RAMRAM (AT)	180.00
☐ KINGDOM (AT)	13.55
☐ STATISTICS I (AT)	17.95
☐ BLACKJACK (AT)	13.55
☐ BIORHYTHM (AT)	13.55
☐ HANGMAN (AT)	13.55
☐ SPACE INVADERS (AT)	17.95
☐ EUROPEAN CAPITALS (AT)	13.55
☐ MORTGAGE LOAN (AT)	13.55
☐ STATES & CAPITALS (AT)	13.55
☐ EDUCATION SYSTEM (AT)	22.50
☐ ATARI BASIC (AT)	53.95
☐ ASSEMBLER DEBUG (AT)	53.95
☐ BASKETBALL (AT)	35.95
☐ ASTEROIDS (AT)	35.95
☐ SUPER BREAKOUT (AT)	35.95
☐ MUSIC COMPOSER (AT)	53.95
☐ COMPUTER CHESS (AT)	35.95
☐ MISSILE COMMAND (AT)	35.95
☐ STAR RAIDERS (AT)	35.95
☐ TELELINK (AT)	22.50
☐ PADDLES (AT)	17.95
☐ JOYSTICKS (AT)	17.95
☐ U.S. HISTORY (AT)	24.50
☐ U.S. GOVERNMENT (AT)	24.50
☐ SUPERVISORY SKILLS (AT)	24.50
☐ WORLD HISTORY (AT)	24.50
☐ BASIC SOCIOLOGY (AT)	24.50

ADVENTURE INTERNATIONAL

☐ ADVENTURE HINT SHEET	7.95
☐ ADVENTURE (1,2,3) (D) (AP)	35.95
☐ ADVENTURE (4,5,6) (D) (AP)	35.95
☐ ADVENTURE (7,8,9) (D) (AP)	35.95
☐ ADVENTURE #10 (D)	18.95
☐ ADVENTURE (specify 1-10) (AP,AT)	17.95
☐ PLANETOIDS (D) (AP)	17.95
☐ PLANETOIDS (AP)	17.95
☐ POKER (AP)	17.95
☐ POKER (AP) [D]	18.95
☐ KID-VENTURE #1 (AP)	17.95
☐ STAR TREK 3.5 (AT)	17.95
☐ MOUNTAIN SHOOT (AT)	13.45
☐ SUNDAY GOLF (AT)	13.45
☐ ANGLE WORMS (AT)	13.45
☐ DEFECTONS (AT)	13.45
☐ GALACTIC EMPIRE (AT)	17.95

AVALON HILL

☐ MIDWAY (AT,AP,P)	13.50
☐ NUKE WAR (AT,AP,P)	13.50
☐ PLANET MINERS (AT,AP,P)	13.50
☐ CONVOY RAIDER (AT,AP,P)	13.50
☐ B1 BOMBER (AT,AP,P)	13.50
☐ LORDS OF KARMA (AT,AP,P)	18.00
☐ CONFLICT 2500 (AT,AP,P)	13.50
☐ COMPUTER ACQUIRE (AP,P)	18.00

AUTOMATED SIMULATION

☐ TUESDAY QUARTERBACK (D) (AP)	26.95
☐ STAR WARRIOR (C,D) (AP)	35.95
☐ THREE PACK (D) (AP)	45.00
☐ STARFLEET ORION (C,D) (AP)	22.50
☐ INVASION ORION (C,D) (AP)	22.50
☐ INVASION ORION (C) (AT,P)	22.50
☐ APISHAI (D) (AP)	35.95
☐ APISHAI (C) (P)	35.95
☐ CRUSH, CRUMBLE & CHOMP (D) (AP)	26.95

Check program desired.
Complete ordering information
and mail entire ad.
Immediate Shipments from stock.

KEY:
AT-Atari
AP-Apple
P-Pet
D-on Disc.
C-Cassette

If not marked-Cassette

ATARI is a trademark of ATARI INC.
APPLE is a trademark of APPLE COMPUTER, INC.
PET is a trademark of COMMODORE BUSINESS MACHINES.
Prices subject to change without notice.

Mail to:

DIGIBYTE SYSTEMS CORP.

31 East 31st Street, New York, N.Y. 10016

OUTSIDE NEW YORK CALL TOLL FREE (800) 221-3144
IN NEW YORK CALL (212) 889-8975

AUTOMATED SIMULATION

☐ RYN [D,C] (AP)	17.95
☐ RYN [C] (PAT)	17.95
☐ MORLOC [C,D] (AP)	17.95
☐ MORLOC [C] (PAT)	17.95
☐ RIGEL [C,D] (AP)	26.95
☐ RIGEL [C] (PAT)	26.95
☐ HELLFIRE [D] (AP)	35.95
☐ HELLFIRE [C] (P)	35.95

QUALITY SOFTWARE

☐ 6502 DISASSEMBLER (AT)	10.55
☐ ASTRO APPLE (AP) [D]	17.95
☐ ATARI ASSEMBLER (AT)	22.50
☐ BABBLE (AP) [D]	17.95
☐ BATTLESHIP COMMANDER [D] (AP)	17.95
☐ FASTGAMMON [D] (AP)	22.50
☐ FASTGAMMON (AP,AT)	17.95
☐ FRACAS ADVENTURE [D] (AP)	22.50
☐ TANK TRAP (AT)	10.55
☐ TANK TRAP (AT) [D]	13.55
☐ TARI TREK (AT)	10.55
☐ TARI TREK (AT) [D]	13.55
☐ FORTH (AT) [D]	72.00

PERSONAL SOFTWARE

☐ CCA MGMT. [D] (PAT)	90.00
☐ DESK TOP PLAN II [D] (AP)	175.00
☐ MONTY MONOPOLY [D] (AP)	31.00
☐ VISICALC [D] (AT,P,AP)	170.00
☐ ZORK (T) [D]	35.95
☐ VISIDEX (AP) [D]	170.00
☐ VISIPILOT (AP) [D]	162.00
☐ VISITERM (AP) [D]	135.00
☐ VISITREND (AP) [D]	210.00

CALIF. PACIFIC

☐ 3-D GRAPHICS (AP) [D]	35.95
☐ AKALAPETH OIDS (AP) [D]	31.50
☐ APPLE (AP) [D]	26.95
☐ FENDER BENDER (AP) [D]	22.50
☐ RASTER BLASTER (AP) [D]	24.00
☐ BUDGE'S SPACE ALBUM (AP) [D]	35.95
☐ BUDGE'S TRILOGY (AP) [D]	26.95

STRATEGIC SIMULATIONS

☐ COMPUTER AMBUSH [D] (AP)	51.50
☐ COMPUTER BISMARCK [D] (AP)	51.50
☐ COMPUTER CONFLICT [D] (AP)	35.00
☐ COMPUTER NAPOLEONICS [D] (AP)	51.50
☐ COMPUTER QUARTERBACK [D] (AP)	35.00
☐ AIR COMBAT [D] (AP)	51.50
☐ WARP FACTOR [D] (AP)	35.00
☐ CUTTHROATS & CARTELS [D] (AP)	35.00
☐ OPERATION APOCALYPSE [D] (AP)	51.50
☐ TORPEDO FIRE [D] (AP)	51.50

MICROSOFT SOFTWARE

☐ ADVENTURE [D] (AP)	25.50
☐ OLYMPIC DECATATHLON [D] (AP)	25.00
☐ TYPING TUTOR (AP) [D]	17.95
☐ TYPING TUTOR (AP)	13.55
☐ Z-80 SOFTCARD [D] (AP)	315.00
☐ 16K RAM BOARD (AP)	165.00

STRATEGIC

☐ PRESIDENT ELECT [D] (AP)	31.50
☐ MAJOR LEAGUE BASEBALL [D] (AP)	31.50

ON LINE SYSTEMS

☐ HI-RES ADVEN. #0 (AP) [D]	17.95
☐ HI-RES ADVEN. #1 [D] (AP)	22.50
☐ HI-RES ADVEN. #2 [D] (AP,AT)	29.00
☐ HI-RES ADVEN. #3 [D] (AP)	31.00
☐ HI-RES CRIBBAGE [D] (AP)	22.50
☐ PADDLE GRAPHICS [D] (AP)	36.00
☐ TABLET GRAPHICS [D] (AP)	44.95
☐ MISSILE DEFENSE [D] (AP)	26.95
☐ SUPERSCRIBE [D] (AP)	81.00

SIRIUS

☐ CYBER STRIKE [D] (AP)	36.00
☐ STAR CRUISER [D] (AP)	22.50
☐ GORGON [D] (AP)	33.00
☐ PHANTOM FIVE [D] (AP)	36.00
☐ SPACE EGGS [D] (AP)	26.95

SYNERTHISTIC SOFTWARE

☐ DUNGEON & WILDERNESS [D] (AP)	29.00
☐ DUNGEON [D] (AP)	13.50
☐ ODYSSEY [D] (AP)	15.75
☐ HIGHER GRAPHICS [D] (AP)	31.50
☐ WILDERNESS [D] (AP)	15.75
☐ PROGRAM LINE EDITOR [D] (AP)	18.00

BRODERBUND

☐ GALACTIC EMPIRE (AP) [D]	22.50
☐ ALIEN RAIN [D] (AP)	21.00
☐ HYPER HEAD ON (AP) [D]	22.50
☐ GALACTIC REVOLUTION (AP) [D]	22.50
☐ TANK [D] (AP)	13.55
☐ TAWALA'S REDoubt (AP) [D]	26.95
☐ GALACTIC TRADER (AP) [D]	22.50
☐ SNOOGLE (AP) [D]	21.00

MUSE COMPANY

☐ ABM [D] (AP)	22.50
☐ APPLOT II [D] (AP)	75.00
☐ BEST OF MUSE [D] (AP)	35.95
☐ GLOBAL WAR [D] (AP)	22.50
☐ SUPER TEXT II [D] (AP)	135.00
☐ THREE MILE ISLAND [D] (AP)	35.95
☐ ROBOT WARS [D] (AP)	32.00
☐ THE VOICE [D] (AP)	35.95

IRIDIS

☐ IRIDIS 1 (AT)	8.95
☐ IRIDIS 1 (AT) [D]	11.75
☐ IRIDIS 2 (AT)	14.50
☐ IRIDIS 2 (AT) [D]	16.95

EDU-WARE

☐ ESP (AP) [D]	14.50
☐ NETWORK (AP) [D]	17.25
☐ PRISONER (AP) [D]	26.95
☐ SPACE (AP) [D]	26.95
☐ SPACE II (AP) [D]	22.50
☐ TERRORIST (AP) [D]	26.95

CRYSTAL COMPUTER

☐ SUMER (AP,AT,P,T) [D]	16.00
☐ GALACTIC QUEST (AP,AT) [D]	25.00
☐ IMPERIAL WALKER (AT) [D]	25.00
☐ SANDS OF MARS (AP,AT) [D]	32.00
☐ LASER WARS (AP,AT) [D]	25.00

HAYDEN

<tr

LO•BALL COMPUTERS



EPSON

... and more

Apple® II

32K	\$1099 ⁰⁰
48K	\$1149 ⁰⁰
Disk II w/3.3 DOS	\$ 529 ⁰⁰
Disk II	\$ 450 ⁰⁰
Apple III w/128K	\$3600 ⁰⁰

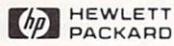
EPSON

MX-70	\$ 399 ⁰⁰
MX-80	CALL
Apple card & cable	\$ 99 ⁰⁰

ATARI

400 w/16K	\$ 439 ⁰⁰
800 w/16K	\$ 775 ⁰⁰
810 Disk Drive	\$ 449 ⁰⁰

We'll attempt to meet or beat any advertised price.



HEWLETT
PACKARD

HP-85A w/16K

\$2697³⁰

NEC

5510-2 w/Tractor	\$2550 ⁰⁰
5520-2 w/Tractor	\$2850 ⁰⁰

SOROC

IQ 120	\$ 725 ⁰⁰
IQ 135	\$ 799 ⁰⁰

C.ITOH

Comet	\$ 499 ⁹⁵
Starwriter	\$1450 ⁰⁰

Northstar, Altos and Zenith
All 25% Discount

LO•BALL COMPUTERS

7677 S.W. Cirrus Dr.
Beaverton, OR. 97005

TO ORDER

CALL (503) 641-0211

Ordering Information: For fastest service, send money order, cashier's check or bank wire. Visa and MC orders, add 3%. Personal checks accepted (allow minimum 10 days to clear). Hours 9-5, M-F.

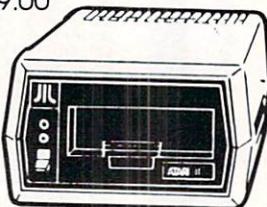
Call for our Free Catalog.

LO•BALL COMPUTERS

LOWER THAN DISCOUNT ON ALL MAJOR BRANDS SUPER SPECIAL

ATARI 800
\$747.00

ATARI D.D.
\$ 449.00



DYSAN DISKETTES	17.50/box
ATARI SOFTWARE	20% off
EPSON MX80	469.00
DC HAYES MICROMODEM II	279.00
NOVATION D CAT	160.00
NEC 12" MONITOR	219.00



uni COMM™
THE PURCHASING SERVICE FOR HOME & BUSINESS COMPUTERS

P.O. BOX 77-C BEVERLY HILLS, CA. 90213 (213) 451-8089

CALL OR WRITE FOR FREE CATALOG



PAY LESS.
GET MORE.

PRICE EXAMPLES:

ATARI 800 with 16K memory	\$749
ATARI 400 with 16K memory	\$339
ATARI 810 Disk Drive	\$439
ATARI Software 10% OFF	

Mail Order Customers

- Indicate Unit(s) you want
- Shipping Address • Mass. res. 5% sales tax
- Include check, money order, MC or VISA number

We ship by best means possible freight collect

WARREN'S COMPUTER SYSTEMS

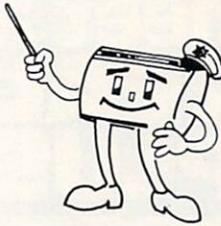
4 Elm St., Braintree, MA 02184 (617)843-1133

After 5:30 EST please dial (617) 961-3285

SEND FOR CATALOG



commodore spectacular



8032-32K 80 COL CRT
REG. \$1495 **\$1095**

4032-32K 40 COL CRT
REG. \$1295 **\$995**

4016-16K 40 COL CRT
REG. \$995 **\$795**

8050-DUAL DISK 950K
REG. \$1795 **\$1345**

4040-DUAL DISK 343K
REG. \$1295 **\$995**

C2N-CASSETTE DRIVE
REG. \$95 **\$69**

4022-80 COL PRINTER
REG. \$795 **\$629**

8024-MANNSMAN TALLEY
REG. \$1995 **\$1595**

25CPS-STARWRITER
REG. \$1895 **\$1445**

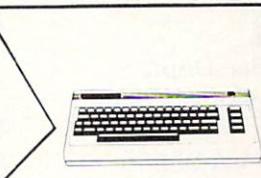
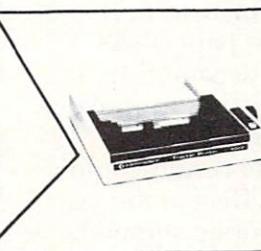
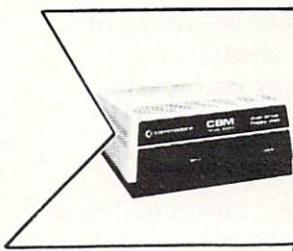
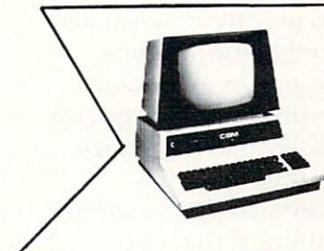
CBM-IEEE MODEM
REG. \$279 **\$229**

VOICE SYNTHESIZER
REG. \$395 **\$329**

VIC 20 ★★★★
REG. \$299 **\$269**

PET TO IEEE CABLE
REG. \$39.95 **\$34**

IEEE TO IEEE CABLE
REG. \$49.95 **\$39**



SOFTWARE

	LIST	YOU PAY
OZZ—The Information Wizard	\$395	\$299
Wordcraft 80	\$395	\$299
IRMA—Info Retrieval & Mgmt. Aid	\$495	\$399
Dow Jones Portfolio Mgmt.	\$149	\$119
Pascal Development Pkg.	\$295	\$229
EBS—Receivables, Inventory	\$750	\$579
BPI—General Ledger	\$395	\$299
Word Pro 3—40 Column	\$250	\$179
Word Pro 4—80 Column	\$375	\$269
Word Pro 4 Plus	\$450	\$329

CUSTOM PRINTED CONTINUOUS MINI-FORMS

- LOOK PROFESSIONAL
- LOW PRICES FOR SMALL RUNS

1000-11"x9 1/2" BLACK

PARTS	LETTERHEAD	INVOICE	STATEMENT
1	37.50	—	37.50
2	63.50	63.50	63.50
3	79.50		
5	115.50		

- SPECIAL LOGOS, 2 COLOR PRINTING & SPECIAL STOCK AVAILABLE

MINI-FORMS PRICES & ORDERS:

(800) 523-3442

PA & West of Rockies (215) 455-9705

- PREPAID ORDERS SHIPPED FREE
- VISA & MASTERCARD ADD 3%
- COD-UPS
- PA RESIDENTS ADD 6% PA TAX

Main Line Computer Discount

P.O. BOX 170
ST. DAVIDS, PA 19087

MAIL
ORDER
PHONE

800-345-8112

IN PA CALL 1-800-662-2444

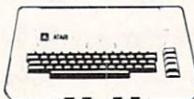
meet a REAL PLUS



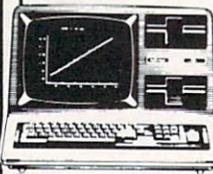
Color Computer 4K \$310
w/Ext. Basic 16K \$459



Model II 64K
\$3300



Atari 800 32K \$789



Model III 16K
\$839
2 DR + RS232C
\$2100

These are just a few of our many fine offers — computers, peripherals, modems, printers, disc drives and an unusual selection of package values. Call TOLL FREE today and check us out for price and warranty.

Factory warranties on Apple and Atari equipment. Other equipment carries manufacturer's warranty or Computer Plus 180 day extended warranty. Combined warranties carry Computer Plus 180 day warranty or original manufacturer's warranty.

DEALER INQUIRIES ARE INVITED

Prices subject to change without notice.

TRS-80 is a registered trademark of Tandy Corp.

**CALL TOLL FREE
1-800-343-8124**

**computer
plus**

Write for your
free catalog ...

Dept. B
245A Great Road
Littleton, MA 01460
(617) 486-3193

NECC-82 Call For Participation

The 1982 National Educational Computing Conference (NECC-82) will be held in Kansas City, Missouri, June 28-30, 1982. The purpose of the conference is to provide a broad and rich forum for discussion among individuals interested in educational computing. Based on previous conferences, approximately 1000 people from institutions at all levels are expected to attend.

Authors are invited to submit papers describing actual experiences with computer use in the classroom or the consequences of concrete results or be survey or tutorial papers which include a synthesis and thorough evaluation. Generally, papers that describe projects presented at previous conferences are not considered unless substantial new information can be reported. In this case provide a brief synopsis of the earlier paper clearly indicating the new information. It is expected that most papers will report on specific accomplishment. Papers reporting negative results are also encouraged, especially when the results could have a profound effect in the way educational computing should be viewed. The deadline for submission of papers is Jan. 15, 1982.

Specifications for paper submittal may be obtained from:

Gerald L. Engel
Computer Science Dept.
Christopher Newport College
50 Shoe Lane
Newport News, VA 23606

or from:

E. Michael Staman
NECC-82 General Chairman
Campus Computing Services
University of Missouri-Columbia
305 Jesse Hall
Columbia, MO 65211

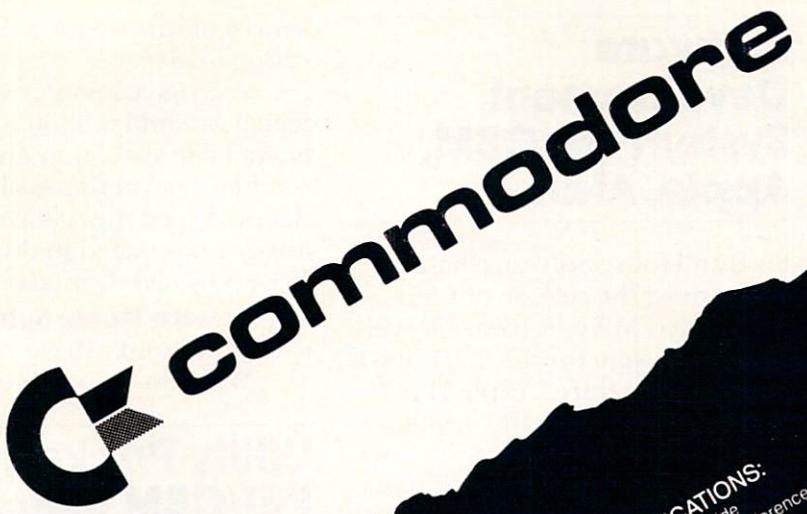
Individuals are also invited to submit proposals for special sessions, exhibits, project presentations, and "Birds of a Feather" sessions. For further information write to E. Michael Staman.

New Book For OSI C1P/C4P Users

Los Alamos, NM — TIS, Inc., the company that for the past two years has provided workbooks for the Ohio Scientific C1P computer, announces a new book. "Understanding Your C1P/C4P: A Workbook of BASIC Exercises" is a 112 page softcover book that is designed specifically for the Ohio Scientific C1P, SUPER-BOARD II, and Challenger C4P. It introduces the fundamentals of OSI BASIC: calculator and program mode, input and output, data representation, and program storage on cassette. The book describes OSI control and logic including testing and branching, subroutine use, and logical operations. It covers character strings and array handling. Understanding Your C1P/C4P contains many exercises and sample programs. It is available from your Ohio Scientific dealer or by writing TIS, Inc., P.O. Box 921, Los Alamos, NM 87544. Price is \$7.95 plus \$2.00 shipping and handling.

Computer Graphics Spotlighted At National Conference On Visual Communications

National Conference on Computer Graphics: Tools for Productivity, December 7-9, 1981, Washington, D.C. The Conference will spotlight trends in usage and applications of computer graphics, as well as perspectives in emerging services and management needs for visual information. Computer graphics equipment and services demonstrations and corporate and government case histories will be included for an overall look at effectively integrating visual and textual information. Contact U.S. Professional Development Institute, 12611 Davan



EQUIPMENT:

CBM 4016 CPU (40 Col. Screen, 16K RAM)
CBM 4032 CPU (40 Col. Screen, 32K RAM)
CBM 8032 CPU (80 Col. Screen, 32K RAM)
CBM 4040 Dual Disk Drive (170K per 5 1/4" Diskette)
CBM 8050 Dual Disk Drive (1/2 Meg. per 5 1/4" Diskette)
CBM 4022 Tractor Feed Printer
CBM 8010 Phone Modem
CBM C2N Cassette Deck
CBM CPU/IEEE Cable
CBM IEEE/IEEE Cable
Tally 8024-7 (7x7 Matrix) Printer
Tally 8024-9 (7x9 Matrix) Printer

839
1069
1249
1049
1449
659
239
85
36
45
1597
1697

329
329
329
49
49
129
249
89
59

SOFTWARE:

Wordcraft 80 Wordprocessor
Wordpro 4 + Wordprocessor
OZZ Data Base
Tax Preparation System
Irma Information Retrieval
Dow Jones Portfolio
Pascal Development Package
Assembler Development Package
Personal Tax Calculator

MART

P.O. Box 77286
Atlanta, Ga. 30357

404-981-5939
Call 9 AM-6:30 PM EST

PUBLICATIONS:

CBM User Guide
CBM Basic 4.0 Reference Manual
CBM Disk Manual
CBM Printer Manual
MOS Hardware Manual
MOS Programming Manual
The PET Revealed
Library of PET Subroutines
Commodore Software Encyclopedia

6.49
7.91
6.49
6.49
5.75
5.75
17.49
4.95

COMING SOON:

CBM 8096
CBM Micro-Mainframe
Upgrade kit will be available to convert
existing 8032's to 8096 or Micro MF
CBM 8250 Dual Disk Drive (1 Meg per 5 1/4" Diskette)
CBM 8061/8062 8 inch Disk Drives
Additional VIC Peripherals and Software

All items Insured
COD or Credit Card
Prepaid Orders Shipped Free
In stock items shipped within 48 hours
MASTERCHARGE OR VISA ACCEPTED

\$270.00
List \$299.95

VIC-20

Special
Introductory
Offer

Price Includes Shipping

Drive, Silver Spring, MD 20904.
Telephone: (301) 622-0066.

Software Package For Small Manufacturers

COMPUMAX ASSOCIATES, Inc., of Palo Alto, CA, announces the newest addition to its MicroBiz product line of Accounting Software, with the release of MICROBOMP. A 'bill of manufacturing/materials program' for the microcomputer.

MICROBOMP is a software package specifically for the small manufacturer. This package is designed to handle inventory control, materials requirement planning and it will also 'explode' your bills of material. The program sets-up and maintains three files; 1) a stock file that contains the inventory master information; 2) a bill of materials file that defines the product structures and 3) a schedule file that contains production schedule data.

In addition a data base manager allows the operator to input and update information in these files. The bill of materials processor generates the 'product tree' up to six levels deep. Shortages are flagged at run time. Separate reports provide stock valuation, ABC analysis, materials requirement listings and a 'MaxMin' report.

The program will, finally, create a journal file automatically, for those using MICROBOMP interactively, either with COMPUMAX's MICROLEDGER program, or with MAXILEDGER, the new Compumax program for divisional accounting.

MICROBOMP is written in Microsoft Basic, requires 48K and retails for \$350.00. For further information contact:

COMPUMAX ASSOCIATES, Inc.
P.O. Box 1139
Palo Alto, CA, 94302
415/321-2881 X56

Software Development System For CBM, Apple, Atari

Eastern House Software has announced the release of their unbundled MAE Software Development System for the 2001/4001/8032 Commodore, Apple II 3.2/3.3 DOS, and Atari 400 or 800 computers.

If a software developer has a microcomputer in his laboratory or office, he can transform it into a development system via purchase of the MAE software package.

A main advantage of this software is that it is available for several different microcomputers. When a software developer moves from a PET to an APPLE to an ATARI etc., he need not be concerned with the time consuming task of having to relearn a new set of syntaxes, commands, and other peculiarities because this software works similarly on each of these microcomputers.

This software was designed for ease of use and to aid programmer productivity via its extensive text editing capabilities and numerous other programmer development utilities included in the package.

Since the Assembler/Editor are co-resident, continual manual loading of the editor, then assembler, then editor, etc. is not necessary. The main features include: Macros, Conditional Assembly, Interactive Assembly, up to 31 characters/label, string search and/or replace, plus numerous other editing facilities. Even a word processor is included to aid in the development of program descriptions, manuals, and other text. A number of other utilities are also provided — depending on the version, they include Word Processor, forward/reverse scrolling, tape interface, machine language macro library, library of disk driver subroutines,

source of information file, relocating loader, etc.

A cross-assembler version which assembles 6800 source code is available and other cross assemblers are in the works. A detailed spec sheet is available to anyone interested in this software. Price \$169.95. Contact:

Eastern House Software
3239 Linda Drive
Winston-Salem, NC 27106

Utility Package For PET/CBM Users

Professional Software Inc. (PSI) of Needham, MA has introduced POWER, a programmer's utility package in a 4K ROM designed for use with Commodore CBM/PET computers.

POWER is for any CBM/PET user who would benefit by reduced program entry time, debugging tools, and easy, quick modifications and updates.

POWER contains a series of new commands and utilities which are added to the BASIC Interpreter. Designed for the user of CBM/PET BASIC, POWER also contains special editing, programming, and debugging features. Included are special keyboard "instant action" features which make up for and go beyond the limitations of CBM/PET BASIC. POWER is sold with complete documentation written by Jim Butterfield of Commodore fame who has been working with preliminary versions of POWER for over a year.

To make POWER even more "user-friendly", PSI has included new "stick-on" keycap labels (which denote POWER's most commonly used features) in every program.

There are currently three (3) versions of POWER, one each for:

40 column CBM/PET with 3.0 BASIC;
40 column (9" or 12") CBM/PET with 4.0 BASIC;
and CBM 8032 (4.0 BASIC) ©

PRICE BREAKTHROUGH

We've done it again! As a leader in small computer sales we must constantly find new ways to save customers money while offering quality products. Our most popular seller, the Apple II Plus, is now available with 64K of user RAM at the unbeatable price of only \$1249. This is possible because we manufacture the 16K RAM Card that expands the factory Apple II 48K to its maximum capacity of 64K. The Ram Card allows use of Integer and Applesoft Basic and other languages like Pascal. It's a must for large data bases, Visicalc, and the Z-80 cards. The card is made from high quality components and has a full one year warranty.

64K APPLE II PLUS*
ONLY **\$1249**

*48 K Apple II Plus with 16K Ram Card

**16K ONLY \$1025 48K ONLY \$1089
DISK II DRIVE WITH CONTROLLER CARD \$499
DISK II DRIVE ADD ON \$439**



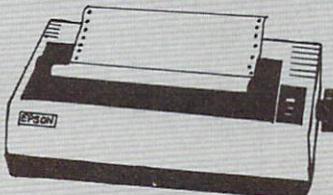
Apple Cards and Hardware

16K Ram Card by CCI.....	130
Language System w/Pascal.....	379
Silentype Printer w/Interface Card.....	349
Hayes Micromodem II.....	299
Novation Apple-Cat II.....	339
Videoterm 80 Column w/Graphics.....	269
Z-80 Softcard by Microsoft.....	299
16K RamCard by Microsoft.....	159
ABT Numeric Keypad (old or new kbd).....	110
ALF 3 Voice Music Card.....	239
ALF 9 Voice Music Card.....	169
Lazer Lower Case Plus +.....	55
Micro-Sci Disk Drives (A-40 & A-70).....	CALL
SSM AIO Serial/Parallel Card A&T.....	189
Sup-R-Terminal 80 Column Card.....	329
SVA ZXV4 Megabyter 8" Disk Controller.....	589
SVA 2+2 Single Den. 8" Disk Controller.....	345
ThunderClock Plus.....	119
Symtec Hi-Res Light Pen.....	210
Integer or Applesoft Firmware Card.....	145
Graphics Tablet.....	619
Parallel Printer Interface Card.....	135
Hi-Speed Serial Interface Card.....	135
Smarternet 80 Column Card.....	299
Joystick by Keyboard Co.....	45
Music System (16 Voices).....	479
A/D + D/A Interface.....	289
Expansion Chassis.....	599
Introl/X-10 Controller Card.....	169
Clock/Calendar Card.....	225
CPS Multi-function Card.....	189
Supertalker SD-200.....	239
Romplus + Card.....	135
Romwriter Card.....	149
Clock/Calendar Module.....	99
GPIB IEEE-488 Card.....	249
Asynchronous Serial Interface Card.....	129
Centronics Parallel Interface Card.....	99
Arithmetic Processor Card.....	299
We carry all CCS cards, please call for best prices.	

Software for the Apple

Visicalc 3.3.....	169
CCA Data Management.....	85
DB Master.....	169
WordStar (Apple 80 col. version).....	299
Applewriter.....	65
Easywriter.....	225
Peachtree Business Software.....	CALL
VisiTerm.....	129
Visitrend/Visiplot.....	219
Real Estate Analyzer.....	89
Tax Preparer.....	99
DOS Toolkit.....	65
Tax Planner.....	99
Dow Jones Portfolio Evaluator.....	45
Dow Jones News & Quotes Reporter.....	85
Apple Fortran.....	165
Controller Gen. Bus. System.....	499

Printers



Epson MX-80 CALL

Anadex 9500/9501 w/2K Buffer.....	1299
C. Itoh Starwriter 25 CPS.....	1499
C. Itoh Starwriter 45 CPS.....	1899
Epson MX-70.....	CALL
Epson MX-80 F/T.....	CALL
Paper Tiger IDS-445.....	699
Paper Tiger IDS-460.....	949
Paper Tiger IDS-560.....	1249
Silentype w/Apple II interface card.....	349
Qume Sprint 5/45.....	2495

TOLL FREE ORDER LINE

800-854-6654

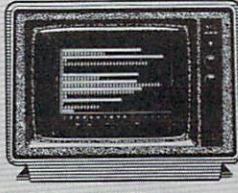
California and outside

Continental US

(714) 698-8088

TELEX 695000 BETA CCMO

Video Monitors



Amdek / Leedex Video 100 12" B&W.....	139
Amdek (Hitachi) 13" Color.....	359
NEC 12" Green Phospher Screen.....	CALL
NEC 12" RGB Hi-Res Color.....	CALL
Panasonic 13" Color.....	449
Sanyo 9" B&W.....	185
Sanyo 9" Green Phospher Screen.....	CALL
Sanyo 12" B&W.....	269
Sanyo 12" Green Phospher Screen.....	285
Sanyo 13" Color w/excellent resolution.....	449

Atari Personal Computer



ATARI 800 16K \$749

Atari 400 16K.....	349
410 Program Recorder.....	65
810 Disk Drive.....	449
815 Dual Disk Drive (Dbl. Den.).....	1295
822 Thermal Printer.....	349
850 Interface Module.....	159
16K Ram Memory Module.....	149
16K Ram Memory Module (by ConComp).....	89

NEC Microcomputer



PC-8001A 32K Ram Computer.....	CALL
PC-8012A I/O Unit w/32K Ram.....	CALL
PC-8031A Dual Mini-Disk Drive Unit.....	CALL

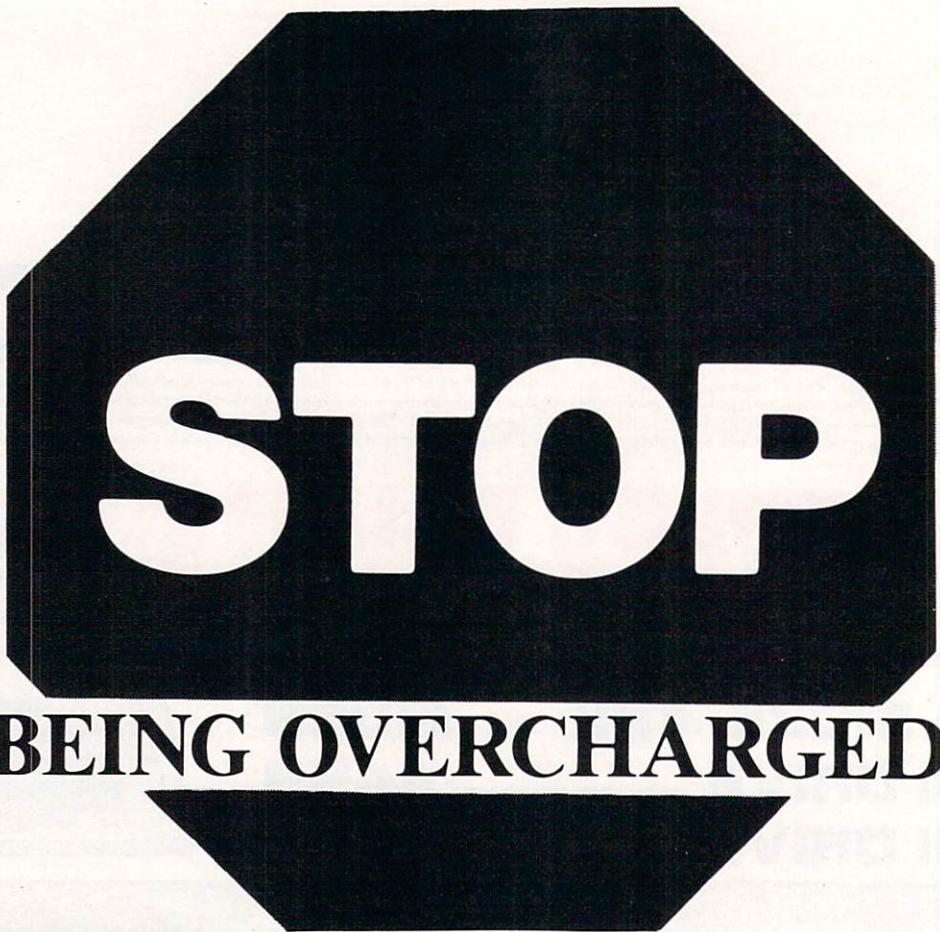
Please write for more information about the NEC computer.

Ordering information: Phone orders using VISA, MASTERCARD, AMERICAN EXPRESS, DINER'S CLUB, CARTE BLANCHE, bank wire transfer, cashier's or certified check, money order, or personal check (allow ten days to clear). Unless prepaid with cash, please add 5% for shipping, handling and insurance (minimum 5.00). California residents add 6% sales tax. We accept CODs OEM's, Institutions and corporations please send for a written quotation. All equipment is subject to price change and availability without notice. All equipment is new and complete with manufacturer's warranty (usually 90 days). Showroom prices may differ from mail order prices.

Send Orders to:

**consumer
computers Mail Order**

8314 Parkway Drive
La Mesa, California 92041



DON'T

Pay Credit Card Surcharges
Pay a U.P.S. C.O.D. "Fee"
Even Pay for the Call!

DO CALL OMEGA TOLL FREE!

**Special
of the Month!**

**EPSON
MX-80**

INTERFACES:
IEEE \$55, TRS-80 \$35,
APPLE INTERFACE & CABLE \$90,
RS-232 \$70



**ATARI 800 16K
\$ 769**



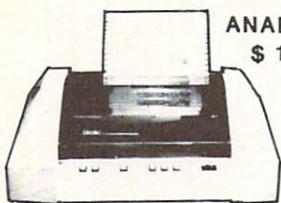
**WEST COAST
1-800-235-3581**

**EAST COAST
1-800-556-7586**

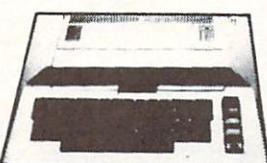
**CALL OMEGA AND FIND OUT WHY WE ARE AMERICA'S FASTEST
GROWING COMPUTER SALES COMPANY!**

ΩMEGA SALES COMPANY

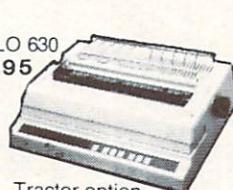
WEST COAST / EAST COAST



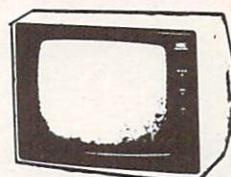
ANADEX
\$ 1249



ATARI 800 32K \$ 749



DIABLO 630
\$ 1995



Tractor option
\$ 245

NEC 12" MONITOR
\$ 229

**NEC
INTERTEC
OKIDATA
APPLE

TELEVIDEO
COMMODOR
RADIO SHAC
AMDEK
QUME
ATARI**

INTERTEC SUPERBRAIN 64K RAM	\$2799
QD SUPERBRAIN	\$2999
NEC 5510 SPINWRITER (7710)	\$2345
NEC 5520 SPINWRITER (7720)	\$2695
NEC 5530 SPINWRITER (7730)	\$2345
NEC 12" MONITOR	\$ 229
OKIDATA MICROLINE-80	\$ 399
OKIDATA MICROLINE-82	\$ 529
OKIDATA MICROLINE-83	\$ 769
DIABLO 630	\$1995
APPLE II PLUS 48K	\$1139
APPLE DISK w/3.3 DOS Controller	\$ 525
APPLE DISK w/o Controller	\$ 449
HAZELTINE 1420	\$ 799
NORTHSTAR HORIZON II 32K QD	\$2925
ANADEX DP-9500/9501	\$1249
TELEVIDEO 912C	\$ 669
TELEVIDEO 920C	\$ 729
TELEVIDEO 950	\$ 929
CBM 8032 COMPUTER	\$1149
CBM 8050 DISK DRIVE	\$1349
CBM 4032 COMPUTER	\$1029
CBM 4040 DISK DRIVE	\$1029
CBM 4022	\$ 649
CBM VIC-20	\$ 269
RADIO SHACK II 64K	\$3245
RADIO SHACK III 16K	\$ 849
LEEDEX/AMDEK 100	\$ 139
LEEDEX/AMDEK 100G	\$ 169
LEEDEX/AMDEK COLOR-1 13" Color Monitor	\$ 329
MICROTEK 16K RAMBOARD for Atari	\$ 79
MICROTEK 32K	\$ 149
QUME SPRINT 9/45 (Full Panel)	\$2295
ATARI 400 16K	\$ 349
ATARI 825 PRINTER	\$ 650
ATARI 850 INTERFACE	\$ 139
ATARI 810 DISK DRIVE	\$ 449
ATARI 800	\$ 749

Call for price list of ATARI software

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

We carry the complete line of Personal Software

We Accept C.O.D.'s • Stock Shipments Same Day or Next
No Surcharge for Credit Cards • All Equipment Factory Fresh with MFT Warranty

WEST COAST
1-800-235-3581

OMEGA SALES CO.
3533 Old Conejo Rd. #102
Newbury Park, CA 91320
1-805-499-3678
CA. TOLL FREE 1-800-322-1873



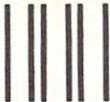
EAST COAST
1-800-556-7586

OMEGA SALES CO.
12 Meeting St.
Cumberland, RI 02864
1-401-722-1027

ΩMEGA SALES COMPANY

Advertiser's Index

Aardvark Technical Services	119
AB Computers	46,47,131
Abacus Software	43
Advanced Operating Systems	23
All Systems	27
Andromeda Incorporated	73
Atari, Inc.	5
Automated Simulations	87
Axon	100
BYTM Systems, Inc.	26
Basic Software Service	136
Batteries Included	131
Briley Software	142
Byte Books	45
C Mart	179
C. E. Software	99
CFI	151
CGRS Microtech	129
Canadian Micro Distributors, Ltd.	13,15,17
Cascade Computerware Co.	138
Commodore Business Machines	BC
Competitive Software	145
CompuSoft, Inc.	159
Computer Age Software	89
The Computer Bus	22
Computer House Division	109
Computer Magic Ltd.	105
Computer Mail Order	173
Computer Plus	178
ComputerMat	159
Computer's Voice	14
Connecticut microComputer, Inc.	141
Consumer Computers	181
Creative Software	32
Crystal Computer	63
Cursor, The Code Works	141
Cyberia, Inc.	65
Cybersoft	85
DataMax	147
Datasoft	25,69
Digibyte Systems Corp.	175
Disco-Tech	75
Dr. Daley's Software	53,143
Dynacomp, Inc.	34,35
Eastern House Software	57
Electronic Specialists, Inc.	43
ETC	137
Excert Incorporated	163
Execom Corp.	133
FSS	139
Falk-Baker Associates	167
Horizon Simulations	45
Howard Industries	51
Huntington Computing	60,61
HW Electronics	59
Image Works Software	99
Interlink, Inc.	147
Iridis, The Code Works	101
Jini Micro Systems	67,151
Krell Software	37
LAR Microtronix	151
LJK Enterprises, Inc.	95
Leading Edge	IBC
LemData Products	145
Lo-Ball Computers	176
Main Line Computer Discount	177
Manhattan Software	107
Matrix Software, Inc.	31
MED Systems	97
Micro Computer Industries, Ltd.	11
Micro Co-op	44
MicroCraft Systems, Inc.	53
Micro-Ed, Inc.	65
Micro Spec. Ltd.	26
Micro Technical Products	59
Micro Technology Unlimited	55
Microperipheral Corp.	97
Microsoft Consumer Products	2,21
Microtek Inc.	33
Monument Computer Service	77
Mountain Computer, Inc.	IFC
Mutontown Software	105
Mystic Software	151
Netronics	43
New England Electronics Co.	40,41
Olympic Sales Company	174
Omega Sales Co.	182,183
On-Line Systems	91
Optimal Technology	38
Optimized Systems Software	107
Osborne/McGraw Hill	71
Pacific Exchanges	43
Patterson Engineering	38
Percom Data Company, Inc.	19
PETTED Microsystems	147
Powersoft	76
Pretzelland Software	121
Professional Software, Inc.	1,9
Program Design, Inc.	88,107
The Program Store	49
Protronics	59
Quality Software	99
Qube International	148
RC Electronics Corp.	80
Renaissance Technology Corp.	57
RNB Enterprises	161
Santa Cruz Software	91
Seawell Microsystems	168
Sierra Pacific	166
Skyles Electric Works	127,158,172
Software Consultants	123
Software Street	111
Spectrum Computers	113
Spima Computer	135
Swifty Software, Inc.	105
T'Aide Software Company	144
T.H.E.S.I.S.	100
TIS	26
TNW Corporation	148
Unicomm Marketing	176
United Microware Industries, Inc.	29
United Software of America	6,7
Versa Computing, Inc.	103
Virginia Micro Systems	144
Voicetek	39
Warren's Computer Systems	176



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 236 BROOMALL, PA

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE! Magazine
515 Abbott Drive
Broomall, PA 19008

Place
Stamp
Here



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 236 BROOMALL, PA

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE! Magazine
515 Abbott Drive
Broomall, PA 19008

Free NEECO Computer Equipment And Peripherals Catalog

NEECO features **COMMODORE • ATARI • APPLE • HEWLETT PACKARD • ALTOS • INTERTEC DATA SUPERBRAIN • NEC MICROCOMPUTER SYSTEMS • TELEVIDEO SYSTEMS • DIABLO • NEC SPINWRITER • and EPSON •**

YES, please send me a FREE NEECO catalog of computer equipment / peripherals and add my name to your mailing list.

I Own / Utilize _____ Computer Equipment.

NAME _____
(Please Print)

COMPANY NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

The 6502 Resource Magazine
COMPUTE! PET•ATARI•APPLE
OSI•KIM•SYM•AIM

My computer is:

- PET APPLE ATARI OSI
 KIM SYM AIM OTHER
 Don't yet have one...

For Fastest Service,
Call Our **Toll-Free**
US Order Line

800-345-8112

In Pennsylvania call 800-662-2444

Please enter my 1 year (12 issue) subscription to **COMPUTE!**

New subscription Renewal subscription

\$20.00 US subscription

\$25.00 Canada and international surface mail: Payment in US funds, drawn
on US bank or money order

Bill me (US only) \$1.00 billing fee

Name, Address: _____

Charge my: Visa MC

Number _____

Expires _____ / _____

10 11 12

Place
Stamp
Here

To:

**FREE NEECO
CATALOG!**

PLACE
STAMP
HERE



NEECO

NEW ENGLAND ELECTRONICS CO., INC.

679 Highland Avenue

Needham, MA 02194



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 236 BROOMALL, PA

POSTAGE WILL BE PAID BY ADDRESSEE

COMPUTE! Magazine

515 Abbott Drive
Broomall, PA 19008

Author Feedback:

COMPUTE!

"WORDSWORTH, TAKE A LETTER!"^{T.M.}



**THE FIRST SUPER-SIMPLE LETTER QUALITY WORD PROCESSOR IN
THE WORLD THAT CAN SIT NEXT TO YOUR SECRETARY—
FOR LESS THAN \$5,000.**

"Wordsworth™" removes the fear and loathing many people have about things called "computers" and "word processing." Because Wordsworth just sits at a desk and does what he's told. With unique new, simplified software, it can tell its typist what to do—step by simple step—to perform even the most complicated tasks.

It can not only "take a letter," but it can revise it, customize it in millions of ways (quite literally), personalize it, print it on your letterhead or business form so you can't tell it from hand-typed . . . in short, everything but put it in an envelope.

Moreover, it can perform all sorts of mundane business functions,

like general ledgers and accounting reports, using easily available industry-compatible CP/M™ software.

Installation? Plug it in. (Cable supplied.)

Size? Bigger than a breadbox—but not by much. It's about half as big, or less, than systems that can't do half as much. Definitely desktop—a sub-compact 20" by 40".

Service? Available everywhere.

Price? About \$4,995. Complete and ready to go.

For the name of your nearest dealer—and a free hands-on demonstration—just pick up the nearest telephone.

TOLL-FREE 1-800-343-6833.

In Massachusetts, call collect (617) 828-8150. Telex 951-624.

LEADING EDGE™

Leading Edge Products, Inc., 225 Turnpike Street, Canton, Massachusetts 02021
DEALERS: For immediate delivery from the Leading Edge Inventory Bank™ on "Wordsworth" and other of the industry's most popular products, just give us a call.

Commodore Software Encyclopedia

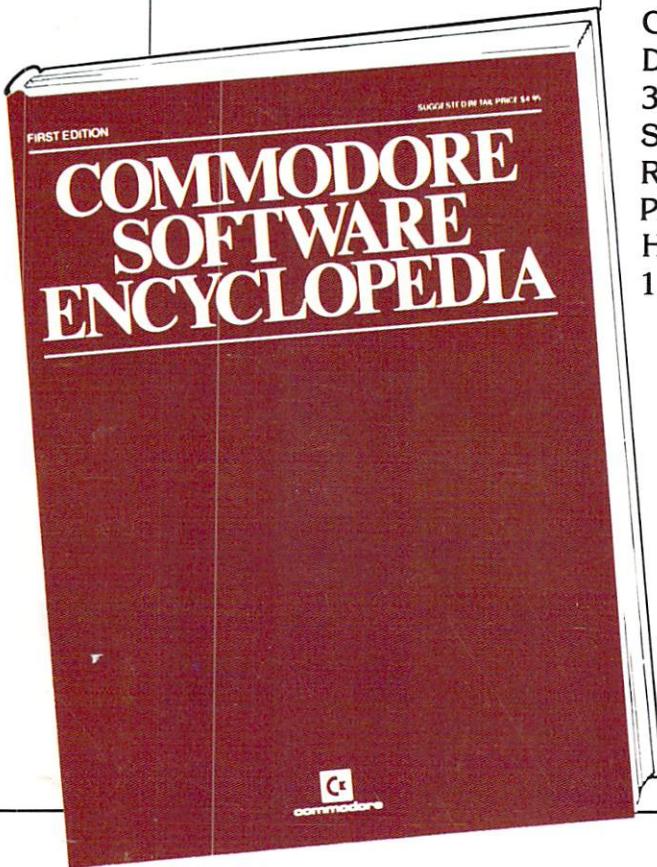
The COMMODORE SOFTWARE ENCYCLOPEDIA is now available from your authorized COMMODORE Dealer, for . . .

\$4 95

The next edition of the COMMODORE SOFTWARE ENCYCLOPEDIA will be available in 90 to 120 days. If your software is

not listed and you would like to have it listed in the next edition, please submit details to:

Software Department
Commodore Business
Machines, Inc.
Computer Systems
Division
300 Valley Forge
Square, 681 Moore
Road, King of Prussia,
PA 19406.
HOTLINE Number
1-800-523-5622



c commodore