

TWO NEW PERSONAL COMPUTERS FOR LESS THAN \$200.00

COMPUTE!

\$2.50
March,
1982
Issue 22
Vol. 4, No. 3
63379

The Journal For Progressive Computing™

**An Energy Workbook
Program For Home
Or Business**

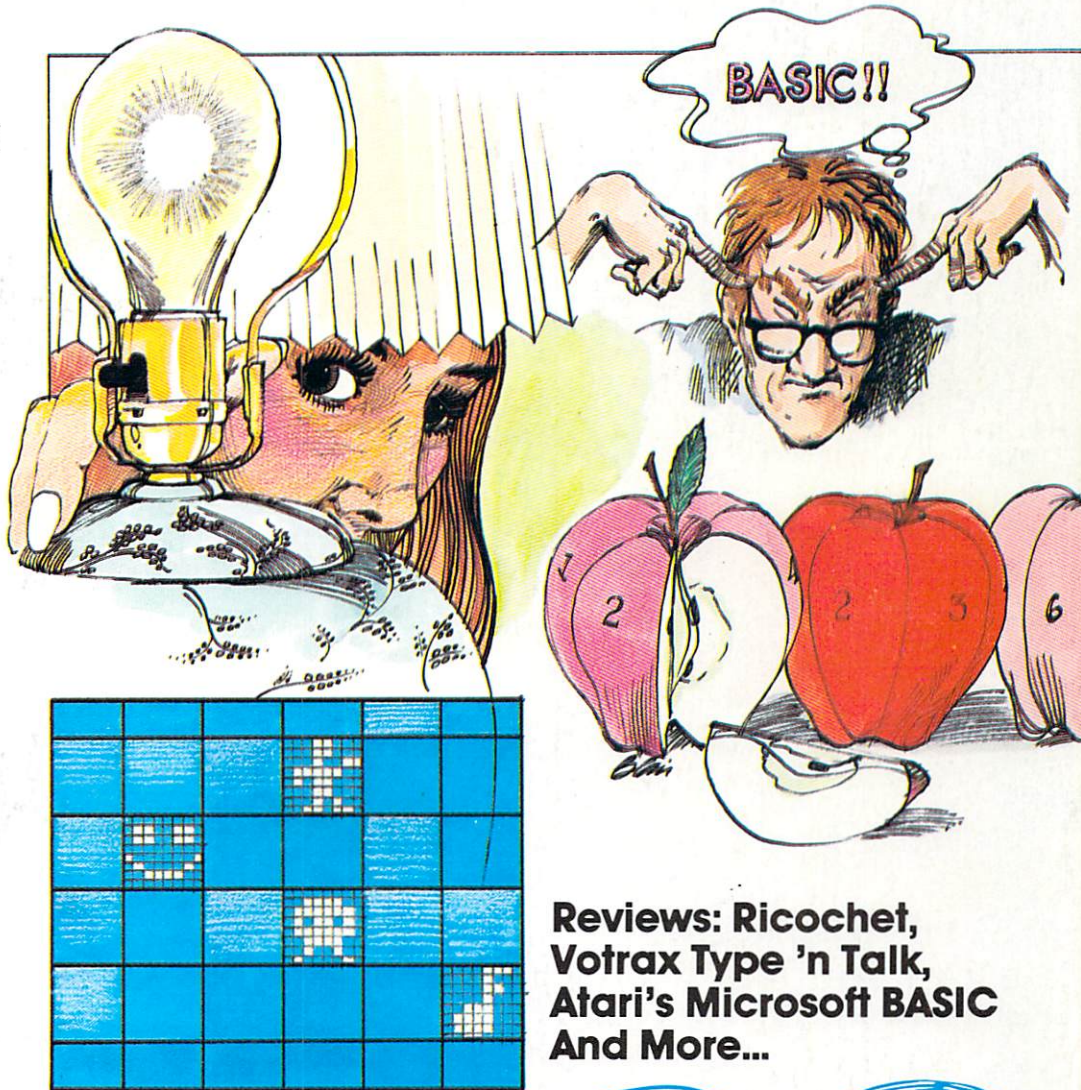
**Two Programs To
Help You Learn
BASIC Programming**

**Organizing APPLE
Data Storage**

**A Game Of
Concentration
For ATARI**

**Disk Drive Check-
Out For PET/CBM**

**Starfight 3
For VIC-20**



**Reviews: Ricochet,
Votrax Type 'n Talk,
Atari's Microsoft BASIC
And More...**

**READY TO USE
BASIC PROGRAMS
For Home, Education
and Recreation**



This is all you really need!

An Apple II®, a printer, a video screen, a modem, a disk drive,
CPS Multifunction, and RAMPLUS+.

The CPS Multifunction card and cables are all you need to connect almost any printer, modem, or terminal to your Apple II®. It's really three cards in one. It provides the capabilities of a serial interface, parallel output interface, and real-time clock/calendar. It saves you money, power, and slots. The CPS Multifunction is compatible with DOS, CPM, PASCAL, and BASIC. Suggested retail price \$239, including software. Cables \$24.95 each.

The RAMPLUS+ card allows you to expand the available memory of your Apple II® to 80K. RAMPLUS+ has two 16K banks of RAM. The card is supplied with 16K of installed RAM, with an additional 16K of plug-in RAM available. It is compatible with DOS, CPM, PASCAL, and BASIC, also. Suggested retail price \$189. Additional 16K RAM \$24.95.



Mountain Computer
INCORPORATED

300 El Pueblo, Scotts Valley, CA 95066
TWX: 910 598-4504 (409)438-6650



The modem is a product of Hayes Microcomputer Products, Inc. The video screen is a product of NEC. The printer is a product of Epson America. The Apple II® is a product of Apple Computer, Inc. The disk drive is a product of Apple Computer, Inc.

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

CMS Software General Accounting

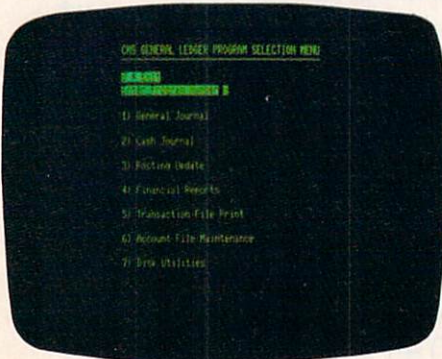
For the Commodore 8000



Now there is an interactive General Accounting System designed especially for the first time user. The user is led through each function by highlighted prompts explain-

ing the required input at each point. And all input requests are prompted with complete verification. Plus, a step-by-step instruction manual guides the user through the

program. The user prompts and the detailed manual make it virtually impossible for the first time user to get lost or to accidentally crash.



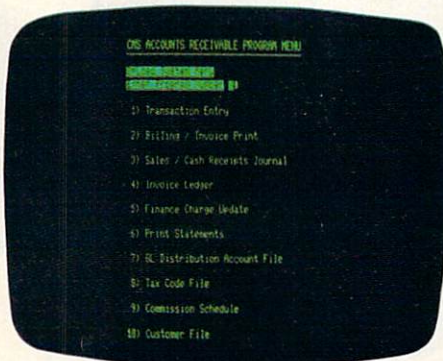
General Ledger

Cash Disbursements and Cash Receipts Journal as well as a General Journal. Maintains account balances for Present Month, Quarter to Date and Year to Date. Accepts postings from

Accounts Receivable, Accounts Payable, Payroll and other programs. Also provides user customized financial statements. Up to 1000 accounts and up to 99 departments.

re Systems nting System II

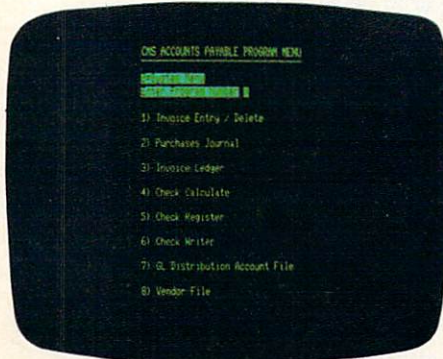
Series Computer System



Accounts Receivable

Invoices and Monthly Statements as well as Credit and Debit Memos. Accomodates full or partial payments. User sets finance charge rate and period. User also sets invoice aging reports and aging breaks. Invoices may be distributed among nine different General Ledger accounts with

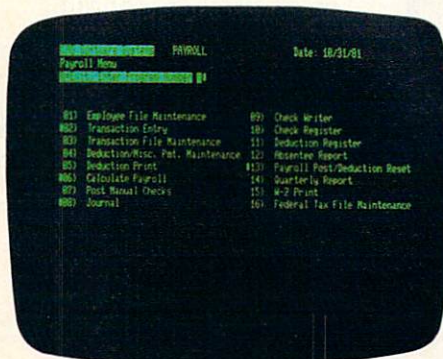
automatic updating to the General Ledger. During invoice data entry the invoice is displayed on the screen and typed exactly as if in a typewriter. File capacity allows 1800 customers and invoices. Five hundred customers allows room for 1300 invoices.



Accounts Payable

Accounts Payable checks with full voucher detail. Detailed check register. Automatic application of Credit Memos. User sets invoice aging reports and aging breaks. Invoices may be dis-

tributed among nine different General Ledger accounts with automatic updating to the General Ledger. File capacity allows 2500 vendors and invoices.



Payroll

Payroll checks with full deductions and pay detail. Pays regular, overtime, holiday and piece work hours. Accommodates Weekly, Bi-Weekly, Semi-Monthly and Monthly employees. Up to eight miscellaneous deductions or payments per

employee. Prints Payroll Journal, Payroll Check Register and an Absentee Report as well as 941 information and W2 forms. Maintains Monthly, Quarterly and Yearly totals for up to 350 employees. Automatic General Ledger updating.

See your nearest
Commodore dealer for
a demonstration.

CMS Software Systems

2204 Camp David Mesquite, TX. 75149 214 285-3581



TASC.™ The Applesoft* Compiler. It turns your Apple into a power tool.*

Step up to speed. TASC, the Applesoft Compiler, converts a standard Applesoft BASIC program into super-fast machine code. By increasing program execution speed up to 20 times, Microsoft gives you a power tool for Applesoft BASIC programming.

Highest capacity available.

TASC will compile and run larger programs than any other Applesoft Compiler. As a disk-based system, it doesn't require the simultaneous presence of compiler and program in memory. The memory you save allows you to compile significantly bigger programs.

Power without bulk. Code expansion of up to 100% severely restricts other compilers. TASC's special code compression schemes typically limit code expansion to only 25%. You'll really appreciate that with complex programs or programs that utilize Apple's hi-res graphic pages.

More BASIC power. TASC's powerful new commands increase Applesoft BASIC programming capability. Chain with COMMON allows compiled programs to share variables, so a main menu

*Applesoft is a trademark of Apple Computer, Inc.



supports several programs in a single runtime environment.

TASC's True Integer Arithmetic and Integer FOR...NEXT capabilities maximize the execution speed of compiled programs.

TASC's near total compatibility with Applesoft speeds compilation of existing programs with little or no modification.

What about mistakes? You perfect your programs interactively with Applesoft. If something does slip by, TASC recovers

from errors discovered in compilation and traps all runtime errors. It even permits graceful interruptions during compilation.

See for yourself. Ask for a demonstration of TASC at your Microsoft dealer. Discover the software package that turns your Apple into a power tool.

MICROSOFT

CONSUMER PRODUCTS

A Division of Microsoft Inc.
10700 Northup Way • Bellevue, WA 98004

Features

- The Winter Of Our Content:
A Report On The January
Consumer Electronics Show
..... David Thornburg, 26
- Twenty Questions Revisited
..... Elizabeth Deal, 38
- Energy Workbook David E. Pitts, 44
- Two Short Programs of
CAI For Teaching BASIC
..... R. Hiatt, 56
- Infinite Precision Multiply
..... G. H. Watson, 62
- More About Numbers
..... Edmund Ricchezza, 65
- Word Hunt
..... Robert W. Baker, 68
- Count The Hearts Christopher J. Flynn, 78

*Significant
New Computers
Unveiled*



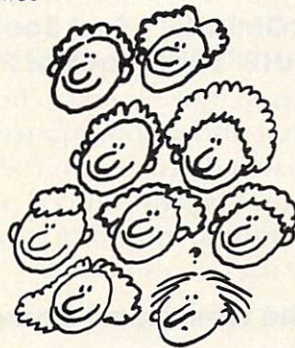
Columns/Departments

- The Editor's Notes Robert Lock, 6
- Ask The Readers
..... Robert Lock, Richard Mansfield, and Readers, 12
- Computers And Society David Thornburg, 16
- The Beginner's Page:
How Computers Remember
..... Richard Mansfield, 20
- Basically Useful BASIC: Tabulation
..... Paul Lilly, 30
- COMPUTE!'s Listing Conventions 43
- Learning With Computers:
Word Processing In The Classroom
..... Glenn Kleiman and Mary Humphrey, 96
- Friends Of The Turtle David Thornburg, 100
- Telecommunications:
MODEM Applications
..... Michael Day, 124
- Machine Language:
Loops and Quality
..... Jim Butterfield, 128
- Insight: Atari Bill Wilkinson, 130



Education And Recreation

- Family: A Simulation In Genetics
..... Andy Gamble, 88
- Large Alphabet For The VIC
..... Doug Ferguson, 104
- Concentration
..... Charles Brannon, 106
- Comment Your Catalog
..... Richard Cornelius, 110
- Starfight3
..... David R. Mizner, 112
- Swirl And Scribble
..... Matt Giwer, 115
- WEBS
..... Loran Gruman, 117



The Journal

- Disk Checkout For 2040, 4040, and 8050 Disks
..... Jim Butterfield, 139
- Organizing Data Storage John Hudson, 141
- Machine Language Sort Utility
..... Ronald and Lynn Marcuse, 144
- Dynamic Renumber R. D. Young, 152
- Disk Data Structures: An Interactive Tutorial
..... David Young, 156
- Apple Addresses Bill Grimm, 163
- More VIC Maps Jim Butterfield, 168
- EPROM Reliability Michael Day, 176
- Random Music Composition On The PET
..... Alfred J. Bruey, 182
- Ghost Programming Aric Wilmunder, 190
- BASIC 4.0 To Upgrade Conversion Kit
..... Elizabeth Deal, 194
- Screen Save Routine Joseph Trem, 201
- A Superboard II Monitor (Part I) Frank Cohen, 203

Reviews

- Votrax Type 'N Talk: TNT Charles Brannon, 118
- Olympia's ES 100 KRO Typewriter/Printer
..... Richard Mansfield, 119
- RPL: A FORTH Sequel? Jim Butterfield, 120
- Ricochet
..... Richard Mansfield, 121
- Atari Microsoft BASIC (Part I)
..... Jerry White, 122



- New Products 209**
- CAPUTE! Corrections And Amplifications 222**
- Advertisers Index 224**

Computer Guide To Articles And Programs By Page Number

- Apple** 6, 12, 16, 20, 26, 30, 38, 43, 44, 56, 62, 65, 68, 78, 96, 100, 110, 118, 119, 121, 124, 128, 141, 163, 176, 203
- Atari** 6, 12, 16, 20, 26, 30, 38, 43, 44, 56, 62, 65, 68, 78, 96, 100, 106, 115, 118, 119, 121, 122, 124, 128, 130, 144, 156, 176, 190, 201, 203
- PET/CBM** 6, 12, 16, 20, 26, 30, 38, 43, 44, 56, 62, 65, 68, 78, 88, 96, 100, 117, 118, 119, 120, 124, 128, 139, 152, 176, 182, 194, 203
- VIC-20** 6, 12, 16, 20, 26, 30, 38, 43, 44, 56, 62, 65, 68, 78, 96, 100, 104, 112, 118, 119, 124, 128, 176, 203
- Other Computers** 6, 12, 16, 20, 26, 30, 38, 43, 44, 56, 62, 65, 68, 78, 96, 100, 118, 119, 124, 128, 176, 203

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, 515 Abbott Drive, Broomall, PA 19008. Controlled circulation postage paid at Greensboro, NC 27403 and additional mailing offices. Entire contents copyright © 1982 by Small System Services, Inc. All Rights reserved. ISSN 0194-357X.

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



The Editor's notes ---

Robert C. Lock
Publisher/Editor

COMPUTE!'s New Format

As we indicated last issue, the format of the magazine has been revised to allow us greater flexibility in article placement. In the front sections of the magazine you'll find general interest articles, including applications programs and games that have been developed to run on numerous computers. More advanced material, both applications and programming support, will be found in the *Journal* section of the magazine,

Each column, article, program, etc. is keyed by page number in the Table of Contents to relevant microcomputers.

On The Importance Of Feedback

On our direct mail response cards at the end of this issue, you'll find a special Editor's Feedback card. Take a look at our new format for the magazine, and *please* take a few minutes to fill out and return the card.

We've tried to accomplish the changes as a constructive enhancement, and rely on your collective opinion as well. Let us know what you think.

Two New Personal Computers For Less Than \$200.00

The Winter Consumer Electronics show was impressive. Commodore was showing a startling array of VIC-20 software. Atari introduced some new twists as well. For full details on the show and the new computers, see David Thornburg's article in this issue.

Home Applications

Being firmly convinced that the myth of the utility of home computers is truly a myth, we've been excited by the range of useful software you've been sending in. With everything from our continuing series of Energy Conservation and Analysis programs by David Pitts, to Real

Estate Investment Analysis and sophisticated financial modeling, we've been proving by example that home computers are being used for education and applications as well as recreation. Keep your efforts coming.

COMPUTE! Books

Our Book Division is now off and rolling, with the release (finally) of our first two titles, **COMPUTE!'s First Book of ATARI®** and **COMPUTE!'s First Book of PET™/CBM™**. We have three more books scheduled for release in the first and second quarters of 1982. Having learned our lesson the first time around, these won't be announced until scheduled at our printers, but we're sure you'll find them equally useful resources.

The West Coast Computer Faire

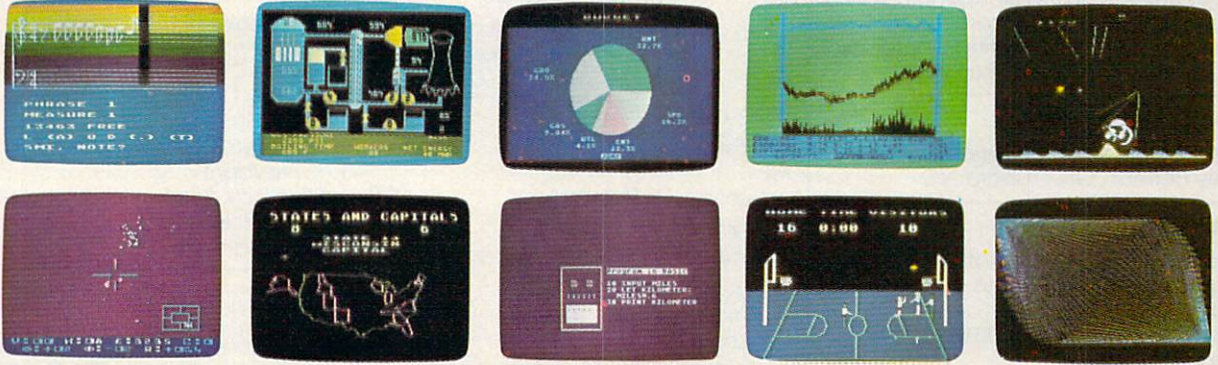
Once again we expect to see hundreds of you among the 30,000 to 40,000 attendees at the Sixth West Coast Computer Faire. Jim Warren's annual extravaganza is a looked-for meeting place for old and new friends. Stop by our booths, numbers 1543 and 1642, and say hello.

An Important Message To Our Retailers

As you've all noticed, we recently moved to a new billing system. By now, our scheduling and updating problems have been resolved. Your new invoices will be showing a message "Payments received after _____ are not reflected in this invoice." Interim shipments of back issues or **COMPUTE! Books** will be billed as shipped, and *also* reflected on your monthly statement-invoice.

THE GRAPHIC DIFFERENCE

BETWEEN ATARI® COMPUTERS AND ALL OTHERS.



3.7 million reasons why the ATARI Home Computer is something to see.

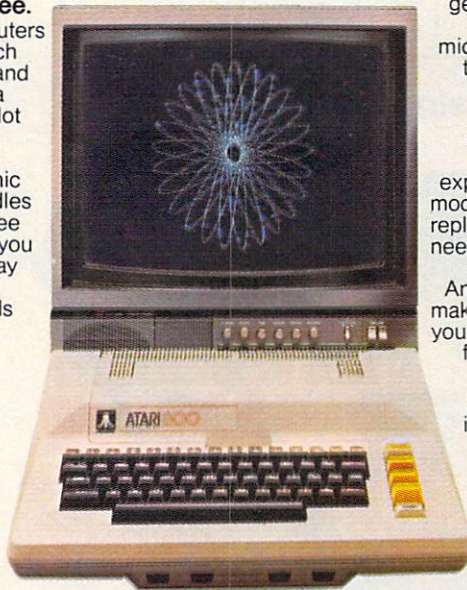
The display screen used with our computers is composed of 192 horizontal lines, each containing 320 dots. Delivering color and luminosity instructions to each dot for a second requires 3.7 million cycles... a lot of work for the normal 6502 processor.

That's why the ATARI computer has equipped its 6502 with its own electronic assistant. It's called ANTIC, and it handles all the display work, leaving the 6502 free to handle the rest. What this means to you is uncompromisingly spectacular display capabilities without loss of computer power needed to carry out the demands of your program.

That's a quality you just don't find in ordinary personal computers. And it's one of the reasons some computer experts say that ATARI computers are so far ahead of their time.

There's more... which is what you'd expect from ATARI.

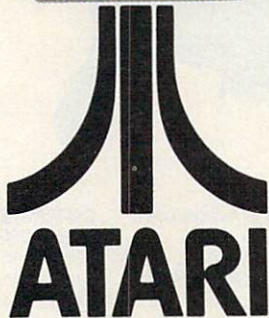
Language. The ATARI Personal Computer uses several programming languages to give the user maximum control of its extraordinary capabilities. PILOT, Microsoft BASIC,* and ATARI BASIC are understood and spoken by the ATARI computer. You'll also find our Assembler Editor cartridge indispensable for machine language programming.



Sound. An ATARI computer has four sound generators, or voices, activated by a separate microchip. This leaves the principal microprocessor chips free to perform other tasks. And you can take full advantage of this capability which is designed for easy programming.

Change. ATARI Home Computers have been designed to make change and expansion easy. The ATARI computer has a modular operating system* that can be easily replaced as new technology develops. If you need it, memory expansion requires no more than inserting additional RAM modules.* And the ATARI ROM cartridge system also makes it easy to change languages. In short, your ATARI computer won't be obsolete by future developments... *because it already incorporates the future.*

Sharing. To learn more about the amazing capabilities of ATARI computers, visit your local computer store for a demonstration. Or send for our Technical User's Notes, intended for the serious programmer. They are only \$27 and contain a lot more information about our computers' special capabilities than most companies could tell. See your ATARI dealer, or send \$30 (\$27 plus \$3 postage and handling), payable to ATARI, to Technical User's Notes, c/o ATARI Customer Service, 1340 Bordeaux Avenue, Sunnyvale, CA 94086.



*ATARI 800™ computer only.

Staff of COMPUTE!

Robert C. Lock, Publisher/Editor
 Kathleen Martinek, Managing Editor
 Richard Mansfield, Assistant Editor
 Alice S. Wolfe, Publisher's Assistant
 Georgia Papadopoulos, Art Director/
 Production Manager
 Harry Blair, Advertising Sales Manager
 Terry Cash, Typesetting/Production
 Assistant
 Margret Jackson, Typesetting
 De Potter, Production Assistant
 Dai Rees, Production Assistant
 Kate Taylor, Production Assistant
 Charles Brannon, Editorial Assistant
 Sonja Whitesell, Dealer Coordinator
 Bonnie Valentino, Accounting Coordinator
 Fran Lyons, Circulation Coordinator

Associate Editors

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

Contributing Editors

Marvin DeJong, Dept. of Mathematics
 -Physics, The School of the Ozarks
 Pt. Lookout, MO 65726
 David Thronburg, 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

Subscription Information

COMPUTE! Circulation Dept.
515 Abbott Drive
Broomall, PA 19008 USA

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

COMPUTE! Subscription Rates
(12 Issue Year):

US	(one yr.) \$20
	(two yrs.) \$36
	(three yrs.) \$54
Canada and Foreign Surface Mail	\$25
Air	
Europe, US Possessions	\$38
Middle East, Central America and North Africa	\$48
South America, South Africa, Far East and Australia	\$88

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

Small System Services, Inc.
 publishes:

COMPUTE!
 The Journal For Progressive Computing

COMPUTE! Books**Corporate office:**

625 Fulton Street,
 Greensboro, NC 27403 USA

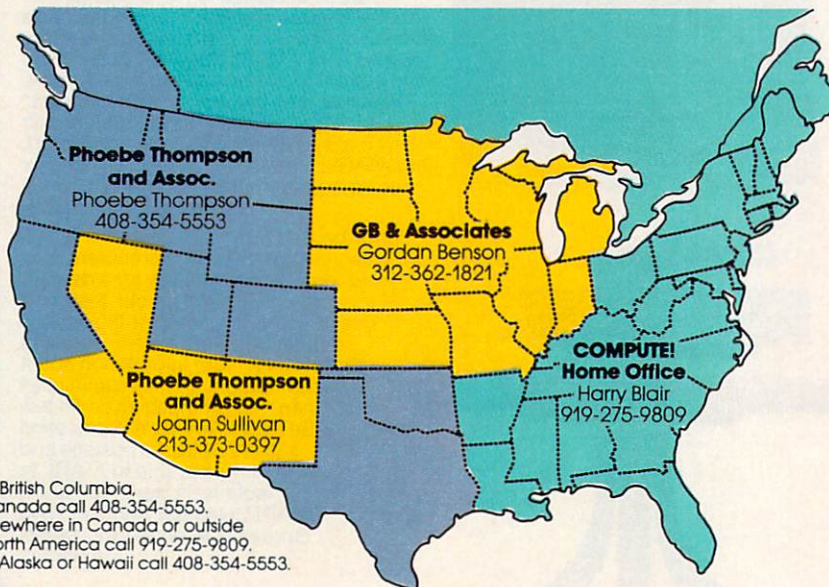
Mailing address: COMPUTE!

Post Office Box 5406
 Greensboro, NC 27403 USA

Telephone: 919-275-9809

Robert C. Lock, President
 W. Jerry Day, Vice-President,
 Comptroller
 Kathleen Martinek, Assistant To The
 President
 Ellen Day, Accounting Manager
 Carol Holmquist Lock, Research
 Assistant

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 © 1982, Small System Services, Inc. Rights to programs developed and submitted by authors are explained in our author contract. Unsolicited materials not accepted for publication in COMPUTE! will be returned if author provides a self-addressed, stamped envelope. 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**Phoebe Thompson and Associates**

101 Church Street, Suite 13
 Los Gatos, CA 95030
 PHOEBE THOMPSON

Phoebe Thompson and Associates

P.O. Box 700-462
 Redondo Beach, CA 90277
 JOANN SULLIVAN

GB & Associates

P.O. Box 335
 Libertyville, IL 60048
 GORDON BENSON

COMPUTE! Home Office

625 Fulton Street
 Greensboro, NC 27403
 HARRY BLAIR

Address all advertising materials to: Alice S. Wolfe/Advertising Production Coordinator. **COMPUTE!** Magazine.
 625 Fulton Street, Greensboro, NC 27403 USA.

Coming In The April Issue Of COMPUTE!:

Tracking Down Memory Bugs

Shooting Stars Game

User Defined Functions: Defined for PET/CBM

Using Textplot For Animated Atari Games

A VIC-20 Terminal Program

Customizing Apple's Copy Program



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.

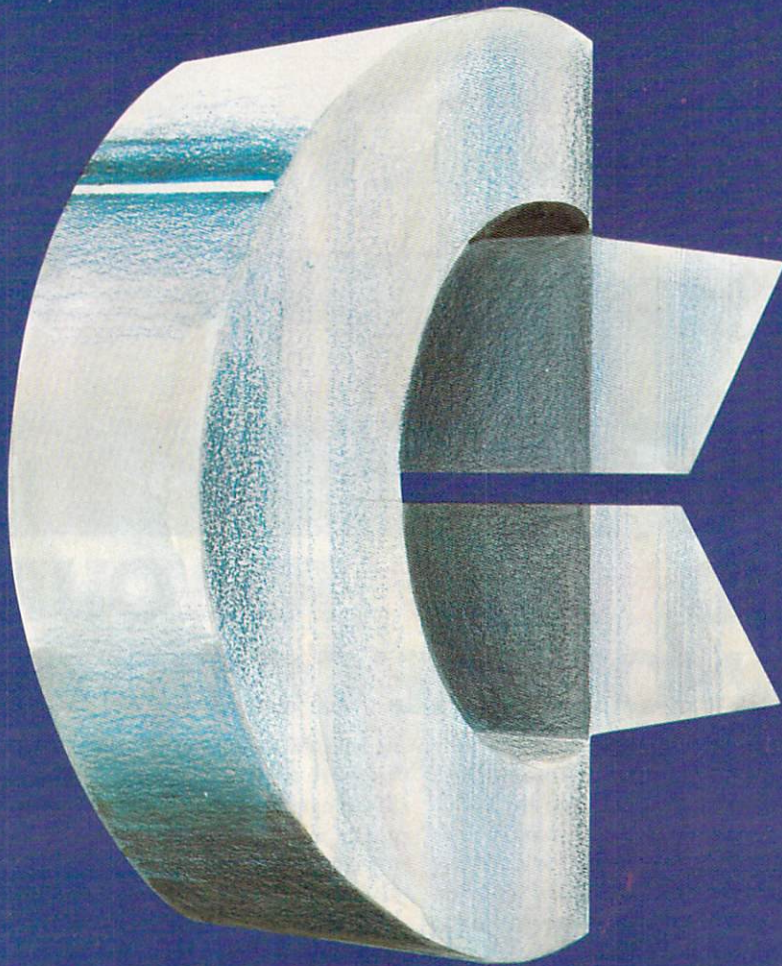
Professional Software Inc.

166 Crescent Road
Needham, MA 02194

Tel: (617) 444-5224 Telex #951579

\$12.95

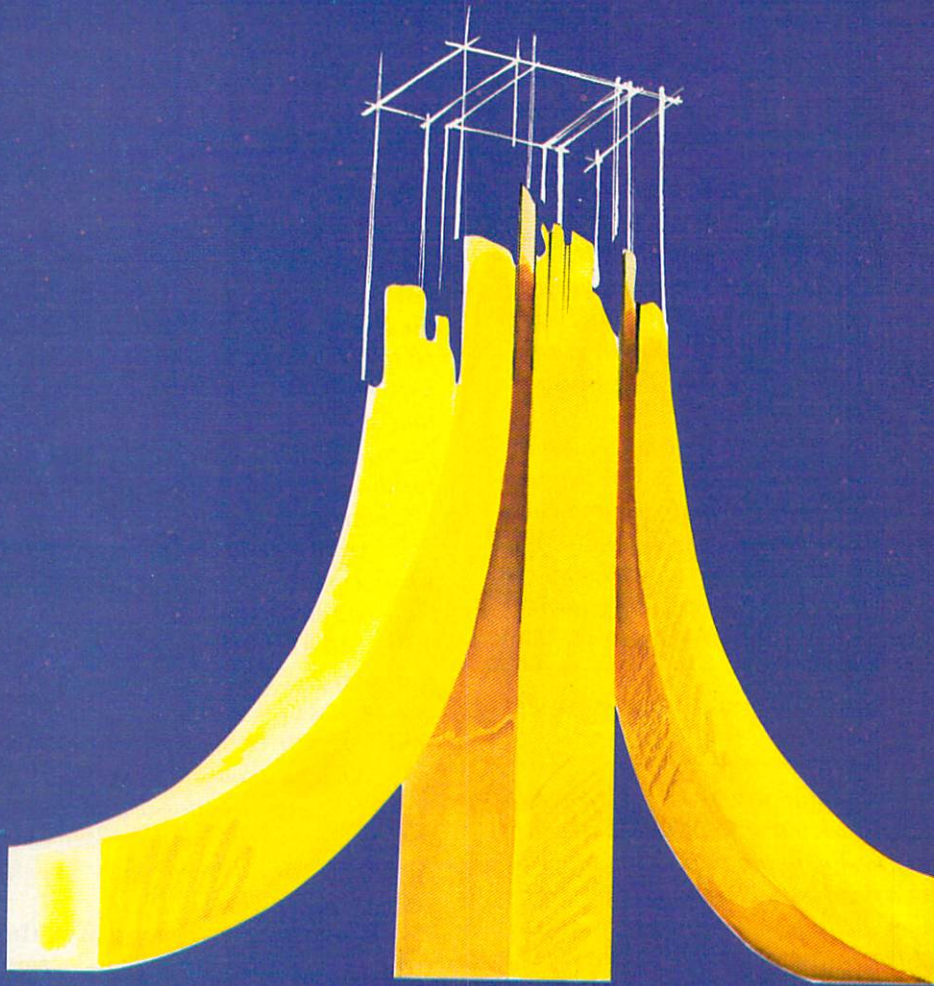
**COMPUTE!'s
FIRST BOOK
OF
PET/CBM™**



**Available Now
At Your Computer Retailer**

\$12.95

COMPUTE!'s FIRST BOOK OF ATARI[®]



Only \$12.95 plus \$2.00 shipping and handling. *Direct orders in the US call TOLL FREE 800-345-8112. In Pennsylvania call 800-662-2444. MasterCard, VISA, check or money order payable in US dollars accepted. Send to **COMPUTE! Books**, 515 Abbott Drive, Broomall, PA 19008 USA.

*Outside US add \$4.00 airmail, \$2.00 surface mail. NC residents add 4% sales tax.

Atari is a registered trademark of Atari, Inc. PET and CBM are trademarks of Commodore Business Machines, Inc.

Ask The Readers

Robert Lock, Richard Mansfield,
And Readers

If you have any questions (or answers to the questions printed below) please write to: Ask The Readers, **COMPUTE!** Magazine, P.O. Box 5406, Greensboro, NC 27403.

Answers

On page 10 of **COMPUTE!** #19, a reader asked about, and you commented on, COM as an Atari BASIC keyword.

I very recently bought an Atari and as yet have not delved extensively into the programming aspects of it since most of the time it has Missile Command in the left slot, but, in other computer systems I have used with either interpreter or compiler BASIC, COM or COMMON defines common variables, either string or numeric, for programs which are to be chained instead of POKEing the information into protected memory by one program, then PEEKing it out by a subsequent one. This is usually accomplished under DOS control.

A question that I have, and perhaps another reader can answer, is how I could build an interface or two to use the Radio Shack (Tandon 40 track) drives and Centronics 737 parallel printer I have for my TRS-80 Model I with the Atari serial port. I realize this identifies me as a "Hardware Nut," but for personal satisfaction, I would rather build, than buy, an interface. William E. Allen

Our thanks to the others who sent in responses to this question.

*I am writing in response to columnist Zumchak's comments in the "Ask The Readers" section of **COMPUTE!** #16.*

The question of a next generation 6502 microprocessor is certainly not a dead issue. However, this is a market-driven decision. Synertek would readily undertake the development and marketing of a sequel to the 6502 if there were reasonable expectations that this would be justified by adequate business in the new part.

As to the SYM board, the SYM-2 version is laid out to accept the 6502, 6800, or 6809. There is also a plug-in module for the SYM-1 to adapt it to those processors. These new products were introduced to widen the market for the SYM, not as a move away from the 6502.

Synertek is continuing to support the 6502, as we

have in the past. New peripheral products are being designed to work with the 6502. We believe that the 6502 is one of the best 8-bit processors available. Although many applications use 1MHz parts, the 6502 is available in versions that run with clocks of 2, 3, and 4 MHz.

Dr. Michael Smolin
Director, Strategic Planning
Synertek Inc.

*In his excellent article Machine Language: What's Your Sign? (**COMPUTE!** #17), Jim Butterfield discusses how the Overflow (V) flag will be set if the addition or subtraction of two signed numbers causes a "sign switch."*

A rarely publicized fact is that a sign switch, or overflow, can only occur if you are adding two numbers that have the same sign (both positive or both negative) or subtracting two numbers that have opposite signs. Moreover, because a sign switch indicates that the result exceeds the legal limits of a signed number, -128 or +127, V=1 always constitutes an error condition...

One further point of interest is that CMP, unlike SBC, does not affect the contents of the Accumulator. This allows you to compare N1 to some other number (N3) immediately, without another LDA N1 instruction.

Leo J. Scanlon

For several years I have been dealing with the CRASH of the INPUT statement on our 2001 and 4016 COMMODORE Computers when the RETURN key is depressed with no input! I have read of several fairly short routines that overcome this problem and have developed my own favorite, as have most users (Our students develop software for the Elementary School - kids, and their teachers, will crash programs).

Anyway - this evening, quite by accident, I stumbled upon a quick way to protect the RETURN key on INPUT! At least I have never heard of it. [Lines 70, 80, 160, 170, and 180 will do.] If you type in the enclosed program and RUN same, you will notice that the INPUT at line 70 (numeric) and line 160 (string) are protected under input/return (and, of course RUN/STOP)!!

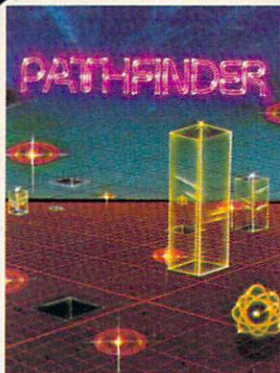
When you look at the listing, I'm sure your reaction will be the same as mine was when I looked at the listing and said to myself and all within earshot, "What's going on here? I tried this years ago! It didn't work then, so why is it WORKING now???"

The key lies in the length of the input prompt - exactly 38 characters. This configuration puts the INPUT question mark at the end of the input line and the cursor all by itself on the left of the next line. Bingo - RETURN = null. The conditional picks up the pieces and we're in business.

John Taylor

To answer John Fry's question [in **COMPUTE!** #18]:

NASIR GEBELLI PRESENTS:



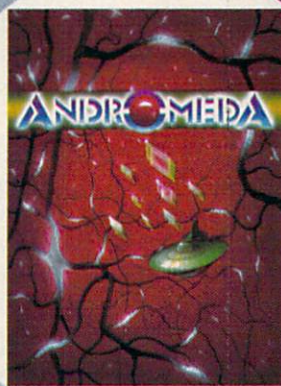
PATHFINDER

Never before released, a super arcade-adventure game for Atari... alone in a vast transparent maze inhabited by radioactive monsters and nuclear waste, you must blast the waste and free the maze of mutant monsters. By Solitaire Group, requires 24K Atari with disk drive.



MATCH RACER

Brand new for the Atari, this one or two player game tests your driving skills on a race track filled with treacherous obstacles. See how far you can get before your luck and skill run out! By Solitaire Group, requires 16K Atari with disk drive.



ANDROMEDA

Introducing a spectacular, original arcade-adventure for the Atari... a battle in inner space... you must invade a living organism and destroy its tissues before its antibodies destroy you. By Solitaire Group, requires 16K Atari with disk drive.

HOLLYWOOD

SOFTWARE INC.
GEBELLI

Gebelli Software Inc.,
1771 Tribute Rd., Suite A, Sacramento, CA 95815

sequential data files: you have two problems.

Statement in line 40 is wrong. It should read 40 DISK CLOSE,6 not 40 DISK CLOSE,6,A\$.

Also, don't forget to run change program to shift BASIC work space to allow for your 1 buffer (step 3 on page 24 in my system's manual).

OSI puts the buffers used for device 6 and 7 before the BASIC program. If you don't run change to tell BASIC to allow for these, it will start in this area for program storage. So your first print #6, A starts writing over your program and, thus, garbage on LIST.

Alex J. Kowalski, Jr.

I am writing with a few odds and ends, corrections/modifications to a couple of programs, and a question that "Ask the Readers" may be able to answer.

To begin with, users of "Keyword" as revised in **COMPUTE!** #17 may have advised you by now that this very nice utility crashes when used with Upgrade (3.0 BASIC) ROMs. I found that the following line fixed the problem:

```
215 POKE BASE + 8,46:POKE BASE + 12,230
```

While on the subject of "Keyword," it may be worth mentioning to all that this and any program that alters the interrupt vector must be turned off prior to initiating tape SAVES or LOADS. I also found that "Keyword" should be turned OFF prior to running a BASIC program to avoid printing a collection of keywords where graphics or lower case should be printed. Perhaps someone can explain this problem.

I am using an Original ROM PET with Upgrade ROMs installed. The Upgrade ROM Monitor, available all the time, is great. I have found at least one anomaly with this Monitor, however: it refuses to accept program names that are more than 15 characters long. Perhaps occasionally, an "End-of-Tape" header is recorded at the end of a machine language program SAVE using the Monitor. Are there any explanations for this out there?

Lastly, I finally got to try the program "Basic Math for Fun and Profit" from **COMPUTE!** #9. It's a great program! I did make one significant change to it, however:

```
922 IFZ$(T) = CHR$(13) THEN Z$(T) = STR$(0):I = 9
923 PRINT Z$(T); " ";
924 Y$ = Z$(9) + Z$(8) + Z$(7) + Z$(6) + Z$(5) + Z$(4) +
      Z$(3) + Z$(2) + Z$(1):W = VAL(Y$)
925 NEXT:GOTO 357
```

(Changes at lines 922 and 925.)

R. D. Young

I would like to share some lessons learned about the VIC 20. In obtaining a TV for use with the VIC 20 I learned several items I thought would be of interest to all VIC 20 owners. Zenith TV's models L, M, N, can have a jump in the picture because of the difference in the sync rate between the VIC 20 and the TV's. This jump can be taken out by your service man by having him connect the jumper (sometimes called non standard vertical or cable standard

jumper) on the vertical output board. If your TV has a crystal controlled tuner and there is no fine tuning, you can adjust your modulator with the adjustment screw closest to the input end so you can get color on both channels 3 and 4 on the TV.

If you are having wavy lines on your TV you could be picking up RF interference signals on the wires from the TV computer switch box. If your TV has cable input capability, use of coaxial cable from the modulator to the input for cable can eliminate this interference. If your picture is not the right spot on the TV POKE 1 through 14 into 36864 will move it right and left, and 0 through 125 into 36865 will move it up and down.

Want to use your "f" keys? You can if you GET A\$ and use the ASC(A\$) to create a value 133 for f1 to 140 for f8. This CHR\$ value can then be used in the program. Jim Turrentine

Questions

I want to thank you and Dub Scroggin for the fine game program in the January 82 issue for the VIC 20. Instead of using the keyboard, I made a change in "ZAP!!" to use a joystick and it works great.

I have a problem with my recorder. I have to turn it upside down to load a program. I have taken the back off, but can't find anything loose. If I try a load it finds a program then doesn't load and prints "out of memory" or loads a scrambled up program. Any ideas? Don Dudley

The school at which I teach has just purchased the VIC 20. Software is scarce at the moment. Could you suggest or indicate programs of an educational nature that I might use in an elementary school setting?

I'm really keen on getting a good start with the VIC 20 in my school. Michael Moher

Hallo there in USA!

I've opened an Atari User Club here in West Germany. I would appreciate it if you could send me the addresses of Atari Programmers. Here in Germany you can only buy some games like Star Raiders and some more, but they are few. My Club wants to make it possible for the members to buy programs from the USA.

Also, could you send me the addresses of Atari User Clubs there in the USA?

I hope you can help me.
Knut Hermann

Merscheider Strasse 130
5650 Solingen-Merscheid
Germany

©

COMPUTE! The Resource.

ATARI OWNERS, WE'VE OPENED UP A WHOLE NEW WORLD FOR YOU.

At SSI, we established our reputation in quality computer games by producing some of the finest strategy simulations for the Apple® and TRS-80®.

Well, Atari owners, this is your lucky day. Because we've just introduced our first game for the Atari® 800 computer: **THE SHATTERED ALLIANCE.**

With it, we've opened up for you SSI's world of fun and excitement in a big way — by literally creating an entire planet called *Osgorth* to serve as your personal playground!

OSGORTH! It is a wonder world of fantasy and adventure populated with creatures as varied as they are enchanted: dwarves, unicorns, Valkyries, centaurs, lizardmen and zorgs (whatever they are!)... just to name a few. They are preassembled into different armies, categorized into five classes of infantry and three of cavalry. They are meticulously rated for armor, speed, strength, and morale. Their weapons may be the bow, javelin, spears, pikes, cavalry lance, swords, axes, clubs, and rocks. They can even call on magic spells to enhance their speed, attacking or defensive power, or courage.

THE SHATTERED ALLIANCE is



Atari is a registered trademark of Atari, Inc.

STRATEGIC SIMULATIONS INC

As part of our demanding standards of excellence, we use MAXELL floppy discs.

WE'RE LOOKING FOR A FEW GOOD DESIGNERS. We're always on the lookout for high-quality games from independent designers. If you have game programs that you'd like SSI to publish, give us a call at (415) 964-1353 or write to SSI, 465 Fairchild Drive, Suite 108, Mountain View, CA 94043.

Apple is a registered trademark of Apple Computer Inc.

TRS-80 is a registered trademark of the Tandy Corporation.

much more than a sophisticated strategy game. It is a rich tale of magic, rivalry among realms, and war among exotic beings. Best of all, these fantasy soldiers are yours to command as you roam Osgorth in search of glory and conquest.

As an added bonus for the Ancient-battles enthusiasts, we have included scenarios such as *Carthage vs. Alexander the Great*.

THE COMPUTER PROGRAM

is a veritable wizard. With color Hi-Res graphics, it paints a beautiful Osgorthian landscape that is your battleground.

It keeps track of all details so you can concentrate solely on strategy planning while its *Rapidfire* movement system makes for smooth and fast action. It even provides a powerful and intelligent computer opponent for solitaire play.

All you need to play this game is a 48K Atari 800 with mini floppy disc drive. For only \$39.95, you can own this fantastic piece of real estate. So hurry on down to your local game/computer store and get **THE SHATTERED ALLIANCE** today!

To order with your VISA or MC, call toll free 800-227-1617, ext. 335 (800-772-3545, ext. 335 in California). To order by mail, send your check to Strategic Simulations Inc, 465 Fairchild Drive, Suite 108, Mountain View, CA 94043. All our games carry a 14-day money back guarantee.

Also available for 48K Apple II with ROM for \$59.95.

Computers And Society

David D. Thornburg
Innovision
Los Altos, CA 94022

Artists have always been among the first to explore new technologies. Many times this exploration begins before the technology leaves the laboratory. For example, long before the laser found its way into supermarket check stand scanners, it was being used as an expressive medium by artists like Robert Whitman who received major technical assistance from Bell Laboratories and the optical scientist Eric Rawson.

The collaboration between artist and technologist requires extraordinary sensitivity on the part of both people. Historically, this collaboration has also required that the artist have access to a large university or industrial research laboratory where the needed technical resources could be found.

The innovative use of movie cameras in the 1940's benefited as much from technological collaboration as does the use of computers by artists today. Whenever a new technology offers an expressive medium to the artist, some technologists are more than happy to lend their assistance when needed. But one must wonder if the need for collaboration aids or inhibits the flow of creative ideas. Some artists are happy to work with others, and some are loners – preferring the solitude of an isolated studio to the constant interchange of ideas with co-workers.

One artist who has spent many years making innovative use of technology is John Whitney. Over the span of several decades, Whitney evolved the idea that the dynamic visual media (such as motion pictures, videodisks, and real-time computer animation) open the door to the creation of visual harmonies which are the counterparts of musical harmonies. His book, *Digital Harmony: On the Complementarity of Music and Visual Art* (Byte Books, 1980) expresses this philosophy in great detail. In it, Whitney traces his own development as an artist involved with technology.

In the late 1930's, he saw the motion picture

camera as a tool which would allow him to create visual images which somehow "looked" the way music sounded. During his early experiments he learned something very important. To suggest that a motion picture camera can contribute to a new visual art makes about as much sense as suggesting that a tape recorder can contribute to the art of music.

Music Into Visual Symmetries

In the computer, on the other hand, Whitney saw a new medium – a medium of creative expression in

**...we are on the threshold
of an era when isolated
artists will ... be able
to use the computer
with as much ease as...
pastels, oils, or clay.**

which his quest for the dynamic display of visual harmonic symmetries could be satisfied.

Thus began a period in which his images were created first on a cathode ray tube and then captured on film for others to see. This work benefited from collaboration with technologists. For example, Larry Cuba assisted in the making of Whitney's film *Arabesque*. (Cuba's software talents in computer animation have probably been seen by many **COMPUTE!** readers – he created the Death Star animation sequence in *Star Wars*.)

Arabesque is occasionally shown on public television, and is a film worth seeing. Each time I have seen it I am once again impressed with its fluidity of geometric form. Not surprisingly, Whitney devotes a chapter of his book to this film.

Books of this sort are inspiring to artists and non-artists alike. It is exciting to see the art which springs out of centers of excellence, such as universities.

But it is even more exciting to realize that we are on the threshold of an era when isolated artists will themselves be able to use the computer with as much ease and familiarity as they presently use pastels, oils, or clay. While the early phases of computer-based art required a high level of technical and financial support, the implementation of easy-to-use graphics environments on low-cost computers (e.g., Atari PILOT on the Atari 400 or 800, TI LOGO on the 99/4A, and Apple Super-PILOT or LOGO on the Apple II) places this medium within the comprehension and budget of many artists.

This adoption of the computer as a new medium will not occur overnight, however. Most of



SOFTWARE FOR
ATARI™ *
 400/800

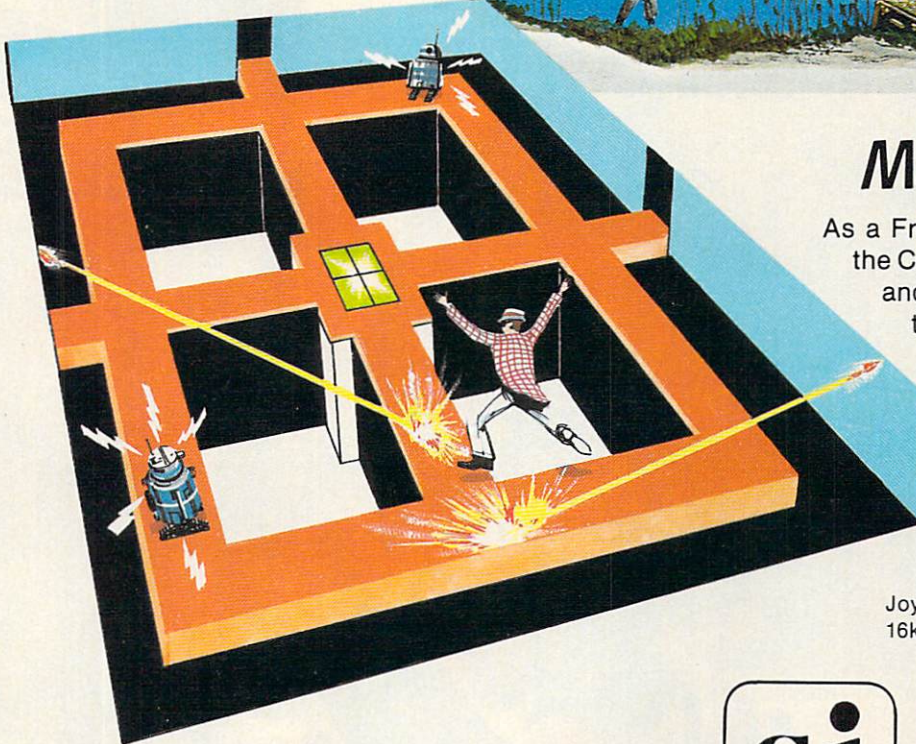
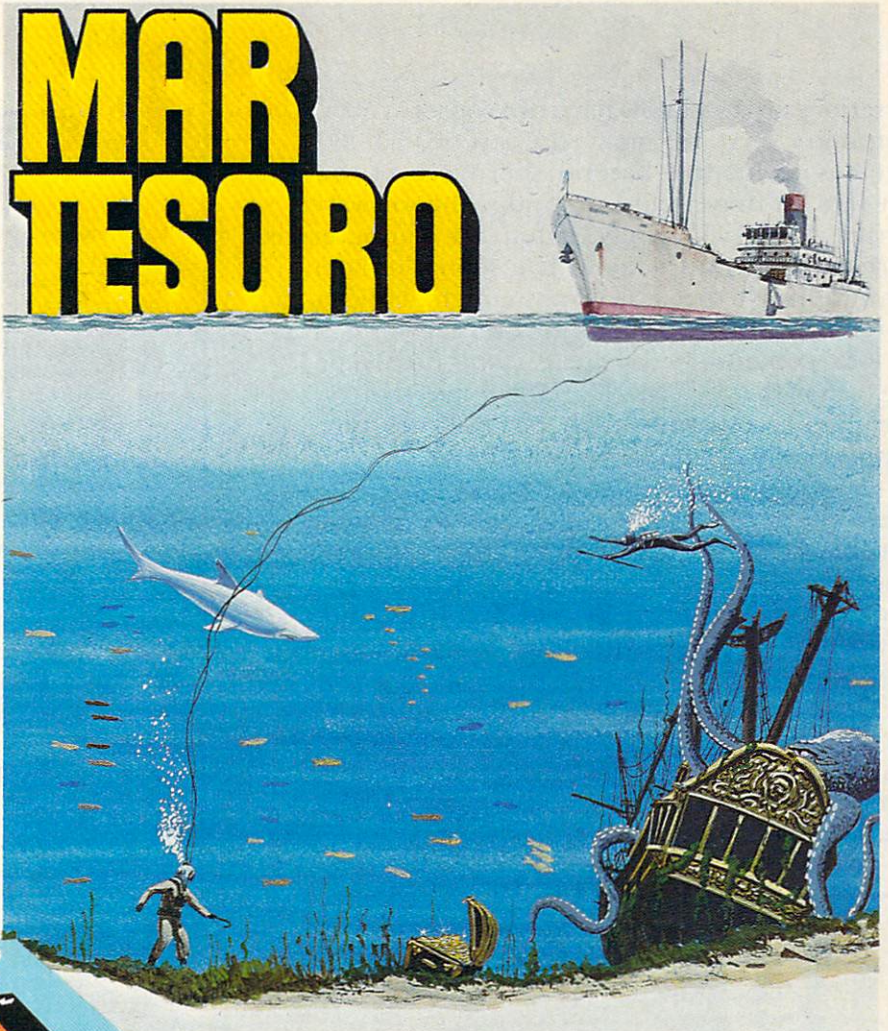
Mar Tesoro

The lure of sunken treasure has been an intriguing adventure for centuries. Now you can embark on your own expedition for fame and fortune.

With your initial financing you obtain necessary equipment and boat to explore off the coral reefs and around the shores of an island to accumulate treasures, some are worthless, others are worth a small fortune.

Joystick Required
 24k Tape \$16.95

With Graphics
 32k Disk \$21.95



Maze of Death

As a Freelance Agent, you try to stop the Cosmitron Device from exploding and destroying the city. The sinister scientist has allowed the device to become critical by removing the radiation control cubes. Your assignment is to find and replace the control cubes before it is too late. Five levels of play in Real Time.

Joystick Required
 16k Tape \$12.95

All Color Graphics
 24k Disk \$17.95



SYNCO INC.
 SOFTWARE DIVISION
 31332 Via Colinas, Suite 107
 Westlake Village, Calif. 91361
 (213) 889-9508

*Atari is the Trademark of Atari, Inc.

ORDER FROM YOUR FAVORITE DEALER OR YOU MAY ORDER DIRECT FROM SYNCO, INC.
 ADD \$1.50 FOR SHIPPING AND HANDLING — CALIF. RESIDENTS ADD SALES TAX.

the serious artists I know have two concerns about computers. First, for many, the cost of a \$3,000 system is prohibitive. Second, there seems to be no easy way for these people to bridge the software barrier. Artists who really want to use computers as more than playthings know that, sooner or later, they will have to become programmers. How sad it is to see these people attending evening courses at the local community college learning BASIC or (Heaven forbid!) COBOL, in the hopes that by learning how to write bubble sort routines, the computer will become less mysterious.

Most introductory programming courses don't satisfy any of these students' real needs. The fact that at least *some* artists (Whitney, for example) have been able to bridge this gap is heartening news, but this is likely to be cold comfort to those art/computer students who think a string variable refers to the color of a length of twine.

Sooner or later, artists in great numbers will start using computers on their own. Whitney's book shows us the promise of this tool and he encourages others to follow their own path with this technology.

All we need now are more practitioners.

©



THE



BIG MATH ATTACK™

Challenging new math program . . .

Sharpen your skills by entering the correct answer before the equation 'lands' on your city! Provides hours of educational entertainment.



Features:

- Full color
- High resolution graphics
- Animation
- Sound
- Four math functions (+, -, X, ÷)
- Two levels for each function

Recommended for grades 1-6. Available for the ATARI & APPLE II.

ATARI 16K (cass.) \$20.00

ATARI 24K (disk) \$25.00

Requires ATARI BASIC cartridge

APPLE II (disk) DOS 3.2/3.3 \$25.00

Requires Applesoft Basic in ROM.

Ask for it at your local computer store.



or order direct:

I.H.E.S.I.S.

P.O. Box 147
Garden City, MI 48135
(313) 595-4722

Please add:

\$1.50 shipping/handling

\$1.50 C.O.D.

WRITE FOR FREE CATALOG
DEALER INQUIRIES WELCOME

Join in the fun as ace plumber Larry Bain of Rodent Rooter plumbing service, tries his best to pipe the sewers of "RAT ALLEY", which has the biggest rat population in the world.

An unbeatable blend of arcade action and quick thinking strategy IN 100% MACHINE LANGUAGE for one or two players.

Available on disk for \$34.95 on 32K ATARI 400/800 and 48K APPLE II or II +

Get MOUSKATTACK at your local computer store or order directly from:

mouskattack

by John Harris
author of JAWBREAKER



36575 Mudge Ranch Rd. Coarsegold, CA 93614 209-683-6858

Visa, MasterCard, Checks, COD

Add one dollar for shipping.

JINSAM

Data Manager selected by NASA, Kennedy Space Center

SAVE TIME! SAVE MONEY!
JINSAM saves taxpayers
100's of thousands of \$



**"Much more powerful than
you can imagine!"**

**Robert Baker
Kilobaud Microcomputing**

JINSAM is an integrated system. It makes it easy to use your information to its fullest. No more will hundreds of valuable hours be spent searching or analyzing needed information nor re-entering information for various reports.

JINSAM transforms your desk-top computer into the "state of the art" data processing machine with features and accessories found nowhere, even at 10 times the price. NASA, Kennedy Space Center selected JINSAM 8.0 and saved approximately \$95,000 over other software/hardware costs. Riley County, Kansas also selected JINSAM 8.0 and saved approximately \$90,000 over other software/hardware costs.

JINSAM is designed for you. It is forgiving. It has help commands for every option, available at the touch of a button. The amount of information you store, its structure and/or your hardware can change but your data won't have to be re-entered. Recovery utilities are included even for catastrophes, security passwords are built in for privacy, simple editing and entry includes auto recall, and deleting records is easy and the space is reclaimed. JINSAM includes TWO FREE accessories for reports and labels. You have unlimited report formats with summing and lined up decimals and the label printer prints up to 5 across - any size and even allows single envelopes or index cards.

JINSAM 1.0 allows fast and easy file handling, manipulation and report generation for any CBM computer with CBM 2040 disk drive. It features a menu for ease, has encrypted passwords, 3 deep sorts, .5 to 3 second recall.

JINSAM 4.0 for CBM 4000 series adds JINSORT, user accessible machine sort of 1000 records in 15 seconds; compaction/expansion of information, automatic list maintenance, unlimited number of fields, unlimited record length and much more.

JINSAM 8.0 for CBM 8000 series has all 4.0 features plus unlimited sort, horizontal format, and search by key or record number.

JINSAM 8.2, NEW FOR '82 expands 8.0 capabilities by adding information search by word, key or record number and machine language print, format and manipulation routines.

- ★ CUSTOM DATA FILES
- ★ CUSTOM REPORTS/LABELS
- ★ KEYED RANDOM ACCESS
- ★ FAST/EASY/MENU DRIVEN
- ★ MULTIPLE SEARCH KEYS
- ★ PRIVACY ACCESS CODES
- ★ WILD CARD SEARCH

JINSAM EXECUTIVE version (soon to be released) is our most powerful professional system for the CBM 8000 and 9000 series. Executive will have 8.2 extended features plus allow multiple users with in-use lockout protection, executive command files, automatic math relations, join, merge or link files, greatly increased record capacity and machine information search by word, as well as by key or record number and many, many more features.

There are currently 7 more interfacing modules - and more under development, including independent interfaces between JINSAM and business packages for your G/L, A/R, A/P needs. We announce the availability of modules and enhancements in JINSAM's quarterly newsletter.

WORDPROPAC - Intelligent interface for WordPro 3, 3+, 4, 4+, creates lists of information from JINSAM files. It allows up to 10 conditions based on each item of information. Produce individualized letters, report cards, special reports, checks, invoices, etc.

MULTI-LABEL - Prints multiple labels per record with up to 2 lines for messages and consecutive numbering. Produce inventory, caution labels, bulk mail labels, etc.

MATHPACK - global calculator/editor +, -, *, /, by another field or constant; null (remove contents) of a field or replace contents of a field with any word, number or phrase. Sum multiple fields in each record or running sum of single field in all records. Extract information or effect permanent change. Replace in the same field or place in a waiting field.

DESCRIPTIVE STATPACK - Determine MEAN, MEDIAN, MODE, STANDARD DEVIATION, VARIANCE, RANGE. Generate HISTOGRAMS from 1 to 25 steps, and produce Z-SCORE reports.

ADVANCED STATPACK - (You must also acquire DESCRIPTIVE STATPACK) Generate one, two or three way CROSSTABS (number of occurrence) CHI SQUARE, LINEAR REGRESSION, with graphic representation and prediction, LINEAR CORRELATION and SIMPLE ANALYSIS OF VARIANCE.

CALCPACK - 2 way interface to VisiCalc or any user program. It lets you use VisiCalc for complex manipulation, editing, placing results in JINSAM for sorting, storing or moving data to WordPro as well as giving the ability for exchange with your own applications.

INTERAC - Interface which can read VisiCalc files, WordPro files and almost any sequential files

to build JINSAM databases automatically. For example: You could "download" information on holerith cards to sequential files and INTERAC would place them into JINSAM files.

All accessories are accessed thru the JINSAM menu and require security password to gain entrance.

JINSAM gives you FREEDOM OF CHOICE. Start with JINSAM 1.0 and upgrade hardware and data at any time. Choose from accessories at any time. The JINSAM Newsletter brings the latest updates, user input and uses and keeps an eye on the future.

JINSAM stands alone by placing "a lot of potential computing power in one integrated program package" (Fred Klein, Ferson div. of Bausch & Lomb). "The JINSAM package is justification for buying a system no matter what the hardware, be it Vector or Commodore or whatever the system" (Larry Colvin, Micro Computer Systems). It is a "grandfather" in this young field. JINSAM EXECUTIVE will be the third generation in development. All JINSAM systems are sophisticated and flexible yet easy to use. JINSAM is saving its users valuable time and money in government, educational and research institutions, business and industry worldwide.

JINSAM is a Commodore approved product. See your local dealer for a demonstration.

JINSAM is a trademark of JINI MICRO-SYSTEMS, Inc.
WordPro is a trademark of Professional Software, Inc.
VisiCalc is a trademark of Professional Software, Inc.
CBM is a trademark of Commodore Business Machines, Inc.
IBM is a trademark of International Business Machines, Inc.

JINSAM Data Manager

- Additional Information and nearest dealer
- Newsletter Subscription (\$5 US/\$8 Worldwide)
- JINSAM Demo Disk (\$15, plus shipping & tax)
- User's Guide (\$40.00, plus shipping & tax)

Please send to:

Name _____

Position _____

Company _____

Address _____

City, State, Zip _____

Phone () _____

Computer, Disk _____

Application _____

JINI MICRO-SYSTEMS, Inc.

Box 274C • Kingsbridge Station
Riverdale, New York 10463
(212) 796-6200

Dealer Inquiry Welcome

The Beginner's Page:

How Computers Remember

Richard Mansfield
Assistant Editor

Computers fascinate us for many reasons. We have only recently built this machine and it is fast and complex, but the same could be said of a jet airplane. One reason for our fascination might be that, after years of passively watching TV, we can finally take control of what appears on the screen. Beyond this, perhaps, is the fact that the computer is the thing we've built which comes closest to being a copy of our own mind.

There are significant differences, though, between the way we think and the way the computer thinks. For complex, abstract thinking, a child can easily outdo the finest computer available today. On the other hand, the computer is far faster than any human. For one thing, the computer was *designed* to be efficient when dealing with numbers. The engineers realized from the start that the computer would be much better off if it avoided using our "decimal" system.

Let's look into some reasons why thinking in decimal is less effective than *binary*, the computer's way. This will help us understand how a machine can "remember."

A computer does two major things: it solves problems (computes) and it *remembers*. To add $2 + 2$, the computer first remembers (stores) your instructions which contain the problem. $10 \text{ X} = 2 + 2$. When you type RUN, it looks for the lowest line number in its memory and solves whatever it finds. Then it remembers the answer (elsewhere in its RAM, its temporary memory cells). If there is another line number (20 PRINT X) it will put the number 4 on your screen, showing that it not only computed the problem in line 10, but also remembered the result.

How does it remember?

Let's try an experiment. Type: POKE 0,1 and notice that nothing happens (at least nothing we can see). In fact, the "lowest" cell in your computer's memory just changed. POKE is a way that you can directly change a memory cell. Each cell has its own *address*, just as if each cell were a house in a city with 65536 houses. (The addresses go from 0 to 65535.) So, when you POKE, you are replacing the

number in that cell with whatever number follows the comma in your POKE command. (If your machine does not have the maximum memory, some zones will not respond to POKE. Also, you can't expect to POKE into the ROM memory because it never changes — its contents are carved in it forever.)

Now type: ? PEEK (0) and notice that our "1" is printed (? is short for PRINT). The "1" is still in the 0 address cell and it will stay there until you POKE something else in, or the computer, in the course of performing a task, needs to use that cell to remember a number of its own. It will also "forget" if you turn off the power. But we still don't yet know just *how* this number is remembered in that cell.

Why We Count By Tens

Another name for a cell in your computer's memory is *byte*. If you have 16K of free memory (a *K* is 1024 bytes, called a *kilobyte*) this means that you have $16 \text{ X } 1024$ cells for a total of 16384 cells for your use. What are these cells? Each one is able to "remember" numbers. How high can a cell count? A byte can hold the numbers from 0 up to 255.

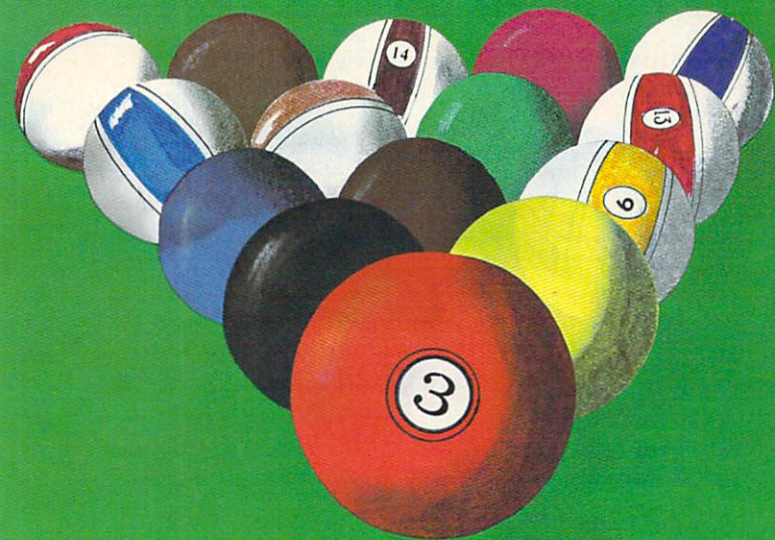
Nobody knows for sure, but it seems a good guess that we humans count in groups of 10's (*decimal*) because long ago, in caves, when the hunters were asked how many bison they saw that morning, the leader would likely hold up a certain number of fingers in the air. On a good day, the leader might say, "We saw many. My hands plus Joe's hands and one hand more!" The people would nod and vaguely understand the concept of 25 bison.

We tend to think that 10's are logical, even a natural, way to count. After all, so many things seem to fall into groups of tens: a dime, a quarter (four hands plus one), a dollar, a \$10 bill, etc. Nevertheless, if lobsters ran the world, it is quite possible that things would be counted in fours. If you're curious, the most "natural" number grouping (found in shells, feathers, flowers and so forth) is called the Fibonacci series. The next number in this series is equal to the sum of the two previous ones: 0,1,1,2, 3,5,8 and so on.

So, since 10's are not natural except to creatures with that many fingers, there is no reason why a computer should count by 10's. For something that runs on electricity, the easiest way to count is by 2's (called *binary*, meaning "can be counted using only two symbols, the zero and one"). The computer finds binary counting very simple since this lets it represent numbers by merely turning something on (like a lightbulb) to stand for "1" or leaving it off to mean "0". If it had to deal with 3's, and 7's, and the rest, it would need to recognize and juggle ten different symbols, 0 through 9, like we do. This

POOL 1.5TM

ATARITM OWNERS,



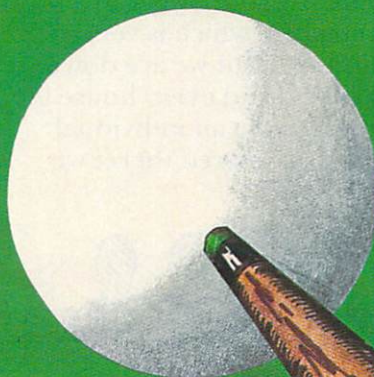
NOW YOU TOO
CAN PLAY POOL 1.5
ON YOUR ATARI
48K DISK SYSTEM.

ALSO AVAILABLE FOR
THE APPLE IITM 48K
DISK SYSTEM.

PRICE: \$34.95

- High resolution graphics-
Life like motion.
- Instant replay on any shot.
- Superfine aiming.
- Pool room sound effects
- Choice of 4 popular games

See your local
computer dealer
or order directly
from IDSI.
Specify ATARI
or APPLE.



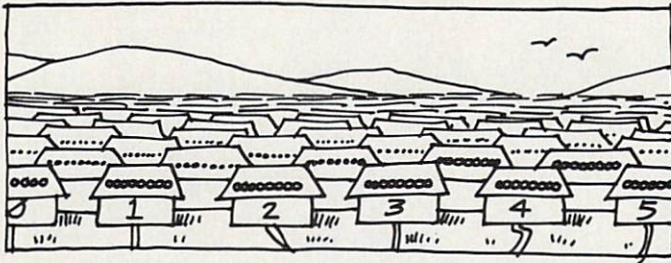
IDSI

P.O. BOX 1658
LAS CRUCES, NM
88004
Ph. (505) 522-7373

ATARI is the registered trademark of ATARI Inc.
APPLE II is the registered trademark of
APPLE Computer Inc.
POOL 1.5 is trademark of IDSI.

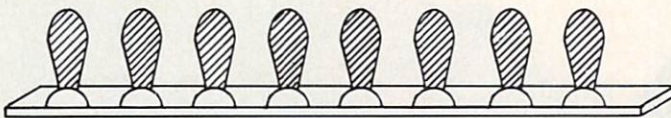
is what we mean when we say that the decimal system has ten *digits* (0-9). The binary system has only two digits, zero and one. By the way, *digit* also means *finger*.

In The City Of Bytes

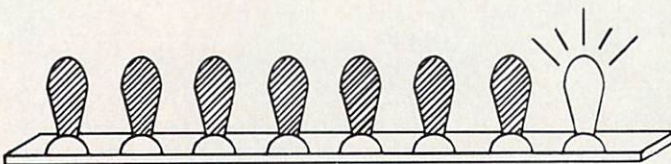


In our computers, there are thousands of rows of bytes lined up. Each of these bytes has an "address" of its own which is just its position in the city of bytes. POKE 5,1 puts the number one into the fifth byte and POKE 8001,0 changes the 8001th byte to zero. We can easily visualize bytes if we think of each one as a house with an odd decoration on the roof: a row of eight lightbulbs. Let's imagine that we have just turned on our computer and all our free bytes are "empty" – we haven't yet typed in a program or loaded anything into them from a tape or disk.

If we fly over the city of bytes, we see only darkness. Each byte contains nothing (zero) so all eight of its bulbs are off. (On the horizon we can see a glow, however, because the computer has memory up there, ROM memory, which is very active with its built-in programs.) But we are down in RAM (our free user-memory) and every house is dark. Let's observe what happens to an individual byte when different numbers are stored there; we can randomly choose byte 1504.

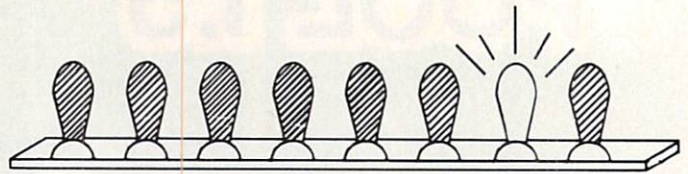


Like all the rest, this byte is dark. Each bulb is off. Observing this, we know that the byte here is holding a zero. If someone types in POKE 1504,1 – suddenly the rightmost lightbulb goes on and the byte holds a one instead of a zero:

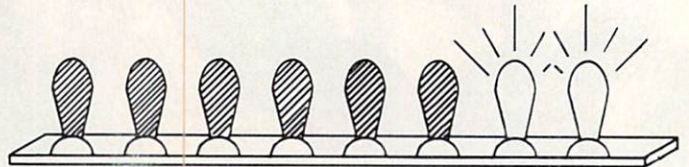


This rightmost bulb is the 1's column (just as it would be when counting by tens in our *decimal* system.) But the next bulb is in the 2's column, so

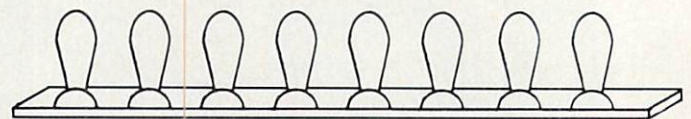
POKE 1504, 2 would be:



And three would be one and two:



In this way – by checking which bulbs are turned on and then adding them together – the computer can look at a byte and know what number is there. These lightbulbs are called *bits* which is short for *binary digit*. Each bit is in its own position and has a value twice the value of the one just before it:



128's 64's 32's 16's 8's 4's 2's 1's

The Columns

Here is a program which will show you a byte as it looks in binary. You then try to give the number in decimal. It has been designed to run on Atari, PET, or Apple. Don't type in any line which has REM in it *unless* it's followed by the name of your computer.

```

100 REM BINARY QUIZ
110 C1=20:C0=111: REM FOR ATARI ONLY
120 C1=88:C0=79: REM FOR APPLE ONLY
130 C1=209:C0=215:REM FOR COMMODORE ONLY
140 X=INT(256*RND(1)): D = X: P = 128
150 PRINT CHR$(125);: REM ATARI ONLY
160 PRINT CHR$(147);: REM COMMODORE ONLY
170 HOME: REM APPLE ONLY
180 FOR I = 1 TO 8
190 IF INT(D/P) = 1 THEN PRINT CHR$(C1);:
      D = D-P: GOTO 210
200 PRINT CHR$(C0);
210 P = P/2: NEXT I: PRINT
220 PRINT " WHAT IS THIS IN DECIMAL?"
230 INPUT Q: IF Q = X THEN PRINT
      "CORRECT": GOTO 250
240 PRINT "SORRY, IT WAS";X
250 FOR T = 1 TO 1000: NEXT T
260 GOTO 140

```


SYSRES™

THE ULTIMATE RESIDENT PROGRAM MANIPULATION SYSTEM FOR PET™/CBM™ MICROCOMPUTERS

SYSRES™ EXTENDED DOS SUPPORT COMMANDS

@ (type "N" keyboard)
 ← (type "B" keyboard)
 ! (original keyboard)
 > (for 'wedge' users)

These commands may be used interchangeably, to perform the following dos support functions.

Disk	Printer	Tape	Directory	Modes	Command	Function
x				3	@	Display disk status / send command
x					@N	Format (header) a new diskette
x					@I	Force initialize diskette
x					@V	Validate diskette (collect)
x					@D	Duplicate diskette
x			x	4	@C	Copy or concatenate disk file(s)*
x					@R	Rename file
x			x	3	@S	Scratch file(s)*
x					@\$	List directory**
x					@U:	Reset disk drive
x	x	x	x	6	@L	List disk file or BASIC program**

Note: Some of the disk utility command set may also be used, if an appropriate direct access channel has been opened.

* Standard command with added options.
 ** Added disk command.

JUST A FEW OF THE FEATURES OF SYSRES™

- * Fast up/down scrolling which works!
- * Advanced repeat-key routine!
- * Re-define any or all keys as any keyword (full or short form) or as any string up to 255 characters long!
- * Auto line numbering which can feed a string of up to 127 characters as well!
- * Extended DOS support (requires DOS 2A or greater)!
- * Never enter another file name! All file commands work from the directory!
- * Supports multiple disk drives!
- * List BASIC programs, sequential and relative files without loading them into memory!
- * TRUE PROGRAM MERGE (overlay). Supports subroutine libraries!
- * Load and run machine language programs with parameter passing!
- * Supports multiple printers!
- * Automatic printer output with paging plus formatted listings with full ASCII code conversion including cursor control and special characters for non-CBM™ printers!

SYSRES™ EXTENDED EDITOR COMMANDS

Disk	Printer	Tape	Directory	Modes	Command	Function
x			x	4	/	Quick load from disk
x			x	4	↑	Quick load from disk with auto run
x			x	2	APPEND	Append from disk to end of current program
				4	AUTO	Auto line number (allows header)
x			x	3	BLOAD	Load machine language (binary) file
x			x	3	BRUN	Load and execute machine language program
	x			776	CHANGE	Change pattern to another pattern
				2	CLOSE	Close one or all files
				1	CMD	Set output to file (does not send "READY.")
				4	DELETE	Delete a range of lines from program
	x			1	DUMP	Dump all scalar variables to screen or file
x			x	2	EXEC	Execute a file as keyboard commands
	x			240	FIND	Find occurrences of a pattern
x		x	x	3	GET	Read a sequential file into editor
				7	KEY	Define a key as a special function
				1	KEYS	Turn key functions on
				1	KILL	Disable SYSRES™
				1	KILL*	Disable SYSRES™ and unreserve memory
	x			10	LIST	Improved BASIC LIST command
x		x	x	3	LOAD	Defaults to disk drive
x			x	2	MERGE	Merge from disk into current program
	x			1	MON	Break to current machine language monitor
				1	OLD	Restore program after "NEW"
x	x	x	x	24	PUT	Send program to disk as text file
				6	RENUMBER	Renumber all or part of program
				2	RUN	Run current program, ignores screen garbage
x		x	x	3	SAVE	Defaults to disk drive, allows replace
x		x		1	SETD	Set disk device #, allows multiple drives
	x			4	SETP	Set printer channel, format mode, paging
				4	TRACE	Select 1 of 3 trace/step modes and speed
x		x	x	3	VERIFY	Compare current program against disk/tape
				1	WHY	Print position of last error
				1	WHY?	List line of break or error
x	x				*	Send output to printer
	x			1	#	Display current version of SYSRES™

- * Edit text files and assembler source code without leaving BASIC!
- * Renumber part of a program or even change the order of lines!
- * Over 700 FIND/CHANGE commands including variable names ("A\$" will not match "BA\$"), pattern matching with "wild-cards", and even commands to remove spaces and REM's!
- * Three TRACE modes including trace variables!
- * Does not affect BASIC program operation!
- * One AUTO-BOOT DISKETTE works for ALL PET™ or CBM™ computers (BASIC 2.0 or greater with at least 16k of RAM), SYSRES™ requires NO ROM SPACE or extra boards, so you can take it with you if you want to use another computer. It may be put above the screen if you have RAM there. It boots automatically without disturbing any program in RAM!
- * Diskette and Extensive Manual – only \$75 (cdn) Documented Source Code (YES!) – \$150 (cdn) Custom versions are available for unique systems!

Dealer enquiries are welcome.



CANSOFT DATA INC.
 MICROCOMPUTER SERVICES

PROGRAMMING * CONSULTING * DESIGNING * EVALUATING

BOX 76752, STN. S, VANCOUVER, B.C. V5R 5S7 TEL: (604) 437-6667

.. one good thing

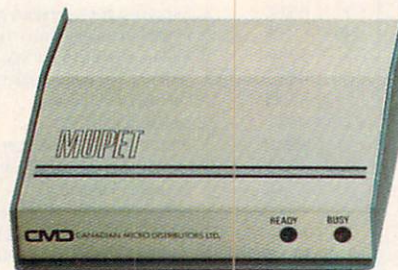


MUPET can save you \$20,000.

Reduce your hardware costs - let Mupet work for you.

- Mupet allows as many as eight students to share a common disk drive and printer.
- With Mupet software transparency you can have any combination of CBM hardware and programs of your choice.
- Word processors share associated hardware, minimize hardware investment.

Mupet works hard, now priced from \$750.00.



Call CMD - the company with world renowned expertise on Commodore and distributors of Mupet and Mupet II, The Manager, DTL Basic Compiler and Supergraphics.

CMD

**CANADIAN MICRO
DISTRIBUTORS LTD.**

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

leads to another..



MUPET II saves money and time too!

Mupet II offers all the advantages of Mupet, plus:

- Will store commands if disk and printer are being used allowing continued use of computer and completion of stored command in turn.
- Protects against incorrect use of harmful disk commands.

- No more printer interface - background printing supported on IEEE, RS 232C and parallel ports included in controller.
- Programmable 16K RAM controller, expandable to 32K provides user defineable operating systems.
- Up to 16 computers may be connected to central printer and disk drives.

Integrate intra-office terminals for common data access allowing independent analysis for such functions as:

- Accounting
- Sales forecasts, budgets and orders
- Production scheduling
- Word processing

The only product available capable of serving Commodore Computers up to 100 feet apart.

MUPET II a small price for huge capabilities, from:

\$995.00



The Winter Of Our Content

A Report On The January Consumer Electronics Show

David D. Thornburg
Innovision
Los Altos, CA

At a time when most of us are contemplating sugar plums, planning New Year's parties, or replacing shingles kicked loose by Santa's reindeer, a few hardy souls are preparing for a major event – the Winter Consumer Electronics Show held each January in Las Vegas.

In the area of personal computers, this year's show will be long remembered. Formal announcements by Commodore, Panasonic, Astrovision, Sharp, and Toshiba, more than justified leaving the remains of our sudden 12" rainstorm for the sunny (if somewhat cold) desert of Nevada.

Here, then, are the highlights of some of the more exciting products for 1982. As you read this, remember that many of the products displayed were prototypes, and that they may undergo some modification before going to market.

For sheer impact, Commodore stole the show with the announcement of two new color computers! Imagine a color computer with separate graphics and sound chips, two memory-mapped graphics modes, the traditional PET 40 column display, three voice music and sound effects, and cartridge programmability. Sound interesting? Got your checkbook ready? The price for the Commodore Ultimax is \$149.95. Yes, the decimal point is in the right place. For less than two-hundred dollars, you will be able to do wondrous things which previously required much more expensive hardware.

What's the catch? Well, the Ultimax doesn't have a full stroke keyboard; it uses the membrane type instead. Also it doesn't have a lot of RAM. However, you do get access to a 300 x 200 dot graphics display (two color mode), or a 160 x 200 screen (four colors at a time out of 16). Also (for you Atari and TI users), Commodore gives you access to up to 255 animated "sprites" per screen (up to 8 per line). Each sprite (or player, for Atari fans) resides in a 63 byte field and is composed of 24 x 21 dots.

The Ultimax uses the VIC peripherals (joy-

sticks, cassette, etc.).

But what about those of us who want more RAM? Well, Commodore has us in mind too. The Commodore-64 comes with 64K of RAM. Using the same chip set as the Ultimax, and equipped with a full-stroke keyboard, this gem sports a \$595 price tag.

Both new computers use the 6510 processor (a stretch 6502, I guess), the 6566 graphics controller, a 6581 sound interface device, and a 6526 PIA. Don't expect to see these chips at your local parts shop for awhile. Commodore plans to use every one they can make. While neither new computer will be on the market immediately (about June for the Ultimax – so *please* don't bug your dealer yet!), Commodore's marketing wizard, Kit Spencer, boldly predicted that Commodore would sell more computers in 1982 than were sold by all manufacturers in 1981.

While the Ultimax (with its game-like price) may lead the sales into the homes, both machines will probably penetrate the school market as well. The reason for this is that they both have a serial port capable of communicating with up to 30 other computers. Just what the teachers ordered!

Commodore wasn't the only booth sporting ear-to-ear grins. Panasonic introduced the 6802-based JR-100 – a \$199.95 compact computer which comes with 16K of RAM and an 8K BASIC. The system can be expanded to 48K RAM. While this monochrome computer has only a character-based display (32 characters by 24 lines), the user is free to define his or her own character set. A color version of this computer will be available for \$299.95 at some future date. While I was impressed by the overall physical layout of this computer, one aspect of the keyboard bothered me. The space bar was located where the right SHIFT key should be. Perhaps this will be changed by the time the product gets to market. The JR-100 was designed (and will be built) by a different group than the one respon-

DTL BASIC COMPILER

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

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

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

sible for the 6502-based hand held computer being sold by Panasonic and Quasar. The JR-100 will be sold to the home market – primarily the hobbyist and home study market at first. A full line of peripherals is planned – modems, floppy disks, etc.

Astrovision demonstrated the Bally Arcade with a plug-in expansion unit housing a full-stroke keyboard and running the language ZGRASS. This graphics language was developed (if memory serves) by Tom Defanti at the University of Illinois in Chicago. The goal is to allow artists and other non-technical types to create breathtaking real-time animations without having to learn machine language programming. The result is beautiful. Since the Z80-based Astrovision game machine has the same multi-chip display controller used in Bally's coin operated arcade games, high quality graphics is possible. What makes it practical is the ease with which figures drawn on a tablet can be saved as procedures, located anywhere on the screen, and can be magnified and rotated at will.

Astrovision seems intent on aggressively pursuing this project, but it isn't clear how effectively they will be able to compete. As with the other machines mentioned so far, don't expect to see the ZGRASS machine next week.

For those who take their graphics seriously, Toshiba was pleased to announce the T100 computer. When used with a high resolution color monitor, the user has access to 8 colors on a 640 by 200 dot array. A multi-line liquid crystal display was shown as an alternative. The packaging of this CP/M machine reminded me of the NEC PC-8000 – very stylish and business-like. Equipped with a Z80, 32K of ROM and 64K of RAM, this computer should appeal to those who are interested in doing some serious work.

Sharp had a surprise of its own. The original PC-1200 hand-held computer (available from Radio Shack for some time) has been joined by an 8-bit brother: the PC-1500. While this new machine is much faster than its predecessor, the most amazing feature was the availability of a color graphic printer. For a total price of \$550, Sharp users will have access to a computer with a pocket-sized drum plotter that lets you draw pictures with any of four automatically selected pens (red, green, blue, black). This is one product that has to be seen to be believed – and even then you won't believe it.

The PC-1500 is available now. (Of course I ordered one!)

At long last, the Casio FX-9000 desktop computer is on the market. This computer has a built-in 5" monochrome display with the ability to show graphics images with a 256x128 resolution. The sleek styling is reminiscent of the Hewlett Packard HP-85, but the price (under \$1800, fully loaded) is

more in keeping with Casio's products. The FX-9000 uses a Z80 compatible processor and gives the user access to two types of RAM. Front panel accessibility to RAM cartridges lets the user choose between 16K dynamic RAM cartridges, and 4K CMOS cartridges. The 4K byte RAM module contains its own battery, so that programs which are saved on this module can be removed and saved for instant reloading later.

Texas Instruments developed and showed a similar 4K RAM cartridge for the 99/4. Since TI also showed a new Assembler/Editor system, the ability to let users make their own cartridges is quite appealing. My, what a difference a year makes.

TI also showed a nicely designed expansion box which does much to reduce the clutter associated with fully loaded systems.

Atari's booth was almost impossible to enter. It was as if everyone who attended the show decided to check them out at the same time. The official authorized Atari Pac Man program was introduced. The action is a little different from the previous version done for the Atari computer (Jawbreaker) by OnLine Systems. Compared to the Pac Man games also shown by Magnavox, Astrovision, Texas Instruments, and others, Atari did a very nice job at software development. Coleco's hand-held version of the game was not as exciting, but then it doesn't use a color display screen either.

While my emphasis has been on hardware, it should be noted that software was on display as well. Automated Simulations displayed some of their newer programs for the Apple and Atari computers. While they are known primarily for their adventure games, Automated Simulations has developed a line of educational games (such as Jabbertalky) which are terrific.

The fact that a few dedicated people are willing to make the effort to generate educational games which teach as well as entertain should not go unrewarded. These people are doing an excellent job and are to be congratulated.

Both Activision and IMAGIC showed cartridges for the Atari video game which demonstrated exceptionally high quality graphics. Not surprisingly, these booths were well attended as well.

So much to see, and too little time! I was so busy getting all this information for you dear readers that I barely got to examine the solar-rechargeable flashlights, underwear with built-in loudspeakers, and ball point pens with built-in clocks and music synthesizers.

But that is why there are two shows a year. So until the next CES this June in Chicago, I'll just have to be content with what I saw.



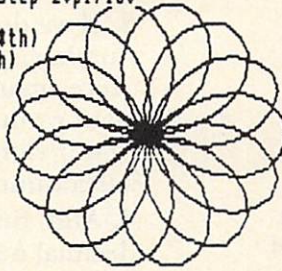
supergraphics for your cbm 8032

- ‡ 128,000 accessible points (640 x 200)
- ‡ mix cbm text with high-res graphics
- ‡ supports hard copy to Epson MX-82

```

5 !frame 0,0 to 639,199
10 open 4,4:recall "cmd logo",8,1
20 k=2.1:z=50:t=7:pi=3.14159:a=4:b=4
30 for th=0 to 2*pi step 2*pi/180
40 r = z*sin(th*t)
50 x = 280+k*r*cos(a+th)
60 y = 120+r*sin(b*th)
70 if th(>0) then 100
80 !move x,y
90 goto 110
100 !draw x,y
110 next th
120 !hard#4
130 close 4: end

```



commands in row include:

```

dot x,y      move x,y
cmove x,y    draw x,y
test x,y,a

line x1,y1 to x2,y2
cline x1,y1 to x2,y2
dline x1,y1 to x2,y2
frame x1,y1 to x2,y2
cframe x1,y1 to x2,y2
fill x1,y1 to x2,y2
clear x1,y1 to x2,y2
displ x,y,a$ - for user
              defined shapes
gsav "filename",8
recall "filename",8

```

commodore

CBM™
Model 8032

computer

SUPERGRAPHICS

128,000 ACCESSIBLE POINTS

Features

- * 128,000 accessible points arranged in 200 x 640 grid
- * 16K static ram supplies memory mapping of pixels on separate board
- * supported through extended Basic commands supplied in ROM
- * uses no memory from the existing system
- * mix standard CBM text and low-res graphics with hi-res displays
- * easy to design and display user defined shapes
- * normal or inverted display mode for partial or total screen
- * switch graphic display on or off - continue output in passive mode
- * save graphic images on a disk file
- * recall images from disk with option to mix with existing display
- * supports hardcopy to any hi-res Epson printer
- * easy to follow installation instruction included



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

Basically Useful BASIC

Tabulation

Paul Lilly
Pelham, AL

If you have ever written a program that output a wide range of numbers, you probably noticed the numbers were left justified (first digit of number printed at next print location regardless of the size of the number). Additionally, if you wanted to print a number such as \$9.20, it would be printed as 9.2, omitting the trailing zero.

So what do you do if you want to write a nice clean program that would balance your checkbook, list expenses, or otherwise output a series of numbers, right justified, in a nice straight column? Answer: use a short subroutine to measure, add trailing zeros if needed, and right justify the number when it is printed.

The Subroutine

The key to the subroutine is to convert the number to a string using the STR\$ command. After the number is a string, we can add or subtract to its length, adjust it to our desired format, and control where it is printed by using the TAB and LEN commands together.

Program 1 is an example of such a subroutine. The instructions are written starting on line 5000 so it could be inserted in most programs without interfering with the existing instructions. We also have created two variables and one string that should be reserved from the rest of the program.

RJ – the print position for the rightmost digit in the number we want to print.

N – the number we want to format and print.

N\$ – the ASCII string of N.

The subroutine can be entered at four different locations, depending on our needs.

1. If we want our number formatted with two digits to the right of the decimal point (as when dealing with dollars and cents figures), we can call the subroutine at 5010. Prior to calling the subroutine we must set N to the number we want to print, and RJ to the print location where we want the rightmost located.
2. If we call this subroutine several times throughout our program, and our print locations vary, we can call subroutine 5000. Line 5000 will set RJ to seven positions past our last print location. This will reduce the pro-

gramming steps needed in our main program. With seven positions (past last print position) we can print numbers up to 9999.99. For larger numbers, line 5000 can be changed accordingly.

3. If we do not want any decimals in our number, we can call the subroutine at 5090. Here again, N must be set to the number we want printed, and RJ to the print location of our rightmost digit, prior to calling the subroutine.

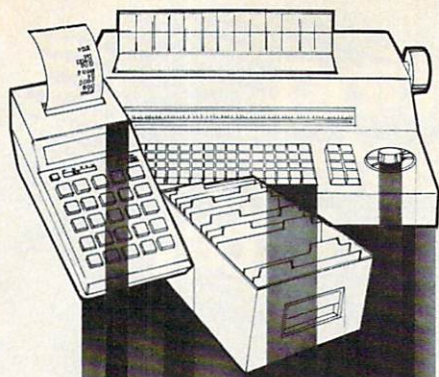
4. And, finally, if we want to print a non-decimal number, and would like to save programming steps, we can enter the subroutine at 5085 and let the subroutine figure RJ for us.

The Method

Suppose we enter at line 5000 with N set to the number we would like printed. Line 5000 will set RJ to six print positions past our current (last printed) print position. Line 5010 will strip away any more than two digits right of the decimal point (it is still possible at this point to have only one or no digits right of the decimal). Let's look at lines 5040 and 5050. These statements look for the decimal (".") to determine if N\$ has a decimal point, and how many digits (one or two) are to the right of it. Line 5040 finds the decimal point one position back from the rightmost character, meaning there is only one digit to the right of the decimal point. Therefore, the statement adds the necessary trailing zero, then jumps ahead to 5070.

Line 5050 finds the decimal point two positions back from the rightmost character, meaning there are already two digits to the right of the decimal point. In this case, no modification is needed to N\$, so the statement simply jumps ahead to 5070. Now the only possible configuration left for N\$ is for it to have no decimal in it. In this case line 5060 tacks on the required ".00", to maintain the standard format. Now let's go back to 5030. If N equaled 0-9, the LENth of N\$ would be only two and would bomb the program at 5050. So, since any string with less than a length of three can't have a decimal point in it anyway, 5030 will catch it and route it around 5040 and 5050. (By the way, the STR\$ command (at least in my machine) puts a leading space in front of the ASCII representation of the number, thus the number 1 has a string LENth of two.)

That brings us to line 5070, which strips the leading space so it doesn't interfere with our print position calculations. Finally on line 5075 we TAB the difference between RJ and LEN(N\$), and print our number. Line 5085 is where we would enter if we wanted to print integers. Line 5090 would strip the number to an integer, then change it to a string. Line 5095 would jump back to where we remove



LET THE MANAGER DO IT!

Inventory Control
Mailing Lists
Accounting systems
Personnel
Costing
Gathering test data
Budgeting
Scheduling

Organize and File Your Records
Without a Programmer

The easy to use Database System suited
for both businessman and programmer.

Today's Filing Cabinet for CBM

- Never again misplace an invoice, important document or key customer address. The Manager is your filing cabinet.
- Talk to the Manager and it responds.
- Take command of your filing, reporting and analysis requirements.
- Create, utilize and store information in familiar and compatible forms.
- The Manager automatically performs all predefined calculations as required in your business.
- Utilize it for one major function or include many important records for recall, update and print-out for analysis.
- Keep inventory levels and controls manageable in today's economic environment - the Manager shows you how.

- The Manager saves money, no in-house programmer required; you and/or your secretary can operate the system effectively.
- The Manager saves time; fast search capabilities allows speedy recall and easy merging.

Can You Afford Not To Have The
(office) Manager Working For You?

For further information and the name of
your nearest dealer, call CMD - the
company with world renowned
expertise on Commodore and
distributors of Mupet and Mupet II,
The Manager, DTL Basic Compiler,
and Supergraphics.



THE
MANAGER

\$250.00

CMD

CANADIAN MICRO
DISTRIBUTORS LTD.

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



Announcing the Printing Breakthrough of the Century: Smith-Corona® TP-1™ Text Printer



- Low Cost Daisy Wheel Printer

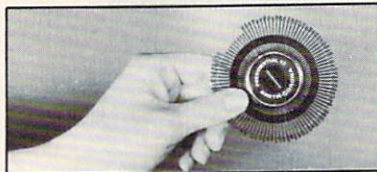
\$845⁰⁰

- Microprocessor Electronics
- Serial or Parallel Interface
- Simple, Reliable Mechanism

ACT NOW: Limited Supply, Low, Low Cost

Smith Corona, one of the largest manufacturers of small printers in the world, gives a whole new perspective to printing with their electronic text printer—TP-1. The TP-1 is a microprocessor controlled, high quality daisy wheel printer. It produces perfectly formed, executive quality printouts at the speed of 120 words per minute. Typewriter quality printing at dot matrix prices.

Simple, durable and dependable, TP-1 may be used with word processing systems, microcomputers and most small business systems. Compact and attractively



Additional daisy print wheels \$4.95



Additional ribbons \$2.95

styled, the TP-1 blends well with any setting.

Now, all your letters, documents forms and reports can have the crisp, professional look you demand—for business or personal use—at an affordable price. TP-1, the electronic text printer.

Don't delay. Order your TP-1 TODAY at the low price of \$845.

Micro Printer Marketing offers same day shipping, nationwide service and invites dealer inquiries. Catalogues available. No shipping charges on pre-paid orders.

**Micro™
Printer
Marketing**

Call Micro-Printer Marketing

CALL TOLL FREE **1-800-523-9859**

MasterCard and Visa Accepted

In PA Call Collect 215 / 433-3366



the leading space and print the number.

Considerations

Line 5075 uses the semicolon after printing N\$ to suppress the LF/CR. This is because you may want to print several numbers on one line. Once you have printed the last number on a line, have the main program execute a PRINT command so you will get your carriage return. If you only want to print one number per line and no further printing will be done after the number, you may remove the semicolon from line 5075.

Also, be careful not to set RJ to a number smaller than N\$ would be after the modifications were made to it, otherwise you will not space properly with the TAB command on line 5075 and, possibly, generate an error that will bomb your program.

Program 2 will show a comparison between two different interest rates, of 15 different loan amounts. The user is asked to enter two rates, principal for first comparison, increment of principal for succeeding comparisons, and the term of the loan in months. The program will output the results neatly.

Figure 1.

Sample Run #1

INITIAL PRINCIPAL
? 50000

INCREMENT PRINCIPAL BY
? 2000

INTEREST RATE 1
? 10

INTEREST RATE 2
? 14

TERM OF LOAN IN MONTHS
? 360

FOR 360 MONTHS

LOAN	10 %	14 %
50000	438.79	592.44
52000	456.34	616.13
54000	473.89	639.83
56000	491.44	663.53
58000	508.99	687.23
60000	526.54	710.92
62000	544.09	734.62
64000	561.65	758.32
66000	579.20	782.02
68000	596.75	805.71
70000	614.30	829.41
72000	631.85	853.11
74000	649.40	876.80
76000	666.95	900.50
78000	684.51	924.20

Program 1. Microsoft Version (Apple, PET, etc.)

```

5000 RJ=POS(RJ)+7
5010 N=INT(N*100+.5)/100
5020 N$=STR$(N)
5030 IFLEN(N$)<3GOTO5060
5040 IFMID$(N$,LEN(N$)-1,1)=", "THENN$=N$+"0":
      GOTO5070
5050 IFMID$(N$,LEN(N$)-2,1)=", "GOTO5070
5060 N$=N$+",00"
5070 N$=RIGHT$(N$,LEN(N$)-1)
5075 PRINTTAB(RJ-LEN(N$));N$;
5080 RETURN
5085 RJ=POS(RJ)+6
5090 N$=STR$(INT(N))
5095 GOTO5070

```

Program 2. Microsoft Version

```

100 PRINT:PRINT"INITIAL PRINCIPAL":INPUTLA
110 PRINT:PRINT"INCREMENT PRINCIPAL BY":INPUTLI
120 PRINT:PRINT"INTEREST RATE 1":INPUTI1
125 IFI1<10RI1>100GOTO120
130 PRINT:PRINT"INTEREST RATE 2":INPUTI2
135 IFI2<10RI2>100GOTO130
140 PRINT:PRINT"TERM OF LOAN IN MONTHS":INPUTNM
150 PRINT:PRINT:PRINT:PRINT:PRINT
160 PRINT"    FOR";NM;"MONTHS"
170 PRINT:PRINT"LOAN    ";I1;"%    ";I2;"%":
      PRINT
180 FORJ=LATOLA+(14*LI)STEPLI
190 I3=I1/1200:I4=I2/1200
200 P1=J*(I3/(1-(1/(1+I3)^NM)))
210 P1=INT(P1*100+.5)/100
220 P2=J*(I4/(1-(1/(1+I4)^NM)))
230 P2=INT(P2*100+.5)/100
240 N=J:GOSUB5085
250 PRINTTAB(8);:N=P1:GOSUB5000
260 PRINTTAB(16);:N=P2:GOSUB5000
270 PRINT:NEXTJ
280 END

```


Program 3. Atari Version

```

5000 RJ=PEEK(85)+7
5010 N=INT(N*100+0.5)/100
5020 GOSUB 5100:N#=STR$(N)
5030 IF LEN(N#)<3 THEN 5060
5040 IF N$(LEN(N#)-1,LEN(N#)-1)="." THEN
  N$(LEN(N#)+1)="0":GOTO 5070
5050 IF N$(LEN(N#)-2,LEN(N#)-2)="." THEN
  5070
5060 N$(LEN(N#)+1)="00"
5070 POKE 85,RJ-LEN(N#)-7:N#
5080 RETURN
5085 GOSUB 5100:RJ=PEEK(85)+6
5090 N#=STR$(INT(N))
5095 GOTO 5070
5100 TRAP 5110:DIM N$(15):TRAP 40000
5110 RETURN

```

Program 4. Atari Version

```

100 PRINT :PRINT "INITIAL PRINCIPAL":INP
UT LA

```

```

110 PRINT :PRINT "INCREMENT PRINCIPAL BY
":INPUT LI
120 PRINT :PRINT "INTEREST RATE 1":INPUT
I1
125 IF I1<1 OR I1>100 THEN 120
130 PRINT :PRINT "INTEREST RATE 2":INPUT
I2
135 IF I2<1 OR I2>100 THEN 130
140 PRINT :PRINT "TERM OF LOAN IN MONTHS
":INPUT NM
150 PRINT :PRINT :PRINT :PRINT :PRINT
160 PRINT "    FOR ";NM;" MONTHS"
170 PRINT :PRINT "LOAN    ";I1;"%    ";
I2;"%":PRINT
180 FOR J=LA TO LA+(14*LI) STEP LI
190 I3=I1/1200:I4=I2/1200
200 P1=J*(I3/(1-(1/(1+I3)^NM)))
210 P1=INT(P1*100+0.5)/100
220 P2=J*(I4/(1-(1/(1+I4)^NM)))
230 P2=INT(P2*100+0.5)/100
240 N=J:GOSUB 5085
250 POKE 85,8:N=P1:GOSUB 5000
260 POKE 85,16:N=P2:GOSUB 5000
270 PRINT :NEXT J
280 END

```

©

It's time Your Computer stopped just playing games

and started doing some work around the house!

Let Creative Software's home programs turn your ATARI® or VIC® into a really useful household appliance—the results may well amaze you!

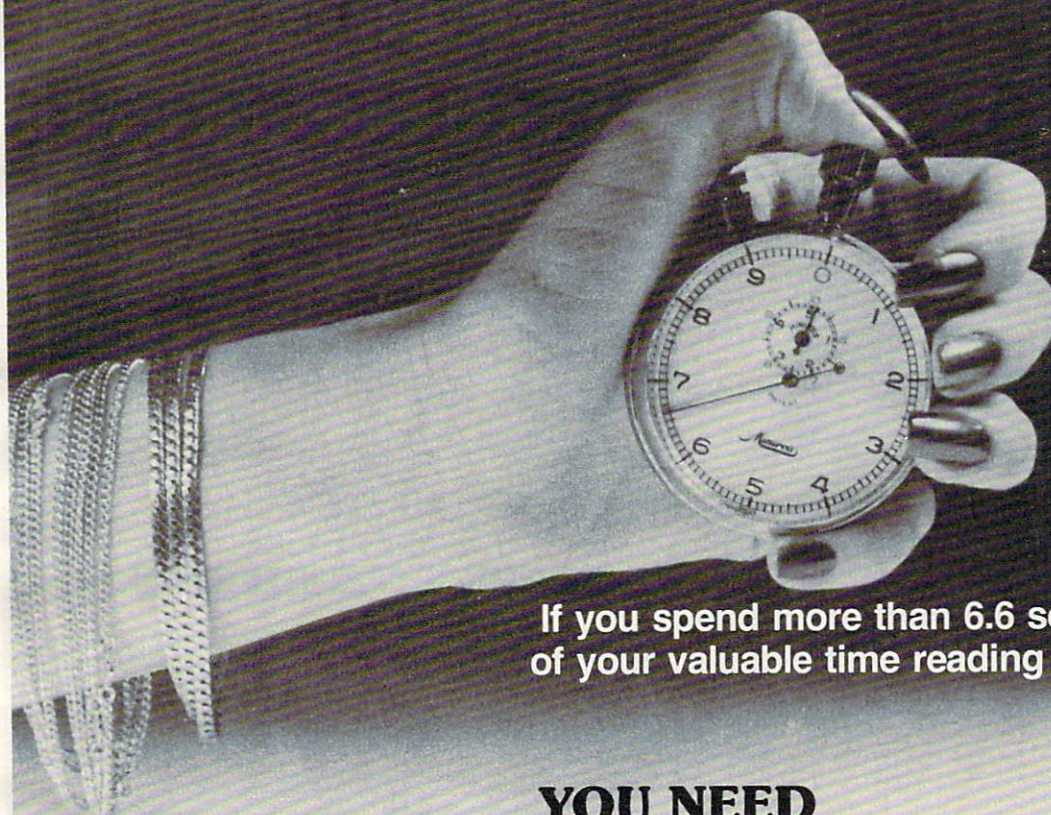
TITLE	ATARI 400/800	VIC (cassette only)
• Household Finance	34.95 cassette 39.95 disk	34.95
• Home Inventory	19.95 cassette 24.95 disk	14.95
• Car Costs	19.95 cassette 24.95 disk	14.95



201 San Antonio Circle, #270
Mountain View, CA 94040
(415) 948-9595

Ask about our many other recreational and home applications!
TO ORDER: 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.

6.6 SECONDS



If you spend more than 6.6 seconds
of your valuable time reading this ad.

YOU NEED

SpeedRead+

- Optimized Systems Software, the company that brought you BASIC A+ and OS/A+, proudly presents another "PLUS".
- **SpeedRead+** is the world's first speed reading tutor designed for use on your personal computer.
- **SpeedRead+** begins with training your eyes and mind to function as the incredible precision machine they were meant to be.
- **SpeedRead+** goes beyond mere words — it trains you to recognize phrases and columns instantly — it exercises your peripheral vision — it increases your comprehension.
- **SpeedRead+** matches *your* pace — now and in the future.

AVAILABLE NOW!

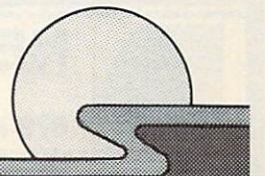
For 16K ATARI® computers with disk, Introductory Price \$59.95
Coming soon for APPLE II®. Inquire about availability of TRS-80® and cassette versions.

SEE YOUR DEALER TODAY!

Call or write for a descriptive brochure of **SpeedRead+**™ and other fine OSS products, such as OS/A+, BASIC A+, and TINY C®.

ATARI, APPLE II, TRS-80, and TINY C are trademarks of Atari, Inc., Apple Computer, Inc., Radio Shack, and Tiny C Associates, respectively. **SpeedRead+** is a trademark of Eagle Software and Optimized Systems Software.

Optimized Systems Software, Inc., 10379 Lansdale Ave., Cupertino, CA 95014, (408) 446-3099





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

commodore

16K B (16K RAM-40 Column) - Lim. Qty	\$ 995
32K B (32K RAM-40 Clm.) - Lim. Qty	\$1295
4016 (16K RAM 4.0 Basic-40 Clm.)	\$ 995
4032 (32K RAM 4.0 Basic-40 Clm.)	\$1295
8032 (32K RAM 4.0 Basic-80 Clm.)	\$1495
8050 Dual Disk (1 Meg Storage)	\$1795
4040 Dual Disk (343K Storage)	\$1295
8010 IEEE Modem	\$ 280
C2N Cassette Drive	\$ 75
CBM - IEEE Interface Cable	\$ 40
IEEE - IEEE Interface Cable	\$ 50
VIC 20 Home/Personal Computer	\$ 295

**CALL NEECO
FOR ANY OF YOUR
COMMODORE COMPUTER NEEDS**

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

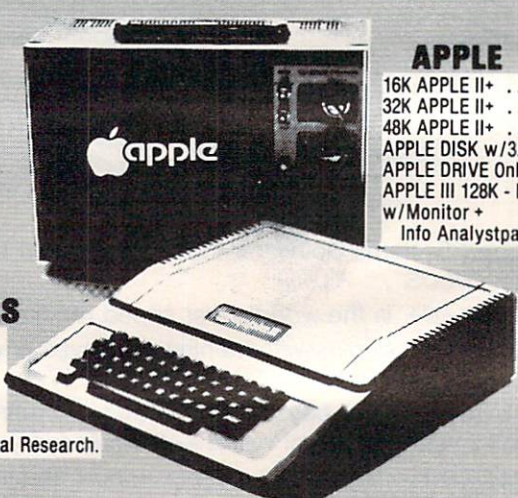
INTERTEC COMPUTERS

64K Superbrain (360 Disk Storage), CP/M™	\$3495
64K QD Superbrain (700K Disk Storage), CP/M™	\$3995

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

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 Analyzepak	\$4740

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.

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 SOME ADVERTISED PRICES ON CERTAIN 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!

C Commodore
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

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

(617) 449-1760

Telex: 951021

**679 HIGHLAND AVE.
NEEDHAM, MA 02194**

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

Twenty Questions Revisited

Elizabeth Deal
Malvern, PA

*Editor's Note: In the September, 1981 Computers And Society column, David Thornburg presented a fascinating program called Twenty Questions. Both versions (Microsoft BASIC and Atari BASIC) are repeated at the end of this article. Here, Liz Deal, a long time contributor to **COMPUTE!**, presents an unedited transcript of her young son and a friend exploring the intrigues of Twenty Questions. — RCL*

In **COMPUTE!** #16, pgs. 12 and 16, there appeared a program called "Twenty Questions." Robert Lock asked for readers' response to the program. I think the reactions of two ten-year old boys might amuse you.

They liked the game, went through many rounds, obviously had some goal in mind, kept changing the rules and conclusions, and gave up feeling somewhat cheated at the end.

They religiously took turns between the typing and thinking tasks every few minutes, supplementing their typing with some loud thinking. I began recording several minutes into the game and noted words present on the screen. The kids' conversation is preceded by P and R to identify who is saying what. What they typed on the screen and what PET answered is in capital letters (shown on one line). Draw your own conclusions from a sample of two people.

RIGHT? NO
WRONG? NO

R: It's supposed to be an object

P: Ok

BIKE? YES

R: Is it an animal?

ANIMAL? NO

VEHICLE? YES

P: Is it a vehicle?

R: Yeah, try it, that's what it was before

IS IT A PERSON? NO

P: Is it an object? o-b-j-e...

R: I know how to spell it

IS IT AN OBJECT? NO

P: If it's not an object it's not anything...

R: I know

IS IT A NAME?

P: Name not an object, erase it

IS IT A VEHICLE? YES

R: That's what we should have tried before... again?

P: Try vehicle again, it's a lucky question

R: What if it's not?

IS IT A VEHICLE? YES

R: I bet it's always vehicle, let's try this

VEHICLE? YES

R: It's going to be always vehicle

P: Let's try vegetable

VEGETABLE? YES

R: I think if it begins with V is right.

Try viking v-i-k-i-n-g

IS IT VIKING? NO

P: Let's see what happens if we go for all twenty...try one word and question mark on it

PAPER? NO

INVENTION? NO

IS IT AMPLIFIER? NO

GLUESTICK? NO

BIG BRICK? NO

HORSE? YES

P: aha...

R: I like horses, they are my favorite animal

CAT? NO

DOG? NO

ANIMAL? NO

P: Put shark

R: No can't be anything that's animal. I'll try tape, we haven't tried that yet

TAPE? YES

P: Try table

TABLE? YES

R: First guess again. This is good!

P: No it is not...it's like trying to eat a live pig without fork and a knife

DOG? NO

P: Do animal instead of certain word

ANIMAL? NO

TAPE? YES

P: Tape again, don't do it again, try t words

TREE? YES

P: Let's try c's

R: No cat didn't work... try h

HOUSE? YES

SNAK? NO

HOUSE? YES

R: I told you to put house before...

P: Well, I can do my own words...from my mind...

2 FROM HORIZON



Time: June, 1943.
 Place: North Atlantic.
 German Wolf Packs have been driven from their hunting grounds by Allied escort vessels and massive air attacks. But unknown to the Allies is a Nazi super sub completed well ahead of schedule: The Mark XXI. Der Führer has demanded total destruction of enemy merchant shipping — a vital link for continued success of the Allied war effort. Will you, as one of the Kriegsmarine's remaining ace skippers, alter history and save the Third Reich from defeat?

Der Führer will not be disappointed!
 FATHOMS 40: \$39.95 ppd. Foreign, FPO and APO add 10% for shipping. Please specify Apple or Atari when ordering.

In the 1930's dramas were slowly unfolding in capital cities throughout the world. From dimly lit hotel rooms to highly sophisticated Intelligence Headquarters, men and women were playing a game of cat and mouse for scraps of information essential to the security of their country. CLOAK & DAGGER pits you against computer, or other players, as head of an Intelligence Agency trying desperately to stay one step ahead of its rivals. Moving agents from capital to capital, ferreting information, and offering bribes are fundamental parts of each player's turn... and your survival!



CLOAK & DAGGER: \$39.95 ppd. Foreign, FPO and APO add 10% for shipping. Please specify Apple or Atari when ordering.

For Apple II*, DOS 3.3 or Atari 800*. 48K with disk drive. Joysticks required. Games on Dyan** diskettes.
 Visa & MasterCard accepted.
 Dealer Inquiries Welcome, contact your local dealer for full details.

HORIZON SIMULATIONS
 Horizon Simulations Inc.
 7561 Crater Lake Highway / White City / Oregon 97503
 (503) 826-4640

R: Try gas
 P: Gas isn't an object...it's a thing...well, it's an object in a way
 R: We have to spell 'em right
 ROCKET? NO
 R: Try shuttle
 P: No, it's a name
 PIG? NO
 R: Can't be an animal?!
 P: I have to devise something in my head...
 (total silence several seconds, followed by
 STOP key somebody forgot to turn off)
 LIST
 P: OK, looking for the words...
 R: Don't they have...
 P: ...don't worry, we'll find the words...(reached
 end of listing)...all they have is that?!! Not
 fair! No words. Only goes to 410. Where
 did it get the words? Has to have memory
 where to get the words...
 R: Let's do something else.

My PET will *think* when this conversation occurs:

ME: IS IT AN ANIMAL?
 PET: NOPE
 ME: IS IT A HORSE?
 PET: I TOLD YOU IN PREVIOUS QUESTION IT'S NOT AN ANIMAL, STUPID

Program 1: Microsoft Version

```
100 REM *TWENTY QUESTIONS
110 PRINT CHR$(147);"WELCOME TO THE GAME
115 PRINT "OF TWENTY QUESTIONS. BY
120 PRINT "ASKING QUESTIONS WHICH HAVE
130 PRINT "YES OR NO ANSWERS, TRY TO
140 PRINT "GUESS THE OBJECT WHICH HAS
150 PRINT "BEEN SELECTED."
155 PRINT
160 PRINT "BE SURE TO END EACH QUESTION WITH A
170 PRINT "QUESTION MARK."
180 PRINT
190 PRINT
195 B$="AEIOUY"
200 C=0
210 REM *ROUND
220 C=C+1
230 REM *QUESTION
240 PRINT "ENTER QUESTIONS #";C
250 INPUT A$
260 IF RIGHT$(A$,1)="?" THEN 290
270 PRINT "THAT ISN'T A QUESTION.
275 PRINT "PLEASE ASK A QUESTION."
280 GOTO 230
290 YES=0:NO=1
300 FOR I=1 TO 6
310 IF MID$(A$,LEN(A$)-1,1)=MID$(B$,I,1) THEN YES=1:NO=0
320 NEXT I
```

```
330 FOR PAUSE=1 TO 50:RND(1):NEXT PAUSE
340 IF YES THEN PRINT "YES"
350 IF NO THEN PRINT "NO"
360 PRINT
370 IF C<20 THEN 210
380 PRINT "END OF TWENTY QUESTIONS."
390 PRINT "PRESS RETURN TO START AGAIN."
400 GET A$:IF A$="" THEN 400
410 RUN
420 END
READY.
```

Program 2: Atari Version

```
100 REM *20 QUESTIONS
105 DIM A$(40),B$(6)
110 PRINT "WELCOME TO THE GAME OF TWENTY
Y"
120 PRINT "QUESTIONS. BY ASKING QUESTIONS WHICH"
130 PRINT "HAVE YES OR NO ANSWERS, TRY TO GUESS"
140 PRINT "THE OBJECT WHICH HAS BEEN SELECTED."
150 PRINT
160 PRINT "BE SURE TO END EACH QUESTION WITH A"
170 PRINT "QUESTION MARK."
180 PRINT
190 PRINT
195 B$="AEIOUY"
200 C=0
210 REM *ROUND
220 C=C+1
230 REM *QUESTION
240 PRINT "ENTER QUESTION #";C
250 INPUT A$
260 IF A$(LEN(A$))="?" THEN 290
270 PRINT "THAT ISN'T A QUESTION. PLEASE ASK A QUESTION."
280 GOTO 230
290 YES=0:NO=1
300 FOR I=1 TO 6
310 IF A$(LEN(A$)-1,LEN(A$)-1)=B$(I,I) THEN YES=1:NO=0
320 NEXT I
330 FOR PAUSE=1 TO 50:RND(0):NEXT PAUSE
340 IF YES THEN PRINT "YES"
350 IF NO THEN PRINT "NO"
360 PRINT
370 IF C<20 THEN 210
380 PRINT "END OF TWENTY QUESTIONS."
390 PRINT "PRESS RETURN TO START AGAIN."
400 INPUT A$
410 RUN
420 END
```


NEW PRINTERS. NEW PERIPHERALS. SAME OLD RELIABLE QUALITY AND VALUE.

1982 will find more OEM's, businesses, dealers and personal computer users turning to MICROTEK than ever before.

TekWriter-1



80 Column Dot Matrix Printer (Formerly BYTEWRITER-1)

The Tekwriter-1 printer is, dollar for dollar, the finest value in the industry. And we've proved it by comparing the Tekwriter-1 to the Epson MX-80. Our print speed is 14 lines per minute faster, our life expectancy is longer, the character sets are the same, and the interface, warranty and printhead replacement cost are all identical.* But the biggest difference is the price. The Tekwriter-1 is about \$300 less.

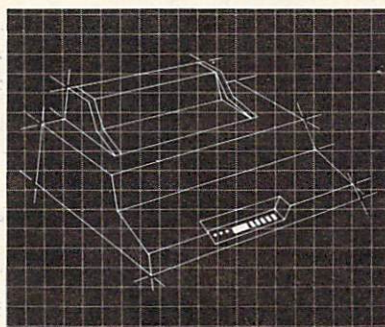
Our extensive testing has proved that the Tekwriter-1 interfaces problem-free to most parallel Centronics and serial (RS-232) computers.

The Tekwriter-1 is tough to beat for performance and quality.

*Data Source: Epson MX-80 Operation Manual

Parallel \$349
Serial \$389

TekWriter-2



NEW! 80/132 Column Dot Matrix Printer

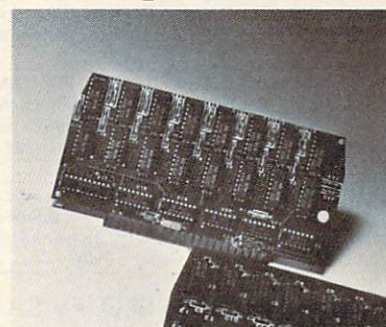
The Tekwriter-2 is perfectly suited to personal, business or OEM applications. Tekwriter-2 is designed to accept single sheet, roll or pin feed paper. It has a 9-wire dot matrix impact print head which produces crisp characters and has underlining capability. The printer is manufactured to run extremely quietly even while operating at peak output levels.

Tekwriter-2 is especially well suited to handle an abundance of text entry because of its data buffer expansion capability to 25K. This ability makes it an efficient graphics generator.

Parallel interface (Centronics type). Interfaces all models of TRS-80, Apple, and Atari 400/800, and most computers with Centronics printer interface.

\$695

Peripherals



16K Apple Memory Board

Expands Apple II to 64K RAM Memory. Works with MICROSOFT Z-80 Softcard, Apple PASCAL and Visicalc software.

16K-32K Atari Memory Board

4116 RAM (200NS) Compatible with Atari 400/800

Parallel/Serial Data Buffer Converter

Interfaces with most computers and printers on the market today. Switch selectable parallel or serial input/parallel or serial output. Data buffer 2K standard — expandable to 62K. Serial I/O BAUD rates switch independently selectable.

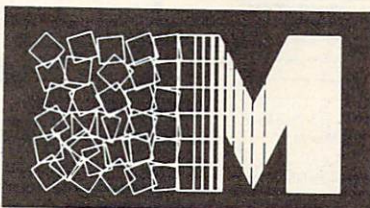
Atari Parallel or Serial Printer Cables

Pre-tested. Centronics or (RS-232) compatible.

APPLE PARALLEL INTERFACE CARD

Quantity and OEM discounts available.

Continuing our quest for excellence.



MICROTEK inc.

TRS-80 is a trademark of Radio Shack, Inc.
Apple II is a trademark of Apple Computer, Inc.
Atari 400/800 are trademarks of Atari, Inc.
Microsoft is a trademark of Microsoft Consumer Products, Inc.
Z-80 is a trademark of Zilog, Inc.
Visicalc is a trademark of Personal Software, Inc.

MICROTEK
9514 Chesapeake Drive
San Diego, CA 92123
(714) 278-0633
Outside CA call
Toll Free (800) 854-1081
TWX. 910-335-1269

CLIP THIS AD!

TAKE ADVANTAGE OF YOUR PERSONAL COMPUTER'S



YOU CAN PLAY THE STOCK & BOND MARKETS WITH YOUR PERSONAL COMPUTER!

- NEW! ONE-OF-A-KIND** - 308 page illustrated Source Book can teach you how to use computers in the Investment Field. For Novice or Advanced Computer Hobbyists who want MORE from their machines and make money! Shows how to get started in Stock and Bond Markets PLUS how to use your computer for determining profitable stock selections, buy-sell decisions, and market evaluations. Order #T1251 Post Paid .. \$11.75
- NEW! CHALLENGING COMPUTER GAMES FOR YOUR TRS/APPLE/PET** - A Learn-by-Playing Manual that contains fascinating games, puzzles, battle simulations, memory teasers and valuable programming practice. For hours of fun, 288 pps. with illus. Order #T1275 Post Paid .. \$9.70
- THE COMPUTERIST'S HANDY MANUAL** - A practical one stop source of information and instruction needed by all small computer users. Informative 64 pps. 39 illust. especially for those who feel buried by Microprocessor data. Order #T1107 Post Paid .. \$5.25

• SEND - Check • M.O. • VISA/MASTERCARD
- **MONEY BACK GUARANTEE** -

TO: **CONSULTORS INT'L**

Box 6589 - TS - 245 Columbine St., Denver, CO 80206

FREE! 101 Title Catalog of Latest Hobby Books With Order!

Dealers - Reserve your copies of **COMPUTE's** first Atari and PET/CBM books today. Call 919-275-9809 for ordering information.

SOFTWARE FOR YOUR 16K TRS-80 COLOR MODEL I, III, ATARI 400/800, APPLE II



Do you know all the innovative ways of using BASIC commands? The staff at the Programmer's Institute have spent 8 months designing a set of programs explaining everything the manuals omit. And much more.

The Programmer's Program leads you step by step through the fundamentals of programming your computer. Then you explore the finer points... multiple loops, queues, stacks, game programming, sorts, trees, boolean logic, and memory savers. All these methods make your programming tasks easier and more efficient.

Difficult programs are built before your very eyes, and designed so you learn at your own speed! A must for every owner of a microcomputer (\$40).



On cassette or diskette*, our magazines are designed explicitly for your computer. Included every month are 6-10 ready-to-load programs ranging from games, home entertainment, and personal finance, to more of our unique "teaching" programs. We will also keep you informed on all the latest products.

- Our next issue will include:
1. STOCK MARKET ANALYSIS
 2. Word Search Puzzles
 3. Minefield with graphics
 4. Micro-Spell Game Quiz
- PLUS TWO SPECIAL TEACHING PROGRAMS

A. Generating Mazes
B. Understanding Binary Trees
(Back issues are available)
You have already missed Concentration, Checkers, Poker, Football, Algebra and Geometry tests, Schedule 1040, Mailing List, and Home Budget Analysis. The price per subscription to TRC, APPLETREE, or MAGATARI is \$50 per year, \$30 per 1/2 year, and \$10 for a trial issue. Don't miss anymore issues!

Our complete home financial package with check maintenance, income/net worth statements, graphing, budgeting, mailing list, and appointment/bill calendars is available for only \$50 or **ABSOLUTELY FREE** with any \$50 order. Purchase both above packages and your net cost is only \$75. **ORDER TODAY!**

THE PROGRAMMER'S INSTITUTE
A Futurehouse Company
P.O. Box 3191 Dept. C
Chapel Hill, N.C. 27514
(919) 489-2198
MC & Visa Welcome
 Programmer's Program Year Subscription 1/2 Year Both Trial Issue
 Computer Model Cassette Diskette

name _____
address _____
city/st _____

*All software available on cassette or diskette for the TRS-80 Model III, Atari 400/800, Apple II. On cassette for the Model I, Color Ext. Basic. (For diskette add \$1 per month.)



400 16K	-----	\$319.00
400 YOURS TO 32K OR 48K	-----	CALL
800 16K	-----	649.00
410 RECORDER	-----	89.00
810 DISK DRIVE	-----	445.00
850 INTERFACE	-----	174.00
830 MODEM	-----	139.00
825 PRINTER	-----	575.00
484 COMMUNICATOR	-----	299.00
ITT Cordless phone	-----	199.95
ZENITH GRN. PHOS. MONITOR	-----	129.00
EPSON PRINTERS	-----	CALL
SOFTWARE	-----	CALL
SHARP CALCULATORS	-----	CALL
SPECIALS!	-----	CALL

Prices subject to change without notice. Shipping extra. No tax out of state. Ca. residents add appropriate taxes.

WE ARE AN AUTHORIZED ATARI SALES AND SERVICE CENTER



COMPUTERTIME, INC.

P.O. Box 216
Kentfield, CA 94914

CALL TOLL-FREE 800-227-2520
In California 800-772-4064

COMPUTE!'s Listing Conventions

Many of the programs which are listed in **COMPUTE!** use special keys (cursor control keys, color keys, etc.) To make it easy to tell *exactly* what should be typed in when copying a program into the computer, we have established the following listing conventions.

For The Atari

All the editing and cursor control characters are spelled out and surrounded by brackets in the program listings: {CLEAR} for "clear screen." Other characters, such as CTRL-T (the "ball" character) will be listed as the "normal" character, but it will be within brackets: {T}. A series of identical control characters will be indicated by a number within the brackets: {3DOWN} means type ESC CURSOR-DOWN three times; {12 R} would mean type CTRL-R twelve times. Remember to press the ESC (escape) key before each cursor control key. If you should see {ESC} itself in a program listing, you would press ESC *twice*.

Two of the control characters, {=} and {-}, should be shifted. Any reverse field text will be enclosed within vertical lines. (In other words, any time you see a vertical line within a program listing in **COMPUTE!**, press the Atari logo key {A}.)

Atari Conventions

```
{CLEAR}= SHIFT-< (Clear Screen)
{UP}= CTRL-minus (Cursor Up)
{DOWN}= CTRL-equals (Cursor Down)
{LEFT}= CTRL-plus (Cursor left)
{RIGHT}= CTRL-asterisk (Cursor right)
{BACK S}= BACK S (Back space)
{DELETE}= CTRL-DELETE (Delete character)

{DEL LINE}= SHIFT-DELETE (Delete Line)
{INSERT}= CTRL-INSERT (Insert character)

{INS LINE}= SHIFT-INSERT (Insert line)
{ESC}= ESC (ESCAPE key pressed twice)
{TAB}= TAB (Tab key)
{CLR TAB}= CTRL-TAB (Clear tab setting)
{SET TAB}= SHIFT-TAB (Set tab stop)
{BELL}= CTRL-2 (Ring buzzer)
```

For PET/CBM/VIC

Generally, any PET/CBM/VIC program listings will contain bracketed words which spell out any special characters: {DOWN} would mean to press the cursor-down key; {3DOWN} would mean to press the cursor-down key three times.

To indicate that a key should be *shifted* (hold down the SHIFT key while pressing the other key), the key would be underlined in our listing. For example, S would mean to type the S key while holding the shift key. This would result in the "heart" graphics symbol appearing on your screen.

Sometimes in a program listing, especially within quoted text when a line runs over into the next line, it is difficult to tell where the first line ends. How many times should you type the SPACE bar? In our convention, when a line breaks in this way, the ~ symbol shows exactly where it broke. For example:

```
100 PRINT "TO START THE GAME ~
    YOU MAY HIT ANY OF THE KEYS
    ON YOUR KEYBOARD."
```

shows that the program's author intended for you to type two spaces after the word *GAME*.

For The Apple

Programs listed as "Microsoft" are written for the PET/CBM,

Apple, OSI, etc. Although the programs are general in nature, you may need to make a few changes for them to run correctly on your Apple. Microsoft BASIC programs written for the PET/CBM sometimes contain special cursor control characters. The following table shows equivalent Apple words. Notice that these Apple commands are *outside* quotations (and even separate from a PRINT statement). PRINT"[RVS]YOU WON" becomes INVERSE: PRINT"YOU WON":NORMAL

```
[CLEAR] (Clear Screen) HOME
[HOME] (Home cursor) VTAB 0:HTAB 0
[DOWN] (Cursor down)
    POKE 37,PEEK(37)+(PEEK(37)<23)
[UP] (Cursor up)
    POKE 37,PEEK(37)-(PEEK(37)>0)
[LEFT] (Cursor left) PRINT CHR$(8);
[RIGHT] (Cursor right)
    POKE 36,PEEK(36)+(PEEK(36)>(PEEK(32)
    +PEEK(33)))
[RVS] (Inverse video on. Turns off automatically after a
carriage return. To be safe, turn off inverse video after
the print statement with NORMAL unless the PRINT
statement ends with a semicolon.)
    INVERSE
[OFF] (Inverse video off) NORMAL
```

Shifted characters can represent either graphics characters or uppercase letters. If within text, just use the non-shifted character, otherwise substitute a space. Some "generalized" programs contain a POKE such as POKE 59468,14. Omit these from the program when typing it in. One final note: you will probably want to insert a question mark or colon within an INPUT prompt. PET/CBM and many other BASICs automatically print a question mark:

```
INPUT "WHAT IS YOUR NAME?";N$
    becomes
INPUT "WHAT IS YOUR NAME?";N$
```

All Commodore Machines

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

VIC Conventions

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

8032/Fat 40 Conventions

Set Window Top {SET TOP}	Erase To Beginning {ERASE BEG}
Set Window Bottom {SET BOT}	Erase To End {ERASE END}
Scroll Up {SCR UP}	Toggle Tab {TGL TAB}
Scroll Down {SCR DOWN}	Tab {TAB}
Insert Line {INST LINE}	Escape Key {ESC}
Delete Line {DEL LINE}	

Energy Workbook

David E. Pitts
Houston, TX

If your heating or cooling costs have increased by 30% or more last year like mine, then you are probably considering installing some energy saving measures such as: storm windows, a clock thermostat, more insulation, caulking, or weatherstripping. Since everyone's home is different and there is a wide diversity of climatic conditions in the United States, it is difficult to determine which of the many choices is the best investment. The program described here utilizes the characteristics of the house together with the estimated climate to determine a projected savings for the homeowner for a wide variety of energy improvements at locations within the contiguous 48 states. The homeowner may utilize this savings, together with the projected cost and the economic outlook, to determine if the payout period meets his criteria for a successful investment.

The energy workbook program allows for a wide variety of fuels for both heating and cooling: oil, natural gas, electricity, wood, liquid petroleum, gas, and coal. The savings due to installing storm windows, changing thermostat settings, caulking and weatherstripping, or adding ceiling or floor insulation are calculated for the homeowner. The required inputs are shown in Table 1. Repetitive calculations involving future energy cost can easily be made using the program, thus improving the homeowner's estimate of the accrued energy savings.

The program was written in Microsoft BASIC on an OSI 4PMF using simple I/O so that the program could be easily converted to other systems such as PET, Apple, and TRS-80. Atari owners will have to modify the program by adding PRINTs to the prompted INPUT statements, adding dimension statements for each string variable and changing the string concatenation and splitting as per page 39 of their user's guide. *[Atari owners: make the changes in the lines indicated in Program 2. — Ed.]* The program is based on an algorithm from the Federal Energy Administration (Reference 1) which divides the 48 contiguous states into climatic regions for cooling and heating for average housing, fuel, and climatic conditions. If the user's situation is unusual in terms of home construction, altitude, etc. additional advice from government offices or utility companies may be advisable.

String variables are used to read the table of states, cities, and heating (H) and cooling (C) factors. Commas are used for delimiters separating the states from the cities and their factors. Because of this, cities comprised of two or more words have had the interior blanks removed. Statements 20-45 decode the city and factors from the string B\$(I). The heating zone and the cooling zone each range from zero to five, with five being the most severe winter climate and zero being the most severe summer climate. The heating and cooling zones are used to calculate a heating factor and a cooling factor. The fuel factors FH(I) and FC(I) are read from the data statements for the fuel chosen by the user and a heating index (HI) or cooling index (CI) is calculated by the product of the heating (or cooling) factor times the fuel factor times the price per fuel unit.

The fuel index (FI) is calculated by the sum of the heating index and cooling index. The annual heating fuel cost is taken from the total energy cost for the heating season times .85 to account for use of other uses of fuel (e.g. hot water heating). The annual cooling cost is calculated from total cooling season fuel cost times .6 to account for other use such as lighting. These ratios can be checked by determining average off season to average in season usage. The appropriate ratios should be used in statements 175 and 200. The ratios in my home were .56 and .88 for cooling and heating respectively, quite close to the Energy Administration's estimate.

Annual heating saving due to changing the thermostat setting is calculated from the product of the number of degrees turned down times the annual heating cost (HS) times a savings factor (Y) calculated in lines 240-247. Additional savings due to setting back the nighttime temperature are calculated using a similar procedure, but with an added factor .3 (due to the reduced time the set back temperature is in effect). Cooling seasons savings are calculated from the annual cooling cost times .02 times the number of degrees the thermostat is turned up. The annual savings from caulking and weatherstripping is calculated from a draft factor times the total floor area times the fuel index. The draft factor is the sum of the factors for windows,

for fast development of fast, tight programs...
step beyond FORTH, to
RPL



High speed, low memory requirements, and user-friendly development tools are no longer mutually exclusive. **Reverse Polish Language**, a FORTH-like language now available for the PET and CBM computers, is faster than FORTH, easier to debug than BASIC, and more space-efficient than any other language known, including assembly language. Here's what **Loren Wright**, MICRO magazine's PET Vet, says about it:

"RPL is generally faster and more conservative of memory than FORTH . . . RPL will serve well the need for a language that is faster than BASIC yet easier to program than assembly language. The package is well-thought-out and well-documented."

RPL uses the ordinary Commodore BASIC screen editor for program entry and editing. And the full power of BASIC, in both immediate and program modes, remains available to the user throughout a development session. The RPL Compiler and Symbolic Debugger reside in the top 8K of memory, ready to be invoked at any time, directly from BASIC, via the commands "compile" and "debug". RPL source code is saved to disk or cassette just like BASIC source, and is compiled memory-to-memory for quick compilation turnaround and instant source accessibility. RPL supports separate compilation of program modules through the use of the compiler's "global symbol" features, which also permit the development of true "subroutine libraries".

The language itself is concise and straightforward, making it much easier to learn and master than most other computer languages. A total of only 47 special keywords and symbols provide the following capabilities:

- Nestable, multi-line IF . . . THEN . . . ELSE constructs.
- Nestable FOR . . . NEXT loops.
- Named subroutines and functions of arbitrary length.
- Compile-time constants and code ORGability.

- Full 16-bit integer arithmetic and logical manipulations.
- Built-in character-string handling.
- Stack-management directives including n-index, n-rotate.
- GET, INPUT, and PRINT operators
- Forward and backward symbolic references, including GOTO.
- Easy access to machine language.
- Predefined arrays with numeric and/or string contents.
- Local and global symbols.

. . . and much more. The 60-page RPL manual is clear and well-organized, making the language easy to learn and easy to use: **Loren Wright** says that **"the documentation is about the best I have ever seen."**

The Samurai RPL Symbolic Debugger is a screen-oriented, object-level debug facility using a soft-key-driven command syntax for ultra-ease of use. Features included are:

- Full visibility into both stacks at all times.
- Single-stepping, with source-level next-step display.
- Breakpointing in both auto-single-step and "go" modes.
- Address specification using expressions with symbols.
- Stack-edit capability on both stacks.
- Debugger video usage is transparent to target program.
- Extra run-time error-checking during debugging only.

. . . and, of course, much more. Here's what **Robert Baker**, author of the PET-pourri column in Kilobaud Micro-computing, says about it:

"RPL offers an unbeatable combination of speed, memory space efficiency, and ease of use. It is well-designed, well-implemented, and well-documented, and it deserves the serious consideration of every PET/CBM programmer. The Samurai RPL Symbolic Debugger, in particular, must be seen to be believed."

The compiler includes a special option making it very easy for you to create "execute-only" object modules from which all development-utility software and memory allocations have been excluded. The price you pay for the compiler also includes an unlimited license to resell the RPL "run-time library" (not the compiler) in conjunction with "execute-only" application object modules of your own.

The Samurai RPL Compiler is now available at the special introductory price of \$49.95, which includes the manual in a nice 3-ring binder and First Class postage within the continental U.S. Media supplied is of top quality, and is *not* copy-protected (this permits you to make backups for yourself without hassles). Compiler and debugger together are **\$80.91, complete**. Manuals are available separately at \$10.00 and \$4.00, respectively, and will be credited toward software purchase. Please specify machine type, memory size, ROM version, and media type (cassette, 4040, or 8050 diskette) when ordering.

**Order anytime, day or night,
7 days a week**

Outside Florida:

800-327-8965

(ask for ext. 2)

Within Florida: **305-782-9985**

VISA and Master Charge accepted

All orders shipped within 2 days of receipt

(For technical inquiries, please phone 305-782-9985)

For more information, or to order by check or money order, please write:

SAMURAI SOFTWARE
P.O. Box 2902
Pompano Beach, FL 33062

DYNACOMP

Quality software for*:

ATARI
PET/CBM
APPLE II Plus
OSBORNE-1
ALTAIR****

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

DYNACOMP OFFERS THE FOLLOWING

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

AND MORE...

- STARTRK 3.2 (Available for all computers)** Price: \$11.95 Cassette/\$15.95 Diskette
This is the classic Startrk 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 reviews in A.N.A.L.O.G., 80 Software Critique and Game Merchandising.
- LII' MEN FROM MARS (Atari only)** Price: \$19.95 Cassette/\$23.95 Diskette
Defend yourself! The little men from Mars are out to get you if you don't get them first. This is a hilarious high resolution animated graphics (arcade) game which exercises much of the Atari's power. Requires one joystick.
- 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.
- ESCAPE FROM VOLANTUM (Atari only)** Price: \$15.95 Cassette/\$19.95 Diskette
Bring the action and excitement of an arcade into your home with ESCAPE FROM VOLANTUM! To escape you must maneuver your space ship around obstacles and laser blast the dragon (without being eaten). If he is killed with a direct shot (not just a leg lopped off), a door opens to the outside. However, the door does not stay open indefinitely. If you fail to escape in time, the door closes and a new dragon appears. Sometimes you can smash through the door by repeatedly chipping away at it. Other times it is impervious. At the higher levels of play more obstacles and dragons appear, adding to the excitement. Uses high resolution graphics and sound. Runs in 16K.
- ALPHA FIGHTER (Atari only)** Price: \$13.95 Cassette/\$17.95 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: \$15.95 Cassette/\$19.95 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: \$15.95 Cassette/\$19.95 Diskette
This is a fast paced graphics game which places you in the middle of the "Dreadnaught" having just stolen its plans. The dragons 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.
- MIDWAY (Atari only)** Price: \$14.95 Cassette/\$18.95 Diskette
MIDWAY is an exciting extension of the game of Battleship. It mixes the challenges of strategy and chance. Your opponent can be another human or the computer. Color graphics and sound are both included. Runs in 16K.
- TRIPLE BLOCKADE (Atari only)** Price: \$14.95 Cassette/\$18.95 Diskette
TRIPLE BLOCKADE is a two-to-three player graphics and sound action game. It is based on the classic video arcade game which millions have enjoyed. The object is to direct your blockading 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, HORSESHOE, 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, WUMPUSS 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. Runs in 16K Atari.
- SPACE TRAP (Atari only, 16K)** Price: \$14.95 Cassette/\$18.95 Diskette
This galactic "shoot'em up" arcade game places you near a black hole. You control your spacecraft using the joystick and attempt to blast as many of the alien ships as possible before the black hole closes about you.
- CHIRP INVADERS (PET/CBM only)** Price: \$14.95 Cassette/\$18.95 Diskette
CHIRP INVADERS is an addictive game using graphics. A Federation space station must be reached before the Chirps conquer the Earth. Stationary obstacles, moving meteors, and the attacking Chirps must be avoided for a successful journey. Good luck.

CARD GAMES

- BACCARAT (Atari only)** Price: \$18.95 Cassette/\$22.95 Diskette
This is the European card game which is the favorite of the Monte Carlo jet set. Imagine yourself at the gaming table with 007 to your left and Goldfinger to your right. Learn and play BACCARAT at your leisure on the Atari. Contains full high resolution color graphics and matching sound. Runs in 16K. Requires one joystick.
- GIN RUMMY (Apple only)** Price: \$18.95 Cassette/\$22.95 Diskette
This is the best micro computer implementation of GIN RUMMY existing. The computer plays exceptionally well, and the HIRES graphics are superb. What else can be said?
- POKER PARTY (Available for all computers)** Price: \$17.95 Cassette/\$21.95 Diskette
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.
- GO FISH (Available for all computers)** Price: \$14.95 Cassette/\$18.95 Diskette
GO FISH is a classic children's card game. The opponent is a friendly computer with user inputs that are simple enough for small children to easily master. The Apple and Atari versions employ high resolution graphics for the display of hands. A must for children!

THOUGHT PROVOKERS

- MANAGEMENT SIMULATOR (Atari, North Star, OSBORNE 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)** Price: \$17.95 Cassette/\$21.95 Diskette
A realistic and extensive mathematical simulation 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 acrobatic 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)** Price: \$15.95 Cassette/\$19.95 Diskette
VALDEZ is a computer simulation of super tanker navigation in the Prince William Sound/Valdez Narrows region of Alaska. Included in this 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 modeled 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 reviews in 80 Software Critique and Personal Computing.
- BACKGAMMON 2.0 (Atari, North Star, OSBORNE 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.
- CHESS MASTER (North Star and TRS-80 only)** Price: \$19.95 Cassette/\$23.95 Diskette
This complete and very powerful 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. See review in onComputing.
- SUPER SUB CHASE (Atari only)** Price: \$19.95 Cassette/\$23.95 Diskette
SUPER SUB CHASE simulates a search and destroy mission. Set your course and keep an eye on the sonar readings as you hunt for the hidden submarine. Set the depth charge explosion depth and watch them sink towards the sub. This is an addictive game which takes advantage of the Atari's graphics and sound capabilities. One or two players. Joystick(s) required.
- FOREST FIRE! (Atari only)** Price: \$15.95 Cassette/\$19.95 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 starting 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.
- BLACK HOLE (Atari 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 EVACUATION! (Apple, Atari and TRS-80 only)** Price: \$15.95 Cassette/\$19.95 Diskette
Can you colonize the galaxy and evacuate the Earth before the sun explodes? Your computer becomes the ship's computer as you explore the universe to relocate millions of people. This simulation is particularly interesting as it combines many of the exciting elements of classic space games with the mystery challenge of ADVENTURE.
- 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. Runs in 16K Atari.
- CHOMPELO (Atari only)** Price: \$11.95 Cassette/\$15.95 Diskette
CHOMPELO 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.
- SPACE LANES (Available for all computers)** Price: \$10.95 Cassette/\$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!

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 (ATARI requires 24K). Except where noted, programs are available on ATARI, PET, TRS-80 (Level II) and Apple (AppleII) cassette and diskette as well as North Star single density (double density compatible) diskette. Additionally, most programs can be obtained on standard (IBM 3740 single density/double density compatible format) 8" CP/M floppy disks for systems running under MBASIC (for example, Altos, Xerox 820 and many others). 5 1/4" CP/M diskettes are available for the North Star and Osborne computer systems.

*ATARI, PET, CBM, NORTH STAR, CP/M, IBM, OSBORNE and XEROX are registered trademarks and/or trade marks.
**Except where noted, all TRS-80 Model II software is available on cassette (only) for the TRS-80 Model III. Exceptions: VALDEZ, CRIBBAGE, GRAFIX, CHESSMASTER. TRS-80 diskettes are not supplied with either DOS or BASIC.
***For most North Star disk-based systems. DYNACOMP presently does not support the new North Star Advantage.
****For Altair systems having Microsoft BASIC.

ADVENTURE

- CRANSTON MANOR ADVENTURE (North Star and CP/M only)** Price: \$19.95 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. Not available in 5 1/4" CP/M format.
- GUMBALL RALLY ADVENTURE (North Star only, 48K)** Price: \$21.95 Diskette
Take part in this outlaw race from the east coast to the west coast. The goal is to find your way to the finish line while maintaining the highest possible speed. You may choose one of five cars available at the garage. The choice will affect your speed and range. Remember to take spare parts and don't get caught speeding!
- UNCLE HARRY'S WILL (North Star only, 40K)** Price: \$24.95 Diskette
Uncle Harry has died and has left you everything. However, he has neglected to mention where everything is! Instead, his will consists of a poem which contains clues. You will have to travel all over the United States both by car and on foot to solve the puzzle, and there are over 300 locations to probe. Be careful and watch out for red herrings!

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.

List price \$375. DYNACOMP's price \$319.95 plus \$5.00 for shipping and handling.

- TALK TO ME (TNT Atari only, 24K)** Price: \$14.95 Cassette/\$18.95 Diskette
This program presents a superb tutorial on speech synthesis using the Atari 800 and TYPE-N-TALK™. TALK TO ME will illustrate normal word generation as well as phoneme generation. The documentation includes many helpful programming tips. TALK TO ME has been demonstrated on network (CBS) TV!

MISCELLANEOUS

- CRYSTALS (Atari only)** Price: \$ 9.95 Cassette/\$13.95 Diskette
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. Runs in 16K Atari.
- NORTH STAR SOFTWARE EXCHANGE (NSSE) LIBRARY**
DYNACOMP distributes the 21 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

BUSINESS and UTILITIES

MAILMASTER (Atari diskette only) Price: \$39.95 Diskette
MAILMASTER is a versatile software package for managing and manipulating mail lists and mini data bases. Each disk can hold over 700 customer entries containing name, address, three 3-letter key words and a phone number. The display is marked so that entries may be made and edited with ease. The status (e.g., disk space left, options, etc.) is shown at all times. Labels will be printed 1, 2 or 3 up, and all sorting (zip code and alphabetic) is performed by a fast machine language program.

PERSONAL FINANCE SYSTEM (Atari and North Star only) Price: \$39.95 Diskette
PFS is a single diskette, menu-oriented system composed of ten different programs. Besides recording your expenses and tax deductible items, PFS will sort and summarize expenses by payer, and display information on expenditures by any of 26 user defined codes by month or by payer. PFS will even produce monthly bar graphs of your expenses by category! This powerful package requires only one disk drive, minimal memory (20K 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 program). You can record checks plus cash expenses so that you can finally see where your money goes and eliminating thousands of tedious hand calculations. Contains high speed machine language sort. PFS has been demonstrated on network (CBS) TV!

FAMILY BUDGET (Apple and Atari only) Price: \$34.95 Diskette
FAMILY BUDGET is a very convenient financial 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 payroll and tax accounts. Data are easily retrieved giving the user complete control over an otherwise complicated (and unorganized!) subject.

INTELINK (Atari only) Price: \$49.95 Diskette
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. 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 LATER and later formatted using TEXT EDITOR II. All in all, TEXT EDITOR II is an inexpensive, easy to use, but very flexible editing system.

TEXT EDITOR II (CP/M) Price: \$29.95 Diskette/\$33.45 Disk
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 LATER and later formatted using TEXT EDITOR II. All in all, TEXT EDITOR II is an inexpensive, easy to use, but very flexible editing system.

PAYFIVE (Apple II plus diskette, two drives required) Price: \$149.95
This is an enormously flexible employee payroll system with extraordinarily good human engineering features. PAYFIVE prints checks and completes the required federal, state and local forms for up to 148 employees. The pay methods may be hourly, salary, commission or any combination. There are multiple options for pay periods, and they also can be used in any combination. PAYFIVE includes many other features and comes extremely well documented with a 200 page manual. The manual may be purchased separately for \$30, and that payment later applied to the software purchase.

SHOPPING LIST (Atari only) Price: \$12.95 Cassette/\$16.95 Diskette
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) Price: \$59.95 Diskette
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). You 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. TAX OPTIMIZER is a tax deductible!

UTIL (Apple only, 48K) Price: \$19.95 Diskette
UTIL is a disk oriented utility system which permits examining and changing of the contents of DOS 3.1 and 3.3 diskettes at the bit (nibble or byte) level. With UTIL you can easily examine the contents of a diskette sector by sector, restructure the sector pointers, reallocate sectors (e.g. bad sectors may be "hidden"), and perform many other sophisticated operations. For the experienced programmer.

TURNKEY AND MENU (Atari only) Price: \$17.95 Diskette
TURNKEY is a utility program which allows you to create autoboot/autorun diskettes easily. Simply load and run TURNKEY, load the program diskette to be modified, and answer the questions! The TURNKEY diskette also comes with DOS 2.0 and includes another program, MENU, MENU lists the contents of your diskette alphabetically, and permits the running of any BASIC program on the diskette by typing a single key. TURNKEY and MENU provide you with the ability to run any program on your diskette by simply turning on the computer and pressing a single key.

STOCKAID (Atari only) Price: \$29.95 Diskette
STOCKAID provides a powerful set of tools for stock market analysis. With STOCKAID you can display point and figure charts, as well as bar charts with oscillators. You can also examine long term moving averages and on-balance volume features. STOCKAID allows you to input daily data with a single diskette storage capability of 259 days x 16 ticks. Included are stock dividend and split adjustment capabilities. A very professional package!

SHAPE MAGICIAN (Apple II, 48K, diskette only) Price: \$29.95
At last! An utility for painting graphics shapes for the Apple. Create, edit and save up to 30 shapes which can then be used to develop arcade games or to simply enhance your programs. Add that professional touch!

STATISTICS and ENGINEERING

DIGITAL FILTER (Available for all computers) Price: \$39.95 Cassette/\$43.95 Diskette
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 SMOOTHER (Not available for Atari) Price: \$19.95 Cassette/\$23.95 Diskette
This special 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) Price: \$19.95 Cassette/\$23.95 Diskette
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.

TFA (Transfer Function Analyzer) Price: \$19.95 Cassette/\$23.95 Diskette
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) Price: \$24.95 Cassette/\$28.95 Diskette
HARMONIC ANALYZER was designed for the spectrum analysis of repetitive waveforms. Features include data file generation, data editing, automatic data, curve and residual 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) Price: \$19.95 Cassette/\$23.95 Diskette
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, curve and residual plotting; a statistical analysis (eg. standard deviation, correlation coefficient, etc.) and much more. In addition, new files 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) Price: \$19.95 Cassette/\$23.95 Diskette
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 (A(1), A(2), etc.) as one or more BASIC statement lines. Data, results and residuals 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) Price: \$24.95 Cassette/\$28.95 Diskette
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 (Not available on Atari cassette or for PET/CBM) Price: \$39.95 Cassette/\$43.95 Diskette
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 2^k-P factorial design. 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, deletion and appending.

BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2 (Not available for Atari)
DYNACOMP is the exclusive distributor for the software key to the popular text BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2 by F. Ruckdeschel (see advertisements in BYTE magazine). These subroutines have been assembled according to chapter. Included with each collection is a menu program which selects and demonstrates each subroutine.

Volume 1
Collection #1: Chapters 2 and 3 - Data and function plotting; complex variables and functions.
Collection #2: Chapter 4 - Extended matrix and vector operations.
Collection #3: Chapters 5 and 6 - Random number generators (Poisson, Gaussian, etc.); series approximations.
Price per collection: \$14.95 Cassette/\$18.95 Diskette
All three collections are available for \$39.95 (three cassettes) and \$49.95 (three diskettes).

Volume 2
Collection #1: Chapter 1 - Linear, polynomial, multidimensional, parametric least squares.
Collection #2: Chapter 2 - Series approximation techniques (economics, inversion, reversion, shifting, etc.).
Collection #3: Chapter 3 - Functional approximations by iteration and recursion.
Collection #4: Chapter 4 - CORDIC approximations to trigonometric, hyperbolic, exponential and logarithmic functions.
Collection #5: Chapter 5 - Table interpolation, differentiation and integration (Newton, LaGrange, splines).
Collection #6: Chapter 6 - Methods for finding the real roots of functions.
Collection #7: Chapter 7 - Methods for finding the complex roots of functions.
Collection #8: Chapter 8 - Optimization by steepest descent.
Price per collection: \$14.95 Cassette/\$18.95 Diskette
All eight collections are available for \$99.95 (eight cassettes) and \$129.95 (eight diskettes).
Because the texts are a vital part of the documentation, BASIC SCIENTIFIC SUBROUTINES, Volumes 1 and 2 are available from DYNACOMP.

BASIC SCIENTIFIC SUBROUTINES, Vol 1 (319 pages) \$19.95 + 75¢ postage
BASIC SCIENTIFIC SUBROUTINES, Vol 2 (790 pages) \$23.95 + \$1.50 postage

See reviews in KILBOAUD and Dr. Dobbs.
SOFTNET (Apple II 48K, diskette only) Price: \$129.95
SOFTNET may be used to create models of liquid pipeline systems to evaluate their flow performance. Up to 150 nodes with up to 150 connecting elements may be simulated, and models may be combined to form yet larger models. If you are involved in water distribution systems, chemical fluid flow problems, building plumbing, or similar situations, this is an ideal analysis tool.

ACTIVE CIRCUIT ANALYSIS (ACAP) (48K Apple only) Price: \$25.95 Cassette/\$29.95 Diskette
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 junction 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) Price: \$24.95 Cassette/\$28.95 Diskette
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 input AND, OR, NOR, EXOR, ENNOR and NAND gates, as well as inverters, J-K and D flip-flops, and one-shots. The response 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 HIRSH graphics. Save your breadboarding until the circuit is checked by LOGIC SIMULATOR.

NUMBERRUNNER (TRS-80 only) Price: \$69.95 Cassette/\$73.95 Diskette
This program is the most complete numerical analysis system available for the TRS-80. It can handle up to 25 data sets, each set having a six character name. It includes complete data editing facilities and convenient data input/output capability. The analyses available are multiple linear regression and correlation determination of residuals, data transformations and extensive graphics operations, including axis naming, and more. The supporting documentation is extremely well written and well organized, and includes appendices which describe the numerical procedures used in the program.

STATSORT (TRS-80 only) Price: \$39.95 Cassette/\$43.95 Diskette
STATSORT consists of several menu selected programs which allow the user to create (build, edit, merge), format and print files, (machine) sort them on any field, and numerically analyze (maximum, minimum, average, variance, standard deviation) tabulated data. STATSORT is well documented and easy to use. The cassette version can also be employed to create a data type which can be read by the Radio Shack Advanced Statistical Package.

STATTEST (TRS-80 only) Price: \$19.95 Cassette/\$23.95 Diskette
This is a statistical inference package which helps you make wise decisions in the face of uncertainty. In an interactive fashion you can build and edit data files and test the differences in means, variances and proportions. STATTEST will also perform data analysis as well as do linear regression. This menu-directed statistical workhorse is rounded out with a chi-square contingency test and a (uniform and normal) random sample generator. The documentation is written by a college professor who guides you through the various tests.

EDUCATION

HODGE PODGE (Apple only, 48K AppleSoft or Integer BASIC) Price: \$14.95 Cassette/\$18.95 Diskette
Let HODGE PODGE be your child's teacher. Pressing any key on your Apple will result in a different and intriguing "chopping" related to the letter or number of the chosen key. The program's graphics, color and sound are a delight for children from ages 1 1/2 to 7. HODGE PODGE is a non-intimidating teaching device which brings a new dimension to the use of computers in education. See the excellent reviews of this very popular program in INFOWORLD and SOFTALK.

TEACHER'S AIDE (Atari only) Price: \$13.95 Cassette/\$17.95 Diskette
TEACHER'S AIDE consists of three basic modules contained in one program. The first module provides addition and subtraction exercises of varying levels of difficulty. The second module consists of multiplication problems in which the student may be tested both on the final answer and/or on the subtotal answers in the long hand procedure. Several levels of complexity are provided here as well. The third module consists of division problems; one particularly nice feature of the division module is that the long hand division steps can be displayed along with the remainder in order to clearly demonstrate the procedure by which the remainder is derived. Using TEACHER'S AIDE is not merely a drill, but rather a learning experience.

PHARMACOLOGY UPDATE (PET only) Price: \$149.95 Cassette/\$153.95 Diskette
This is DYNACOMP's first educational software entry for the medical profession (more are coming!). PHARMACOLOGY UPDATE was written by a R.N. as a masters project, with the aid of a practicing pharmacologist and an electronics instructor. This package comes in two parts. The first part is a 200 page manual which is divided into 10 sections. Each of these sections provides both concise information and probing questions. The second part consists of 10 programs that are keyed to the text and which test the degree of your understanding of the text material. This package has great educational value for the beginning student as well as the professional interested in an efficient way to review and update his or her knowledge.

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. Purchase orders accepted.

Shipping and Handling Charge Delivery
Within North America: Add \$2.00 All orders (excluding books) are sent First Class.
Outside North America: Add 15% (Air Mail)

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

8" CP/M Disks
Add \$2.50 to the listed diskette price for each 8" floppy disk (IBM soft sector CP/M format). Programs run under Microsoft MBASIC or BASIC-80.

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

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

DYNACOMP, Inc. (Dept. E)
1427 Monroe Avenue
Rochester, New York 14618

24 hour order phone: (716) 442-8731 recording
Office phone (9AM-5PM EST): (716) 442-8960

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



ABOUT DYNACOMP

DYNACOMP is a leading distributor of small system software with sales spanning the world (currently in excess of 50 countries). During the past three 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, A.N.A.L.O.G., Softalk, Creative Computing and Kilobaud. DYNACOMP software has also been chosen for demonstration on network television. 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.

Boston

Chicago

Houston

San Francisco



Applefest

The Most Spectacular Extravaganza Ever... For Apple Users

At Applefest '82 hundreds of manufacturers, distributors and dealers will showcase the entire spectrum of Apple-compatible products including computers, components, peripherals, plug-in cards, publications, gifts, magazines, services, accessories and software for home, office and school.

Hands-on centers and multimedia presentations will demonstrate the newest applications for business, education and entertainment.

Seminars and workshops, conducted by the world's leading Apple authorities, will detail new uses to make your Apple more enjoyable and more useful than you ever imagined.

You'll meet thousands of other Apple owners and find the newest of everything for your Apple under one roof... and for sale at super show prices.

So if you use an Apple... or are thinking about buying one, you won't want to miss a minute of Applefest '82.

Ticket & Hotel Information

Send your check and a note indicating the specific show you wish to attend. Tickets and hotel information will be mailed back to you. Tickets can also be purchased at the show. Make all checks payable to Northeast Expositions Inc. 824 Boylston Street, Chestnut Hill, Mass. 02167 Tel: 617 739 2000.

Applefest/Boston

Fri-Sun May 14-16, 1982
Hynes Auditorium
Show Hours: 11AM to 6PM Daily
Admission: \$6 per day or \$10 for 2 days,
\$15 for 3 days

Applefest/Chicago

Fri-Sun Nov 5-7, 1982
Arlington Park Racetrack/Exposition Center
Arlington Heights, Ill.
Show Hours: 1PM to 10PM Daily
Admission: \$5 per day or \$8 for 2 days, \$12 for 3 days

Applefest/Houston

Fri-Sun Nov 19-21, 1982
Albert Thomas Convention Center
Show Hours: 1PM to 10PM Daily
Admission: \$5 per day or \$8 for 2 days, \$12 for 3 days

Applefest/San Francisco

Fri-Sun Dec 3-5, 1982
Moscone Center
Show Hours: 1PM to 10PM Daily
Admission: \$5 per day or \$8 for 2 days, \$12 for 3 days

Applefest is produced by Northeast Expositions Inc. and is sanctioned by Apple Computer Inc. and The Boston Computer Society. Apple and Applefest are registered trade and service marks of Apple Computer Inc.


```

120 INPUT"COST PER UNIT FOR HEATING FUEL(CENTS)";S:S=S/100
125 HI=S*FH(J)*HF:REM HEAT INDEX
126 PRINT:PRINT:INPUT"CHOOSE # FOR COOLING FUEL";J
127 INPUT"COST PER UNIT FOR COOLING FUEL(CENTS)";S:S=S/100
130 CI=S*FC(J)*HC:FI=HI+CI:REM COOL AND FUEL INDEX
135 PRINT:PRINT:PRINT:PRINT
145 PRINT"INPUT # OF SQUARE FT OF SINGLE GLASS WINDOWS, DO NOT"
150 INPUT"COUNT STORM WINDOWS OR SLIDING GLASS DOORS";X
170 X=INT(X*100*FI*.65)/100
175 PRINT"ANNUAL SAVINGS DUE TO STORM WINDOWS= $";X:X=.85:GOSUB800
180 PRINT:PRINT"IS HEATING FUEL USED FOR OTHER PURPOSES, E.G. COOKING ";
190 INPUTB$:IFASC(B$)=78THENX=1
200 INPUT"ANNUAL HEATING FUEL COST (DOLLARS)";HS:HS=HS*X:PRINT:PRINT:X=.6
210 PRINT"IS COOLING FUEL USED FOR OTHER PURPOSES, E.G. LIGHTING";
220 INPUTB$:IFASC(B$)=78THENX=1
230 INPUT"ANNUAL COOLING FUEL COST (DOLLARS)";CS:CS=CS*X
240 PRINT:PRINT:Y=.05:FORI=1TO3:IFI=HTHEN247
245 Y=Y-.01:NEXT:IFH=4THENY=.025
246 IFH=5THENY=.02
247 GOSUB800
250 PRINT"THE FOLLOWING SECTION EVALUATES THE SAVINGS OBTAINED BY TURNING"
255 PRINT"THE THERMOSTAT DOWN IN WINTER OR UP IN SUMMER FROM THE SETTING"
256 PRINT"YOU HAVE BEEN USING.":PRINT:PRINT:PRINT"HEATING":PRINT
260 INPUT"DEGREES TURNED DOWN DURING DAY";X:S=INT(100*Y*HS*X)/100
265 PRINT"SAVINGS = $";S:PRINT"ADDITIONAL DEGREES TURNED DOWN DURING NIGHT";
270 INPUTX:I=INT(100*Y*HS*X*.3)/100:PRINT"SAVINGS= $";I
280 S=S+I:PRINT"ANNUAL TOTAL HEATING SAVINGS = $";S:PRINT:PRINT"COOLING":PRINT
285 INPUT"DEGREES THERMOSTAT TURNED UP DURING COOLING";X
290 I=INT(100*CS*X*.02)/100:PRINT"SAVINGS = $";I
300 PRINT:PRINT"TOTAL ANNUAL SAVINGS = $";S+I:GOSUB800
310 PRINT:PRINT:PRINT"ANNUAL SAVINGS FROM CAULKING AND WEATHERSTRIPPING"
315 PRINT"CHECK DRAFTS HOLDING CANDLE NEAR CRACK ON WINDY DAY"
320 PRINT"CHOOSE ONE OF FOLLOWING":PRINT"          1) WINDOWS WITH GOOD FIT"
340 PRINT"          2) SOME LEAKAGE":PRINT"          3) RATHER DRAFTY"
350 INPUTY:PRINT:PRINT"CHOOSE ONE OF FOLLOWING":PRINT"          1) DOORS FIT GOOD"
360 PRINT"          2) SOME LEAKAGE":PRINT"          3) DRAFTY":INPUTI
370 PRINT:PRINT:PRINT"CHOOSE ONE OF FOLLOWING":PRINT
380 PRINT"          1) CAULKING AND WEATHERSTRIPPING GOOD":PRINT"          2) NEEDREPAIR"
390 PRINT"          3) NO CAULKING OR WEATHERSTRIPPING":INPUTS
400 INPUT"FLOOR AREA OF HOUSE - SQ FT";X
410 X=X*(Y+I+S-3)/100*FI:X=INT(X*100)/100:PRINT
420 PRINT"ANNUAL SAVINGS FOR CAULKING AND WEATHERSTRIPPING= $";X:GOSUB800
440 PRINT:PRINT:PRINT"ANNUAL SAVINGS FROM CEILING INSULATION":PRINT:PRINT
450 Y=38:INPUT"CEILING R VALUE";X:IFH<3THENY=26
455 IFH=3THENY=30
460 IFH=4THENY=33
465 INPUT"FIRST FLOOR AREA OF HOUSE (SQ FT)";F
470 R=Y:GOSUB900:I=R:R=X:GOSUB900:X=R:X=INT(100*(X-I)*F*FI)/100
475 IFX<0THENX=0
480 PRINT"ANNUAL SAVINGS BY BRINGING CEILING R UP TO";Y;" = $";X:GOSUB800
550 INPUT"IS THE HOUSE ON PILLARS OR HAVE AN UNHEATED BASEMENT";B$
555 IFASC(B$)=78THEN799
560 PRINT"CHOOSE FOUNDATION FACTOR FROM LIST BELOW":PRINT
565 PRINT"          FACTOR          FOUNDATION CHARACTERISTICS":PRINT
570 PRINT"          0.5 BUILDING WITH TIGHT CRAWL SPACE"
580 PRINT"          0.5 BUILDING WITH TIGHT BASEMENT (UNHEATED)"
590 PRINT"          0.8 STONE WALL BASEMENT (UNHEATED)"
600 PRINT"          0.8 2 FT OR MORE OF BASEMENT WALL EXPOSED (UNHEATED)"
610 PRINT"          0.8 CRAWL SPACE SKIRTED"
620 PRINT"          1.0 BUILDING ON PILLARS WITH NO SKIRTS"
625 PRINT:INPUT"FLOOR FACTOR FROM ABOVE TABLE";J
627 Y=11:IFH>1THENY=13:IFH>2THENY=19:IFH>3THENY=22
628 R=Y:GOSUB900:Q=R:INPUT"CURRENT R FACTOR FOR FLOOR";R

```


LETTER PERFECT T.M. LJK

WORD PROCESSING

ATARI 400/800

APPLE II & II+

EASY TO USE — Letter Perfect is a single load easy to use program. It is a menu driven, character orientated processor with the user in mind. **FAST** machine language operation, ability to send control codes within the body of the program, mnemonics that make sense, and a full printed page of buffer space for text editing are but a few features. Screen Format allows you to preview printed text. Indented margins are allowed. Data Base Merge with **DATA PERFECT** by LJK, form letters, accounting files and mailing labels only with **MAIL MERGE/UTILITY** by LJK. **FEATURES** — Proportional/Incremental spacing * Right Justification * File Merging * Block movement * Headers * Footers * Print Multiple Copies * Auto Page Numbering * Scroll forward/backward * Search and Replaces * Full cursor control * Underlining * Boldface * Superscripts * Subscripts * Auto page numbering * Insert character/line * Delete character/line * Centering * Horizontal tabs/changeable * Multifunction format line (line spacing — left margin — page width — lines/page — change fonts — top/bot margin adjust) **MUCH MORE!** \$149.95

ATARI VERSION 2.0 #2001

Uses proportional font, right justified with Atari 825/Centronics* 737, 739 printers. Uses EPSON MX* Series + Graftrax/italized font. Can mix type fonts on same page; mix boldface and enhanced font in same line with justification. Can be used with 16K Atari/400.

"Compared to the price of many other word processors, this package is a steal. It does everything the advertisement claims and more. On top of this the software is very easy to use." **A.N.A.L.O.G. MAGAZINE**

APPLE VERSION 5.0 #1001

DOS 3.3 compatible — Use 40 or 80 column interchangeably (Smarterm — ALS; Videoterm-Videx; Full View 80 — Bit 3 Inc.; Vision 80 — Vista; Sup-R-Term — M&R Ent.) Reconfigurable at any time for different video, printer, or interface. **USE HAYES MICROMODEM II*** LCA necessary if no 80 column board, need at least 24 K of memory. Files saved as either Text or Binary. Shift key modification allowed. Data Base Merge compatible with **DATA PERFECT*** by LJK.

"For \$150, Letter Perfect offers the type of software that can provide quality word processing on inexpensive micro-computer systems at a competitive price." **INFOWORLD**

DATA PERFECT T.M. LJK

Complete Data Base System. User orientated for easy and fast operation. 100% Assembly language. Easy to use. You may create your own screen mask for your needs. Searches and Sorts allowed, Configurable to use with any of the 80 column boards of Letter Perfect word processing, or use 40 column Apple video. Lower case supported in 40 column video. Utility enables user to convert standard files to Data Perfect format. Complete report generation capability. **Much More!**

EDIT 6502 T.M. LJK

This is a coresident — two pass **ASSEMBLER, DIS-ASSEMBLER, TEXT EDITOR, and MACHINE LANGUAGE MONITOR**. Editing is both character and line oriented. Disassemblies create editable source files with ability to use predefined labels. Complete control with 41 commands, 5 disassembly modes, 24 monitor commands including step, trace, and read/write disk. Twenty pseudo opcodes, allows linked assemblies, software stacking (single and multiple page) plus complete printer control, i.e. pagination, titles and tab setting. User can move source, object and symbol table anywhere in memory. Feel as if you never left the environment of **BASIC**. Use any of the 80 column boards as supported by **LETTER PERFECT**, Lower Case optional with **LCG**.

LJK DISK UTILITY APPLE \$29.95

This menu driven program allows the user to manipulate a variety of different file types. Binary, Text, and Source files may be easily converted into each other. The program may be used with **APPLESOFT***, **VISCALC***, and other programs. These program files may be readily adapted for multiple use including editing with **LETTER PERFECT** word processings.

APPLE & ATARI INTRODUCTORY PRICE DATA BASE MANAGEMENT \$99.95

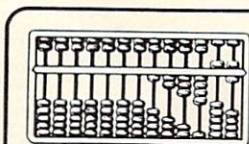
MAIL MERGE/UTILITY ATARI \$29.95

This menu driven program combined with **LETTER PERFECT** allows user to generate form letters and print mailing labels. With the Atari, you may **CONVERT ATARI DOS FILES**, or Visicalc files compatible for editing with **LETTER PERFECT**. Utility creates Data Base files for Letter Perfect.

LOWER CASE CHARACTER GENERATOR \$24.95



Lower Case Character Generator for the Rev. 7, Apple II or II+ computers. When installed, this Eprom will generate lower case characters to the video screen. Lower case characters set has two dot true descenders. Installation instruction included. Manual includes listing of software for full support and complete instructions for shift key modification. Compatible with **LETTER PERFECT**.



LJK ENTERPRISES INC.
P.O. Box 10827
St. Louis, MO 63129
(314) 846-6124

**DEALER
INQUIRES
INVITED**

*Trademarks of: Apple Computer — Atari Computer — Epson America — Hayes Microcomputers — Personal Software — Videx — Bit 3 Inc. — M&R Ent. — Advanced Logic Systems — Vista Computers


```

630 GOSUB900:X=J*(R-Q)*F*FI:PRINT:PRINT:X=INT(X*100)/100:IFX<0THENX=0
640 PRINT"ANNUAL SAVINGS BY INCREASING FLOOR R VALUE TO ";Y;" =";X
645 GOSUB800
799 RESTORE:PRINT:PRINT:GOSUB800:PRINT:PRINT:L=96:GOTO14
800 PRINT"=====
801 RETURN
828 R=Y:GOSUB900:I=R
899 REM CONDUCTION FACTOR SUBROUTINE
900 IFR<11THEN920
901 IFR<12THENR=.077:RETURN
902 IFR<15THENR=.066:RETURN
903 IFR<20THENR=.048:RETURN
904 IFR<24THENR=.042:RETURN
905 IFR<28THENR=.036:RETURN
906 IFR<34THENR=.031:RETURN
910 R=.025:RETURN
920 R=.5-.0385*R:RETURN
1000 DATA CALIFORNIA,LOSANGELES 1 4 SANFRANCISCO 3 4 SACRAMENTO 1 3
1010 DATA COLORADO,DENVER 3 4 DURANGO 4 4 ASPEN 4 5
1020 DATA ALABAMA,MONTGOMERY 1 2 BIRMINGHAM 1 3 HUNTSVILLE 2 3
1030 DATA ARIZONA,PHOENIX 1 3 FLAGSTAFF 3 3,CONNECTICUT,HARTFORD 3 5
1040 DATA NEW MEXICO,ROSWELL 2 3 ALBUQUERQUE 3 3 SANTA FE 4 4
1050 DATA UTAH,SALT LAKE CITY 3 4 MOAB 4 4,IDAHO,BOISE 3 5 POCATELLO 4 4
1070 DATA MONTANA,BILLINGS 4 5,OREGON,PORTLAND 2 5 BAKER 3 5
1090 DATA WASHINGTON,SEATTLE 3 5,NEVADA,RENO 3 3 LAS VEGAS 1 3
1110 DATA NORTH DAKOTA,GRANDFORKS 5 5,OKLAHOMA,OKLAHOMA CITY 2 3
1120 DATA SOUTH DAKOTA,SIOUX FALLS 4 4 PIERRE 4 5
1130 DATA NEBRASKA,OMAHA 3 4,KANSAS,WICHITA 2 4 TOPEKA 3 4
1160 DATA TEXAS,DALLAS 1 3 HOUSTON 1 2 BROWNSVILLE 0 1 AMARILLO 2 3
1170 DATA LOUISIANA,NEW ORLEANS 1 2 SHREVEPORT 1 3
1180 DATA ARKANSAS,LITTLE ROCK 1 3 FAYETTEVILLE 2 3
1190 DATA MISSOURI,SPRINGFIELD 2 3 ST LOUIS 2 4 KANSAS CITY 3 4
1200 DATA IOWA,DES MOINES 3 4 SIOUX CITY 4 4,VERMONT,MONTPELIER 4 5
1210 DATA MINNESOTA,MINNEAPOLIS 4 5 DULUTH 5 5,NEW HAMPSHIRE,CONCORD 4 5
1220 DATA WISCONSIN,MADISON 4 4 EAUCLAIRE 4 5,RHODE ISLAND,PROVIDENCE 3 5
1230 DATA ILLINOIS,CHICAGO 3 4 SPRINGFIELD 2 4,VIRGINIA,RICHMOND 2 4
1240 DATA MICHIGAN,DETROIT 3 4 GRAND RAPIDS 4 5 SAULT ST.MARIE 5 5
1270 DATA INDIANA,INDIANAPOLIS 3 4 EVANSVILLE 2 4,WYOMING,CASPER 4 5
1290 DATA TENNESSEE,MEMPHIS 2 3 KNOXVILLE 2 4 CHATTANOOGA 2 3
1300 DATA MISSISSIPPI,JACKSON 1 2 TUPELO 1 3,KENTUCKY,LOUISVILLE 2 4
1320 DATA WEST VIRGINIA,CHARLESTON 3 4,MASSACHUSETTS,BOSTON 3 5
1330 DATA FLORIDA,MIAMI 0 1 JACKSONVILLE 1 2,OHIO,COLUMBUS 3 4
1340 DATA GEORGIA,SAVANNAH 1 3 ATLANTA 2 3,MAINE,PORTLAND 4 5
1350 DATA SOUTH CAROLINA,CHARLSTON 1 3,NEW JERSEY,NEWARK 2 4
1360 DATA NORTH CAROLINA,RALEIGH 2 3 ASHEVILLE 2 4 WILMINGTON 1 3
1390 DATA PENNSYLVANIA,PITTSBURGH 3 4,MARYLAND,BALTIMORE 2 4
1410 DATA NEW YORK,NEW YORK 3 4 ALBANY 4 5,DELAWARE,WILMINGTON 2 4
1480 DATA ERROR
1500 DATA OIL/GALLON,1,0,NAT GAS/CUFT,120,150,ELECTRICITY/KWH,30,15
1510 DATA WOOD/CORD,.01,0,LPG/CUFT,50,60,LPG/LBS,6,7,LPG/GALLON,1.3,1.5
1520 DATA COAL/TON,.006,0
2000 END

```

Program 2.

Change these lines for Atari:

```

0 DIM B$(20),C$(20),D$(20),BB$(4*10),BBL
(4),X(10),Y(10),FK(10),FC(10)
14 ? :? :? :? "STATE (DON'T ABBREVIATE)"
: : INPUT B$:FOR I=1 TO L:READ C$
15 IF B$(1,7)=C$(1,7) THEN B$=C$:READ D$
20 NEXT I:FOR I=1 TO 4:BBL(J)=0:NEXT I:I
=1:Y=LEN(D$):J=1
25 X=ASC(D$(I,I)):IF X=32 THEN 45
30 BBL(J)=BBL(J)+1:BB$(J-1)*10+1,(J-1)*
10+BBL(J)=CHR$(X):GOTO 55

```



```

45 I=I+1:Y(J)=VAL(D$(I,I)):I=I+2:Y(J)=VAL(D$(I,I))
60 POKE 85,15:Y(I):POKE 85,20:Y(BB$(I-1)*10+1,(I-1)*10+BB(I)):POKE 85,35:Y(B$:NEXT I
65 ? :? :? "CHOOSE # FOR NEAREST CITY":
INPUT I:H=X(I):C=Y(I):REM ZONES
85 NEXT I
90 HC=X:X=0:FOR I=0 TO 5:IF H=I THEN 100
:REM HF & CF ARE HEAT & COOL FACTORS
95 X=X+0.5:NEXT I
110 FOR I=1 TO 8:READ B$,A,B:FH(I)=A:FC(I)=B:PRINT "          ";I;B$:NEXT I

115 ? :? :? "CHOOSE # FOR HEATING FUEL(CENTS)":INPUT S:S=S/100
126 ? :? :? "CHOOSE # FOR COOLING FUEL":INPUT J
127 ? "COST PER UNIT FOR COOLING FUEL(CENTS)":INPUT S:S=S/100
150 ? "COUNT STORM WINDOWS OR SLIDING GLASS DOORS":INPUT X

200 ? "ANNUAL HEATING FUEL COST (DOLLARS)":INPUT HS:HS=HS*X:Y:Y=X*0.6
230 ? "ANNUAL COOLING FUEL COST (DOLLARS)":INPUT CS:CS=CS*X
245 Y=Y-0.01:NEXT I:IF H=4 THEN Y=0.025
260 ? "DEGREES TURNED DOWN DURING DAY":INPUT X:S=INT(100*Y*HS*X)/100
285 ? "DEGREES THERMOSTAT TURNED UP DURING COOLING?":INPUT X
400 ? "FLOOR AREA OF HOUSE-SQ FT":INPUT X
450 Y=38:Y="CEILING R VALUE":INPUT X:IF H<3 THEN Y=26
465 ? "FIRST FLOOR AREA OF HOUSE (SQ FT)":INPUT F
550 ? "IS THE HOUSE ON PILLARS OR HAVE AN UNHEATED BASEMENT":INPUT B$
625 ? :? "FLOOR FACTOR FROM ABOVE TABLE":INPUT J
628 R=Y:GOSUB 900:Q=R:Y="CURRENT R FACTOR FOR FLOOR":INPUT R

```

Figure 1. Sample Run

ITEMS NEEDED FOR ENERGY WORKBOOK

- 1) STATE
- 2) CITY
- 3) HEATING FUEL COST (E.G. .37 CENTS/CU FT)
- 4) COOLING FUEL COST (E.G. 5.14 CENTS/KWH)
- 5) SQUARE FT OF SINGLE GLASS WINDOWS IN HOUSE
- 7) ANNUAL HEATING AND COOLING FUEL COST
- 8) CHECK FOR LEAKAGE AROUND WINDOWS AND DOORS WITH CANDLE
- 9) FLOOR AREA OF HOUSE - SQ FT
- 10) CEILING R VALUE - USE TABLE PROVIDED WITH INSTRUCTIONS
- 11) FIRST FLOOR AREA - SQ FT
- 12) FLOOR R VALUE IF BASEMENT IS UNHEATED OR HOUSE IS ON PILLARS

STATE(DON'T ABBREVIATE)? TEXAS

1	DALLAS	TEXAS
2	HOUSTON	TEXAS
3	BROWNSVILLE	TEXAS
4	AMARILLO	TEXAS

CHOOSE # FOR NEAREST CITY? 2

1	OIL/GALLON
2	NATGAS/CUFT

- 3 ELECTRICITY/KWH
- 4 WOOD/CORD
- 5 LPG/CUFT
- 6 LPG/LBS
- 7 LPG/GALLON
- 8 COAL/TON

CHOOSE # FOR HEATING FUEL? 2
 COST PER UNIT FOR HEATING FUEL(CENTS)? .45

CHOOSE # FOR COOLING FUEL? 3
 COST PER UNIT FOR COOLING FUEL(CENTS)? 6.

INPUT # OF SQUARE FT OF SINGLE GLASS WINDOWS, DO NOT
 COUNT STORM WINDOWS OR SLIDING GLASS DOORS? 190
 ANNUAL SAVINGS DUE TO STORM WINDOWS= \$ 116.7

=====

IS HEATING FUEL USED FOR OTHER PURPOSES, E.G. COOKING ? Y
 ANNUAL HEATING FUEL COST (DOLLARS)? 175.

IS COOLING FUEL USED FOR OTHER PURPOSES, E.G. LIGHTING? Y
 ANNUAL COOLING FUEL COST (DOLLARS)? 800.

=====

THE FOLLOWING SECTION EVALUATES THE SAVINGS OBTAINED BY TURNING
 THE THERMOSTAT DOWN IN WINTER OR UP IN SUMMER FROM THE SETTING
 YOU HAVE BEEN USING.

HEATING

DEGREES TURNED DOWN DURING DAY? 5
 SAVINGS =\$ 37.18
 ADDITIONAL DEGREES TURNED DOWN DURING NIGHT? 5
 SAVINGS=\$ 11.15
 ANNUAL TOTAL HEATING SAVINGS =\$ 48.33

COOLING

DEGREES THERMOSTAT TURNED UP DURING COOLING? 5
 SAVINGS =\$ 48

TOTAL ANNUAL SAVINGS =\$ 96.33

=====

ANNUAL SAVINGS FROM CAULKING AND WEATHERSTRIPPING
 CHECK DRAFTS HOLDING CANDLE NEAR CRACK ON WINDY DAY
 CHOOSE ONE OF FOLLOWING

- 1) WINDOWS WITH GOOD FIT
- 2) SOME LEAKAGE
- 3) RATHER DRAFTY

? 2

CHOOSE ONE OF FOLLOWING

- 1) DOORS FIT GOOD
- 2) SOME LEAKAGE
- 3) DRAFTY

? 2

CHOOSE ONE OF FOLLOWING

- 1) CAULKING AND WEATHERSTRIPPING GOOD
- 2) NEEDREPAIR
- 3) NO CAULKING OR WEATHERSTRIPPING

? 2

FLOOR AREA OF HOUSE - SQ FT? 2000

ANNUAL SAVINGS FOR CAULKING AND WEATHERSTRIPPING= \$ 56.7

=====

ANNUAL SAVINGS FROM CEILING INSULATION

CEILING R VALUE? 19

FIRST FLOOR AREA OF HOUSE (SQ FT)? 2000

ANNUAL SAVINGS BY BRINGING CEILING R UP TO 26 = \$ 22.68

=====

IS THE HOUSE ON PILLARS OR HAVE AN UNHEATED BASEMENT? Y

CHOOSE FOUNDATION FACTOR FROM LIST BELOW

FACTOR	FOUNDATION CHARACTERISTICS
--------	----------------------------

- | | |
|-----|--|
| 0.5 | BUILDING WITH TIGHT CRAWL SPACE |
| 0.5 | BUILDING WITH TIGHT BASEMENT (UNHEATED) |
| 0.8 | STONE WALL BASEMENT (UNHEATED) |
| 0.8 | 2 FT OR MORE OF BASEMENT WALL EXPOSED (UNHEATED) |
| 0.8 | CRAWL SPACE SKIRTED |
| 1.0 | BUILDING ON PILLARS WITH NO SKIRTS |

FLOOR FACTOR FROM ABOVE TABLE? 1.

CURRENT R FACTOR FOR FLOOR? 7

ANNUAL SAVINGS BY INCREASING FLOOR R VALUE TO 11 = \$ 290.11

===== ©

Dealers — Reserve your copies of
COMPUTE!'s first Atari and PET/CBM books
 today. Call 919-275-9809 for ordering information.

Two Short Programs Of CAI For Teaching BASIC

R. Hiatt
Dept. of Chemistry
Brock University
St. Catharines, Ontario

While much is written about, and many programs are produced for, CAI in diverse subjects and disciplines, there seems to be very little about CAI applied to learning about computation itself.

To be sure, the computer itself is the best CAI for individual self-paced effort. But for the classroom, demonstration programs are useful. By CAI, however, I don't mean simple routines that are merely examples, but rather, programs that make their point by manipulation and/or simulation of a process. I venture to present two examples.

1. PEEKPROG – A BASIC program that PEEKs itself.

At some point in teaching a course in BASIC, it seems useful to PEEK out to the screen a page or so of a program. This can be in response to a question as to why conserving line numbers conserves memory space, or a similar query suggesting that a brief digression into actual program storage would be illuminating. (In my experience, it is wise to postpone any mention of bits, bytes, hex or ASCII until this kind of curiosity evinces itself.)

While it's easy enough to PEEK out a page from immediate mode, (for I=2049 to 2304: Print PEEK (I) " "; NEXT), and fill the screen with numbers, this is more astounding than useful. It takes a trained eye to discern any pattern at all.

Program 1 organizes the PRINT PEEK – so that each line number starts off a new line on the screen. By keeping the program short and the line numbers below 256 it is possible to pseudo list the whole program and have the line numbers easily recognizable (Figure 1). The line terminators can be pointed out, as can the linking bytes and the

program terminator.

BASIC tokens can be mentioned, and the students can practice their ASCII by reading the REM statement, etc.

The program itself illustrates READ...DATA – partly because the questions seem to arise about the time we're dealing with that subject, and partly because it seemed an easy way to control the position of carriage returns in the loop.

Actually, this turned up something about the Apple that I hadn't realized; that is, each time a DATA statement is edited, an additional space, actually another byte with value 32, is inserted between this DATA token and the first byte of the data. This, of course, changes the length of the program and the byte at which a new print line is wanted. In other words, the datum just corrected has been made erroneous by the process of correction. The only way out seems to be to retype the line.

2. READ/RESTORE – (Program 2) is a routine that simulates a small portion of program which reads data into two arrays, one numeric and the other string. The displayed portion of the program, (lower screen, Figure 2), consists of two FOR I = ... READ A (I) ..., separated by a RESTORE, the whole followed by a FOR I = ...READ A\$(I)... . Two pseudo cursors are employed, one flashing the current value of I at the end of the FOR I ... NEXT I loop, the other acting as a data pointer.

Action is controlled by the instructor, via the programmed "invisible GET"; i.e. IF PEEK - 16384 < 128 THEN The first (any) key depression causes a datum to be "READ"; its index and value appear in the table. This second key depression moves the data pointer and movements "I".

Progression of the program being entirely in the hands of the instructor, there is unlimited time to point out the salient features, to comment on indices, the differences between numeric and string data, etc., and to run the program two or three times for emphasis.

For Atari Users...

Program 3 will provide a dump of an Atari BASIC program, similar to Program 1. To merge it with another program, LIST it to tape or disk (with LIST"C:" or LIST"D:BDUMP"), load the program to be viewed, and then use ENTER"C:" or ENTER "D:BDUMP". Start the routine with GOTO 20000.

Program 4 is called "BASIC in Action." It is a display of a BASIC program (the "Atarized" version of Figure 1) as it RUNs. Just type it in and RUN it. A program will be listed at the bottom of the screen with an arrow pointing to the first line. When you press a key, the line will be executed. The action of the program, including the DATA statement pointer,

**CALL TOLL FREE
800 424-2738**



Save \$\$ on Popular Programs for Atari

LIMITED TIME OFFER

Now through March 15, take advantage of our price reduction on these popular programs

the
PROGRAM STORE

RACE IN SPACE



MATCH RACER

From Gebelli Software

A one or two player racing game that matches your skills against a diabolical road with randomly-occurring obstacles. Barricades, water, rocks and oil slicks all hamper your progress, and in the two-player version, your troubles are doubled! Realistic graphics and sound effects help make this game a delight.

16K disk...~~\$29.95~~ **Save 20%!**

THRU APRIL 15 ONLY: Pay Just \$23.95!

By Charles Bachand from Analog
Two-player game with 128 variations! Your objective is to travel through space further and faster than your opponent. All the while, you must dodge various densities of tiny asteroids and comets. To further impede your progress, you must avoid your opponent's (and your own) boomerang missiles! Selectable playing time from 3 to 5 minutes.

16K tape...~~\$19.95~~
16K disk...~~\$24.95~~ **Save 20%!**

THRU APRIL 15 ONLY:
Pay Just \$15.15 (T), \$19.95 (D)!



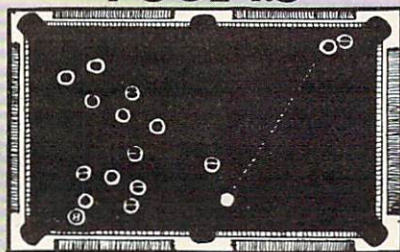
**WizArD
AND THE
Princess**

Ken & Roberta Williams from On-Line
HI-RES adventuring comes to Atari! Armed only with bread, water, a knife and a blanket, you set off in search of Princess Priscilla. She has been abducted from the kingdom by the dread Wizard, Harlin. If you can return her safely, half the kingdom is yours! Each scene is depicted in color and you can even get close-up views of important objects. Not for beginners.

40K disk...~~\$32.95~~ **Save 20%!**

THRU APRIL 15 ONLY: Pay Just \$26.35!

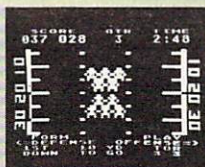
POOL 1.5



By Hoffman, St Germain & Morock from IDS
The pressure is on: if you can just get enough english on the ball to bank it into the corner pocket . . . In POOL 1.5, you can! A remarkable action-simulation of the real thing, this program allows full control of your "cue-stick" for aim and control. Play four different types of pool at your choice of table speed, with "instant replay" of any shot! HI-RES color graphics are used throughout this real-time game.

48K Disk...\$34.95

CYPHER BOWL



From ArtSci

The most impressive 2-player football game we've seen for the Atari. Using five players per side instead of 11 keeps the game manageable while providing all the action you can handle. Each player uses a joystick to call formations and plays -- 256 possibilities -- then the players are maneuvered after the ball is hiked. Skill improvements come gradually and you can plan on many hours of excitement & enjoyment with CYPHER BOWL.

16K tape or disk...\$49.95

**MISSION: ASTEROID
HI-RES ADVENTURE #0**

From On-Line
An introduction to HI-RES adventures, it is designed to acquaint beginning adventurers with this exciting genre of games. An asteroid is about to hit earth. Your job as a novice astronaut is to blow it up before it destroys earth. On your way you must cut through red tape impeding your plan, learn to fly the rocket, and follow a flight plan that will put you in striking distance.

40K disk...\$24.95

RICOCHET

DeKoven & Connelley from Mind Toys
A unique new approach to computer gaming. RICOCHET combines diabolical strategy with fast action to yield a game that satisfies your intellect as well as your senses. You have 6 playing pieces to move around, plus 2 ball launchers. Each turn consists of either repositioning the pieces or launching a ball. Points are scored each time the ball ricochets. Simple? Deceptively so. Easy to master? Definitely not! 1 or 2 players.

32K disk...\$19.95



HOCKEY

From Gamma Software

A high-speed video action game for 2, 3, or 4 players. You use joysticks to control the players. The offensive player with the puck and the nearest defensive player are automatically assigned to a joystick; Players not so controlled become "smart" players who play automatically. The action is fast and furious, the color graphics and sound are realistic. Perfect for family entertainment.

16K disk or tape...\$29.95

**LUNAR
LANDER**



By Wall, Moncrief & Jessee from A.I.
Grab your joystick and sweat out the touch-down of your LEM. Choose from four lunar landscapes, with many choices for landing sites. Select a more difficult site and get more points -- if you can land successfully. You have complete control of your LEM via main engines and small side thrusters, and five successful landings are heralded with a patriotic event. Great fun!

24K tape (disk compatible)...\$14.95

REAR GUARD

By Neil Larimer from Adventure Int.
A space battle between your cruiser and wave-after-wave of enemy ships. You can destroy them with your energy darts or you can ram them -- as long as your shields are intact. The action takes place on a continuous horizontal landscape. You control the altitude and speed of your craft as you pursue the enemy. Skill level 1 is exciting, and there are four more levels available.

24K disk...\$24.95

DISK MANAGER

From Synapse Software
An excellent way to keep track of that growing pile of Atari disks. This easy-to-use system lets you categorize them by disk, subject or filename. Supports searches by name or wild-card entry. If you have a printer, DISK MANAGER will print listings or labels, too. Entry and updates are so simple that you'll have no excuse not to use it!

32K disk...\$29.95

Visit our other stores: Seven Corners Center · Falls Church, VA & W. Bell Plaza · 6600 Security Blvd. · Baltimore, MD



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. U03 Box 9609
Washington, D.C. 20016

variables, strings, DIMensioning, and FOR/NEXT loops are visually and audibly demonstrated.

Figure 1.

```

20 8
10 0 178 32 80 69 69 75 32 80 82 79 71 8
2 65 77 0 27 8
20 0 135 65 0 41 8
30 0 129 73 208 50 48 52 57 193 65 0 53
8
40 0 173 73 209 66 196 54 48 0 62 8
50 0 135 66 58 186 0 76 8
60 0 186 226 40 73 41 34 32 34 59 0 83 8
70 0 130 73 0 89 8
80 0 128 0 115 8
100 0 131 32 50 50 51 50 44 50 48 53 49
44 50 48 55 48 44 50 48 55 55 0 141 8
110 0 131 32 50 48 57 49 44 50 49 48 51
44 50 49 49 50 44 50 49 50 54 0 167 8
120 0 131 32 50 49 51 51 44 50 49 51 57
44 50 49 54 53 44 50 49 57 49 0 183 8
200 0 131 32 50 50 50 49 55 44 50 51 48 48
0 0 0

```

Figure 2.

```

40 for I=1 to 3: Read A(I): Next I
50 Restore
60 For I=4 to 6: Read A(I): Next I
70 For I=1 to 5: Read A$(I): Next I
80 Data 76,40,67
90 Data "SUE","ANN","JOE","KIM","JIM"

```

Program 1.

```

10 REM PEEK PROGRAM
20 READ A
30 FOR I = 2049 TO A
40 IF I < B THEN 60
50 READ B: PRINT
60 PRINT PEEK (I) " "
70 NEXT I
80 END
100 DATA 2232,2051,2070,2077
110 DATA 2091,2103,2112,2126
120 DATA 2133,2139,2165,2191
200 DATA 2217,2300

```

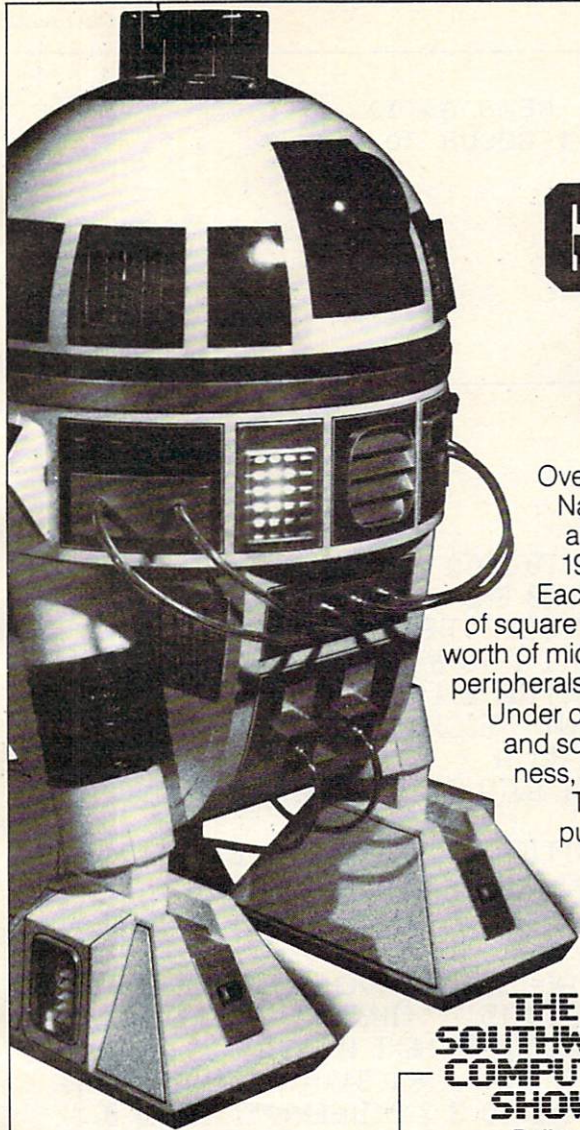
Program 2.

```

10 REM DATA READ-RESTORE DISPLAY
20 GOTO 50
30 IF PEEK ( - 16384) < 128 THEN 30
40 POKE - 16368,0: RETURN
50 DIM A(10),A$(10)
60 B$(0) = "INDEX":B$(1) = "DATA":C$ = CHR$(34):B$ = C$ + "," + C$
70 HOME
80 PRINT TAB(6)"A(I)" TAB(25)"A$(I)"
90 PRINT B$(0) TAB(10)B$(1) TAB(20)B$(0) TAB(30)B$(1)
100 VTAB 15
110 PRINT "40 FOR I = 1 TO 3 : READ A(I) : NEXT I"
120 PRINT "50 RESTORE"
130 PRINT "60 FOR I = 4 TO 6 : READ A(I) : NEXT I"
140 PRINT "70 FOR I = 1 TO 5 : READ A$(I) : NEXT I"
150 PRINT : PRINT "80 DATA 76,40,67"
160 PRINT : PRINT "90 DATA "C$"SUE"B$"ANN"B$"JOE"B$"KIM"B$"JIM"C$
199 REM START THE DISPLAY
200 V1 = 1871:V2 = 1621:VT = 3:A1 = 1:B = 3: GOTO 220
210 V1 = 1143:V2 = 1621:VT = 6:A1 = 4:B = 6
220 FOR I = A1 TO B: POKE V1,I + 112
230 VT = VT + 1:V2 = V2 + 3: POKE V2,96
240 GOSUB 30: READ A(I)
250 VTAB VT: PRINT " I: SPC(7)A(I): GOSUB 30
260 POKE V2,160: NEXT I: POKE V1,160: IF I > 4 THEN 300
270 POKE 1971,96: FOR I = V2 TO V2 - 5 STEP - 1
280 POKE I,160: POKE I - 1,96: FOR J = 1 TO 300: NEXT : NEXT : GOSUB 30:
290 POKE 1971,160: RESTORE : GOTO 210
300 V2 = 1875:V1 = 1271:VT = 3
310 FOR I = 1 TO 5:V2 = V2 + 6:VT = VT + 1

```


HAVE WE GOT A PROGRAM FOR YOU IN '82



Over 150,000 computer owners and novices attended the 1981 National Computer Shows and Office Equipment Expositions, and more than a quarter of a million are expected to be at the 1982 shows.

Each show features **hundreds** of companies using **thousands** of square feet of display space to showcase and sell **millions** of dollars worth of micro and mini computers, data and word processing equipment, peripherals, accessories, supplies and software.

Under one roof you'll see — and be able to buy — all of the hardware and software made by every major computer manufacturer for business, industry, government, education, home and personal use.

The show includes computers costing as little as \$100 to computers selling for \$150,000.

Don't miss the coming of the new computers — show up for the show. Admission is \$5 per person and \$3 for children.

THE NATIONAL COMPUTER SHOWS

Ticket Information

Send \$5 with the name of the show you plan to attend to National Computer Shows, 824 Boylston Street, Chestnut Hill, Mass. 02167. Tickets can also be purchased at the show.

THE MID-ATLANTIC COMPUTER SHOW

Washington, DC
DC Armory/Starplex
Across from RFK Stadium

Thursday-Sunday
October 28-31, 1982
11 AM to 6 PM Daily

DIRECTIONS:
2001 E. CAPITOL ST. SE
(E. CAPITOL ST. EXIT OFF I-295
— KENILWORTH FRWY)

THE SOUTHWEST COMPUTER SHOW

Dallas
Dallas Market Hall

Thursday-Sunday
April 15-18, 1982
11 AM to 6 PM Daily

DIRECTIONS:
2200 STEMMONS FREEWAY
(AT INDUSTRIAL BLVD)

THE NEW YORK COMPUTER SHOW

Uniondale, Long Island
Nassau Coliseum

Thursday-Sunday
April 22-25, 1982
11 AM to 6 PM Daily

DIRECTIONS: TAKE L.I. EXPWY
TO EXIT 38 NO. STATE PKWY
TO EXIT 31A MEADOWBROOK
PKWY SO. TO EXIT M5
HEMPSTEAD TURNPIKE

THE TWIN CITIES COMPUTER SHOW

Minneapolis
Minn. Auditorium
& Convention Hall
Third Avenue

Thursday-Sunday
September 16-19, 1982
11 AM to 6 PM Daily

DIRECTIONS: HWY 94 to
11th St. Exit to Third Ave.

THE MID-WEST COMPUTER SHOW

Chicago
(Arlington Heights)
Arlington Park Racetrack
Exhibition Center

Thursday-Sunday
November 5-7, 1982
11 AM to 6 PM Daily

DIRECTIONS: EUCLID AVE &
WILKE RD. TAKE NW TOLLWAY
TO RTE 53 EXIT AT
EUCLID AVE EAST

THE NORTHEAST COMPUTER SHOW

Boston
Hynes Auditorium/
Prudential Center

Thursday-Sunday
November 11-14, 1982
11 AM to 6 PM Daily

DIRECTIONS: TAKE MASS
PIKE TO PRUDENTIAL
CENTER EXIT

THE SOUTHEAST COMPUTER SHOW

Atlanta
Atlanta Civic Center

Thursday-Sunday
December 9-12, 1982
11 AM to 6 PM Daily

DIRECTIONS:
395 PIEDMONT AVE NE
(AT RALPH MCGILL BLVD)

The National Computer Shows are produced by Northeast Expositions Inc. who also produce Electronica — shows featuring home entertainment equipment and personal electronics — which are held annually in major US cities. NEI also produces the Applefest Shows. For more information about any of these events call us at 617-739-2000 or write to the above address.


```

320 POKE V1,I + 112: POKE V2,96: GOSUB 30: READ A$(I)
330 VTAB VT: HTAB 22: PRINT I SPC( 8)A$(I): GOSUB 30
340 POKE V2,160: NEXT
350 POKE V1,160
400 END
500 DATA 76,40,67
510 DATA "SUE","ANN","JOE","KIM","JIM"

```

Program 3.

```

20000 REM ATARI BASIC LINE DUMP
20010 REM TYPE GOTO 20000
20020 CLR
20030 BEGIN=PEEK(136)+256*PEEK(137)
20040 LINE=PEEK(BEGIN)+256*PEEK(BEGIN+1)

20050 IF LINE=20000 THEN PRINT "LAST LINE":END
20060 PRINT LINE,
20070 LENGTH=PEEK(BEGIN+2)
20080 FOR I=1 TO LENGTH
20090 PRINT PEEK(BEGIN+2+I); " ";
20100 NEXT I
20110 PRINT :PRINT "-----"
20120 BEGIN=BEGIN+LENGTH
20130 GOTO 20040

170 ? " 70 DATA SUE,ANN,JOE,KIM,JIM"
180 ? " 80 END";
190 REM START THE DISPLAY
200 FOR I=1 TO 8
210 POSITION 2,14+I+(I>5)
220 PRINT "(ESC)(RIGHT)";
240 GET #1,A
250 ON I GOTO 260,290,300,400,410,600,60
0,600
260 POSITION 2,1:FOR J=1 TO 6:?"A";J;"
)=?":SOUND 0,PEEK(53779),10,8
265 FOR W=1 TO 50:NEXT W:NEXT J:SOUND 0,
0,0,0
270 ? "A#=";CHR$(34);CHR$(34);"(LEFT)";:
FOR J=1 TO 15:?"(INSERT)";:SOUND 0,J,8,
8:FOR W=1 TO 30:NEXT W:NEXT J
275 ? :?"T#=";CHR$(34);CHR$(34);"(LEFT)
";:FOR J=1 TO 3:?"(INSERT)";:SOUND 0,J,
8,8:FOR W=1 TO 30:NEXT W:NEXT J
280 SOUND 0,0,0,0:GOTO 600
290 FOR J=1 TO 10:POSITION 6,21:?"IDATA
I(4 LEFT)";:SOUND 0,50,12,8:FOR W=1 TO 2
0:NEXT W:SOUND 0,0,0,0:?"DATA":NEXT J
295 GOTO 600
300 OFF=0
310 FOR J=1 TO 3:READ T#
320 POSITION 2,9:?"I=";J+3*OFF:POSITION
19,17+OFF:?"I READ T"
330 POSITION 8+3*(J+OFF*3),21:?"T#":READ
T#
340 POSITION 2,10:?"T=";T#
345 GET #1,A:POSITION 8+3*(J+OFF*3),21:?"
T#
350 POSITION 19,17+OFF:?"READ T":POSITI
ON 26,17+OFF:?"I(AI)=T"
360 FOR K=1 TO 15:POSITION 9+K,10:?" ";
T#;:GOSUB 50:NEXT K:?"(2 LEFT) "
370 FOR K=1 TO J+OFF*3:POSITION 24,10-K:
?"T#;:GOSUB 50:?"(2 LEFT) ";:NEXT K
380 POSITION 24,J+OFF*3:?"T#;:POSITION 7
,J+OFF*3:FOR K=1 TO 17:?"(DELETE)";:POK
E 53279,0:NEXT K

```

Program 4.

```

10 GRAPHICS 0:POSITION 12,0:?"I BASIC I
n Action I"
20 POKE 752,1
30 OPEN #1,4,0,"K:"
40 DIM L$(40),T$(20):GOTO 100
50 REM CLICK/PAUSE SUBROUTINE
60 POKE 53279,0:FOR W=1 TO 10:NEXT W:RET
URN
100 POSITION 2,14:?"(37 R)":?
110 ? " 10 DIM A(6),A$(3*5),T$(3)"
120 ? " 20 RESTORE"
130 ? " 30 FOR I=1 TO 3:READ T:A(I)=T:NE
XT I"
140 ? " 40 FOR I=4 TO 6:READ T:A(I)=T:NE
XT I"
150 ? " 50 FOR I=1 TO 5:READ T#:
A$(I*3-2,I*3)=T#:NEXT I"
160 ? " 60 DATA 76,40,67,29,14,33"

```



```

390 GET #1,A:POSITION 26,17+OFF:? "A(I)=
T"
395 NEXT J:POSITION 2,9:? "I=";J+OFF*3:G
OTO 600
400 OFF=1:GOTO 310
410 FOR J=1 TO 5:POSITION 2,9:? "I=";J
420 POSITION 19,19:? "IREAD T$1":READ T$
:POSITION 7+J*4,22:? T$
430 READ T$:POSITION 6,8:? T$:GET #1,A
440 POSITION 19,19:? "READ T$":POSITION
6,20:? "IA$(I*3-2,I*3)=T$1":POSITION 7+J
*4,22:? T$
450 FOR U=15 TO 0 STEP -1:SOUND 0,10+20*
RND(1),10,U:NEXT U
470 POSITION 3+J*3,7:? T$
480 GET #1,A:POSITION 6,20:? "A$(I*3-2,I
*3)=T$":NEXT J:POSITION 2,9:? "I=";J:GOT
O 600
600 POSITION 2,14+I+(I>5):? " ";
610 NEXT I
620 POSITION 2,10:POKE 752,0:END
1000 DATA 1761,76,1401,40,1671,67,1291,2
9,1141,14,1331,33
1010 DATA ISUE1,SUE,IANH1,ANN,IJOE1,JOE,
IKIMI,KIM,IJIMI,JIM

```

©

The Good Books from COW BAY COMPUTING

FEED ME, I'M YOUR PET
(Book 1)

LOOKING GOOD
WITH YOUR PET
(Book 2)

TEACHERS' PET
(Lesson Plans, Answer Key)



Instruction, classwork, homework,
worksheets, quizzes for classroom use.
Workbooks are \$4.95. TEACHERS' PET is \$4.00.



COW BAY COMPUTING

BOX 515 MANHASSET, N.Y. 11030
(516) 365-4423

the Computerist's Directory

The national phone book of computing

\$7.50

"Let your
fingers
do the
talking"



Alphabetical Index Contents N2
Key Word Finder White Pages Bulletin Boards User Groups & Associations
Yellow Pages

FOR JUST \$10.00 YOU GET

- 1) a Free copy of current issue
- 2) a One Year Subscription!
- 3) a Free 25 word White Page Listing!
- 4) \$5.00 Credit on a Yellow Page Listing!
- 5) \$10.00 Credit towards any size Display Ad!

Total Value = \$37.50

the
Computerist's Directory
PO BOX 405
FORESTVILLE, CA 95436
(707) 887-1857

VISA
 MASTER CHARGE
 AMERICAN EXP
ACCOUNT NO.

Save \$18.50 and Join the Information Revolution, Subscribe Now

EXPIRES
SIGNATURE

Send me Display ad rates

ENCLOSED \$

STATE ZIP

The Computerist's Directory is becoming
the one reference to your products.
The Computerist's Directory is published
twice annually in January and July with
quarterly up-dates planned for
April 82.

Infinite Precision Multiply

G. H. Watson
Newark, DE

$123 \times 456 = 56088$. Right? Sure! Just ask a young student and he/she will quickly work out something similar to:

```

  123
x 456
-----
 738
 615
 492
-----
56088

```

If you are near a microcomputer, you may verify this result by entering `?123*456 <CR>`.

How about 123123×456456 ? At this point your young student may balk and suggest "Let's let the computer do it!" Unfortunately the computer may also balk at such a request. Entering `?123123*456456 <CR>` into a PET yields the following result: $5.62002321E + 10$. With some further encouragement the student may work out 56200232088 as the correct product. Why the difference?

In PET BASIC most numbers are represented in floating-point format, which allows convenient handling of real numbers which may be positive or negative, integer, fractional, or mixed, and of greatly varying magnitude. The format in the PET is such that numbers have nearly nine digits of precision. This means that 123456789 may be represented exactly in this format, but something will have to be done for 1234567891 . That something is called scientific notation — 1234567891 will be handled as $1.23456789E + 09$, where $E + 09$ means that the decimal would be moved 9 spaces to the right. On the PET enter `X = 1234567891 <CR>` and then enter `?X <CR>`. Notice that the trailing digit "1" has been dropped; it would have been the tenth digit and only nine digits of precision are possible.

Scientific notation has great utility and nine digits of precision will be plenty for many cases of numerical calculation. Occasionally, though, you may run up against a calculation which requires infinite precision — you need the answer exactly (no lost digits). Recently I needed to know the exact product of several large numbers. Working the problem by hand and finding several errors, I

decided to write a short infinite precision multiply routine to check my answer. INFINI-MULT is the resulting BASIC program.

Using strings to represent the numbers is the trick for extending the precision. By operating on each string with the string function `MID$(,)`, each digit of the number may be isolated and an arithmetic operation performed. Only single digit operations are performed in INFINI-MULT. The microcomputer is doing only second grade arithmetic — addition and multiplication of two numbers between zero and nine.

The result of the operation on two single-digit numbers may be a double-digit number. Here enters the carry digit. Most of the errors I make when doing arithmetic by hand involve the carry digit. Care must also be taken when programming for the carry digit. The subroutine at line 500 separates the double-digit number P into the carry digit C and adds the remaining digit onto the string D\$ from the left. For example, if $P = 25$ and $D\$ = "456"$ then line 500 will return with $C = 2$ and $D\$ = "5456"$.

In order to simplify handling the carry digits and make the program as straightforward as possible, the strings involved in the addition routine are made the same length by padding from the left with zeros (line 380). For instance, if $Z\$ = "123"$ and $A\$ = "45600"$ then we will pad Z\$ so that $Z\$ = "00123"$. We also pad strings with zeros from the right in the multiplication routine so that the proper power of ten is obtained (line 330).

INFINI-MULT handles 123×456 as follows:

lines 250-330,	370-440
123	000
x 6	+ 738
738	738
123	0738
x 5	+ 6150
6150	6888
123	06888
x 4	+ 49200
49200	56088

If the two numbers to be multiplied differ in the number of digits, the multiplication routine will be faster with the smaller number as the multiplier (456 in example) and the larger number as the multiplicand (123 in example) — just as you learned in grade school. The digits "0" and "1" are treated preferentially in lines 270 and 280 so time will be saved if the number with many ones and zeros is used as the multiplier. It will be faster to multiply 456 by 123 in INFINI-MULT than 123 by 456.

I have made no provision for handling decimal points: this would be an interesting modification for you to make. To sidestep this limitation use the same trick that you learned in school: count the number

of places to the right which the decimal point must be moved to reach the last digit in the multiplicand and multiplier, add, and move that many places to the left in the product. For example, consider $1.23 \times .456$:

$$\begin{array}{r} 1.23 \quad 2 \text{ right } \rightarrow \quad 123 \\ \times .456 \quad +3 \text{ right } \rightarrow \quad \times 456 \\ \hline .56088 \quad \leftarrow 5 \text{ left} \quad 56088 \end{array}$$

INFINI-MULT follows the simple rules of arithmetic which you learned early in school. There may be faster or more sophisticated ways of getting the extra precision you desire. The PET/CBM PERSONAL COMPUTER GUIDE contains some interesting double-precision routines for addition, subtraction, and multiplication. Play around with INFINI-MULT and some evening when you feel like writing a quick program take a shot at INFINI-DIVI.

Program 1: Microsoft Version

```
100 REM INFINITE PRECISION MULTIPLY
110 REM G.H.WATSON 6/25/81
120
130 REM INITIALIZATION
140
150 DIM P,C,D$,J,Z,A,X,Y,X$,Z$,A$
160 DIM I,AL,ZL,XL,YL,Y$
170 INPUT "X = ";X$:INPUT "Y = ";Y$
180 XL=LEN(X$):YL=LEN(Y$)
190 I=XL+YL:DIM N$(9),Q$(I),C$(8)
200 FOR J=1TOI:Q$(J)="0"+Q$(J-1):NEXT J
210 FOR J=0TO9:N$(J)=CHR$(J+48):NEXT J
215 FOR J=1TO8:C$(J)=N$(J):NEXT J
220
230 REM MULTIPLICATION ROUTINE
240
250 FOR I=YLTO1 STEP-1:C=0:D$=""
260 Y=VAL(MID$(Y$,I,1))
270 IF Y=0 THEN 450
280 IF Y=1 THEN D$=X$:GOTO 330
290 FOR J=XLTO1 STEP-1
300 X=VAL(MID$(X$,J,1))
310 P=X*Y+C:GOSUB 500
320 NEXT J
330 A$=C$(C)+D$+Q$(YL-I)
340
350 REM ADDITION ROUTINE
360
370 ZL=LEN(Z$):AL=LEN(A$)
380 Z$=Q$(AL-ZL)+Z$:C=0:D$=""
390 FOR J=ALTO1 STEP-1
400 Z=VAL(MID$(Z$,J,1))
410 A=VAL(MID$(A$,J,1))
420 P=Z+A+C:GOSUB 500
430 NEXT J
```

```
440 Z$=C$(C)+D$
450 NEXT I
460
470 PRINT "Z = ";Z$
480 END
490
500 C=INT(P/10):D$=N$(P-C*10)+D$:RETURN
READY.
```

Program 2: Atari Version

```
130 REM : INITIALIZATION
140 REM
150 DIM D$(99),X$(99),Z$(99),A$(99)
160 DIM Y$(99),T$(99)
170 PRINT "X=";:INPUT X$
175 PRINT "Y=";:INPUT Y$
180 XL=LEN(X$):YL=LEN(Y$)
190 I=XL+YL:DIM N$(10),Q$(I),C$(10)
200 FOR J=1 TO I:Q$(J,J)="0":NEXT J
210 N$="0123456789":C$=" 12345678 "
220 REM
230 REM : MULTIPLICATION ROUTINE
240 REM
250 FOR I=YL TO 1 STEP -1:C=0:D$=""
260 Y=VAL(Y$(I,I))
270 IF Y=0 THEN 450
280 IF Y=1 THEN D$=X$:GOTO 330
290 FOR J=XL TO 1 STEP -1
300 X=VAL(X$(J,J))
310 P=X*Y+C:GOSUB 500
320 NEXT J
330 A$="" : IF C THEN A$=C$(C+1,C+1)
335 A$(LEN(A$)+1)=D$:IF YL-I THEN A$(LEN(A$)+1)=Q$(1,YL-I)
340 REM
350 REM : ADDITION ROUTINE
360 REM
370 ZL=LEN(Z$):AL=LEN(A$)
380 T$=Z$:Z$="" : IF AL-ZL THEN Z$=Q$(1,AL-ZL)
385 Z$(LEN(Z$)+1)=T$:C=0:D$=""
390 FOR J=AL TO 1 STEP -1
400 Z=VAL(Z$(J,J))
410 A=VAL(A$(J,J))
420 P=Z+A+C:GOSUB 500
430 NEXT J
440 Z$="" : IF C THEN Z$=C$(C+1,C+1)
445 Z$(LEN(Z$)+1)=D$
450 NEXT I
460 REM
470 PRINT "Z=";Z$
480 END
490 REM
500 C=INT(P/10):T$=D$:D$=N$(P-C*10+1,P-C*10+1):D$(LEN(D$)+1)=T$:RETURN
```

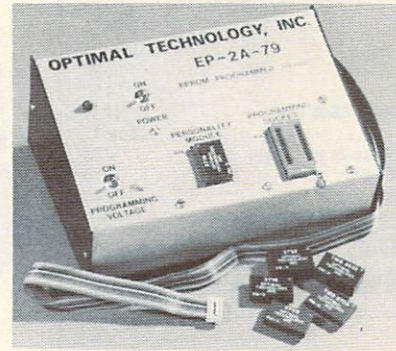

VARIABLE TABLE FOR INFINI-MULT

X\$	multiplicand
Y\$	multiplier
Z\$	product
A\$	intermediate addend
D\$	working string for creating A\$ and Z\$ from digits
X, Y	value of selected digit of X\$, Y\$
Z, A	..... Z\$, A\$
XL, YL	length of X\$, Y\$
ZL, AL	..... Z\$, A\$
C	carry digit
P	result formed by numerical operations on digits
J, I	indices for selecting digits from strings
Q\$()	zeroes for padding strings
N\$()	decimal numerals
C\$()	carry numerals, same as N\$() except that C\$(0)="" and N\$(0)="0" and C\$(9) is unneeded.

©

**Model EP-2A-79
EPROM Programmer**

North Star
Apple
S-100
SS-50
STD-Bus
Atari
Pet
Kim-1



TRS-80
H-8
H-89
Ohio
Scientific
SWTP
Aim-65
Sym-1

Three years in the field with unsurpassed performance. Software is available for the EP-2A-79 for most all of the microcomputers including the popular CP/M, FLEX, HDOS operating systems. Write or call for specific hardware/software interfacing. Driver packages available for F-8, 6800, 6809, 8080, 8085, Z-80, 1802, 6502 and 2650 based systems.

EP-2A-79 115V 50/60 HZ\$169.00

Personality Modules

PM-0	TMS 2708	\$17.00	PM-5	2716, 2758	\$17.00
PM-1	2704, 2708	17.00	PM-5E	2816	35.00
PM-2	2732	33.00	PM-8	MCM68764	35.00
PM-2A	2732A	33.00	PM-9	2764	35.00
PM-3	TMS 2716	17.00	SA-64-2	TMS 2564	39.00
PM-4	TMS 2532	33.00	SA-64-3	2764	39.00

Optimal Technology, Inc.

Phone (804) 973-5482
Blue Wood 127 Earlysville, VA 22936

More About Numbers

Edmund N. Ricchezza

Certain numbers when acted upon in a certain manner will converge to a definite number. There are many of these, though the best known are Ulam's Conjecture, The 6174 Problem, and The Golden Mean.

Ulam's Conjecture states that any positive integer will always converge to "1" if acted upon as follows:

- 1) If it is even, divide by 2.
- 2) If it is odd, multiply by 3 and add 1.

For example, consider 15:

Since it is odd we multiply by 3 and add 1 obtaining	46
46 is even so we divide by 2 and obtain	23
Multiply 23 by 3 and add 1	70
Divide 70 by 2	35
Multiply 35 by 3 and add 1	106
Divide 106 by 2	53
Multiply 53 by 3 and add 1	160
Divide 160 by 2	80
Divide 80 by 2	40
Divide 40 by 2	20
Divide 20 by 2	10
Divide 10 by 2	5
Multiply 5 by 3 and add 1	16
Divide 16 by 2	8
Divide 8 by 2	4
Divide 4 by 2	2
Divide 2 by 2	1

Programming this is elementary but it will reveal many curious situations. Consider this: 50,000,000 requires 106 operations to converge to

1 while the much smaller 63 requires 107 operations to converge to 1.

The "6174 Problem" states that any positive 4-digit integer except those with all the same digits will converge to "6174" when acted upon as follows:

1. Arrange the number in descending order.
2. Arrange the number in ascending order.
3. Subtract. Take this subtracted number as the new 4-digit number and repeat the process.

After not more than five iterations the difference will always be 6174. For example consider 4389:

9843	6543	8730	8532
<u>-3489</u>	<u>-3456</u>	<u>- 378</u>	<u>-2358</u>
6354	3087	8352	6174

This makes for an interesting and not too difficult program exercise.

Quotients of successive terms of the Fibonacci Sequence will converge to .61803398. The ancient Greeks called this the "Golden Mean" because it expressed the ideal ratio of width to length that gave the most aesthetically appealing building or room.

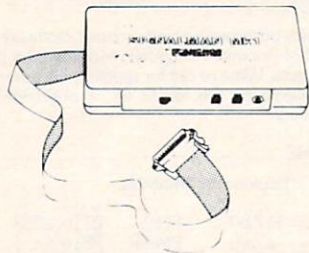
I found this relationship fascinating considering that Fibonacci was born c. 1170, centuries after the Greeks discovered this number.

©

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				8 for 17
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



MODEM SPECIAL \$99

SIGNALMAN Mk1 from Anchor Automation
 DIRECT CONNECT Modem with RS232 Cable and Connector included. Fully compatible with all Bell 103 modems. 0 to 300 bps, full duplex, frequency shift keyed modulation, automatic ANSW/ORIG selection, direct connect, audible tone carrier detect indicator, self-contained battery powered.

PET/CBM Version (Mk1P) \$169

For Commodore Computers, the Signalman Mk1P includes connector, cable, and machine language software (parallel port).

STAR MODEM

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

commodore



CBM-PET SPECIALS

8023 Printer - 136 col, 150 cps bi-directional	list SALE (995) 775
8300 Daisy Wheel - 40 cps bi-directional	(2250) 1750
8032 80 x 25 CRT, business keyboard	(1495) 1100
Super Pet	(1995) 1650
8096 Board (extra 64K RAM for 8032)	(500) 400
8050 Dual Disk Drive - 1 megabyte	(1795) 1345
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) 550
4022 Tractor Feed Printer	(795) 630
C2N External Cassette Deck	(75) 65
VIC 20 Color Computer	(299) 259
VIC 1515 Graphic Printer	(395) 335
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	215
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-pin 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 8" Double Dens.	10/3.45	50/3.35	100/3.20
Verbatim 5" Datalife	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
Wabash 5" in Plastic Box	10/2.70	50/2.60	100/2.50
Wabash 8" in Plastic Box	10/2.75	50/2.65	100/2.55

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	10/56	50/50	100/48
C-30	10/73	50/68	100/66

All other lengths available. Write for price list.

SPECIALS

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

ALL BOOK and SOFTWARE PRICES DISCOUNTED

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

Synertek Systems

SYN-1 Microcomputer	SALE 199
SYM BAS-1 BASIC or RAE 1/2 Assembler	85
KTM-2/80 Synertek Video and Keyboard	349
KTM-3/80 Synertek Tubeless Terminal	385

ZENITH data systems

Z90-80 64 K	2170
Z90-82 64K, 1 double dens. drive	2395
Z89-0 48K	1950
Z89-1 48K, 1 drive	2150
Z67 10 Megabyte + Floppy Drive	4495
Z37 1.3 Megabyte Dual Floppy	1495
Z25 High Speed Printer	1195
Z19 Video Terminal (VT-52 compatible)	670
ZVM-121 Green Phosphor Monitor	119
All Zenith Software discounted	



ATARI SPECIALS

800 Computer	695	410 Recorder	69
400 - 16K	339	Pilot	68
810 Disk Drive	449	Microsoft BASIC	68
825 Printer	629	Educ. Series	20% off
850 Interface	175	MISSILE COMMAND	32
822 Printer	359	ASTEROIDS	32
Paddle Pair	17	STAR RAIDERS	32
Joystick Pair	17	Space Invaders	32
16K RAM	85	Music Composer	45
Assembler/Editor	46	Chess	30
TeleLink	20	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

KMMM 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 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 dimensional 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

by John Fluharty

\$30

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 on 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.



for PET/CBM Computers

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.

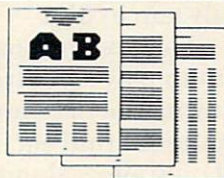
Available soon:

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

BASIC INTERPRETER \$200

Designed to support the CBM 8096 (8032 with add-on 64K board). A full interpreter implementation to automatically take advantage of the extra memory available to the 8032.

BPI General Ledger - 8032/8050 300
 BPI Accounts Receivable - 8032/8050 300

Hayden Software

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

CASH MANAGEMENT SYSTEM \$45

Easy to use. Keeps track of cash disbursements, cash receipts, cash transfers, expenses for up to 50 categories.

MICRO-REVERSI 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

Word Hunt

Robert W. Baker
Atco, NJ

This game is designed to test your ability to find specific words or letter sequences hidden in a 10 by 10 letter matrix. Scoring is based on the time it takes to enter your correct answer within a given time period determined by the skill level selected. The program uses very little memory and will easily run in 8K.

To play the game, first select the skill level you want to play at, between 1 and 5. One is the easiest, allowing the maximum time of approximately 1.5 minutes to find each word. Skill level 5, however, will only allow about 20 seconds to find each word.

Next enter a list of ten words, each being three to eight characters long. Only the letters A to Z may be entered, but they really do not have to be words. You can even use the game to make learning foreign languages more fun. If two people are playing, let one player enter the words for the other to find. Try to mix the word lengths, entering both long and short words for best results. If too many long words are entered it may take a while for the puzzle to be generated. If any word will not fit into the matrix, enter a new list of words when asked.

When the puzzle is ready, hit any key to start the game. Timing will start when the first word is shown.

Scoring for a correct answer is based on the amount of time it takes to respond, with 100 points maximum for each of ten words. If a correct answer is given in five seconds, you score 100 points. After that, your possible score decreases with time to a minimum of ten points for a correct answer. A wrong answer does not score any points and you only get *one* try for each word.

To enter your answer, you give a row and column number of the first character of the word followed by the direction code (see the diagram in the game!). Any invalid entries are discarded and you only type numbers, you do not type a comma or RETURN.

Before looking at how the program actually works, let's take a look at the major variables used in the program:

S – defines the size of the letter matrix to be created.

W – defines the number of words to be entered and used in the matrix.

M(S,S) – is the actual letter matrix, note that a floating point numeric matrix is used instead of a string matrix. More about this later.

W\$(W) – contains the word list.

L(W,3) – remembers the starting location and direction of each word after it has been placed in the letter matrix. Each entry directly corresponds to the entry in the same position in the word matrix.

P(S,S) and F(8) – are working matrices used to create the actual letter matrix used in the game.

Now let's take a look at how the program works. First the program gets the desired skill level (SL) as a number between 1 and 5. The program sets a default value of 3 on the input line that the user can change before hitting the RETURN key. Lines 130-290 then get the list of words and check each is a valid character string (A-Z). The words are put into the word list in alphabetical order as each word is entered by the user. This avoids the time consuming process of sorting the entire word list at the end. In this way, there is a short delay as each word is entered. This short delay is not even noticeable by the user!

Line 340 initializes the letter matrix to all *'s (decimal value 42). Now each word in the word list is inserted randomly in the letter matrix in the following fashion:

- 1) The point matrix is cleared (line 360) so we can remember what points in the matrix have been tried for a particular word in the word list.
- 2) Lines 400-440 check that there is still at least one point in the letter matrix that has not been tried (entry in P is still 0). If all points have been tried, the user is asked to enter a new list of words since this list will not fit properly in the letter matrix.
- 3) A random starting point (that has not been tried) is chosen in line 450.
- 4) The starting point is flagged as having been tried (P value now 1) and then a check is made to see if the matrix position is open (still *) or matches the first letter of the word (lines 460-470).
- 5) Now the direction matrix (F) is cleared to remember what directions have been tried from this starting point (line 490).
- 6) A check is made that at least one direction still hasn't been tried from this point (lines 500-510).
- 7) A random direction (that has not been tried) is chosen in line 520.

FIRST: MONSTER MOVIES NOW:
CRUSH, CRUMBLE & CHOMP!
THE GREAT MOVIE MONSTER COMPUTER GAME!

And guess who stars as the movie monster. You! As any of six different monsters. More if you have the disk version.

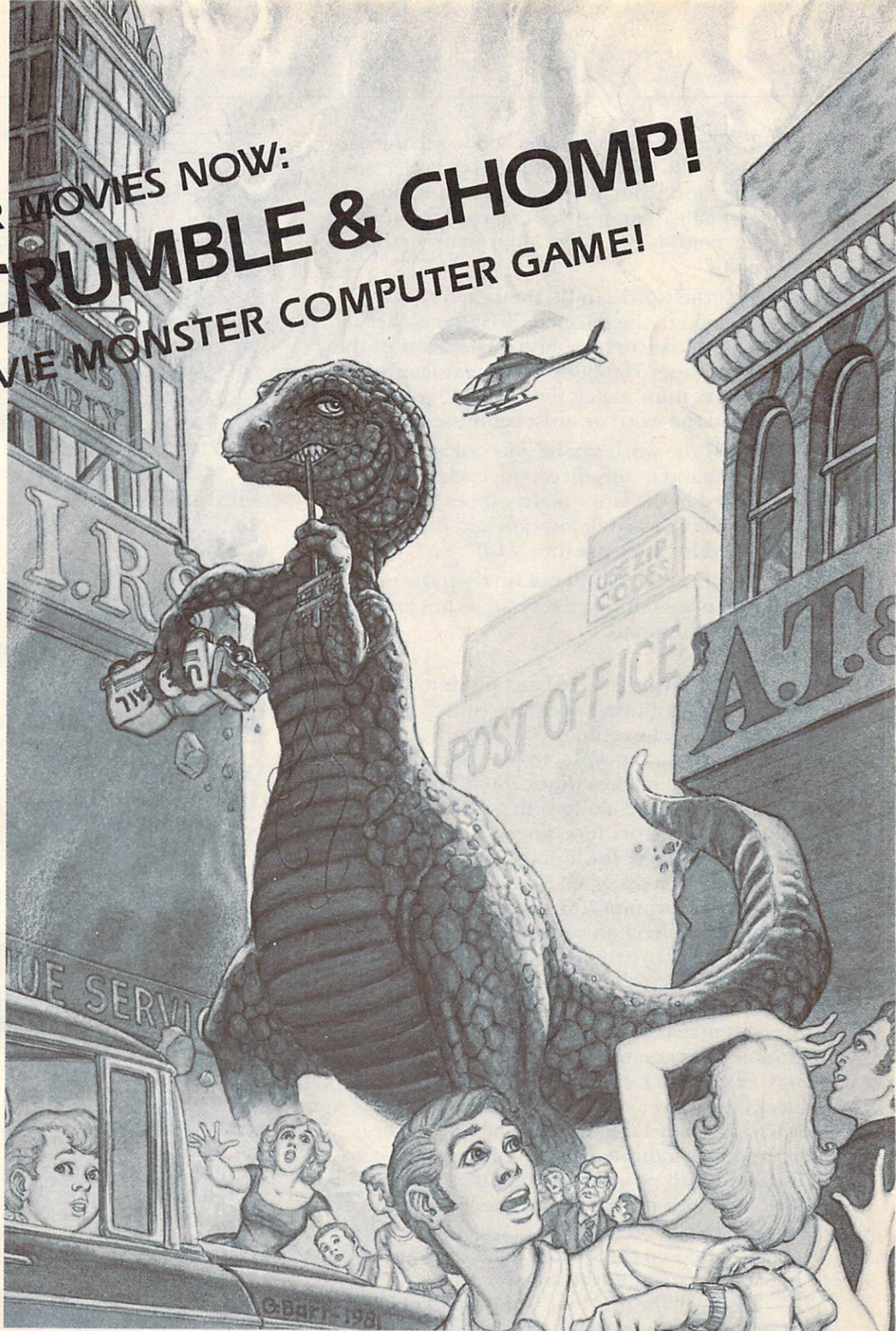
You can terrorize and destroy four of the world's largest and most densely populated cities in over 100 possible scenarios. From Tokyo to the Golden Gate, you are the deadliest creature in the air, on the land, or in the sea.

You can be the deadly amphibian who simultaneously smashes street cars, lunches on helpless humans and radiates a ray of death.

If you were a giant winged creature, think of the aerial attacks you could make on the terrified but tasty tidbits beneath you.

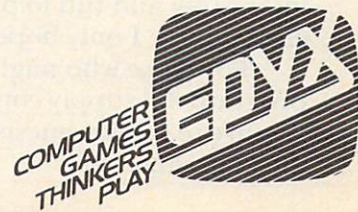
But as in all the best monster movies, you're up against everything the human race can throw at you—even nuclear warheads and a strange concoction developed by a team of mad scientists.

For only \$29.95 you get 6 stupendous monsters, each with its own monstrous summary card, a teeming metropolis displayed in graphic detail on your computer display and mapped in the accompanying 48-page illustrated book, the awesome sounds of monstrous mayhem, and spine-tingling, real-time, edge-of-your-seat excitement.



GET CRUSH, CRUMBLE & CHOMP

Now at your local dealer for your APPLE, ATARI,
or TRS-80 . . . before it's too late.



8) Then the word is checked to see if it can physically fit in the matrix in the selected direction from the current starting point (lines 530-650). This insures the word will not exceed the boundaries of the letter matrix from this point.

9) If the word can fit, then each character position in the selected direction is checked against the corresponding character of the word (lines 760-690). Each character in the matrix must match the corresponding character in the word or must be unused (still *).

10) If the word can be entered at this starting point and in this direction, each letter is inserted in the latter matrix (lines 710-720).

Then the starting location and direction are saved for later use (line 740).

11) If the word will not fit, then the next direction is tried until all directions are exhausted from this point.

When all words have been put into the matrix, the remaining unused positions (still *) are filled in with random letters (lines 760-770).

Everything is now set to play the game, as soon as the player hits a key (lines 780-800). The letter matrix is displayed along with a direction code diagram and a score box (lines 820-960). A word is given to the player for him to find in the matrix and the timer is restarted (lines 970-1000). Then the program prompts the player for the starting location and direction code (lines 1020-1170). The values entered are then checked to see if correct, first against the values saved when the word was put into the matrix (lines 1190-1210). If the value does not match, then the program checks to see if a "double" was created when the unused positions were filled with random letters. Thus the program checks the player's answer again to insure it is right or wrong (lines 1230-1280). If a bad answer is entered, it is indicated and the correct answer is displayed with no score added (lines 1360-1430). A good answer is indicated and the appropriate score displayed and added to the player's total. The score is based on the selected skill level and the time it takes to enter the answer.

That's all there is to it! I should explain that a numeric vector was used for the actual letter matrix since it was easier and faster to use. Most people who have tried this game have found it to be very interesting and fun to play. At times it can even be educational. I only hope it's as much fun for you!

For those who might not want to type in the program, I'll supply copies on cassette tape for \$2. Be sure to send requests to me and not through the magazine.

Program 1: Atari Version

```

10 REM *** WORD HUNT ***
20 REM
30 REM BY: ROBERT W. BAKER
40 REM ATCO, NJ
50 REM *****
60 REM
70 OPEN #1,4,0,"K:"
80 S=10:W=10:DIM M$(S,S),W$(W*10),LNKW),P
(S,S),L(W,3),F(8),R$(10),T$(10)
85 T$=""      ":FOR I=0 TO 9:W$(I*10+
1,I*10+10)=T$:NEXT I
90 POKE 752,0:PRINT "(CLEAR) (DOWN)WHAT S
KILL LEVEL"
100 ? :? "1 (EASY) - TO - 5 - (HARD)?3(2
LEFT)";
110 INPUT X:IF X<1 OR X>5 THEN 100
120 SL=6-X
130 ? "(2 DOWN)ENTER ";W;" WORDS,"
140 ? "Each 3 to 7 characters long(2 DOWN)
"
150 REM *** GET WORDS & PUT IN ORDER
160 REM *** LONGEST TO SHORTEST
170 FOR X=1 TO W:L(X,1)=0:L(X,2)=0:L(X,3
)=0
180 PRINT "WORD ";X:INPUT R$
190 Q=LEN(R$)
200 IF Q<3 THEN ? "% TOO SHORT *":GOTO 1
80
210 IF Q>7 THEN ? "% TOO LONG *":GOTO 1
80
220 X9=0:T$=""*:T$(2)=R$:T$(LEN(T$)+1)="
*":FOR Y=1 TO Q:A=ASC(T$(Y+1,Y+1))
230 IF A<65 OR A>90 THEN X9=1:Y=Q
240 NEXT Y:IF X9=1 THEN PRINT "% BAD WOR
D *":GOTO 180
250 IF X=1 THEN T$=R$:T$(Q+1)="*":W$(X*1
0-9,X*10)=T$:LNK(X)=Q+1:GOTO 290
260 X9=0:FOR Y=1 TO X-1:IF Q<LNK(Y)-1 TH
EN 280
270 FOR B=X TO Y+1 STEP -1:T$=W$((B-1)*1
0-9,(B-1)*10):W$(B*10-9,B*10)=T$:LNK(B)=L
NK(B-1):NEXT B
275 T$=R$:T$(Q+1)="*":W$(Y*10-9,Y*10)=T$
:LNK(Y)=LEN(T$):Y=X-1
280 NEXT Y:IF X9=0 THEN T$=R$:T$(Q+1)="*
":W$(X*10-9,X*10)=T$:LNK(X)=LEN(T$)
290 NEXT X
300 POKE 752,1:?"(CLEAR) (7 DOWN)That's
enough words!"
310 PRINT "(6 DOWN)Please be patient....
"
320 ? "(3 DOWN          I'm now makin
g the puzzle!"
330 REM *** INITIALIZE LETTER MATRIX ***

```


TYPE RIGHT on your own MICROCOMPUTER

TYPE
RIGHT is a complete course of 22 typing programs.

TYPE
RIGHT has easy directions. The beginner will find all necessary instructions displayed on the screen, but there is extensive documentation for the programmer who wishes to make adaptations.

TYPE
RIGHT is varied to keep your interest. You will be typing hundreds of real words, not just random letter drills. Your spelling and writing skills will improve. There are even five games!

TYPE
RIGHT emphasizes accuracy first, then speed.

TYPE
RIGHT computes words per minute the official way. (Errors are subtracted.)

TYPE
RIGHT is a fantastic educational value at less than \$2 per program.

BARRON ENTERPRISES

714 Willow Glen Road
Santa Barbara, CA 93105
(805) 687-5873

\$29.95 PET (8K)
+ \$1.50 shipping &
6% CA tax

cassette diskette

SWIFTY SOFTWARE TOP RATED PRODUCTS FOR ATARI



NEW! SAVE \$5

HARDWARE DISK SENTRY™

An intelligent digital accessory for your ATARI 810 Disk Drive, lets you selectively write data to both sides of single sided and write protected disks. DISK SENTRY cannot harm your drive or disks. Installs and removes easily; no soldering required. DISK SENTRY's LED signals system status, preventing accidental erasure of data. DISK SENTRY is a convenient push button write-protect override which can pay for itself with your first box of disks. \$39.95 + \$2.50 Shipping and Handling.

ARCADE GAMES

24K Disk; 16K Cassette; Joystick required
Add these popular 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

NEW! AND MORE GAMES..... TRIVIA TREK™

Unlimited fun and lots of laughs for one or two players. Five hundred questions and two thousand multiple choice answers are supplied on the master diskette. A powerful database handling program allows creation of your own trivia questions and answers. Features include: Player Missile Graphics, user or random selection of subjects and numerous comical answer choices. This DISK ONLY package comes complete with user instructions. An incredible value for only \$29.95. Requires 32K and disk drive.

NEW! FUN "n" GAMES #1™

WORDGAMES, POSSIBLE and LEAPFROG giving you hours of fun, challenge and entertainment. WORDGAMES, two games in one, contains GUESSIT - a deductive alphabetic reasoning game for one or two players and WORDJUMBLE - a multiple word descrambling puzzle with play-on-word hints and mystery answers. Instructions show how you can substitute your own words. Use POSSIBLE to help descramble word jumble puzzles or to create your own. All letter/number combinations or permutations of input are printed to screen or optional printer. LEAPFROG is a Chinese-Checker type jumping game in which you try to position two sets of animated jumping frogs in a minimum number of moves. 16K Cassette \$19.95; 24K Disk \$24.95. Disk version of GUESSIT works with VOTRAX Type "n" TALK. A real crowd pleaser.

COMING SOON! Space Shuttle Adventure Series™

Real-time Space Flight Simulations

★ PERSONAL DATA MANAGEMENT FILE-IT 2™

Contains all the programs in FILE-IT plus five additional file handling and financial programs. Financial entry and report generator programs create a powerful personal accounting system while two additional utility programs provide random access updating and user controlled record selection. Subfiles may be created, merged and sorted by any field. A monthly Bar Graph program generates a visual picture of financial data on the screen and/or printer. Supports up to four disk drives as well as the AXLON RAMDISK. Minimum requirements are 24K, 1 disk drive and an 80 column printer. Extensive documentation, supplied in a ring binder, provides clear instruction along with a tutorial on computer filing. \$49.95 + \$3.25 Shipping and Handling. AXLON RAMDISK not required.

FILE-IT™

Use this start up database system to file and manage personal information and data. Create, sort, store and manipulate information such as appointment calendars, address, or telephone data, credit or charge records, stock investments, medical or prescription information, hobby, coupon or other types of collection information....and more. With 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 over 300 records in 40K. Requires minimum of 24K and 1 disk drive. Printer optional. \$34.95 (Disk Only)

COMING SOON! The Family Financier™

AN easy to use financial package.

UTILITIES

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.

SWIFTY UTILITIES

A valuable collection of programming utilities for the ATARI programmer. This DISK ONLY package includes all of Programming Aids 1 and additional programs designed to make programming time more efficient. Special MENU program runs both saved and listed programs. REM REMOVER eliminates REM statements so programs take less core and run faster. PRINT 825 and PRINTEPS custom print programs prepare condensed, indented and paginated program listings on your ATARI 825 or EPSON MX-80 printer. Listings identify machine code, graphics and inverse video characters. VARIABLE LIST and VARIABLE PRINT programs help you prepare alphabetized annotated list of your program variables. A delete lines utility provides convenience of line deletion while a DOS CALLER gives you convenient access to many DOS utilities while your program is in core. Disklist prepares disk jacket labels. Many of these programs work consistent with each other and with your program. Disk Drive and minimum of 24K required. \$29.95

PROGRAMMING AIDS PACKAGE I™

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 user's manual. 16K cassette \$14.95; 24K disk \$19.95

SWIFTY DATALINK™

High Quality Smart Terminal Communications program. Easy to use Multi-Option, Menu Driven. Full performance uploading/downloading. Works in Duplex or Simplex modes supporting ASCII and ATASCII transmission. Printer Dump, Screen Dump and Disk Search options. Use as remote terminal. Send/receive and store programs and data files. Saves connect time charges with commercial services. Requires 24K RAM, 810 Disk Drive, 850 Interface or equivalent, 830 or other 300 Baud modem. (Printer optional) \$39.95

NEW! SWIFTY TACH MASTER™

An accurate disk speed diagnostic utility program designed specifically for ATARI 810 Disk Drives. Provides easy-to-read visual indication of the speed of any drive connected to your system. Using the accuracy of machine language, DISK DOCTOR displays five RPM readings per second with a working tachometer accurate to 1/4 RPM. Allows you to adjust your drive(s) to factory specs easily and at any time in the convenience of your own home. Comes complete with easy to follow user's manual. \$29.95

NEW! ACCESSORIES

VINYL DUST COVERS

New, glove soft, vinyl dust covers for the ATARI 800 Computer, the 400 Computer and the 825 Printer. Custom made from heavy duty upholstery grade vinyl, these covers completely cover the top and sides of your valuable equipment. Do not confuse them with cheap, flimsy plastic covers available elsewhere. Accessory ports and other input/output plugs are exposed for convenience of use. Available in either black or "ATARI" beige. ATARI 400: \$9.95; ATARI 800: \$10.95; ATARI 825: \$10.95. Specify model and color. Any two covers for \$18.95. Please include \$2.50 for Shipping and Handling.

send check or money order to:

SWIFTY SOFTWARE, INC.

64 BROAD HOLLOW ROAD
MELVILLE, N. Y. 11747
(516) 549-9141

N. Y. Residents add 7 1/4 % sales tax

send for free catalogue dealer orders and c.o.d.'s accepted
©1981, 1982 Swifty Software, Inc.
NOTE: ATARI® is a registered trademark of Atari Inc., a Warner Communications Company and all references to ATARI® should be so noted.


```

340 FOR X=1 TO S:FOR Y=1 TO S:MK(Y,X)=42:
NEXT Y:NEXT X:Q=0
350 REM *** INIT POINT MATRIX & GET NEXT
WORD
360 FOR X=1 TO S:FOR Y=1 TO S:P(Y,X)=0:N
EXT Y
370 NEXT X:Q=Q+1:IF Q>W THEN 760
380 G=LNK(Q)-2
390 REM *** TRY ALL POINTS FOR EACH WORD
400 X9=0:FOR X=1 TO S:FOR Y=1 TO S:IF P(
Y,X)=0 THEN X9=1:X=S:Y=S
410 NEXT Y:NEXT X:IF X9=1 THEN 450
420 REM *** WORD WILL NOT FIT, TRY AGAIN
430 ? "(CLEAR)This list of words will no
t all fit."
440 ? :? "Please enter another list of w
ords!":GOTO 130
450 A=INT(S*RND(1)+1):B=INT(S*RND(1)+1):
IF P(B,A)>0 THEN 450
460 P(B,A)=1:IF MK(B,A)=42 THEN 490
470 IF MK(B,A)>ASC(W$(Q*10-9)) THEN 400
480 REM *** TRY ALL DIRECTIONS FROM THIS
POINT
490 FOR X=1 TO 8:F(X)=0:NEXT X
500 X9=0:FOR X=1 TO 8:IF F(X)=0 THEN X9=
1:X=8
510 NEXT X:IF X9=0 THEN 400
520 D=INT(8*RND(1)+1):IF F(D)=1 THEN 520
530 F(D)=1:ON D GOTO 550,590,580,620,610
,650,640,560
540 REM *** CHECK WORD WILL FIT
550 IF (A+G)>S THEN 500
560 IF (B-G)<1 THEN 500
570 GOTO 670
580 IF (B+G)>S THEN 500
590 IF (A-G)>S THEN 500
600 GOTO 670
610 IF (A-G)<1 THEN 500
620 IF (B+G)>S THEN 500
630 GOTO 670
640 IF (B-G)<1 THEN 500
650 IF (A-G)<1 THEN 500
660 REM *** CHECK WORD MATCHES INTO MATR
IX
670 X=A:Y=B:X9=0:FOR N=2 TO G+1:GOSUB 15
50:IF MK(Y,X)=42 THEN 690
680 IF MK(Y,X)>ASC(W$((Q-1)*10+N)) THEN
X9=1:N=G+1
690 NEXT N:X=A:Y=B:IF X9=1 THEN 500
700 REM *** ENTER WORD
710 FOR N=1 TO G+1:IF MK(Y,X)=42 THEN MK(
,Y)=ASC(W$((Q-1)*10+N))
720 GOSUB 1550:NEXT N
730 REM *** SAVE START & DIRECTION INFO
740 L(Q,1)=A-1:L(Q,2)=B-1:L(Q,3)=D:IF D<
W THEN 360
750 REM *** FILL IN SPACES
760 FOR Y=1 TO S:FOR X=1 TO S:IF MK(Y,X)=
42 THEN MK(Y,X)=INT(25*RND(1)+65)
770 NEXT X:NEXT Y:WP=0:TS=0
780 ? "(CLEAR)(10 DOWN) IR
EADY!"
790 ? "(6 DOWN)Depress any key when read
y to play!"
800 IF PEEK(764)=255 THEN 800
805 POKE 764,255
810 REM *** SET UP DISPLAY
820 ? "(CLEAR)(DOWN) 1 COLUMN":POKE
85,26:?"I W O R D!"
830 REM *** PRINT 'ROW' DOWN LEFT COLUMN
840 REM *** START OUT DOWN 4
850 REM *** LATER DO 5 UP & 3 RIGHT
860 ? "(4 DOWN)IRI(DOWN)(LEFT)10I(DOWN)(
LEFT)1WI(5 UP)(3 RIGHT)":
870 FOR X=0 TO S-1:? X:;NEXT X:? :Y=1:GO
SUB 1650
880 FOR Y=1 TO S:? "(2 RIGHT)":Y-1:"(=)"
;
890 FOR X=1 TO S:? CHR$(MK(Y,X)):;NEXT X
900 ? "(=)":NEXT Y:Y=0:GOSUB 1650
910 ? :? "DIRECTIONS:I":?"(DOWN) 7 8
1"
920 ? " (G)(=)(F)":? " 6(R)(T)(R)2":?
" (F)(=)(G)":? " 5 4 3"
930 G=16:GOSUB 1700:?" | SCORE |"
:POKE 85,25:?"(U) (B)"
940 POKE 85,25:?"(U) 0 (B)"
950 POKE 85,25:?"(U) (B)"
955 POKE 85,25:?"(9 MD)"
960 G=0:GOSUB 1700:?"
":REM <-- 19 SPACES
970 WP=WP+1:IF WP>W THEN 1450
980 Q=LNK(WP)-1
990 REM *** NEXT WORD
1000 GOSUB 1700:POKE 85,29-(Q/2):? W$((W
P-1)*10+1,(WP-1)*10+Q)
1005 POKE 20,0:POKE 19,0:REM KILL RTCLK
1010 REM *** GET START LOC
1020 G=3:GOSUB 1700:?"STARTING LOCATION
":POKE 85,20:?"(ROW,COLUMN):"
1030 FOR G=6 TO 14:GOSUB 1700
1040 ? " :NEXT G:G=6:
GOSUB 1700:REM <-- 19 SPACES
1050 GET #1,B:IF B=155 THEN 1050
1070 PRINT CHR$(B);",":IF B=48 THEN B=0
:GOTO 1090
1080 B=B-48:IF B<1 OR B>9 THEN PRINT "(2
BACK S)":GOTO 1050
1090 GET #1,A
1100 IF A=155 THEN 1090
1110 PRINT CHR$(A):;IF A=48 THEN A=0:GOT

```


the SOFTWARE For Atari Only connection

Specials for the Month of March

These Prices Good Through March 30, 1982

Match Racer Retail \$29.95 Now \$22.95

Gebelli Software has you matching your wits and ability against your race car opponent in a show down of racing skill.

Pool 1.5 Retail \$34.95 Now \$25.95

This popular Apple game now available for use with your Atari 800.

Pathfinder Retail \$39.95 Now \$25.95

Blast your way through the maze filled with nuclear waste and radioactive monsters in this never before released game by Gebelli Software.

Ghosthunter Retail \$34.95 Now \$25.95

2 player version of the arcade maze game with multiple levels of play.

Andromeda 2 Retail \$34.95 Now \$25.95

First time ever for any machine by Gebelli Software. Trapped inside a gigantic living organism you must find your way out before the antibodies get you.

Jaw Breaker Retail \$29.95 Now \$22.95

This arcade game takes you to the candy store for a wild game of tag with some of the rowdiest play mates you'll find anywhere.

GAMES

	Retail	Now
Checker King..... C 8K	\$ 19.95	\$ 15.95
Microchess..... C 8K	19.95	15.95
Empire of the Overmind C 40K	30.00	24.00
The Datestones of Ryn..... C/D 32K*	19.95	15.95
Rescue at Rigel..... C/D 16K*	29.95	23.95
Temple of Aphai Dujonquest.. C/D 32K*	39.95	31.95
Star Warrior..... C/D 32K*	39.95	31.95
Crush, Crumble & Chomp..... C/D 32K*	29.95	23.95
Invasion Orion..... C/D 32K*	24.95	19.95
Major League Baseball. D 40K*	30.00	34.00
Computer Acquire.... C 32K	20.00	16.00
Lords of Karma..... C 40K	20.00	16.00
Reversi..... C 8K	19.95	15.95
Deflection..... C 8K	14.95	11.95
Sunday Golf..... C 16K	14.95	11.95
Adventure Series..... C 24K	19.95	15.95
Mountain Shoot..... C 16K	14.95	11.95
Galactic Trader..... C 32K	19.95	15.95
Poker Solitaire..... C 8K	14.95	11.95
Galactic Empire..... C 32K	19.95	15.95
Star Trek 3.5..... C 32K	19.95	15.95
Gomoku..... C 8K	19.95	15.95
Ricochet..... C 16K*	19.95	15.95
Mouskattack..... D 32K	34.95	27.95
Stone of Sisyphus..... D 40K	34.95	27.95
Ali Baba..... D 32K	32.95	26.50

The following require joystick controllers

Angle Worm..... C 8K	14.95	11.95
Lunar Lander..... C 24K	14.95	11.95
Stocks and Bonds..... D 40K*	25.00	20.00
Cypher Bowl..... C/D 16K	49.95	39.95
Kayos..... C/D 8K	34.95	27.95
Crazy Shootout..... R 16K	49.95	39.95
Ghost Hunter..... C 16K	29.95	22.50

MISCELLANEOUS

	Retail	Now
Vis/Calc** D 32K	\$199.95	\$145.00

A number one best seller by Apple® now available for your Atari.

Letter Perfect**..... D 16K	149.95	119.95
LJK Utility		
Mail/Merge**..... D 16K	29.95	22.50
Data Perfect**..... D 32K	99.95	79.95
Text Wizard**..... D 32K	99.95	79.95
Datasm-65**..... D 48K	149.95	119.95
Edit 6502***..... R 24K	199.95	160.00
The Next Step***..... D 32K	39.95	31.95

The following require joystick controllers

Micro-Painter**..... D 48K	34.95	27.95
Character Generator***..... D 24K*	19.95	15.95
Lisp 2.0***..... D 48K	149.95	119.95

(C) Cassette Tape (D) Diskette (R) ROM Cartridge

*Requires Atari Basic

***No printer option

**Printer optional

Catalog free with any order or send \$2 postage and handling to

THE SOFTWARE CONNECTION

5133 Vista Del Oro Way
Fair Oaks, CA 95628

MAIL ORDERS: For fast delivery, send certified check, money orders or Visa or MasterCard number and expiration date, for total purchase price plus 1% or \$2 minimum for postage and handling. Add \$5 for shipments outside the continental U.S.

California residents add 6% sales tax.

COD and Chargecard orders may call (916) 989-3174. Subject to stock on hand. Prices subject to change.

APPLE USERS CHECK OUR CATALOG


```

0 1140
1120 A=A-48:IF A<1 OR A>9 THEN 1030
1140 G=8:GOSUB 1700:PRINT "DIRECTION:"?
:POKE 85,20:? " (LEFT)";
1150 GET #1,D
1160 IF D=155 THEN 1150
1170 PRINT CHR$(D);:D=D-48:IF D<1 OR D>8
THEN 1140
1180 REM *** CHK IF GOOD INFO INPUT
1190 WT=PEEK(20)+256*PEEK(19):IF B<>L(WP
,2) THEN 1230
1210 IF D=L(WP,3) THEN 1360
1220 REM *** CHK IF A DOUBLE MAY EXIST
1230 X=A+1:Y=B+1:G=L(WP)-1:IF M(Y,X)<>A
SC(W$(WP*10-9)) THEN 1300
1240 X9=0:FOR N=2 TO G:GOSUB 1550:IF X<1
OR X>10 THEN 1270
1250 IF Y<1 OR Y>10 THEN 1270
1260 IF M(Y,X)=ASC(W$(WP*10+N)) THEN
1280
1270 X9=1:N=G
1280 NEXT N:IF X9=0 THEN 1360
1290 REM *** BAD START/DIR - NO SCORE
1300 G=6:GOSUB 1700:PRINT "
";:B=L(WP,2):A=L(WP,1):REM 14 SPACES
1310 ? B;";";A
1320 G=10:GOSUB 1700:? " ";L
(WP,3):REM 13 SPACES
(WP,3):REM 13 SPACES
1330 G=12:GOSUB 1700:? "(ESC) (UP)
(ESC) (UP)":REM 13 SPACES
1340 G=13:GOSUB 1700:? "(Z) INOI, CORREC
T (C)":GOTO 1420
1350 REM *** GOOD ANSWER - GET SCORE
1360 IF WT<(SL*60) THEN WS=100:GOTO 1390
:REM ← MAX SCORE
1370 IF WT>(SL*1200) THEN WS=10:GOTO 139
0:REM ← MIN SCORE
1380 WS=5+INT(((SL*1200)-WT)/60)
1390 G=12:GOSUB 1700:? "(ESC) (UP)"
1400 G=13:GOSUB 1700:? "(Z) IYESI, ";WS;
" POINTS":TS=TS+WS
1410 REM *** UPDATE TOTAL SCORE
1420 G=18:GOSUB 1700:? "(8 RIGHT)";TS
1430 FOR X=1 TO 500:NEXT X:GOTO 960
1440 REM *** END GAME ***
1450 POSITION 2,15
1460 FOR X=1 TO 8:? " ";NEXT
X:REM ← 12 SPACES
1470 FOR G=-2 TO 14:GOSUB 1700
1480 PRINT " ";NEXT G:RE
M 17 SPACES
1490 POSITION 2,15:? "PLAY AGAIN (Y OR N
) ?"
1500 GET #1,R
1510 IF R=ASC("Y") THEN 90

```

```

1520 IF R<>ASC("N") THEN 1500
1530 END
1540 REM *** SUBR TO INC COORDINATES IN
DIR
1550 ON D GOTO 1560,1570,1580,1590,1600,
1610,1620,1630
1560 Y=Y-1
1570 X=X+1:RETURN
1580 X=X+1
1590 Y=Y+1:RETURN
1600 Y=Y+1
1610 X=X-1:RETURN
1620 X=X-1
1630 Y=Y-1:RETURN
1640 REM *** SUBR FOR BOT TOP/BOTTOM
1650 PRINT "(3 RIGHT)";:IF Y=1 THEN ? "(
0)";:GOTO 1670
1660 PRINT "(Z)";
1670 FOR X=0 TO 9-1:? "(R)";:NEXT X:IF Y
=1 THEN PRINT "(E)":RETURN
1680 ? "(C)":RETURN
1690 REM *** SUBR TO POSITION
1700 POSITION 20,G+2:RETURN

```

Program 2: Microsoft Version

```

10 REM ***** W O R D H U N T ***
**
20 REM
30 REM BY: ROBERT W. BAKER, ATCO, ~
NJ
40 REM
50 REM *****
**
60 :
70 FOR X=1 TO VAL(RIGHT$(TI$,2)) :
R=RND(1) :NEXT :POKE 59468
,12
80 S=10 :W=10 :DIM M(S,S),W$(W),P(
S,S),L(W,3),F(8)
90 PRINT "{CLEAR}{DOWN}WHAT SKILL L
EVEL"
100 PRINT :PRINT"1 (EASY) - TO - 5 ~
(HARD) 3{03 LEFT}";
110 INPUT R$ :X=VAL(R$) :IF X<1 OR ~
X>5 THEN 90
120 SL=6-X
130 PRINT"{02 DOWN}ENTER"W"WORDS,"
140 PRINT :PRINT"EACH 3 TO 8 CHARAC
TERS LONG{02 DOWN}
150 REM **** GET WORDS & PUT IN ORD
ER
160 REM **** LONGEST TO SHORTEST
170 FOR X=1 TO W :L(X,1)=0 :L(X,2)=
0 :L(X,3)=0
180 PRINT"WORD";X;TAB(8);"{02 RIGHT

```



```

RIGHT}?{03 LEFT}";
190 INPUT R$:Q=LEN(R$)
200 IF Q<3 THEN PRINT TAB(26);"{UP}
* TOO SHORT *":GOTO 180
210 IF Q>8 THEN PRINT TAB(26);"{UP}
* TOO LONG *":GOTO 180
220 X9=0 :FOR Y=1 TO Q :A=ASC(MID$(
***+R$+***,Y+1,1))
230 IF A<65 OR A>90 THEN X9=1 :Y=Q
240 NEXT Y :IF X9=1 THEN PRINT TAB(
26);"{UP}* BAD WORD *":G
OTO 180
250 IF X=1 THEN W$(X)=R$+*** :GOTO ~
290
260 X9=0 :FOR Y=1 TO X-1 :IF Q<=LEN
(W$(Y))-1 THEN 280
270 FOR B=X TO Y+1 STEP -1 :W$(B)=W
$(B-1) :NEXT B :W$(Y)=R$+
*":X9=1 :Y=X-1
280 NEXT Y :IF X9=0 THEN W$(X)=R$+
*":
290 NEXT X
300 PRINT"{CLEAR}{07 DOWN}";SPC(8);
"THAT'S ENOUGH WORDS!":RE
M <-- 7 DOWN
310 PRINT"{06 DOWN}PLEASE BE PATIEN
T ....." :REM <-- 6 DOWN
320 PRINT"{03 DOWN}";SPC(12);"I'M N
OW MAKING THE PUZZLE!
330 REM **** INITIALIZE LETTER MATR
IX
340 FOR X=1 TO S :FOR Y=1 TO S :M(Y
,X)=42 :NEXT Y :NEXT X :Q=
0
350 REM **** INIT POINT MATRIX & GE
T NEXT WORD
360 FOR X=1 TO S :FOR Y=1 TO S :P(Y
,X)=0 :NEXT Y
370 NEXT X :Q=Q+1 :IF Q>W THEN 760
380 G=LEN(W$(Q))-2
390 REM **** TRY ALL POINTS FOR EAC
H WORD
400 X9=0 :FOR X=1 TO S :FOR Y=1 TO ~
S: IF P(Y,X)=0 THEN X9=1 :
X=S :Y=S
410 NEXT Y :NEXT X: IF X9=1 THEN 45
0
420 REM **** WORD WILL NOT FIT, TRY
AGAIN!
430 PRINT"{CLEAR}THIS LIST OF WORDS
WILL NOT ALL FIT
440 PRINT :PRINT"PLEASE ENTER ANOTH
ER LIST OF WORDS !":GOTO ~
130
450 A=INT(S*RND(1)+1) :B=INT(S*RND(
1)+1) :IF P(B,A)<>0 THEN 4
50
460 P(B,A)=1 :IF M(B,A)=42 THEN 490
470 IF M(B,A) <> ASC(LEFT$(W$(Q),1)
) GOTO 400
480 REM **** TRY ALL DIRECTIONS FRO
M THIS POINT
490 FOR X=1 TO 8 :F(X)=0 :NEXT X
500 X9=0 :FOR X=1 TO 8 :IF F(X)=0 T
HEN X9=1 :X=8
510 NEXT X :IF X9=0 THEN 400
520 D=INT(8*RND(1)+1) :IF F(D)=1 GO
TO 520
530 F(D)=1 :ON D GOTO 550,590,580,6
20,610,650,640,560
540 REM **** CHECK WORD WILL FIT
550 IF (A+G)>S THEN 500
560 IF (B-G)<1 THEN 500
570 GOTO 670
580 IF (B+G)>S THEN 500
590 IF (A+G)>S THEN 500
600 GOTO 670
610 IF (A-G)<1 THEN 500
620 IF (B+G)>S THEN 500
630 GOTO 670
640 IF (B-G)<1 THEN 500
650 IF (A-G)<1 THEN 500
660 REM **** CHECK WORD MATCHES INT
O MATRIX
670 X=A :Y=B :X9=0 :FOR N=2 TO G+1 ~
:GOSUB 1550 :IF M(Y,X)=42 ~
GOTO 690
680 IF M(Y,X)<>ASC(MID$(W$(Q),N,1))
THEN X9=1 :N=G+1
690 NEXT N :X=A :Y=B :IF X9=1 THEN ~
500
700 REM **** ENTER WORD
710 FOR N=1 TO G+1 :IF M(Y,X)=42 TH
EN M(Y,X)=ASC(MID$(W$(Q),N
,1))
720 GOSUB 1550 :NEXT N
730 REM **** SAVE START & DIRECTION
INFO
740 L(Q,1)=A-1 :L(Q,2)=B-1 :L(Q,3)=
D :IF Q<W THEN 360
750 REM **** FILL IN SPACES
760 FOR Y=1 TO S :FOR X=1 TO S :IF ~
M(Y,X)=42 THEN M(Y,X)=INT(
25*RND(1)+65)
770 NEXT X :NEXT Y :WP=0 :TS=0
780 PRINT"{CLEAR}{10 DOWN}";TAB(15)
;"{REV}READY" :REM <-- 10 ~
DOWN
790 PRINT"{06 DOWN} DEPRESS ANY KE
Y WHEN READY TO PLAY !":R
EM <-- 6 DOWN

```



```

800 R$="" :GET R$ :IF R$="" THEN 80
      0
810 REM **** SET UP DISPLAY
820 PRINT"{CLEAR}{DOWN} {REV}COL
      UMN";TAB(25);"{REV}W O R D
      "
830 REM *** PRINT 'ROW' DOWN LEFT C
      O L U M N
840 REM *** START OUT DOWN 4
850 REM *** LATER DO 5 UP & 3 OVER
860 PRINT"{04 DOWN}{REV}R{DOWN}{LEF
      LEFT}O{DOWN}{LEFT}W{05 UP}
      {03 RIGHT}{OFF}";
870 FOR X=0 TO S-1 :PRINT RIGHT$(ST
      R$(X),1); :NEXT X :PRINT :
      Y=1 :GOSUB 1650
880 FOR Y=1 TO S :PRINT"{02 RIGHT}"
      ;RIGHT$(STR$(Y-1),1);"]";
890 FOR X=1 TO S :PRINT CHR$(M(Y,X)
      ); :NEXT X
900 PRINT"]" :NEXT Y :Y=0 :GOSUB 16
      50
910 PRINT :PRINT"{REV}DIRECTIONS:" ~
      :PRINT"{DOWN} 7 8 1"
920 PRINT" M]N" :PRINT" 6@Q@2" :
      PRINT"N]M":PRINT" 5 4 3
930 G=16 :GOSUB 1700 :PRINT" {R
      REV} SCORE " :PRINT TAB(
      25);"5 6
940 PRINT TAB(25);"5 0 6"
950 PRINT TAB(25);"5 6" :PRIN
      T TAB(25);"8888888888
960 G=0 :GOSUB 1700 :PRINT" ~
      " :REM <-- 19 S
      PACES
970 WP=WP+1 :IF WP>W THEN 1450
980 Q=LEN(W$(WP))-1
990 REM **** NEXT WORD
1000 GOSUB 1700 :PRINT TAB(29-(Q/2))
      ;LEFT$(W$(WP),Q) :TI$="000
      000"
1010 REM **** GET START LOC
1020 G=3 :GOSUB 1700 :PRINT"STARTING
      LOCATION" :PRINT TAB(20);
      "(ROW,COLUMN):
1030 FOR G=6 TO 14 :GOSUB 1700
1040 PRINT" " :NE
      XT G :G=6 :GOSUB 1700 :REM
      <-- 20 SPACES
1050 B$="" :GET B$ :IF B$="" THEN 10
      50
1060 IF ASC(B$)=13 THEN 1050
1070 PRINT B$;","; :IF B$="0" THEN B
      =0 :GOTO 1090
1080 B=VAL(B$) :IF B<1 OR B>9 THEN]P
      RINT"{02 LEFT} {02 LEFT}"
; :GOTO 1050
1090 A$="" :GET A$ :IF A$="" THEN 10
      90
1100 IF ASC(A$)=13 THEN 1090
1110 PRINT A$ :IF A$="0" THEN A=0 :G
      OTO 1140
1120 A=VAL(A$) :IF A<1 OR A>9 THEN 1
      030
1130 REM **** GET DIRECTION
1140 G=8 :GOSUB 1700 :PRINT"DIRECTIO
      N:" :PRINT :PRINT TAB(20);
      " {LEFT}";
1150 GET D$ :IF D$="" THEN 1150
1160 IF ASC(D$)=13 THEN 1150
1170 PRINT D$ :D=VAL(D$) :IF D<1 OR ~
      D>8 THEN 1140
1180 REM **** CHK IF GOOD INFO INPUT
1190 WT=TI :IF B<>L(WP,2) THEN 1230
1200 IF A<>L(WP,1) THEN 1230
1210 IF D=L(WP,3) THEN 1360
1220 REM **** CHK IF A DOUBLE MAY EX
      IST
1230 X=A+1 :Y=B+1 :G=LEN(W$(WP))-1 :
      IF M(Y,X)<>ASC(LEFT$(W$(WP)
      ),1) THEN 1300
1240 X9=0 :FOR N=2 TO G :GOSUB 1550 ~
      :IF X<1 OR X>10 THEN 1270
1250 IF Y<1 OR Y>10 THEN 1270
1260 IF M(Y,X)=ASC(MID$(W$(WP),N,1))
      THEN 1280
1270 X9=1 :N=G
1280 NEXT N :IF X9=0 THEN 1360
1290 REM **** BAD START/DIR - NO SCO
      RE
1300 G=6 :GOSUB 1700 :PRINT SPC(14);
      :B$=STR$(L(WP,2)) :A$=STR
      $(L(WP,1))
1310 PRINT RIGHT$(B$,LEN(B$)-1);",";
      RIGHT$(A$,LEN(A$)-1)
1320 G=10 :GOSUB 1700 :PRINT SPC(13)
      ;L(WP,3)
1330 G=12 :GOSUB 1700 :PRINT"^";SPC(
      13);"^"
1340 G=13 :GOSUB 1700 :PRINT"] {REV}
      NO{OFF}, CORRECT K" :GOTO ~
      1420
1350 REM **** GOOD ANSWER - GET SCOR
      E
1360 IF WT<(SL*60) THEN WS=100 :GOTO
      1390 :REM <-- MAX SCORE
1370 IF WT>(SL*1200) THEN WS=10 :GOT
      O 1390 :REM <-- MIN SCORE
1380 WS=5+INT(((SL*1200)-WT)/60)
1390 G=12 :GOSUB 1700 :PRINT"^"
1400 G=13 :GOSUB 1700 :PRINT"] {REV}

```



```

YES{OFF},";WS;"POINTS" :TS
=TS+WS
1410 REM **** UPDATE TOTAL SCORE
1420 G=18 :GOSUB 1700 :PRINT"{07 RI
G RIGHT}";TS
1430 FOR X=1 TO 1000 :NEXT X :GOTO
960
1440 REM **** END GAME ****
1450 PRINT"{HOME}{15 DOWN}" :REM <-
- DOWN 15
1460 FOR X=1 TO 6 :PRINT"
~ " :NEXT X :REM <-- 12 SPA
CES
1470 FOR G=-2 TO 13 :GOSUB 1700
1480 PRINT" " :NEXT
~ G :REM 17 SPACES
1490 PRINT"{HOME}{20 DOWN}PLAY AGAI
N (Y OR N) ?" :REM <-- DOWN
20
1500 R$="" :GET R$ :IF R$="" THEN 1
500
1510 IF R$="Y" THEN 90
1520 IF R$<>"N" THEN 1500
1530 END
1540 REM **** SUBR TO INCR COORDINA

```

```

TES IN DIR
1550 ON D GOTO 1560,1570,1580,1590,
1600,1610,1620,1630
1560 Y=Y-1
1570 X=X+1 :RETURN
1580 X=X+1
1590 Y=Y+1 :RETURN
1600 Y=Y+1
1610 X=X-1 :RETURN
1620 X=X-1
1630 Y=Y-1 :RETURN
1640 REM **** SUBR FOR BOX TOP/BOTT
OM
1650 PRINT"{03 RIGHT}"; :IF Y=1 THE
N PRINT"0"; :GOTO 1670
1660 PRINT"=";
1670 FOR X=0 TO S-1 :PRINT"@"; :NEX
T X :IF Y=1 THEN PRINT"." :
RETURN
1680 PRINT"=" :RETURN
1690 REM **** SUBR TO POSITION
1700 PRINT"{HOME}"TAB(20); :FOR X9=
1 TO G+3 :PRINT"{DOWN}"; :N
EXT X9 :RETURN

```

©

WARLOCK'S REVENGE

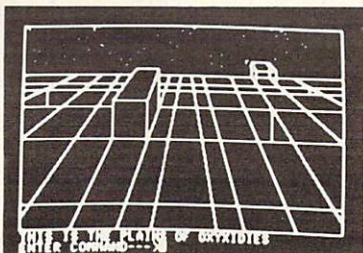


NEW FROM

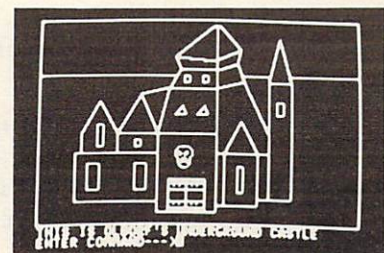


**Synergistic
Software**

AN EXCITING ATARI* HIGH-RES ADVENTURE GAME



Over 100 high resolution pictures in this two disk adventure, guide you to treasure as well as dangers. As you explore caverns and castles you use your various skills to obtain the riches therein, while eluding the pitfalls and creatures that abound. You provide the Atari, Warlock's Revenge provides the challenge. Requires at least a 40K, 400/800 with Atari Basic and disk. **\$35.00**



SYNERGISTIC SOFTWARE
5221 120th Ave. S.E.
Bellevue, Washington 98006
(206) 226-3216

Available for the Apple II Computer
as Oldorf's Revenge
from Highlands Computer Services

ATARI* 400/800 are trademarks of
Atari Computers Inc.

Count The Hearts

Christopher J. Flynn
Herndon, VA

"Count the Hearts" is a VIC program which will help you to develop your child's counting skills. VIC will display a certain number of hearts on your television screen. Ask your child to count them. If your child can correctly count the hearts, he or she will be rewarded by a duet of chirping birdies. Otherwise, ... To challenge older children, you can place a limit on the time VIC allows for a response.

Once it is set up, no reading is required to play "Count the Hearts." However, preschoolers will probably need you to help them with the keyboard.

Setting Up

When you first start "Count the Hearts," it will ask you for a range of numbers and a time limit.

You can tailor the game to your child's counting skills by trying different number ranges. For example, you may want to start with numbers between one and five. Gradually, a child will work up to counting up to ten. If you notice difficulties with some numbers, you might want to work within that range (say from six to nine).

Here is how VIC will ask you to set the number range:

1. VIC will display:
ENTER NUMBER RANGE
LOW NUMBER (1) ?
2. You should type in the low number in the range (don't forget to hit RETURN). If you just hit RETURN, VIC will use one as the low number.
3. Next VIC will ask:
HIGH NUMBER (9) ?
4. Now type in the high number. Again, if you just hit RETURN, VIC will use nine as the high number.

VIC will make sure that your low number is really lower than your high number. It will also make sure that neither number is greater than 484. Why 484? Well, that's how many spaces are left on the screen for displaying the hearts.

The time limit gives you a way to speed up "Count the Hearts." If you don't take a guess at how many hearts there are within the time limit, then VIC will let you know that time's up. VIC will then just start another game.

VIC will ask you for the time limit:

5. VIC will display:
TIME LIMIT PER SET
SECONDS (120) ?

6. Type in the number of seconds you want to use for the time limit. If you just type RETURN, VIC will set the time limit to 120 seconds or two minutes.

By the way, if, in any of the above steps, VIC didn't understand your response, it will either ask the question again or ask you to repeat your response.

Counting Hearts

O.K. The television screen goes blank for just an instant. In that brief instant VIC is deciding how many hearts it will ask you to count. Then, one by one, VIC displays the hearts at random locations on the television screen. As it shows each new heart, VIC says in a deep voice, "BEEP!". Notice how VIC paints the hearts in different colors.

Now VIC will ask:

HOW MANY HEARTS ?

Ask your child to count them. Type in the number (don't forget RETURN!) and see what happens. What happens if your child gives the right answer? How about a wrong answer? What is your child's reaction?

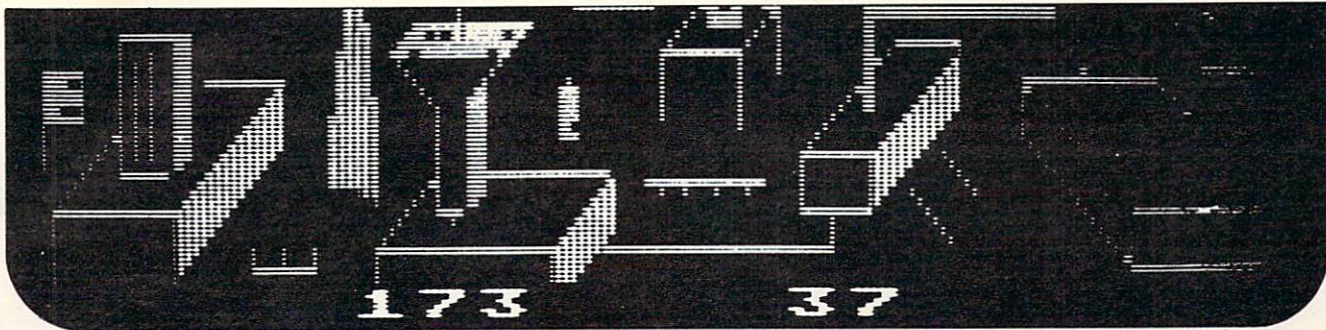
VIC will start a new game when the right answer is typed in or when time runs out and nothing has been heard from the keyboard. VIC is very patient with small folks learning to count. When a wrong answer is given, VIC just resets its timer and gives you another try.

Scoring

When you are finished playing "Count the Hearts", just hit the F1 key in reply to the "HOW MANY HEARTS ?" question. VIC will promptly clear the screen and tell you:

- how many games were played
- how many correct answers there were
- how many wrong answers there were
- how many times the player ran out of time

By keeping track of the number range (VIC shows you the range you used) and the scores, you can note your child's progress. For example, do you notice a little slowness in your child's learning to count past ten? We did. That seems to be the upper limit for our three year old for a while.



Rocket Raiders

Our High Quality Software Is More Than A Stroke Of Genius... It's A Work Of Art.

PM EDITOR: by Dennis Zander (Atari, 16K)
Create your own fast action graphics game for the Atari 400 or 800 using its player missile graphics features. By using player data stored as strings, players can be moved or changed (for animation) at machine language speed. All this is done with string variables (PO\$(Y)=SHIP4). This program is designed to permit creation of up to 4 players on the screen, store them as string data and then immediately try them out in the demo game included in the program. Instructions for use in your own game are included. PM EDITOR was used to create the animated characters in **ARTWORX RINGS OF THE EMPIRE** and **ENCOUNTER AT QUESTAR IV**.
PRICE \$29.95 cassette \$33.95 diskette

ROCKET RAIDERS by Richard Petersen (Atari 24K)
Defend your asteroid base against pulsar bombs, rockets, lasers, and the dreaded "stealth saucer" as aliens attempt to penetrate your protective force field. Precise target sighting allows you to fire at the enemy using magnetic impulse missiles to help protect your colony and its vital structures.
PRICE \$19.95 cassette \$23.95 diskette

INTRUDER ALERT! by Dennis Zander (Atari, 16K)
This is a fast paced action game in which you must escape from the "Dreadstar" with the secret plans. The droids are after you and you must find and enter your ship in order to escape. If you fail, the rebellion is doomed.
PRICE \$16.95 cassette \$20.95 diskette

THE RINGS OF THE EMPIRE: by Dennis Zander (Atari 16K)
The Empire has developed a series of battle stations protected by one or more rings of energy. You must destroy these weapons by attacking them in your Y-wing fighter armed with Zydon torpedoes. Each time you blast through the rings and destroy the station, the Empire develops a new station with more protective rings.
PRICE \$16.95 cassette \$20.95 diskette

FOREST FIRE! by Richard Petersen (Atari, 24K)
Using excellent color graphics, your Atari is turned into a fire scanner to help you direct operations to contain a forest fire. You must compensate for changes in wind, weather and terrain. Not protecting valuable property can result in startling penalties. Life-like variables make **FOREST FIRE** a very suspenseful and challenging simulation.
PRICE \$16.95 cassette \$20.95 diskette

PILOT: by Michael Piro (Atari, 16K)
Pilot your small airplane to a successful landing using both joysticks to control throttle and attack angle. **PILOT** produces a true perspective rendition of the runway, which is constantly changing. Select from two levels of pilot proficiency.
PRICE \$16.95 cassette \$20.95 diskette

ALPHA FIGHTER: by Douglas McFarland (Atari, 16K)
Consisting of two different programs, **ALPHA FIGHTER** requires you to destroy the alien starships. As you become more successful, the games get harder and and harder.
PRICE \$14.95 cassette \$18.95 diskette

GIANT SLALOM: by Dennis Zander (Atari, 16K)
Bring the Winter Olympics to your computer anytime of the year! Use the joystick to guide your skier's path down a giant slalom course consisting of open and closed gates. Choose from three levels of difficulty. Take practice runs or compete against from two to eight additional skiers.
PRICE \$15.95 cassette \$19.95 diskette

HODGE PODGE: by Marsha Meredith (Apple 48K, Applesoft or Integer BASIC)
This captivating program is a marvelous learning device for children from 18 months to 6 years. **HODGE PODGE** consists of many cartoons, animations and songs which appear when any key on the computer is depressed. A must for any family containing young children and an Apple.
PRICE \$19.95 diskette

STUD POKER: by Jerry White (Atari, 16K)
This is the classic gambler's card game. You will find the computer to be a worthy opponent who occasionally bluffs but never cheats! **STUD POKER** employs all of the Atari's sound, color and graphics capabilities.
PRICE \$14.95 Cassette \$18.95 diskette

TYPE-N-TALK*
ARTWORX is offering the fantastic **TYPE-N-TALK™** from Vortrax*. This easy-to-use unit connects to your computer's serial port. Text is automatically translated into electronic speech enabling the **TYPE-N-TALK™** hobbyist to use and enjoy it immediately.
PRICE \$329.00

The following **ARTWORX** programs are available for **TYPE-N-TALK:**
STUD POKER (Atari, 24K) \$16.95 cassette \$20.95 diskette
TEACHER'S PET (Atari, 24K; North Star) \$16.95 / \$20.95
BRIDGE 2.0 (Atari, 24K; North Star) \$19.95 / \$23.95
NOMINOES JIGSAW (Atari, 24K) \$17.95 / \$21.95
Please specify "TNT" version when ordering programs.

CRANSTON MANOR ADVENTURE: by Larry Ledden (Atari, North Star and CP/M)
You must enter mysterious Cranston Manor and attempt to collect its many treasures. This extremely challenging program will provide you with many hours (days?) of adventure. The program may be interrupted at will and your status saved onto the diskette.
PRICE \$21.95 diskette

BLOCKADE: by Edward Schneider (Atari, 16K)
Every games library needs **Blockade** program, and this is one of the best. Choose from three levels of difficulty and play against another person or by yourself against the clock.
PRICE \$14.95 cassette \$18.95 diskette

TEACHER'S PET: by Arthur Walsh (Atari, Apple, TRS-80, PET, North Star and CP/M (MBASIC) systems)
This is an introduction to computers as well as a learning tool for the young computerist (ages 3-7). The program provides counting practice, letter-word recognition and three levels of math skills.
PRICE \$14.95 cassette \$18.95 diskette

FORM LETTER SYSTEM: (Atari, North Star and Apple)
This is the ideal program for creating personalized form letters! **FLS** employs a simple-to-use text editor for producing fully justified letters. Addresses are stored in a separate file and are automatically inserted into your form letter along with a personalized salutation. Both letter files and address files are compatible with **ARTWORX MAILLIST 3.0** and **TEXT EDITOR** programs.
PRICE \$39.95 diskette

TEXT EDITOR: (Atari and North Star)
This program is very "user friendly" yet employs all essential features needed for serious text editing with minimal memory requirements. Features include common sense operation, two different justification techniques, automatic line centering and straightforward text merging and manipulation. **TEXT EDITOR** files are compatible with **ARTWORX FORM LETTER SYSTEM**.
PRICE \$39.95 diskette

MAIL LIST 3.0: (Atari, Apple and North Star)
The very popular **MAIL LIST 2.2** has now been upgraded. Version 3.0 offers enhanced editing capabilities to complement the many other features which have made this program so popular. **MAIL LIST** is unique in its ability to store a maximum number of addresses on one diskette (typically between 1200 and 2500 names!). Entries can be retrieved by name, keyword(s) or by zip codes. They can be written to a printer or to another file for complete file management. The program produces 1, 2 or 3-up address labels and will sort by zip code (5 or 9 digits) or alphabetically (by last name). Files are easily merged and **MAIL LIST** will even find and delete duplicate entries! The address files created with **MAIL LIST** are completely compatible with **ARTWORX FORM LETTER SYSTEM**.
PRICE \$49.95 diskette

THE VAULTS OF ZURICH: by Felix and Ted Herlihy (Atari, 24K, PET)
Zurich is the banking capital of the world. The rich and powerful deposit their wealth in its famed impregnable vaults. But you, as a master thief, have dared to undertake the boldest heist of the century. You will journey down a maze of corridors and vaults, eluding the most sophisticated security system in the world. Your goal is to reach the Chairman's Chamber to steal the most treasured possession of all: **THE OPEC OIL DEEDS!**
PRICE \$21.95 cassette \$25.95 diskette

BRIDGE 2.0 by Arthur Walsh (Atari (24K), Apple, TRS-80, PET, North Star and CP/M (MBASIC) systems)
Rated #1 by Creative Computing, **BRIDGE 2.0** is the only program that allows you to both bid for the contract and play out the hand (on defense or offense!). Interesting hands may be replayed using the "duplicate" bridge feature. This is certainly an ideal way to finally learn to play bridge or to get into a game when no other (human) players are available.
PRICE \$17.95 cassette \$21.95 diskette

ENCOUNTER AT QUESTAR IV: by Douglas McFarland (Atari, 24K)
As helmsman of Rikar starship, you must defend **Questar Sector IV** from the dreaded **Zentarians**. Using your plasma beam, hyperspace engines and wits to avoid **Zentarian** mines and death phasers, you struggle to stay alive. This **BASIC/Assembly** level program has super sound, full player missile graphics and real time action.
PRICE \$23.95 cassette \$27.95 diskette

THE NOMINOES JIGSAW PUZZLE: by C. Minns/B. Brownlee (Atari, 24K, TRS-80, and Apple)
We quote: "...A brainteaser supreme... the concept of **NOMINOES JIGSAW** is brilliant... this video jigsaw game is so clever and completely original that only the most hardhearted puzzle hater could fail to be charmed."—**ELECTRONIC GAMES MAGAZINE**.
PRICE \$17.95 cassette (also available for TRS-80 color computer) \$21.95 diskette.

Artworx

ARTWORX SOFTWARE COMPANY

Highest Quality Software*, Guaranteed.

150 North Main Street Fairport, NY 14450 (716) 425-2833

Call ARTWORX toll-free number to order direct:



800-828-6573

In New York, Alaska, Hawaii call: (716)-425-2833

All orders are processed and shipped within 48 hours.



Shipping and handling charges:

Within North America: Add \$2.00

Outside North America: Add 10% (Air Mail)

New York State residents add 7% sales tax.

Quantity Discounts:

Deduct 10% when ordering 3 or more programs

Ask for ARTWORX at your local computer store.



Write for FREE Catalogue listing more information about these and other quality ARTWORX programs.

*ATARI, APPLE, TRS-80, PET, NORTH STAR, CP/M, and TYPE-N TALK are registered tradenames and/or trademarks.

Hints

You probably don't need to be reminded that the attention span of preschoolers is not long. Try to move on to another activity before your child gets bored and begins to act silly. You want your child to remember counting as something that is fun to do.

One way for you to help beginners is for you to point to the hearts very slowly one by one. Let your child count them as you point to them. Gradually your child will take over the pointing. And, before you know it, your child will be typing in the numbers on the keyboard! Experiment. Try out different arrangements. What works best for you?

The program will run on a standard VIC without memory expansion. If you need to, you should be able to modify Count the Hearts without too much trouble.

Now you're ready to play "Count the Hearts"! But remember, to stop the game and see your score, all you need to do is press the F1 key. Have fun.

Program 1: Microsoft Version

```

100 REM VIC-20
110 REM COUNT THE HEARTS
120 REM V1.0 7/81
130 REM
200 REM
210 REM HEARTS.BEGIN
220 GOSUB 30000
230 REM PLAY GAMES
240 GOSUB 1000
250 IF Q=0 THEN 240
260 REM HEARTS.END
270 GOSUB 31000
280 END
1000 REM PLAY GAMES
1010 PRINT CHR$(147)
1020 REM DISPLAY HEARTS
1030 N=LO+INT((HI-LO+1)*RND(1))
1040 FOR I=1 TO N
1050 P=INT(484*RND(1))
1060 CL=INT(8*RND(1)):IF CL=1 THEN 1
    060
1070 IF PEEK(VA+P)=83 THEN 1050
1080 POKE VA+P,83
1090 POKE CA+P,CL
1100 POKE VL,15
1110 POKE S2,200
1120 FOR Z=1 TO 400:NEXT
1130 POKE S2,0:POKE VL,0
1140 NEXT I
1150 G=G+1:REM GAMES
1160 PRINT CHR$(19);
1170 FOR I=1TO21:PRINT " ";:NEXT
1180 PRINTCHR$(19);"HOW MANY HEARTS ~
    ? ";
1190 REM GET RESPONSE
1200 GOSUB 3000
1210 IF R$="QUIT" THEN Q=1:RETURN
1220 IF R$="TIME" THEN GOSUB 9000:RE
    TURN
1230 REM O.K.?
1240 R=VAL(R$)
1250 IF R<>N THEN GOSUB 5000:GOTO 11
    60
1260 IF R=N THEN GOSUB 7000
1270 RETURN
3000 REM TIMED RESPONSE
3010 T1=TI+SC*60
3020 R$=""
3030 REM TRY A KEY
3040 GET A$
3050 IF TI>T1 THEN R$="TIME":RETURN
3060 IF A$="" THEN 3040
3070 IF ASC(A$)=133 THEN R$="QUIT":R
    ETURN
3080 IF ASC(A$)=13 THEN RETURN
3090 IF ASC(A$)=20 AND LEN(R$)>0 THE
    N GOSUB 3300:R$=LEFT$(R$,(
    LEN(R$)-1)):GOTO3040
3095 IF ASC(A$)=20 THEN 3040
3100 PRINT A$;
3110 IF A$<"0" OR A$>"9" THEN GOSUB ~
    3300:GOTO 3040
3120 R$=R$+A$
3130 GOTO 3040
3300 REM BACKSPACE
3310 PRINT CHR$(157);
3320 PRINT " ";
3330 PRINT CHR$(157);
3340 RETURN
5000 REM WRONG
5010 WR=WR+1
5030 REM UFO-VARIATION
5040 POKE VL,15
5050 FOR L=1 TO 15
5060 POKE SB,42
5070 FOR M=200 TO 220+L*2
5080 POKE S3,M
5090 NEXT M
5100 POKE SB,25
5110 FOR Z=1TO 25:NEXT Z
5120 NEXT L
5130 POKE VL,0:POKE S3,0
5140 POKE SB,27
5150 RETURN
7000 REM RIGHT
7010 RI=RI+1
7020 REM BIRDS VARIATION
7025 PRINT CHR$(19);:FOR Z=1 TO 21:P
    RINT " ";:NEXT Z
7030 POKE VL,15
7040 FOR L=1 TO 20
7050 PRINT CHR$(19);SPC(5);CHR$(106)
    ;CHR$(113);CHR$(107);

```



```

7055 PRINT SPC(5);CHR$(117);CHR$(113
);CHR$(105);
7060 FOR M=254 TO 240+RND(1)*10 STEP
-1
7070 POKE S3,M
7080 NEXT M
7090 POKE S3,0
7100 FOR M=1 TO 100:NEXT M
7110 PRINT CHR$(19);SPC(5);CHR$(117)
;CHR$(113);CHR$(105);
7115 PRINT SPC(5);CHR$(106);CHR$(113
);CHR$(107);
7120 FOR M=1 TO 120*RND(1):NEXT M
7130 NEXT L
7140 POKE S3,0:POKE VL,0
7150 RETURN
9000 REM TIME
9010 TM=TM+1
9020 VM=VA+253:CM=CA+253
9030 REM TONE
9040 POKE S3,240:POKE VL,15
9050 J=0
9060 FOR L=15 TO 0 STEP -2
9070 POKE VM+J,81:POKE CM+J,2
9080 POKE VM-J,81:POKE CM-J,2
9090 POKE VM+22*J,81:POKE CM+22*J,2
9100 POKE VM-22*J,81:POKE CM-22*J,2
9110 FOR Z=1 TO 50:NEXT Z
9120 POKE VM+J,32
9130 POKE VM-J,32
9140 POKE VM+22*J,32
9150 POKE VM-22*J,32
9160 FOR Z=1TO50:NEXT Z
9170 POKE VL,L
9180 J=J+1
9190 NEXT L
9200 POKE VM-2,20:POKE CM-2,4
9210 POKE VM-1,9:POKE CM-1,4
9220 POKE VM,13:POKE CM,4
9230 POKE VM+1,5:POKE CM+1,4
9240 POKE S3,0:POKE VL,0
9250 FOR Z=1 TO 2000:NEXT Z
9260 RETURN
30000 REM HEARTS.BEGIN
30010 REM CONSTANTS/VARS
30020 VA=7702
30030 CA=38422
30040 SB=36879
30050 VL=36878
30060 S2=36875
30070 S3=36876
30080 S4=36877
30090 LO=1
30100 HI=9
30110 SC=120
30120 G=0
30130 TM=0
30140 RI=0
30150 WR=0
30160 Z=RND(-TI)
30170 PRINT CHR$(147);
30180 PRINT SPC(8);"VIC-20"
30190 PRINT
30200 PRINT" COUNT THE HEARTS"
30210 PRINT:PRINT
30215 PRINT CHR$(158);
30220 PRINT" COPYRIGHT 1981"
30230 PRINT" HOMESPUN SOFTWARE"
30235 PRINT CHR$(31);
30240 PRINT:PRINT
30250 PRINT"ENTER NUMBER RANGE"
30260 INPUT"LOW NUMBER (1)";LO
30270 LO=ABS(INT(LO))
30275 IF LO<1 OR LO>484 THEN PRINT "S
ORRY":LO=1:GOTO 30260
30280 INPUT"HIGH NUMBER (9)";HI
30290 HI=ABS(INT(HI))
30300 IF HI<=LO OR HI>484 THEN PRINT"
SORRY":HI=9:GOTO 30260
30310 PRINT
30320 PRINT"TIME LIMIT PER SET:"
30330 INPUT"SECONDS (120)";SC
30340 SC=ABS(INT(SC))
30345 IF SC<1 THEN PRINT "SORRY":SC=1
20:GOTO 30330
30350 PRINT:PRINT
30360 PRINT"KEY F1 TO STOP"
30370 PRINT:PRINT
30380 PRINT"THANK YOU. HAVE FUN!"
30390 FOR Z=1TO2000:NEXT
30400 RETURN
31000 REM HEARTS.END
31010 PRINT CHR$(147)
31020 PRINT"COUNT THE HEARTS"
31030 PRINT:PRINT
31032 PRINT"LOW #",LO
31034 PRINT"HIGH #",HI
31036 PRINT:PRINT
31040 PRINT "# GAMES",G
31050 PRINT "# RIGHT",RI
31060 PRINT "# WRONG",WR
31070 PRINT "# TIME OUTS";TM
31080 RETURN

```

Program 2: Atari Version

```

100 REM ATARI 400/800
110 REM COUNT THE HEARTS
120 REM V1.1 7/81
130 REM
200 REM
210 REM HEARTS.BEGIN
220 GOSUB 30000
230 REM PLAY GAMES
240 GOSUB 1000
250 IF G=0 THEN 240

```


NEW! Student Management System for the PET Professor



The Pet Professor Arithmetic Software

If you need to teach division of a 2-digit decimal by a 1-digit whole number, we have D-D-1. This program teaches the concept step by step.

Since you probably need to keep student interest high, we go very slowly with a moving cursor. The student is comfortable and involved.

Do you need to drill subtraction of a fraction from a mixed number? Just bypass the teaching part of program F-S-2 and go directly to drill. The nice part is if the student happens to forget, the teaching is still available.

If a test on subtraction of whole numbers with 4-digits, multiple zeros and borrowing is your need, program WN-S-6 is your answer.

The 77 program series is available for \$499 on cassettes and diskettes. The Student Management System is \$150.

For more information send for a sample tape or call (516) 365-4423 and tell us what you need.



COW BAY COMPUTING

BOX 515
MANHASSET, N.Y. 11030

Fantasy for your ATARI Ali Baba and the forty thieves

By Stuart Smith



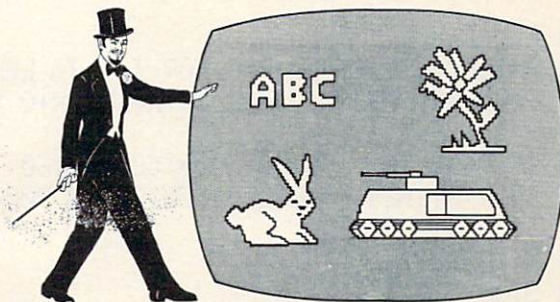
Guide your alter ego, Ali Baba, through the thieves mountain den in an attempt to rescue the beautiful princess. Treasure, magic, and great danger await you! One or more human players can guide up to seventeen friendly characters through the many rooms, halls, and caves. Some characters wander around randomly, making each adventure a little different.

ALI BABA AND THE FORTY THIEVES is written in high resolution color graphics and includes music and sound effects. Adventures can be saved to disk and resumed at a later time. Requires 52K.

On Diskette Only — \$32.95

Graphics for your ATARI Character Magic

By Chris Hull



It's easy to create your own character sets and save them to diskette or cassette with CHARACTER MAGIC. But this is not just another character editor. CHARACTER MAGIC helps you use all the character types that the Atari is capable of, including descending characters (8 x 10 dots) and two types of five-color character graphics not supported by Atari's Operating System. Documentation includes examples of display lists that let you use these "secret" graphics modes. Requires 32K.

Cassette or Diskette - \$29.95

FOR OUR COMPLETE LINE OF ATARI SOFTWARE
PLEASE WRITE FOR OUR CATALOG

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.

QS QUALITY
SOFTWARE

6660 Reseda Blvd., Suite 105, Reseda, Ca. 91335

(213) 344-6599

*Indicates trademarks of Atari


```

260 REM HEARTS.END
270 GOSUB 31000
280 END
1000 REM PLAY GAMES
1010 GRAPHICS 1+16:SETCOLOR 0,0,0:POKE 7
56,226:DL=PEEK(560)+256*PEEK(561)+4:POKE
DL-1,66
1015 UA=PEEK(88)+256*PEEK(89)+40
1020 REM DISPLAY HEARTS
1030 N=LO+INT((HI-LO+1)*RND(0))
1040 FOR I=1 TO N
1050 P=INT(440*RND(1))
1060 CL=INT(3*RND(1)+1)
1070 T=PEEK(UA+P):IF T=64 OR T=128 OR T=
192 THEN 1050
1080 POKE UA+P,64*CL
1090 REM
1100 SOUND 0,100,10,8
1110 REM
1120 FOR Z=1 TO 100:NEXT Z
1130 SOUND 0,0,0,0
1140 NEXT I
1150 G=G+1:REM GAMES
1160 POKE 87,0:POSITION 1,0:?"
";:REM 19 SPACES
1180 POSITION 1,0:?"How many hearts?";
1190 REM GET RESPONSE
1200 GOSUB 3000
1210 IF R$="QUIT" THEN Q=1:RETURN
1220 IF R$="TIME" THEN GOSUB 9000:RETURN

1230 REM O.K.?
1240 P=10^(LEN(R$)-2):R=0:FOR I=2 TO LEN
(R$):R=R+(ASC(R$(I,I))-48)*P:R=INT(R+.0
5):P=P/10:NEXT I
1250 IF R<N THEN GOSUB 5000:GOTO 1160
1260 IF R=N THEN POKE DL-1,70:GOSUB 7000

1270 RETURN
2000 STOP
3000 REM TIMED RESPONSE
3010 T1=PEEK(20)+256*PEEK(19)+SC*60
3020 R$=""
3030 REM TRY A KEY
3040 IF PEEK(20)+256*PEEK(19)>T1 THEN R$
="TIME":RETURN
3050 IF PEEK(53279)<7 THEN R$="QUIT":RET
URN
3060 IF PEEK(764)=255 THEN 3040
3070 GET #1,A
3080 IF A=155 THEN RETURN
3090 IF A=126 AND LEN(R$)>1 THEN GOSUB 3
300:R$=R$(1,LEN(R$)-1):GOTO 3040
3095 IF A=126 AND LEN(R$)=1 THEN 3020
3097 IF A=126 THEN 3040
3100 IF A<48 OR A>57 THEN 3040

```

```

3110 PRINT CHR$(A);
3120 R$(LEN(R$)+1)=CHR$(A)
3130 GOTO 3040
3300 REM BACKSPACE
3310 PRINT CHR$(30);" ";CHR$(30):RETURN

5000 REM WRONG
5010 WR=WR+1
5030 REM UFO-VARIATION
5040 FOR L=1 TO 15
5050 FOR M=100 TO 140+L*2 STEP 2
5060 SOUND 0,M,10,8:POKE 712,PEEK(53770)

5070 NEXT M
5080 FOR Z=1 TO 10:NEXT Z
5090 NEXT L
5100 SOUND 0,0,0,0:POKE 712,0
5110 RETURN
7000 REM RIGHT
7010 RI=RI+1:POKE 87,1
7020 REM BIRDS VARIATION
7025 COLOR 32:PLOT 0,0:DRAWTO 19,0
7040 FOR L=1 TO 5
7050 POSITION 5,0:?"#6:CHR$(17);CHR$(20)
";CHR$(5);
7055 POSITION 10,0:?"#6:CHR$(26);CHR$(20)
";CHR$(3);
7060 FOR M=50 TO 10+10*RND(1) STEP -1
7070 SOUND 0,M,10,8
7080 NEXT M
7090 SOUND 0,0,0,0
7100 FOR M=1 TO 50:NEXT M
7110 POSITION 5,0:?"#6:CHR$(26);CHR$(20)
";CHR$(3);
7120 POSITION 10,0:?"#6:CHR$(17);CHR$(20)
";CHR$(5);
7130 FOR M=1 TO 60*RND(1):NEXT M
7140 NEXT L:POKE 87,0
7150 RETURN
9000 REM TIME
9005 POSITION 1,0:?"
";
9010 TM=TM+1
9020 UM=UA+229
9030 REM TONE
9040 SOUND 0,100,12,8
9050 J=0
9060 FOR L=15 TO 0 STEP -1
9070 POKE UM+J,148
9080 POKE UM-J,148
9090 POKE UM+20*J,148
9100 POKE UM-20*J,148
9110 FOR Z=1 TO 50:NEXT Z
9120 POKE UM+J,0
9130 POKE UM-J,0
9140 POKE UM+20*J,0

```

TIME


```

9150 POKE VM-20*J,0
9160 FOR Z=1 TO 50:NEXT Z
9170 SOUND 0,L*5,12,L
9180 J=J+(L/2<>INT(L/2))
9190 NEXT L
9200 RETURN
30000 REM HEARTS.BEGIN
30010 REM CONSTANTS/VARS
30090 LO=1:HI=9:SC=120:G=0:TM=0:RI=0:WR=
0
30100 DIM R$(20):OPEN #1,4,0,"K:"
30170 GRAPHICS 0
30180 ? CHR$(125);:POSITION 12,0:? " ATA
RI 400/800"
30190 POSITION 11,2:? "Count the Hearts"

30210 ? :?
30220 ? "          Copyright 1981"
30230 ? "          HOMESPUN SOFTWARE"
30240 ? :?
30250 ? "Enter number range:"
30260 TRAP 30250:? "Low number (1)":INP
UT LO:TRAP 40000
30270 LO=ABS(INT(LO))
30275 IF LO<1 OR LO>440 THEN ? "SORRY":L
O=1:GOSUB 30260
30280 ? "High number (9)":TRAP 30280:IN

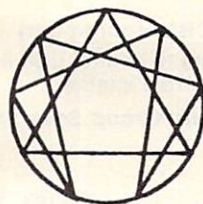
```

```

PUT HI:TRAP 40000
30290 HI=ABS(INT(HI))
30300 IF HI<=LO OR HI>440 THEN ? "SORRY"
:HI=9:GOTO 30260
30310 ?
30320 ? "TIME LIMIT PER SET:"
30330 ? "Seconds (120)":TRAP 30330:INPU
T SC:TRAP 40000
30340 SC=ABS(INT(SC))
30350 ? :?
30360 ? "PRESS [OPTION] TO STOP"
30370 ? :?
30380 ? "THANK YOU. Have fun!"
30390 FOR Z=1 TO 100:NEXT Z
30400 RETURN
31000 REM HEARTS.END
31010 GRAPHICS 0
31020 ? "COUNT THE HEARTS"
31030 ? :?
31032 ? "LOW #",LO
31034 ? "HIGH #",HI
31036 ? :?
31040 ? "GAMES",G
31050 ? "RIGHT",RI
31060 ? "WRONG",WR
31070 ? "TIME OUTS ";TM
31080 RETURN

```

©



ALTERNATE REALITY SOFTWARE

Presents for the Atari

THE I CHING

THE ANCIENT CHINESE BOOK OF DIVINATION

- The complete text of the world's oldest book on disk
- 40K program
- 73 disk files (155,000 bytes)
- Occupying 1211 disk sectors
- High Resolution Graphics
- Animation
- Music and Sound Effects
- Instructional text material
- Calculates and Displays Hexagrams
- Displays Judgement, Image, Moving Lines for primary & secondary Hexagrams
- \$44.95

order from:

Alternate Reality Software
2111 W. Arapahoe Drive
Littleton, Colorado 80120

Dealer inquiries invited
Atari is a T.M. of Atari, Inc.



Your VIC-20 Will Smile . . .

VIXEL™

Volume One

Fire

Fly a water-dropping helicopter, and try to put out the high-rise fire before it spreads.

Draw

Be an artist! This high-resolution drawing program makes it easy to create pictures on the screen, and then save them on tape.

Race

Race the computer, head-on! Simple but fun.

The VIXEL #1 cassette costs only \$12.95 in the US and Canada. Foreign orders please add \$3.00 for shipping. CA residents add 6% tax. Visa and MasterCard welcome.

VIXEL is a trademark of The Code Works
VIC-20 is a trademark of Commodore Business Machines, Inc.

The Code Works

Box 550, Goleta, CA 93116 805/683-1585

CBM CERTIFIED
In-House Maintenance

ALL UNDER

for 31

DES

Data Equipment Supply Corp.
8315 Firestone Blvd., Downey, CA 90241

*from the DES
Business
Division . . .*



The accounting program by an accountant, for REAL accounting!



Acc/Sys GA 1600

AUTOMATED ACCOUNTING FOR THE COMMODORE COMPUTER

- Simple to Use — No Computer Experience Required
- Automatic Operation Speeds Work, Eliminates Errors, and Creates an Audit Trail
- Conforms with Recognized Accounting Procedures and Formats
- Runs on Low-Cost, Highly Reliable Commodore Computers

ACC/SYS GA 1600 was developed for practical use for professional accountants, educators, beginning and advanced students, and small business owners and managers.

The \$25.00 price for the documentation, manual and printouts will be deducted when purchased.

from the EDUCATION DIVISION . . .

We specialize in Microcomputers in Education

* SCHOOL STARTER KIT *

6 CBM 4016 Microcomputers	\$5970.00
1 CBM 4040 Dual Disk Drive	1295.00
1 CBM 4022 Tractor Drive Printer.....	795.00
1 CBM C2N Cassette Drive.....	75.00
6 DES Orgaprocess.....	1080.00
1 PET to IEEE cable.....	39.95
1 IEEE to IEEE cable.....	49.95
1 Box (10) BASF 5¼" Floppy Diskettes.....	45.00
1 Box Tractor Drive Paper.....	26.52
6 Copies Hands-on-Basic.....	77.70
6 Copies PET/CBM Personal Computer Guide....	101.94
6 Basic Documentation Pads.....	27.00

TOTAL: 9583.00

LESS Education Discount (20%) - 1916.60

School Pays ONLY **\$7666.40**

DES VIDEO TEACHER \$39.95

*Allows 1 computer to teach entire class
(Used with monitor with video input)*

**Ask for our Educational Software Index —
programs are classified by grade and subject.**

Revolutionary Software from Germany . . . By KAVAN®

DES "ORGAPROZESS" (for all CBM equipment)

Chain UNLIMITED number of computers to central disk and/or printer devices — Need NO ram or free rom space!

TOTAL COST \$180.00/unit Multi-Group Save \$\$

DES "4 Pass" Disk-Recovery

Program (Compiled) (4.0 BASIC ONLY) \$39.95

- Every pass creates an information file about every block on disk
- Recovers COMPLETE damaged or crashed disk and scratched files
- Allows viewing of recovered files (HEX and ASCII)
- Renames File Type

"Super-Basic" Programmers' ROM (8K-4.0)

60 NEW Powerful Basic Commands..... **\$150.00**

(FULL SCREEN Generator, sort, list any file to screen/printer without changing program in RAM, makes programs unlistable, scroll, rev. move, define windows, print using, etc.)

from NORELL DATA SYSTEMS . . .

"VISUALIZE" (CBM, APPLE, IBM) \$100.00

"EASYDATA DBMS" (CBM, APPLE, IBM)..... \$200.00

*We're dealers for: Commodore Business Machines · Chattsworth Data Corp. · Professional Software · AB Computers · MTU · Abacus Software
CMD · Micro Ed · Skyles Electric Works · Datatronics ab.*

(714) 778-5455

(213) 923-9361

Built on a

CBM 4016 - 4032 - 8032 - MICROCOMPUTERS - VIC 20

8315 Firestone Blvd.
DOWNEY, CA.

ONE ROOF

years

Data Equipment Supply Corp. ^{DES}
8315 Firestone Blvd., Downey, CA 90241



from DES
"VIC-VILLE"[®]
(VIC 20) ...

ANNOUNCING!! DES 48K Expansion Board..... Available in March

Basic and Machine Language (3K expansion needed) by KAVAN of Germany

- * RENUMBERS * AUTOLINE * FIND * TRACE * HELP
- * DISASSEMBLE/ASSEMBLE * DUMP * APPEND/DELETE
- * SPECIAL SOUND & VIDEO COMMANDS and more

\$69.95

GAMES: From our young professionals (future genius programmers)

Robert Winter - Ralph Orton - Dan Haste - Robert Burnett

Goldbrick \$12.95
Many levels of play,
sound and color.

A Maze Ing \$10.95
Travel through the maze
game of skill and tense
action.

Gobbler \$9.95
Sound Easy? You have
25 seconds to get him
and the time gets shorter
at each higher level.

Hang-U \$10.95
Traditional Hangman
plays against the VIC's
250 word dictionary
OR another person.

Coggle \$9.95
Computerized version
of Boggle. Great for
parties. Keeps score
for 4 people.

Baseball Strategy \$10.95
The excitement of base-
ball as a video strategic
game. Fun for family.

Attack on Silo III \$10.95
You are the commander
of Silo III. Defend your
base.

Yahtzee \$10.95
Solitaire version of this
famous dice game, good
graphics & lots of fun.

ASK FOR DEALER DISCOUNT!!

from the DES SUPPLY DIVISION ...

— ASK FOR OUR CATALOG —

DISKETTES (5¼ & 8")

- BASF, Memorex, Dysan,
Verbatim, Scotch 3M

**DES "DATA-DISC"
SPECIAL - as low as \$2.00**

Ribbons All Types

Mailing Labels - All Sizes

Printer Paper - All Sizes

**VOLUMN PRICES for
SINGLE USERS**

★SOFTWARE HOUSES!
Check us for Quantity \$

from the DES LAB ...

DES Master Switch..... \$59.95

4 ROMS in 1 Space

DES Portexpander..... \$29.95

Dual use for the Users Port

From TYPE-SHARE ...

Use Your Computer as a Typesetting Terminal!

- You create files on your computer complete with typesetting commands
- Transmit your files to one of our Type-Share Centers for processing.
- We will send you back camera-ready-copy at a minimal cost.

If you don't have a terminal system we'll sell you one complete with software for as low as \$475.00!!

Call or write TYPE-SHARE INC. for more details (division of DES)

**Send for our pricing lists on all
supplies and peripherals.**

DES DATA EQUIPMENT SUPPLY CORP.
8315 Firestone Blvd., Downey, CA 90241
(213) 923-9361 (714) 778-5455

PAYMENT

- CHECK # _____
- VISA
- MASTERCHARGE Exp. Date _____
Acct. # _____

Name _____

Address _____

City _____

State _____ Zip _____

CBM 4040 - 8050 DISK DRIVES - 4022 PRINTERS - MODEMS

TNW Corp. - Jini Micro Systems, Inc. - Micro Computer Industries Ltd. - Voicetek - The Code Works - CMC - Software by Sasso - HES - Memorex
Dysan - NEC - BASF

firm foundation!

(714) 778-5455

(213) 923-9361

Family: A Simulation In Genetics

Andy Gamble
Columbia College
Vancouver, Canada

Biology teachers know only too well the practical problems of illustrating the effects of gene selection. Mendel struck it lucky with his pea plants, but even they are a little too complicated for an introductory class. Besides, any meaningful experiment would take months, even years, to conduct. Barring a few thousand fruit-flies, what can one do?

Once again the mild-mannered computer steps into the nearest telephone booth and saves the day. This program lightheartedly illustrates the genealogy of a Martian couple.

Mars Genetics

A subject was clearly needed which could be easily displayed on the PET screen, with control over a few features. In this case, the Martians have either white or gray hair (green or light green on some PETs) and round or slanted eyes. The gene for white hair is dominant, as is the gene for round eyes. Male and female Martians are represented by square and round jawlines respectively.

The usual method of denoting dominant and recessive genes by upper and lower case letters is not used here, as the PET cannot display both with the graphics characters at the same time.

The program can be used in two ways. First, merely as a demonstration of the effects of gene selection. Genes are chosen at random from the parents, and control the facial features of their 24 children. The sexes are also randomly assigned. The genes for the parents can be picked at random by the program, or chosen by the user.

Alternatively the user may choose to have the faces of the parents and children displayed, but not their genes. The parents' genes can therefore be determined from the features, giving practice of a more experimental kind.

The instructions and the RUN of the program should be self-explanatory. There are several techniques used in the program which I think are quite interesting. I believe very strongly in making programs as user-friendly as possible, and this is particularly important when dealing with INPUT

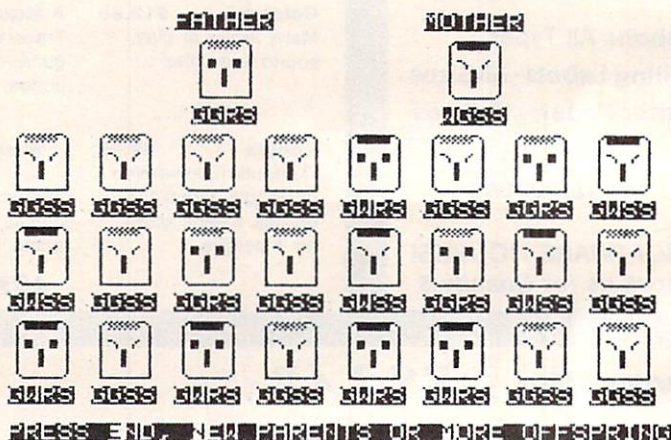
statements. When a yes/no answer is needed, the easiest method is to use a trick INPUT statement (see lines 280-410).

Parts of this program need input which is less obvious to the user: namely, the genes R,S,W and G. It's perfectly possible to remind the user of this when necessary, but here a different method is used. When that input is called for, the genes are displayed on the screen, as for example:

```
WG
↑
```

The arrow is moved left or right by the < and > keys; the genes are picked by pressing return. This is foolproof as far as I can tell, and there is the added advantage of it being obvious which genes are to be chosen (see lines 510-1080).

The program uses over 8K as given so, to run it on 8K machines some editing is necessary. The instructions can be removed (lines 280-310, 1520-1870) and printed separately for student use. Removing all the REM statements also (none are referenced) brings the memory needed down to just over 6K. Family will run on all 40-column PETs.



```
100 REM FAMILY
110 REM ANDY GAMBLE JUNE 81
120 REM COLUMBIA COLLEGE, 1619 W10 ~
    AVE
130 REM VANCOUVER BC V6J 2A2
140 GOTO1430
150 REM HP<=35,VP<=19
160 VT$="{HOME}{25 DOWN}"
170 X=RND(-RND(0))
180 DEFFNR(X)=INT(2*RND(1)+1)
190 NOS$="] ' & ]"
200 CH$(1)="J@K":REM FEM
210 CH$(2)="-@@" :REM MALE
220 EY$(1)="] ; ]"
230 EY$(2)="] IU ]"
240 HA$(1)="U" " I"
250 HA$(2)="U ( ( I"
```


ELCOMP

BOOKS and SOFTWARE

For ATARI - PET - OSI - APPLE II - 6502

ATARI BASIC - Learning by Using

This new book is an "Action" Book. You do more than read it. Learn the intricacy of ATARI-BASIC through the short programs which are provided. The suggestions challenge you to change and write program routines. Yes, it's exciting - Many of the programs are appropriate for beginners as well as experienced computer users. (Screen Drawings, Special Sounds, Keys, Paddles + Joysticks, Specialized Screen Routines, Graphics and Sound, Peeks and Pokes and special stuff).

Order-No. 164 \$9.95

Games for the ATARI-Computer

How to program your own games on the ATARI. Complete listings in BASIC and Machine Language of exciting games. Tricks and hints.

Order-No. 162 \$4.95

ATMONA-1

Machine Language Monitor for the ATARI 400/800.

This powerful monitor provides you with the firmware support that you need to get the most out of your powerful system. ATMONA-1 comes on a bootable cassette. No cartridges required. Disassemble, Memory Dump HEX + ASCII, (Change Memory Locations, Blocktransfer, fill memory block, save and load machine language programs, start mach. Lang. Progr. (Printer optional)).

Comes with introductory article on how to program the ATARI computer in machine language. (Available also in ROM)

Order-No. 7022 \$19.95

ATMONA-2 Superstepper

A very powerful Trace to explore the ATARI ROM/RAM area. Stop at previously selected address. Opcode or operand (cassette).

Order-No. 7049 \$49.95

EDITOR/ASSEMBLER for ATARI 800, 32K RAM

Extremely fast and powerful Editor/Assembler. (8K Source code in about 5 seconds) Includes ATMONA-1.

Order-No. 7098 \$49.95

MACRO-Assembler for ATARI 800, 48K RAM

Please specify your system: RAM, disc or cassette.

Order-No. 7099 \$89.00

Gunfight - For ATARI 400/800

16K RAM, needs two joysticks, animation and sound. (8K machine language).

Order-No. 7207 \$19.95

EPROM BURNER for ATARI 400/800

Bare boards only with description, schematic + software (2716, 2732).

Order-No. 7041 \$99.00

Invoice Writing for very small business with ATARI 400/800

16K RAM.

Order-No. 7022, cass. \$29.85

Order-No. 7200, disc. \$39.99

Wordprocessor for ATARI 800, 48K RAM

Order-No. 7210 \$29.95

How to connect your EPSON-Printer to the ATARI 400/800.

Construction article with printed circuit board and software. (Screenprint and variable characters per line).

Order-No. 7210 \$19.95

OSI OSI OSI OSI OSI

The First Book of Ohio Scientific Introduction to OSI computers. Diagrams, hardware and software information not previously available in one compact source. 192 pages.

Order-No. 157 \$7.95

The Second Book of Ohio Scientific

Very valuable information about OSI microcomputer systems. Introduction to OS-65 D and OS-65U networking. Hardware and software hints and tips.

Systems specifications. Business applications.

Order-No. 158 \$7.95

The Third Book of Ohio Scientific

is now available! Very important information for the OSI system experimenter. Interface techniques, system expansions, accessories and much more (EPROM-Burner, 6522 I/O-card with 1K RAM, Soundboard, EPROM/RAM board).

Order-No. 159 \$7.95

The Fourth Book of Ohio VIP-Book - Very Important Programs.

Many interesting programs for OSI computers. Sorting (Binary Tree), Differential Equations, Statistics, Astrology, Gas Consumption, Games a. s. o.

Order-No. 160 \$9.95

VIP Package - Above book plus a cassette with the programs.

Order-No. 160 A \$19.95

The Fifth book of Ohio Scientific

Many exciting programs programming hints and tricks, Textwriter, Debugger for C1P, Games, Utilities and much more (polled keyboard)

Order-No. 161 \$7.95

Invoice Writing Program for OSI-C1PMF, C4P, Disk and Cassette, 8K RAM.

Order-No. 8234 \$29.80

Mailing List for C1PMF or C4PMF 24K RAM

250 addresses incl. phone number and parameters on one 5 1/4 disk

Order-No. 8240 \$29.80

8K Microsoft BASIC Reference Manual

Authoritative reference for the original Microsoft 4K + 8K BASIC developed for ALTAIR and later computers including OSI, PET, TRS-80 and VIC.

Order-No. 141 \$9.95

Expansion Handbook for 6502 and 6802

S-44 Card Manual describes all of the 4.5 x 6.5 44-pin S-44 cards incl. schematics. A MUST for every 6502 system user (KIM, SYM, AIM, VIC, PET, OSII)

Order-No. 152 \$9.95

Microcomputer Application Notes

Reprint of Intel's most important application notes including 2708, 8085, 8255, 6251 chips. Very necessary for the hardware buff.

Order-No. 153 \$9.95

Complex Sound Generation

New revised applications manual for the Texas Instruments SN 76477 Complex Sound Generator.

Order-No. 154 \$6.95

Small Business Programs

Complete listings for the business user. Inventory, Invoice Writing, Mailing List and much more. Introduction to Business Applications.

Order-No. 156 \$14.90

Microcomputer Hardware Handbook

Descriptions, pinouts and specifications of the most popular microprocessor and support chips. A MUST for the hardware buff.

Order-No. 29 \$14.95

Care and Feeding of the Commodore PET

Eight chapters exploring PET hardware. Includes repair and interfacing information. Programming tricks and schematics.

Order-No. 150 \$9.95

Prototype-Expansion Board for VIC-20 (S-44-Bus).

Order-No. 4844 \$18.95

16K RAM/ROM board for S44-bus.

Any combination of RAM and ROM on one board. (SY2128 or 2716)

Order-No. 613 \$39.95

Low cost expansion boards for your APPLE II.

Bare board comes with extensive description and software.

Prototyping card

Order-No. 604 \$29.00

6522 VIA-I/O Exp. \$39.00

Order-No. 605 \$39.00

2716 EPROM-Burner \$49.00

Order-No. 607 \$49.00

8K EPROM/RAM Card \$29.00

Order-No. 609 \$29.00

MICROGRAMS EDUCATIONAL SOFTWARE



THE HEART OF YOUR CLASSROOM COMPUTER

Expect more from your PET®...

PET is a registered trademark of Commodore Business Machines.

MICROGRAMS

INCORPORATED

P.O. BOX 2146, LOVES PARK, IL 61130

PHONE 815/965-2464

Please send me a free K-8 catalog.

Please send me a sample program and a free K-8 catalog. I have enclosed \$2.00 for postage and handling.

NAME _____

ADDRESS _____

CITY _____

STATE _____ ZIP _____

ELCOMP Publishing, Inc., 53 Redrock Lane
Pomona, CA 91766, Phone: (714) 623-8314

Payment: Check, Money Order, VISA, Mastercharge, Eurocheck, POSTPAID PREPAID IN USA. \$5.00 handling fee for C.O.D. All orders outside USA: Add 15% shipping. CA add 6.5% sales tax. ATARI is a registered trademark of ATARI Inc. APPLE II is a registered trademark of APPLE Inc.


```

260 REM W OVER G, R OVER S
270 GE$="N"
280 INPUT "{CLEAR}{04 DOWN}DO YOU NE
ED INSTRUCTIONS _"{03 LEFT
LEFT}";ZZ$
290 IFZZ$="" THEN280
300 IFLEFT$(ZZ$,1)="Y" THEN1520
310 IFLEFT$(ZZ$,1)<>"N" THEN280
320 GE$="N":PRINT "{CLEAR}{03 DOWN}D
O YOU WANT TO GUESS THE GE
NOTYPES";
330 INPUT "(Y/N) _"{03 LEFT}";GE$
340 IFGE$="" THEN320
350 GE$=LEFT$(GE$,1):IFGE$="N" THEN3
70
360 GOTO430
370 PRINT "{CLEAR}{03 DOWN}ARE THE G
ENES FOR THE PARENTS TO BE
CHOSEN RANDOMLY ";
380 INPUT "(Y/N) _"{03 LEFT}";ZZ$
390 IFZZ$="" THEN370
400 IFLEFT$(ZZ$,1)="N" THEN500
410 IFLEFT$(ZZ$,1)<>"Y" THEN320
420 REM RANDOM
430 FORI=1TO2:FE$(I)="R":IFRND(1)>.
5 THENFE$(I)="S"
440 FH$(I)="W":IFRND(1)>.5 THENFH$(I
)="G"
450 NEXT
460 FORI=1TO2:ME$(I)="R":IFRND(1)>.
5 THENME$(I)="S"
470 MH$(I)="W":IFRND(1)>.5 THENMH$(I
)="G"
480 NEXT
490 GOTO1090
500 PA=33067
510 PRINT "{CLEAR}{02 DOWN}CHOOSE GE
NES FOR FATHER'S HAIR:"
520 PRINT "{03 DOWN}"TAB(19) "{REV}WG
"
530 E$(1)="" : E$(2)=""
540 GOSUB2020
550 POKEPA,30
560 FORI=1TO2
570 GOSUB1960
580 FH$(I)="G":IFPA=33067 THENFH$(I)
="W"
590 H$(I)=FH$(I)
600 NEXT
610 VP=10:HP=18:SEX=2
620 GOSUB1920
630 GOSUB1360
640 GOSUB2040
650 PRINT "{02 DOWN}":GOSUB1890
660 PRINT "{CLEAR}{02 DOWN}CHOOSE GE
NES FOR FATHER'S EYES:"
670 PRINT "{03 DOWN}"TAB(19) "{REV}RS
"
680 GOSUB2020
690 POKEPA,30
700 FORI=1TO2
710 GOSUB1960
720 FE$(I)="S":IFPA=33067 THENFE$(I)
="R"
730 E$(I)=FE$(I)
740 NEXT
750 VP=10:HP=18:SEX=2
760 GOSUB1920
770 GOSUB1360
780 GOSUB2040
790 PRINT "{02 DOWN}":GOSUB1890
800 PRINT "{CLEAR}{02 DOWN}CHOOSE GE
NES FOR MOTHER'S HAIR:"
810 PRINT "{03 DOWN}"TAB(19) "{REV}WG
"
820 GOSUB2020
830 E$(1)="" : E$(2)=""
840 POKEPA,30
850 FORI=1TO2
860 GOSUB1960
870 MH$(I)="G":IFPA=33067 THENMH$(I)
="W"
880 H$(I)=MH$(I)
890 NEXT
900 VP=10:HP=18:SEX=1
910 GOSUB1920
920 GOSUB1360
930 GOSUB2040
940 PRINT "{02 DOWN}":GOSUB1890
950 PRINT "{CLEAR}{02 DOWN}CHOOSE GE
NES FOR MOTHER'S EYES:"
960 PRINT "{03 DOWN}"TAB(19) "{REV}RS
"
970 GOSUB2020
980 POKEPA,30
990 FORI=1TO2
1000 GOSUB1960
1010 ME$(I)="S":IFPA=33067 THENME$(I)
="R"
1020 E$(I)=ME$(I)
1030 NEXT
1040 VP=10:HP=18:SEX=1
1050 GOSUB1920
1060 GOSUB1360
1070 GOSUB2040
1080 PRINT "{02 DOWN}":GOSUB1890
1090 PRINTCHR$(147)TAB(10) "{REV}FATH
ER{09 RIGHT}MOTHER"
1100 VP=1:HP=11:SEX=2
1110 FORI=1TO2:H$(I)=FH$(I):E$(I)=FE
$(I):NEXT
1120 GOSUB1920
1130 GOSUB1360
1140 VP=1:HP=26:SEX=1
1150 FORI=1TO2:H$(I)=MH$(I):E$(I)=ME
$(I):NEXT
1160 GOSUB1920
1170 GOSUB1360

```


Commodore

Check Our New Lowest Prices!



EQUIPMENT:

- VIC-20 (Includes RF Modulator, 16K RAM)
- CBM 4016 CPU (40 Col. Screen, 32K RAM)
- CBM 4032 CPU (80 Col. Screen, 32K RAM)
- CBM 8032 CPU (80 Col. Screen, 96K RAM)
- CBM Micro Mainframe (Super PET)
- VIC Single Disk Drive (170K per 5 1/4 Diskette)
- CBM 2031 Single Disk Drive (170K per 5 1/4 Diskette)
- CBM 4040 Dual Disk Drive (170K per 5 1/4 Diskette)
- VIC Tractor Feed Printer (80 Col., 136 CPS)
- CBM 8050 Dual Disk Drive (170K per 5 1/4 Diskette)
- VIC Tractor Feed Printer (80 Col., 136 Col., 150 CPS)
- CBM 4022 Tractor Printer
- 8023P Dot Matrix Printer (7x9 Matrix)
- CBM 4022 Matrix Printer
- 8023P Dot Matrix Printer (40 CPS)
- Tally 8024-9 (7x9 Matrix) Printer
- 8300P Letter Quality Printer (New Style)
- CBM 8010 Phone Modem
- CBM C2N Cassette Deck
- CBM CPU/IEEE Cable
- CBM IEEE/IEEE Cable

265
790
990
1090
1590
1690
470
570
890
1340
1360
1360
1360
1425
1425
1790
2320
2320
2320

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

7.95
9.95
7.95
7.95
6.95
6.95
19.95
19.95
4.95

43.95

43.95

VIC SOFTWARE:

- VT 106A Recreation Six Pack
Includes Car Chase, Blue Meanies, Space Math, Silther/Super Silther, Biorhythm Capability
- VT 107A Home Utility Six Pack
Includes Personal Finance I, Personal Finance II, VIC Typewriter, Expense Calendar, Loan & Mortgage Calculator, Home Inventory
- VIC 1901 VIC Super Alien
- VIC 1904 Super Slot
- VIC 1907 Super Lander
- VIC 1908 Draw Poker

29.95
29.95
29.95
29.95

"CALL ABOUT SUPPLIES"

COMING SOON:

- More VIC Peripherals and Software
- CBM 8250 Dual Disk Drive
- Data Acquisition and Control Devices

All items insured
COD - UPS
Prepaid Orders Shipped Free
In stock, items shipped within 48 hours

MASTERCARD OR VISA ADD 3%
GA RESIDENTS ADD 4% SALES TAX

SOFTWARE:

- Wordcraft 80 Wordprocessor
- Wordpro 4+ Wordprocessor
- OZZ Data Base System
- Visicalc
- Tax Preparation System
- IRMA Information Retrieval
- Dow Jones Portfolio



3300 Buckeye Rd., N.E.
Suite 641
Atlanta, Ga. 30341

404-458-0729
Call 9 AM - 5 PM EST, M-F

WORD PROCESSING SPECIAL

- CBM 8300 (Letter Quality, DIABLO 630, 40 CPS, Bi-directional)
- WORDCRAFT 80
• Includes all cables



\$4200

CALL ABOUT EQUIPMENT
AND/OR SOFTWARE
SUBSTITUTIONS

CBM 8032
CBM 4040


```

1850 PRINT"POSSIBLE BUT WILL GIVE A ~      "FH$(1)FH$(2)
      WRONG ANSWER."                      2230 FG=1
1860 PRINT"{03 DOWN}";:GOSUB1890          2240 GOTO2340
1870 GOTO320                               2250 IF MH$(1)=HG$(1) ANDMH$(2)=HG$(
1880 REM GET-CONT                          2)THEN2290
1890 PRINTTAB(8)"{REV}PRESS ANY KEY ~    2260 IF MH$(1)=HG$(2) ANDMH$(2)=HG$(
      TO CONTINUE"                          1)THEN2290
1900 GETZZ$:IFZZ$=""THEN1900              2270 GOTO2320
1910 RETURN                                 2280 REM MOTHER GUESS CORRECT
1920 HC=1:IF(H$(1)="G")AND(H$(2)="G"      2290 PRINTLEFT$(VT$,6);TAB(26)"{REV}
      )THENHC=2                               "MH$(1)MH$(2)
1930 EC=1:IF(E$(1)="S")AND(E$(2)="S"      2300 GOTO2340
      )THENEC=2                               2310 REM BOTH WRONG
1940 RETURN                                 2320 PRINTLEFT$(VT$,22);"{REV}      AN
1950 REM CHOOSE GENES                      SWER IS WRONG: TRY AGAIN O
1960 GOSUB1900                              R {OFF}E{REV}ND      "
1970 IFZZ$="<"ANDPA=33068THENPOKEPA,      2330 GOTO2090
      32:PA=33067:POKEPA,30                 2340 PRINTLEFT$(VT$,22);"{REV}      INPU
1980 IFZZ$=">"ANDPA=33067THENPOKEPA,      T GENES FOR HAIR OF OTHER ~
      32:PA=33068:POKEPA,30                 (W/G)      "
1990 IFZZ$<>CHR$(13)THEN1960              2350 GOSUB1900
2000 RETURN                                 2360 IFZZ$="W"ORZZ$="G"THEN2390
2010 REM MESSAGE                           2370 IFZZ$="E"THEN1340
2020 PRINTLEFT$(VT$,19);"{REV}PRESS ~    2380 GOSUB1900
      < TO MOVE LEFT, > TO MOVE ~          2390 HG$(1)=ZZ$
      RIGHT "                               2400 GOSUB1900:IFZZ$="W"ORZZ$="G"THE
2030 PRINTLEFT$(VT$,20);"{REV}      PRE    N2420
      SS RETURN WHEN GENE IS CHO           2410 GOSUB1900
      SEN      ":RETURN                     2420 HG$(2)=ZZ$
2040 PRINTLEFT$(VT$,19);" ~              2430 PRINTLEFT$(VT$,22);" ~
      " ~
2050 PRINTLEFT$(VT$,20);" ~              2440 IFFG=1THEN2520
      " ~
      ":RETURN                               2450 IF FH$(1)=HG$(1) ANDFH$(2)=HG$(
2060 REM HAIR GENE GUESS                   2)THEN2500
2070 PRINTLEFT$(VT$,22);"{REV}INPUT ~    2460 IF FH$(1)=HG$(2) ANDFH$(2)=HG$(
      GENES FOR HAIR OF ONE PARE           1)THEN2500
      NT (W/G)"                             2470 IFFG=0THEN2590
2080 FG=0                                   2480 GOTO2520
2090 GOSUB1900                              2490 REM FATHER GUESS CORRECT
2100 IFZZ$="W"ORZZ$="G"THEN2130            2500 PRINTLEFT$(VT$,6);TAB(11)"{REV}
2110 IFZZ$="E"THEN1340                      "FH$(1)FH$(2)
2120 GOSUB1900                              2510 GOTO2620
2130 HG$(1)=ZZ$                             2520 IF MH$(1)=HG$(1) ANDMH$(2)=HG$(
2140 GOSUB1900:IFZZ$="W"ORZZ$="G"THE      2)THEN2560
      N2160                               2530 IF MH$(1)=HG$(2) ANDMH$(2)=HG$(
2150 GOSUB1900                              1)THEN2560
2160 HG$(2)=ZZ$                             2540 GOTO2590
2170 PRINTLEFT$(VT$,22);" ~              2550 REM MOTHER GUESS CORRECT
      " ~
2180 IF FH$(1)=HG$(1) ANDFH$(2)=HG$(      2560 PRINTLEFT$(VT$,6);TAB(26)"{REV}
      2)THEN2220                               "MH$(1)MH$(2)
2190 IF FH$(1)=HG$(2) ANDFH$(2)=HG$(      2570 GOTO2620
      1)THEN2220                               2580 REM BOTH WRONG
2200 GOTO2250                               2590 PRINTLEFT$(VT$,22);"{REV}      AN
2210 REM FATHER GUESS CORRECT              SWER IS WRONG: TRY AGAIN O
2220 PRINTLEFT$(VT$,6);TAB(11)"{REV}      R {OFF}E{REV}ND      "

```



```

GENES FOR EYES OF ONE PARE
NT (R/S) "
2630 FG=0
2640 GOSUB1900
2650 IFZZ$="R"ORZZ$="S"THEN2680
2660 IFZZ$="E"THEN1340
2670 GOSUB1900
2680 EG$(1)=ZZ$
2690 GOSUB1900:IFZZ$="R"ORZZ$="S"THE
N2710
2700 GOSUB1900
2710 EG$(2)=ZZ$
2720 PRINTLEFT$(VT$,22);"
"
2730 IF FE$(1)=EG$(1) ANDFE$(2)=EG$(
2)THEN2770
2740 IF FE$(2)=EG$(2) ANDFE$(2)=EG$(
1)THEN2770
2750 GOTO2800
2760 REM FATHER GUESS CORRECT
2770 PRINTLEFT$(VT$,6);TAB(13)"{REV}
"FE$(1)FE$(2)
2780 FG=1
2790 GOTO2890
2800 IFME$(1)=EG$(1)ANDME$(2)=EG$(2)
THEN2840
2810 IFME$(1)=EG$(2)ANDME$(2)=EG$(1)
THEN2840
2820 GOTO2870
2830 REM MOTHER GUESS CORRECT
2840 PRINTLEFT$(VT$,6);TAB(28)"{REV}
"ME$(1)ME$(2)
2850 GOTO2890
2860 REM BOTH WRONG
2870 PRINTLEFT$(VT$,22);"{REV} AN
SWER IS WRONG: TRY AGAIN O
R {OFF}E{REV}ND "
2880 GOTO2640
2890 PRINTLEFT$(VT$,22);"{REV} INP
UT GENES FOR EYES OF OTHER
(R/S) "
2900 GOSUB1900
2910 IFZZ$="R"ORZZ$="S"THEN2940
2920 IFZZ$="E"THEN1340
2930 GOSUB1900
2940 EG$(1)=ZZ$
2950 GOSUB1900:IFZZ$="R"ORZZ$="S"THE
N2970
2960 GOSUB1900
2970 EG$(2)=ZZ$
2980 PRINTLEFT$(VT$,22);"
"
2990 IFFG=1THEN3070
3000 IF FE$(1)=EG$(1)ANDFE$(2)=EG$(2
)THEN3050
3010 IFFE$(1)=EG$(2)ANDFE$(2)=EG$(1)
THEN3050
3020 IFFG=1THEN3140
3030 GOTO3070
3040 REM FATHER GUESS CORRECT
3050 PRINTLEFT$(VT$,6);TAB(13)"{REV}
"FE$(1)FE$(2)
3060 GOTO3170
3070 IFME$(1)=EG$(1)ANDME$(2)=EG$(2)
THEN3110
3080 IFME$(1)=EG$(2)ANDME$(2)=EG$(1)
THEN3110
3090 GOTO3140
3100 REM MOTHER GUESS CORRECT
3110 PRINTLEFT$(VT$,6);TAB(28)"{REV}
"ME$(1)ME$(2)
3120 GOTO3170
3130 REM BOTH WRONG
3140 PRINTLEFT$(VT$,22);"{REV} AN
SWER IS WRONG: TRY AGAIN O
R {OFF}E{REV}ND "
3150 GOTO2900
3160 REM ALL CORRECT
3170 PRINTLEFT$(VT$,22);"{REV}
CORRECT! TRY AGAIN? (Y/N
)
"
3180 GOSUB1900
3190 IFZZ$="Y"THEN320
3200 IFZZ$<>"N"THEN3180
3210 GOTO1340

```

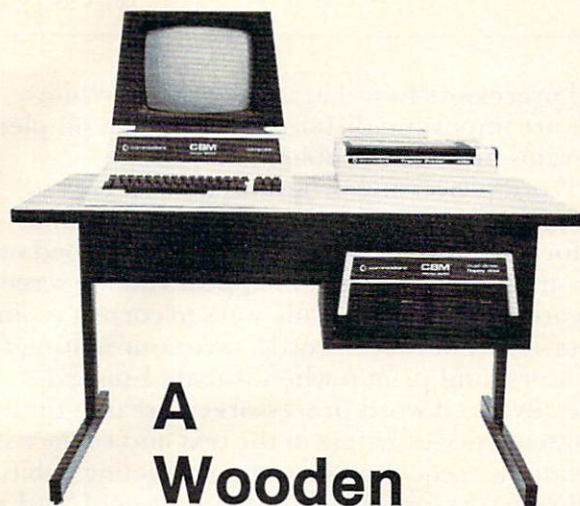
Robot for PET/VIC ONLY \$37.95!

- REMOTE CONTROLLED BY COMPUTER
- INCLUDES SOFTWARE INTERFACE, & ROBOT

This affordable robot package allows your computer to control a robot to perform sophisticated movement patterns. The program has three modes: teach a path, replay paths, or random movement. Robot's base measures 10" x 8". Batteries are not included. California residents add 6% tax.

Pendulum Software

1310 Dover Hill Rd., Santa Barbara, CA 93103



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 desk-top.
- 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.
- T-molding and rounded corners make a handsome finish on a durable edge that won't chip.
- 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!

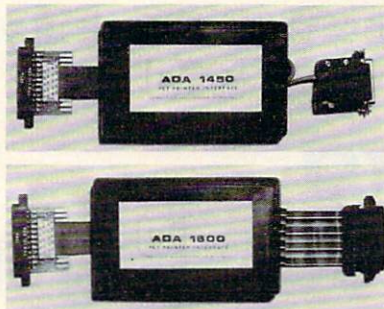
Name _____

Address _____

City _____ St _____ Zip _____

Interlink, Inc., Box 134, Berrien Springs, MI 49103
Master Charge and Visa welcome. Call our order line:
616-473-3103

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 7 1/2% 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

Learning With Computers

Word Processing In The Classroom

Glenn Kleiman and Mary Humphrey
Teaching Tools: Microcomputer Services
P.O. Box 50065
Palo Alto, CA 94303

"All right, class. Load the word processing program and put your name at the top of a new file. We're all going to write thank you letters to the PTA for buying the computers for our class."

In recent months we have heard from a number of teachers, students and researchers who have been using computerized word processing in classrooms. All have found it to be a successful and valuable experience, even with children as young as second grade. In this month's column we focus on word processing – what it is, some ways it is being used in classrooms, its effects on children's writing, and how to get started with it.

What Is Word Processing?

Word processing is the use of computer-controlled writing systems. The computer system replaces not only the typewriter, pen or pencil, but also the scratch paper, eraser, scissors and tape, and, in some advanced systems, the dictionary.

Programs are available to turn almost every personal computer into a word processing system. For most computers there is a choice ranging from very simple word processing programs to programs so sophisticated they match the capabilities of the

word processors found in many offices. While there are important differences, even the simpler programs provide valuable writing aids.

Word processing programs make it easy to create and modify essays, notes, letters, outlines – any form of written material. The text is typed on the computer keyboard and appears on the screen. All word processors provide ways to correct typing errors, insert or delete words, save your writing for later work, and print it when you are finished. More advanced word processors can search for a given sequence of letters in the text and replace it with another sequence (great for correcting habitual spelling errors, or replacing all instances of "utilize" with "use"). They make it possible to move sections of text, such as when you decide a paragraph you put in the introduction would be better in the conclusion. They also let you format the print-out: setting margins and spacing between lines, centering headings, numbering pages and so on. Very advanced word processors add a dictionary so spelling can be checked automatically. An on-line thesaurus and systems that do some checking of sentence syntax are being developed. Perhaps some day we will have a computerized Strunk and White's *Elements of Style* program to point out the needless words we should omit.

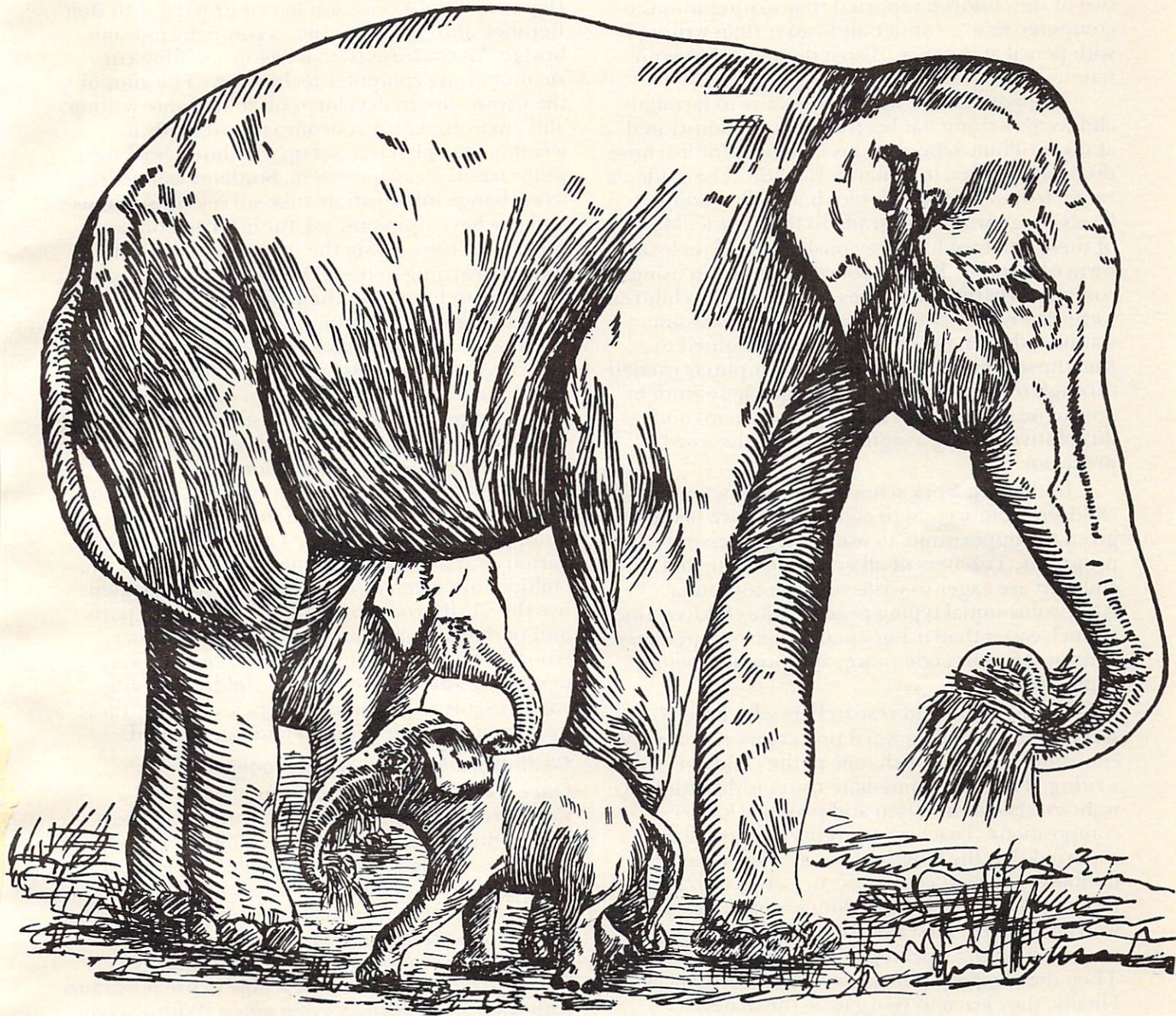
How Can Word Processing Be Used In Education?

Teachers often report that children are unwilling to write and even more unwilling to edit and revise what they have written. Writing requires both the mental processes of composing text and the physical processes of producing it. Computerized word processing makes the physical aspects of producing and editing text much easier, so more attention can be devoted to the mental aspects. Word processors can also be used to create situations which stimulate children's creativity with language and motivate them to write.

A fourth grade class in Oceanside, California, has produced a school newsletter with their word processing system. The well written, eleven page newsletter contains news stories, book reviews, jokes, original stories, and letters to the editor. The newsletter reflects careful use of the formatting capabilities of the word processing system. It has centered headlines and is neatly divided into pages with two columns of print on each page.

The children in this class did most of their writing in pairs, helping each other both in using the computer and in creating and editing text. The children could access each other's working drafts and offer comments on them. They used a word processing program developed by researchers at the University of California at San Diego. It contains some special features, such as a command that automatically arranges the text into a paragraph

Micro-Ed is EXPANDING!



Send for free educational catalogs *

* Specify: Pet • Vic • TI • Apple • TRS-80
color computer

you can telephone us
at
612-926-2292

Micro-Ed, Inc.
PO Box 24156

Minneapolis, MN 55424

format or a sentence format. The ease of making changes made editing and revising fun rather than a chore. In a letter to the editor of the newsletter, two of the children reported that writing with the computer was "...funner and easier than writing with pencil and paper. Also it does not hurt your hand."

The potential of word processors to facilitate children's writing has been further demonstrated at the Trillium School, a special school for learning disabled children in Ontario, Canada. The students range from 7 to 16 years old, but their reading levels range from first grade to fifth grade. Many of these children had previously refused to do any form of writing. The school recently began using computers in the classrooms and found the children were eager to use them. When word processing was introduced, the teachers were delighted to find the students' enthusiasm for computers carried through to using them for writing. These students now write school reports, take essay exams and do creative writing assignments with the word processor.

In the East York schools in Ontario, Canada, children from second to eighth grade are being given the opportunity to use word processing programs. Teachers of all grades indicate that children are eager to write with the computer. After some initial typing practice, the children find it much easier than using a pencil, pen or typewriter. They write more, edit more, and produce better compositions.

The teachers and researchers who have observed children using word processors report very consistent patterns of change in the children's writing. The most immediate result is that students want to write more often and produce longer compositions. Teachers of young children have reported that the length of the average essay doubles. The next change occurs when the children become familiar with the editing capabilities of the word processor. First they start being more careful to correct typing, spelling and punctuation errors. Then they begin to change words and sentences. Finally, they learn to reorganize the material, moving, adding and deleting large sections of text. They no longer just edit for details but also pay more attention to the meaning of ideas and the order of presentation.

Overall, using word processors has been very beneficial in the classes we have seen. The children enjoy writing more, they are more willing to revise their work, and they produce better essays. They take pride in the quality of their writing, the final neat print-outs, and the fact that they know how to use a computer.

The potential of word processors as a creative

teaching resource is just beginning to be realized. We have heard of a number of interesting ideas that are now being developed or tested. The Department of Education has contracted with Bolt Beranek and Newman, Inc., a company in Cambridge, Massachusetts, to develop a writing curriculum using computer technology. The aims of the project are to develop tools to facilitate writing, and environments to encourage and motivate writing. One plan is to set up a within-school computer based message system. Students can use this to exchange information, take surveys of students' and teachers' opinions, ask for information, and other such uses. Using the message system will require learning to use a computer and text editor.

Researchers from the University of California at San Diego are developing a new use of computers in schools. They will have children in California exchange written messages with children in Alaska. All of the writing will be done on computers and the messages will be sent via an electronic communication system. This will allow immediate responses and on-line interactions.

Another possibility for using word processing is interactive stories in which the child helps create a story as he or she reads it. This can be done in various ways. In one use of interactive stories, the children are given incomplete stories. They then use the word processor to fill in the missing parts and perhaps change parts of the original story. Another possibility is to give children paragraphs describing various events. The children choose which events to put in their stories, and how these events should be sequenced and interrelated.

Getting Started With Word Processing

Once you have a computer, you need to add a word processing program and a printer to use it for producing and editing text. There are many word processing programs available for each of the widely sold computers. In a future column we may review some of them with an eye towards classroom rather than office use.

Two general points merit mentioning here. One is that children seem best able to use programs with what are known as *screen editors*. With a screen editor, what you see on the screen is what you get on the printer, and making a change on the screen automatically makes the same change in the computer's memory. The other point is to remember that for most classroom purposes you do not need as sophisticated and expensive a word processing program as you would want in an office.

There are three classes of printers. Thermal or electrostatic printers are the least expensive to buy. They print quickly and are relatively quiet. Their disadvantage is that they require special paper and, if they are to be used a great deal, this

can become very costly. The next type is the dot matrix printer. These are more expensive to buy than thermal printers, but since they use regular paper they may be more economical in the long run. Dot matrix printers are widely used and are the best choice for most classroom word processing applications. Their main disadvantage is they tend to be noisy. The third type is typewriter-quality printers. These produce the nicest print, but are much more expensive. When checking into printers, be sure to check the cost of the interface you will need to attach the printer to your computer.

One worry is that children have to learn to type in order to use word processing programs. We have found that with just a little practice most children prefer typing to writing with a pen or pencil. Also, several programs, such as *Typing Tutor* by Microsoft, are available to help master typing.

We do not have the space here to mention all the relevant projects, ideas and products. (Fortunately, we do all our writing on a word processor, so that when we realized we had written too much, it was easy to edit and reorganize this article to fit our space.) We have covered just a few of the many possible uses of word processing programs in education. We hope to hear from you about other innovative projects and ideas. ©

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

Don't Blame The Software!



Power Line Spikes, Surges & Hash could be the culprit! Pat. #4,259,705
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-11) 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)

Electronic Specialists, Inc.

171 South Main Street, Natick, Mass. 01760
Technical & Non-800: 1-617-655-1532

SILENT MAGIC

How to Get Started with CP/M

Carl Townsend

This practical book gives you a good overview of the operating system, an idea of what it will be like to use it, and what it can do for you.

ISBN 0-918398-32-0 \$13.95

Nailing Jelly to a Tree

Jerry Willis and William Danley, Jr.

This is a book about software. The emphasis is on learning to use the thousands of available programs that have already been written, and adapting them to your machine.

ISBN 0-918398-42-8 \$15.95

Microsoft BASIC

Ken Knecht

Want a complete introduction and tutorial on programming in Microsoft BASIC? This book starts with the simplest and most commonly used commands and progresses on with examples that actually run.

ISBN 0-918398-23-1 \$13.95

Instant BASIC, 2nd Astounding! Edition

Jerald Brown

The new edition of this best-selling programming book keeps both the flavor and style of the old edition. It provides more annotations, extra activities and additional text.

ISBN 0-918398-57-6 \$12.95



With dilithium Press

Yes, please send me the following book(s). I understand that if I am not satisfied, I may return for full refund.

How to Get Started with CP/M Microsoft BASIC Instant BASIC Nailing Jelly to a Tree
Enclosed is \$_____ plus \$1 for shipping and handling. Please send me your free catalog.

NAME _____ dilithium Press

ADDRESS _____ P.O. Box 606

CITY, STATE, ZIP _____ Beaverton, OR 97075



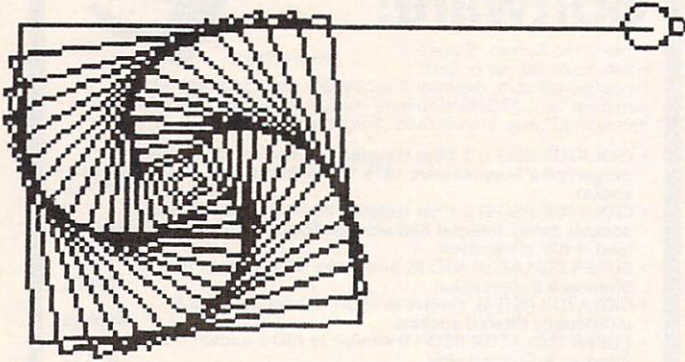
dilithium Press

P.O. Box 606
Beaverton, OR 97075
800-547-1842

Call for the store nearest you that carries our books.

Friends Of The Turtle

David D. Thornburg
Los Altos, CA



FRIENDS OF THE TURTLE

Procedures And Pathways

All turtle languages incorporate at least two basic commands – one to move the turtle forward and another to make it turn. In Atari PILOT, for example, one can have the turtle draw a 40 unit square by entering the commands:

```
GR: DRAW 50
GR: TURN 90
GR: DRAW 40
GR: TURN 90
GR: DRAW 50
GR: TURN 90
GR: DRAW 40
GR: TURN 90
```

Figure 1.



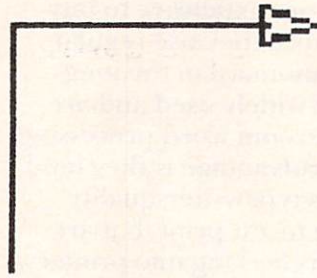
GR: DRAW 40

Figure 2.



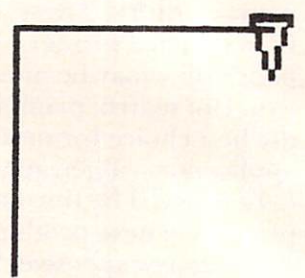
GR: TURN 90

Figure 3.



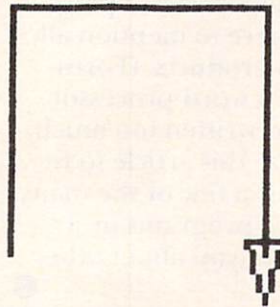
GR: DRAW 40

Figure 4.



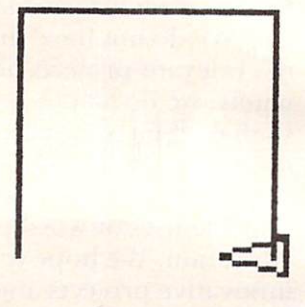
GR: TURN 90

Figure 5.



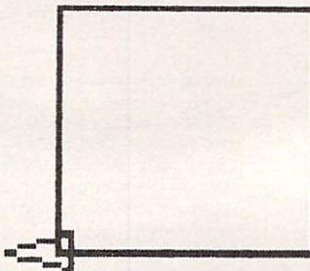
GR: DRAW 40

Figure 6.



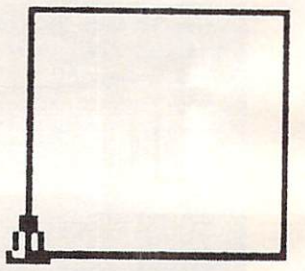
GR: TURN 90

Figure 7.



GR: DRAW 40

Figure 8.



GR: TURN 90

If you want lots of these squares, most turtle environments will let you create a *procedure* which can be used anytime you want to draw this figure. In our case (using Atari PILOT), the procedure starts with a name (for example, *SQUARE). Next, the commands shown above are entered, and finally the *end* command is entered. In PILOT this last command is simply E:.

Once a procedure is defined, it can be used to create copies of squares at any screen location,

COLLEGE BOARD SAT* PREP SERIES

TRS-80, APPLE, PET, OSI, ATARI, CP/M, PDP-11

Each program confronts the user with a virtually limitless series of questions and answers. Each is based on past exams and presents material on 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. — Educator Edition set includes 25 programs covering Vocabulary, Word Relationships, Reading Comprehension, Sentence Completion, and Mathematics. **Independent tests of S.A.T. series performance show a mean total increase of 70 points in students' scores.** Price **\$229.95**

GRADUATE RECORD EXAM Series — Educator Edition includes 28 programs covering Vocabulary, Word Relationships, Reading Comprehension, Sentence Completion, Mathematics, Analytical Reasoning and Logical Diagrams. Price **\$289.95**

COMPETENCY PROFICIENCY EXAM PREP 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.

This 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.

Special editions available for California Proficiency Assessment Test and New York Regents Competency Tests. Call for Prices.

M.I.T. Logo for Apple \$179.95

(Includes Alice In Logoland)

Odyssey In Time

This spectacular adventure game adds a new dimension of excitement and complexity to **Time Traveler**.

Odyssey In Time includes all the challenges of **Time Traveler** plus 10 additional eras. Each game is different and may be interrupted and saved at any point for later play. **\$39.95**

Time Traveler

The best of the adventure games. Confronts the player with complex decision situations and the demand for real time action. Using the Time Machine, players face a challenging series of historical environments. To succeed you must build alliances and struggle with the ruling power. Each game is unique. **\$24.95**



★ NEW ★

★ MICRO-DEUTSCH ★

Micro-Deutsch set includes 24 grammar lessons, covering all material of an introductory German course. Four test units also included. Grammar lessons use substitution transformation drills, item ordering, translations and verb drills. Drill vocabulary based on frequency lists. Suitable for use with any high school or college textbook. Extensively field tested at SUNY Stony Brook. Available for Apple II and PET/CBM. (PET version includes a special foreign language character chip.) Also available soon: MICRO-FRANCAIS, MICRO-ESPAÑOL, MICRO-IVRIT, MICRO-YIDDISH, MICRO-CHINESE, MICRO-JAPANESE. **\$179.95**

★ NEW ★

★ Pythagoras and The Dragon ★

Mathematics in a fantasy game context. Based on **The Sword of Zedek, Pythagoras and The Dragon** introduces Pythagoras as a mentor to the player. When called on for aid, Pythagoras poses math questions, and depending on the speed and accuracy of the player response, confers secret information. With Pythagoras as an ally, the quest to overthrow Ra, The Master of Evil, assumes a new dimension of complexity. Depending on the level chosen, problems range from arithmetic through plane geometry.

32K **\$39.95**

Isaac Newton +

Perhaps the most fascinating and valuable educational game ever devised - **ISAAC NEWTON** challenges the players (1-4) 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.

F.G. Newton

Full Graphics Newton. This version of Isaac Newton presents all data in graphic form. Because data is graphic rather than symbolic, this game is suitable for very young children. Players may select difficulty levels challenging to the most skilled adults.

\$49.95

Free Bonus with purchase of \$300.00 or more: Applesoft Tutor Series

Krell Software Corp. has no official ties with the College Entrance Examination Board or the Educational Testing Service. Krell is, however, a supplier of products to the E.T.S.

PROGRAMS AVAILABLE FOR
TRS-80, APPLE II, PET & ATARI

N.Y.S. residents add sales tax.

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

KRELL SOFTWARE CORP.

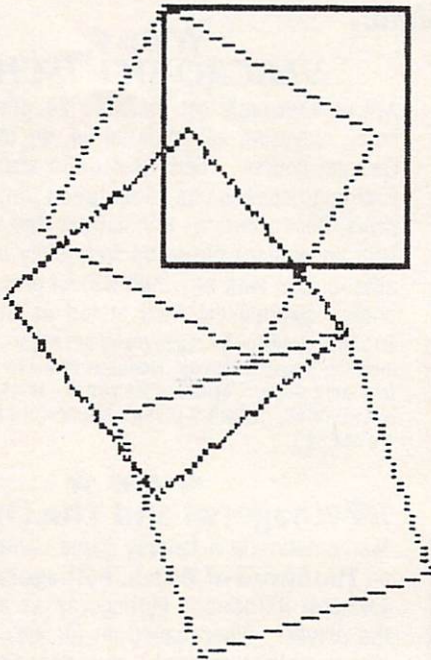
"The State of the Art in Educational Computing"

21 Millbrook Drive, Stony Brook, N.Y. 11790 (516) 751-5139

orientation, or color you may desire. In our case, one simply uses the procedure with the *use* command; e.g., U: *SQUARE. In this manner, procedures let you extend the number of things the turtle can "understand". To see how handy this is, look at the following program which draws several squares:

```
GR: PEN YELLOW
GR: GOTO -30,0
U: *SQUARE
GR: PEN BLUE
GR: TURN 30
U: *SQUARE
GR: GOTO 20,30
GR: TURN 40
U: *SQUARE
GR: PEN RED
GR: TURN 70
U: *SQUARE
```

Figure 9.



While this isn't a particularly pretty picture, it does illustrate how to use procedures to save a lot of typing! Procedures also make programs easier to read.

An even greater value of procedures is the freedom they give you while you are writing a program. As you think about what you want your program to do, you can write the program in outline form, with procedure names being used for those activities you haven't fully defined. Next, you can create each procedure and test it out independently of the others to make sure it works. In this way you

can make steady progress from the outline to the final program without having to deal with massive numbers of statements at a time. I tend to keep procedures short and sweet – and to use lots of them.

The next topic for this month is the idea of a closed *pathway*. Closed turtle paths have some interesting properties. If you look at the figures shown above for the square, you might think that we were done when we drew the fourth side (Figure 7). If you think about it some more, you will see that the turtle is back at the place where it started, but that it hasn't returned to its original orientation. Closed turtle pathways have the property that the turtle returns to its original location and orientation at the end of the trip. This is a very important point to remember.

Now that we have defined a pathway, let's look at a simple way to create some special closed paths in Atari PILOT. One type of closed path creates geometric shapes called regular polygons. A regular polygon is a closed figure which is made from equal length sides and equal turning angles. While we could repeat our DRAW and TURN commands for each side and angle, this would make our procedures very long and tedious to type out. Fortunately, Atari PILOT allows some shorthand to make this task easier. For example, the command:

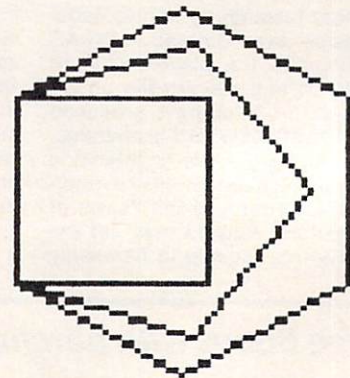
```
GR: 4(DRAW 30; TURN 90)
```

will draw a square on the display screen. The command says, in effect, "Repeat, four times, the commands DRAW 30 and TURN 90".

Using this shorthand, we can create several polygons to study.

```
GR: 4(DRAW 30; TURN 90)
GR: 5(DRAW 30; TURN 72)
GR: 6(DRAW 30; TURN 60)
```

Figure 10.



```
GR: 4(DRAW 30; TURN 90)
GR: 5(DRAW 30; TURN 72)
GR: 6(DRAW 30; TURN 60)
```

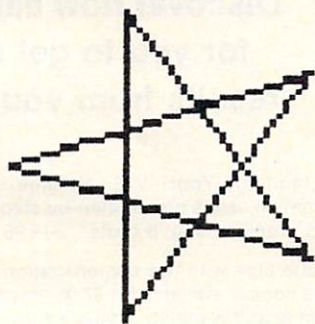

We have created three closed paths – a square, a pentagon, and a hexagon. If you look at the commands which created these figures, you will notice that the only thing that changed was the number of sides and angles, and the amount that was turned each time. If you are really on your toes, you might have noticed that the total amount turned for each figure was the same: $4 \times 90 = 360$, $5 \times 72 = 360$, and $6 \times 60 = 360$. The total amount of turning for simple closed paths is 360 degrees, regardless of the number of sides on the polygon. This is called the Turtle Total Trip Theorem, and it is a beautiful unifying concept that makes turtle geometry quite valuable.

If you would like some challenges until next time, think about these two problems.

1. Can you use the Turtle Total Trip Theorem to help you make a figure which looks like a circle?
2. Look at the picture which results from this command:

GR 5(DRAW 50; TURN 144)

Figure 11.



How much total turning did this figure require? Why?

Until next time, keep those turtles moving, and send me ideas, pictures, programs, and anything else you want to share with your fellow members. Friends of the Turtle chapters should be started in your home town. Let me know what you are doing.

Resource List

Turtle graphics is increasing in popularity both as an educational and as an artistic tool. From time to time, we will publish updates of books, languages, and organizations which incorporate and/or describe turtle geometry. As you look at this list, you

might find that I have left some important references out – please let me know what is missing! In the meantime, here is a beginning list to get us started.

Books:

Mindstorms: Children, Computers, and Powerful Ideas by Seymour Papert (Basic Books, 1980).

Turtle Geometry: The Computer as a Medium for Exploring Mathematics, by Harold Abelson and Andrea diSessa (MIT Press, 1981).

Computer Languages and Products:

Big Trak (programmable robot vehicle from Milton Bradley)
Atari PILOT (language cartridge for Atari 400 and 800 from Atari)

TI LOGO (language cartridge for the TI 99/4 and 99/4A from Texas Instruments)

WSFN (language disk or tape for the Atari 400 and 800 from Atari Program Exchange)


WSFN (language tape for the Commodore PET from Peninsula School Computer Project, Peninsula Way, Menlo Park, CA 94025)

Organizations:

Young People's LOGO Association
 1208 Hillsdale Drive
 Richardson, TX 74081

Friends of the Turtle
 P.O. Box 1317
 Los Altos, CA 94022





Mathematics, Basic Skills

Paper Exercises in Arithmetic

For use with
 PET/CBM Computer & Printer
 plus
 Compatible Disk System

The Teacher's Aide

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

Sample diskette, one program, each group:
 \$14.95 postpaid, Cost Deductible

Large Alphabet For The VIC

Doug Ferguson
Elida, OH

There are many exciting applications for the 64 programmable characters on the VIC-20. David Malmberg's article in the first issue of *Home and Educational COMPUTING!* explains fully how the VIC can generate programmable characters merely by changing the contents of memory location 36869, and by redefining the 64 eight-pixel tall characters beginning at 7168.

Another interesting memory location in the VIC is nearby: 36867. Changing its contents creates double-sized characters. By POKEing a 47 into 36867, the bottom border of the screen drops out of sight and vertically-paired characters occupy "stretched" screen locations. After clearing the screen, type an A and get $\overset{b}{A}$. Actually, the VIC's first character is the "@" (screen POKE 0) which yields $\overset{a}{@}$. Continue to type the alphabet and see how the stacked letters follow a pattern. To return to normal, POKE 36867,46 or hit the RESTORE and RUN/STOP keys simultaneously.

I set about to combine these two ideas so that I could get a large alphabet. I painstakingly re-programmed the B to look like the top of a stretched "A" and the C to look like its matching bottom half. Continuing on for nearly two hours, I made it to the "O" and gave up for the night.

Somehow, the clear light of day the next morning directed me toward a much simpler approach: if the characters already reside in ROM, just read each eighth of a character *twice* into the RAM space for programmable characters to program two letters at a time!

Clearly, only 32 such stretched characters can be made since only 64 unstretched characters can be readily programmed. The space key and all the numerals fall in the wrong half of the 64, but all 26 letters of the alphabet can be stretched with the following, surprisingly short, program:

```

10 POKE 56,28: REM RELOCATE END-OF-MEMORY
    POINTER
20 CH=32776: REM LOCATION OF ALPHABET
    IN ROM
30 FOR X=7184 TO 7600 STEP 2: REM ALPHABET
    IN RAM
40 POKE X, PEEK(CH): POKE X+1, PEEK(CH):
    REM STRETCH
50 CH=CH+1: NEXT X: REM LOOP
60 POKE 36879,25: REM NO MORE BORDER
  
```

70 POKE 36869,255: REM PROGRAMMABLE
CHARACTERS

80 POKE 36867,47: REM STRETCHED CHARACTERS

90 PRINT "(clear)ABCDEFGHIJKLMNOPQRSTUVWXYZ
WXYZ": END

Lines 20 through 50 read the normal alphabet (8x8 pixels) out of ROM and into RAM. Since RAM is also where a longer program will do its work, line 10 tells the computer not to go beyond 7134 (28 times 256). Line 60 is for the purist who notices the lack of a bottom border with the "normal" screen.

Simple? Certainly. The biggest drawback is the lack of numerals and spaces. In string variables with spaces, e.g., A\$="HELLO THERE", the space can be replaced by the symbol for cursor-right.

The applications of this large alphabet program are left to the reader. Although it is obvious that any characters can be programmed for stretching, only the alphabet (and a few insignificant symbols) can be programmed in a way that an exact keyboard-to-character correspondence can be realized.

I would appreciate hearing from anyone who can expand on this or who has a clever application. ©

LEARN


**Discover how easy it is
for you to get useful
results from your VIC.**

Understanding Your VIC Volume 1: Basic programming uses a proven step-by-step approach to teach programming. It costs \$11.95

A cassette tape with two demonstration programs from the book is available for \$7.95. It will save you typing time and eliminate typing errors.

VIC Software

Easy to use program for you to create new characters for graphics or games. Cassette \$9.95.



See your dealer or order direct
VISA/MC accepted
Money back guarantee
Please add \$2 (\$8 overseas)
for shipping and handling

TIS INC.

Total Information Services, Inc.
Box 921, Dept. H
Los Alamos, NM 87544

Dealer inquiries invited.

SOFTWARE • HARDWARE

FOR THE
VIC20[®]

COMMUNICATIONS AND COMPUTER TOOLS

- **UMI RS232 COMMUNICATOR INTERFACE** \$49.95
Our RS-232 Communicator Interface enables the VIC-20 to talk to most RS232 devices.
- **VICTERM A** \$19.95
With the VICTERM A program, begin telephone communications.
- **UMI 3K RAM CARTRIDGE** \$39.95
The easiest way to have 6655 bytes of program memory in your VIC.
- **UMI 3K RAM EXPANDER** \$79.95
For programmers, ROM developers and advanced users, our 3K RAM EXPANDER adds two ROM slots and 3K of RAM memory to the Commodore VIC-20 to give a total of 6655 bytes of available user memory. An 8-position dipswitch provides switch-selectable base address and single-socket enable/disable to two ROM sockets.
- **UMI 8K RAM CARTRIDGE** \$89.95
Our 8K RAM CARTRIDGE adds 8K of user memory to the VIC-20.
- **UMI SOCKETED 8K RAM/ROM BOARD** \$29.95
Our 8K board has four sockets for mixing and matching RAMS, ROMS, or EPROMS.
- **BUTI (BASIC PROGRAMMER'S UTILITY ROM)** \$34.95
A beauty of a ROM that plugs into CVH-0002, our 3K RAM EXPANDER, or CVU-0006, our RAM/ROM/EPROM Board.
- **UMI VIC-20 REFERENCE CARD** \$4.95
Our 8-1/2" by 11" laminated reference card is packed with commonly needed Commodore VIC20 information.

PROGRAMS FOR THE COMMODORE PET[®]

- **SATELLITES AND METEORITES** \$49.95
Satellites and Meteorites is a greater challenge than most space pilots have met.
- **SKYMATH** \$12.95
Decimal addition and subtraction with super PET graphics!
- **MATH SERIES DISKETTE I** \$29.95
Pedagogically correct programs SKYMATH, SPACEDIV, and LONGDIV, on a 5-1/4" Diskette for Commodore Disk Drives.
- **SPACEDIV** \$12.95
Division practice with graphics that hold the child's interest.
- **LONGDIV** \$14.95
20 problems of step-by-step long division with super graphics and 1-inch high digits.
- **SUPERHANGMAN** \$16.95
Superior graphic version of the popular spelling game.

GAMES AND ENTERTAINMENT

- **KIDDIE PAK I** NOW \$39.95
The KIDDIE PAK I includes the following games:
 - KIDDIE CHECKERS** (SEPARATE PRICE \$7.95)
Checkers for very small children.
 - SHAPE MATCHER** (SEPARATE PRICE \$11.95)
Fun for very small children, matching hidden patterns.
 - DOGGIE MAZE** (SEPARATE PRICE \$11.95)
A dog's race against time to reach the hydrant.
 - FUN TENSES** (SEPARATE PRICE \$11.95)
Nonsense sentences which aid children.
- **SUPER FOUR I** NOW \$49.95
SUPER FOUR I includes the following games:
 - 3-D MAZE** (SEPARATE PRICE \$14.95)
Choose a 4 to 9 level maze, then find your way down the hallways.
 - BREAKOUT** (SEPARATE PRICE \$14.95)
No program library is complete without *BREAKOUT!*
 - CAROM** (SEPARATE PRICE \$14.95)
Planning and skillful play with deflector zaps the target.
 - RACEWAY** (SEPARATE PRICE \$14.95)
Beat the competition with a high-speed race car.
- **FABULOUS FOUR I** NOW \$59.95
Fabulous Four I contains the following games:
 - STAR WARS** (SEPARATE PRICE \$16.95)
Blast the tie fighter!
 - DRAGON MAZE** (SEPARATE PRICE \$16.95)
Lurking man eating dragon.
 - LASER WAR** (SEPARATE PRICE \$18.95)
Blast away space debris and aliens.
 - INVADER FALL** (SEPARATE PRICE \$21.95)
Alien paratroopers descend from space. (Requires 3K Expn.)
- **SUPER STARS I** NOW \$69.95
SUPER STARS I includes the following games:
 - THE ALIEN** (SEPARATE PRICE \$24.95)
Fast work with inflatable alien traps. (Requires 3K Expn.)
 - AMOK** (SEPARATE PRICE \$18.95)
Killer robots with one instruction - get the intruder.
 - ALIEN BLITZ** (SEPARATE PRICE \$24.95)
Split second reactions at the 9th level of ALIEN BLITZ will find how good you are.
 - GLOBBLER** (SEPARATE PRICE \$24.95)
The Conqueror Worm gobbles globs under your control.

ORDER NOW WHILE SUPPLIES LAST!

EDUCATION

- **SUPER ADDITION, SUBTRACTION, DON'T FALL** \$14.95
One cassette contains all three educational games.
- **SKYMATH** \$14.95
With excellent graphics, SKYMATH shoots 5-digit, 3-place addition and subtraction problems into screen's "sky" in 1-inch high digits.
- **SPACEDIV** \$14.95
Division practice with graphics that hold the child's interest.

GAME PROGRAM CARTRIDGES NOW AVAILABLE—ORDER NOW!

- **DEALER INQUIRIES INVITED**
- **ATTENTION SOFTWARE DEVELOPERS**
Please contact UMI for distribution and top royalties. Blank Cartridge kits available in quantity.
- **MASTERCARD/VISA Accepted**



united microware industries, inc.

• 3431 H POMONA BLVD. • POMONA, CA 91768 • PHONE (714) 594-1351 •
VIC 20 and PET are Registered Trademarks of Commodore Business Machines

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

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

NAME _____

ADDRESS _____

CITY _____ STATE _____

ZIP _____ COMPANY _____

Clip Coupon for FREE CATALOG



Concentration

Charles Brannon
Editorial Assistant

One application of a user-definable character set is high-resolution, five-color games in GRAPHICS modes one and two. For example, the invaders in Atari's Space Invaders game are GRAPHICS 1 characters. The illusion of smooth motion is performed with the aid of a special feature of the Atari, horizontal fine scrolling. Although my game is less ambitious, it shows what you can do with minimum effort – I spent no more than three hours programming – from the design to the finished game.

The game is based on the card game "Concentration." Two decks of cards are thoroughly shuffled together, then laid out in a matrix of 8 by 13 cards. Each player takes his turn by turning over two cards. If they match, they are removed from the set and this "point" is credited to the player. If not, they are flipped back over. The game continues until all the cards have been matched and removed.

The Atari Version Is Slightly Different

The Atari version of the game is rather different, but the idea is similar. Nineteen different graphics symbols (people, sailboats, "happy faces," cars, etc.) are randomly hidden in a 16 by 20 array. When the game is run, the computer draws the "board," a solid green rectangle. It then flashes the prompt "START/SELECT" at the bottom of the screen. Press [SELECT] to change the number of players, and [START] to begin play. A solid red cursor is placed at the top left corner of the board. Move the cursor with joystick #1 (everyone uses the same joystick). When you wish to "flip" a card, press the red button. Then try to match the revealed symbol by selecting another. If successful, your score is increased by one. The play then passes to the next player. Since the array is 16 by 20 elements, (a total of 320) there could be as many as 160 matches. Unlike the card game version, there are multiple pairs of each symbol. This could make for a very long game, so, instead, the first player to get ten matches wins. SuperFont (**COMPUTE!** #20) could be used to design other gaming characters.

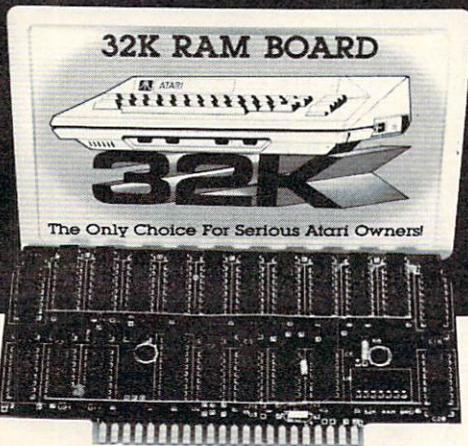
```
100 REM | Concentration |
110 REM
120 REM (C) 1981 Small Systems
    Services, Inc.
130 REM Charles Brannon 12/03/81
140 REM
```

```
150 GOSUB 740
160 GRAPHICS 1+16:POKE 756,BASE
170 POKE (PEEK(560)+256*PEEK(561)+3),7+6
    4
180 SETCOLOR 2,0,10:SETCOLOR 4,6,0:SETCO
    LOR 1,12,6
190 IF T=0 THEN DIM A(16,20),CH$(20),SC(
    4),PROMPT$(24)
200 FOR I=1 TO 4:SC(I)=0:NEXT I
210 CH$=")*+,-./:;<=>?@[\]^_`"
220 COLOR 1
230 PROMPT$="|START |SELECTSTART |SELECT
    |"
240 FOR Y=1 TO 20:FOR X=1 TO 16:A(X,Y)=I
    NT(19*RND(0)+1):PLOT X+1,Y+2:NEXT X:NEXT
    Y
250 POSITION 3,0:?: #6:"|concentration|"
260 NP=1:POSITION 2,2:?: #6:"ABCDEFGHIJKL
    MNOP":FOR I=1 TO 20:COLOR 224+I:PLOT 1,I
    +2:NEXT I
270 POSITION 5,1:?: #6:"|PLAYERS| ";NP:PO
    KE 53279,8:POKE 20,26:K=0
280 IF PEEK(20)>25 THEN POSITION 4,23:?:
    #6:PROMPT$(1+K*12,12+K*12):POKE 20,0:K=1
    -K
290 IF T THEN 310
300 T=PEEK(53279):IF T=7 THEN T=0:GOTO 2
    80
310 IF PEEK(53279)=T THEN 310
320 IF T=5 THEN NP=NP*(NP(4)+1):T=0:P=T:G
    OTO 270
330 IF T<>6 THEN 300
340 POSITION 4,23:?: #6:" "
350 REM MAIN LOOP
360 P=P*(P(NP)+1):POSITION 2,1:?: #6:"|PLA
    YER| ";P:" score ";SC(P)
370 GOSUB 610:X1=X:Y1=Y:U1=U
380 GOSUB 610:IF U=U1 THEN 450
390 SOUND 0,20,2,8:SOUND 1,100,12,8:FOR
    W=1 TO 50:NEXT W:SOUND 0,0,0,0:SOUND 1,0
    ,0,0:POSITION 5,23:?: #6:"|PRESS FIRE|"
400 IF STRIG(0)=1 THEN 400
410 IF STRIG(0)=0 THEN 410
420 POSITION 5,23:?: #6:" "
430 COLOR 1:PLOT X+1,Y+2:PLOT X1+1,Y1+2:
    SOUND 0,12,12,8:FOR W=1 TO 20:NEXT W
440 SOUND 0,0,0,0:GOTO 360
450 FOR I=1 TO 15 STEP 0.4:SOUND 0,I*17,
    12,I:SOUND 1,I*17,12,I:NEXT I:SOUND 0,0,
    0,0:SOUND 1,0,0,0
460 SC(P)=SC(P)+1:POSITION 17,1:?: #6:SC(
    P):FOR I=1 TO 10:POKE 709,PEEK(53770):PO
    KE 53279,0
470 FOR W=1 TO 10:NEXT W:NEXT I:POKE 709
    ,198:IF SC(P)=10 THEN 520
    ,198:IF SC(P)=10 THEN 520
```


THE MOSAIC 32K RAM FOR ATARI

THE BEST:

For ATARI



- ✓ DESIGN
- ✓ MATERIALS
- ✓ SAFETY
- ✓ GUARANTEE

THE ONLY CHOICE

You own the best micro computer available, the Atari*. At Mosaic we've made Atari computers our only business and have made our products the best anywhere. You've seen the advantage of having a 32K RAM board. The Mosaic 32K RAM is the only board designed to meet your needs now and in the future too. It has designed-in flexibility to be compatible with products available in the near future. See for yourself, Mosaic is the only choice for the serious Atari owner.

THE BEST SCREEN CLARITY

Here's what A.N.A.L.O.G. magazine had to say: "Mosaic uses, what we feel are the highest quality components, which may improve reliability," and "The Mosaic showed no sign of interference and gave the best screen clarity."

THE MOSAIC ADVANTAGE	MOSAIC 32K RAM	OTHER 32K RAMS
Works in both Atari 400 & 800	■	■
Gold edge connectors for better reliability	■	■
Fits Atari 400 without modification	■	■
Custom components for better performance & reliability	■	■
Highest quality components for the best screen clarity	■	■
Full year warranty	■	■
Designed to take advantage of Atari 800's superior bus structure.	■	■
Can be used with 8K, 16K and future products.	■	■
Allows Atari 800 to have 2 slots for future expansion	■	■
Designed so there's no danger of damaging your computer	■	■
Designed for inter-board communication in Atari 800	■	■
Easy to follow instructions for simpler no-solder installation in Atari 400	■	■
Available companion board (\$5) to allow running 32K board independent of other boards	■	■
Full flexible memory configuration	■	■

Atari 800 Memory Configuration	with the MOSAIC 32K RAM	with other 32K Boards	Atari 800 Memory Configuration	with the MOSAIC 32K RAM	with other 32K Boards
Empty 32K 16K	48K RAM 40K With BASIC Cartridge	48K RAM 40K With BASIC Cartridge	Empty 8K 32K	40K RAM	Danger! This Configuration Can Damage Computer
Empty 32K 8K	40K RAM	Danger! This Configuration Can Damage Computer	8K 32K 8K	48K RAM 40K With BASIC Cartridge	Danger! This Configuration Can Damage Computer
Empty 16K 32K	48K RAM 40K With BASIC Cartridge	Danger! This Configuration Can Damage Computer	Empty Companion 32K	32K RAM	Danger! This Configuration Can Damage Computer

Now from your nearest Mosaic dealer

\$179.95

Direct from Mosaic \$189.95

MOSAIC
ELECTRONICS

P.O. Box 748 Oregon City, Oregon 97045 503/655-9574

*Trade Mark of Atari, Inc.


```

480 POSITION 5,23:?: #6:"IPRESS FIRE!"
490 IF STRIG(0)=1 THEN 490
500 IF STRIG(0)=0 THEN 500
510 POSITION 5,23:?: #6:":GOTO
360
520 POSITION 0,2:?: #6:"Player number "JP
;" Iwins!":POKE 53279,8
530 FOR I=0 TO 15 STEP 0.4:SETCOLOR 4,I,
6+INT(4*RND(0)):SOUND 0.10+5*RND(0),10,4
:SOUND 1,50+10*I,12,8:NEXT I
540 SOUND 0,0,0,0:SOUND 1,0,0,0:SETCOLOR
4,6,0
550 T=PEEK(53279):IF T=7 THEN 550
560 IF T<>3 THEN 160
570 FOR X=1 TO 16:FOR Y=1 TO 20
580 LOCATE X+1,Y+2,Z:IF Z<>1 THEN COLOR
Z-128:PLOT X+1,Y+2:GOTO 600
590 COLOR ASC(CH$(A(X,Y)))+128:PLOT X+1,
Y+2
600 NEXT Y:NEXT X:GOTO 550
610 X=1:Y=1
620 LOCATE X+1,Y+2,Z:COLOR Z+32-160*(Z>1
):PLOT X+1,Y+2:TX=X:TY=Y
630 ST=STICK(0):TR=STRIG(0):IF TR=0 AND
Z=1 THEN 720
640 IF PEEK(53279)<7 THEN COLOR Z:PLOT X
+1,Y+2:GOTO 550
650 IF ST=15 THEN 630
660 T=INT(100*RND(0)+50):SOUND 0,T,10,8:
SOUND 1,T+20,10,8
670 IF ST=14 OR ST=10 OR ST=6 THEN Y=Y-1
:IF Y<1 THEN Y=20
680 IF ST=9 OR ST=5 OR ST=13 THEN Y=Y+1:
IF Y>20 THEN Y=1
690 IF ST>8 AND ST<12 THEN X=X-1:IF X<1
THEN X=16
700 IF ST>4 AND ST<8 THEN X=X+1:IF X>16
THEN X=1
710 COLOR Z:PLOT TX+1,TY+2:SOUND 0,0,0,0
:SOUND 1,0,0,0:GOTO 620
720 FOR I=1 TO 7:COLOR 1+I:PLOT X+1,Y+2:
SOUND 0,100+I*10,12,8:FOR W=1 TO 20:NEXT
W:NEXT I:SOUND 0,0,0,0
730 U=A(X,Y):COLOR ASC(CH$(U,U))+128:PLO
T X+1,Y+2:RETURN
740 REM INITIALIZE CHARACTER SET
750 BASE=PEEK(106)-8:CHSET=BASE*256
760 GRAPHICS 2+16:POSITION 3,4:?: #6:"ICI
On!cE!n!b!r!A!l!l!o!N!l"
770 POSITION 2,6:?: #6:"Patience please"
780 FOR I=CHSET TO CHSET+127:READ A:POKE
I,A:POKE 712,A:SOUND 0,A,10,8:NEXT I
790 FOR I=CHSET+26*8 TO CHSET+32*8+7:REA
D A:POKE I,A:POKE 712,A:SOUND 0,A,10,8:N
EXT I
800 FOR I=CHSET+59*8 TO CHSET+63*8+7:REA

```

```

D A:POKE I,A:POKE 712,A:SOUND 0,A,10,8:N
EXT I
810 FOR I=128 TO 207:A=PEEK(57344+I):POK
E CHSET+I,A:POKE 712,A:SOUND 0,A,10,8:NE
XT I
820 FOR I=264 TO 471:A=PEEK(57344+I):POK
E CHSET+I,A:POKE 712,A:SOUND 0,A,10,8:NE
XT I
830 SOUND 0,0,0,0:RETURN
840 DATA 0,0,0,0,0,0,0,0
850 DATA 255,255,255,255,255,255,255,255
860 DATA 0,255,255,255,255,255,255,255
870 DATA 0,0,255,255,255,255,255,255
880 DATA 0,0,0,255,255,255,255,255
890 DATA 0,0,0,0,255,255,255,255
900 DATA 0,0,0,0,0,255,255,255
910 DATA 0,0,0,0,0,0,255,255
920 DATA 0,0,0,0,0,0,0,255
930 DATA 24,24,19,124,88,24,20,54
940 DATA 0,0,0,28,20,127,34,0
950 DATA 129,66,60,36,36,60,66,129
960 DATA 0,0,0,96,95,101,5,0
970 DATA 0,16,40,68,254,124,0,0
980 DATA 0,102,102,0,129,66,60,0
990 DATA 0,56,124,84,124,56,40,68
1000 DATA 0,0,68,34,63,34,68,0
1010 DATA 0,195,102,60,126,36,0,0
1020 DATA 66,255,102,90,90,102,255,66
1030 DATA 16,16,16,56,56,56,124,254
1040 DATA 0,0,56,68,84,68,56,0
1050 DATA 0,16,40,68,254,68,40,16
1060 DATA 0,170,108,198,16,198,108,170
1070 DATA 170,85,170,85,170,85,170,85
1080 DATA 16,56,124,254,84,16,16,124
1090 DATA 14,0,12,0,0,56,120,40
1100 DATA 0,255,0,255,0,255,0,255
1110 DATA 24,56,129,0,0,136,127,62


```

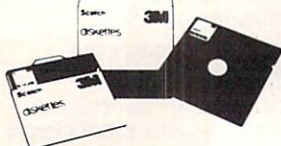
©

Scotch® Diskettes

Rely on Scotch® diskettes to keep your valuable data safe. Dependable Scotch diskettes are tested and guaranteed error-free. The low abrasivity saves your read/write heads. They're compatible with most diskette drives.

(800)235-4137

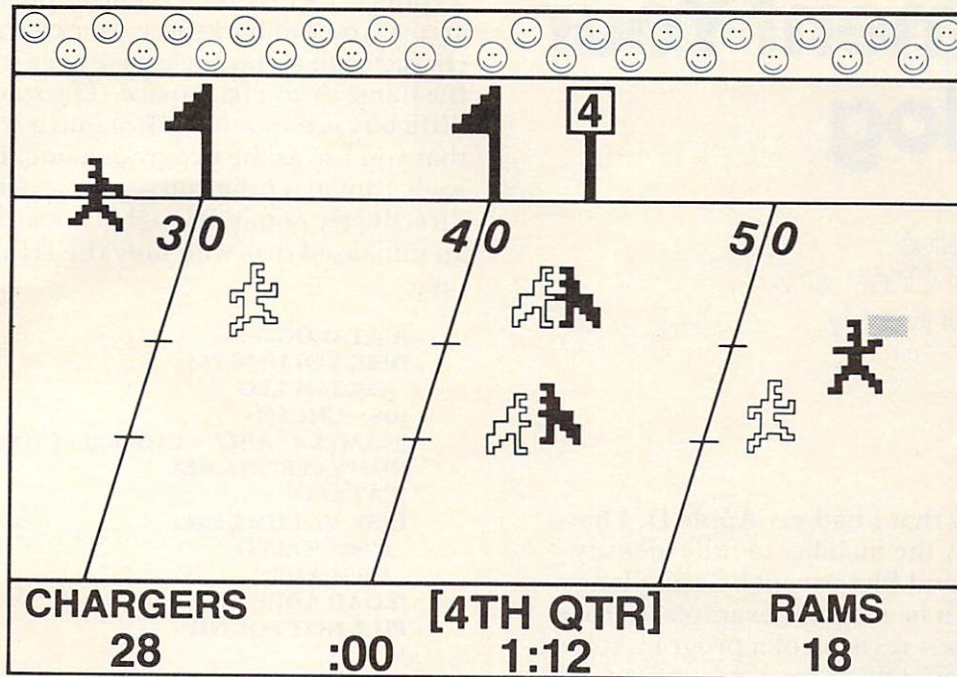




PACIFIC EXCHANGES
100 Foothill Blvd
San Luis Obispo, CA
93401 In Cal call
(800)542-5915 or
(805)541-1117

Dealer Inquiries Invited

ARCADE PRO FOOTBALL™



An Armchair Quarterback's Dream Come True!

It's 4th down and 14 on your opponent's 44 yard line. You're out of time outs with just over a minute left in the game. You call it...sweep right, screen pass left or go for the bomb!

Arcade Pro Football™ puts you in the middle of 60 minutes of exciting gridiron play. You control the action *and* call all the shots. It's the most realistic computer sports game available and it's designed exclusively for the Atari 400/800™ personal computers by Arcade PLUS.

With features like these, Arcade Pro Football™ is in a league of its own!

- Play offense *and* defense head-to-head against the computer or against another player!
- Control two full-color, animated teams in 3-D perspective on a 100 yard, scrolling field!
- 4 game variations, including player handicapping!
- Over 25 offensive and defensive play possibilities...passing, *and* catching, running and kicking!
- All the fun and excitement of real Pro Football...penalties, interceptions, fumbles, bad snaps, 30 second clock—even 4-channel sound and a crowd to cheer you on!

Arcade Pro Football™ is available on cassette or disk for Atari® 400/800™ computers with 16K minimum memory from your local Atari computer dealer. Or send \$29.95 (cassette)/\$34.95 (disk) plus \$2.50 postage and handling (California residents please add 6% sales tax).

arcade | **PLUS**

Comment Your Catalog

Richard Cornelius
Department of Chemistry
Wichita State University
Wichita, KS

Since the first day that I had my Apple II, I have been frustrated by the inability to fully identify stored programs and files except by using long names. Wouldn't it be nice, for example, to have the date of the latest revision of a program stored along with its name? Of course, a person can always make the date part of the name, but I thought that there ought to be a better way. There is a better way. I have written a program to make writing comments in the catalog easy.

Control Characters

You may have already discovered that some control characters can be part of program and file names in the catalog. For example, a CTRL-J at the end of a program name is helpful in formatting the catalog. The CTRL-J is a linefeed which, when entered as the last character in a program name, has the effect of leaving an empty line between that program name and the next one when the catalog is listed. Another control character which can be inserted into a program name is CTRL-G which will make the Apple beep when the name of the program is listed in the catalog.

Most of the other control characters can be entered into program names, but generally they are not particularly useful. One application they do have is based on the fact that control characters in a name do not actually appear on the screen in the catalog, but they must be used in order to access the program on the disk. Their invisibility can provide a measure of security by preventing someone else from readily loading programs off of your disk. (See your Apple DOS manual for a program to detect most of these control characters.)

The control character that I have found useful in creating comments for the catalog is CTRL-H, the backspace character. This character cannot easily be entered directly into a program name.

Typing CTRL-H is the same as pressing the left arrow; you can backspace over characters, but the character that you backspace over is deleted from the name as you backspace. The solution to this difficulty is to put CHR\$(8) into a string variable that you use as the program name. In *immediate mode*, [not in a program – just type it on the screen directly] try going through the routine below using an initialized disk with only the HELLO program on it:

```
]CATALOG
DISK VOLUME 254
  A 002 HELLO
]D$=CHR$(4)
]NAME$="ABC"+CHR$(8)+CHR$(8)+"DEF"
]?D$"SAVE";NAME$
]CATALOG
DISK VOLUME 254
  A 002 HELLO
  A 004 ADEF
]LOAD ADEF
FILE NOT FOUND
]
```

The lines that start with a "]" prompt are the ones that I typed into the Apple. The others are those that the computer wrote. When I try to load ADEF the computer tells me FILE NOT FOUND because the name is not ADEF, but "ABC" + CHR\$(8) + CHR\$(8) + "DEF". Although the program name in the catalog appears to be four characters long, if you were to ask ?LEN(NAME\$) you would find that it is actually eight characters long.

This information about CHR\$(8) is really all that you need in order to be able to write comments into your catalog. You simply create a string variable that contains enough backspace characters to backspace over the letter that identifies the file type and the number that gives how many sectors are occupied on the disk by the file. Once all of that information is backspaced over, the desired comment is entered into the string. The string variable is then used as shown above to SAVE a program – any program. The "comment" is actually the name of a program – whatever program you had in memory when you do the SAVEing – but it doesn't look like a program name because the file type and sector-count information is missing.

Some Limitations

This commenting technique does have its limitations. Names of programs are limited to 30 characters by DOS. Since the first character of a name cannot be a control character, seven backspaces are needed to erase the information that is normally printed. The first character, plus these backspaces, consume eight of the available 30 characters, so only 22 characters can go into a comment. In addi-

tion, you have only limited control over where in the catalog the comment appears. This kind of comment is best used for disks on which people are not going to be making many changes. As long as you start with a fresh disk and put the files, programs, and comments onto the disk in the order you wish them to appear, the catalog will come out fine. If you modify programs in such a way as to change their length, then the order of items in the catalog may be changed and the comments will no longer be adjacent to the program name. One more limitation is that hard copies of the catalog are harder to make appear as nice as the screen listing of the commented catalog. If you try to print the catalog directly, the printer will backspace and overstrike the original characters.

This difficulty can be overcome by listing the catalog on the screen and then, using a program such as that by Jeff Schmoyer (**COMPUTE!** #6) to route the screen image to the printer. In spite of these limitations, I have prepared commented catalogs such as the one in Figure 1. Each line of letters is actually a program name, but the only programs of interest are the ones that have the file type and sector count next to them. The other program names serve only as comments, and the actual programs could be anything (or nothing).

Clearly typing all of these names with the CHR\$(8) feature inserted could be quite a chore at the keyboard, so I wrote a program to enter the comments into the catalog. The program is called simply "Catalog Commenter" and is a short BASIC (Applesoft) program. The program shows just how long the name can be and lets you either erase or write names. It then gets a catalog so that you can see what you have done. Hitting any key clears the screen and takes you back to the beginning of the program. This program is the one that was used to prepare the catalog Figure 1. After the backspace characters, two spaces are inserted into the initial part of the string variable used for the name. This spacing makes the comments appear lined up with the sector count of the "real" program names in the catalog, but further limits the length of the comments to 20 characters.

Figure 1.

DISK VOLUME 254

A 025 PH PLOT-BUFFER CAPACITY
(MAIN PROGRAM WHICH
LOADS OTHER FILES)

*B 002 OR LOADER & LINE ERASE
(OVERLAYS HIRES PAGE
2 ONTO PAGE 1 AND
ERASES HIRES TEXT
LINES. A#300; A#325)

*B 027 MZCHAR3
(SPECIAL WHITE CHARACTER SET. A#6000)

*B 006 INSTRUCTIONS
(BINARY TEXT FILE OF
INSTRUCTIONS. A#8000)

*B 034 COVER PAGE
(BINARY HIRES FILE.

```

100 REM ** CATALOG COMMENTER**
110 REM BY RICHARD CORNELIUS
120 REM CHEMISTRY DEPARTMENT
130 REM WICHITA STATE UNIV.
140 REM WICHITA, KS 67208
150 REM (316) 689-3120
160 REM **INITIALIZATION**
170 D$= CHR$(13) + CHR$(4)
180 REM D$ SIGNALS DOS COMMAND
190 N$= CHR$(8) + CHR$(8) + CHR$(8)

200 REM CHR$(8) IS BACKSPACE
210 N$="A"+N$+N$+CHR$(8)+" "
220 HOME: VTAB 5
230 REM **GET COMMENT**
240 PRINT "TYPE IN COMMENT"
250 PRINT"---UP TO THIS LONG--"
260 INPUT";C$
270 PRINT
280 PRINT"WRITE(W), ERASE(E), OR QUIT(Q)?";
290 GET G$
300 IF G$= "Q" THEN 410
310 IF G$ <> "E" AND G$ <>"W" THEN ~
GOTO 220
320 REM **CREATE PROGRAM NAME**
330 N$= N$ + C$
340 REM **WRITE TO DISK**
350 IF G$= "E" THEN 370
360 PRINT D$"SAVE";N$:GOTO 380
370 PRINT D$"DELETE";N$
380 PRINT D$"CATALOG"
390 GET G$
400 IF G$ <> "Q" THEN 220
410 PRINT:PRINT"THE END"

```


STARFIGHT3

David R. Mizner
Houston, TX

STARFIGHT3 is a program that will let you fight off Klingons to save the Federation. Before you start typing away, a little word of warning is needed. This program *loves* memory. In fact, STARFIGHT3 will use it all up; so be careful entering the program. An extra space added now may cause a "no memory" message later.

Have fun!!!

Program Description

A new Galaxy is generated each time the program is RUN. A random number of stars (maximum of 25) and Klingons (maximum of 3) are generated and, along with the Enterprise, are randomly placed in a 10x10 Galaxy.

The Enterprise is equipped with three photon torpedos for every Klingon, and three shield units. Three hits on the Enterprise from Klingon attacks will deplete its shield, a fourth hit will destroy the enterprise. There will be self-destruction if the Enterprise runs into a star or Klingon while traveling around the Galaxy.

Klingons (all that have not been destroyed) will fire at the Enterprise if your response time for a command is too slow or if your torp misses. Only one hit on the Enterprise is allowed per attack. Take note that the Klingons fire their torps in eight directions while the good guys can only fire in one direction at a time. However, neither side can fire through a star.

The stars and Klingons remain stationary throughout the game.

Program Directions

1. Observe operating procedures for VIC20.

2. Commands

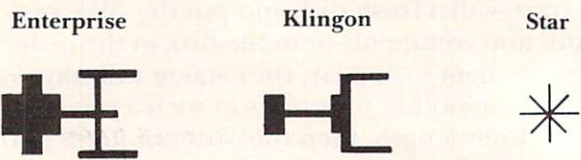
- a. Move: VIC will request direction and distance. Direction is a number from 1 through 8, while distance is the number of spaces you want to move.
- b. Torp: VIC will request a direction. Torp does not have a distance since a photon torpedo will travel until it hits a star, Klingon, or Galaxy boundary.
- c. End: This command ends the game. "You surrendered" is the real meaning of "end."

3. Scan

- a. A scan is generated before each command request.
- b. The Galaxy is displayed so you can see the

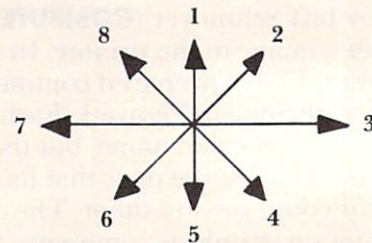
actual location of stars, Klingons, and the Enterprise. At the same time, the direction code is printed out.

c. Scan code.



4. Direction

The direction for moving the Enterprise or firing a photon torpedo is given by entering a number from 1 through 8. These numbers will let you move or fire a torp every forty-five degrees.



5. Changing the game's difficulty

- a. You can change the number of torps allowed by modifying line 120.
- b. Another way is to change the time you are allowed before the Klingons fire. The value of TIS is changed by modifying lines 450,545, and/or 1530.

```

10 PRINT "{CLEAR} ** STARFIGHT3 **"
20 PRINT:PRINT"DAVID R MIZNER,SEP81"
30 X=PEEK(56)-2:POKE52,X:POKE56,X:POKE51
  ,PEEK(55):CLR
40 CS=256*PEEK(52)+PEEK(51)
50 FORI=CSTOCS+511:POKEI,PEEK(I+32768-CS
  ):NEXT
60 FORI=7168TO7175:READJ:POKEI,J:NEXT
70 DATA15,68,228,254,228,68,15,0
80 FORI=7448TO7455:READJ:POKEI,J:NEXT
90 DATA7,12,204,252,204,12,7,0
100 POKE36869,255
110 DIMA%(10,10),KL(6)
120 FORI=1TO10
130 FORJ=1TO10
140 A%(I,J)=0
150 NEXTJ
160 NEXTI
170 K=INT(RND(1)*3+1):S=INT(RND(1)*25+1)
180 KC=K:T=3*K:H=3
190 FORI=1TOS
200 GOSUB840
210 IFA%(C1,C2)<>0THEN200

```


NEW VIC-20 SOFTWARE

General Purpose

* Character Generator

Design your own special symbols for any mathematical or engineering application with your own unique figures, create excellent low resolution graphics for your games. The program comes on a cassette with a sample run that includes many strange game creatures.

Price \$12.50

* Mailing List

Create files, enter your mailing lists, names, addresses and phone numbers with this user friendly program. Use one keystroke commands to sort by name or zip code, modify, delete or add new entries, and store them on tape. Recall entries by name or phone number. Print out mailing lists. It's simple! Requires at least 10k bytes of memory to be used effectively.

Price \$16.00

* Bold Face

This program lets you create titles, banners, and headlines in almost any shape or size. Create big banners, headlines, feelines, all kinds of lines. Imagine a ten foot long "Happy Birthday", for instance.

Price \$9.00

* Text Editor

At last! The indispensable - An easy to use single load text editor for your VIC. Don't wait any longer.

Price \$16.00

Mathematics

MathPak

* **Complex Function Calculator:** Use your VIC as a handy complex number calculator with eight registers to store complex numbers, recall them, operate on them, and restore them.

* **Matrix Operations:** Add, subtract, multiply, find the inverse and determinant of any matrices with this menu driven program.

* **Systems of Linear Equations:** Solve any system of linear equations with this menu driven program.

* **Function Analysis:** Finds zeros, min., max., derivative, or integral of any user supplied polynomial function.

* **Statistics I and II:** Computes mean and standard deviation. Performs linear and nonlinear regression on a user supplied data set as well as histograms.

* **Special Functions:** Use trigonometric functions not found in VIC's instruction set with this easy to use program.

* **Data and Function Plotting:** Plots any user supplied functions or data set with labels on the VIC printer.

Each program \$9.50
Complete MathPak \$49.50

Educational

- * U.S. Quiz Set
- * States of the Union
- * Revolutionary War Battles
- * Civil War Battles

This series of four tutorial programs helps teach important facts about U.S. History. Learn the who, when, where, and how long of two centuries of American Presidents. Learn when each state entered the Union, where it is, what its capital and population are. Learn about the battles of the Revolutionary and Civil wars that changed the course of history, when and where they were fought, who the commanding generals were, and who won!

Single \$8.00
Pack \$25.00

* Quiz Kit

Create your own quizzes with this handy quiz programming kit. Compile the questions and answers and the computer program does the rest. This flexible program allows you to design custom quiz sets for home or classroom use. A great way to teach or to study.

Price \$14.00

* Spelling Bee

I. You are the spelling bee, and

though that flower you nestle in looks beautiful, if you miss the word, it's deadly. The program contains a dictionary of often misspelled words for you to practice on.

II. Included on the same tape is an advanced version of the above program that allows teachers and parents to make their own lists of hard to spell words to use with this program.

Price \$12.50

Games & Entertainment

- * Road Rally
- * Wipeout
- * Hidden Code
- * Alien Descent
- * Labyrinth
- * Pods
- * Blackjack
- * Kaliedescope

Each \$7.00
Any three \$17.00

Color Sound Graphics

Order today or ask for our free catalogue;

MDS

47 Dearborn Pl. #18
Goleta, CA 93117

Please add \$1.50 for shipping. California residents add 6% sales tax.

VIC-20 is a Registered Trademark of Commodore Business Machines.

```

220 A%(C1,C2)=1
230 NEXTI
240 FORI=1TOK
250 GOSUB840
260 IFA%(C1,C2)<>0THEN250
270 A%(C1,C2)=2:KL(I)=C1:KL(I+3)=C2
280 NEXTI
290 GOSUB840
300 IFA%(C1,C2)<>0THEN290
310 A%(C1,C2)=3:E1=C1:E2=C2
320 PRINT:PRINT:PRINT"KLINGONS",K
330 PRINT:PRINT"TORPS",T
340 PRINT:PRINT"STARS",S
350 FORI=1T03000:NEXT
360 GOSUB860
370 PRINT:PRINT"ENTER YOUR COMMAND"
380 PRINT"1=MOVE 2=TORP 3=END"
390 TI$="000000"
400 INPUTC
410 IFTI$<"000015"THEN440
420 GOSUB1130
430 GOTO360
440 ONCGOTO470,580
450 PRINT">YOU SURRENDERED"
460 GOTO1420
470 PRINT:PRINT"ENTER DIRECTION,DISTANCE"

480 C1=E1:C2=E2:TI$="000000"
490 INPUTC,D
500 IFTI$<"000015"THEN530
510 GOSUB1130
520 GOTO350
530 IFC>8ORD>14THEN490

```

```

540 A%(E1,E2)=0:GOSUB670
550 E1=T1:E2=T2
560 IFA%(E1,E2)=1ORA%(E1,E2)=2THENPRINT">
HIT A STAR OR KLINGON":GOTO1420
570 A%(E1,E2)=3:GOTO360
580 IFT>0THENGOSUB1270
590 IFT>0ANDKC>K0THEN360
600 PRINT">NO MORE TORPS"
610 IFKC>1THEN640
620 PRINT">RAM LAST KLINGON"
630 GOTO470
640 PRINT">YOU'RE OUTNUMBERED"
650 PRINT">FEDERATION IS LOST"
660 GOTO1420
670 ONCGOTO690,700,710,720,730,740,750
680 U=-1:V=-1:GOTO760
690 U=-1:V=0:GOTO760
700 U=-1:V=1:GOTO760
710 U=0:V=1:GOTO760
720 U=1:V=1:GOTO760
730 U=1:V=0:GOTO760
740 U=1:V=-1:GOTO760
750 U=0:V=-1
760 FORI=1TOD
770 T1=C1+I*U:T2=C2+I*V
780 IFT1<1ORT1>10ORT2<1ORT2>10THEN820
790 IFA%(T1,T2)>0THEN830
800 NEXTI
810 GOTO830
820 T1=C1+(I-1)*U:T2=C2+(I-1)*V
830 RETURN
840 C1=INT(RND(1)*10+1):C2=INT(RND(1)*10+
1)

```



```

850 RETURN
860 PRINT:PRINT" *** SCAN ***"
870 PRINT:PRINT" ++++++"
880 FORI=1TO10
890 PRINT" +";
900 FORJ=1TO10
910 ONA%(I,J)+1GOTO940,960,980
920 PRINT"@";
930 GOTO990
940 PRINT" ";
950 GOTO990
960 PRINT"*";
970 GOTO990
980 PRINT"#";
990 NEXTJ
1000 ONIGOTO1020,1030,1040,1050,1060,1070,
1080
1010 GOTO1090
1020 PRINT"+ COURSE":GOTO1100
1030 PRINT"+":GOTO1100
1040 PRINT"+ 1":GOTO1100
1050 PRINT"+ 8 2":GOTO1100
1060 PRINT"+ 7 3":GOTO1100
1070 PRINT"+ 6 4":GOTO1100
1080 PRINT"+ 5":GOTO1100
1090 PRINT"+
1100 NEXTI
1110 PRINT" ++++++"
1120 RETURN
1130 FORM=1TOK
1140 C1=KL(M):C2=KL(M+3):D=14
1150 IFA%(C1,C2)=0THEN1210
1160 PRINT">KLINGON SHOOTING"
1170 FORC=1TO8
1180 GOSUB670
1190 IFA%(T1,T2)=3THEN1230
1200 NEXTC
1210 NEXTM
1220 GOTO1260
1230 H=H-1:IFH<0THEN650
1240 PRINT:PRINT">ENTERPRISE IS HIT"
1250 PRINTH"SHIELD UNITS LEFT"
1260 RETURN
1270 PRINT:PRINT"PHOTON TORP DIRECTION"
1280 TIS="000000"
1290 INPUTC
1300 IFTIS<"000015"THEN1330
1310 GOSUB1130
1320 GOTO1410
1330 C1=E1:C2=E2:T=T-1:D=14
1340 IFC>8THEN1270
1350 GOSUB670
1360 IFA%(T1,T2)<>2THEN1400
1370 A%(T1,T2)=0:KC=KC-1
1380 IFKC=0THENPRINT"> FEDERATION SAVED <"
:GOTO1420
1390 GOTO1410
1400 GOSUB1130
1410 RETURN
1420 PRINT:PRINT
1430 INPUT"ANOTHER GAME 1=YES";Z
1440 IFZ=1THEN120
1450 END

```

©

"Probably the best-documented programs I've seen for the PET/CBM."

- Robert Baker, Sept. 1981 KILOBAUD/Microcomputing

HESBAL : Assembler/editor for PET and VIC
 HESCOUNT, HESLISTER : Debugging tools for PET and VIC
 HESPLOT : Hi-res graphics subroutines for VIC
 HESCAT : Disk cataloging system for PET
 HESCOM : Exchange data, programs between PET and VIC

Also, many games for the VIC

**V
I
C**

Write today for your free catalog

HES

Human Engineered Software
 3748 Inglewood Blvd. Room 11
 Los Angeles, California 90066

(213) 398-7259
 24 HOURS

SOURCE ID:
 TCK308

PET, CBM, and VIC are trademarks of Commodore

Dealer Inquiries invited

Swirl And Scribble

Matt Giwer
Annandale, VA

Swirl produces extremely complex designs in Graphics 8 which have to be seen to be appreciated. These are not simple sinusoidal or trigonometric plots, but rather are of some artistic merit and may be suitable for logos, letterheads and the like.

The basis for these plots is the set of equations in lines 230 and 235. They arise from the study of modern control theory and are of interest in that a very small change in the two input constants, A and C, can produce a very large change in the shape and character of the plots. The program is easily adaptable to computers other than the Atari by simply plotting the values of X and Y as in line 250. The values of R and T merely center the plot on the screen.

On your first few plots you will notice that, for the first minute or so, the points will all be in a small area in the center. REM lines 2249 and 2250 show how to change line 250 to show this region. To get you started the 501 through 660 REM lines show pairs of values for A and C respectively.

A note of caution: since this uses Graphics 8+16, if the program should end, the display will go back to Graphics 0 and tell you that it is ready. This is why the I loop in line 215 is set to 3000. Although a few hundred would be more than enough to fill enough to fill the screen the extra hundreds hurt nothing and permit unexpected phone calls and the like.

Scribble

A computer program should be scaled to its users. Scribble is a simple program thrown together at the insistence of my six year old who remembered that our last computer had a built in game called scribbling. The Atari would never be up to his standards until there was a way to scribble on the screen. So in order to keep down the heated discussions as to which computer to hook up to the TV I threw this short program together. To my surprise this little program is held higher in his estimation than Star Raiders and is second only to his favorite sea serpent. I offer it here for your child's enjoyment.

To use, a joystick is inserted into position number one and this draws a line on the screen. Pushing the trigger erases the screen. No other

provision for operator interaction is made. Keeping it simple kept it popular.

Scribble

```
1 REM NAME SCRIBBLE
1100 GRAPHICS 5+16
1102 COLOR 1
1210 A=STICK(0)
1220 IF A=7 THEN X=X+1
1230 IF A=11 THEN X=X-1
1240 IF A=14 THEN Y=Y-1
1250 IF A=13 THEN Y=Y+1
1260 IF A=6 THEN X=X+1:Y=Y-1
1270 IF A=5 THEN X=X+1:Y=Y+1
1280 IF A=9 THEN X=X-1:Y=Y+1
1290 IF A=10 THEN X=X-1:Y=Y-1
1400 IF X<0 THEN X=0
1410 IF X>79 THEN X=79
1420 IF Y<0 THEN Y=0
1430 IF Y>47 THEN Y=47
1500 PLOT X,Y
1510 IF STRIG(0)=0 THEN GRAPHICS 5+16
1550 GOTO 1210
```

Swirl

```
50 GRAPHICS 0
80 ? :? :? :?
90 ? "INPUT A AND C :";
100 INPUT A,C
110 ? "A=";A;" C=";C
151 GRAPHICS 8+16:COLOR 1
152 R=150
153 T=85
154 SETCOLOR 2,1,0
155 SETCOLOR 1,4,13
170 X=1
180 Y=1
215 FOR I=1 TO 3000
220 S=X
230 X=A*Y+C**X+S***** (1-C)/(1+X**X)
235 Y=-S+C**X+2***** (1-C)/(1+X**X)
250 TRAP 315:PLOT X+R,Y+T:TRAP 40000
315 NEXT I
```



```

320 GOTO 220
330 END
501 REM 1.01,-1
502 REM 1.01,-.95
503 REM 1.01,-.92
504 REM VERY GOOD, BLACK HOLE 1.01,+0.8
505 REM 1.01,-.1
600 REM 1.0001,-2
601 REM A RANGE .999 AND .992; C RANGE -
2.0055 AND -1.9
650 REM 1.01,0
651 REM 1.008,+0.001<>-0.001
660 REM 1.008,+0.05<>-0.05
2249 REM TO SEE THE CENTER OF THESE PLOT
SCHANCE LINE 250 TO
2250 REM LINE 250 TRAP 315:PLOT X*10+R,Y
*10+T:TRAP 40000
4900 END
5000 GRAPHICS 0:LIST 1,330

```

©

COMPUTE!

The Resource.



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 and REACTION	Req. — 16K RAM/Cassette	9.95
		— 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

® Trademark of ATARI, Inc.



DIVISION OF CUSTOM ELECTRONICS, INC.
SOFTWARE

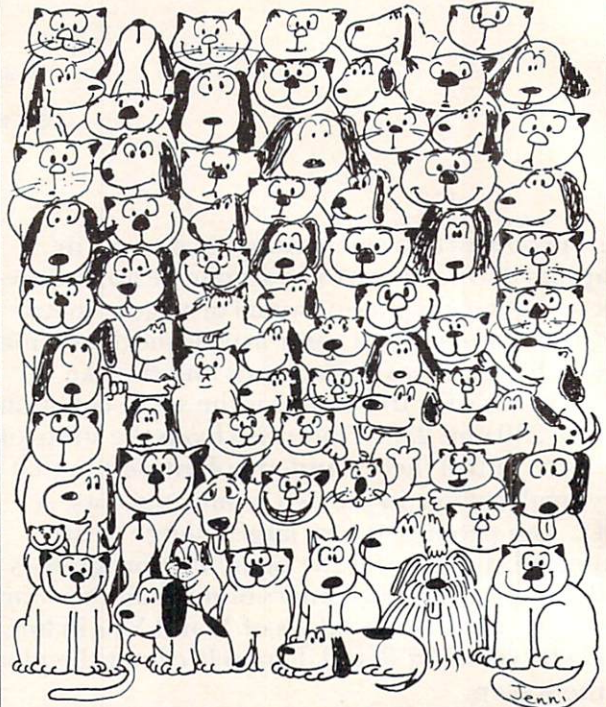
238 Exchange St., Chicopee, Massachusetts 01013
(413) 592-4761

Mastercard & VISA Accepted

• Dealer And Distributor Inquiries Invited

• Closed Mondays — Open Daily 'Til 5:30 — Fridays 'Til 8

Every PET Needs a Friend.



CURSOR™ is the best friend your Commodore PET will ever have. Since July, 1978 we have published 170 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 all the little things that help make using a computer a pleasure instead of a pain.

Naturally, **CURSOR** programs are technically excellent. Each program that we publish 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 four varieties of Commodore ROMs. All issues from #23 on also work on the 80 column CBM.

For only \$5.95 you can buy a sample issue and judge for yourself, or send \$20.00 and we'll mail you the four most recent issues of **CURSOR** (over 20 excellent programs for your PET). Each C-30 cassette tape includes five programs, a graphic Front Cover, ready to LOAD and RUN on your PET. VISA and Mastercard welcome.

Who knows? After your PET meets **CURSOR**, things may never be the same!

CURSOR is a trademark of The Code Works.

AUTHORIZED DISTRIBUTORS:

Great Britain
AUDIOGENIC, Ltd.
P.O. Box 88
Reading, Berkshire

Holland
COPYTRONICS
Bergemeester
Van Suchtelenstraat 46
7413 XP Deventer

Japan
SYSTEMS FORMULATE CORP.
Shin-Makicho Bldg. 1-8-17
Yaesu, Chuo-ku, Tokyo 103

Australasia
**MICROCOMPUTER
HOUSE, LTD.**
133 Regent Street
Chippendale, Sydney
N.S.W. Australia 2008

**THE
CODE
WORKS**

Box 550
Goleta, CA 93116
805-683-1585

WEBS

Loran Gruman
Burnsville, MN

Here is a one-player game for a 40-column PET [or an 80 column machine with the program in **COMPUTE!** #12, pg. 130 loaded — Ed.]. If your machine has sound, turn it on.

```

100 REM WEB WRITTEN 1980 BY LORAN G
    RUMAN 2300 SO SKYLINE DR. ~
    BURNSVILLE
110 REM MINNESOTA, 55337
120 POKE59467,0
130 PRINT"{CLEAR}{02 DOWN}{08 RIGHT
    RIGHT}{REV}WEB INSTRUCTION
    S:{OFF}"
140 PRINT"{02 DOWN}YOU ARE THE NUMB
    ER."
150 PRINT"KEEP THE MOVING NUMBER FR
    OM TOUCHING ANYWEB ON THE ~
    SCREEN."
160 PRINT"{DOWN}THE NUMBER IS CONTR
    OLLED BY PUSHING:
170 PRINT"{DOWN}{03 RIGHT}8=UP
    8"
180 PRINT"{03 RIGHT}4=LEFT
    B"
190 PRINT"{03 RIGHT}6=RIGHT
    4C5C6"
200 PRINT"{03 RIGHT}2=DOWN
    B"
210 PRINT"{03 RIGHT}5=STOP
    2"
220 PRINT"{DOWN}          TEN HITS A
    ND YOUR OUT.{DOWN}"
230 PRINT"{02 DOWN}{04 RIGHT}PUSH A
    NY KEY WHEN READY TO START
    "
240 GETK$:IFK$=""THEN240
250 PRINT"{CLEAR}":A=32768:F=49
260 R=INT(RND(1)*500)+1:Q=A+R
270 GETB$
280 IFB$="4"THENC=-1:S=1
290 IFB$="6"THENC=1:S=1
300 IFB$="8"THENC=-40:S=1
310 IFB$="2"THENC=40:S=1
320 IFB$="5"THENC=0:S=0
330 IFC=40ORC=-40THEN360
340 IFP+C>39ORP+C<0THENC=0:S=0:GOTO
    360
350 P=P+C
360 IFAA=ETHENE=INT(RND(1)*25)+1:I=
    TT:TT=INT(RND(1)*4)+1:AA=0
370 IFTT=1THENQ=Q+1
380 IFTT=2THENQ=Q-1
390 IFTT=3THENQ=Q-40
400 IFTT=4THENQ=Q+40
410 IFTT=4ANDI=3THENQ=Q+1
420 IFTT=3ANDI=4THENQ=Q-1
430 IFQ>33768THENTT=3:GOTO360
440 IFQ<32768THENTT=4:GOTO360
450 LETAA=AA+1
460 POKEQ,81
470 IFA+C>33767ORA+C<32768THENS=0:G
    OTO270
480 T=T+S:IFS<>0THEN GOSUB680
490 A=A+C
500 V=PEEK(A)
510 IFV<>32ANDDV<>FTHENN=1
520 IFV=FTHENN=1
530 IFC=0THENN=0
540 IFN=1THENGOSUB650
550 F=F+N:IFF=58THEN570
560 N=0:POKEA,F:GOTO270
570 PRINT"YOU SCORED A TOTAL OF";T
    {LEFT} ":PRINT:GOSUB690
580 PRINTTAB(30);"          ";
590 PRINT"
    {02 LEFT}{0
    2 UP}"
600 PRINT"DO YOU WISH TO PLAY AGAIN
    (Y/N)";
610 GETPG$:IFPG$=""THEN610
620 IFPG$="Y"THENCLR:GOTO250
630 IFPG$="N"THENPRINT"{CLEAR}THANK
    S FOR PLAYING ":END
640 IFPG$<>"Y"ORPG$<>"N"THEN610
650 POKE59466,0:POKE59467,16:POKE59
    466,15
660 FORNN=30TO90STEP6:POKE59464,NN:
    NEXT
670 POKE59467,0:RETURN
680 POKE59464,150:POKE59467,16:POKE
    59466,15:FORZ=1TO10:NEXT:P
    OKE59467,0:RETURN
690 POKE59466,0:POKE59467,16:POKE59
    466,51
700 FORNN=225TO120STEP-2:POKE59464,
    NN:NEXT:FORNN=120TO255STEP
    2
710 POKE59464,NN:NEXT:POKE59467,0:R
    ETURN

```


Review:

Votrax Type 'n Talk: TNT

Charles Brannon
Editorial Assistant

The concept of the Votrax Type 'n Talk speech synthesizer is simple: you send the device a word, and it pronounces it. For example, the command PRINT#1, "HELLO" would cause the Votrax to say "hello." This makes programming it simple and fun. Other synthesizers can require you to construct words from one or two letter *phonemes*, the simplest units of speech. For example, the word "hello" might be coded as: "H EH3 L O" or "[@X&." Yet another kind of synthesizer lets you send English words, but has a memorized vocabulary which is limited by memory size. What makes Votrax unique is the combination of ease-of-use and flexibility.

The voice is distinct and understandable, but it is obviously artificial. It sounds robotic, similar to the voice synthesizers found in many arcade and electronic pinball games. Both volume and frequency (pitch) can be adjusted with knobs. The voice sounds most natural at its lower frequency.

Built into the unit is a "text-to-speech" algorithm that converts English words into phonemes that can be pronounced by the device — no easy task. Considering the complexity of the English language, it is a remarkably good algorithm, permitting you to generate speech with straightforward PRINT statements. Its arbitrary methods can cause some problems. "COMPUTE!" sounds like "comput." "HELLO" sounds a bit slurred, "HUH LO" sounds better. It is sometimes necessary to intentionally misspell. "COMPUTE!" sounds excellent when spelled "COM PEWT." The space breaks longer words into distinct syllables. Some few words are tougher to generate; for example, MOUSE becomes "mus" (the *ous* is treated like the *ous* in *dangerous*). Spelling it MOWSE doesn't help; it comes out "mose" as in *most*. To solve any such problems you can also program speech directly with phonemes.

Is Votrax for you? It depends on the application. Votrax can be the basis for some fascinating dialogue games, such as ELIZA and Adventure. It

can liven up arcade games with threats, taunts, and warnings (We Are The MURLOD Invaders).

Voice synthesis is an alternate (superior?) man-machine interface; it can streamline business (can you imagine your computer saying "Please insert the Word Processing Disk?"). It would be of tremendous aid to the blind, where every character typed could be spoken and, when SPACE was pressed, the preceding word spoken.

Votrax can be attached to almost any computer, via an RS-232 interface. It can even be attached between the computer and another device, permitting data to be spoken automatically (CompuServe becomes TalkuServe?). Although a one-watt amplifier is built in, you must provide a speaker (eight-ohm).

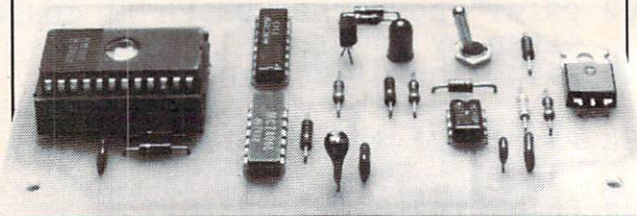
The significance of the Votrax Type 'n Talk is its text-to-speech routine. It permits beginners to use it immediately, and relieves professionals of the tedium of phoneme construction. The Votrax deserves its acronym — any device that can pack so much power into such a small box is truly TNT!

Votrax Division of Federal Screw Works
500 Stephenson Highway
Troy, Michigan 48084
\$375

©

EPROM PROGRAMMER

Shown assembled. EPROM not included.



For single supply 2516, 2716 & 2758 EPROMs. Connects through a user supplied interface to any computer system. Interfacing requires two 8-bit ports plus hand-shake lines. One of the ports must be software controllable for input or output. Timing is done via hardware, thus is independent of MPU clock rate. Verify erased. Program — entire or partial. Auto verify after programming. Transfer contents to RAM for modifying or duplicating.

Select Documentation for:

6502

6800

6809

8080/8085/Z80

Interface to:

6820 PIA or 6522 VIA

6820 PIA

6820 PIA

8255 PPI

Comprehensive documentation booklet contains schematic, instructions for construction, check-out and use, and a well commented assembly listing for the specified MPU.

Complete kit of parts (includes ZIF socket) \$ 45.00

Bare PC board and Documentation \$ 25.00

Software listings for additional MPUs

(with purchase of Kit or PC board) \$ 5.00

Ordering: Specify MPU. Add 5% for P&H. Overseas add 10%. Ariz. residents add 5% tax.



Micro Technical Products, Inc.

814 W. Keating Ave., Dept. M
Mesa, Arizona 85202 • 602-839-8902



Review:

Olympia's ES 100 KRO Typewriter/ Printer

Richard Mansfield
Assistant Editor

The ES100, one of a line of Olympia printer-typewriter combinations, can serve as an advanced, stand-alone typewriter with correction facilities or as a computer printer. It contains a built-in RS 232-C serial interface and will work with most personal computers. As one of the new "intelligent" typewriters, it operates somewhat differently from the venerable machines so common only a few years ago.

The first thing you notice is that very little is *mechanical* – you don't move margin stops, you simply set them with left and right margin keys. All keys are repeating, when used with the "repeat" key. Reverse vertical half-line spacing (for superscripts), choice of two pitches, reverse tabulation, CR without LF, and several line spacings are all key-selected. Unlike the older generation of electrics, most of the formatting and spacing is done from the keyboard. As when using a word processor, you can move around the page without taking your fingers from the keys.

Another feature of this latest generation of typewriters is their feel. They resemble a computer keyboard in layout, versatility, and touch. Instead of a direct mechanical relationship between a pressed key and struck paper, the keys simply click to let you know that they've been acknowledged by the system. The 96-character typewheel responds at 16 characters per second (if you could type that fast). This separation of the mechanical from the keyboard activities makes sense when the printing mechanism does not care whether it gets information from the keys or from a computer.

A green LED shows, on a numbered scale, the precise typing position. The value of some of these features might not be immediately obvious, but, in use, their utility becomes clear. The carriage return without line feed, for example, makes underlining easier. Reverse tabulation means that you don't

need to return to the left hand margin to access the tab stops – you can move left through the stops as well as tabbing right, the traditional direction.

Specifications

The typewriter stores functions in an accumulator with the margin release and tab settings "remembered" for 70 to 90 hours. A "correction memory" allows the revision of up to eight characters if the mistake is noticed at once. Depending on the platen size (13/15 inches) the printer supports a maximum paper width of 12.9/15.3 inches and a line length of 11.6/15.5 inches. The unit weighs 30.3/36.3 pounds.

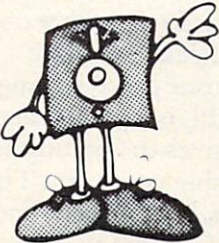
There are 92 characters on the keyboard and line spacing can be either 1, 1½, or double. Horizontal spacing (keyboard selected) is between ten and twelve characters per inch. A variety of typestyles are available on the printwheels and there are five types of ribbon cartridges (black, black/red, carbon, correctable film, or multi-strike).

Using a standard Type D 25 connector, the interface permits odd, even, or no parity bits and the data rate is jumper selectable between 110, 134.5, 150, or 300 baud.

There are a variety of "daisywheel" printers on the market. These printers feature excellent, crisp lettering and typefaces which are easily and quickly changed. The Olympia ES 100 KRO deserves to be considered even if the intent is simply to upgrade an older electric typewriter to the new generation of intelligent electrics. If you ever want computerized, full word processing – the purchase of one of the state-of-the-art electrics would make the transition painless.

Olympia USA, Inc.
Box 22
Somerville, NJ 08896
\$1680

©




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)592-5935 or
(805)543-1037



RPL: A FORTH Sequel?

Jim Butterfield
Toronto, Canada

RPL is a FORTH-related language produced by Samurai Software. There are versions for all PET/CBM machines, and it will fit in systems as small as 8K. It is similar to FORTH in many ways ... but there are fundamental differences.

RPL stands for Reverse Polish Language. This is the backwards-type of coding which calls for you to write $X + Y$ as $X Y +$ and $PRINT M$ as $M PRINT$. Owners of Hewlett-Packard calculators will be used to this kind of thing by now and, in fact, it makes good coding sense to do it this way.

Proprietary

Since RPL is a proprietary system, the language must be considered in a different category from FORTH, FORTRAN, or BASIC. It seems unlikely that competing RPL's would be generated by various sources, and RPL literature will be confined to a relatively small community of purchasers.

Timothy Stryker, the author of the language and compiler, has taken many of the characteristics of FORTH, rebuilding and reconceptualizing as he saw desirable. The result will not please FORTH traditionalists — it has a different style from FORTH — but it does form an interesting new language.

Faster? Simpler?

One-to-one comparisons of FORTH versus RPL programs shows that RPL fits in slightly less space and runs slightly faster. This is surprising, since FORTH is known for its compactness and high speed.

Savings in time and memory are achieved, at least in part, by reducing the generality of the language. FORTH works interactively with a user; each program module can be checked out the moment it is typed in, and the user can try things out as he builds his program. RPL is less interactive: the user writes code and then gives the command **COMPILE** to generate a runnable program. This allows RPL to be more efficient, but reduces user interaction; however, RPL has features to offset this problem during debugging.

Another reason for RPL's speed and compact-

ness is in the internal representation of the program. FORTH uses threaded code, where each "action" of a command is represented by a subroutine address; RPL uses p-code, with each action represented by a token value.

RPL has a streamlined vocabulary of operators; slightly over forty commands are implemented, and all are useful. This compares well with FORTH, which seems to the beginner to be cluttered up with hundreds of commands, many of which are seldom needed by the programmer. The commands are nicely chosen for newcomers; many closely parallel BASIC keywords.

PET/CBM owners will be pleased to see that their machine's characteristics are well supported by RPL. BASIC can co-exist with RPL, and file input/output capabilities are preserved. There's a danger, of course: Programs using "custom" features won't transport well to other computers.

SIM, a symbolic debugger, is sold as a separate package. It allows users to try out sequences of commands before writing them into a program. It has a nice way of presenting the stack visually which may help give users an intuitive feel for how RPL works.

Considerable documentation comes with RPL (60 pages) and SIM (12 pages). The material is nicely written and is quite well done; the approach is tutorial in nature and uses examples liberally.

We've been comparing RPL to FORTH because of the similarities in the languages. RPL deserves to be rated on its own merits.

It's not as easy as BASIC or as pretty as APL. But RPL is fast, compact, and relatively straightforward to program. Users will have to learn to cope with stacks and the backwards-like Reverse Polish Notation. It may take a particular mentality to get hot in an RPL-like language; but the payoff in efficiency can be very good.

*Samurai Software, P.O. Box 2902, Pompano Beach, FL 33062.
RPL Compiler, \$49.95 on disk, \$44.95 on cassette; Debugger
Compiler and Debugger are ordered together. Specify computer ROM
system and disk type.*

Review:

Ricochet

Richard Mansfield
Assistant Editor

An intriguing new game from Automated Simulations, Ricochet (for the Apple, Atari, or TRS-80) demonstrates why there is so much new interest in games. With the advent of the computer, suddenly there are entirely new categories of games: simulations, interactive adventure stories, exciting hybrids which combine the preplanning involved in traditional strategy games like chess with the visual, physical action of games like pinball.

Ricochet falls into the hybrid category; it has to be seen to be understood, but it's something of a combination of pool and checkers. Each player (you vs. the computer or you vs. a friend) has nine "bars" which initially appear in front of a set of "bumpers." The bars start out in a 4-3-2 pattern, guarding your bumpers, since your opponent can score points by landing in your bumpers.

There are two possible ways to react during your turn. You can change the arrangement of your bars or you can *launch* which sends a ball out from one of your corners ricocheting off walls, bars, and bumpers, and gaining points for each one hit. The ball continues to ricochet until it goes past a bumper into space or hits a corner launcher. Hitting a corner, aside from ringing up points, can render that particular launcher useless for the remainder of a game. You make your moves and launches either from the keyboard or with joysticks.

Broadly defined, the idea is to arrange your bars (which toggle between vertical and horizontal orientation, when hit) so that you best protect your bumpers and launchers. Likewise, you attempt to launch in such a way as to maximize the damage to your opponent.

A Smart Clock

Ricochet takes full advantage of the computer's ability to handle many variations of play. If you play against the computer, it can take on four distinct "personalities" each of which use different strategies. Beyond this, there are five variations of the game itself. In variant two, you can win extra

launches, and variant three adds two extra bumpers to each side. Variant five removes all the position markers from the playfield and it becomes more difficult to predict the ricochet effects of a launch.

If a player takes too much time planning or arranging his bars, a *smart clock* starts giving points to the opponent. It is smart because it determines how much is "too much time" by averaging the opponent's decision-making time. In effect, if you make your moves quickly, you force your opponent to move quickly too.

The game is "intelligent" in several senses. If you lose a game, the next game adds point value to your opponent's bumpers while your bumpers retain their original value. This evens things up since you will score more points when you hit the opponent's bumpers.

In the past few years, with computers becoming widely available in homes and game arcades, a variety of new types of games have appeared. Ricochet is an excellent example of this emerging art form.

Automated Simulations, Inc.
P.O. Box 4247
Mountain View, CA 94040
Apple, Atari, TRS-80. \$19.95

©

Memory Expansion Boards for the ATARI* Computer

Completely compatible with ATARI
hardware and software

No modifications necessary

Fully assembled and tested

User installable — simply plug it in

One year warranty

Gold connector tabs

16K Memory Board — \$49⁹⁵

32K Memory Board — \$124⁹⁵

Build Your Own Memory

16K board - no components — \$10⁰⁰

32K board - no components — \$30⁰⁰

Add \$2 Shipping & Handling per board

*ATARI is a trademark of Atari Inc.

Anderson Peripherals, Inc.

P.O. Box 629 • Richardson, TX 75080 • 214-231-6866

Review:

Atari Microsoft BASIC (Part I)

Jerry White
Levittown, NY

*Editor's Note: This review is in three parts. The second and third parts will appear in **COMPUTE!** April and May. — RTM*

Not long ago, the Atari Personal Computer owner had two programming alternatives: 8K Atari BASIC and Assembler Language. Now there are three versions of BASIC from which to choose, plus PILOT and PASCAL.

The most recent Basic on the market is called Atari Microsoft BASIC (AMSB). Those of you familiar with other versions of Microsoft will feel right at home with the Atari version. It is said to be the most powerful Microsoft of them all and will certainly make program conversion much easier. The manual provides all the information needed for converting from many other versions of BASIC including PET BASIC, Apple and Applesoft BASIC, Radio Shack Level II BASIC, and Atari 8K BASIC.

This series of articles is being written to help you decide if AMSB is for you. If the Atari is the only computer you've ever had, and 8K Atari BASIC is the only version you've ever used, you will need some specific comparisons to understand the advantages and disadvantages of using AMSB.

Disadvantages??? Yes, although AMSB provides dozens of advantages over 8K Atari BASIC, there are always two sides to every story. So let's get the bad news out of the way first.

The most obvious of the bad news is cost, about \$80.00. You'll also need at least 32K RAM and a disk drive since, as of this writing, AMSB is available only on diskette and requires 11,252 bytes more than 8K Atari BASIC. Since the language must load from disk, there's 40 seconds of boot and load time.

Some Tradeoffs

If you can live with the previously mentioned disadvantages, you'll surely find the power and flexibility of AMSB worth looking into. There are, however, a few other sacrifices that must be made by the 8K BASIC user. AMSB has no immediate

syntax error checking and permits only two abbreviations, ? = PRINT and != REM. Oh how I miss typing GR.0. You also must give up that unlimited length string in trade for string arrays. The 8K STICK, STRIG, PADDLE, and PTRIG commands are not included, but they are easily replaced with PEEK and POKE.

Now for the good news! Here are a few of the most significant advantages AMSB has to offer:

COMMAND PROVIDES...

AUTO	Automatic line numbering.
COMMON	Variable values are passed from one program run to another.
DEF	Define integer, single, and double precision.
DEL	Delete range of lines from program.
DIM	Three Dimensional Alpha/Numeric Arrays
ELSE	IF THEN ELSE decisions.
INSTR	Search for a small string within a larger string.
MOVE	MOVE a number of bytes from one area of memory to another.
OPTION	Reserve RAM for Assembler Routines, Player Missile Graphics, Redefined Character Sets.
PRINT	AT specified coordinates.
PRINT	(TAB) and (SPC) positioning.
PRINT	USING for formatting output such as right justified currency amounts.
RENUM	Renumber lines and references.
TIME	In 60ths of a second.
TIME\$	Current time in HH:MM:SS format.
TRON	Current line number trace display on.
	Turn off trace function.
VERIFY	Verify Program in memory with program on tape or disk.
WAIT	Loop until specified conditions exist.

Many commands are identical in both Atari BASICs. Some commands perform identical functions but are formatted differently. For example, 8K BASIC uses the XIO command for many useful functions. AMSB makes things easier to remember with commands like FILL, KILL, LOCK, MERGE, NAME, and UNLOCK. ASMB uses PLOT TO instead of DRAWTO, CLS instead of ?CHR\$(125), and SCRNS\$ instead of LOCATE.

Some of the other commands available in AMSB include AFTER, CLEAR STACK, EOF, ERL, ERR, ERROR, INKEY\$, LEFT\$, LINE INPUT, MID\$, ON ERROR, RANDOMIZE, SAVE with LOCK, STACK, and STRING(n,X\$).

One beautiful feature was added to the SOUND command. An optional fifth variable for duration has been added. The duration is a value of up to 255 JIFFIES (60ths of a second). Up to 25 SOUND commands may be stored on the STACK, eliminating the need for many time delay loops. AMSB can go on to calculations or display work while SOUND commands execute at previously specified intervals.

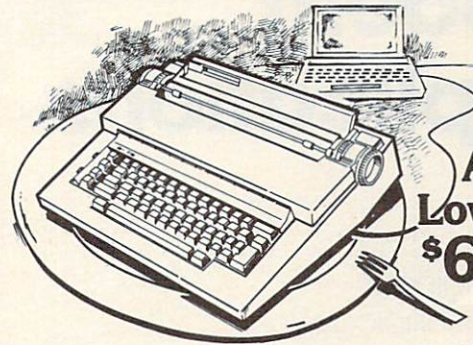
The ability to define integers allows floating point routines to be bypassed. This can account for significantly faster execution. How much faster, you ask? I'll get into speed comparisons and routine examples in part two of this series.

I Use All Three

Before closing this segment, I'd like to voice some of my own personal opinions. AMSB will certainly find its place in the rapidly growing Atari software market. Both the beginner and experienced programmer can benefit from the wide range of commands offered. The buyer should also be aware of another alternative called BASIC A+.

Anything you can do using AMSB can be done in 8K BASIC with occasional help from an Assembler subroutine. AMSB offers a great deal to the BASIC only programmer, but cannot be used by those with less than 32K RAM or without a disk drive. Personally, I've grown to really appreciate the amazing number of features Atari BASIC has squeezed into an 8K ROM cartridge. I've also learned to appreciate fast binary I/O and the DIR (Disk Directory) feature available in BASIC A+, as well as the speed made possible by the AMSB integer feature. They all have their advantages and disadvantages. Which one do I recommend you ask? I use all three. ©

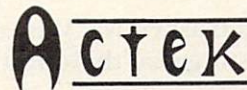
HAVE YOUR CAKE AND EAT IT TOO



As Low As \$690⁺

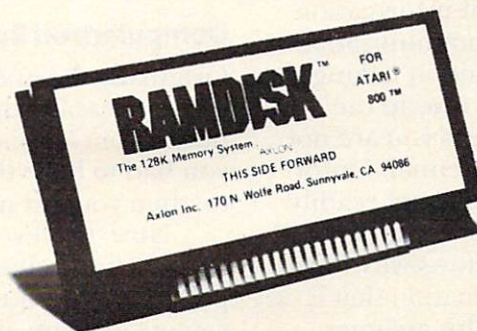
IT'S A PIECE OF CAKE TO CONNECT AN **Actek** TRIX I INTERFACE TO YOUR OLIVETTI PRAXIS 30 OR 35 CORRECTING ELECTRONIC TYPEWRITER. DAISY WHEEL QUALITY AT DOT MATRIX PRICES!

- 10+ CPS
- 15 MINUTE INSTALLATION
- HALF SPACE JUSTIFICATION
- CABLE REMOVES IN SECONDS
- TYPEWRITER FUNCT. UNIMPAIRED
- AVAILABLE NOW: ATARI & APPLE
- OTHER DIRECT CONNECTIONS AND RS232 AVAILABLE SOON
- PRINT AND PRINT #N OPERATE
- NO INTERFACE NEEDED: USES FRONT CONNECTOR - ATARI USES CONTROLLER PLUG - APPLE
- PRICE: \$215 - APPLE ADD \$10
- *BASED ON WARDS PR30 PRICE
- TYPEWRITER AND SERVICE WIDELY AVAILABLE



12225 SW 2nd/SUITE 200 -E
P.O.B. CCC
BEAVERTON, OR 97075

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.

TELECOMMUNICATIONS

Modem Applications

Michael E. Day
Chief Engineer
Edge Technology

*In **COMPUTE!**, September, 1981, #16, Mr. Day discussed technical specifications for MODEM's. Here he explores several uses for MODEM's in everyday computing. — The Editors*

One of the questions I am often asked is: "Why do I need a modem?" It is interesting that this question would be asked rather than just "Do I need a modem?" since this indicates several things. The need for the modem is already felt.

The feeling of the need for the modem comes about because of the large amount of information presented to the person about telecommunications both in magazines such as this one and in talking to other computer users. This tends to lead to the belief that if you do not have a modem you are not using your computer to its fullest potential. Unfortunately, the reasoning for this belief is not readily apparent. Analysis of the information generally presented on telecommunications shows why this is so. The most common type of information that is presented is of a technical nature. This assumes that you already know why you do or do not need a modem, and are simply after "how does it work" information. The other type of information that is presented is applications information. Again this assumes that you already know why the modem is needed, and that you are simply after the information on how to use it for a particular type of application.

The question *why* is one of the hardest of this type to answer. It cannot be answered directly. When you ask *why*, what you are really saying is give me more information so that I can decide if I really need it. The information that is normally provided is reference information with which you are familiar. In answer to "Why do I need a car?",

one might answer "In order to get to and from work." This provides a base point that you can expand upon to gain the information needed to determine how the car would fit into your lifestyle. A response could be "But I can take the bus." with a return of "But what if you work odd hours when the bus doesn't run?" This generates the pros and cons necessary to make a final decision.

The problem that we have with the modem is the same problem that the computer has experienced — a lack of readily discernible common reference points. In answer to why do I need a computer, the easily determined reference points tended to be rather weak, such as to balance your checkbook, or keep records of your gas mileage. Since these could be done far more cheaply with existing alternative methods, they hardly generate a decision in favor of the computer. The computer is slowly overcoming this problem by creating its own reference points. The computer is doing things that were not possible before (controlling heating and lighting to minimize utility bills, or writing letters (or magazine articles) with greater ease than ever before, even playing exciting new games and, as a side benefit, you can balance your checkbook too.

The modem is going through the same stage of development of use. It is a device that has entirely new uses and concepts that are not currently realized, and it must "create" these in our awareness so that they can be realized of their own accord.

Computerized Bulletin Boards

Originally the question was easy to answer, the modem was for the purpose of operating a computer from a remote location. If you had to do this, you had to have the modem. If you did not have to, then you did not need a modem.

Now, however, that use of the modem has been radically altered. With the advent of the personal computer we can put the computer at the remote location along with the user.

If you are only going to use the computer to play games or balance your checkbook, you probably don't need a modem. If you want to communicate with other computer users, however, there is a very good probability that, at some point, you will need a modem.

One of the new uses is the Computerized Bulletin Board Systems that appeared. These are public access message systems which can be used by anyone to post messages or read those left by others. These tend to be messages that don't fit into normal modes of communication and include calls for help, general notices of information, advertisements, classifieds, and personal messages. There is no charge for the use of these systems, they are

HUNTINGTON COMPUTING

Now Selling Atari®, PET®, TRS-80® Software

Atari®		
Compu-Math Decimals (disk)	\$39.95 now	\$35.14
Comp Magic Kayos (disk)	\$34.95 now	\$30.74
Ali Baba & 40 Thieves	\$32.95 now	\$28.94
Arcade - Ghost Hunter (cass.)	\$29.95 now	\$26.34
Arcade - Ghost Hunter (disk)	\$34.95 now	\$30.74
Comp Magic Kayos (cass.)	\$34.95 now	\$30.74
Epyx Crush Crumble Chomp (cassette or disk)	\$29.95 now	\$26.34
Creative ATC (cass.)	\$11.95 now	\$10.44
Mouskattack	\$39.95 now	\$35.14
The Next Step	\$39.95 now	\$35.14
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
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
Conflict 2500 (cass.)	\$15.00 now	\$12.74
Empire of the Overmind (disk)	\$35.00 now	\$29.44
Tanktics (cass.)	\$24.00 now	\$20.44
Atari® Mailing List (disk)	\$24.95 now	\$21.24
Atari® Character Generator (disk)	\$19.95 now	\$16.94
Text Wizard (disk)	\$99.95 now	\$84.44
Atari® Character Gen. (cass.)	\$15.95 now	\$13.54
Le Stick	\$39.95 now	\$33.94
Checker King (cass.)	\$19.95 now	\$16.94
MicroChess (cass.)	\$19.95 now	\$16.94
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
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	\$12.44
Tank Trap (cass.)	\$11.95 now	\$10.14
Tank Trap (disk)	\$14.95 now	\$12.44
Tari Trek (cass.)	\$11.95 now	\$10.14
QS Forth (disk)	\$79.95 now	\$67.94
Starbase Hyperion (disk)	\$22.95 now	\$19.44
Name That Song (cass.)	\$14.95 now	\$12.64
Jaw Breaker (disk)	\$29.95 now	\$25.44
Pornopoly (disk)	\$29.95 now	\$25.44
The Broker (CCI) (disk)	\$99.95 now	\$84.94
Super Modem Pak (CCI) (disk)	\$49.95 now	\$42.44
Atari® Snuff (CCI) (disk)	\$29.95 now	\$25.44
Utility Man (CCI) (disk)	\$99.95 now	\$84.94
Tanktics (cass.)	\$24.00 now	\$20.44
Fantasyland (disk)	\$59.95 now	\$50.94
Empire of the Overmind (cass.)	\$30.00 now	\$25.44
Bridge 2.0 (cass.)	\$17.95 now	\$15.24
Nominoes Jigsaw (cass.)	\$17.95 now	\$15.74
Intruder Alert (cass.)	\$16.95 now	\$14.84
Alpha Fighter (disk)	\$18.95 now	\$16.44
Compu-read (disk)	\$29.95 now	\$25.44
Letter Perfect (disk)	\$150.00 now	\$127.44
Sammy Sea Serpent (cass.) PDI	\$16.95 now	\$14.34
Cribbage (Thesis) (cass.)	\$15.00 now	\$13.54
Viscalc	\$200.00 now	\$149.00
Kross 'N Quotes PDI (cass.)	\$16.95 now	\$14.34
Star Raiders (cart.)	\$39.95 now	\$33.94
Stock Charting	\$24.95 now	\$21.14
Adventure International	10% - 15% off sug. retail	
Atari® Safari (CDS) (disk)		\$33.94
Atari® Safari (CDS) (cass.)		\$25.44
Computation (Thesis) (cass.)	\$15.00 now	\$13.94

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.)	\$15.00 now	\$12.77
Nukem (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

VIC SOFTWARE		
UMI Kiddie Checkers	\$7.95 now	\$6.87
UMI Star Wars	\$16.95 now	\$14.87
UMI AMOK	\$18.95 now	\$16.67
UMI Globber	\$29.95 now	\$21.87

ARTWORX		
Teacher s Pet (disk)	\$18.95 now	\$16.67
Teacher s Pet (cass.)	\$14.95 now	\$13.07
Vaults of Zurich (disk)	\$25.95 now	\$22.77

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 Apsahai (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		
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	\$153.97
Request (disk)	\$225.00 now	\$191.27
Thinker (disk)	\$495.00 now	\$426.77
Space Intruders (cass.)	\$19.95 now	\$16.97
All MICRO-ED	10% OFF List	
All Microcomputer Workshops	15% OFF List	

VIC SOFTWARE		
Aldocm Missile Commander	\$16.44	
Channel Vic Data Logger	13.16	
MMA Star Command	8.96	
TIS Basic Programming I	17.46	

Apple®

See full page of Apple® products elsewhere in this magazine.

Gorgon	\$39.95 now	\$33.99
Word Star	\$375.00 now	\$289.00
Mail Merge	\$125.00 now	\$106.19
Super Sort	\$200.00 now	\$169.99
VisiCalc 3.3	\$200.00 now	\$149.00
Wurble of Huntington Computing		\$19.99
Nibble Express	\$12.95 now	\$11.99
Soft Porn Adventure	\$29.95 now	\$25.39
Time Lord	\$29.95 now	\$25.39
French Hangman	\$29.95 now	\$25.39
Alicia-Sp. bilingual reader	\$29.95 now	\$25.39
H&H Stock Trader	\$190.00 now	\$161.49
Grow (CIA)	\$35.00 now	\$31.49
All Edu-Ware	10% to 15% OFF List	
VersaCalc	\$100.00 now	\$84.99
Hebrew	\$60.00 now	\$50.99
All Serendipity	10% to 15% OFF List	
All Sirius	15% OFF List	
All Sybex Courses	10% to 15% OFF List	
Win at the Races	\$39.95 now	\$33.99
Disk Prep	\$25.00 now	\$21.19
PIE Chip	\$60.00 now	\$50.99

We maintain a huge inventory of software for Apple® and hardware. Call us toll free 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.

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

ADVENTURE INTERNATIONAL		
Adv. 4-5-6 (disk)	\$39.95 now	\$35.08
Adv. 1-2-3 (disk)	\$39.95 now	\$35.08
Adv. 7-8-9 (disk)	\$39.95 now	\$35.08

ARTWORK		
Teacher s Pet (disk)	18.95 now	\$16.58
Nominoes Jigsaw (disk) color	\$21.95 now	\$19.28
Nominoes Jigsaw (cass.) color	\$17.95 now	\$15.78
Bridge 2.0 (cass.)	\$17.95 now	\$15.78
Hearts (disk)	\$19.95 now	\$17.48

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	\$25.38
SECS (COLOR) (cass.)	\$29.95 now	\$25.38

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	\$25.38
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
Pigskin (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 Automated Simulations	10% to 15% OFF List	
All Avalon Hill	10% to 15% OFF List	
All Hayden	10% to 15% OFF List	
All Microsoft	10% to 15% OFF List	

FOREIGN ORDERS

We regret that we can no longer accept checks (bank charges were sometimes greater than the amount of the check). We will gladly accept U.S. currency, VISA, MasterCard or American Express at no extra charge, or you may make direct wire transfers to our bank, Security Pacific, Corcoran, CA 93212, for a \$6.00 charge. All overseas orders are shipped by air.

VISCALC

Special for Pet®, Atari® & Apple®

Regular \$200.00 List

Now \$149.00

Order by Phone

800-344-5109

800-692-4146

In California

Great Grandma Huntington
Great Grandma Huntington always said to try harder - and we do. We will soon have tee shirts for sale with Great Grandma Huntington's picture on them. Watch for Granny!

HUNTINGTON COMPUTING

Post Office Box 1235
Corcoran, California 93212

Order by Phone 800-344-5109
In California 800-692-4146

Apple® is a registered trademark of Apple Computer, Inc.
Pet® is a registered trademark of Commodore.
TRS-80® is a registered trademark of Tandy Corp.
Atari® is a registered trademark of Atari, Inc.

(209) 992-5411



We take MasterCard, American Express 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.

wholly supported through donations and out-of-pocket expenses by the owners.

As an outgrowth of the BBS's are the remote computer systems and database systems. Although many of them are open to the general public, they are not readily usable due to the technical knowledge needed. Additionally, these systems tend to be very specific in the application to which they are oriented and are generally of little or no use to the general public.

Because the bulletin boards are privately supported, they are limited in the scope of services they can provide. For those who are willing to pay, there are more elaborate systems available. The most widely-known are Compuserve, The Source, and Micronet. These systems provide a wider range of services including message transfer, information retrieval (stock reports, news, etc.), conferencing, program storage and retrieval, and running programs.

Often there is a need to find information of a more extensive or technical nature than can be provided by the general services systems. This need is provided for by the technical information database systems. These systems are usually oriented around a particular subject area or group of areas. The technical data systems, by being very specific can carry a much wider range of information on a subject than is possible on a general information system. Because this information is also the most expensive to obtain, these systems are the most expensive to use. They can cost over \$100 an hour.

Multiuser Systems

Finally we come to the original multiuser computer systems, time-share computer systems. These systems are rented on a usage basis to anyone who needs a computer, but, for some reason, does not have a computer of his or her own available. These are generally used for overflow work, temporary, or occasional applications where it is not possible or practical to use one's own computer. The cost of using these systems can vary widely depending on how the usage is determined.

It is interesting that now that the personal computer has come into being, another application appears to be evolving. This can best be understood by describing the need that has been generated.

If you wish to say something to George who lives down the street, you could go to his house and speak to him directly, or you could call him up on the telephone and talk to him. In the first case there was no *equipment* involved in talking to George, you went to his house. This is *direct* communications. In the second instance you used the telephone to talk to him. Rather than expend the energy to go

to George, you used a device which allowed you to talk to George without actually going to his house and thus you were *communicating at a distance*.

If you and George both have a computer and you wish to share programs you have written, there are many ways this could be done. You could put a copy of the program on a cassette or floppy disk and give it to George to read into his computer. This works great if George has a similar computer and can read the tape or disk.

If the two systems are not compatible, another way will have to be found. One way that has been used a lot is for you to simply provide George with a written copy of the program and let him type it into his system. This isn't too bad if the program isn't very long and is in human-readable form. This is the way most magazines provide programs as it is the surest way to cover a wide range of computers. But, as mentioned, if the program is not in a human-readable form, or is excessively long, this method does not work very well.

Computers Talking To Computers

A method of communication that computer hobbyists have often used is to directly tie their computers *back to back*. This is a form of *direct communication*. This allows the computers to talk to each other, but has the disadvantage of requiring that both computers be next to each other. To date, it has also meant that the computer operator be fully knowledgeable of the way the computer internals work as well as the programming needed to allow the two computers to talk to each other. This can be a bit much for the general user and, in fact, has baffled quite a few experienced computer technicians.

The modem provides a common link that both computers can communicate through. By defining a standard of how the interconnection between the computers is to be accomplished, the problem of how to hook the two computers together is eliminated. What is occurring now is a definition of the method of communication between the computers. Although there are some communications programs in use already, they are currently machine-type dependent. An Apple can talk to another Apple, but it can't talk to an Altair. Most of the programs that are used to allow one computer to communicate to another are in the early stages of development: they allow the communication to occur, but there is little or no provision for options or alternatives. They tend to be very restrictive in their use.

As the need to communicate between different types of computers grows, the communications programs will become simultaneously more comprehensive and easier to use. ©

7 ATARI PRODUCTS



THE MONKEY WRENCH

The Monkey Wrench is a machine language ROM cartridge which extends the operating capability of the ATARI 800 computer. The Monkey Wrench provides 9 new BASIC commands. They are:

- Auto Line Numbering - Provides new line numbers when entering BASIC program lines.
- Delete Line Numbers - Removes a range of BASIC line numbers.
- Renumber - Renumbers BASIC's line numbers including internal references.
- Cursor Exchange - Allows usage of the cursor keys without holding down the CTRL key.
- Change Margins - Provides the capability to easily change the screen margins.
- Memory Test - Provides the capability to test RAM memory.
- Hex Conversion - Converts a hexadecimal number to a decimal number.
- Decimal Conversion - Converts a decimal number to a hexadecimal number.
- Monitor - Enter the machine language monitor. In addition to the BASIC commands, the Monkey Wrench also contains a machine language monitor with 15 commands used to interact with the powerful features of the 6502 microprocessor.

Cartridge and Manual - \$49.95

TYPING EXERCISE FOR ATARI

Typing Exercise is a great educational program for those who wish to improve their typing skills. Typing Exercise consists of two programs. TYPING 1 contains 13 typing drills; 9 drills progress thru alphabet and 4 thru numerics. TYPING 2 is a timed typing test. Time and words per minute are calculated for you.

810 Diskette - \$12.95

EPROM CARTRIDGE

The EPROM cartridge is a specially designed printed circuit board which will allow the user to install his or her own EPROM software. Uses 2716, 2532, 2732, type EPROMs

Cartridge and Manual - \$19.95

OTHER NICE STUFF

Atari 400 16K Memory	\$345.00
Atari 800 16K Memory	\$779.00
Commodore UIC-20 Computer	\$265.00
Syncom or Memorex 5 1/4" disks	10 for \$30.00
Mini-Flex disk File Case (holds 50 5 1/4" disks)	\$24.95
Ribbon Cartridge For Starwriter, Diablo, etc.	Mylar - \$6.00, Cloth - \$6.00
Starwriter 25 cps printer with tractors Parallel Interface	\$1645.00

MAE (Macro Assembler Editor)

MAE contains the most powerful 6502 assembler and test editor currently on the market. If you are looking for a professional development tool that can greatly increase the productivity of your programming staff, then MAE may be the answer. The following are just some of MAE's features - Write for detailed spec sheet:

- MAE was written entirely in machine language - not in Basic like some assemblers we know of.
- Thus you get very fast and accurate assemblies.
- Contains a machine language monitor with numerous commands for debugging machine code.
- 38 error codes, 27 commands, 26 pseudo ops, and 5 conditional assembly operators.
- Contains a word processor, example files, and learning aid.
- Requires at least 32K of memory.
- All commands oriented for disk operation with ATARI 810 disk drive.
- Macro, Conditional Assembly, and Interactive Assembly capability.
- Sorted Symbol Table.
- Optionally creates executable object code in memory or relocatable object code on disk.

810 Diskette and Manual - \$169.95 (requires license agreement)

MACRO ASSEMBLER AND TEXT EDITOR (ASSM/TED)

ASSM/TED is a high powered Macro assembler and text editor for use with ATARI 800 computers with at least 40K of memory.

- Written entirely in Machine Language - Not in Basic like some we know of. Thus you get very fast and accurate assemblies.
- 36 Error Codes, 26 Commands, 22 Pseudo ops.
- Macro and Conditional Assembly Capability.
- Input/Output of source files to cassette deck.
- Multiple source files on cassette may be assembled.
- Built-in machine language monitor.

Cassette and Manual - \$49.95
810 Diskette and Manual - \$53.95

MACHINE LANGUAGE MONITOR FOR ATARI

The Machine Language Monitor for ATARI provides 21 commands which allows the user the ability to interact with the 6502 microprocessor. It is compatible with ATARI BASIC and (once loaded) is ready for your use at anytime. The monitor comes on cassette or on diskette for the ATARI 810 disk.

Cassette version - \$24.95 Diskette version - \$29.95

MEMORY TEST FOR ATARI

When you purchase a new ATARI or add on new RAM modules, you need to be sure that the memory is working properly. Remember, you only have a short guarantee on your memory. Memory Test performs the most extensive memory check available.

Cassette and Manual - \$6.95

EASTERN HOUSE SOFTWARE

3239 Linda Drive

Winston-Salem, N.C. 27106 U.S.A.

Call Orders: (919) 924-2889



We Pay Postage on Prepaid
USA/Canada Orders. Add
\$7.50 to Cover Shipment Elsewhere



OLYMPIC SALES COMPANY

Apple Computer

LARGE INVENTORY LOWER-THAN-EVER PRICES

NEW APPLE FAMILY SYSTEM

- * 48K Apple II +
- * Disk w/controller
- * RF Modulator
- * 7 Personal & game disks

Retail: \$2495.00
Call for BEST Price!



WE ALSO CARRY SOFTWARE!

Personal Software: Innovative, Peach Tree Software, American Microsoft, Micropro and more.

Just some of the software in stock NOW - Magic Window, Raster Blaster, Ultima, Home \$ Minder, Tax Preparer, Pool 1.5, Typing Tutor, Olympic Decathlon, ABM, Robot War, Castle Wolfenstein, Cranston Manor, Excelsior, O-O Topos, Cyborg, Gorgon, Falcons, Wizardry, Personal Filing System, PFS: Report, Flight Simulator...

Texas Instruments Home Computer

New-1982 Model with full typewriter-style keyboard, TI-99/4A U/L case & more!
Retail: \$950.00
Your Cost: \$369.95!



10" color monitor for 99/4	650.00	319.95
32K Exp. mem. module	339.95	314.95
Extended Basic, a MUST for 32K module	100.00	75.00
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

We carry a large inventory of software, & accessories

HEWLETT PACKARD

HP-11C Advanced Programmable Scientific LCD Retail: \$130.00
Your Cost: \$114.95

HP-12C Advanced Programmable Financial LCD Retail: \$150.00
Your Cost: \$129.95

HP-125 New Microcomputer 64K CPU/Terminal/Keyboard
Retail Your Cost
3750.00 3195.00

HP-85 Microcomputer - built-in printer/monitor
3250.00 2499.00

HP-83 Microcom - built-in mon
2250.00 1799.00

HP-2631B Printer, dot mtrix
3950.00 3199.00

HP-82905A 80 col printer
945.00 755.00

HP-2601A Letter quality prtr
3495.00 3495.00

HP-82901M Dual master
2500.00 1999.00

Graphics plotter 7225
2450.00 2089.00

Personality module - a must for 7225
750.00 636.00

Graphics Table 9111A
2050.00 1699.00

HP-41CV
325.00 258.00

Card Reader for 41CV
215.00 171.00

Printer for 41CV
385.00 294.00

Quad Ram
95.00 84.95

Optical Wand for 41CV
125.00 99.95

HP-41C Calculator
250.00 188.95

Memory mod. for 41C
26.95

HP-97 Progmbile printer
750.00 579.95

HP-34C Progmbile scientific
150.00 117.95

HP-38C Progmbile business R/E
150.00 119.95

HP-32E Advanced scientific
55.00 48.95

HP-37E Business management
75.00 58.95

We carry a complete inventory of Libraries, accessories & supplies.

Mattel 1670 Race Horse Computer
Ret. \$125.00 Y/C: \$24.95

ATARI Programmable Color TV Game
Retail: \$225.00
Video Console: \$137.95

Intellivision
Retail: \$325.00
Your Cost: \$234.95

VIDEO TAPES
Min order: 3, mixed OK

SONY L500 2 hr \$11.89

SONY L750 3 hr 14.69

RCA VK250 6 hr 13.95

TEXAS INSTRUMENTS
Retail You Pay

TI-59 295.00 179.95

TI-3011 LCD Stu Slide/NEW 18.95

TI-355P LCD Sci 22.50

TI-40 LCD Sci/NEW 28.95

Bus. Anal. I 19.95

Bus. Anal. II 44.95

Bus. Card 39.95

Invest. Analyst 64.95

TI-54 Adv. LCS Sci/NEW 39.95

TI-5511 NEW 44.95

TI-57 Prog. Sci 39.95

TI-58C 480 Step. Prog. 89.95

PC-100C Print/Plot 148.95

LCD-Programmer/NEW 59.95

Main Showroom & Offices:
216 South Oxford Avenue
Los Angeles, CA 90004

WE HONOR
VISA AND MASTERCARD

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

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.

EPSON PRINTERS Retail: Your Cost

MX80 645.00 499.00

Optional Graftrax Chip 80 95.00

MX80 FT 745.00 599.00

MX100 995.00 749.00

DIABLO 630 PAPER TIGER PRINTERS

Letter Quality 460 995.00 895.00

460G graphics 1094.00 969.95

daisy wheel 560 1295.00 1099.00

w/tractors 560G graphics 1394.00 1195.00

Retail: \$3395.00 445 795.00 695.00

Y/C: \$2595.00 445G 894.00 789.00

SANYO MONITORS High resolution

13" Color (new) high quality 550.00 419.95

12" Green phosphorus 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

OHIO SCIENTIFIC

Professional Computers Retail Your Cost
C8PDF-48K 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!

Machine Language: Loops And Quality

Jim Butterfield
Toronto, Canada

Program loops seem to be a byproduct of laziness. When a programmer tires of writing a series of instructions, he produces a loop to save coding time and processor memory. Yet something more profound happens at the same time: the program usually becomes more generalized.

Suppose I wanted to place the value hexadecimal 20 into locations \$8000 to \$8027. My first instinct is to code: LDA #\$20 : STA \$8000 : STA \$8001 : STA \$8002 ... and so on. Around the time I reach \$800B, it will probably occur to me that I'm writing a lot of essentially similar code. Creative sloth comes into play. I observe that the repeated instruction is STA \$something. Racking my brains, I decide that if I could vary the "something" part, I could then do most of the job with a variable instruction.

"Indexing!", I cry, and proceed to tear up the old sheets and code LDX #\$00: LDA #\$20: (loop) STA \$8000,X: INX: CPX #\$28: BNE (loop). This drops coding to six instructions instead of forty-one and memory usage to twelve bytes instead of one hundred and twenty-two; but the running time increases from 162 to 443 microseconds. There's no use crying over spilt microseconds: the time difference is less than a three-thousandth of a second, and I'll usually happily take it rather than a case of writer's cramp.

But something more important has happened than just mechanics. If I want to convert my first ("hard way") program so that it stored into 64 locations, or stored to address \$0400 and up, I have no choice but to rewrite. On the second program which uses loops, it's a snap. A mere stroke of the coding pen, a one or two byte change, and the job's done. We've somehow created a program that's more general and more applicable to a range of tasks.

As we consolidate our program, we have to generalize. And as we generalize, we not only

shorten the code: we create sturdier and more broadly applicable code.

A word to those picky bit-and-microsecond counters who will point out that we could save two bytes and a few dozen microseconds by starting our index X at 39 and counting it down to zero. Sure you can. But that kind of picking is not what makes sounder code. We want to look for methods that generalize; they are the ones that will produce sturdy and reliable code ... and perhaps save us a few coding lines and bytes.

A Larger Scale

The same ideas apply to coding that repeats several lines. When you find yourself writing the same code, look for a generalization. Take these two sets of coding:

ONE	LDX	#\$09	ZRO	LDX	#\$06
	PHA			PHA	
ONE1	BIT	CLKRDI	ZRO1	BIT	CLKRDI
	BPL	ONE1		BPL	ZRO1
	LDA	#126		LDA	#195
	STA	CLKIT		STA	CLKIT
	LDA	#\$A7		LDA	#\$A7
	STA	SBD		STA	SBD
	

The above subroutines are from the tape write program of the KIM. ONE writes a logic 1 to tape; ZRO writes a logic 0 to tape. They are very similar. The only differences are: nine versus six on the first line, and 126 versus 195 on the fifth line. How might we consolidate these two pieces of program?

At the moment, the Y register doesn't seem to be used. We could ask the calling routine to set Y to zero or one, depending on whether we wanted to call ZRO or ONE activities; and then write a common routine:

ZONE	LDX	TABLE,Y
	PHA	
ZONE1	BIT	CLKRDI
	BPL	ZONE1
	LDA	TIMING,Y
	STA	CLKIT
	...	...etc.

We have now consolidated the two routines. The values 6 and 9 which count the number of cycles in each signal are now stored in a table TABLE. The values 126 and 195 which set the timing of each cycle are in a second table TIMING.

Have we accomplished anything other than saving a few bytes of code? Yes, almost accidentally. Now that the number of cycles are stored neatly in a table, we can easily adjust them to change the type of signal we write. In fact, this particular coding was part of the sequence that led to the introduction of the high speed tape format known as Hypertape.

Deeper...

The programmer doesn't always have free registers,

of course; but the methodology of saving registers isn't hard to do.

Where addresses within a program change from routine to routine, the best way to handle this is via indirect addresses. If program 1 searches table 1, and program 2 searches table 2 and so forth, indirect address.

Consider: if you have written a game with planes and tanks moving around the screen, you may find that, with a little work, a single subroutine can move both craft around. Once you have generalized, all sorts of bonuses arrive: the bombs and shells can likely be folded into the same subroutine. Collisions and other effects can now be handled in their generalized form rather than as special coding (did a bomb hit a shell? did a plane hit a bomb? did a shell go off screen? etc...)

What seems to start out as laziness or convenience develops into something more important. In reaching for the general solution, we write much better code.

Many programmers often find themselves very pleased with a program they have written; it seems "good" to them, although they don't know exactly why. It's usually because they have solved more than the specific problem — they have solved a whole class of problems. ©

VIGIL

PET/CBM

Exciting, new games interactive language.

- Easy to learn with 60 powerful commands
- Double density graphics, large number display, sound
- 9 complete programs including Breakout, SpaceWar, Anti, U.F.O., Maze
- PET/CBM version for OLD/NEW/4.0 ROMs and 8K of memory
- VIC version has color and enhanced sound (req. 3K memory expander)
- Comprehensive 50 page manual

	U.S. & CANADA FOREIGN
VIGIL for PET/VIC w/9 games on cassette (diskette add \$3.00).....	\$40 \$12 \$30
VIGIL User's Manual (refundable with software order).....	\$10 \$25

TINY BASIC COMPILER - PET

A true compiler that turns your BASIC program into fast machine code

- Subset of PET BASIC compiles to 6502 machine code. Req. only 8K memory
- Has full floating point capabilities and functions
- Compiler listing available with 16K version (included)
- Can load compiled machine code anywhere in memory
- On cassette (add \$3.00 for diskette)

	U.S. & CANADA FOREIGN
TINY Basic Compiler OLD/NEW/4.0 ROMS/8032 with 8K memory.....	\$25 \$30
TINY Basic User's Manual (refundable with software order).....	\$ 5 \$ 7

PET & APPLE II USERS TINY PASCAL

Structured language alternative to BASIC for PET or APPLE II includes

- LINE EDITOR - creates, modifies and maintains source language
- COMPILER - converts your source to an executable P-code format
- INTERPRETER - executes compiled P-code. Features built-in TRACE
- CASE-OF, WHILE-DO, IF-THEN-ELSE, REPEAT-UNTIL, FOR-TODOWN-TO, PROC, FUNC
- Graphics version has more: GRAPHICS, PLOT, POINT, TEXT, INKEY, ABS, SQR
- APPLE II has lores & hires-COLOR, HGRAPHICS, HCOLOR, HPOINT, PDL and TONE

	U.S. & CANADA FOREIGN
TINY Pascal PLUS - GRAPHICS PET 32K NEW/4.0 ROMS/8032/diskette.....	\$50 \$55
TINY Pascal PLUS - GRAPHICS APPLE II 48K and DOS 3.2/3.3.....	\$50 \$55
TINY Pascal NON-GRAPHICS PET 16K/32K NEW/4.0 ROMS diskette.....	\$35 \$40
TINY Pascal NON-GRAPHICS PET 16K/32K NEW/4.0 ROMS cassette.....	\$40 \$45
TINY Pascal User's Manual (refundable with software order).....	\$10 \$12
TINY Pascal 6502 Interpreter Listing GRAPHICS version.....	\$25 \$30

PIPER-THE MUSIC MACHINE

Here's the simplest way yet to compose, conduct and play music on your VIC/PET. Complete music capability — play all note values, list and edit your music, easily handles repeats and rests. Written in fast machine language. Includes sample compositions and manual. VIC version does not require additional memory. PET version requires external CB2 speaker.

	U.S. & CANADA FOREIGN
PIPER of PET/VIC on cassette (add \$3.00 for diskette).....	\$25 \$30
PIPER User's Manual (refundable with software order).....	\$ 5 \$ 7
PIPER 6502 Assembly Listing.....	\$25 \$30

PET MACHINE LANGUAGE GUIDE

Now in its ninth printing. Learn the hidden talents of your OLD, NEW or 4.0 ROM PET/CBM with this easy to follow manual. Details 30 of the PET's builtin routines, U.S. & CANADA FOREIGN

	U.S. & CANADA FOREIGN
PET MACHINE LANGUAGE GUIDE for OLD, NEW or 4.0 ROMS.....	\$9 \$11

Orders prepaid in U.S. Dollars, VISA, MC, ACCESS, etc. Prices include postage.

ABACUS SOFTWARE
 P. O. Box 7211
 Grand Rapids, Michigan 49510

VISA
 MC

616 / 241-5510

Teach your Commodore to use the telephone.

Telecommunicate with McTerm

Don't miss out on the computer/telephone revolution. With our McTerm package and a modem, your Commodore becomes an *intelligent* terminal. You can interact with large and small computers anywhere in the world.

Access databases like the Source™, or MicroNet™, or Dow Jones for up-to-the minute news, sports, stock market reports, etc. Write programs on your micro and run them on distant mainframes.

McTerm actually saves you money and time while you use it. There's no need to read data line-by-line as you receive it. Instead, you can quickly save it all to disk or printer and sign-off. You save on expensive computer time *and* long distance phone rates.

McTerm sends and receives faster than anything else on the market — up to 1200 baud. Adjustable duplex, echo, and parity. Runs on any Commodore with Basic after version 1.0. Works with most RS-232 modems and supports auto dial.



McTerm connects you with the rest of the world.

Madison Computer, 1825 Monroe, Madison, WI 53711 USA. 608-255-5552

INSIGHT: ATARI

Bill Wilkinson
Optimized Systems Software

Good news! I have finally found out how and where you will be able to obtain copies of *De Re Atari* ... and it won't even cost you your left thumb. The Atari Program Exchange now has it available for \$19.95 plus shipping. The part number for it is APX-90008, and you can order it through 800-538-1862 (800-672-1850 in California). There are several changes and improvements from earlier versions, including a section on the GTIA. One disappointment is that an appendix on random access files has been deleted. Oh well, leaves room for me to do a future article.

The How and Why articles on Atari BASIC that appeared in the last two issues were the result of requests for ways of "hooking into" BASIC, in order to add commands, etc. I am trying to gently break the news that you *can't* add commands to a RUNning program (though direct, keyboard commands can be done by intercepting keyboard input, as I presume the Eastern House "Monkey Wrench" does.). But I have been trying to lead up to *why* you can't add commands, so that people won't waste time on false leads in trying to prove me wrong.

However, I am suspending the How and Why series this month in order to take a look at the USR function. It is my belief that the USR function will give most of you access to all the added commands you could write, which lessens somewhat the impact of not being able to integrate your own commands. In addition to some suggestions on usage, this month we implement a really powerful USR function: one which will play a song (or most any kind of sound) in the background while your BASIC program continues to chug away (zapping Klingons, etc.). Naturally, there will also be the usual mix of tricks, etc.

In order to deliver on my promise to the BASIC users regarding the song-playing USR function, I must first lead the assembly language fanatics through a short intro to the Atari's interrupt system. As far as I know, the Atari is the only low-end personal computer that gives you such complete access to a fully-integrated, usable interrupt system. The Atari OS is structured to take advantage of several of these interrupts; and, more importantly, the user is invited to gain full or partial control of most interrupt routines. This despite the fact that Atari's interrupt service routines are in ROM.

The 6502 microprocessor supports two types of interrupts: NMI (Non-Maskable Interrupt) and

IRQ (Interrupt ReQuest). A bit in the CPU status byte controls whether IRQ's will generate interrupts, but if an NMI signal is presented to it the 6502 will always call in interrupt service routine. Atari, however, allows the user to prevent NMI's from reaching the CPU (except for the RESET button), thus giving even greater control. Once again, I must refer you to the Atari Technical Manual for full details, but herewith is a summary of the available interrupts.

Table 1. Available Interrupts

Type	Description
NMI	Reset Button (the only uncontrollable interrupt)
NMI	Display List Interrupt
NMI	Vertical Blank Interrupt (60 times per second)
IRQ	BREAK key
IRQ	any other key
IRQ	Serial Input (for SIO communication with disk, etc.)
IRQ	Serial Output (ditto)
IRQ	Serial Transmission Completed (ditto)
IRQ	Timer #4
IRQ	Timer #2
IRQ	Timer #1
IRQ	6520 parallel port "A"
IRQ	6520 parallel port "B"
IRQ	BRK instruction encountered (internal to 6502)

Each of the available interrupts, except the Reset Button and the BREAK key (and Timer #4 on all except newest machines), has a vector (two byte pointer) through RAM. To take control of an interrupt, simply put the address of your routine in the vector, and OS will call you instead of the default routine. The only exception is the Vertical Blank Interrupt, which is handled slightly differently and is the real subject of this article.

The Vertical Blank Interrupt (VBI) is really the key to many of Atari's unique features. It occurs 60 times per second, at the bottom of each scan of the TV screen, and is used by the OS ROMs to do all sorts of things. First, and perhaps most obvious, it drives the three-byte clock at locations \$12,\$13,\$14 (18,19,20 decimal) as well as several other usable event timers (e.g., serial bus timeout), most of which are accessible to the user. Second, and most useful, it allows changes to the graphics-related hardware at a time when nothing is being displayed on the screen: it moves all the "shadow" locations (see the technical manual) to their corresponding hardware ports.

Of necessity, then, the user would not normally want to interfere with the operations of the VBI routines. But, once again, the Atari software design team thought ahead: they provided not one, but two, VBI vectors. Thus, upon receipt of a VBI request, the ROM code first calls the routine pointed

to by vector VVBLKI (at \$0222) and then calls via the vector VVBLKD (at \$0224). The 'I' and 'D' stand for "Immediate" and "Deferred," respectively.

Normally, the user routine would not replace the vector at VVBLKI. Thus the Atari ROM code can update its clocks and move its "shadow" registers in confidence that it will finish its job before the screen starts displaying the next TV frame.

The user may replace VVBLKD to cause his routine to execute directly after the Atari system code.

Some cautions are in order:

(1) Disaster will strike if your VBI routine is not done before the next VBI occurs. If you simply need to synchronize your routine to a vertical blank, just wait for the system clock to tick before starting (see the label WAITVB in this month's example program).
 (2) As with most Atari vectors, the safest way to use these is to move them somewhere in your own data area, replace them with your pointer, and have your code finish up by jumping back via the original Atari routine. This is particularly important to do with interrupt handlers, else the interrupt system may not be properly reset.

Finally, let me note that you may, if you really have to, steal the entire VBI processing for yourself. This is not necessarily bad (especially if you are writing a dedicated game, etc.), but be forewarned that you will have to worry about shadow registers, etc., yourself. There is a lot more to this subject, including what Atari refers to as time-critical I/O, but for most purposes you should be able to work within the rules I have outlined.

A Real, Live Example

The example program this month is designed to be used via `USR` from BASIC, but there is a simplified entry point from assembly language. You could lift this program as is and plunk it into any assembled game, etc. The idea behind the program is simple: a routine is passed a sequence of bytes which are interpreted to be commands to the sound genera-

tors of the Atari hardware. The routine examines the bytes and performs the requests. One of the available requests is to "play" sound(s) for a specified length of time; upon encountering this request, the routine waits the appropriate time before processing the next byte. Simple.

Except that this routine will operate (invisible to a running BASIC program) merrily playing

Main Assembly Listing

```

0000      1000      .PAGE "      equates, origins, etc."
          1010      ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
          1020      ;
          1030      ; PLAYIT  -- a demonstration of performing
          1040      ;          clocked, interrupt-driven
          1050      ;          tasks under Atari OS.
          1060      ;
          1070      ; Written by Bill Wilkinson
          1080      ;   for March, 1982, COMPUTE!
          1090      ;
          1100      ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
          1110      ;
0600      1120      ORIGIN =   $0600
0000      1130      * =   ORIGIN
          1140      ;
00FF      1150      LOW   =   $FF
0100      1160      HIGH  =   $100
          1170      ;
D200      1180      AUDF1 =   $D200      ; Frequency, audio channel 1 (sound
          0)
D201      1190      AUDC1 =   $D201      ; Channel 1 control & volume
          1200      ;
0224      1210      VVBLKD =   $0224      ; Delayed Vertical Blank routine
          1220      ;
0014      1230      CLOCKLSB = $14        ; the system clock, LSB of 3
          1240      ;
00CE      1250      PLAYADDR = $00CE     ; 2 byte pointer in safe place
          1260      ;
          1270      ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
          1280      ;
          1290      ; Equates for our private sound commands
          1300      ;
00FF      1310      CMDR  =   255        ; Repeat
00FE      1320      CMDS  =   254        ; Stop sound (keep routine going)
00FD      1330      CMON  =   253        ; Number of voices
00FC      1340      CMTV  =   252        ; set Tone and Volume
0000      1350      CMDE  =   0          ; End (but sound not turned off)
          1360      ;

0600      1370      .PAGE "      install our PLAYIT routine "
          1380      ;
          1390      ; INSTALL is the entry point called from BASIC
          1400      ;
          1410      ; The BASIC program calls us via
          1420      ;   USR( INSTALL, ADR(playit-command-string) )
          1430      ;
          1440      ; The routine may be called from
          1450      ;   assembly language at INSTALL1
          1460      ;   by placing the address of the
          1470      ;   command string in A,Y (LSB,MSB)
          1480      ;
          1490      INSTALL
0600 68      1500      PLA          ; BASIC tells us how many parameters
0601 C901      1510      CMP   #1      ; better just have one!
0603 D0FE      1520      GOOF  BNE  GOOF  ; else only RESET will get him out!
0605 68      1530      PLA          ;
0606 A8      1540      TAY          ; MSB to Y register
0607 68      1550      PLA          ; LSB to A register
          1560      ;
0608      1570      INSTALL1 = *        ; assembly language entry point
          1580      ;
          1590      ; first, we wait for a vertical blank
          1600      ; ...to ensure we don't get a VBLANK
          1610      ;   interrupt while we are working!
          1620      ;
0608 A614      1630      LD   X, CLOCKLSB
          1640      WAITVB
060A E414      1650      CP   X, CLOCKLSB ; has clock ticked?
060C F0FC      1660      BEQ  WAITVB     ; no...keep waiting
          1670      ;
          1680      ; OKAY TO PROCEED
          1690      ;
060E 85CE      1700      STA  PLAYADDR ; we preempted a zero page spot

```

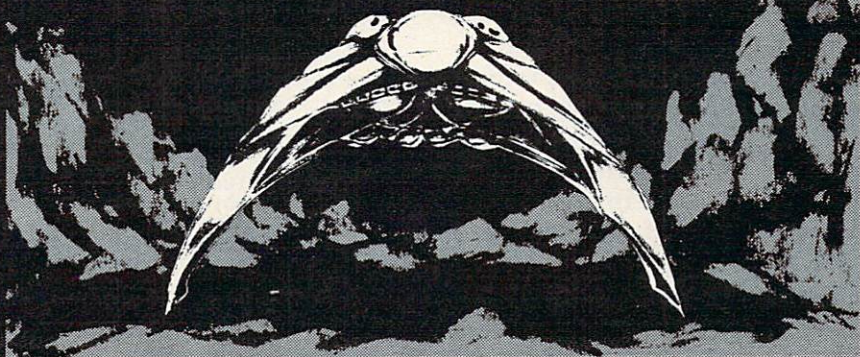

along while BASIC continues what it is doing. To accomplish this, we have hooked into VVBLKD (as described above). The user specifies the note duration as a number of "jiffies" (60ths of a second), and we let the VBI count down the duration for us.

The commands are imbedded in a string of bytes passed to the routine. Playit recognizes six command types, as shown in Table 2. Playit is not particularly sophisticated. For example, all voices must play sounds for the same duration and, when chang-

Table 2. Playit Command Codes

Byte value	Name	Description
255 (\$FF)	CMDR	Repeat the entire sound command string
254 (\$FE)	CMDS	Stop all sounds (do not end command string)
253 (\$FD)	CMDN	Number of voices is specified in next byte (0-4)
252 (\$FC)	CMDTV	Specify Tone and Volume (as in SOUND 0,freq, TONE,VOLUME). Must be followed by 0-4 bytes (one per each voice as specified by CMDN), each of which specifies a Tone/Volume for one channel.
0 (\$00)	CMDE	End command, unhook from VVBLKD. Does not turn off sound, so is usually preceded by CMDS.
any other	---	Any other value is assumed to be a duration, given in 'jiffies' (60ths of a second). Must be followed by 0-4 bytes (one per voice as specified by CMDN), each of which specifies the frequency of the sound for one channel (as in SOUND 0,FREQ, tone, volume).

SPRING SALE



CAVERNS OF MARS

ATARI APX

The surface of Mars is barren and rubble strewn, but beneath it lies a challenge only the brave and skillful dare undertake. Deep within the Red Planet lies the nerve center of the Martian's stronghold, protected by layer upon layer of the most ingenious defenses the crafty Martians can contrive. Your mission is to take on those legendary—and some say impregnable—defenses and to penetrate to the heart of the CAVERNS OF MARS! Player/Missile graphics, high-resolution color, and fine scrolling routines have been combined to create one of the most addicting games of all times.

Cat. No. 3452 16K, cass, joystick **\$29.95**
 Cat. No. 3453 24K, disk, joystick **\$29.95**

48K

ATARI 400 OWNERS

48K

Now Atari 400 owners can solve the nagging problem of "you need more memory". The 48K RAMBOARD from Intec Peripherals comes completely assembled and tested and is fully documented for installation in the Atari 400. All contacts are gold plated for maximum reliability.

Cat. No. 3474

\$285.00

VERBATIM DATALIFE DISKETTES

Verbatim Datalife series has become synonymous with quality. If you have an ATARI, APPLE II, TRS-80, or any computer which uses soft-sector diskettes, you can take advantage of this low HW price.

Cat. No. 1147

\$28.00



YAHTMAN COMPUTER CORE SOFTWARE

YAHTMAN is a computerized version of a dice game which has been popular with young and old for years. Up to four people, school age and up, can compete for hours of enjoyment. YAHTMAN takes advantage of the Atari computer's graphics and can be played on both the Atari 400 and 800.

Cat. No. 3405 16K, cass, joystick

\$19.95

TT#5 PLAYER/MISSILE GRAPHICS

SANTA CRUZ SOFTWARE

This is what it's all about. P/M Graphics is what set the Atari computer a cut above the rest when it comes to graphics. Learn how to create a simple shape called a player and you're on your way. This tutorial is loaded with 25 examples to create programs ranging from a complete business application to a small game.

Cat. No. 3400 32K, cass

\$29.95

Cat. No. 3401 32K, disk

\$29.95

 ★ BE SURE TO STOP BY AND ★
 ★ SEE US AT THE 7TH WEST ★
 ★ COAST COMPUTER FAIRE IN ★
 ★ BOOTH 1310H ★

HOW TO ORDER

Write or phone. Pay by check, M/C, VISA, or COD (add \$1.50 for COD). Offer expires Mar. 31, 1982. Mention this ad and we pay shipping (UPS ground only). (800) 423-5387
 HW Electronics
 19511 Business Center Dr. Dept. G3
 Northridge, CA 91324 (213) 886-9200

WHEN IN SOUTHERN CALIFORNIA,
 VISIT OUR RETAIL STORES

HW ELECTRONICS

19511 Business Center Dr.
 Northridge, CA 91324

2301 Artesia Blvd.
 Redondo Beach, CA 90277

ing volume or tone quality, all voices must be respecified. A more sophisticated sound interpreter would presumably mean smaller command strings but a bigger interpreter. If you go to the trouble to type in both Playit and Playit From BASIC, you will see that some more than acceptable sounds can be accomodated, so I am reasonably happy with the results.

Some interesting projects remain: Why not convert Atari's Music Composer disk files to Playit-compatible strings? Or how about a real Music Compiler written in BASIC? How about making Playit relocatable, a la last month's article? Please write and tell of your successes (or failures?).

Last but not least, another caution: since I/O to anything but the screen or keyboard uses the SIO serial bus driver, and since the serial bus uses the sound generators to get its baud rates, etc., you MUST turn off sound generation (commands CMDS, CMDE) before doing such I/O.

Atari BASIC: On Sounds, Hex Numbers, And The USR Function

The featured idea and program in this issue is the Playit From BASIC listing which follows. The program itself is not very sophisticated: it simply allows the one-character command codes (R,S,N,T,E) and hex data bytes to be translated into characters in a string. It then passes the address of the string to Playit (the assembly language program) and comes back to the user, ready to compile the next string of commands. If you intend to emulate this scheme, rather than use the program as is, you might be advised to put the sound command string into memory you have reserved (e.g., via the "Simplest Method" given in previous articles in this series). Putting the command in a string is inviting trouble: if your program stops, if you ENTER new

```

0610 8DC206 1710 STA REPEAT ; just in case of a repeat cmd
0613 84CF 1720 STY PLAYADDR+1
0615 8CC306 1730 STY REPEAT+1 ; similarly for MSB
;
0618 AD2402 1750 LDA UVBLKD ; prepare to save the ptr
061B AC2502 1760 LDY UVBLKD+1
061E C93C 1770 CMP #PLAYIT&LOW ; already saved?
0620 D004 1780 BNE NOWINSTALL ; no
0622 C006 1790 CPY #PLAYIT/HIGH
0624 F010 1800 BEQ INSTALLED ; yes
;
; 1810 ;
; 1820 NOWINSTALL
0626 8DC406 1830 STA SAVEVBLK
0629 8CC506 1840 STY SAVEVBLK+1 ; save system vector
;
; 1850 ;
062C A93C 1860 LDA #PLAYIT&LOW
062E 8D2402 1870 STA UVBLKD ; and install our own
;
;
0631 A906 1880 LDA #PLAYIT/HIGH
0633 8D2502 1890 STA UVBLKD+1
;
; 1900 INSTALLED
0636 A901 1910 LDA #1 ; A single clock tick
0638 8DC706 1920 STA DURATION ; until we start playing
063B 60 1930 RTS ; done with install!
;
; 1940 ;
;
063C 1950 .PAGE " The actual PLAYIT routine"
; 1960 ;
; 1970 ; PLAYIT is the entry point for our Delayed
; 1980 ; Vertical Blank routine
; 1990 ;
; 2000 ; PLAYIT 'reads' the sound command string
; 2010 ; and plays our 'song'
; 2020 ;
; 2030 ; SAM is simply the looping point for cmds
; 2040 ;
; 2050 PLAYIT
063C CEC706 2060 DEC DURATION ; keep on playing?
063F D029 2070 BNE EXIT ; yep...no changes
;
; 2080 ;
; 2090 SAM
0641 20B706 2100 JSR GETCMD ; get a byte from command string
0644 C900 2110 CMP #CMDE ; End it now?
0646 F053 2120 BEQ DOEND ; yes
0648 C9FF 2130 CMP #CMDR ; D.C. al Fine?
064A F05E 2140 BEQ DORPT ; yes
064C C9FE 2150 CMP #CMDS ; Stop all sound ?
064E F03F 2160 BEQ DOSTOP ; yep
0650 C9FC 2170 CMP #CMDTV ; Tone and Volume on TV?
0652 F02A 2180 BEQ DOTV ; yeah
0654 C9FD 2190 CMP #CMDN ; Number of voices change?
0656 F015 2200 BEQ DONUM ; uh-huh
;
; 2210 ;
; 2220 ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
; 2230 ;
; 2240 ; if none of the above, must be duration
; 2250 ;
; 2260 DODURATION
0658 8DC706 2270 STA DURATION ; we assume so
065B AEC606 2280 LDY NUMVCS
065E 300A 2290 BMI EXIT ; no voices, just duration
;
; 2300 FREQLP
0660 20B706 2310 JSR GETCMD ; yes...get next byte
0663 9D00D2 2320 STA AUDF1,X ; and set the frequency
0666 CA 2330 DEX
0667 CA 2340 DEX ; see if more voices
0668 10F6 2350 BPL FREQLP ; yes...keep trying
;
; 2360 ; no...fall through to EXIT
; 2370 ;
; 2380 EXIT
066A 6CC406 2390 JMP (SAVEVBLK) ; let OS clean things up
;
; 2400 ;
; 2410 ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
; 2420 ;
; 2430 ; set number of voices
; 2440 ;
; 2450 DONUM
;
;
066D 20B706 2460 JSR GETCMD ; next byte...
0670 AA 2470 TAX
0671 CA 2480 DEX
0672 8A 2490 TXA ; less one
0673 3003 2500 BMI NUMOK ; if < zero, leave it alone
0675 2903 2510 AND #*03 ; Ensure 1-4 voices
0677 0A 2520 ASL A ; doubled, for ease of use
;
; 2530 NUMOK
0678 8DC606 2540 STA NUMVCS ; as number of voices

```


lines, if you DIMension more variables, etc., the string may move and Playit would start playing random sounds.

The commands have simply been entered into the program via DATA statements starting at line 9000. Those of you who go to the trouble to enter all this will, I hope, be pleasantly surprised by the sounds generated by lines 9400-9418. You will probably be dismayed, however, at the idea of putting in such a complex sound yourself. That is why I encourage someone to come up with a better "Music Compiler" along these same lines.

In any case, I invite you to compose your own music or sounds to be put into this system. Generally, I wrote a sound in BASIC to test it before committing it to DATA statements. For example, the "CHOO-CHOO" sound evolved from this BASIC line:

```
FOR V=15 TO 0 STEP -1 : SOUND
O,V,O,V : NEXT V
```

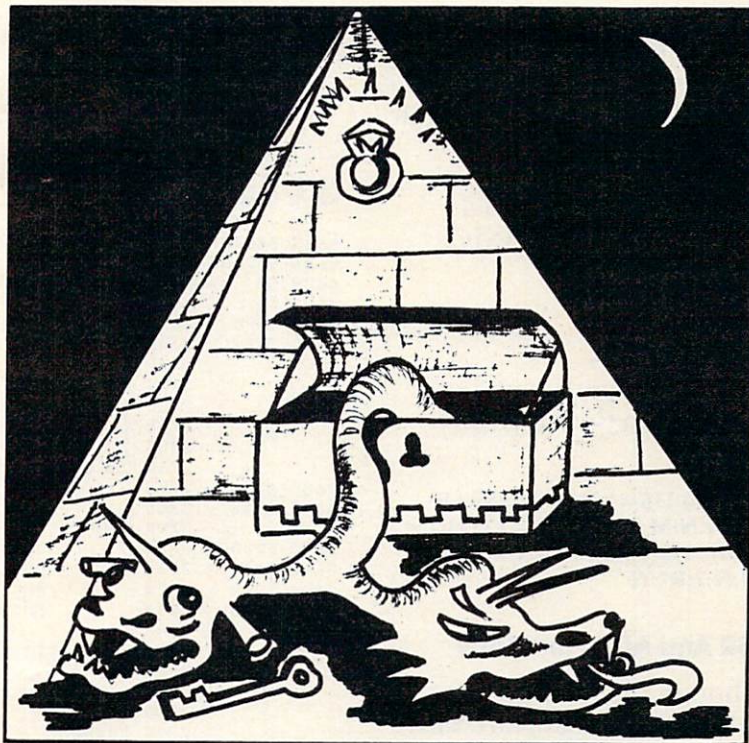
The above sounds like an explosion, but if you slow it down a little and repeat it regularly you can train it as you wish. On to the short subjects.

HexDec

If you have already peeked at the listing of Playit From BASIC, you may have noted an unusual looking hexadecimal to decimal conversion routine. In fact, I herewith present you with a "one-liner" HexDec program:

```
1 DIMH$(23),N$(9):H$=",_ABCDEF
GHI!!!!!! JKLMNO":IN.N$:F.I=
ITOLEN(N$):N=N*16+ASC(H$(ASC
(N$(I)-47))
:N.I?:N:RUN
```

The underlined characters are control characters (control-comma is the heart, etc.). The abbreviations are necessary to get it to fit on one line. To see how it works, figure out what happens when you input "9A". Recall that ASC("9") is 57 and ASC("A") is



CRYPTS OF TERROR

Beware as you enter the Crypts Of Terror. No one has survived this horror. Only your unrelenting nerve and determination will drive you deeper into the unknown.

Find what lurks in these ancient crypts!!

At last we have found an adventure with full graphics, sound and intrigue for your ATARI 400/800 computer.

- CRYPTS OF TERROR is the first adventure game that was completely designed for the Atari computers only. The graphics are the finest available using the full potential of the Atari.



Atari 800/400 16K requires joysticks.

Payment: Personal Checks – allow three weeks for check to clear.

American Express, VISA, MasterCard – include all numbers on card. Please include phone number with all orders.

Orders from USA \$29.95 (US funds)

Orders from Canada \$39.95 (Canadian funds)

Plus \$2.00 for shipping.

Ontario residents add 7% R.S.T.

Check your local computer dealer for Crypts Of Terror.

Dealer inquiries encouraged.

**INHOME
SOFTWARE**

PH. 1-416-961-2760

1560 Yonge St.
P.O. Box 10
Toronto
Ontario Canada
M4T 1Z7

65. 57-47 is 10 and 65-47 is 18. Look at the 10th and 18th characters in H\$. What is ASC("control-I")? ASC("control-J")?

You can avoid the control characters by adding the -64 shown in Playit From BASIC. Simple.

DecHex

This isn't really pertinent, but while we are on the subject of one-liners:

```
1DIMH$(16):H$="0123456789ABCDEF":IN:N:M=4096:F:I=1TO4:J=INT(N/M):?H$(J+1):N=N-M*J:M=M/16:N.N:?:RUN
```

The USR And ADR Functions

Even though the methods of using the USR function are fairly thoroughly covered in the Atari BASIC Reference Manual, I find that many users are not fully aware of the real power of this function. Recall that the general syntax of this function is:

```
USR(addr [,expr [,expr ... ]])
```

In other words, in addition to giving BASIC an address to call, you may pass any number of expressions to the assembly language routine. BASIC converts each expression to a 16-bit integer, pushes the result on the CPU stack, and cleans up by pushing on a single byte which tells the number of such expressions it pushed. (The address, which may itself be an expression, is not pushed and is not counted by that single byte.)

So what can we pass to assembly language? Obviously, numbers in the range of 0 to 65535. But what about characters? Conceive of

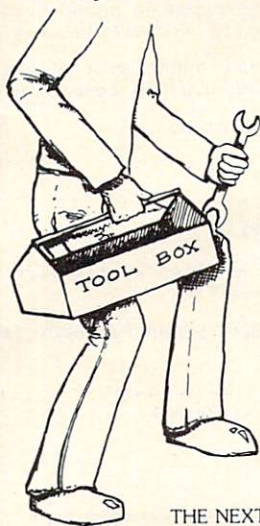
```
USR(addr, ASC("T"), expr),
```

where the "T" might be used as a mnemonic command to tell the routine which of several functions is desired. How about strings of characters? Recall that the three essential ingredients defining a

```
067B 4C4106 2550 JMP SAM
2560 ;
2570 ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
2580 ;
2590 ; set tone and volume
2600 ;
2610 DDTV
067E AEC606 2620 LDX NUMVCS
0681 30BE 2630 BMI SAM ; no voices to set
2640 TVLP
0683 20B706 2650 JSR GETCMD ; get next byte
0686 9D01D2 2660 STA AUDC1,X ; treat as t&v command
0689 CA 2670 DEX
068A CA 2680 DEX ; more voices?
068B 10F6 2690 BPL TVLP ; yes
068D 30B2 2700 BMI SAM ; no
2710 ;
2720 ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
2730 ;
2740 ; STOP the sound (by clearing all sound regs)
2750 ;
2760 DOSTOP
068F A207 2770 LDX #7
0691 A900 2780 LDA #0
2790 STOPLP
0693 9D00D2 2800 STA AUDF1,X ;freq and vol to zero
0696 CA 2810 DEX
0697 10FA 2820 BPL STOPLP
0699 30A6 2830 BMI SAM ; sound stops, pgm keeps going
2840 ;
2850 ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
2860 ;
2870 ; END the processing (but doesn't stop sound)
2880 ;
2890 DOEND
069B ADC406 2900 LDA SAVEVBLK
069E 8D2402 2910 STA VVBLKD ; restore system ptr
06A1 ADC506 2920 LDA SAVEVBLK+1
06A4 8D2502 2930 STA VVBLKD+1 ; and, to OS, we aren't here
06A7 6CC406 2940 JMP (SAVEVBLK) ; one last time
2950 ;
2960 ;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
2970 ;
2980 ; repeat the same stuff again
2990 ;
3000 DORPT
06AA ADC206 3010 LDA REPEAT
06AD 85CE 3020 STA PLAYADDR
06AF ADC306 3030 LDA REPEAT+1
06B2 85CF 3040 STA PLAYADDR+1 ; just reset the address
06B4 4C4106 3050 JMP SAM ; and try it again
06B7 3060 .PAGE " the GETCMD subroutine"
3070 ;
3080 ; simply gets next byte from
3090 ; command string
3100 ;
3110 GETCMD
06B7 A000 3120 LDY #0
06B9 B1CE 3130 LDA (PLAYADDR),Y ; get the byte
06BB E6CE 3140 INC PLAYADDR ; bump LSB of pointer
06BD D002 3150 BNE GCEXIT ; done
06BF E6CF 3160 INC PLAYADDR+1 ; and the MSB
3170 GCEXIT
06C1 60 3180 RTS
3190 ;
06C2 3200 .PAGE " ram usage"
3210 ;
06C2 0000 3220 REPEAT .WORD 0 ; in case we hear it again
06C4 0000 3230 SAVEVBLK .WORD 0 ; so we can jmp indirect
06C6 00 3240 NUMVCS .BYTE 0 ; controls TVLP and FREQLP
06C7 00 3250 DURATION .BYTE 0 ; how long we hold a sound
3260 ;
3270 ;
06C8 3280 .END
```

Table with 4 columns of memory addresses and labels: =0600 ORIGIN, =0201 AUDC1, =00FF CMDR, =0000 CMDE, 060A WAITVB, 0636 INSTALLED, 0641 SAM, 068F DOSTOP, 06C6 NUMVCS, 0693 STOPLP, =00FF LOW, =0224 VVBLKD, =00FE CMDS, 0600 INSTALL, 06C2 REPEAT, 06C4 SAVEVBLK, 06B7 GETCMD, 067E DDTV, 0660 FREQLP, 06C1 GCEXIT, =0100 HIGH, =0014 CLOCKLSB, =00FD CMDN, 0603 GOOF, 063C PLAYIT, 06C7 DURATION, 069B DOEND, 066D DONUM, 067B NUMOK, =D200 AUDF1, =00CE PLAYADDR, =00FC CMTV, =0608 INSTALL1, 0626 NOWINSTALL, 066A EXIT, 06AA DORPT, 0658 DODURATION, 0683 TVLP

Imagine being able to print the letter "A" and get a multi-color space ship. Using THE NEXT STEP and a minimum of programming effort, you can do it in no time at all.



THE NEXT STEP features full joystick control for ease-of-use and quick editing.

THE NEXT STEP runs on any 32K ATARI 400/800 with a disk drive and is available for \$39.95 at your local computer store or order direct from



THE NEXT STEP contains well-written, easy-to-use documentation with simple BASIC programming examples that show you how THE NEXT STEP can help develop colorful graphic displays. Graphics you never thought possible until now.

THE NEXT STEP is a user friendly, menu driven graphics tool kit that allows you to create new character sets or redefine characters to make shapes for use with your basic or machine language programs. THE NEXT STEP allows you to save these "new" characters on disk for future use.

THE NEXT STEP is perfect for use on shapes for animation and features a joystick controlled color menu to make your graphics come alive. THE NEXT STEP even generates its own code to help you incorporate new characters and shapes into your programs.

THE NEXT STEP allows you to see your shapes as you make them. Now you can determine ahead of time how characters will interact with one another when creating shapes for Character Set or Player-Missile Graphics.

THE NEXT STEP helps you to mix any of ATARI's 14 graphics modes in the same display. THE NEXT STEP is a perfect graphics utility for the BASIC or machine language programmer, novice and professional alike.

THE NEXT STEP

VISA, MASTERCARD, CHECK, C.O.D.

Add \$1.00 for Shipping

36575 MUDGE RANCH ROAD • COARSEGOLD, CA 93614 • 209-683-8858

string in Atari BASIC are its DIMension, LENgth, and address. Since your program presumably DIMensioned the string, you know that value and may pass it as an expression. And the address and length are available from the ADR and LEN functions!

Would you like your assembly language routine to modify your string, affecting its length? Try something like this:

```
DIM XX$(XXDIM)
XX$(USR(addr,ADR(XX$),XXDIM)+1)=" "
```

Recall that the USR function may return any 16-bit value to the BASIC program, which is automatically converted to floating point as needed. Assume that this USR routine puts something in the XX\$ string and returns the number of characters it put in. The above will then set the LENgth of XX\$ properly for use by other BASIC statements and functions.

Finally, there is floating point. How about writing a matrix inversion program? If we are limited to passing 16-bit integers, how do we pass a floating point number via USR? Simple: we pass the address of the number, just as we do with a string. And how do we get the address of a number, when the ADR function only works with strings? Like this:

```
DIM FF$(1),FF(dim1,dim2)
JUNK = USR(addr,ADR(FF$)+1,dim1,dim2)
```

A little published fact about Atari BASIC is that DIMensioning of both strings and arrays proceeds in an orderly fashion according to the DIM statements encountered. And you are guaranteed that the order you DIM strings and arrays is the order they will occur in memory! So, by DIMensioning that one-byte string, FF\$, directly before the DIMension of the array, FF(), we know that the address of the array is one greater than the address of the string. Thus we can pass all the pertinent information about the array (its address and dimensions) to our assembly language routine. Incidentally, if you don't want to waste a one-byte string for this purpose, there is no reason FF\$ can't be any DIMension you need: just adjust the '+ 1' to reflect the actual DIM you use.

One last note on this subject: the fact that you can predict the memory order of strings and arrays has fascinating possibilities in regards to record structures, etc. But (and how many times have you read this from me) that's a topic for another article.

Program 1.

```
10 AUDCTL=53768:DEL=120
20 AUDF1=53760:AUDC1=53761
30 SOUND 1,10,10,15:SOUND 3,10,10,15
40 POKE AUDC1,0:POKE AUDC1+4,0
50 POKE AUDCTL,DEL
60 FOR J=10 TO 15:POKE AUDF1+2,J:POKE AUDF1+6,20-J
```



```
70 FOR I=0 TO 255:POKE AUDF1,I:POKE AUDF1+4
,255-I:NEXT I
80 NEXT J
```

...VERY SMOOTH GLIDES...

Program 2.

```
10 AUDCTL=53768:DBL=120
12 OSC=1789790/2
20 AUDF1=53760:AUDC1=53761
30 SOUND 1,10,10,0
40 POKE AUDC1,0:POKE AUDC1+4,0
50 POKE AUDCTL,DBL
60 P2=2^(1/12)
70 NTE=16:REM C IN THE REAL BASS
80 FOR I=1 TO 109
90 FREQ=INT(OSC/NTE-7+0.5):F0=INT(FREQ/256)
92 F1=FREQ-256*F0
100 POKE AUDF1,F1:POKE AUDF1+2,F0
102 POKE AUDC1+2,175
103 PRINT "NOW PLAYING ";INT(NTE+0.5);" HZ"
105 FOR J=1 TO 100:NEXT J
110 NTE=NTE*P2
120 NEXT I
130 GOTO 70
```

...9 OCTAVE CHROMATIC SCALE...

Playit From BASIC

```
1000 REM *****
1020 REM *
1040 REM * PLAYIT FROM BASIC, SAM
1060 REM *
1080 REM * This routine is a simple
1100 REM * sound "compiler", which
1120 REM * takes DATA statements and
1140 REM * converts them into command
1160 REM * strings suitable for use by
1180 REM * the interrupt-driven PLAYIT
1200 REM * routine.
1220 REM *
1240 REM *
1260 REM * Written by Bill Wilkinson
1280 REM *
1300 REM * for March, 1982, COMPUTE!
1320 REM *
1340 REM *****
1360 REM
1380 REM First, constants, routine addresses, etc.
1400 REM
1420 DIM HX$(2),CMD$(11),PLAY$(1000),HEX$(23),TYPE$(1),
PLAYIT$(1000)
1440 HEX$="@ABCDEFGHII!!!!!!JKLMNO"
1460 DOCMD=2300:LOOP=1800:HEXDEC=2600
1480 AGAIN=1700:EXITLOOP=2100
1500 PLAYIT=6*256:REM or wherever you put the routine
1520 REM
1530 SOUND 0,0,0,0:REM needed to initialize properly
1540 REM The command equates...
1560 REM notice that these match the
1580 REM assembly language routine
1600 CMDR=255:CMD5=254:CMDN=253:CMDTV=252:CMDE=0
1620 REM
1640 REM *****
1660 REM
1680 REM This is the AGAIN of
1700 REM PLAY IT AGAIN, ATARI
1720 REM
1730 PRINT " <processing...please wait>"
1740 PLAY$="":PLAY=0
1760 REM
1780 REM This is LOOP
1800 PLAY=PLAY+1:REM to next cmd byte
1820 READ CMD$:REM a bunch of commands
1840 REM
1860 TYPE$=CMD$:REM use the command character
1880 IF TYPE$="R" THEN PLAY$(PLAY)=CHR$(CMDR):GOTO EXIT
LOOP
```

```
1900 IF TYPE$="S" THEN PLAY$(PLAY)=CHR$(CMD5):GOTO LOOP
1920 IF TYPE$="N" THEN NUMVCS=1:CMD=CMDN:GOSUB DOCMD:NUM
VCS=DEC:GOTO LOOP
1940 IF TYPE$="T" THEN CMD=CMDTV:GOSUB DOCMD:GOTO LOOP
1960 IF TYPE$="E" THEN PLAY$(PLAY)=CHR$(CMDE):GOTO EXIT
LOOP
1980 REM *** IF TO HERE, ASSUME DURATION & FREQ ***
2000 HX$=CMD$:GOSUB HEXDEC:CMD=DEC:REM command is
duration
2020 CMD$=CMD$(2):REM to fool DOCMD
2040 GOSUB DOCMD:GOTO LOOP
2060 REM
2080 REM exitloop
2100 REM
2120 REM do the sound playing
2140 REM
2150 PLAYIT$=PLAY$:REM else we alter what we are playing
2160 JUNK=USR(PLAYIT,ADR(PLAYIT$))
2180 REM
2200 PRINT "HIT RETURN FOR NEXT SOUND ";:INPUT TYPE$
2220 GOTO AGAIN
2240 REM
2260 REM
2280 REM *****
2300 REM THE SUBROUTINES
2320 REM
2340 REM first, DOCMD
2360 REM
2380 PLAY$(PLAY)=CHR$(CMD):REM The command byte
2400 IF NUMVCS=0 THEN RETURN
2420 REM we process NUMVCS bytes
2440 FOR I=2 TO NUMVCS+NUMVCS STEP 2
2460 HX$=CMD$(I):GOSUB HEXDEC:REM convert the byte
2480 PLAY=PLAY+1:PLAY$(PLAY)=CHR$(DEC):REM and stuff it
away
2500 NEXT I
2520 RETURN
2540 REM
2560 REM .....
2580 REM *****
2600 REM and now HEXDEC
2620 REM
2640 DEC=0:REM our accumulator
2660 FOR L=1 TO LEN(HX$)
2680 DEC=DEC*16+ASC(HEX$(ASC(HX$(L))-47))-64
2700 NEXT L
2720 RETURN
8999 REM ...a siren-like sound...
9000 DATA N01,TCF,1408,1412,R
9099 REM ...a fanfare of sorts...
9100 DATA S,N01,TA2,30F3
9102 DATA N02,TA3A3,30F3C1
9104 DATA N03,TA4A4A4,30F3C1A1
9106 DATA N04,TA5A5A5A5,60F3C1A17A
9108 DATA T00000000
9110 DATA N00,C0,R
9199 REM ...beeping off the seconds...
9200 DATA S,N01
9202 DATA TAE,0130
9204 DATA TAC,0130
9206 DATA TAA,0130
9208 DATA TAB,0130
9210 DATA TA6,0130
9212 DATA TA4,0130
9214 DATA TA2,0130
9216 DATA T00,3500
9218 DATA R
9299 REM ...choo-choo ??? ...
9300 DATA S,N01
9302 DATA T0E,010E
9304 DATA T0C,010C
9306 DATA T0A,010A
9308 DATA T08,0108
9310 DATA T06,0106
9312 DATA T04,0104
9314 DATA T02,0102
9316 DATA T00,0300
9318 DATA R
9400 DATA S,N01,TAC
9402 DATA 3051,305B,3044,183C,182D,3035
9404 DATA 303C,182D,3035,3044,303C,3051,305B
9406 DATA N04,TACA4A4A8
9408 DATA 30516C89A2,305B7990B6,30446C89A2
9410 DATA 183C4879B6,182D4879B6,3035485BD7
9412 DATA 183C4879B6,182D5BB4B6,3035445B89
9414 DATA 3044516CA2,38325179F3
9416 DATA 423C485BB6,50445B6C89
9418 DATA S,N00,F0,R
9898 REM ...stop and end...to quit...
9999 DATA S,E
```


PART I

Disk Checkout For 2040, 4040, And 8050 Disks

Jim Butterfield
Toronto, Canada

Editor's Note: In Part I of this article Jim explains disk manipulations via machine language. Next month, in Part II, he concludes with a machine language disk routine and a program that can analyze the condition of files and blocks on the disk. — RTM

The disk doesn't know or care who's giving it instructions: BASIC or Machine Language. All that's needed is to send or receive the same information as BASIC uses.

For all input and output, I recommend opening the necessary channels from BASIC. It's easier and works the same in all systems. Machine language may then take over and use the previously opened files as it wishes, connecting and disconnecting at will.

You'll often want to check the status byte ST. It's located at hexadecimal 96 in PET's memory. It's especially important for checking end-of-file on sequential records and end-of-record on relative records. You can also detect IEEE problems here, especially timeouts.

Let's take a simple example. We might want to do a Block Read of a given track and sector from disk and then dump part of the contents to the screen. To make our example easy, we'll display only bytes one through eight. Byte zero is sometimes hard to get on early disk systems due to a bug in the Buffer-Pointer routine; we'll sidestep that question.

The BASIC Program

We're planning to read bytes one through eight of track 18, sector 0. That might be the BAM (Block Availability Map) block, but perhaps not: these programs will also work on 8050 disks.

We must: Open the Command channel, secondary address 15; Initialize the disk, in case it's a

2040; Open a direct access channel; Cause the block read; Set the Buffer pointer; and, finally, read the channel. At the finish we should close our channels. Our BASIC program would read:

100 OPEN 6,8,15	(Command Channel)
110 PRINT#6,"I0"	(Initialize)
120 OPEN 2,8,3,"#"	(Direct Access channel)
130 PRINT#6,"U1:";3;0;18;0	(Read Block)
140 PRINT#6,"B-P:";3;1	(Set Buffer Pointer)
150 GET#2,X\$	(Get a byte)
160 PRINT ASC(X\$ + CHR\$(0));	(Print it)
170 C = C + 1	(Count them)
180 IF C < 8 GOTO 150	(Do more?)
190 CLOSE 2:CLOSE 6	(Quit)

You might like to try this to see it work. If you like, change the buffer pointer (line 140), the number of values displayed (line 180) or the track and sector (line 130). Now let's try the same thing in machine language.

The BASIC Driver

It's convenient to OPEN from BASIC, so we type NEW and enter the following BASIC program which will set things up for Machine Language:

```
100 OPEN 6,8,15
110 PRINT#6,"I0"
120 OPEN 2,8,3,"#"
125 SYS 1200
190 CLOSE 2:CLOSE 6
```

Don't run this yet, since the Machine Language is not in place.

Planning The Machine Language Program

We want to send exactly the same stuff as was sent by BASIC, to the same logical channels. We know that the ML equivalent of PRINT#6... is LDX #\$06, JSR \$FFC9 ... JSR \$FFCC. Note that we use the logical file number, 6. Similarly, we know the equivalent of GET#2 is: LDX #\$02, JSR \$FFC6, JSR \$FFE4,... JSR \$FFCC. So we can code:

LDX	#\$06	
JSR	\$FFC9	(Open channel 6)
LDA	#\$55	(Letter U)
JSR	\$FFD2	(. print it)
LDA	#\$31	(Digit 1)
JSR	\$FFD2	(. print it)
LDA	#\$3A	(Colon)
JSR	\$FFD2	
LDA	#\$20	(Space)
JSR	\$FFD2	
LDA	#\$33	(Digit 3)
JSR	\$FFD2	
LDA	#\$20	(Space)
JSR	\$FFD2	
LDA	#\$30	(Digit 0)
JSR	\$FFD2	
LDA	#\$20	(Space)

- JSR \$FFD2
- LDA # \$31 (Digit 1)
- JSR \$FFD2
- LDA # \$38 (Digit 8)
- JSR \$FFD2
- LDA # \$20 (Space)
- JSR \$FFD2
- LDA # \$30 (Digit 0)
- JSR \$FFD2
- LDA # \$0D (Return)
- JSR \$FFD2
- JSR \$FFCC (End transmission)

Note that we are sending exactly what BASIC sent from line 130. Most programmers would quickly realize that a program loop would save a good deal of memory here. In Part II of this article, we'll rewrite the code and complete it.

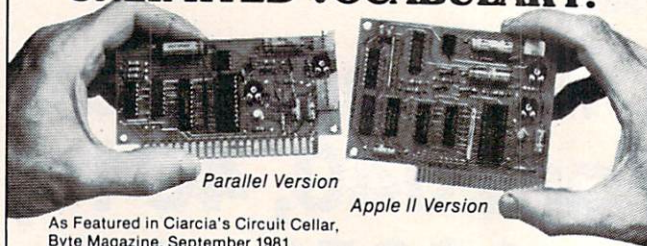
Copyright © 1981 Jim Butterfield.



COMPUTE!

The Resource.

SWEET-TALKER, IT GIVES YOUR COMPUTER AN UNLIMITED VOCABULARY.



As Featured in Ciarcia's Circuit Cellar, Byte Magazine, September 1981.

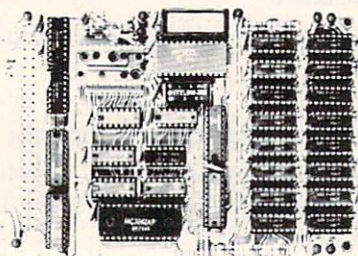
The Sweet-Talker voice synthesizer allows you to add speech of unlimited vocabulary to your computer. Utilizing the Votrax SC-01A chip, you can output any message by programming individual phonemes. Comes in two versions; one plugs directly into your Apple II, the other connects to any computer with an 8-bit parallel printer port. +12 volts and +5 volts required for parallel board.

- Contains 64 different phonemes accessed by a 6-bit code. **ST01 Sweet Talker Parallel Port Board A & T.....\$139.00**
- Automatic and manual inflection modes. **ST02 Sweet Talker Apple II plug in board.....149.00**
- Parallel port driven or plug-in compatible with Apple II. **ST06 Text-to-Speech algorithm on disk for Apple II.....35.00**
- Super text-to-speech algorithm on disk for Apple II. Makes Sweet-Talker equivalent to units 3 times the cost. **SC01A Votrax Speech Synthesizer chip.....70.00**
- On board audio amplifier **5 or more.....55.00 each**
- Sample program on cassette with Apple II board. **UPS01 Universal Power Supply-A & T.....35.00**
- Optional power supply for parallel board. **Add \$2.00 for shipping & handling.**

To Order: Call Toll Free 1-800-645-3479
(In N.Y. State Call: 1-516-374-6793)
For Information Call: 1-516-374-6793



MICROMINT INC.
917 Midway
Woodmere N.Y. 11598



BETA 32K BYTE EXPANDABLE RAM FOR 6502 AND 6800 SYSTEMS

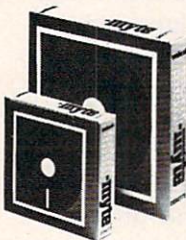
AIM 65 KIM SYM PET S44-BUS

- Plug compatible with the AIM-65/SYM expansion connector by using a right angle connector (supplied).
- Memory board edge connector plugs into the 6800 S44 bus.
- Connects to PET using an adaptor cable.
- Uses +5V only, supplied from the host computer.
- Full documentation. Assembled and tested boards are guaranteed for one full year. Purchase price is fully refundable if board is returned undamaged within 14 days.

Assembled with 32K RAM.....\$349.00
& Tested with 16K RAM.....329.00
Bare board, manual & hard-to-get parts... 99.00
PET interface kit. Connects the 32K RAM board to a 4K or 8K PET.....\$ 69.00

See our full-page ad in
BYTE and INTERFACE AGE

wabash



8" or 5 1/4" flexible diskettes certified 100% error free with manufacturer's 5-year limited warranty on all 8" media. Soft-sectored in boxes of 10. 5 1/4" available in 10-sector.

(Add \$3.00 for plastic library cases)

8" single sided, single density.....\$27.50
8" single sided, double density..... 35.50
8" double sided, double density..... 45.50
5 1/4" single sided, single density..... 27.50
5 1/4" single sided, double density..... 29.50
5 1/4" single sided, double density, 10-sector\$29.50

TERMS: Minimum order \$15.00. Minimum shipping and handling \$3.00. Calif. residents add 6% sales tax. Cash, checks, Mastercard, Visa and purchase orders from qualified firms are accepted. (Please allow two weeks for personal checks to clear before shipment.) Product availability and pricing subject to change without notice.

INTERNATIONAL ORDERS: Add 15% to purchase price for all orders. Minimum shipping charge is \$20.00. Orders with insufficient funds will be delayed. Excess funds will be returned with your order. All prices are U.S. only.

PAPER TIGER PRINTERS

IDS 460G 9x9 Dot Matrix Printer..... \$890.00
IDS 560G Wide Carriage Printer..... 1099.00

TERMINALS

ADDS Viewpoint \$569.00
TeleVideo 910 579.00
TeleVideo 912C 679.00
TeleVideo 920C 729.00
TeleVideo 950 929.00

8" DISK DRIVES

Shugart 801R..... \$399.00
NEC FD1160 (double sided)..... 569.00

DYNAMIC RAMS

4116 (200ns) set of 8 \$24.00
4164 (64Kx1) \$18.00

BETA
COMPUTER DEVICES

1230 W. COLLINS AVE.
ORANGE, CA 92668
(714) 633-7980



Visit us at the West Coast Computer Faire-Booth 1714-C.

Organizing Data Storage

John Hudson
Los Angeles, CA

There are many storage media available to mini-computer users. Minicomputer users with a disk unit know that the disk unit enhances the storage and retrieval powers of their minicomputer. One type of file that can be created for the purposes of storage and retrieval is a text file (for storage of such things as mailing addresses, telephone numbers, receipts, etc.).

For small text files, the time involved in disk retrieval and storage is not a problem. However, when a text file becomes larger than 2,000 records, the retrieval and storage of information can become time consuming.

Large text files can be organized in one of two ways: sequentially, and randomly. In sequentially organized text files, fields are stored back to back, where the beginning character of a new field immediately follows the return character ending the previous field. Information is retrieved in a linear fashion, i.e., from the beginning to the end of the file.

Disk Can Also Be Slow

When a text file does not require much updating or ongoing revision, sequential organization of the text file is indicated. However, if a large text file is ordered sequentially, and there is need for frequent updating or revision of the file, or frequent retrieving of information from end of text file, a disk unit is not much better than a cassette unit. This accessing of information at end of file may take a couple of minutes, due to the reading and verification of each record, each time.

In this type of situation, the random method of text file organization is more effective. A random-access text file is like a collection of equally-sized records; the records may be full, or they may be empty, but the length of each record in a random text file is fixed. Thus, a record at the end of the file can be accessed at approximately the same speed as records in any other location in the file.

However, the controlling program needs to know where in the file a specific record is located. Most random files are organized by 'keying' a field within the record. For example, a mailing address text file can be organized by last names. The problem when using a random text file keyed to a specific field in the record is *collision*. Collision is when two

or more records address the same location within the text file, as, for example, when two people have the same last name (B. JONES and J. JONES).

A method of reducing collision is called *hashing* the key field. The basic idea of hashing, or hash addressing, is that each stored record occurrence is placed in the text file at a location whose address may be computed as some function (the hash function) of a value which appears in the occurrence — usually the primary key value.

One of the disadvantages of hash-addressing is that the sequence of stored record occurrences within the text file will almost certainly not be the keyed field sequence. In addition, there may be gaps of arbitrary size between consecutive occurrences of records.

In fact, a text file in a hash-addressing organization is usually, though not invariably, considered to have no particular sequence.

Using Mod To Hash

The following is an example of a hash function: given that the number of unique records is 1,000; the "mod" arithmetic function can be used to assign unique address locations. The mod function divides one number by another and returns the remainder. The mod parameter used in this function should be the prime number closest to the number of the records in the text file (see Table 1 for prime numbers). For this example, the closest prime number is 997. (Note: if the key field is alphabetic, it should be converted to numeric.) The function will be (key field) MOD 997. The hash function thus minimizes collision.

There are text files, such as a monthly inventory file, that require multiple entries of the same record over a period of time. Inventory may be taken at the end of each week, and the quantity stored into a text file. This presents a different type of collision problem — same record hash to same location in text file.

In the case where hashing records into a text file still causes collision, the controlling program needs to be able to insert the colliding record into another location and, when it goes to retrieve this record, it needs to know where it is located. A solution to this problem is to link the records in the text file. From the previous example, you have 1,000 unique records; in addition, each record is entered more than once.

A link field (LF) can be added to the end of each record to allow the linking of records. For example:

RECORD	LINK FIELD
--------	---------------

This LF is used to point to successive entries of the

same type of record, and contains the address locations of the successive record entries. The first record, A1, hashed into the text file at location 100 has '0' in the link field.

TEXT

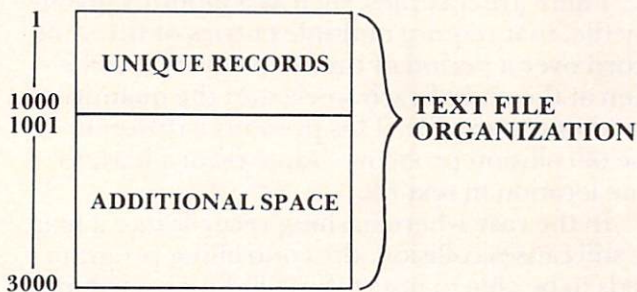
LOCATION		LF
100	RECORD A1	0

When the controlling program tries to hash another record, A2, into record location 100, it notes that there already exists a record at that location, and inserts the new record, A2, at another text address. It changes the LF of the record A1 from 0 to the next text address of record A2 (in this case, 1972), inserts 0 into the LF of record A2, and the results are as follows:

TEXT

LOCATION		LF
100	RECORD A1	1972
1972	RECORD A2	0

Thus, in this example, record A1 points to record A2. However, a problem arises with this type of organization: how to set up the text file? The text file can be organized with 1,000 unique hashing locations, occupying text address locations 1-1000. Any additions to a unique record can be located at text address locations 1001-3000.



This type of text file organization needs to be initialized, since the Apple system does not allow reading of a text file that does not contain records, and will produce an "END OF DATA" error message. An example of an initialization routine follows:

```

5 D$=" "
10 DLOC = 66:DDTE = 9999:DBS = 1:DSN = 2:DLP
   = 333:DTRK = 444:DCAST = 555:DLINK = 8888
11 PRINT D$; "OPEN RECORD,L29"
20 I = 2001
30 PRINT D$; "WRITE RECORD,R0"
40 PRINT I: PRINT DDTE: PRINT DBS: PRINT
   DSN: PRINT DLP: PRINT DTRK: PRINT
   DCAST: PRINT DLOC:

```

```

1001 FOR J = 1 TO 4200
1006 PRINT D$; "WRITE RECORD,R";J
1007 PRINT DLOC: PRINT DDTE: PRINT DBS:
   PRINT DSN: PRINT DLP: PRINT DTRK:
   PRINT DCAST: PRINT DLINK:
1009 NEXT J
1010 PRINT D$;"CLOSE RECORD"
1013 END

```

This routine initializes enough space for 4,200 records of length 29. It writes into every record a set of dummy values.

When you wish to insert a record into the main text area, the controlling program will read the text address and check a specific field for 9999, (DDTE). If it finds 9999, the controlling program can insert the record into the read text location. If it does not, then it will insert the record into the additional text area. After inserting the record, the LF of the main record is updated to point to the location of the additional record(s).

A method of keeping track of available space in the additional text area is to store this address location and length of records into address location 0 of the text file. After each "additional text area" insertion, the available address is incremented. At the start, the controlling program will read this information, update it as needed, and, upon completion of the program, will rewrite the record 0 with the new address location.

The following is an example of a program using the link organization of a text field:

Line 70 reads text location 0 to determine the next available additional space, which is indicated by the variable "FREESPACE."

Lines 120 through 140 determine the location where the new record will be inserted. Note that this is not a hashing function.

Line 190 checks to see if the text field location DDTE has the dummy value of 9999, or if it is filled.

Lines 191 through 200 insert the new record into the unique text space.

Lines 212 through 214 traverse the link lists to get to the last record in the link.

Lines 220 through 260 update the last record in the link, and insert the new record into the additional text space area.

Lines 280 through 290 update record 0 when the program is completed.

2	3			
5	7	11	13	17
19	23	29	31	37
41	43	47	53	59
61	67	71	73	79
83	89	97	101	103
107	109	113	127	131


```

137      139      149      151      157
163      167      173      179      181
191      193      197      199      211
223      227      229      233      239
241      251      257      263      269
271      277      281      283      293
307      311      313      317      331
337      347      349      353      359
367      373      379      383      389
397      401      409      419      421
431      433      439      443      449
457      461      463      467      479
487      491      499      503      509
521      523      541      547      557
563      569      571      577      587
593      599      601      607      613
617      619      631      641      643
647      653      659      661      673
677      683      691      701      709
719      727      733      739      743
751      757      761      769      773
787      797      809      811      821
823      827      829      839      853
857      859      863      877      881
883      887      907      911      919
929      937      941      947      953
967      971      977      983      991
997      1009     1013     1019     1021
    
```

```

171 INPUT DCAST: INPUT DLINK
190 IF DDTE#9999 THEN GOTO 212
191 PRINT D$;"WRITE RECORD,R";LOC
200 PRINT LOCA: PRINT DTE: PRINT BS
   : PRINT SN: PRINT LP: PRIN
   T TRK: PRINT CAST: PRINT L
   INK
210 GOTO 90
212 IF DLINK=0 THEN GOTO 220:LOC=DL
   INK
213 PRINT D$;"READ RECORD,R";DLINK
214 GOTO 170
220 PRINT D$;"WRITE RECORD,R";LOC
225 DLINK=FREESPACE
230 PRINT DLOCA: PRINT DDTE: PRINT ~
   DBS: PRINT DSN: PRINT DLP:
   PRINT DTRK: PRINT DCAST: ~
   PRINT DLINK
240 FREESPACE=FREESPACE+1
250 PRINT D$;"WRITE RECORD,R";DLINK

260 GOTO 200
270 PRINT D$;"WRITE RECORD,RO"
280 PRINT FREESPACE: PRINT DDTE: PR
   INT DBS: PRINT DSN: PRINT ~
   DLP: PRINT DTRK: PRINT DCA
   ST: PRINT DLOCA
290 PRINT D$;"CLOSE RECORD"
300 INPUT "DO YOU WISH TO CONTINUE
   .. Y/N ",K$
310 IF K$="Y" THEN GOTO 10
320 END
    
```

©

```

10 INPUT "PLEASE ENTER STORE
   NUMBER ", SN
11 CALL - 936: FOR X = 1 TO 9
   : CALL - 922: NEXT X
15 PRINT:PRINT"      I N S E R
   T      D I S K      ";SN
16 FOR X=1 TO 3000: NEXT X
17 CALL -936
20 INPUT "PLEASE ENTER DATE .
   . MMDD .. ",DTE
30 INPUT "PLEASE ENTER PURCHA
   SE OR SELL 1 = PURCHASE ..
   2 = ~ SELLS ",BS
40 D$=""
50 PRINT D$;"OPEN RECORD,L29"
60 PRINT D$;"READ RECORD,RO"
70 INPUT FREESPACE: INPUT DDT
   E: IN PUT DBS: INPUT DSN:
   INPUT ~ DLP: INPUT DTRK
71 INPUT DCAST: INPUT DLINK
80 IF FREESPACE>=5000 THEN GO
   TO 320
90 PRINT D$;"CLOSE RECORD"
100 INPUT "PLEASE ENTER RECOR
   D CODE,LPS,TRK8S,CASSETTES
   ",LOC,LP,TRK,CAST
110 IF LOC=9999 THEN GOTO 270
120 LOCA=LOC/100
130 LOCA=LOC-LOCA*100
140 LOC=LOC/100:LINK=0
150 PRINT D$;"OPEN RECORD,L29"
160 PRINT D$;"READ RECORD,R";
   LOC
170 INPUT DLOCA: INPUT DDTE:
   INPUT ~ DBS: INPUT DSN:
   INPUT DLP: INPUT DTRK
    
```

Software Breakthrough!

THE WORD HANDLER

BY SILICON VALLEY

THE ONLY WORD PROCESSOR IN THE WORLD
FOR THE APPLE THAT:

- Gives you full line capability on the screen, no boards nec.
- Two character formats to choose from at all times!

RUNS WITHOUT ANY HARDWARE MODIFICATIONS!

HIGH POWER

Simplicity of
Operation!

LARGE SCALE

Direct to disk!

All functions seen on the screen!

- Lower and upper case underlining
- Superscript, bold, and unlimited tabs
- Proportional spacing
- Even and normal justification
- Other functions seen on turnkey systems in the \$13-\$20,000 range

DEALER INQUIRIES INVITED

1625 EL CAMINO REAL, SUITE 4
BELMONT, CA 94002
(415) 593-4344



Machine Language Sort Utility

Ronald and Lynn Marcuse
Freehold, NJ

There have been occasional articles in the various personal computer magazines concerning the sorting of data files. Some of these have presented sort routines coded in BASIC that can be utilized by existing programs. The complex string handling required by the sort logic is not really suitable for BASIC's rather slow execution speed. Clearly, any type of repetitive string manipulations (as performed by sorting or searching functions) would benefit from machine language code. If you continue reading you will find out how much faster it really is.

Before we get into the programs themselves, it would probably be beneficial to include some background information. The verb *sort* is defined: "to put in a certain place or rank according to kind, class or nature; to arrange according to characteristics." This comes pretty close to what we sometimes want to do with the data we store in our computers and files; put it in some kind of order. Once we have arranged it we can search it quicker (imagine a disorganized phone book), list it in a more readable format, or even match it to other files that have been sorted the same way.

The Main Questions

First we must decide where will we do the actual sorting. All of us have arranged things on a desk or table. Our sort area is, therefore, the desk or table that we used. In a computer system we have a choice of using the memory within the machine (internal) or our disk drive (external). There are problems with both of these. Computer memory is limited in size and this, in turn, will limit the number of records that can be read in. The disk drive may be able to hold more data, but the speed of the device is snail-like when compared to memory. We could use both: divide the file up into smaller chunks which can be sorted in memory, store these on disk as temporary files, and then merge all of them together. This process is usually referred to as "sub-listing" or "sort-merge."

The next question involves the type of sort logic (there are many ways of putting things in

order). The algorithm used here is called a *bubble* sort. The file or list is examined two records at a time. If the second has a lower sort key than the first, the two will exchange places within the file. Why then, you ask, is it called a bubble sort. Because records appear to "bubble" upward in memory (I didn't coin the phrase so don't blame me). Although this is not a very exotic methodology, it does offer several advantages. It requires no other memory allocations for sorting and is fast if the file is not too disorganized. It will also not disturb the relative positioning of records that have equal sort keys.

There are numerous other types of sort algorithms. A *selection* sort would go through a list of (n) items (n-1) times, pulling out the next lowest record and adding it to the current end of a new list. This would need double the memory, though. A *selection and exchange* would perform a similar function within the main sort area, selecting the lowest element during each pass, moving it upward in the list to be exchanged with the element occupying its new position. This method tends to upset the existing relative positioning. Other types involve binary tree searches and more complex algorithms.

Why Machine Language

The choice of language is, as stated above, rather clear. Unless you have a lot of time to kill, your sort must be in executable object code (machine language). When you're doing several hundred thousand (or million ?) character comparisons and swaps, you don't have time to pull out a "BASIC dictionary" for each line in the program (this, in essence, is what the BASIC does).

Here are some representative execution times, based on some testing we did last winter. The speeds are approximate and do not include disk input/output time. The test file consisted of 200 records, each 75 characters in length. The sort key occupied ten positions:

BASIC selection/exchange sort (in memory) – 8 minutes

BASIC bubble sort (in memory) – 12 minutes

BASIC selection sort (on disk) – 2 HOURS plus (hit BREAK key)

Machine Language bubble (memory) – 3 seconds

The sort program was developed with flexibility in mind. It will sort fixed length records up 150 bytes in size. The sort key itself may be located anywhere in the record and can be any length (up to the size of the record). It will sort in either ascending or descending order. The records themselves must be comprised of ASCII (ATASCII) characters. While in memory, they need not be terminated by end-of-line (\$9B) characters.

ATARI* SOFTWARE

COMPUTER HOUSE

at
DISCOUNT
PRICES
from

ADVENTURE INTERNATIONAL	reg. retail	OUR PRICE
Adventures 1 thru 12 each (T)	19.95	15.95
Star Trek 3 5 (T)	19.95	15.95
Lunar Lander (T)	19.95	15.95
Galactic Empire (T)	19.95	15.95

ATARI	reg. retail	OUR PRICE
Assembler Editor (C)	59.95	47.95
Asteroids (C)	39.95	31.95
Atari Word Processor (D)	150.00	115.00
Conversational Spanish (T)	59.95	47.95
Missile Command (C)	39.95	31.95
Scram (T)	19.95	15.95
Star Raiders (C)	49.95	39.95

AUTOMATED SIMULATIONS	reg. retail	OUR PRICE
Invasion Orion (T or D)	24.95	19.95
Rescue at Riget (T or D)	29.95	23.95
Star Warrior (T or D)	39.95	31.95

AVALON HILL	reg. retail	OUR PRICE
Conflict 2500 (T)	15.00	12.00
Empire of the Overmind (T)	30.00	24.00
Tanktics (T)	24.00	19.20
Midway Campaign (T)	15.00	12.00

C E SOFTWARE	reg. retail	OUR PRICE
CCA Data Management (D)	99.95	79.95

CODE WORKS	reg. retail	OUR PRICE
Iridis #1 (T)	9.95	7.95
Iridis #1 (D)	12.95	10.35
Iridis #2 (T)	15.95	12.75
Iridis #2 (D)	18.95	15.15

CRYSTAL COMPUTER	reg. retail	OUR PRICE
Crystaloids (D)	29.95	23.95
Glamis Castle (D)	49.95	39.95
Fantasyland 2040 A.D. (D)	59.95	47.95
Protector (D)	39.95	31.95
Sands of Mars (D)	39.95	31.95

DATASOFT	reg. retail	OUR PRICE
Le Stick	39.95	31.95
Lisp Interpreter (D)	149.95	119.95
Text Wizard (D)	99.95	79.95

DYNACOMP	reg. retail	OUR PRICE
Flight Simulator (T)	17.95	14.35
Rings of the Empire (T)	16.95	13.55

ON-LINE SYSTEMS	reg. retail	OUR PRICE
Jawbreaker (D)	29.95	23.95
Softporn Adventure (D)	29.95	23.95
Wiz and Princess (D)	32.95	26.35

OPTIMIZED SYSTEMS SOFTWARE	reg. retail	OUR PRICE
Basic A+ (D)	80.00	64.00
OS/A+ (D)	80.00	64.00

PERSONAL SOFTWARE	reg. retail	OUR PRICE
Visicalc (D)	199.95	149.00

QUALITY SOFTWARE	reg. retail	OUR PRICE
Assembler (T)	24.95	19.95
OS Forth (D)	79.95	63.95
Starbase Hyperion (T)	19.95	15.95

UNITED SOFTWARE OF AMERICA	reg. retail	OUR PRICE
Atari World (D)	59.95	47.95
Survival Adventure (D)	24.95	19.95

(C) ROM CARTRIDGE (D) DISKETTE (T) CASSETTE TAPE

REPRESENTING OVER 30 COMPANIES WITH 400+ PROGRAMS AND HARDWARE.

Write for a FREE catalog to:

COMPUTER HOUSE

P.O. Box 369, Dept. 10, Mammoth Lakes, CA 93546

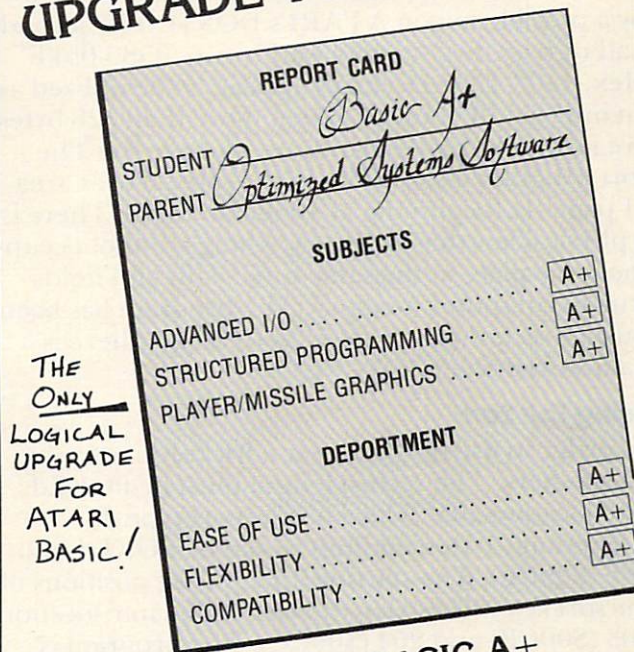
(714) 934-6538

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 \$100.00 we pay shipping. All foreign orders add \$10.00. CALIFORNIA residents add 6% tax. Prices subject to change.

* ATARI is the trademark of Atari, Inc.

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



The nominal limit of 150 characters is imposed by a possible bug in ATARI's DOS II. The second half of page five (memory addresses 0580-05FF Hex, 1408-1535 Decimal) appears to be utilized as an internal I/O buffer. When more than 128 bytes are input, the excess winds up on page six. The sort program also resides in the safe (?) user area of page six (beginning at \$0620 or 1568). There is a physical law that states: two things cannot occupy the same place at the same time. This also holds true in computer memory. The program has been pushed as far into page six as it can go (there is data stored behind it).

Using The Sort

In order to use the sort, you must feed it certain parameters. The record length must be POKEd into location 205 (\$00CD). The sort type (0-Ascending, 1-Descending) would be POKEd into 206 (\$00CE). The starting and ending positions of the sort key will also have to be POKEd into locations 203 (\$00CB) and 204 (\$00CC). The program is expecting to see the offset of the sort key. The offset is the number of positions in front of that byte. For example; the first position of a record has a 0 offset, the second has an offset of 1, and the 100th has an offset of 99. The USER function that calls the sort will also pass the address of the string containing the file and the record count. For those who are a little unsure of what this is all about, there are a few examples coming up.

Now that you have a routine that will sort your data faster than you can say Rumpelstiltskin, how do you use it? Here are several suggestions. The best method is to link through our sort/file loader in Program 3. Your existing program that is processing the data file is probably much, much longer than the short loader. The main advantage of using a small program is that you wind up with more free memory. And, since memory is our sort area, the more that is free, the larger the file. If you don't type the REMark statements, you'll have even a larger sort area. The disk file must be fixed length records terminated by end-of-line characters. Your existing processing program must contain the POKEs mentioned above. It may look something like this:

```
POKE 203,SKEYA-1:POKE 204,SKEYB-1:POKE 205,
RECLen:POKE 206,0 (for Ascending).
```

The call to the loader would be a RUN "D: SORTLOAD" (give the loader this file name when you save it). The sort/file loader must have your file name in the variable F\$ and your program name in P\$. If your processing program handles several files, you can also pass the file name by using the following statements. First, your program:

```
FOR I=0 TO 14:POKE 1776+I,32:NEXT I
FOR I=0 TO LEN(F$):POKE 1776+I,ASC(F$(I,I)):
NEXT I
```

Note: F\$ is your file's name.

The sort/file loader will require the following lines to be added:

```
70 FOR I=0 TO 14:F$(I,I)=CHR$(PEEK(1776+I)):
NEXT I
80 IF F$(1,2)<>"D:" THEN ? "ERROR":END
```

If your processing program or file is small, you may do all of the above from within your program. Besides the same POKEs as above (you wouldn't need the file name, of course), you will need the following line added to your program:

```
IF RC>1 THEN A=USR(1568,ADR(X$),RC)
```

(RC is the number of records stored in the string X\$.) Substitute your names where applicable.

Program 4 is a sort/merge utility that uses the same sort routine. This will give you the ability to handle much larger files. With a 40 or 48K machine you will be able to sort files that are 60,000 bytes long (If the record length is 60 characters, that will translate to 1,000 records). This particular version divides the file into two manageable sub-files, sorts each, and then merges them. Be careful with your disk space; the temporary file will need room also. If you have more than one drive, you can modify the program to split it three or more ways and sort even more records. For example, put the temporaries on drive 2 and the new file on drive 3. Who said micros can't handle larger files?

Your Options

The sort/merge program is a stand-alone. By swapping the front end with the sort loader (Program 3), you can do a sort/merge from a call (RUN "D: SORTMERG") in your existing software.

Now that you know how to feed the sort its required parameters and call it, you must still get it into memory. Once again, you have several options. If you have the Assembler/Editor cartridge (or a similar assembler), the source appears in Program 1. Please feel free to modify it if you so desire. If you're limited to BASIC, Program 2 will load the machine language code when it is run. After doing either of these, you should go directly to DOS (DOS II only) and do a binary save (option K) with the following parameters:

```
D1:AUTORUN.SYS,0620,069D
```

Saving the code as AUTORUN.SYS will enable the program to auto-boot when you power up with the disk (You *must* power up with that disk). Do *not* append an INIT or RUN address to the file unless you want the machine to lock up every time you turn it on.

> SEBREE'S COMPUTING <
 >--- 456 Branite Ave., Monrovia, California, zip- 91016 U.S.A. ---<
 PRESENTS SOFTWARE FOR THE ATARI 800
 and the 16K EXTENDED BASIC
 TRS-80 COLOR COMPUTER
 Please make sure that you specify which computer you are ordering for.
 All of the games below have sound effects and graphics, and require joysticks.

ATARI 800 16K EXTENDED TRS-80 COLOR COMPUTER

3-D RED BARON DOGFIGHT- Our best selling program!-----\$16.95 +.95p/h
 BATTLING TANKS--For 2 players, another top seller!-----\$9.95 +.95p/h
 HUMPUS ADVENTURE-EXPANDED VERSION!--Adventure!-----\$17.95 +.95p/h
 DOWN THE TRENCH-Star Wars simulation! 1 Player, Top Seller---\$16.95 +.95p/h
 SUBMARINE NINEFIELD Navigator-1 or 2 Players-----\$9.95 +.95p/h


-----NEWEST PROGRAMS ARE BELOW!-----
 FLIGHT SIMULATOR! Graphics! 1 player, Top seller!-----\$17.95 +.95p/h
 AIR-SEA WATCH COMMANDER! Graphic! 1 Player-----\$16.95 +.95p/h

-----/ ✓ /-----OUR VERY BEST!!-----\ ✓ \-----
 TRIP TO JUPITER SPACE ADVENTURE!! Graphics! MANY scenes, 1 Player. Requires
 32K ATARI. Loads in TWO-halves on TRS-80 COLOR COMPUTER.---\$18.95 +.95p/h

3-DIMENSIONAL COMPUTER GRAPHICS PACKAGE!!! Design your own 3-D wire-frame
 objects and view these images from any angle(s) you wish! Many programs are
 included within the package! A VERY powerful package! Major differences
 between ATARI and COLOR COMP. versions. COLOR COMP. Requires Joystk. Large
 manual included w/full listings!! Disk version is recommended and available
 for either ATARI 800 or TRS-80 COLOR COMPUTER. Add \$5.00 for DISK version.
 ATARI 800 version (8K to 48K) supplied on cassette-----\$29.95 +\$1.50 p/h
 16K EXTENDED TRS-80 COLOR COMPUTER cassette version-----\$24.95 +\$1.50 p/h

ATARI 800- > GRAPHICS EDITOR! < 16K min. 48K Preferred. Design 2-D or 3-D
 scenes with a Joystick, Save them to DISK, Retrieve them and edit scenes on
 screen in any Graphics Mode! 'HELP' option included. Complete package of 5
 programs. Disk version is recommended (add \$5.00). Powerful and well docu-
 mented! With listings. ATARI 800 only. On cassette-----\$29.95 +\$1.50 p/h

AT WEST COAST COMPUTER FAIRE- Booth # 1324




PAYROLL SOFTWARE FOR THE ATARI 800*

The MILES PAYROLL SYSTEM# is the first of a series of business software for the Atari 800*. Atari* graphics and sound have been greatly utilized and a detailed and comprehensive manual leads the user step by step enabling a person with little experience to easily operate the entire software package.

- Random access file organization for fast updating of individual records
- Allows weekly, biweekly, semi-monthly, monthly, quarterly, semi-annual, or misc. payroll periods
- Calculates and prints payroll checks automatically
- Monthly, quarterly, and yearly cumulative totals maintained for each employee
- User-defined workman's compensation classifications
- Complete reporting, including W-2 at end of year
- User-defined earnings and deductions at end of year
- Automatic data error detection
- Packaged in a handsome three ring binder with diskettes and manual

To order, or for more information:



MILES COMPUTING

8941 Owensmouth Ave. #202
 Canoga Park, CA 91304
 (213) 700-1166

Special introductory price \$179.95. Requires 32K and two Atari* 810 disc drives. Payment in U.S. funds required with order. Add \$3.00 shipping/handling. California residents add 6% sales tax. Dealer inquiries welcome.

*Atari and Atari 800 are trademarks of Atari, Inc.
 #Miles Computing and Miles Payroll System are trademarks of Miles Computing, Canoga Park, California. Not affiliated with Atari, Inc.

RAM

For ATARI

48K RAM BOARD FOR THE 400

- Increases memory capacity
- Reduces power consumption
- Reduces heat

48K Board (400) \$299
32K Board (800) \$150

INTEC PERIPHERALS CORP

3389 Del. Rosa Avenue
 San Bernardino, CA 92404
(714) 864-5269


ATARI, 400, 800 are Trademarks of ATARI, Inc.

COMPUTER Calligraphy?

Well, not really! But with FONTEDIT you can design your own character sets for the ATARI. You can create special graphic symbols for use in games, or even make a Russian alphabet. After you design a new set of characters, save them on disk or tape for later use. We provide a subroutine that you can use in your own programs to load a custom character set.

FONTEDIT is very easy to use: you use a joystick to design a large copy of the new character as you individually control whether each of the 64 dots that make-up a character are on or off. A menu of FONTEDIT commands on the screen shows you how to control this powerful yet simple-to-use character editor. The 56-page User's Guide provides clear, easy-to-understand instructions for FONTEDIT. There is also a detailed, line-by-line description that explains exactly how FONTEDIT works.

In addition to the FONTEDIT program, our IRIDIS #2 package includes three custom character sets, a routine to load the custom characters for use in your own programs, and a program that shows the use of custom-designed graphic characters. IRIDIS #2 is an exceptional value: only \$17.95 for the cassette, (requires 16K) or \$20.95 for disk (requires 24K). California residents add 6% tax. VISA and MASTERCARD welcome.



Box 550
 Goleta, CA 93116
 805-683-1585

ATARI is a registered trademark of Atari, Inc.

Program 1.

```

; RON MARCUSE, FREEHOLD NJ 11/29/81
;
; CALLED FROM BASIC WITH:
;
; A=USR(1568,ADR(X$),RC)
;
; NOTE: X$ IS THE STRING THAT CONTAINS
THE FILE
; RC IS THE NUMBER OF RECORDS
;
; THE FOLLOWING ARE POKED BY BASIC PROG
RAM:
;
; SS - BEGINNING OF SORT KEY (DECIM
AL- 203)
; SE - END OF SORT KEY (DECIMAL - 2
04)
; RL - RECORD LENGTH (DECIMAL - 205
)
; TYPE - ASCENDING (0) OR DESCENDI
NG (1)
; (DECIMAL - 206)
;
; THE ROUTINE WILL LOOP THROUGH "FILE" S
WAPPING UNSORTED
; ADJOINING MEMBERS UNTIL THE "SWAP FLAG
" HAS NOT BEEN SET
; IN A GIVEN PASS, THE ZERO PAGE ADDRESS
ES "FST" AND "SEC"
; POINT AT THE INDIVIDUAL MEMBERS BEING
COMPARED, THE Y
; REGISTER IS USED AS AN INDEX POINTER F
OR TESTING OR
; MOVING BYTES WITHIN THE TWO RECORDS.
;
;
; * = $0620 START AT PAGE 6
; MEMBER n ADDRESS (LSB,MSB)
FST = $04
; MEMBER (n+1) ADDRESS (LSB,MSB)
SEC = $06
; BASE ADDRESS OF LIST (LSB,MSB)
BASE = $08
; FIRST POSITION OF SORT KEY
SS = $0B
; LAST POSITION OF SORT KEY
SE = $0C
RL = $0D ELEMENT LENGTH
SWAP = $0A SWAP SWITCH
; NUMBER OF ELEMENTS (LSB,MSB)
RC = $00
; RECORD COUNTER (MSB, X REG IS LSB)
CNTH = $0F
; SORT TYPE, 0-ASC 1-DES
TYPE = $0E
;

```

```

;
; POP # OF ARGUMENTS FROM STACK
PLA
PLA
STA BASE+1 SET BASE ADDRESS
PLA
STA BASE
PLA
STA RC+1 SET ELEMENT COUNT
PLA
STA RC
;
;
; START EACH PASS THROUGH FILE
BEGIN LDA #$00
STA SWAP SET SWAP TO 0
STA CNTH SET HIGH COUNT TO 0
; SET X REGISTER TO 1 (LOW COUNT)
LDX #$01
; SET POINTER (n) TO BASE
LDA BASE
STA SEC
LDA BASE+1
STA SEC+1
;
CONT CLC
LDA SEC RESET POINTERS-
STA FST (n) to (n+1)
ADC RL
STA SEC (n+1) to (n+2)
LDA SEC+1
STA FST+1
ADC #$00
STA SEC+1
; ASCII STRING COMPARISON
LDY SS
;
;
; ASCENDING OR DESCENDING?
COMP LDA TYPE
BEQ ASC SORT IS ASCENDING
LDA (SEC),Y TYPE = DESCENDING
; COMPARE ADJOINING MEMBERS
CMP (FST),Y
BCC BACK (n)>(n+1)
BEQ INCR (n)=(n+1) TRY AGAIN
BCS FLIP (n)<(n+1)
;
ASC LDA (SEC),Y TYPE = ASCENDING
; COMPARE ADJOINING MEMBERS
CMP (FST),Y
BCC FLIP (n)>(n+1)
BEQ INCR (n)=(n+1) TRY AGAIN
BCS BACK (n)<(n+1)
;
INCR INY ADD 1 TO POINTER
CPY SE END OF SORT KEY?
BEQ COMP NO
BCS BACK YES, NEXT ELEMENT

```



```

      BCC COMP NO
;
; SWAP ELEMENTS (n),(n+1)
FLIP LDA #01
      STA SWAP SET SWAP SWITCH ON
      LDY RL LOAD LENGTH
;
MOVE DEY SET DISPLACEMENT
      LDA (SEC),Y EXCHANGE BYTES
      PHA
      LDA (FST),Y
      STA (SEC),Y
      PLA
      STA (FST),Y
      CPY #00 MORE BYTES TO SWAP?
      BNE MOVE YES
;
; INCREMENT RECORD COUNTER
BACK INX
      CPX #00 CHECK FOR >255
      BNE TEST
      INC CNTH ADD 1 TO HIGH COUNT
;
TEST CPX RC END OF FILE?
      BNE CONT NO
      LDA RC+1 CHECK HIGH EOF
      CMP CNTH
      BNE CONT NOT END OF FILE
      LDA SWAP TEST FOR END OF SORT
      CMP #00 ANY SWAPS?
      BNE BEGIN YES, START OVER
      NO, RETURN TO CALLING PROGRAM
      RTS
      .END

```

Program 2.

```

100 FOR I=1568 TO 1693:READ A:POKE I,A:N
EXT I
1568 DATA 104,104,133,217,104,133
1574 DATA 216,104,133,209,104,133
1580 DATA 208,169,0,133,218,133
1586 DATA 207,162,1,165,216,133
1592 DATA 214,165,217,133,215,24
1598 DATA 165,214,133,212,101,205
1604 DATA 133,214,165,215,133,213
1610 DATA 105,0,133,215,164,203
1616 DATA 165,206,240,10,177,214
1622 DATA 209,212,144,44,240,12
1628 DATA 176,19,177,214,209,212
1634 DATA 144,13,240,2,176,30
1640 DATA 200,196,204,240,227,176
1646 DATA 23,144,223,169,1,133
1652 DATA 218,164,205,136,177,214
1658 DATA 72,177,212,145,214,104
1664 DATA 145,212,192,0,208,241
1670 DATA 232,224,0,208,2,230
1676 DATA 207,228,208,208,172,165

```

```

1682 DATA 209,197,207,208,166,165
1688 DATA 218,201,0,208,144,96

```

Program 3.

```

10 REM SORT LOAD PROGRAM LYNN MARCOUSE 1
11/27/81
11 REM
12 REM CALLING PROGRAM MUST:
13 REM
14 REM * POKE RECORD LENGTH INTO LOCATI
ON 205
15 REM * POKE BEGINNING OF SORT KEY INT
0 LOC 203
16 REM * POKE END OF SORT KEY INTO LOCA
TION 204
17 REM * POKE TYPE (ASCENDING - 0 OR DE
SCENDING - 1) INTO LOC 206
18 REM
19 REM THIS PROGRAM WILL LOAD FILE INTO
MEMORY AND CALL MACHINE
20 REM LANGUAGE ROUTINE. WHEN COMPLETED,
YOUR PROGRAM MAY BE
21 REM RE-CALLED BY EQUATING P# TO YOUR
PROGRAM NAME.
22 REM
50 DIM X$(FRE(0)-600),R$(130),F$(15),P$(
15),I$(1)
58 REM
59 REM REPLACE X'S WITH YOUR FILE & PROG
RAM NAMES
60 P#="XXXXXX":F#="XXXXXX"
99 REM GET RECORD LENGTH
100 RET=100:R=PEEK(205)
109 REM OPEN FILE AND INPUT RECORDS
110 ? " LOADING ";F#:TRAP 600:OPEN #2,4,
0,F#:L=1
120 TRAP 140:INPUT #2,R#:TRAP 40000
130 X$(L,L+R-1)=R#:L=L+R:GOTO 120
140 CLOSE #2:L=L-1:N=L/R:? " RECORDS LOA
DED=";N
149 REM CALL MACHINE LANGUAGE SORT ROUTI
NE
150 IF N>1 THEN ? " BEGIN SORT":A=USR(15
68,ADR(X#),N)
160 RET=170:? " COMPLETED SAVING ";F#
169 REM ERASE OLD FILE AND SAVE NEW ONE
170 TRAP 600:XIO 36,#2,0,0,F#:OPEN #2,8,
0,F#
180 FOR I=1 TO L STEP R:R#=X$(I,I+R-1):?
#2;R#:NEXT I
190 CLOSE #2:XIO 35,#2,0,0,F#
199 REM RETURN TO YOUR PROGRAM ?
200 RET=200:TRAP 600:IF P$(3,4)<>"XX" TH
EN ? " LOADING ";F#:RUN P#
210 END
600 ? " ERROR - ";PEEK(195):CLOSE #2
610 ? " PRESS RETURN TO CONTINUE";:INPUT

```


I#:GOTO RET

Program 4.

```

10 REM SORT MERGE PROGRAM RON MARCUSE 1
2/01/81
11 REM
12 REM THIS PROGRAM WILL LOAD FILE INTO
MEMORY AND CALL MACHINE
13 REM LANGUAGE ROUTINE. IF FILE IS TOO
LARGE, THE SORTED DATA
14 REM WILL BE SAVED AS "D:TEMP" AND BAL
ANCE OF FILE WILL BE
15 REM READ AND SORTED. WHEN THIS STEP I
S FINISHED, THE TEMPORARY
16 REM FILE WILL BE MERGED WITH THE SOR
TED DATA IN MEMORY.
17 REM
20 GRAPHICS 0: DIM F$(15): ? : ? , "SORT/MER
GE UTILITY": POKE 82,1
30 ? : ? "ENTER": ? : ? "FILENAME (D:name.
ext) ": INPUT F$
40 ? "RECORD LENGTH ": TRAP 40: INPUT R: T
RAP Q3: IF R<2 OR R>150 THEN 40
50 ? "SORT KEY (1st,2nd) ": TRAP 50: INPU
T SS, SE: TRAP Q3
55 IF SS>=SE OR SS<0 OR SE>R THEN 50

```

```

60 ? "ASCENDING - 0 OR DESCENDING - 1 "
: TRAP 60: INPUT T: TRAP Q3
65 IF T<0 OR T>1 THEN 60
70 POKE 205,R: POKE 203,SS-1: POKE 204,SE-
1: POKE 206,T
80 XL=FRE(0)-600: DIM X$(XL),R$(R),T$(R),
D$(6)
90 Q1=210: Q2=600: Q3=40000: D$="D:TEMP"
100 ? "LOADING ": F$: TRAP Q2: OPEN #2,4,0,
F$: M=0
120 L=1: ? "PASS 1 - ": GOSUB 500: IF M=0
THEN 160
140 ? "WRITING ": D$: OPEN #3,8,0,D$: GOSUB
560
150 ? "PASS 2 - ": L=1: GOSUB 500
160 CLOSE #2: ? "DELETING ": F$
170 TRAP Q2: XIO 36,#3,0,0,F$: OPEN #3,8,0
,F$
180 ? "WRITING ": F$: IF M=0 THEN GOSUB 56
0: GOTO 400
200 TRAP Q2: OPEN #2,4,0,D$: J=1: A=1: B=1: A
E=1: BE=1
210 IF A=1 THEN TRAP 330: INPUT #2,R$: TRA
P Q3
220 IF B=1 THEN TRAP 340: T$=X$(J,J+R-1):
J=J+R: TRAP Q3
230 IF AE=0 AND BE=0 THEN 390
240 IF AE=1 AND BE=0 THEN 300

```

ATTENTION ATARI OWNERS

32K MEMORY BOARD FOR ATARI	\$129.00
Atari 800 with 16K Memory	\$679.00
Atari 800 with 48K Memory	\$789.00
Atari 810 Disk Drive	\$449.00

NEW

PRO FOOTBALL FOR ATARI WITH 16K Cassette \$9.95
Disk \$13.95

20% Discount on All Atari Software

COMPUTER COUNTRY

909 North Main Street
Randolph, MA 02368
(617) 961-3285

Cash...Money Order...COD...Certified Check


```

245 IF AE=0 AND BE=1 THEN 310
250 IF T=1 THEN 280
260 IF R*(SS,SE)>T*(SS,SE) THEN 310
270 GOTO 300
280 IF R*(SS,SE)<T*(SS,SE) THEN 310
300 ? #3;R#:A=1:B=0:IF AE=0 THEN A=0:B=B
E
302 GOTO 01
310 ? #3;T#:A=0:B=1:IF BE=0 THEN B=0:A=A
E
312 GOTO 01
330 AE=0:GOTO 220
340 BE=0:GOTO 230
390 CLOSE #2:?"DELETING ";D#:XIO 33,#2,
0,0,D#
400 CLOSE #3:XIO 36,#3,0,0,F#
410 END
500 TRAP 530:INPUT #2,R#:TRAP 03
510 X$(L)=R#:L=L+R:IF (L+R)<XL THEN 500
520 M=1
530 L=L-1:N=L/R:?"RECORDS LOADED = ";N
540 IF N>1 THEN ? "BEGIN SORT ";:A=USR(
1568,ADR(X$),N)
550 ? "END SORT":RETURN
560 FOR I=1 TO L STEP R:R=X$(I,I+R-1):?
#3;R#:NEXT I:CLOSE #3:RETURN
600 ? "ERROR - ";PEEK(195):END

```

©

1 STOP SOFTWARE for the ATARI 400/800*

ACR: A POINT OF SALE PROGRAM

CASH RECEIPTS, INVOICING, INVENTORY, COST AVERAGING, PURCHASE ORDERS, RECEIVING RECORDS, 40 OR 80 COL. PRINTER.

48K DISK INTRO OFFER: \$169.95

CASSETTE CHECKBOOK PROGRAM

MULTIPLE ACCOUNTS, 200 TRANSACTIONS PER PERIOD, USER DEFINED CATEGORIES, CREATIVE USE OF GRAPHICS AND SOUND.

16K CASS.: \$14.95

SHADOW HAWK 1

THIS IS A MACH. LANG. SPACE ADVENTURE, WHICH WE KNOW WILL OFFER COMPETITION EVEN TO STAR RAIDERS. * OFFERS 3-AXIS ROTATION; HIRES GRAPHICS & ALL OF THE SPACE SHOOTEM UP YOU'LL EVER NEED (by HORIZON SIMULATIONS).

REQUIRES AT LEAST 48K, 1 DISK DRIVE: \$48.95

DEALER INQUIRIES INVITED

High Country Microsystems

3489 W. 72nd Ave. Suite 108
Westminster, CO 80030
(303) 427-9036 426-5329

\$2.00 Shipping & Handling. ADD 2.50 for COD.
Colo. residents add 6.5% sales tax.
Free catalogue available. MC and VISA accepted.

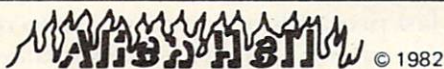
*ATARI is a registered trademark of ATARI, Inc.
SHADOW HAWK 1 is a trademark of HORIZON SIMULATIONS



SYNCR0, INC.

SOFTWARE DIVISION
31332 VIA COLINAS SUITE 107
WESTLAKE VILLAGE, CALIF. 91361
213-889-9508
T.M.

SOFTWARE FOR **ATARI** 400/800



© 1982
ALL GRAPHIC ADVENTURE. CAN YOU FREE YOURSELF FROM ALIEN HELL? IN THE SPIRIT OF THE "MAZE OF DEATH".

JOYSTICK REQUIRED
16K Tape \$14.95 24K Disk \$19.95



© 1981
A NEW GRAPHIC ADVENTURE, SIT BACK WITH YOUR JOYSTICK AND DIVE THE DEEP BLUE SEA. RENT RIG AND CREW TO PLUNDER THE STRANGE TREASURES THAT AWAIT YOU.

JOYSTICK REQUIRED
24K Tape \$16.95 32K Disk \$21.95



© 1981
ARE YOU A SUPERAGENT? A FAST ACTION, ALL GRAPHIC GAME WITH PLENTY OF SPECIAL EFFECTS IN A MAZE LIKE UNDERGROUND COMPLEX. FIVE LEVELS OF PLAY IN REAL TIME.

JOYSTICK REQUIRED
16K Tape \$12.95 24K Disk \$17.95

VISA AND MASTERCARD ACCEPTED.
CALIF. RES. PLEASE ADD 6% SALES TAX
PLEASE INCLUDE \$1.50 SHIPPING
DEALER INQUIRIES WELCOME



BUDGETMASTER (\$34.95)

- is a professional budgeting tool geared to develop and maintain even the most complex budget. At the same time, the easy to read manual and the friendly prompts allow even the beginning budgeter without computer experience to develop a budget to meet their needs.

- includes the option for hardcopy printout of any of the 39 different displays as well as an option to save your data to cassette or diskette.

- requires 32K RAM

CHECKBALANCER (\$16.95)

- although the perfect companion program to the Budgetmaster, stands alone as a great tool to balance your checking account(s), with a monthly breakdown of your spending pattern.

- allows you to store your spending analysis to tape or diskette, or use **Checkbalancer** in conjunction with the **Budgetmaster**, and automatically rewrite the expense data of the latter program process.

- requires 16K RAM

BUY BOTH PROGRAMS TOGETHER FOR \$39.95 AND SAVE \$11.95!!!

Send check or money order plus \$1.50 for shipping and handling and save C.O.D. fee (Sorry, no credit cards)

Ohio Residents Add Sales Tax

(DEALER INQUIRIES WELCOME)

Sunrise Software® • P.O. Box 25621 • Garfield Hts., Ohio 44125
(216) 581-9359

*Atari is a Trademark of Atari, Inc.

Dynamic Renumber

R. D. Young
Ottawa, Ontario

Program line renumbering is often more than just cosmetic. Afterthoughts, frequently called *bugs*, invariably use up all those spaces left between original program lines. There are a number of line renumbering programs/utilities available for PET (and other computer) owners. Unfortunately, those that I have seen, including Toolkit, renumber the entire program, once invoked. It is therefore impossible to retain blocks of subroutines, as might be initially intended.

Blocks of subroutines, 1000-1999 or 2000-2999 for example, are particularly helpful during program development. It is easier to remember a thousand-line block while debugging (and leaving lots of space between blocks) than, for example, something like 760-790. At the same time, the mainline program or a subroutine block of lines may require renumbering during the debugging stage. A segment of the program can now be renumbered with Dynamic Renumber.

This program is a modified version of Resequencer by Joe Trimble from PET User Notes, Issue 5, July-August 1978, which was modified by Jim Russo and Henry Chow in PET User Notes, Issue 7, November-December 1978.

Dynamic Renumber will renumber the selected range of lines beginning with the desired new line number and using the desired increments. It will abort if the highest renumbered line overlaps a line not selected for renumbering, but it will give erroneous line numbers if the overlap occurs at the

beginning of the renumbered segment. The program will then locate all GOTO's, GOSUB's, THEN's, ON...s, and RUN's, and insert the new target line number if required. If, however, the new target line number is longer than the old line number, only part of the new line number will be inserted. When such an event occurs, the line number of the line in which the shortened insertion is being made and the proper target line will be printed side-by-side on the screen. An asterisk is printed as each program line is being analyzed for required changes.

This program will function quite nicely as a utility stored in and run from a 4K memory partition. The program to be renumbered must, of course, reside in the normal low end of memory. Alternatively, this program can be readily appended to a program already in memory.

Dynamic Renumber can be easily converted to other than PET BASIC, provided that line numbers are stored in the same manner (see also "Program Compactor," **COMPUTE!** #11). The first four bytes of each line are defined as follows:

Pointer to next line – low byte
Pointer to next line – high byte
Line number – low byte
Line number – high byte

Changes to Dynamic Renumber, required before implementation with other BASIC's, are the start-of-BASIC pointer and the GOTO, GOSUB, etc. token values. The start-of-BASIC in the PET is 1025 decimal; this is the number that must be changed in lines 63895, 63933, and 63937. The applicable statement tokens are in line 63940 (assigned to variable P).

As one last precaution, you may wish to retain the space between the variable LE and the statement THEN in the associated IF...THEN statements, thus avoiding BASIC confusion with the LET statement.

```

63776 REM END RENUMBER
63887 REM LINE RENUMBER - RUN63888
63888 PRINT"RENUMBER":INPUT"START AT LINE #":LS
63889 INPUT"END AT LINE #":LE:IFLE>=63776THENLE=63775
63890 IF LS>= LE THEN63888
63891 INPUT"FIRST NEW LINE #":Z
63892 INPUT"INCREMENT NEW LINES BY":K
63895 DIML(500):L=1025:DEFFNR(X)=PEEK(X)+256*PEEK(X+1):REM*OLD ROM DIM L
(255)*
63900 DEFFNM(X)=INT((K*X-K+Z)/256)
63902 N=FNR(L):X=FNR(L+2):IFX<LSTHENL=N:GOTO63902
63904 L1=L
63910 N=FNR(L):X=FNR(L+2):IFX<= LE THENA=A+1:L(A)=X:L=N:IFN=0THEN63920
63912 IFX<=LE THEN63910
63915 Y=INT(K*A-K+Z):IFX<=YTHENPRINT"MAX. LINE OVERLAP - CK. PGM":END

```


NEW FROM CYBERIA ★ NEW FROM CYBERIA

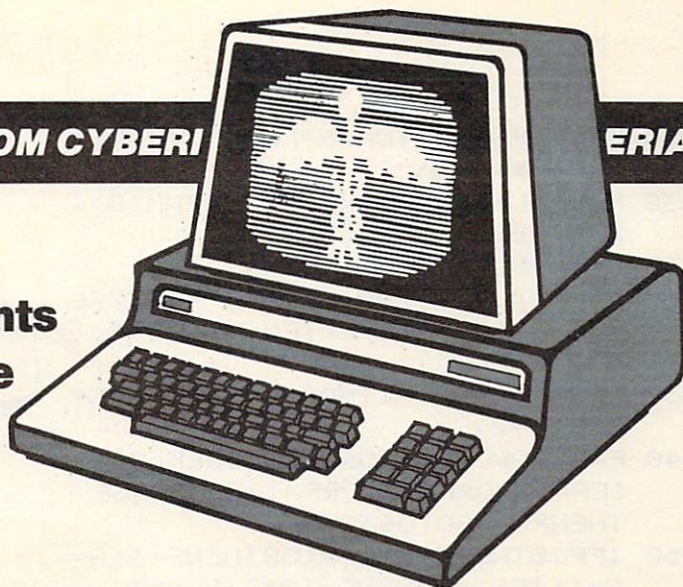
ERIA

Mari

A comprehensive accounts receivable and insurance billing system for modern health care offices and clinics

C DESIGNED FOR COMMODORE 8000 SERIES COMPUTERS AND DISK DRIVES

- Help functions are always on-line
- Supports CPT, ICD and RVS medical coding
- Supports open item or balance forward accounting systems
- Interfaces to popular word processing programs
- Multiple terminals may be added with Superbus 4.0
- Multiple disk drives may be used—no limit on number of patients or accounts

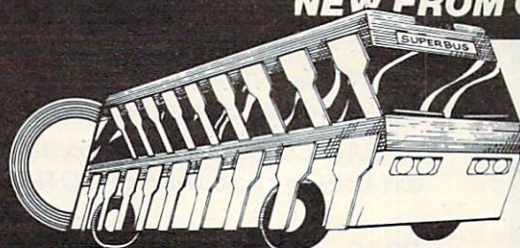


- Includes a data base and forms generator to fill out any insurance form
- Includes a computer aided instruction program to train new users

Includes these standard reports:

- A/R aging
- A/R transactions
- General ledger
- Instant cash receipt
- Income analysis by physician
- Doctor referral report
- Patient/account cross reference
- Standard SuperBill insurance form

N NEW FROM CYBERIA ★ NEW FROM CYBERIA



SUPERBUS 4.0 Commodore Computer Networking System

- Up to 18 computers can be interconnected
- Multiple disk drives, printers and other devices may be added to the network
- Sophisticated security system prevents unauthorized use
- WordPro and Wordcraft programs are supported to allow multiple terminal word processing

*WordPro is a trademark of Professional Software, Inc.


```

63920 L=L1:FORB=1TOA:N=FNR(L):POKE(L+3),FNM(B)
63930 POKE(L+2),K*B-K+Z-256*FNM(B):L=N:NEXT
63933 L=1025
63935 N=FNR(L):X=FNR(L+2):IFX<63776 THENAA=AA+1:L=N:IFN<>0 THEN 63935
63937 L=1025:FORB=1TOAA:N=FNR(L):X=FNR(L+2)
63940 F=0:FORC=L+4TON-1:P=PEEK(C):IFP=137ORP=141ORP=167ORP=138 THENF=1:GOTO63999
63950 IFF>0THENF=0:IFP<58THENF=1:G=G+1:IFP>47THEND=10*D+P-48:GOTO63999
63960 IFD=0GOTO63999
63970 FORE=1TOA:IFD=L(E)GOTO63990
63980 NEXTE:D=0:G=0:GOTO63999
63990 D=0:E$="" "+STR$(E*K-K+Z):H=LEN(E$):C=C-G:IFP<48THENG=G-1:C=C+1
63995 IFH-6>GTHENPRINTX:E*K-K+Z:
63997 FORI=1TOG:POKEC,ASC(MID$(E$,I+H-G,1)):C=C+1:NEXTI:G=0
63999 NEXTC:L=N:PRINT"*":NEXTB:END
READY.

```

PETTERM INTELLIGENT TERMINAL



Turn your PET into an intelligent terminal with one of our terminal packages. These are complete assembled hardware and software packages. All include line editing/ resend, repeat key, shift lock, output to CBM printer, and more... Delivered on PET cassette with manuals.

- PETTERM I All features above \$75.00
- 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

for PET/CBM

FORTH is a new concept in programming, with the speed of compilers and interactive ease of BASIC. Programs become a part of FORTH extending the power of FORTH and your PET.

8050,4040 disk, cassette all PET-CBMs 16k+

Startec	fig-FORTH w editor assembler	\$35
Personal	floating point; strings; source	\$75
Professional	turnkey development/data base	\$259

===== F S S =====

software for small computers

1983 Rio Grande Austin, Texas 78785 1-512-477-2207 P.O. Box 8483 Austin, Texas 78712



DEALERS INQUIRE



NEW COMMODORE ADD-ONS RAM-ROM: GETS RID OF SAFING ROM

*MX-910 CBM/PET RAM/ROM:

Allows multi ROM protected programs using the same socket to be put onto diskette/cassette, no need to insert protect ROM in socket after initial load, eliminates need for ROM switch box, write protect in software, decoded for dual ROM socket usage, 4K expandable to 8K, easy internal CBM installation: \$119.95

*MX-232 CBM/PET TO RS-232C INTERFACE:

Low cost, bidirectional, 50 to 19,200 baud rate, full modem controls, parity allows for two RS-232C CBM ports, installs easily inside CBM: \$199.95

SX-100 IEEE-488/PET MODEM SOFTWARE:

Best 810 modem software, by 8010 developer, works with Source/Micronet/CBM to disk/CBM to CBM: \$79.95

*MX-200 IEEE-488/PET PARITY MODEM/SOFTWARE

Talk to a host computer requiring parity, all features of SX232: \$399.95

*MX-903 CBM/PET AUTORESET:

Easily installed reset circuit: \$19.95

ECX COMPUTER COMPANY

2678 NORTH MAIN ST.
WALNUT CREEK, CA 94596
(415)944-9277

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, 201 West 92 St., New York, NY 10025

NOW COMMODORE TALKS. AND LISTENS.

COGNIVOX VIO-1002 is a speech recognition and voice output peripheral for Commodore computers. It offers state-of-the-art capabilities with pleasant sounding natural voice output and recognition performance equal to that of units costing many times more. Its capabilities, the very affordable price and its variety of uses makes it a "must have" peripheral.

Many uses

With COGNIVOX your imagination is not the limit, as the saying goes. It is the starting point. Use it for data entry when the hands and/or eyes are busy. As an educational tool. As an aid to the handicapped. Or as a foreign language translator, a sound effects generator, a telephone dialing device, an answering machine, a talking calculator or clock. Use it in conjunction with the IEEE 488 port to control by voice instruments, plotters, test systems. And all these devices can talk back to you telling you their readings, alarm conditions, even their names. Or use it with a BSR controller interface (see Compute, Oct. 81) to control by voice lights and appliances in the house.

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. To train COGNIVOX to your vocabulary, all you have to do is repeat the entries three times at the prompting of the computer. The voice output vocabulary can also have up to 32 words or phrases of your choice. Data rate is approximately 700 bytes per word. Vocabularies can be stored and recalled from disk, giving in effect unlimited selection of entries.

COGNIVOX VIO-1002 will work with all Commodore computers (old, new and newer ROMs) with at least 16K of RAM. It comes complete with assembled and tested hardware in a quality instrument case, speaker/amplifier, power supply, microphone, cassette with software and detailed user manual.

Easy to use

All you need to get COGNIVOX up and running is to plug it in the user port and load one of the programs supplied. Load the demon 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 or to recognize a word. Full instructions on how to do it are given in the manual.

Order your COGNIVOX now.

To order by mail send us a check or money order for \$249 plus \$5 shipping and handling (CA residents add 6% tax). You may also order by phone and charge it to your VISA or MASTERCARD. Call us at (805) 685-1854, 9AM to 5PM, PST, M-F. Foreign orders are welcome, please add 10% for air mail shipping and handling.



VOICETEK

P.O. Box 388, Goleta, CA 93116

Disk Data Structures: An Interactive Tutorial

David Young
Richardson, TX

The floppy disk is a marvelous and yet mysterious medium for mass storage of data. Indeed, understanding exactly how a bit of data is stored and retrieved from the surface of the disk requires a good knowledge of physics. However, to learn about the data structures found on a disk requires mathematics no more complex than hexadecimal arithmetic. The manual supplied with the computer usually does an adequate job of supplying all the technical details, but wouldn't it sink in better if the actual data on the media could be viewed while it is being described?

The program that is presented here, Diskpeek, was created just for that purpose. Though this program was written for the Atari Personal Computer (DOS 2.0S), the interactive tutorial which follows contains information which should apply, in one form or another, to most other disk based computer systems. Those with a disk based Atari computer should type in Diskpeek before proceeding. This program is used to demonstrate the disk data structures as they are being described. The instructions integrated into the program should make its use self-explanatory.

The Disk Medium

The first disk structure to be aware of is the sector which, on any computer system, consists of a group of contiguous bits recorded at a specific location on the disk. The disk drive hardware always operates on whole sectors, that is to say, it is not possible to read or write partial sectors. Groups of sectors are organized into tracks forming concentric rings about the center of the disk.

The Atari system divides the disk into 40 tracks with 18 sectors per track for a total of 720 sectors. This is best visualized by taking the lid off of the disk drive and watching the read/write head move as certain sectors are addressed. On the Atari 810 disk drive this is accomplished by removing the four Phillips head screws hidden under gummed tabs at each corner of the lid. While inside the case, a bit of lubrication on the 2 cylindrical

guide rails supporting the head will make the drive less noisy.

If sectors 1 through 18 are read with Diskpeek, the head remains fixed on the outermost track. When sector 720 is read, the head moves in to the innermost track. When a disk is formatted, the head can be seen to bump sequentially through all 40 tracks. It is laying down the patterns on the oxide surface which will be recognized by the drive hardware as the sectors. The sectors are all initially empty (128 bytes of 0), but at the end of the formatting routine, as described in the next section, the Atari DOS records special data into certain sectors. The top of the drive can now be resecured. No more information about the hardware is needed to understand the higher level disk data structures of the software.

Boot Sector

At the end of the formatting process, DOS reserves and initializes certain sectors for special tasks. Into sectors 1 through 3 is stored the bootstrap for DOS. On power-up the Atari operating system reads sector 1 to determine how many sectors to read and where into memory to load them. After it has loaded in the specified number of sectors, DOS starts executing the new code at the load address + 6. Put Diskpeek into the hex mode and read sector 1 of any DOS disk. Byte 0 says that 3 sectors are read (sequentially) and bytes 1 and 2 specify a load address of \$700. (A 2 byte number is always specified with the least significant byte first.) Byte 6 is the first instruction to be executed (a \$4C1407 is a JMP \$714). In this case the code which follows sets up to load the File Management System of DOS into memory. This is called the second stage of the boot. Look at the first sector of any other boot disk available (any game or program which loads in from disk on power-up). It might be seen that the program loads in entirely during the first stage of the boot, i.e. byte 1 of sector 1 has a sector count which represents the entire program. For more details on the disk boot process, see the Atari *Operating System User's Manual*.

Volume Table Of Contents

Besides the first three boot sectors, DOS sets up sectors 360 to 368 as the directory of the disk. DOS uses the directory to keep track of where files are stored on disk and how much disk space remains. Read sector 360 of a DOS disk with Diskpeek in the hex mode and view a part of the directory called the Volume Table of Contents (VTOC). Information pertaining to the availability of every sector on the disk is stored in this sector. Bytes 1 and 2 specify the maximum number of user data sectors on the disk (\$2C3 = 707) and bytes 3 and 4 specify the number of free sectors remaining on

Announcing

ATARI

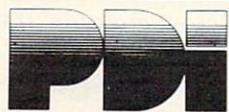
software

TM

from the
authors of
An Invitation to Programming

exciting games
and educational programs
for kids,
teenagers
and
adults
featuring sound
and color graphics.

available on
guaranteed-to-load
cassettes
at fine
computer dealers in your
area or,
write us directly for
descriptive materials



Program Design, Inc.
Department CA
11 Idar Court
Greenwich, CT 06830

203-661-8799

See us at the West Coast Computer Faire — Booth 1348.



MICROWORLD, an adventure within your computer, is available on the ATARI and the TRS-80. You are transformed into an electroid, and must explore the circuits of your computer. Over 80 locations and many original problems exist within the maze of transformers and transistors. We dare you to explore the maze of bit cells! Each version of Microworld explores the workings of its respective computer, Atari or TRS-80. Microworld comes with a booklet defining terms and describing the function of the mystifying inner workings of home computers. Come face to face with a station! Explore the Microworld!

SATISFACTION GUARANTEED!

If for any reason you are not satisfied with our products, return your order within 14 days for a prompt and cheerful refund.

ORDERING INFORMATION

Orders are processed within five working days. Shipping and handling charge of \$1.00 will be added to all orders within the U.S. and Canada. Overseas orders please add \$3.00 for air post.

Atari Microworld	Atari 400 and 800	
32K Cassette	.....	\$19.95
Atari 400 and 800		
32K Diskette	.....	\$22.95
TRS-80 Microworld	TRS-80 Model I and Model III	
Level II 16K Cassette	.....	\$19.95
TRS-80 Model I and Model III		
Level II 32K Diskette	.....	\$22.95

MICROWORLD \$
SHIPPING 1.00
TOTAL \$

TRS-80 ATARI
 CASSETTE DISKETTE

NAME

STREET

CITY STATE ZIP

CHECK VISA MASTERCARD

EXP. DATE

MED SYSTEMS SOFTWARE

P.O. Box 2674, Chapel Hill, NC 27514
1-800-334-5470

the disk (707 for an empty disk, 0 for a full one). Starting in bit 6 (the second to highest order bit) of byte \$0A, each bit up through byte \$63 corresponds to a sector. A 1 corresponds to a free sector while a 0 means the sector is being used.

When a file is stored on the disk, the bits corresponding to the sectors used are set to 0. When the file is erased, the bits are set back to 1. That is why DOS, when it deletes a file, can be heard reading the entire file. It is determining which sectors were being used by the file so that it can free them back up. Notice that even on a newly formatted disk, sector bits 1, 2 and 3 (bits 6, 5 and 4 of byte \$0A) are set to 0. These correspond to the 3 boot sectors. Likewise, the nine bits starting in byte \$37 are 0 because they correspond to the sectors of the directory. These 12 sectors are thus kept from being overlaid by user files.

If the VTOC is viewed on an older disk which has had many file additions and deletions, it may be noted that the VTOC has become quite fragmented. Any file added to the disk may get stored into sectors scattered about the disk. How DOS keeps track of files spread over multiple sectors will be discussed shortly. By the way, even though the operating system recognizes sector 720 (try reading it; should be all zeroes), DOS never makes use of it. True to Murphy's Law, it adopted the number scheme of 0 to 719 instead of 1 to 720. No need to bother trying to read sector 0!

The Directory

Of all the disk data structures, probably the most important one to be acquainted with is the directory. The eight sectors following the VTOC (361-368) contain a list of all the files on the disk along with their size, starting sector, and status. Put Diskpeek into character mode and read sector 361 of the DOS disk that has several files on it. It can be seen that the name of the first file starts in byte \$05 and the extension (if any) starts in byte \$0D. If any of the 11 character positions of the filespec are unused, it contains a blank. Notice that the filenames start every 16 bytes, allowing eight directory entries per 128 byte sector. Thus, the maximum number of entries for the eight sectors of the directory is 64.

Now put Diskpeek in hex mode and read sector 361. The first byte of each 16 byte entry contains the status of the file. For a normal file that byte is \$42, unless it is locked, in which case it has a status of \$62. A deleted file has a status of \$80. An anomaly occurs whenever a file is opened for output (from BASIC, perhaps) but is not closed before the computer is powered down or glitched. Since the status of an open file is \$43, DOS will neither recognize the entry as "in use" nor "deleted." Even the sectors which may have been written out will not

really exist on disk because the VTOC is not updated until the file is closed. The only harm done is that this bogus entry will take up space in the directory until the disk is reformatted. The second and third bytes of each entry contain the size in sectors of the file (low order byte first) while the fourth and fifth bytes specify the first sector of the file. DOS only needs to know the first sector of a file because each sector points to the next sector of the file in a process called "linking."

Linking

At this point it would be best to explain how DOS forms a data file on disk. First, the user must open an I/O channel for output to the disk, perhaps with the BASIC "OPEN" command. DOS responds by creating an entry in the directory with the specified filename and a status of \$43. DOS reads the VTOC into memory and searches the disk map for the first free sector. If a free sector is found, its number is used as the starting sector in the directory entry. Now, when the user begins to output data via this I/O channel, perhaps with the BASIC "PUT" command, DOS waits until it has collected 125 bytes of user data in a buffer. Then DOS adds three special bytes of its own and outputs the sector to the disk. I call these three bytes the "sector link."

The sector link, bytes 125 to 127 of the sector, contains three pieces of information. The high order six bits of byte 125 contain a number which represents the position of the file's entry within the directory (0 to 63). DOS uses this number to check the integrity of the file. If ever this number should fail to match the position of the file's directory entry, DOS generates an error. The low order two bits of byte 125 and all of byte 126 form a pointer to the next sector of the file. A pointer is the address of a record in the computer's memory or, in this case, the address of a record on disk, the sector number.

The next sector of the file is determined by scanning the bit map of the VTOC for the next free sector, which may or may not be the next sequential sector of the disk. Thanks to the link pointers, all sectors of a file need not be contiguous sectors on the disk. The last byte of the sector link (byte 127 of the sector) contains the number of bytes used within the sector. This byte will always be \$7D (125) except for the last sector of a file, which will probably be only partially filled. DOS writes out this partial sector only when the user closes the file, perhaps with the BASIC "CLOSE" command.

When an output disk file is closed, DOS writes the newly updated VTOC back out to sector 360. It then updates the file's directory entry by changing the status to \$42 and filling in the file size (bytes 1

and 2) with the number of sectors used by the file. This completes the process of creating a file on disk. Now, when DOS is requested to read a file from disk, it finds the directory entry of the specified file to determine the start sector. Then, following the link pointers, it reads the file, sector by sector, until EOF (end of file) is reached, indicated by a link pointer of 0.

Equipped with a basic understanding of how a file is stored on disk, try looking at a file with Diskpeek. In character mode, first locate the name of the desired file in the directory (sectors 361-368). Then put Diskpeek in hex mode and look at the fourth and fifth byte of the entry to determine the start sector. For example, if these two bytes were "01 02" then type "\$201" to read the first sector.

Observe the last three bytes of the sector and verify that the high order six bits of byte 125 correspond to the directory entry position and that byte 127 is the number of bytes used (probably \$7D). Then determine the next sector of the file from the low order two bits of byte 125 and byte 126. For example, if bytes 125 and 126 are "06 02" then the next sector of the file is \$202 and the file is the second entry of the directory (the first entry being entry zero). If the file is not too long, it would be instructive to follow the sector links to EOF. Once the ability of finding a file on disk and following the sector links is mastered, all that remains is to become familiar with the three types of files used by DOS.

File Types

The first type of file is not a true file, per se, because there is no entry in the directory for it. This file type includes the boot record and the directory itself. And, since the sectors which make up these files are not linked, but, instead, are related to each other sequentially, I call these records "sequentially linked files." When examining a sector of the boot record or directory, merely increase the sector number by one to get to the next sector of the record.

An example of the second type of file is that which is created with the BASIC LIST or SAVE command. This file consists of ASCII characters which either represent straight text, as in a LISTed file, or a sort of condensed text, as in a tokenized or SAVED file. Except when viewing the sector links, the character mode of Diskpeek is best suited for examining this type of file. At this point it would be instructive to locate (in the directory of a DOS disk) a file created with the BASIC LIST command.

Upon determining the start sector, observe the file in the character mode. The BASIC program can be easily recognized. It may be noted that the carriage return-line feed character (CRLF) is dis-

played in its ATASCII representation (an inverse escape character) instead of being executed. Now observe a file that consists of a program that was SAVED from BASIC. Since the text has been tokenized, the program is harder to recognize. However, certain parts of the program are not altered during the tokenization process, notably text following REM and PRINT statements. Now, having investigated ASCII files, it is time to discuss the last file type, the *binary load* file.

The binary load file is primarily used to load 6502 machine code into memory for execution. However, its format is so general that it can be used just as easily to load any type of data, including ASCII text. Locate a game or other program which is run with the BINARY LOAD option of DOS. Alternatively, create a binary load file by saving any part of memory (except ROM) with the BINARY SAVE option. Now observe the first sector of the file with Diskpeek in the hex mode.

First, notice that all binary load files start with two bytes of \$FF. The next four bytes are the start and end addresses, respectively, where the data to follow will be loaded into memory. If these four bytes were "00 A0 FF BF" then the data would be loaded between the addresses of \$A000 and \$BFFF. I call these four bytes a *load vector*. After DOS has loaded in enough bytes to satisfy the load vector, it assumes (unless EOF is reached) that the next four bytes specify another load vector. DOS will continue inputting the file at this new address.

Upon completion of a BINARY LOAD, control will normally be passed back to the DOS menu. However, DOS can be forced to pass control to any address in memory by storing that two byte address at location \$2E0. To store the two bytes, it is necessary to specify another load vector as part of the file. If, for example, it were desired to execute the program loaded in at \$A000, the following load vector would be part of the file: E0 02 E1 02 00 A0. I call this specialized load vector an *autorun vector*. It achieves the same result as the RUN AT ADDRESS option of DOS. Try to find the autorun vector in the file being viewed. Although it could be at the beginning, it is most likely located at the very end of the file.

```

10 REM DISKPEEK: David Youne 11/10/81
20 SETCOLOR 1,0,4:SETCOLOR 2,10,10
30 DIM HEXCHAR$(16),HEXBYTE$(2)
40 DIM HEXNUM$(113),SECTRM$(68)
50 DIM TEMP$(3),DFORM$(1)
60 ? CHR$(125):? "WAIT A FEW SECONDS..."

70 GOSUB 1130:GOSUB 970
80 GOSUB 660:RESTORE 90

```



```

90 DATA 0123456789ABCDEF
100 READ HEXCHAR$: OPEN #1,4,0,"K"
110 DFORM$="H"
120 ? CHR$(125):? "          DISKPEEK by Da
vid Youns":?
130 ? "This is a disk utility for viewin
s"
140 ? "individual sectors of a disk. It"
150 ? "reads the sector specified by the
"
160 ? "user and then displays it's conte
nts"
170 ? "as a matrix of hex bytes or ATASC
II"
180 ? "characters.":?
190 ? "The sector number can be specifie
d in"
200 ? "decimal ('361') or hex ('$169').
Type"
210 ? "RETURN to toggle from one displa
y"
220 ? "format to the other."
230 POSITION 2,20: ? CHR$(156):? "Sector
#";
240 INPUT HEXNUM$: IF LEN(HEXNUM$)<>0 THE
N 280
250 IF DFORM$="C" THEN DFORM$="H":GOTO 2
70
260 DFORM$="C"
270 GOSUB 770:GOTO 230
280 GOSUB 500: IF BYTE<0 OR BYTE>720 THEN
GOSUB 350:GOTO 230
290 SECNUM=BYTE
300 GOSUB 880: IF X=1 THEN GOSUB 770
310 GOTO 230
320 REM
330 REM *** PRINT ERROR MESSAGE ***
340 REM
350 POSITION 2,19: ? CHR$(156):CHR$(156):
CHR$(156): "NOT LEGAL NUMBER!":RETURN
360 REM
370 REM **** PRINT HEX BYTE ****
380 REM
390 GOSUB 430:PRINT HEXBYTE$:RETURN
400 REM
410 REM *** HEX CONVERSION ***
420 REM
430 TEMPB=BYTE:BYTE=INT(BYTE/16)+1
440 HEXBYTE$(1,1)=HEXCHAR$(BYTE, BYTE)
450 BYTE=(TEMPB-(BYTE-1)*16)+1
460 HEXBYTE$(2,2)=HEXCHAR$(BYTE, BYTE)
470 BYTE=TEMPB:RETURN
480 REM
490 REM *** NUMBER CONVERSION ***
500 REM
510 TRAP 630: IF HEXNUM$(1,1)<>"$" THEN G
OTO 620
520 HEXNUM#=HEXNUM$(2)
530 IF LEN(HEXNUM$)=3 THEN HEXNUM$(4)=HE
XNUM$(3):HEXNUM$(3,3)=HEXNUM$(2,2):HEXNU
M$(2,2)=HEXNUM$(1,1):HEXNUM$(1,1)="0"
540 IF LEN(HEXNUM$)=2 THEN HEXNUM$(4)=HE
XNUM$(2):HEXNUM$(3,3)=HEXNUM$(1,1):HEXNU
M$(1,2)="00"
550 IF LEN(HEXNUM$)=1 THEN HEXNUM$(4)=HE
XNUM$(1):HEXNUM$(1,3)="000"
560 IF ASC(HEXNUM$(1,1))>64 THEN HEXNUM$(
1,1)=CHR$(ASC(HEXNUM$(1,1))-7)
570 IF ASC(HEXNUM$(2,2))>64 THEN HEXNUM$(
2,2)=CHR$(ASC(HEXNUM$(2,2))-7)
580 IF ASC(HEXNUM$(3,3))>64 THEN HEXNUM$(
3,3)=CHR$(ASC(HEXNUM$(3,3))-7)
590 IF ASC(HEXNUM$(4,4))>64 THEN HEXNUM$(
4,4)=CHR$(ASC(HEXNUM$(4,4))-7)
600 BYTE=(ASC(HEXNUM$(4,4))-48)+16*(ASC(
HEXNUM$(3,3))-48)+256*(ASC(HEXNUM$(2,2))
-48)+4096*(ASC(HEXNUM$(1,1))-48)
610 TRAP 40000:RETURN
620 TRAP 630:BYTE=VAL(HEXNUM$):GOTO 610
630 GOSUB 350:BYTE=-1:GOTO 610
640 REM
650 REM *** DISK READ/WRITE ***
660 REM
670 RESTORE 680:FOR K=1 TO 68:READ 0:SEC
TRM$(K,K)=CHR$(0):NEXT K:RETURN
680 DATA 104,104,104,201,83,169,82,144
690 DATA 2,169,87,72,169,0,72,169
700 DATA 1,72,169,0,72,169,128,72
710 DATA 169,6,72,72,104,104,141,5
720 DATA 3,104,141,4,3,104,104,141
730 DATA 1,3,104,104,141,2,3,104
740 DATA 141,11,3,104,141,10,3,32
750 DATA 83,228,173,3,3,133,212,169
760 DATA 0,133,213,96
770 REM
780 REM *** DISPLAY SECTOR ***
790 REM
800 BYTE=INT(SECNUM/256): ? CHR$(125)
810 ? "SECTOR # = ",SECNUM:
820 ? " ($":GOSUB 370
830 BYTE=SECNUM-256*INT(SECNUM/256)
840 GOSUB 370: ? ")
850 IF DFORM$="H" THEN GOTO 870
860 X=USR(ADR(MEMCHAR$),1536+128):RETURN

870 X=USR(ADR(MEMHEX$),1536+128):RETURN

880 REM
890 REM *** READ SECTOR ***
900 REM
910 X=USR(ADR(SECTRM$),82,SECNUM)

```



```

920 IF X=1 THEN 950
930 POSITION 2,19
940 ? "CAN'T READ SECTOR ";SECNUM;"!"
950 RETURN
960 REM
970 REM *** DISPLAY MEM IN HEX ***
980 REM
990 DIM MEMHEX$(122)
1000 RESTORE 1010:FOR K=1 TO 122:READ Q:
MEMHEX$(K,K)=CHR$(Q):NEXT K:RETURN
1010 DATA 104,104,133,229,104,133,228,16
9
1020 DATA 0,72,104,72,16,7,169,155
1030 DATA 32,164,246,104,96,169,155,32
1040 DATA 164,246,104,72,74,74,74,74
1050 DATA 201,10,48,2,105,6,105,48
1060 DATA 32,164,246,104,72,41,15,201
1070 DATA 10,48,2,105,6,105,48,32
1080 DATA 164,246,169,32,32,164,246,169
1090 DATA 32,32,164,246,104,72,168,177
1100 DATA 228,74,74,74,74,201,10,48
1110 DATA 2,105,6,105,48,32,164,246
1120 DATA 104,72,168,177,228,41,15,201
1130 DATA 10,48,2,105,6,105,48,32
1140 DATA 164,246,169,32,32,164,246,104
1150 DATA 24,105,1,72,41,7,208,204

1160 DATA 240,144
1170 REM
1180 REM *** DISPLAY MEM IN CHAR FORMAT
***
1190 REM
1200 DIM MEMCHAR$(122)
1210 RESTORE 1220:FOR K=1 TO 122:READ Q:
MEMCHAR$(K,K)=CHR$(Q):NEXT K:RETURN
1220 DATA 104,104,133,229,104,133,228,16
9
1230 DATA 0,72,104,72,16,7,169,155
1240 DATA 32,164,246,104,96,169,155,32
1250 DATA 164,246,104,72,74,74,74,74
1260 DATA 201,10,48,2,105,6,105,48
1270 DATA 32,164,246,104,72,41,15,201
1280 DATA 10,48,2,105,6,105,48,32
1290 DATA 164,246,169,32,32,164,246,169
1300 DATA 32,32,164,246,169,1,141,254
1310 DATA 2,104,72,168,177,228,201,155
1320 DATA 208,11,169,0,141,254,2,169
1330 DATA 219,133,93,169,31,32,164,246
1340 DATA 169,32,32,164,246,169,32,32
1350 DATA 164,246,169,0,141,254,2,104
1360 DATA 24,105,1,72,41,7,208,204
1370 DATA 240,144

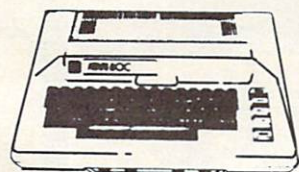
```

©

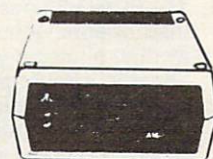
ATARI

from

SOFTWARE STREET

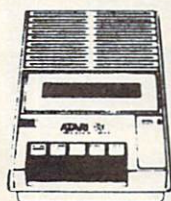


\$729.00



\$429.00

We carry a wide variety of
hardware and software to
accommodate all ATARI needs.



\$65.00

Call or write for FREE catalog
SOFTWARE STREET

3392 Clipper Dr.
Chino, CA 91710
(714) 591-3061

call for shipping charges



Single Board Computers	Bare Board	Kit	Assm.
80-153 1k RAM 2k EPROM	\$19.95	\$ 89.95	\$110.95
80-280 1k RAM 2k EPROM	\$19.95	\$119.95	\$129.95
81-260 2k RAM 4k EPROM	\$39.95	\$149.95	\$199.95
81-030 4k RAM 16k EPROM	\$89.95	*\$249.95	\$349.95
8085 3 chip system	\$24.95		
8088 5 chip system	\$29.95		
Apple II boards	Bare Board	Kit	Assm.
79-295 Parallel I/O	\$19.95	\$59.95	\$ 69.95
81-132 A-D 16 Channel	\$29.95	\$69.95	\$ 89.95
80-085 12k EPROM (2716)	\$39.95	\$49.95	\$ 59.95
80-244 EPROM PROGRAMMER	\$24.95	\$39.95	\$ 49.95
80-144 Display add + data	\$25.95	\$42.95	\$ 49.95
80-297 Parallel Printer Interface		\$69.95	\$ 79.95
Extender Board		\$12.95	
81-088 Speech Synthesizer (Votrax SC-01)			\$139.90
Other Products	Bare Board	Kit	Assm.
CRT Controller	\$39.95		
79-287 A-D and D-A	\$19.95	\$59.95	\$ 79.95
79-282 S S Switch 1 ch.	\$ 6.95	\$10.95	\$ 13.95
79-282 S S Switch 4 ch.	\$24.95	\$39.95	\$ 49.95
80-160 +5 Volt 500 Ma.	\$ 8.95	\$16.95	\$ 20.95
80-161 ± 12 Volt 120 Ma.	\$ 8.95	\$18.95	\$ 22.95
81-120 Parallel Input Speech Synthesizer			\$149.90

Send for complete Catalog and OEM pricing.
* Partially Populated price.

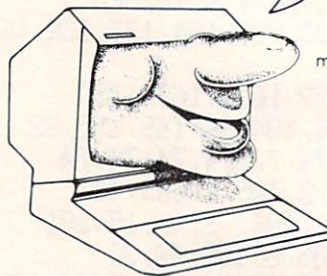
JOHN BELL ENGINEERING, INC.

ALL PRODUCTS ARE AVAILABLE FROM JOHN BELL ENGINEERING
P.O. BOX 338 • REDWOOD CITY, CA 94064
ADD SALES TAX IN CALIFORNIA
ADD 5% SHIPPING & HANDLING • 3% FOR ORDERS OVER \$100
10% OUTSIDE U.S.A.

SEND FOR CATALOG (415) 367-1137

The Voice

The Voice gives your Apple the power of speech! Use the standard Voice vocabulary to speak an endless combination of phrases, or easily record your own vocabulary and make your Apple say anything you like. Each data disk stores up to 80 words or phrases which can be sorted for quick reference. What's more, the Voice allows you to speak from any Basic program by using Print Commands. Guaranteed the best and easiest to use speech software available. For the Apple II or Apple II Plus with 48K. (\$39.95)



from the leader in quality software

MUSE SOFTWARE™

Apple II is a trademark of Apple Computer Corp.

330 N. CHARLES STREET
BALTIMORE, MD 21201
(301) 659-7212

Call or write for information and the name of your nearest MUSE dealer.

ECHO][™ SPEECH SYNTHESIZER UNLIMITED VOCABULARY AT YOUR FINGERTIPS

Give your Apple* something to talk about with an ECHO][Speech Synthesizer. The ECHO][offers intelligible voice-output while using a minimum of RAM. The ECHO][uses LPC technology pioneered by Texas Instruments, coupled with a phoneme-based operating system allowing you to create any vocabulary desired. Variable stress, pitch and volume let your Apple ask questions or make exclamations while also allowing for optimal quality. Speech can easily be added to BASIC programs with PRINT statements.

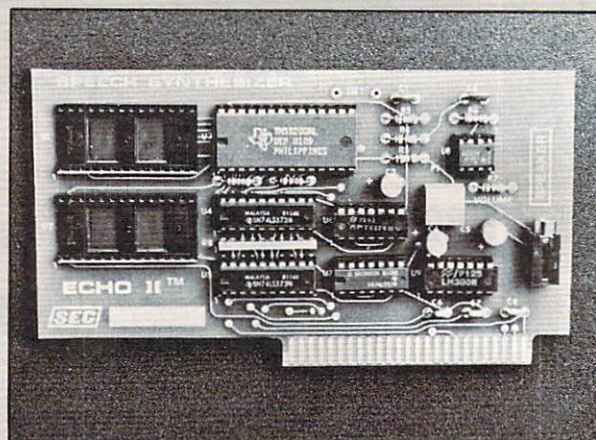
The applications of synthesized speech are limited only by your imagination. From educational programs to games to business applications, speech-output adds a new dimension to your Apple's capabilities.

The ECHO][Speech Synthesizer comes complete with speaker and cable, instruction manual, speech editing features and a sample vocabulary. The ECHO][requires 48K, Applesoft and at least one disk drive. Suggested list price is \$225.

For further information, contact your dealer or Street Electronics Corporation.

Dealer inquiries welcome.

* Trademark of Apple Computer Company



SEC

STREET ELECTRONICS CORPORATION

3152 E. La Palma Ave., Suite D
Anaheim, CA 92806

(714) 632-9950

Apple Addresses

Bill Grimm
Mountain View, CA

The Apple II uses three types of addressing depending upon the language being used. Apple's machine language uses hexadecimal addresses in the range from \$0000 to \$FFFF. Its Floating Point BASIC language uses decimal addresses in the range from 0 to 65535. Its Integer BASIC uses decimal addresses in the range from 0 to 32767 to -32767 to -1. This means that, if you want to address a particular memory location, you must choose the correct address for the language you are using. Since I program in all three languages and my references are a mixture from all three, I needed an address cross-reference program. So I wrote "Apple Addresses."

"Apple Addresses" can be used "as is" to convert one language's address to another's, and to give the high and low byte values which need to be poked into a BASIC program to store that address. Alternatively, you could extract the subroutines in Apple Addresses which convert between hex and decimal numbers and insert them in your own program. See the last paragraph of this article for more details.

The program begins by asking the user which of the six possible conversions he would like to make. This is followed by a request to select the way the results of the conversions are to be displayed. There are four possible displays:

1. single conversions displayed on the monitor one at a time.
2. Single conversions printed out on a Silentype printer* one at a time.
3. a range of conversions displayed on the monitor.
4. a range of conversions printed out on a Silentype printer*.

*With slight program modifications other printers could be used.

Subroutines

"Apple Addresses" makes extensive use of subroutines. This helps in organizing the program as well as making it shorter and easier to debug. The controlling or EXECutive routine is called Apple Addresses - Exec. It starts on line 100 and goes to line 310. Since a picture is worth a thousand words, I made what I call a *balloon diagram* (Figure 1) to

show how data flows through the program. These are the conventions I used to make the diagram;

1. Each balloon represents a subroutine. The name of the subroutine and the line numbers where it is located are placed in the balloon.
2. Data flows through a subroutine in the direction of the arrows on the outside of the balloon.
3. Data flows between subroutines in the direction of the arrows on the *strings*.
4. If conditions are placed on what data flows through a subroutine, these conditions are written in along the *strings*.

As an additional aid for understanding how the program works I have included the following variable descriptions list:

A() — each A(I) holds the decimal equivalent value of the Ith hexadecimal numeral in the hex number being created from a decimal number — appropriate numbers are then added to convert these to ASCII codes.

A\$() — holds the characters represented by the ASCII codes in A().

CHOICE — holds the number of the conversion chosen — see lines 120 to 178.

DVL — holds the decimal value of the number being converted — may be either FP or INT decimal.

DVL\$ — is the string equivalent of DVL and is used in the output routines.

FLAG — if flag = 1 then an invalid number was entered and the program returns to get a new number.

FRST — holds the FP Basic address equivalent of the lowest address in the selected range.

FRST\$ — holds the smallest address chosen — this address is then processed and stored in FRST.

HVL\$ — holds the hex number selected or the hex number resulting from the conversion — if no hex numbers are involved then it holds the converted decimal number.

LST — holds the FP Basic address equivalent of the largest address in the selected range.

LST\$ — holds the largest address chosen — this address is then processed and stored in LST.

N — holds the decimal equivalent of each hex numeral in a hex number being converted to a decimal number.

PHI% — holds the number that would be poked into the high byte when placing the address into memory.

PLO% — holds the number that would be poked into the low byte when placing the address into memory.

POK — holds the address from which PLO% and PHI% are derived.

SELECT — holds the type of output selected — see lines 462 to 470.

STP — holds the positive decimal stepping interval chosen.

STP\$ — holds the stepping interval chosen which is later changed and stored in STP.

TB — the horizontal tab value desired.

TN — holds the intermediate numbers of the decimal address that is being converted into a hex address.

VTB — used to control the vertical tabbing of the monitor output.

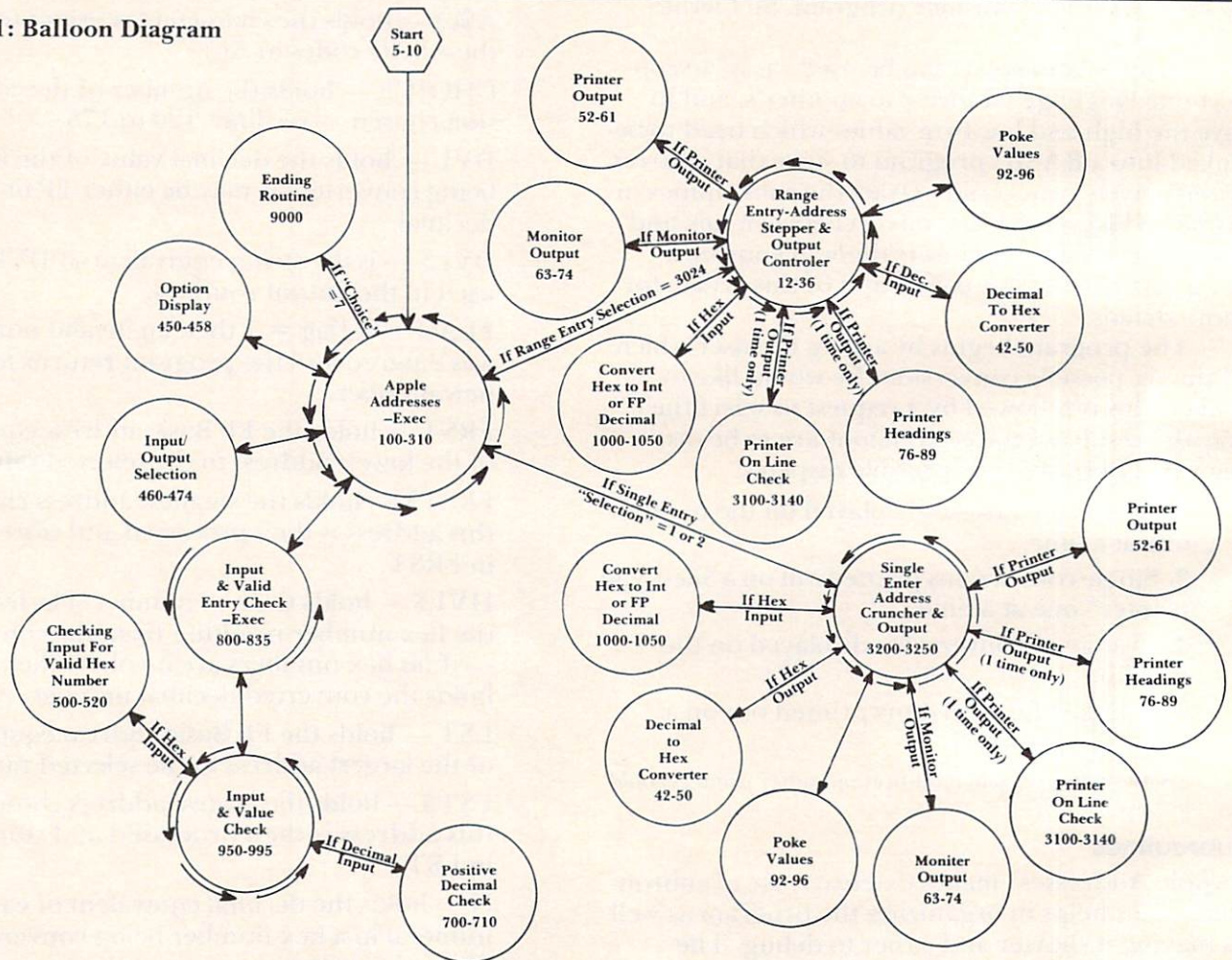
Some Suggestions

I have found that the easiest way to debug a pro-

gram while I am entering it is to first type in the EXEC program. Then, if I place return statements at all the branching locations, I can check the EXEC for bugs. Once the EXEC is free of bugs, I add one subroutine at a time in the order that the EXEC uses them, checking for bugs as I go.

If you have a need for subroutines which convert numbers from hex to decimal or from decimal to hex, two subroutines in this program may be of help. The first is called "decimal to hex converter" (lines 42 to 50). The input to this routine is TN which must hold a positive decimal number <65536. The output is HVL\$ which holds the hex equivalent to the number in TN. The second is called "convert hex to INT or FP decimal" (lines 1000 to 1050). The input to this routine is HVL\$ which must hold a hex number <= \$FFFF and choice. If choice = 1 then you get the positive decimal equivalent. Otherwise you get Int BASIC's equivalent. The output is a decimal number in DVL.

Figure 1: Balloon Diagram



```

10 GOTO 100
12 IF CHOICE < 3 THEN IN$ = STP$: GOSUB 1000:STP = DVL:IN$ = LST$: GOSUB
    1000:LST = DVL:IN$ = FRST$: GOSUB 1000:FRST = DVL: GOTO 16

```



```

14 STP = VAL (STP$):LST = VAL (LST$):FRST = VAL (FRST$)
16 VTB = 7:TB = 1: IF SELECT = 4 THEN GOSUB 3100: POKE - 12526,83: PR#
   1: PRINT : PRINT "CONVERTING FROM ";: ON CHOICE GOSUB 76,78,80,82,84
   ,86: POKE - 12526,80
18 IF LST < 0 THEN LST = LST + 65536: IF FRST < 0 THEN FRST = FRST + 655
   36
19 FOR DVL = FRST TO LST STEP STP: IF CHOICE < > 4 OR CHOICE < > 6 THEN
   TN = DVL: GOSUB 42
20 IF CHOICE = 3 AND DVL > 32767 OR CHOICE = 4 AND DVL > 32767 OR CHOICE
   = 2 AND DVL > 32767 OR CHOICE = 6 AND DVL > 32767 THEN DVL = DVL -
   65536
22 IF CHOICE = 4 THEN HVL$ = STR$ (DVL): IF DVL < 0 THEN HVL$ = STR$ (
   DVL + 65536)
24 IF CHOICE = 6 THEN HVL$ = STR$ (DVL): IF DVL < 0 THEN DVL = DVL + 65
   536
26 GOSUB 92
28 IF SELECT = 4 THEN GOSUB 52: GOTO 32
30 GOSUB 62
32 IF DVL < 0 THEN DVL = DVL + 65536
34 NEXT DVL: IF SELECT = 4 THEN PRINT : PR# 0
36 RETURN
42 HVL$ = "": FOR I = 4 TO 1 STEP - 1:A(5 - I) = INT (TN / (16 ^ (I - 1
   ))) : TN = TN - (A(5 - I) * (16 ^ (I - 1))) : NEXT I
44 FOR I = 1 TO 4: IF A(I) < 10 THEN A(I) = A(I) + 48: GOTO 48
46 A(I) = A(I) + 55
48 A$(I) = CHR$ (A(I)):HVL$ = HVL$ + A$(I): NEXT I
50 RETURN
52 DVL$ = STR$ (DVL): IF CHOICE < 3 THEN 58
54 PRINT SPC( 6 - LEN (DVL$));DVL$;: IF CHOICE = 5 OR CHOICE = 3 THEN
   PRINT ">$";HVL$; SPC( 1);: GOTO 59
56 PRINT ">"; SPC( 6 - LEN (HVL$));HVL$;: GOTO 59
58 PRINT " $"; SPC( 4 - LEN (HVL$));HVL$;">"; SPC( 6 - LEN (DVL$));DVL
   $;
59 PRINT SPC( 9 - LEN (PLO$));PLO$; SPC( 14 - LEN (PHI$));PHI$;:TB =
   TB + 39: IF TB > 42 OR SELECT = 2 THEN TB = 1: PRINT
60 HTAB TB: IF TB = 40 THEN PRINT SPC( 3);
61 RETURN
62 REM
63 DVL$ = STR$ (DVL): VTB VTB: HTAB TB: IF CHOICE < 3 THEN 68
64 PRINT SPC( 6 - LEN (DVL$));DVL$;: IF CHOICE = 5 OR CHOICE = 3 THEN
   PRINT ">$";HVL$; SPC( 2);: GOTO 70
66 PRINT ">"; SPC( 6 - LEN (HVL$));HVL$; SPC( 1);: GOTO 70
68 PRINT "$0000>";: HTAB TB + 5 - LEN (HVL$): PRINT HVL$;: HTAB TB + 12
   - LEN (DVL$): PRINT DVL$; SPC( 2);
70 PRINT SPC( 8 - LEN (PLO$));PLO$; SPC( 14 - LEN (PHI$));PHI$;VTB =
   VTB + 1: IF VTB > 23 THEN HTAB 3: INPUT "PRESS <RETURN> TO CLEAR SC
   REEN";IN$: HOME :VTB = 6:TB = 1: GOTO 72
71 GOTO 74
72 IF IN$ = "Q" THEN POP : GOTO 100
73 IF SELECT = 3 THEN VTB = 7
74 RETURN
76 PRINT "HEX TO FP DECIMAL": GOSUB 88: RETURN
78 PRINT "HEX TO INT DECIMAL": GOSUB 88: RETURN
80 PRINT "INT DECIMAL TO HEX": GOSUB 88: RETURN
82 PRINT "INT DECIMAL TO FP DECIMAL": GOSUB 88: RETURN
84 PRINT "FP DECIMAL TO HEX": GOSUB 88: RETURN
86 PRINT "FP DECIMAL TO INT DECIMAL": GOSUB 88: RETURN
88 IF SELECT = 2 THEN PRINT : PRINT " CONVERSION POKE LO BYTE POKE H
   I BYTE": RETURN

```



```

89 PRINT : PRINT " CONVERSION  POKE LO BYTE  POKE HI BYTE  CONVERSION
   POKE LO BYTE  POKE HI BYTE": RETURN
92 POK = DVL: IF POK < 0 THEN POK = POK + 65536
94 PHI% = POK / 256:PLO% = POK - PHI% * 256
96 PHI$ = STR$(PHI%):PLO$ = STR$(PLO%): RETURN
100 POKE - 16298,0: TEXT : HOME :FLAG = 0
110 VTAB 7
120 PRINT " 1. CONVERT HEX ADDRESSES TO FP BASIC": PRINT
130 PRINT " 2. CONVERT HEX ADDRESSES TO INT BASIC": PRINT
135 PRINT " 3. CONVERT INT BASIC ADDRESSES TO HEX": PRINT
140 PRINT " 4. CONVERT INT BASIC ADDRESSES TO FP": PRINT
150 PRINT " 5. CONVERT FP BASIC ADDRESSES TO HEX": PRINT
160 PRINT " 6. CONVERT FP BASIC ADDRESSES TO INT": PRINT
162 PRINT " 7. QUIT": PRINT
165 PRINT : PRINT "NOTE: ENTERING A 'Q' AT ANY POINT           RETURNS
   YOU TO THIS MENU."
170 VTAB 4: INPUT "CHOOSE ONE: ";IN$
175 IF IN$ = "7" THEN 9000
178 CHOICE = VAL (IN$): IF CHOICE < 1 OR CHOICE > 6 THEN 100
180 GOSUB 450: GOSUB 460: HOME : VTAB 1: HTAB 13: ON SELECT GOTO 190,195
   ,200,210
190 PRINT ": SINGLE ENTRY : MONITOR": GOTO 220
195 PRINT ": SINGLE ENTRY : PRINTER": GOTO 220
200 PRINT ": RANGE ENTRY : MONITOR": GOTO 220
210 PRINT ": RANGE ENTRY : PRINTER"
220 HOME : IF SELECT < 3 THEN PRINT "ENTER NUMBER": GOTO 250
230 PRINT "FIRST NUMBER";: HTAB 22: PRINT "LAST NUMBER"
240 PRINT "STEPPING INTERVAL"
250 FOR I = 0 TO 39: PRINT CHR$(45);: NEXT I: PRINT " CONVERSION  POK
   E LO BYTE  POKE HI BYTE": POKE 34,6: IF SELECT < 3 THEN POKE 34,5
260 HOME
280 CNT = 0:TB = 1:VTB = 7: IF SELECT < 3 THEN VTB = 6
290 GOSUB 800
300 ON SELECT GOSUB 3200,3200,12,12: IF SELECT < 3 THEN 290
310 VTAB 24: HTAB 5: CALL - 868: INPUT "PRESS <RETURN> TO CONTINUE.";IN
   $: GOTO 100
450 HOME : HTAB 4: ON CHOICE GOSUB 452,456,458,455,454,457: FOR I = 0 TO
   39: PRINT CHR$(45);: NEXT I: POKE 34,2: RETURN
452 PRINT "HEX->FP": RETURN
454 PRINT "FP->HEX": RETURN
455 PRINT "INT->FP": RETURN
456 PRINT "HEX->INT ": RETURN
457 PRINT "FP->INT": RETURN
458 PRINT "INT->HEX": RETURN
460 HOME : VTAB 8
462 PRINT " 1. SINGLE ENTRY - MONITOR OUTPUT": PRINT
463 PRINT " 2. SINGLE ENTRY - PRINTER OUTPUT": PRINT
464 PRINT " 3. RANGE ENTRY - MONITOR OUTPUT": PRINT
466 PRINT " 4. RANGE ENTRY - PRINTER OUTPUT": PRINT
468 VTAB 6: INPUT "CHOOSE ONE: ";IN$: IF IN$ = "Q" THEN POP : GOTO 100
470 SELECT = VAL (IN$)
472 IF SELECT < 1 OR SELECT > 4 THEN 460
474 RETURN
500 FOR I = 1 TO LEN (IN$): IF ASC ( MID$( IN$,I,1)) > 70 OR ASC ( MID$(
   IN$,I,1)) < 48 THEN 520
510 IF ASC ( MID$( IN$,I,1)) > 57 AND ASC ( MID$( IN$,I,1)) < 65 THEN 520
512 NEXT I: RETURN
520 FLAG = 1: RETURN
700 FOR I = 1 TO LEN (IN$)

```



```

705 IF ASC ( MID$ ( IN$,I)) > 57 OR . ASC ( MID$ ( IN$,I)) < 48 THEN 710
709 NEXT I: RETURN
710 FLAG = 1: RETURN
800 IF SELECT > 2 THEN 815
805 VTAB 3: HTAB 13: CALL - 868: GOSUB 950: IF FLAG = 1 THEN FLAG = 0: GOTO
805
810 GOTO 835
815 VTAB 3: HTAB 13: POKE 33,21: CALL - 868: GOSUB 950:FRST$ = IN$: POKE
33,40: IF FLAG = 1 THEN FLAG = 0: GOTO 815
820 VTAB 3: HTAB 33: CALL - 868: GOSUB 950:LST$ = IN$: IF FLAG = 1 THEN
FLAG = 0: GOTO 820
825 VTAB 4: HTAB 18: CALL - 868: GOSUB 950:STP$ = IN$: IF DVL < 0 THEN
FLAG = 1
830 IF FLAG = 1 THEN FLAG = 0: GOTO 825
835 RETURN
950 IF CHOICE > 2 THEN 970
955 INPUT "=$";IN$: IF IN$ = "Q" THEN POP : POP : GOTO 100
957 IF IN$ = "" THEN FLAG = 1: GOTO 995
960 IF LEN ( IN$) > 4 THEN FLAG = 1: GOTO 995
965 GOSUB 500: GOTO 995
970 INPUT "=";IN$: IF IN$ = "Q" THEN POP : POP : GOTO 100
972 IF IN$ = "" THEN FLAG = 1: GOTO 995
975 IF CHOICE < 5 AND VAL ( IN$) < - 32767 THEN FLAG = 1: GOTO 995
977 IF CHOICE < 5 AND VAL ( IN$) > 32767 THEN FLAG = 1: GOTO 995
980 IF CHOICE > 4 AND VAL ( IN$) < 0 THEN FLAG = 1: GOTO 995
983 IF CHOICE > 4 AND VAL ( IN$) > 65535 THEN FLAG = 1: GOTO 995
985 DVL = VAL ( IN$): IF DVL < 0 THEN IN$ = MID$ ( IN$,2): GOSUB 700:IN$ =
STR$ ( DVL + 65536): GOTO 995
990 GOSUB 700
995 RETURN
1000 HVL$ = IN$
1010 DVL = 0: FOR I = 1 TO LEN ( IN$): IF ASC ( MID$ ( IN$,I,1)) > 64 THEN
N = ASC ( MID$ ( IN$,I,1)) - 55
1018 IF ASC ( MID$ ( IN$,I,1)) < 64 THEN N = ASC ( MID$ ( IN$,I,1)) - 48
1020 DVL = DVL + N * 16 * ( LEN ( IN$) - I): NEXT I
1030 IF CHOICE = 1 THEN 1050
1040 IF DVL > 32767 THEN DVL = DVL - 65536
1050 RETURN
3100 FOR I = 1 TO 7
3110 J = - 16384 + 256 * I
3120 IF PEEK ( J + 23) = 201 AND PEEK ( J + 55) = 207 AND PEEK ( J + 76)
= 234 THEN RETURN
3130 NEXT I
3140 HOME : VTAB 10: PRINT "NO SILENTYPE PRINTER INSTALLED.": PRINT "SEL
ECTION ABORTED!": FOR K = 1 TO 3000: NEXT K: POP : RETURN
3200 IF CHOICE < 3 THEN GOSUB 1000: GOSUB 92: GOSUB 62: GOTO 3230
3210 IF CHOICE = 3 OR CHOICE = 5 THEN TN = VAL ( IN$): GOSUB 42: GOSUB 9
2: GOSUB 62: GOTO 3230
3220 HVL$ = IN$: IF CHOICE = 6 AND VAL ( IN$) > 32767 THEN HVL$ = STR$ (
DVL - 65536)
3225 GOSUB 92: GOSUB 62
3230 IF SELECT = 2 AND CNT = 0 THEN GOSUB 3100: POKE - 12526,83: PR# 1
: PRINT : PRINT "CONVERTING FROM ";: ON CHOICE GOSUB 76,78,80,82,84,
86: CNT = CNT + 1
3240 IF SELECT = 2 THEN PR# 1: GOSUB 52: PR# 0
3250 RETURN
9000 POKE - 16300,0: POKE - 16298,0: TEXT : CALL - 936: POKE - 16368
,0: END

```


More VIC Maps

Jim Butterfield
Toronto, Canada

*Editor's Note: For more, see Jim's VIC maps in last month's issue, **COMPUTE! #20**. — RTM*

It's interesting to look at the innards of the VIC. In some ways, it's much like the PET/CBM and many things are quite recognizable. But new things have crept in, too: some are associated with new features such as color, others are there to implement advanced ideas such as an improved INPUT statement. Inner-space explorers will recognize many familiar landmarks.

The most noticeable new feature is the massive tables of vectors and links that have been implemented in page three. In hopes of explaining things better, I am using the terms rather carefully. Both vectors and links are addresses in RAM. An advanced application program can use these addresses, or even change them; and this gives the VIC remarkable programming flexibility. The term "Link" is used when the address is normally used to connect adjacent code; in this case, it doesn't affect the program flow until the link is broken with a new address. A vector, on the other hand, is used as a jump point, and the normal program jumps somewhere else through the vector. In other words, a ROM program hits a link point and normally keeps going; it hits a vector point and branches.

I wish Commodore had chosen to keep VIC

addresses compatible with those in the PET/CBM. If they had done so, many programs would have been portable between machines with no coding changes at all. But that's wishful thinking and, since many things are still the same style, it's not a serious hardship to trim up the PEEK and POKE addresses for transfer to the VIC.

I have inserted the "normal" address contents of many of the links/vectors in the brackets behind the description; they may not be valid for current machines, but a serious user can easily PEEK them himself.

The input and output ports are somewhat congested. There are almost as many I/O bits available as on the PET/CBM, but extra features such as joysticks and RS232 have caused a bit of a crunch.

The Video Interface Chip (VIC) itself is a remarkable piece of electronics. I hope my chart helps; but a full description can only be obtained in Commodore's technical reference.

I haven't noted the standard Jump Table in this map. Near the top of both the PET and the VIC are a series of standard locations to allow inputting, outputting, checking the stop key, and other jobs. Users familiar with their use in the PET/CBM will be pleased to know that the Jump Table is exactly the same in the VIC. All of the old favorites, such as FFD2 for PRINT and FFE4 for GET are still there.

Beginners shouldn't be scared by the mass of technical detail given here. The VIC can be used effectively without any of this information. But for those who love to tinker with the innards of the machine, there's a lifetime of experimental PEEKing and POKEing to be done; this map will help direct your efforts.

VIC Zero Page Memory Map

Hex	Decimal	Description
0000-0002	0-2	USR jump
0003-0004	3-4	Float-Fixed vector
0005-0006	5-6	Fixed-Float vector
0007	7	Search character
0008	8	Scan-quotes flag
0009	9	TAB column save
000A	10	0=LOAD, 1=VERIFY
000B	11	Input buffer pointer/# subscript
000C	12	Default DIM flag
000D	13	Type: FF=string, 00=numeric
000E	14	Type: 80=integer, 00=floating point
000F	15	DATA scan/LIST quote/memry flag
0010	16	Subscript/FNx flag
0011	17	0=INPUT; \$40=GET; \$98=READ
0012	18	ATN sign/Comparison eval flag
0013	19	Current I/O prompt flag
0014-0015	20-21	Integer value

Introducing

nüFEKOP

SOFTWARE PEOPLE

Games for VIC 20 available now

ALL 5 FOR \$35.00 OR \$9.99 APIECE

- VIKMAN** - you guessed it - you won't believe it
 - ALIEN PANIC** - dig holes through brick floors of three story ladder maze to trap alien
 - DODGE CARS** - fast fun hard to quit playing - keeps top 5 scores and compares with last 50
 - BLOW UP** - you and a live mine field filled with booty - get as much as you can in two minutes
 - BANK ROBBERS** - just try to make crime pay - before the police come
- ALSO** - Search, Krazy Kong and many more send \$.50 for more information.

*nüFEKOP

P.O. BOX 156, SHADY COVE, OREGON 97539-0156

C.O.D. ORDERS CALL (503) 878-2113

VIC is a registered trademark for Commodore Bus. Machines

SPECIFY KEYBOARD OR JOYSTICKS

*NUFEKOP: Druid origin, concerned with the putting of a extraordinarily large amount in a small pocket or enclosure; possible mystical connotations.

VIC-20 SOFTWARE

PIPER-THE MUSIC MACHINE

Here's the simplest way yet to compose, conduct and play music on your VIC. Complete music capability - play all note values, list and edit your music, easily handle repeats and rests. Written in fast machine language. Includes sample composition and manual. Does not require additional memory.

VIGIL FOR THE VIC

INTERACTIVE GRAPHICS/GAME LANGUAGE
Create your own games with easy to learn, powerful language. Color & enhanced sound. With manual and 9 games including Breakout, SpaceWar, AntiAircraft, U.F.O., Concentration, Maze. Requires 3K memory expander.

HiRes/Multi-color Graphics

Add HiRes & Multi-Color graphics to VIC BASIC. Set colors, plot points, draw lines and boxes and write text to HiRes or Multi-Color screen. HiRes 104 x 152 points and Multi-Color 52 x 76. Does not require additional memory.

	U.S. & CANADA	FOREIGN
PIPER on cassette	\$25	\$30
PIPER User's Manual (refundable with software order)	\$ 5	\$ 7
PIPER 6502 Assembly Listing	\$25	\$30
VIGIL (requires a 3K memory expander) on cassette	\$35	\$40
VIGIL User's Manual (refundable with software order)	\$10	\$12
VIGIL 6502 Assembly Listing	\$25	\$30
HiRes/Multi-Color package for the VIC on cassette	\$15	\$20
HiRes/Multi-Color documentation	\$ 3	\$ 5
HiRes/Multi-Color 6502 Assembly Listing	\$10	\$15

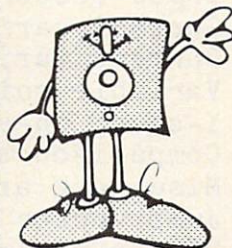
Order prepaid, MC or VISA only (U.S. dollars) Add \$3.00 for diskette

ABACUS SOFTWARE
P. O. Box 7211
Grand Rapids, Michigan 49510
616 / 241-5510



Verbatim flexible disks

Call Free (800) 235-4137 for prices and information. Dealer inquiries invited. C.O.D. and charge cards accepted.



PACIFIC EXCHANGES

100 Foothill Blvd.
San Luis Obispo, CA
93401. In Cal. call
(800) 592-5935 or
(805) 543-1037.

VISA

ATTENTION

*VIC 20 OWNERS

QUANTUM DATA INCORPORATED
"THE PERIPHERAL PEOPLE"

Makers of the following quality add-ons for the VIC 20*

- RAM Memory Expansion from 0K to 64K
 - 64 or 80 Column Video Expansion
 - PROM Simulator for saving programs in power-off mode
 - 21-Key Numeric Pad for high speed data entry
 - 3 Position Expansion Chassis
 - PROM Programmers and PROM/ROM Expansion
- AND MORE!!!**

Ask your local
Commodore Dealer about our products or phone
or write for Free Catalogue:



QUANTUM
DATA, INC.

3001 Redhill Ave.
Bldg. 4, Suite 105
Costa Mesa, CA 92626

(714) 754-1945

* a Commodore Trademark

Dealer inquiries welcomed



MALA

Educational Programs
For Your Pet For Only

\$48

For 8 Issue Subscriptions

Each "MALA" comes to you on cassette with 4 brand new programs to load and run on your Pet.

COMM*DATA SYSTEMS, INC.

P. O. BOX 325
MILFORD, MICHIGAN 48042
(313) 685-0113

GAMES FOR YOUR VIC

VIC TREK • HANGMAN
TANK • YAHTZEE
DAMSEL • NAB PLUS
AND MANY MORE

only **\$7.95** Each

FREE Program Summaries available



0016	22	Pointer: temporary strg stack
0017-0018	23-24	Last temp string vector
0019-0021	25-33	Stack for temporary strings
0022-0025	34-37	Utility pointer area
0026-002A	38-42	Product area for multiplication
002B-002C	43-44	Pointer: Start-of-Basic
002D-002E	45-46	Pointer: Start-of-Variables
002F-0030	47-48	Pointer: Start-of-Arrays
0031-0032	49-50	Pointer: End-of-Arrays
0033-0034	51-52	Pointer: String-storage(moving down)
0035-0036	53-54	Utility string pointer
0037-0038	55-56	Pointer: Limit-of-memory
0039-003A	57-58	Current Basic line number
003B-003C	59-60	Previous Basic line number
003D-003E	61-62	Pointer: Basic statement for CONT
003F-0040	63-64	Current DATA line number
0041-0042	65-66	Current DATA address
0043-0044	67-68	Input vector
0045-0046	69-70	Current variable name
0047-0048	71-72	Current variable address
0049-004A	73-74	Variable pointer for FOR/NEXT
004B-004C	75-76	Y-save; op-save; Basic pointer save
004D	77	Comparison symbol accumulator
004E-0053	78-83	Misc work area, pointers, etc
0054-0056	84-86	Jump vector for functions
0057-0060	87-96	Misc numeric work area
0061	97	Accum#1: Exponent
0062-0065	98-101	Accum#1: Mantissa
0066	102	Accum#1: Sign
0067	103	Series evaluation constant pointer
0068	104	Accum#1 hi-order (overflow)
0069-006E	105-110	Accum#2: Exponent, etc.
006F	111	Sign comparison, Acc#1 vs #2
0070	112	Accum#1 lo-order (rounding)
0071-0072	113-114	Cassette buff len/Series pointer
0073-008A	115-138	CHRGET subroutine; get Basic char
007A-007B	122-123	Basic pointer (within subrtn)
008B-008F	139-143	RND seed value
0090	144	Statusword ST
0091	145	Keyswitch PIA: STOP and RVS flags
0092	146	Timing constant for tape
0093	147	Load=0, Verify=1
0094	148	Serial output: deferred char flag
0095	149	Serial deferred character
0096	150	Tape EOT received
0097	151	Register save
0098	152	How many open files
0099	153	Input device, normally 0
009A	154	Output CMD device, normally 3
009B	155	Tape character parity
009C	156	Byte-received flag
009D	157	Direct=\$80/RUN=0 output control
009E	158	Tp Pass 1 error log/char buffer
009F	159	Tp Pass 2 err log corrected
00A0-00A2	160-162	Jiffy Clock HML
00A3	163	Serial bit count/EOI flag

00A4	164	Cycle count
00A5	165	Countdown, tape write/bit count
00A6	166	Tape buffer pointer
00A7	167	Tp Wrt ldr count/Rd pass/inbit
00A8	168	Tp Wrt new byte/Rd error/inbit cnt
00A9	169	Wrt start bit/Rd bit err/stbit
00AA	170	Tp Scan;Cnt;Ld;End/byte assy
00AB	171	Wr lead length/Rd checksum/parity
00AC-00AD	172-173	Pointer: tape bufr, scrolling
00AE-00AF	174-175	Tape end adds/End of program
00B0-00B1	176-177	Tape timing constants
00B2-00B3	178-179	Pntr: start of tape buffer
00B4	180	1=Tp timer enabled; bit cnt
00B5	181	Tp EOT/RS232 next bit to send
00B6	182	Read character error/outbyte buf
00B7	183	# characters in file name
00B8	184	Current logical file
00B9	185	Current secndy address
00BA	186	Current device
00BB-00BC	187-188	Pointer to file name
00BD	189	Wr shift word/Rd input char
00BE	190	# blocks remaining to Wr/Rd
00BF	191	Serial word buffer
00C0	192	Tape motor interlock
00C1-00C2	193-194	I/O start adds
00C3-00C4	195-196	Kernel setup pointer
00C5	197	Last key pressed
00C6	198	# chars in keybd buffer
00C7	199	Screen reverse flag
00C8	200	End-of-line for input pointer
00C9-00CA	201-202	Input cursor log (row, column)
00CB	203	Which key: 64 if no key
00CC	204	0=flash cursor
00CD	205	Cursor timing countdown
00CE	206	Character under cursor
00CF	207	Cursor in blink phase
00D0	208	Input from screen/from keyboard
00D1-00D2	209-210	Pointer to screen line
00D3	211	Position of cursor on above line
00D4	212	0=direct cursor, else programmed
00D5	213	Current screen line length
00D6	214	Row where curosr lives
00D7	215	Last inkey/checksum/buffer
00D8	216	# of INSERTs outstanding
00D9-00F0	217-240	Screen line link table
00F1	241	Dummy screen link
00F2	242	Screen row marker
00F3-00F4	243-244	Screen color pointer
00F5-00F6	245-246	Keyboard pointer
00F7-00F8	247-248	RS-232 Rcv pntr
00F9-00FA	249-250	RS-232 Tx pntr
00FF-010A	256-266	Floating to ASCII work area

[Additional VIC Maps appeared in **COMPUTE!**, January, 1982, #20, pgs. 181-3. — Ed]

FF8A-FFF5 65418-65525 Jump Table, Including:

FFC6 - Set Input channel
 FFC9 - Set Output channel
 FFCC - Restore default I/O channels
 FFCF - INPUT
 FFD2 - PRINT
 FFE1 - Test Stop key
 FFE4 - GET

c000	ROM control vectors	cb1e	Print message from (y,a)
c00c	Keyword action vectors	cb3b	Print format character
c052	Function vectors	cb4d	Bad-input routines
c080	Operator vectors	cb7b	Perform [GET]
c09e	Keywords	cba5	Perform [INPUT#]
cl9e	Error messages	cbbf	Perform [INPUT]
c328	Error message vectors	cbf9	Prompt & input
c365	Miscellaneous messages	cc06	Perform [READ]
c38a	Scan stack for FOR/GOSUB	ccfc	Input error messages
c3b8	Move memory	cd1e	Perform [NEXT]
c3fb	Check stack depth	cd78	Type-match check
c408	Check memory space	cd9e	Evaluate expression
c435	'OUT OF MEMORY'	cea8	Constant - PI
c437	Error routine	cefl	Evaluate within brackets
c469	Break entry	cef7	Check for ')''
c474	'READY.'	ceff	Check for comma
c480	Ready for Basic	cf08	Syntax error
c49c	Handle new line	cfl4	Check range
c533	Re-chain lines	cf28	Search for variable
c560	Receive input line	cfa7	Set up FN reference
c579	Crunch tokens	cfe6	Perform [OR]
c613	Find Basic line	cfe9	Perform [AND]
c642	Perform [NEW]	d016	Compare
c65e	Perform [CLR]	d081	Perform [DIM]
c68e	Back up text pointer	d08b	Locate variable
c69c	Perform [LIST]	d113	Check alphabetic
c742	Perform [FOR]	d11d	Create variable
c7ed	Execute statement	d194	Array pointer subroutine
c81d	Perform [RESTORE]	d1a5	Value 32768
c82c	Break	d1b2	Float-fixed conversion
c82f	Perform [STOP]	d1d1	Set up array
c831	Perform [END]	d245	'BAD SUBSCRIPT'
c857	Perform [CONT]	d248	'ILLEGAL QUANTITY'
c871	Perform [RUN]	d34c	Compute array size
c883	Perform [GOSUB]	d37d	Perform [FRE]
c8a0	Perform [GOTO]	d391	Fixed-float conversion
c8d2	Perform [RETURN]	d39e	Perform [POS]
c8f8	Perform [DATA]	d3a6	Check direct
c906	Scan for next statement	d3b3	Perform [DEF]
c928	Perform [IF]	d3e1	Check FN syntax
c93b	Perform [REM]	d3f4	Perform [FN]
c94b	Perform [ON]	d465	Perform [STR\$]
c96b	Get fixed point number	d475	Calculate string vector
c9a5	Perform [LET]	d487	Set up string
ca80	Perform [PRINT#]	d4f4	Make room for string
ca86	Perform [CMD]	d526	Garbage collection
caa0	Perform [PRINT]	d5bd	Check salvageability

d606	Collect string	dfed	Perform [EXP]
d63d	Concatenate	e040	Series evaluate 1
d67a	Build string to memory	e056	Series evaluate 2
d6a3	Discard unwanted string	e094	Perform [RND]
d6db	Clean descriptor stack	e0f6	?? Breakpoints ??
d6ec	Perform [CHR\$]	e127	Perform [SYS]
d700	Perform [LEFT\$]	e153	Perform [SAVE]
d72c	Perform [RIGHT\$]	e162	Perform [VERIFY]
d737	Perform [MID\$]	e165	Perform [LOAD]
d761	Pull string parameters	e1bb	Perform [OPEN]
d77c	Perform [LEN]	e1c4	Perform [CLOSE]
d782	Exit string-mode	e1d1	Parameters for load/save
d78b	Perform [ASC]	e203	Check default parameters
d79b	Input byte parameter	e20b	Check for comma
d7ad	Perform [VAL]	e216	Parameters for open/close
d7eb	Get params for poke/wait	e261	Perform [COS]
d7f7	Float-fixed	e268	Perform [SIN]
d80d	Perform [PEEK]	e2b1	Perform [TAN]
d824	Perform [POKE]	e30b	Perform [ATN]
d82d	Perform [WAIT]	e378	Initialize
d849	Add 0.5	e387	CHRGET for zero page
d850	Subtract-from	e3a4	Initialize Basic
d853	Perform [SUBTRACT]	e429	Power-up message
d86a	Perform [ADD]	e44f	Vectors for \$300
d947	Complement fac#1	e45b	Initialize vectors
d97e	'OVERFLOW'	e467	Warm restart
d983	Multiply by zero byte	e476	Program patch area
d9ea	Perform [LOG]	e4a0	Serial output '1'
da2b	Perform [MULTIPLY]	e4a9	Serial output '0'
da59	Multiply-a-bit	e4b2	Get serial input & clock
da8c	Memory to FAC#2	e4bc	Program patch area
dab7	Adjust FAC#1/#2	e500	Set 6522 addr
dad4	Underflow/overflow	e505	Set screen limits
dae2	Multiply by 10	e50a	Track cursor location
daf9	+10 in floating pt	e518	Initialize I/O
dafe	Divide by 10	e54c	Normalize screen
db12	Perform [DIVIDE]	e55f	Clear screen
dba2	Memory to fac#1	e581	Home cursor
dbc7	FAC#1 to memory	e587	Set screen pointers
dbfc	FAC#2 to fac#1	e5bb	Set I/o defaults
dc0c	FAC#1 to FAC#2	e5c3	Set vic chip defaults
dclb	Round FAC#1	e5cf	Input from keyboard
dc2b	Get sign	e64f	Input from screen
dc39	Perform [SGN]	e6b8	Quote mark test
dc58	Perform [ABS]	e6c5	Set up screen print
dc5b	Compare FAC#1 to mem	e6ea	Advance cursor
dc9b	Float-fixed	e715	Retreat cursor
dccc	Perform [INT]	e72d	Back into previous line
dcf3	String to fac	e742	Output to screen
dd7e	Get ascii digit	e8c3	Go to next line
dddd	Float to ascii	e8d8	Do 'RETURN'
df16	Decimal constants	e8e8	Check line decrement
df3a	TI constants	e8fa	Check line increment
df71	Perform [SQR]	e912	Set colour code
df7b	Perform [POWER]	e921	Colour code table
dfb4	Perform [NEGATIVE]	e929	Code conversion

e975	Scroll screen	f20e	Input
e9ee	Open space on screen	f250	Get.. tape/serial/RS232
ea56	Move screen line	f27a	Output..
ea6e	Synch colour transfer	f290	..to tape
ea7e	Set start-of-line	f2c7	Set input device
ea8d	Clear screen line	f309	Set output device
eaal	Print to screen	f34a	Close
eaaa	Store on screen	f3cf	Find file
eab2	Synch colour to char	f3df	Set file values
eabf	Interrupt (IRQ)	f3ef	Abort all files
eble	Check keyboard	f3f3	Restore default I/O
ec00	Set text mode	f40a	Do file opening
ec46	Keyboard vectors	f495	Send SA
ec5e	Keyboard maps	f4c7	Open RS232
ed21	Graphics/text control	f542	Load program
ed30	Set graphics mode	f647	'SEARCHING'
ed5b	Wrap up screen line	f659	Print file name
ed6a	Shifted key matrix	f66a	'LOADING/VERIFYING'
eda3	Control key matrix	f675	Save program
ede4	Vic chip defaults	f728	'SAVING'
edfd	Screen line adds low	f734	Bump clock
eel4	Send 'talk'	f760	Get time
eel7	Send 'listen'	f767	Set time
eelc	Send control char	f770	Action stop key
ee49	Send to serial bus	f77e	File Error Messages
eeb7	Timeout on serial	f7af	Find any tape header
eec0	Send listen SA	f7e7	Write tape header
eec5	Clear ATN	f84d	Get buffer address
eece	Send talk SA	f854	Set buffer start, end pointers
eee4	Send serial deferred	f867	Find specific header
eef6	Send 'untalk'	f88a	Bump tape pointer
ef04	Send 'unlisten'	f894	'PRESS PLAY ..'
ef19	Receive from serial bus	f8ab	Check cassette status
ef84	Clock line on	f8b7	'PRESS RECORD ..'
ef8d	Clock line off	f8c0	Initiate tape read
ef96	Delay 1 ms	f8e3	Initiate tape write
efa3	RS232 send (NMI)	f8f4	Common tape read/write
efee	New RS232 byte send	f94b	Check tape stop
f016	Error or quit	f95d	Set timing
f027	Compute bit count	f98e	Read bits (IRQ)
f036	RS232 receive (NMI)	faad	Store characters
f05b	Setup to receive	fbd2	Reset pointer
f09d	Receive parity error	fbdb	New tape character setup
f0a2	Receive overrun error	fbea	Toggle tape
f0a5	Receive break error	fc06	Data write
f0a8	Receive frame error	fc0b	Tape write (IRQ)
f0b9	Bad device	fc95	Leader write (IRQ)
f0bc	File to RS232	fccf	Restore vectors
f0ed	Send to RS232 buffer	fcf6	Set vector
f116	Input from RS232 buffer	fd08	Kill motor
f14f	Get from RS232 buffer	fd11	Check read/write pointer
f160	Check serial bus idle	fd1b	Bump read/write pointer
f174	Messages	fd22	Powerup entry
f1e2	Print if direct	fd3f	Check A-rom
f1f5	Get..	fd52	Set kernal2
f205	..from RS232		


```
fd8d Initialize system constants
fdf1 IRQ vectors
fdf9 Initialize I/O regs
fe49 Save data name
fe50 Save file details
fe57 Get status
fe66 Flag ST
fe6f Set timeout
fe73 Read/set top of memory
fe82 Read/set bottom of memory
fe91 Test memory location
fea9 NMI interrupt entry
fed2 RESET/STOP warm start
fede NMI RS232 sequences
ff56 Restore & exit
ff5c RS232 timing table
ff72 Main IRQ entry
ff8a Jumbo jump table
fffa Hardware vectors
```

©

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

80/40 COLUMN ALIEN 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.

MasterCard
and VISA
Accepted.

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

nis VIC-20 SOFTWARE

EGG ATTACK JOYSTICK

This seemingly innocent electronic game of catch turns gradually into a harried race of joystick control. The player must maneuver a nuclear reactor in order to catch radioactive eggs as they are dropped from advancing "monsters." If the player misses three eggs, the Earth is no longer habitable and their turn of play is over. **12.95**

TUNNEL PATROL JOYSTICK

The player is required in this arcade game to maneuver an android through a maze in order to harvest "Energy Crystals" and score points. As an obstacle, the program randomly throws the android into the fourth dimension where it must battle the dreaded "Batwing" in order to survive. **12.95**

AVAILABLE EARLY APRIL: OUR COMPREHENSIVE CHECKBOOK PROGRAM.

See this and other MIS software at your local computer store, or order direct from MIS (408) 338-9546. California residents add sales tax.

DEALERS INQUIRIES WELCOME

250 FERN ROCK WAY/BOULDER CREEK CA./95006

Great VIC Software
New Programs for your VIC Computer
On Cassette!

COLOR & SOUND

• Cattle Roundup	• Adventure
• Artillery Shoot	• Head On
• Micro Maze	• Target
• Snake Out	• Hang In
• Trapper	• Chase

\$9.95 ea.
(Includes shipping, Arizona residents add sales tax).

Ready To Load — Hours of Fun!
Write For Free Catalog

ComputerMat Software Box 1664 Dept. V
Lake Havasu City, AZ 86403

EPROM Reliability

Michael E. Day
West Linn, OR

Although EPROMs are in widespread use, there are continuing problems with the use of the device affecting their overall reliability.

The following report describes how to obtain the maximum performance and reliability from the 2708 EPROM. The concepts involved, however, may be applied to most of the ultra-violet erasable PROMs on the market to date.

The EPROM 'cell' consists, basically, of a capacitor which either has a charge on it or does not. The charge is created by applying a high voltage pulse to the device, and is removed by exposing the device to high intensity ultra-violet light.

The cell is programmed by injection of high energy electrons through the oxide onto the floating gate. Once there, the charge is trapped, as there are no electrical connections to this floating gate. This action is similar to the action of a zener diode in that, as the voltage increases, it finally passes a point where it can overcome the barrier presented by the silicon oxide surrounding the gate and allows the electrons to flow to the gate and collect there. As the voltage is removed it finally drops to a point where it can no longer maintain the bridge through the oxide, and it again becomes isolated. However, the gate now has a charge of electrons on it.

The charge is removed from the cell by exposure with ultra-violet light of the correct wavelength (2537Å) and energy (10 watt seconds/cm²) which will impart sufficient photon energy to the trapped electrons to allow the floating gate to be fully discharged.

The presence of charge on the floating gate causes a shift of the cell threshold. In the discharged state (no charge on the floating gate) the cell has a low threshold, and selection of the cell turns on the transistor. Storing a charge on the gate shifts the threshold of the cell above the select voltage so that the transistor will not turn on when it is selected. The amount of charge on the gate determines the level of select voltage at which the transistor will change from a non-conducting to a conducting state. The cell is designed so that the discharged threshold and charged threshold are equally above and below the select voltage. This provides for maximum immunity against marginal cells.

Data retention can be measured by baking the device at an elevated temperature (250°C). 168 hours at this temperature is equivalent to 10 years at 70°C. Test samplings have shown that the time to 5% batch failure is 100 years.

Experiments have been made to determine the effects of prolonged exposure to UV light. Through the first 20 hours the threshold voltage increased slightly after which it stabilized out to 30 days at which time the test was terminated. Although no study has been made to determine what is causing the initial change, it is thought to be caused by some radiation damage caused by the UV.

It is believed that UV lamps with short wavelengths (less than 1800Å) and high intensity can ionize oxide with long exposure. The theory is that this will shift the threshold until the part will not function properly. This is not a permanent shift and a bake at 150° for 24 hours should correct the problem.

Some EPROMs exhibit a sensitivity to ambient light. This does not erase them, but they may not function properly. This is a common phenomenon with most semiconductors. Covering the lid with some sort of opaque material will prevent this.

For a given device, given that the programming equipment is operating at factory specifications, the failure to take a charge is device-related, and attempts to bring the charge level higher by reprogramming will seldom be successful. Failure to erase is the most common problem. There are many factors which can cause inadequate erasure; among them are weak UV lamp due to age, dirt on the IC (both internal and external), dirt on the UV lamp, erase requirements outside of normal specifications, or a defective component.

The EPROM is read by determining if the charge on the capacitor of the cell is above or below the threshold of the sensing transistor (the threshold being that level of applied voltage which causes the transistor to change from a non-conducting state to a conducting state). This threshold can be affected by shifts in the -12 volt and -5 volt supplies at the device and temperature. Due to this, if the charge on the cell is near the threshold of the sensing transistor, a shift in the supply voltage or temperature can cause the cell to appear to change state, have an excessive access time, or be intermittent. A cell which is sufficiently near the threshold of the sensing transistor so that it can be affected by temperature or voltage shifts is called "marginally programmed" or "marginal."

One failure of the EPROM is a "leaky cell" (a cell that loses its charge after a short period of time). A leaky cell can be found several ways. One way is to bake the device at 250° after programming it, and then test for lost data.



**monitor
analog data
quickly and
inexpensively**

ADAM

provides analog data monitoring for your micro-computer. With proper transducers it allows you to sense temperature, wind direction, electrical current, or joysticks and convert the sensors analog voltages into digital readings your micro-computer can process.

SPECS

8 bit resolution A/D
0-5 volt input range
16 Analog Input channels

MODELS

ADAM with TRS-80 interface \$190.00
ADAM with RS-232/RS-423 interface \$250.00
ADAM with RS-422 interface \$275.00
Dealer inquiries welcomed.



small system design

P. O. BOX 4546 • MANCHESTER, NH 03108

Representatives Pacific Northwest Data Systems Marketing (503) 297-8444

New England American Data Systems Marketing (617) 341-0171



Oryx software

What does the Oryx, an African antelope, have in common with reliable service? They are both almost extinct. Oryx Software wants to bring trustworthy service back to life. We're here to stay!

GUARANTEED LOWEST PRICES!
To celebrate our opening, we are matching any advertised price. Just show us the ad.

**ORDER TOLL FREE - Outside WI
1-800-826-1589**

SOFTWARE

Graphpower	299.00
Tax Preparer '82	127.00
Real Estate Analyzer	127.00
Creative Financing	127.00
Word Processor	425.00
Financial Projection	550.00
Mail Management	250.00
Micropro Wordstar	248.00
Mailmerge	90.00
Spellstar	169.00
Supersort II	159.00
Context Connector	180.00
Easywriter (Pro)	195.00
Easyviewer	45.00
Tellstar II	70.00
Easymailer	160.00
Datadex	249.00
Microplan Basic	419.00
Executive Secretary	212.00
Nevada CoBol	129.00

ACCESSORIES

Apple II Dual Thermometer w/software	260.00
Mountain Expansion Chassis	625.00
CPS Multifunction	199.00
Mountain Music System	395.00
100,000 Day Clock	375.00
Mountain Clock	252.00
Supertalker SD 2000	199.00
A/D + D/A	299.00
CCS 12K ROM/PROM Board	99.00
CCS A/D Converter Board	99.00
CCS Serial Asynch. Board	139.00
CCS Calendar/Clock Board	99.00
VOTRAX Type-n-Talk	375.00
ADALAB Package	495.00
DOS Dater	49.00
ABT Numeric Keypad	125.00
ABT Softkey	150.00
ABT Barwand	195.00
ABT Cash Box	295.00

... AND MANY MORE!

Call for price information:

Printers - Epson, Okidata, Microline, NEC, C. ITOH, Qume, Diablo, Anadex, IDS, MPI, Microtek, Printek.

Monitors - Amdek, Sanyo, Hitachi, NEC, Kaga/TSK.

Modems - Novation, Hayes.

Disk Drives - Percom, Corvus, Morrow, CCS, etc.

Plotters - Watanabe.

Quoted prices valid for stock on hand and subject to change without prior notice.

Ask for our FREE catalog.

Please:

- Wisconsin residents - add 4% sales tax
- Foreign orders - please add 15%
- Add \$2.50 for shipping per software and small item. Call regarding others.

We Welcome:

- Visa, MasterCard - (Add 4%)
- Checks (Allow 1-2 weeks for clearing)
- COD (Add 4%)

**TOLL FREE - Outside Wisconsin:
1-800-826-1589**

For Technical Info & in Wisconsin:

715-848-2322

Oryx Software

P.O. Box 1961 • Wausau, WI 54401



APPLESCOPE

DIGITAL STORAGE OSCILLOSCOPE

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
- Programmable Scale Select
- Continuous and Single Sweep Modes
- Single or Dual Channel Trace

Price for the two board Applescope system is **\$595**
EXTERNAL TRIGGER ADAPTER **\$29**

APPLESCOPE ACCESSORIES

APPLESCOPE-HR12 High resolution 12 bit analog to digital converter with sample rates to 100 KHz. Requires 48K Apple II with disk drive. Software provided on floppy disk includes basic SCOPE DRIVER package.

Price per channel **\$695**

APPLESCOPE-HRHS High Resolution AND High Speed. Circuit combines two 6 bit flash analog to digital converters to give a 10 bit dynamic range. The 10 bit converter resolution is maintained at sampling rates up to the 7 Mhz, maximum for signal slew rates less than .5 volts per microsecond. Larger inputs slew rates will reduce the converter resolution to 6 bits until the signal stabilizes within the .5 Volt per microsecond limit. Requires 48K Apple II with disk drive. Software provided on disk includes the basic SCOPE DRIVER package. Price per channel **\$695**

APPLESCOPE-EXT External trigger adapter has a switch selectable external trigger input to a BNC connector mounted in a rear slot of the Apple II computer. Price **\$29.00**

APPLESCOPE-BNC BNC adapter connects the Berg stick connectors on the A1 circuit card to male BNC plugs mounted in a rear slot of the Apple II computer. Price **\$14.95**

BUS EXTENDERS Allow easy access to Apple II peripheral circuit cards. Price **\$19.95**

SCOPE PROBES Oscilloscope probes for use with the APPLESCOPE - BNC adapter. Price **\$29.95**

SCOPE DRIVER Advanced software for the Applescope system provided on 5 1/4" floppy disk. Available options include:

- Signal Averaging - Acquires 1 to 255 signal sweeps and displays the averaged result.
- Digital Volt Meter - Allows use as a real time DVM or use to measure points on an acquired sweep.
- Hard Copy - Uses graphics printer to produce hard-copy output of displayed traces.
- Disk Storage - Allows automatic storage and recover of acquired data on floppy disks.
- Spectrum Analyzer - Calculates and displays frequency spectrum of acquired data.

BUS RIDER

LOGIC ANALYZER for the APPLE II

The BUS RIDER circuit card silently rides the Apple II peripheral bus and allows real time tracking of program flow. Software provided on EPROM allows set up of trace parameters from the keyboard and read back of disassembled code after a program has been tracked.

- 32 bit by 1024 sample memory buffer
- Monitors Data and Address bus plus 8 external inputs
- Trigger on any 32 bit word or external trigger
- Pretrigger viewing

The BUS RIDER is an invaluable development tool for anyone working with Apple II or Apple II+ computers.

Price **\$295**

RC ELECTRONICS INC.

7265 Tuolumne St., Goleta, CA 93117

(805) 968-6614

Visa

M/C

Another method of testing for leaky cells is to make an erase profile for the suspect EPROM. This is done by programming the device, and then erasing it in one to two minute increments, measuring the number of erased bits after each increment. Making a graph with this information will give you a profile of the erasure characteristics of the EPROM. Any cell that erases twice as fast as the overall average should be considered suspect.

Another failure mode of the EPROM is the "sticky cell" (a cell which is difficult to program or erase). Although a sticky cell can be overcome by a longer program or erase time, in a production environment it is not acceptable to adjust these times for each device. Therefore, any device which requires more than three times the normal time to program or erase should be considered defective.

The major source of problems with the 2708 EPROM is inadequate erasure. In testing the EPROM to determine if it has been adequately programmed or erased, it is not acceptable to simply read the PROM and compare the information read against the true data, since marginal cells may not be found with this method. A more reliable method of verifying if an EPROM has been properly programmed or erased is to measure the depth of the charge at each cell. This can be done by shifting the threshold level of the sensing transistor

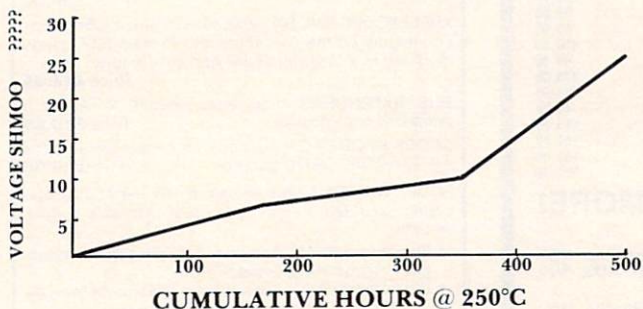
above and below the normal level and by doing a normal read and compare.

In this way, a map of the charge level of the cells in the EPROM can be generated by observing the level at which the output changes state.

The threshold level of the 2708 EPROM can be shifted by adjusting the -5 volt supply (VBB). Causing the -5 volts to go more negative will determine how deep the cell has been charged; bringing it more positive will determine how much it has been erased.

The charge limits will vary greatly not only from manufacturer to manufacturer, but from device to device. Therefore, an acceptable limit must be determined at which the device may be considered good or bad. For the 2708 this is greater than twice the tolerance for the -5 volt supply. This can be simply generated by using the forward voltage drop across the diode (.7 volts) above and below the -5 volt level. In more critical applications a two-diode level drop (1.4 volts) might be considered.

More is not always better. Just because the charge on one device is deeper than on another does not mean that it will retain the charge longer. Data retention is related to cell isolation and not necessarily to the level of the charge.



TEMPERATURE	FAILURE RATE 60% CONFIDENCE (% / 1000 hours)	FAILURE RATE 90% CONFIDENCE (% / 1000 hours)
70°C	0.013	0.027
55°C	0.006	0.013

Operating Life Test Results

TEMPERATURE	SAMPLE SIZE	HOURS	EQUIVALENT DEVICE HOURS @ 70°C	FAILURES	FAILURE MODE
160°C	64	2243	39.9 x 10 ⁶	1	Charge Loss
160°C	49	2028	27.6 x 10 ⁶	0	
160°C	51	2028	28.7 x 10 ⁶	1	Charge Loss
160°C	40	2830	31.4 x 10 ⁶	2	Charge Loss
160°C	80	1176	26.1 x 10 ⁶	1	Charge Loss
160°C	77	1176	25.1 x 10 ⁶	4	Charge Loss
160°C	79	984	21.6 x 10 ⁶	1	Charge Loss

DOS FOR AIM-65® \$499.00

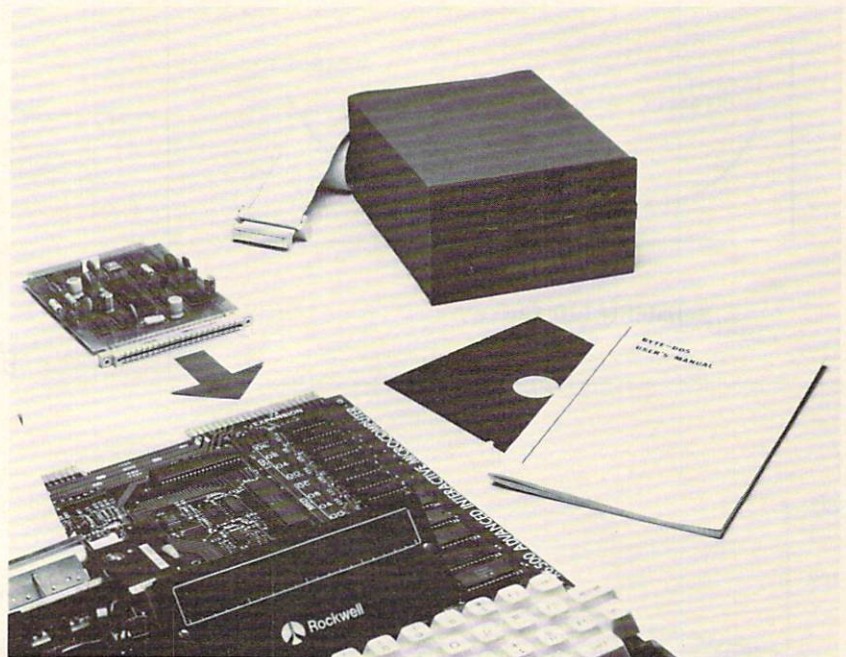
COMPLETE!

INSTANT EASY ACCESS TO YOUR AIM-65 PROGRAMS!
MANIPULATE OBJECT FILES AT THE TOUCH OF A KEY.
NEW BYTE-DOS DISC OPERATING SYSTEM.
153K BYTES ON-LINE. INEXPENSIVELY!

BYTE-DOS COMMANDS

- **FORMAT** - Prepares New Disc
- **BAD SECTOR SCAN** - QC's Disc
- **DUMP** - RAM File to Disc
- **LOAD** - Disc File to Ram
- **LIST** - Prints Disc File Names
- **ERASE** - Eliminate a File
- **UNERASE** - File Recovery
- **RENAME** - Rename a File
- **COPY** - Copy 1 File
- **TRANSFER** - Copy Complete Disc
- **KOMPRESS** - Optimizes Disc Space

AND MORE!



IT'S EASY AND FUN TO USE!

BYTE MICROSYSTEMS

C O R P O R A T I O N

1477 ELKA AVENUE, SAN JOSE, CA 95129

408/446/0559



SEND ME THE FULL STORY!

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Telephone _____ home
 work

I own an AIM-65.

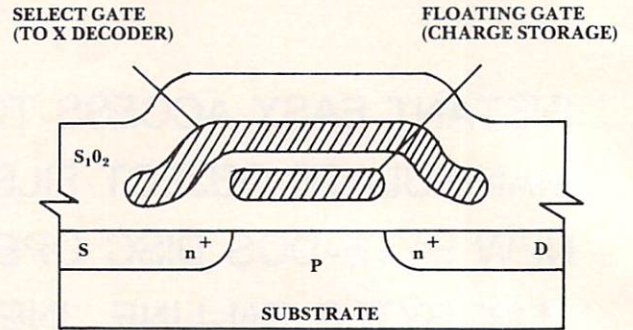
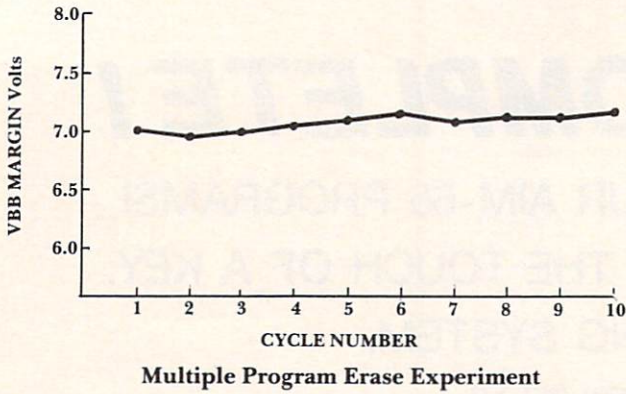
I'm thinking of buying an AIM-65.

Send full BYTE-DOS Data.

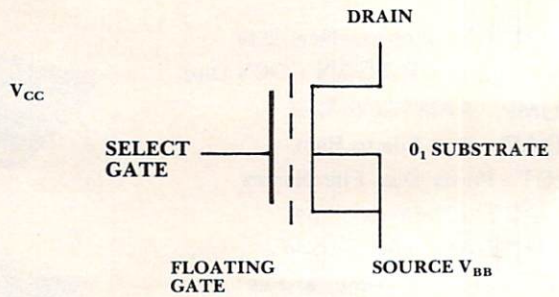
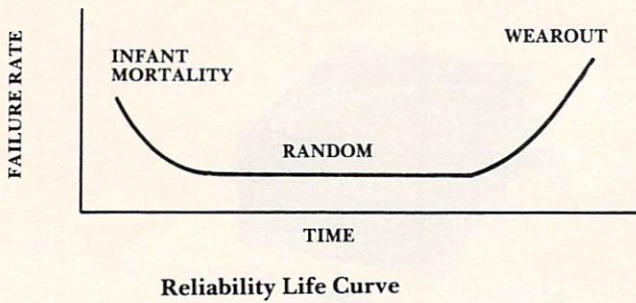
● *BYTE-DOS OPERATES WITH THE AIM-65 MONITOR, BASIC, ASSEMBLER, EDITOR, PL/65 AND FORTH. ACCESS IS THROUGH PROGRAM I/O AND F1-F3 KEYS. BYTE-DOS SUPPORTS ONE OR TWO 5¼" OR 8" FLOPPYS!*

● *BYTE-DOS \$499 SYSTEM INCLUDES DISC CONTROLLER CARD, TEAC FD-50A DISC DRIVE (153K FORMATTED BYTES), BYTE-DOS SOFTWARE SYSTEM, CABLES, CONNECTORS, MANUALS. COMPLETE! JUST PLUG IT TOGETHER AND USE!*

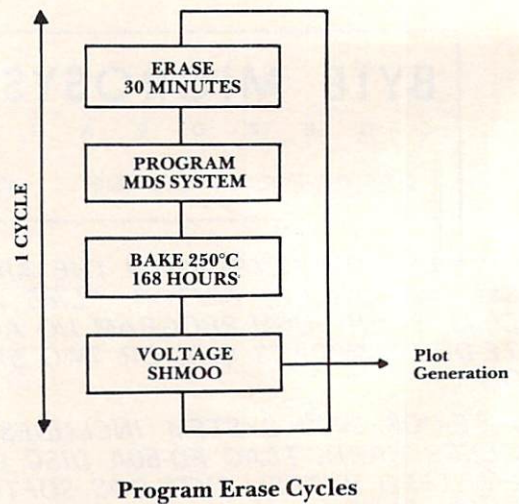
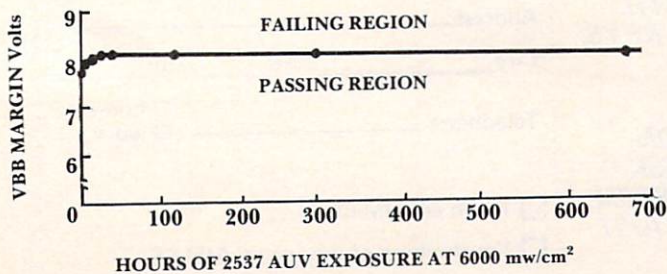
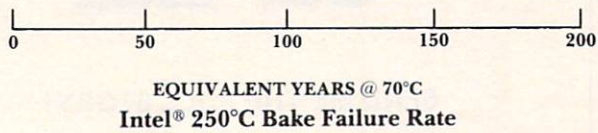
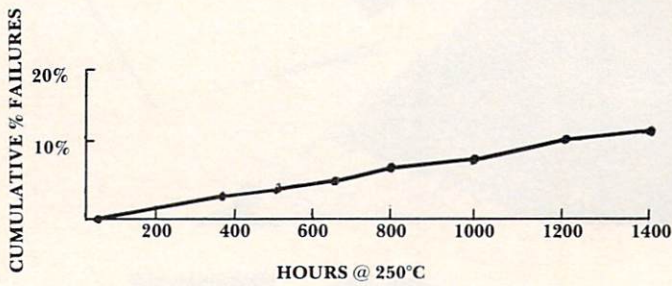
AIM-65 is a trademark of Rockwell International



(a) CROSS SECTION



(b) SCHEMATIC SYMBOL



SPRING SPECIAL

No need to wait any longer for our controller development system;

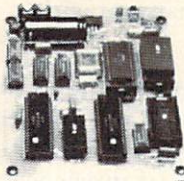
The MMC/03S is back! For \$250.00 you get:

- 1 MMC/03D Microcomputer, IKRAM, 2-6522's ZIF sockets for CPU and EPROM, 20MA full duplex current loop, & crystal clock.
- 1 MMC/03ICE In circuit emulator, works off any 6502-based system including AIM, SYM, KIM, OSI. (Apple version slightly more, PET version a lot less)
- 1 MMC/03EPA EPROM programming adaptor; Programs - 2758's, 2716's, and 2532's.

MMC/03D

MMC/03ICE

MMC/03EPA



R. J. BRACHMAN ASSOCIATES, INC.
P.O. Box 1077
Havertown, PA 19083
(215) 622-5495

SEE COMPUTE!
April 1981
For Eric Rehnke's Review.

ANNOUNCING TWO NEW TERMINALS

Smart • Fast • Graphics • Matching Modem and \$295 Printer

Netronics announces a state of the art breakthrough in terminals, now at prices you can afford, you can go on-line with data-bank and computer phone-line services. It's all yours: "electronic newspapers," "educational services," Dow-Jones stock reports, games, recipes, personal computing with any level language, program exchanges, electronic bulletin boards... and more every day!!!



Netronics offers two new terminals. Both feature a full 56 key/128 character typewriter-style keyboard, baud rates to 19.2 kilobaud, a rugged steel cabinet and power supply. The simplest one, FASTERM-64, is a 16 line by 64 or 32 character per line unit, with a serial printer port for making hard copy of all incoming data, and optional provisions for block and special character graphics. The "smart" version, SMARTERM-80, features either 24 line by 80 characters per line or 16 by 40 characters per line, it offers on-screen editing with page-at-a-time printing, 12,000 pixel graphics, line graphics, absolute cursor addressing, underlining, reverse video, one-half intensity and much more... simply plug them into your computer or our phone modem and be on-line instantly. Use your TV set (RF modulator required) or our deluxe green-phosphor monitor pictured above. For hard copy just add our matched printer.

Price breakthrough!!! Own the FASTERM-64, a complete terminal kit, ready to plug in for just \$199.95 or order the SMARTERM-80 kit for just \$299.95, (both available wired and tested.) Be on-line with the million-dollar computers and data services today... we even supply the necessary subscription forms.

More good news: All the components in our terminals are available separately (see coupon), so you buy only what you need!!!

FASTERM-64 ... DISPLAY FORMAT: 64 or 32 characters/line by 16 lines ... 96 displayable ASCII characters (upper & lower case) ... 8 baud rates: 150, 300, 600, 1200, 2400, 4800, 9600, 19, 200, (switch sel.) ... LINE OUTPUT: RS232C or 20 ma current loop ... VIDEO OUTPUT: 1V P/P (EIA RS-170) ... CURSOR MODES: home & clear screen, erase to end of line, erase cursor line, cursor up & down, auto carriage return/line feed at end of line & auto scrolling ... REVERSE VIDEO ... BLINKING CURSOR ... PARITY: off, even or odd ... STOP BITS: 1, 1.5, 2 ... DATA BITS PER CHARACTER: 5, 6, 7 or 8 ... CHARACTER OUTPUT: 5 by 7 dot matrix in a 7 by 12 cell ... PRINTER OUTPUT: prints all incoming data ... 1K ON BOARD RAM ... 2K ON BOARD ROM ... CRYSTAL CONTROLLED ... COMPLETE WITH POWER SUPPLY ... OPTIONAL GRAPHICS MODE: includes 34 Greek & math characters plus 30 special graphics characters ... ASCII ENCODED KEYBOARD: 56 key/128 characters.

SMARTERM-80 ... DISPLAY FORMAT: 80 characters by 24 lines or 40 characters by 16 lines 128 displayable ASCII characters (upper & lower case) 8 baud rates: 110, 300, 600, 1200, 2400, 4800, 9600, 19, 200 ... LINE OUTPUT: RS232C or 20 ma current loop ... VIDEO OUTPUT: 1V pp (EIA RS-170) ... EDITING FEATURES: insert/delete line, insert/delete character, forward/back tab ... LINE OR PAGE TRANSMIT ... PAGE PRINT FUNCTION ... CURSOR POSITIONING: up, down, right, left, plus absolute cursor positioning with read back ... VISUAL ATTRIBUTES: underline, blink, reverse video, half intensity, & blank ... GRAPHICS: 12,000 pixel resolution block/pli line graphics ... IN-SCREEN PARITY INDICATOR ... PARITY: off, even or odd ... STOP BITS: 110 baud 2, all others 1 ... CHAR. OUTPUT: 7 by 11 character in a 9 by 12 block ... PRINTER OUTPUT ... 60 OR 50 Hz VERTICAL REFRESH ... BLINKING BLOCK CURSOR ... CRYSTAL CONTROLLED ... 2K ON BOARD RAM ... ASCII ENCODED KEYBOARD: 56 key/128 character ... 4K ON BOARD ROM ... COMPLETE WITH POWER SUPPLY.

TELEPHONE MODEM 103 O/A ... FULL DUPLEX, FCC APPROVED ... DATA RATE: 300 baud ... INTERFACE: RS232C and TTY ... CONTROLS: talk/data switch, no need to connect and disconnect phone, originate/answer switch on rear panel ... NO POWER SUPPLY REQUIRED.

ASCII KEYBOARD ASCII-3 ... 56 KEY/128 CHARACTER ASCII ENCODED ... UPPER & LOWER CASE ... FULLY DEBOUNCED ... 2 KEY ROLLOVER ... POS OR NEG LOGIC WITH POS STROBE ... REQUIRES +5 & -12V DC (SUPPLIED FROM VIDEO BOARDS)

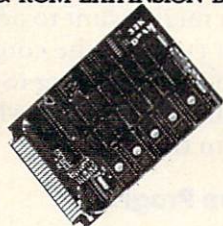
PRINTER COMET ... SERIAL I/O TO 9600 BAUD ... 80 CHARACTER COLUMN (132 COMPRESSED) ... 10" TRACTOR FEED ... UPPER/LOWER CASE ... INDUSTRY STANDARD RIBBONS ... 4 CHARACTER SIZES ... 9 BY 7 DOT MATRIX ... BI-DIRECTIONAL PRINTING



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 upgrade, 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.
- 5 on board sockets for 2516/2532 (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

Price — \$289.88

Include \$3.00 for S&H within the U.S.
Allow 6 weeks for delivery.

Full informative documentation included with all our products.
50% deposit required on all C.O.D. Orders.
(213) 362-8156 Mail Order Only

PROTRONICS
COMPUTER INNOVATIONS

17537 Chatsworth St.
Granada Hills, CA. 91344

Continental U.S.A. Credit Card Buyers Outside Connecticut

CALL TOLL FREE 800-243-7428

To Order From Connecticut Or For Tech. Assist. Call (203) 354-9375

NETRONICS R&D LTD. Dept.

333 Litchfield Road, New Milford, CT 06776

Please send the items checked below:

- COMPLETE FASTERM-64 TERMINAL (includes FASTVID-64 video board ASCII-3 keyboard, steel cabinet and power supply) ... kit \$199.95 plus \$3 P&I ... wired & tested \$249.95 plus \$3 P&I ... graphics option: add \$19.95 to each of above
- COMPLETE SMARTERM-80 TERMINAL (includes SMARTVID-80 video board, ASCII-3 keyboard, steel cabinet and power supply) ... kit \$299.95 plus \$3 P&I ... wired and tested \$369.95 plus \$3 P&I
- FASTVID-64 VIDEO BOARD (requires +5 & -12V DC) ... kit \$99.95 plus \$3 P&I ... graphics option add \$19.95 ... wired & tested \$129.95 plus \$3 P&I ... graphics option add \$19.95
- SMARTVID-80 VIDEO BOARD (requires +5 & +/-12V DC) ... kit \$199.95 plus \$3 P&I ... wired & tested \$249.95 plus \$3 P&I
- DELUXE STEEL TERMINAL CABINET ... \$19.95 plus \$3 P&I
- ASCII-3 KEYBOARD (requires +5 & -12VDC) ... kit \$69.95 plus \$3 P&I ... wired and tested \$89.95 plus \$3 P&I
- POWER SUPPLY (powers ASCII-3 keyboard & video boards) ... kit only \$19.95 plus \$2 P&I
- ZENITH VIDEO MONITOR (high resolution green phosphor) ... wired & tested \$149.95 plus \$6 P&I
- TELEPHONE MODEM MODEL 103 O/A ... wired & tested \$189.95 plus \$3 P&I
- DOT MATRIX PRINTER Comet I ... wired & tested \$299.95 plus \$10 P&I
- RF MODULATOR MOD RF-1 ... kit only \$8.95 plus \$1 P&I
- 3FT-25 LEAD MODEM/TERMINAL OR PRINTER/TERMINAL CONNECTOR CABLE ... \$14.95 ea plus \$2 P&I

For Canadian orders, double the postage. Conn. res. add sales tax.

Total Enclosed \$ _____

Personal Check Cashier's Check/Money Order
 VISA MasterCard (Bank No. _____)
Acct. No. _____ Exp. Date _____

Signature _____
Print Name _____
Address _____
City _____ State _____ Zip _____

Random Music Composition On The PET

Alfred J. Bruey
Jackson, MI

This program, MUSICOMP, lets the PET computer compose and play music. MUSICOMP was written to provide the user with an introduction to computer generated music. The music is output using the CB2 method of music generation which is described many places in PET literature. Attachments A and B give descriptions of the hardware that you can use if you don't already have CB2 sound. Figure 1 shows the connections necessary to output sounds from the PET to an audio amplifier. Figure 2 shows a simple audio amplifier that you can make if you don't have one.

Program Description

MUSICOMP generates three kinds of music: white music, brown music, and 1/f music. For a complete description of these three types of music, see Martin Gardner's Mathematical Games column in the April, 1978, issue of *Scientific American* magazine.

A. White music: White music is a sequence of completely random sounds. In this program, you have your choice of two different types of white music:

1. Option 1 on the menu allows any of 256 different frequencies to be generated. The notes are not correlated with each other in any way. It is unlikely that you will want to go away humming the tunes you generate using this option.
2. Option 2 also generates random sounds, but these sounds are restricted to: the 25 piano notes (well-tempered scale) beginning with the B below middle C.

B. Brown Music: The second type of music is called brown music (Option 3). It is similar to the Brownian motion of particles. In brown music, each note can vary by only one tone (half-step) from the preceding note. The only randomness is in choosing the

starting note and in determining whether each note is one tone higher or lower than its predecessor. You will probably find this music boring. It sounds something like a finger exercise for a violinist.

To get brown music, enter a 1 when you are asked for the maximum variation. Entering some other number, a 3 for example, will allow each note to vary three tones from its predecessor. True brown music allows only a one tone variation from note to note. The option of choosing a maximum variation is given so you can experiment with sounds.

C. 1/f Music: The final type of random music in this program is 1/f music. This music is somewhere between the randomness of white music and the boring regularity of brown music. 1/f music was discovered by an investigator who was trying to find music in nature. The algorithm used in this program is the same as the one described in the previously mentioned article except five different colored dice were used instead of three so that tunes 32 notes long could be created. Most listeners agree that 1/f music is much more musical than either white or brown music.

Extensions

I assume that anyone who knows BASIC and a minimum of music will want to change this program. That's why an annotated listing of the program is provided.

You might want to add options which impose different rules on the composition. You might also want to add the coding to save the composition on tape or disk. The place where you might do this is marked in the listing.

Using The Program

Load the program in the usual way. The main menu will be displayed on the screen as follows. Press the proper key from 1 to 5 to make your selection, but do not press RETURN. (If you press RETURN accidentally and get the READY signal, type CONT and press RETURN and you'll be right back where you left off.)

COMPOSITION SELECTION

- 1 RANDOM TUNE
- 2 RANDOM TUNE, WELL-TEMPERED
- 3 RANDOM TUNE, WELL-TEMPERED WITH STEP SIZE LIMIT
- 4 1/F MUSIC
- 5 END PROGRAM

A brief description of each of the options follows:

Option 1: Random notes – This option will compose and play tunes based on 256 different tones, ranging from a tone slightly below the B below middle C to a tone that's probably even too high for your dog

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.

SM-KIT

for Commodore Computers

A Programming Productivity Tool



ONLY
\$40



A 4K ROM with both
programming and disk
handling aids.

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.

**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.

\$150⁰⁰



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

to hear. When you press the 1 key, a series of questions will be displayed (Press RETURN after each answer):

HOW LONG IS THE TUNE

(Answer with a number from 1 to 150)

DIFFERENT LENGTH NOTES (Y OR N)

(If you enter a Y, each note length will be one second long. If you answer M it will be $\frac{1}{2}$ second long. If you answer F it will be $\frac{1}{4}$ second long. All other note lengths will be scaled accordingly.)

REPEAT NOTES (Y OR N)

(If you reply N, the tune will play one time and then the main menu will reappear. If you reply Y, the tune will repeat. In either case, you can stop the tune while it is playing by

holding down the X key. You will return to the main menu.)

After you have answered these four questions, there will be a short pause while time values are being calculated for all the notes. Then the tune will begin to play.

Option 2: Random notes, well-tempered. This is the same as Option 1 except that all notes are chosen randomly from one of 25 tones. These tones are the 25 piano notes beginning with the B below middle C.

Option 3: Random notes, well-tempered, with step-size limit. You will be asked the same questions as in Options 1 and 2. After you answer them, you will receive an additional question:

MAX. VAR. FROM LAST NOTE

This question is asking you for the maximum variation in tone (half-steps) that are permissible from one note to the next. If you reply 1, you will get brown music. You may enter any other value just to see what kind of tune the PET will compose.

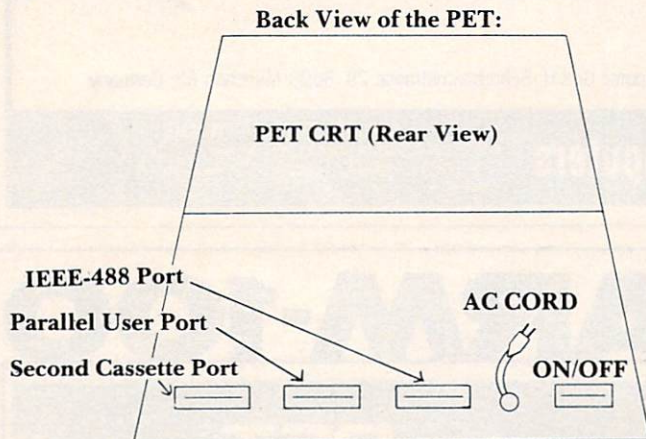
Option 4: 1/f Music. Pressing the 4 key will generate 1/f music. The 1/f tunes will all be 32 notes long, so you will not be asked for the length of the tune. Otherwise, you will be asked the same questions as in Options 1 and 2.

Option 5: End Program. Select Option 5 when you are ready to quit.

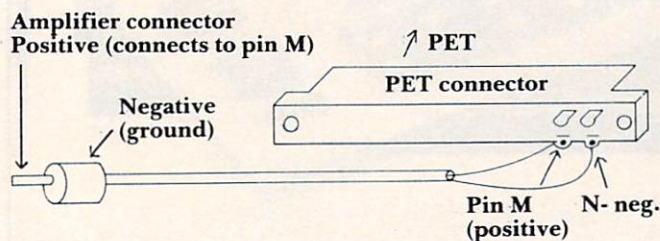
A Circuit For A PET Amplifier

Below is a circuit for a PET amplifier for making music or adding sound effects to your games. Use an RCA phono jack as the input and you'll be able to use the same connector cable as described previously.

Figure 1.

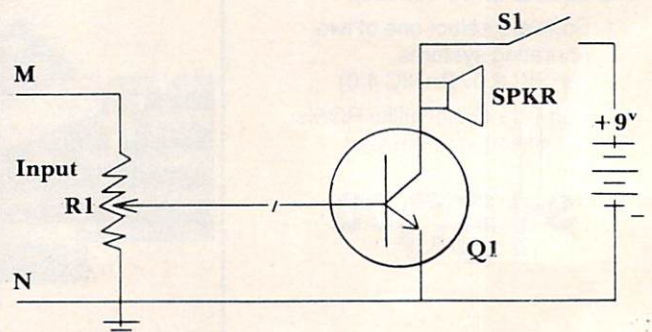


The edge connector that you need plugs into the Parallel user port of the PET. Do not attach it to the IEEE-488 port. (It's not a bad idea to put a strip of masking tape across the IEEE port so you don't accidentally plug into it.) Here's what the completed cable should look like. The amplifier end might look different if your system doesn't use the RCA type jack.



You should use shielded cable for the line between the PET and the amplifier. *Be sure you don't put the PET connector on upside down!*

Figure 2.



R1 - 100K potentiometer with switch

S1 - Part of R1

Q1 - RS2031 (Radio Shack 276-2031)

SPKR - 8 ohm SPEAKER

SMALL PLASTIC BOX, 9 VOLT BATTERY, BATTERYHOLDER

• **THE MAGIC OF MAGIS** •

MAGIS is a fully integrated accounting system designed for both experienced and novice business users. No previous knowledge of computers is required. MAGIS offers a comprehensive solution to your business accounting needs. It covers General Ledger, Accounts Receivable, Accounts Payable, Inventory and Payroll. In addition, MAGIS has a Point of Sale or Sales Journal which updates all affected files, and fills in prices and descriptions.

Although a thorough manual is provided, you can operate the system without it, as MAGIS is completely **MENU DRIVEN**. That is, all of your choices are shown on the screen. You never have to look up a command. Default file sizes are:

- 375 - General Ledger Accounts
- 500 - Accounts Receivable (6000 open invoices)
- 50 - Accounts Payable (1000 open invoices)
- 50 - Payroll Records
- 3000 - Inventory Items. (12000 w/2 drives)
- 10 - Departments
- 40 - Depreciable Assets. Automatically computed

How much will all this accounting power cost me? The answer is "Not NEARLY what you would expect to pay!" MAGIS sells for up to \$1500.00 at other dealers, but now you can get it for **\$499** from **C & O Micro Systems**. MAGIS requires a CBM 8032, 8050 disk drive and printer.

MAGIS IS COMMODORE APPROVED

Also - **ASTEROID MINER**. Uses graphics, music and sound effects. Requires 8032. \$14.95 Cass. \$16.95 Disk.

C & O Micro Systems Inc.
P.O. Box 14633 Lenexa, KS 66215

To order call toll free 800/854-4368
In California call 800/472-4378
For information call 913/888-4062 or 816/252-0216

80 x 25

PET/CBM™

2000/3000/4000 Series

not using a CRT, or display controller chip

\$275.00*

Select either **80 x 25** or **40 x 25** On The Built-in Display

From the keyboard or program

Displays the full, original character set

Available from your local dealer or:

EXECOM CORP.

1901 Polaris Ave.
Racine, WI 53404
Ph. 414-632-1004

* Plus installation charge of \$75.00

Available only for Basic 3.0 & Basic 4.0

PET & CBM™s

trademark of Commodore Business Machines

NEW PET/CBM SOFTWARE

Let Computer Mat turn your Pet into a Home Arcade!

ASTEROIDZ — Its your ship vs. a swarm of killer gammaroidz. You are on a collision course and must destroy them before they blast you into the next galaxy. Four levels of play. Has hyperspace keys that move you around. Arcade style entertainment at its finest. Great graphics and sound.

Cass. 8K \$9.95

MUNCHMAN — How many dots can you cover? It's you against the computer munchers ZIP and ZAP. Can you clear the maze first or will they get you? Number keys move you up, down, right and left. **GREAT GRAPHICS AND SOUND.**

Cass. 8K \$9.95

TARGET COMMAND — Its you against a barrage of enemy lazars that are aimed at your ammo dumps. Sight in on the targets and score as many hits as you dare. As your skill increases so does the the difficulty — (5 levels to select). This is an arcade-style game with great graphics and sound effects. A must for your PET/CBM.

Cass. 8K \$9.95

ALL OUR SOFTWARE RUNS IN 8K

OLD-NEW ROM — 40 CHR. SCREEN

WRITE FOR FREE CATALOG OF VIC/PET SOFTWARE

PLEASE ADD \$1.00 PER ORDER FOR SHIPPING

COMPUTER MAT • BOX 1664C • LAKE HAVASU CITY, AZ. 86403

OLD PET OWNERS NEVER DIE

☆THEY JUST CALL ON US! ☆

Our innovative line of hardware products protect the investment in your original version 4K/8K PET by extending its life and usefulness. Our software works on most PET/CBMs.

● 2114-TO-6550 RAM ADAPTER HUNDREDS SOLD!

Replaces up to eight 6550 RAMs with low cost, reliable 2114s—one at a time. Use two units for total 6550 replacement. Never worry about RAM availability again!

PHB-001	Bare Board	\$11.95
PHK-001S	Full Kit (No 2114s)	\$17.95
PH-001S	Assembled (No 2114s)	\$24.95
(\$2.50 postage/handling per order)		

● 4K MEMORY EXPANSION

Installs easily internally. Uses eight 2114Ls. Write protect provisions. Second expansion needs external +5V power. "Soft-ROM" applications. Bigger programs!

PHB-002	Bare Board	\$16.00
PHK-002	Full Kit (No 2114s)	\$29.00
PH-002S	Assembled (No 2114s)	\$42.00
PH-002	Assembled with 2114s	\$89.00
(\$3.00 postage/handling per order)		

● "REAL WORLD" SOFTWARE

For most PET/CBMs. Word Processor, Mailing List, Catalog, Satellite Tracker, Morse Code Keyer, Frequency Counter. Professional results at low cost!

\$17-\$25

Write for Free Catalog

PROMPT SHIPMENT! SATISFACTION GUARANTEED
California Residents, add 6% Tax Foreign Shipping Higher

OPTIMIZED DATA SYSTEMS

Dept. C, P.O. Box 595 Placentia, California 92670



DEALER INQUIRIES INVITED



PET/CBM Trademark of Commodore Business Machines

Substitutions may be made for Q1, but a high-gain transistor should be used to be sure of sufficient volume. The transistor can be mounted directly on the leads of the potentiometer.

Program 1.

```

150 DIM SN(150),ST(150),PI(25),PN(1
    50)
160 FORI=1TO25:READPI(I):NEXTI
170 DATA251,237,223,211,199,188,177
    ,167,157,148,140,132,125,1
    17,111,104
180 DATA98,93,87,82,78,73,69,65,61
190 REM *****
    ****
200 REM VARIABLE LIST: *
210 REM T=TIME OF NOTE IN 60THS OF ~
    SECOND
220 REM P=POKE NUMBER FOR NOTE
230 REM TY$=TYPE OF SONG
240 REM     1=RANDOM
250 REM     2=RANDOM, WELL-TEMPERED
260 REM     3=RANDOM, WELL-TEMPERED,
    LIMIT ON STEP SIZE
270 REM     4=1/F MUSIC
280 REM     5=STOP
290 REM L%=LENGTH OF SONG
300 REM L$="Y" NOTES DIFFERENT LENG
    TH
310 REM     "N" NOTES SAME LENGTH
320 REM S$="S" SLOW SONG,S=1
330 REM     "M" MEDIUM SPEED SONG,S=
    2
340 REM     "F" FAST SONG,S=4
350 REM *****
    ****
360 PRINT"{CLEAR}{03 RIGHT}{03 DOWN
    DOWN}{REV}COMPOSITION SELE
    CTION"
370 PRINT"{DOWN}{04 RIGHT}{REV}1{OF
    OFF} RANDOM TUNE
380 PRINT"{DOWN}{04 RIGHT}{REV}2{OF
    OFF} RANDOM TUNE, WELL-TEM
    PERED"
390 PRINT"{DOWN}{04 RIGHT}{REV}3{OF
    OFF} RANDOM TUNE, WELL-TEM
    PERED
400 PRINT"{DOWN}{04 RIGHT} WITH ~
    STEP SIZE LIMIT"
410 PRINT"{DOWN}{04 RIGHT}{REV}4{OF
    OFF} 1/F MUSIC
420 PRINT"{DOWN}{04 RIGHT}{REV}5{OF
    OFF} END PROGRAM
430 GET TY$:IFTY$=""THEN430
440 ONVAL(TY$)GOTO500,590,690,980,4
    60
450 GOTO430
460 REM *****
    ****
470 REM EXIT ROUTINE *****
    ****
480 REM *****
    ****
490 PRINT"{CLEAR}{03 RIGHT}{04 DOWN
    DOWN}{REV}ROUTINE ENDED":E
    ND
500 REM *****
510 REM PLAY RANDOM *****
520 REM *****
530 GOSUB 1190 :REM GET SONG DATA
540 FORI=1TOL%
550 SN(I)=INT(RND(3)*255+1)
560 NEXTI
570 GOSUB1410:REM GENERATE NOTES AN
    D PLAY
580 GOTO360
590 REM*****
    ****
600 REM RANDOM, WELL-TEMPERED *****
    ****
610 REM *****
    ****
620 GOSUB 1190 :REM GET SONG DATA
630 FORI=1TOL%
640 SN(I)=INT(RND(5)*25+1)
650 SN(I)=PI(SN(I))
660 NEXTI
670 GOSUB 1410
680 GOTO360
690 REM *****
    ****
700 REM RANDOM,WELL-TEMP,STEP-SIZE ~
    ****
710 REM *****
    ****
720 GOSUB 1190 :REM GET SONG DATA
730 SN(1)=INT(RND(6)*25+1):PN(1)=PI
    (SN(1))
740 IFMV>1THEN850
750 REM BROWNIAN MOVEMENT
760 FORI=2TOL%
770 IFSN(I-1)=1THENSN(I)=2:PN(I)=PI
    (2):GOTO830
780 IFSN(I-1)=25THENSN(I)=24:PN(I)=
    PI(24):GOTO830
790 KR=RND(7)
800 IFKR<.5THENSN(I)=SN(I-1)+1
810 IFKR>=.5THENSN(I)=SN(I-1)-1

```



```

820 PN(I)=PI(SN(I))
830 NEXTI
840 GOTO950
850 FORI=2TOL%
860 MX=SN(I-1)+MV
870 IFMX>25THENMX=25
880 MN=SN(I-1)-MV
890 IFMN<1THENMN=1
900 NO=MX-MN+1
910 CG=INT(RND(6)*NO)
920 SN(I)=MN+CG
930 PN(I)=PI(SN(I))
940 NEXTI
950 FORI=1TOL%:SN(I)=PN(I):NEXTI
960 GOSUB 1410:REM SET TIMES AND PL
  AY NOTES
970 GOTO360
980 REM *****
990 REM 1/F MUSIC *****
1000 REM *****
1010 GOSUB 1190 :REM GET SONG DATA
1020 L%=32
1030 FORI=1TO5:D(I)=INT(RND(8)*6+1):
  NEXTI
1040 SN(1)=D(1)+D(2)+D(3)+D(4)+D(5)-
  5
1050 IFSN(1)<1THENSN(1)=1
1060 SN(1)=PI(SN(1))
1070 FORI=2TOL%
1080 IFI=17THEND(1)=INT(RND(8)*6+1)
1090 IFINT((I-1)/8)=(I-1)/8THEND(2)=
  INT(RND(8)*6+1)
1100 IFINT((I-1)/4)=(I-1)/4THEND(3)=
  INT(RND(8)*6+1)
1110 IFINT(I/2)<>I/2THEND(4)=INT(RND
  (8)*6+1)
1120 D(5)=INT(RND(8)*6+1)
1130 SN(I)=D(1)+D(2)+D(3)+D(4)+D(5)-
  5
1140 IFSN(I)<1THENSN(I)=1
1150 SN(I)=PI(SN(I))
1160 NEXTI
1170 GOSUB1410
1180 GOTO360
1190 REM *****
1200 REM ASK FOR SONG DATA
1210 REM *****
1220 PRINT"{CLEAR}{03 RIGHT}{03 DOWN
  DOWN}{REV}COMPOSITION DATA
  "
1230 IFTY$="4"THEN1270
1240 INPUT"{02 RIGHT}{DOWN}ENTER LEN
  GTH, IN NOTES";L%
1250 IFL%=<=0THENPRINT"{DOWN}TOO SHOR
  T":GOTO1240
1260 IFL%>150THENPRINT"{DOWN}MAXIMUM
  LENGTH 150":GOTO1240
1270 INPUT"{02 RIGHT}{DOWN}DIFFERENT
  LENGTH NOTES (Y OR N) ";L
  $
1280 IFRIGHT$(L$,1)<>"Y"ANDRIGHT$(L$
  ,1)<>"N"THENPRINT"{DOWN}EN
  TER Y OR N":GOTO1270
1290 INPUT"{DOWN}{02 RIGHT}SLOW, MED
  IUM, FAST (S,M,F)";S$
1300 IFS$<>"S"AND S$<>"M"ANDS$<>"F"
  THENPRINT"{DOWN}S,M, OR F":
  GOTO1290
1310 IFS$="S"THENS=1
1320 IFS$="M"THENS=2
1330 IFS$="F"THENS=4
1340 INPUT"{DOWN}{02 RIGHT}REPEAT NO
  TES (Y OR N) ";RP$
1350 IFRP$<>"Y"ANDRP$<>"N"THENPRINT"
  {DOWN}ENTER Y OR N":GOTO13
  40
1360 IFTY$<>"3"THEN1400
1370 INPUT"{02 RIGHT}{DOWN}MAX. VAR.
  FROM LAST NOTE ";MV
1380 MV=INT(MV)
1390 IFMV<=0THENPRINT"{DOWN}INVALID ~
  VALUE ":GOTO1370
1400 RETURN
1410 REM *****
1420 REM GENERATE TIMES AND PLAY NOT
  ES
1430 REM *****
1440 IFL$="Y"THEN1490
1450 FORI=1TOL%
1460 ST(I)=16/S
1470 NEXTI
1480 GOTO1540
1490 W=64/S
1500 FORI=1TOL%
1510 R=INT(RND(4)*5+1)
1520 ST(I)=W/R
1530 NEXTI
1540 POKE59467,16:POKE59466,15
1550 FORI=1TOL%
1560 POKE59464,SN(I)
1570 T=TI
1580 IFTI-T<ST(I)THEN1580
1590 POKE59464,0
1600 GETA$:IFA$="X"THEN1630
1610 NEXTI
1620 IFRP$="Y"THEN1550
1630 POKE59467,0:POKE59466,0
1640 RETURN

```


P.I.E.-C

Interface CBM to Parallel Printer. Uses and Extends the IEEE-488 Bus.

Fully Compatible with ALL WORD-PROCESSING SOFTWARE!

Will Operate EPSON, IDS, OKIDATA, CENTRONICS, ANADIX, C. ITOH, NEC, PLUS ALL OTHER PARALLEL PRINTERS!

Switch Selectable Address 4 to 30. Switch for Direct/Converted Data. Professional Package and 6' Cable.

(301) 730-3257
\$129.95 + \$5 S&H (MD Res. +5 tax)

LemData Products

P.O. Box 1080, Columbia, MD 21044

AFFORDABLE - ONLY \$50

MAILING LIST PROGRAM

FOR COMMODORE

16K or 32K - 40 or 80 column
2040 or 4040 Disk Drive

Write up to 1125 FILES, SORT, SEARCH,
PRINT LISTS AND LABELS.

PLUS receive an UNDERSTANDABLE GUIDE!

ALSO AVAILABLE -- BIBLE HOCKEY GAME -- \$10 --
ORDER GAME ON TAPE OR DISK

PSK EVALUATION SERVICE

1421 CAMERON LANE
MERCED, CA 95340
TELEPHONE: (209) 393-0405

WHEN ORDERING SPECIFY EQUIPMENT

Dealers —
Reserve your
copies of
COMPUTE's first
Atari and
PET/CBM books
today. Call
919-275-9809
for ordering
information.



GOLF

An instructional game for beginners. Realistic distances for each club (driver thru wedge). Perfect for the experienced golfer on a rainy day. 1 to 4 players. 9 or 18 holes. Accommodates for hooking and slicing. Graphics. Hazards-water, trees, sand traps, out-of-bounds. PGA rules. Computer scoring. Instructions.

For PET 16K: TRS-80 Mod. 1 Level II 16K (No Graphics)
Cassette \$14.95 (N.Y.S. Residents Add 4 % Sales Tax)
Listing For Other Machines \$4.95 (No Graphics)

Send Check or Money Order To:
R.L. HEFFNER
7 NEPTUNE LANE
MIDDLETOWN, N.Y. 10940

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

NEW SOFTWARE

VORTEX

The enemy is at the center of swirling rings of energy. Your mission — penetrate and destroy.

PHANTOM FIGHTER

Defend Superstition Mountain from attacking UFO's.

Two original arcade games for 40 column PETs. Machine language routines and graphics by Bob Carr and Kathy Higby, the originators of FROG, DANCER, OURANOS! and DROMEDA!

... Each **14.95*** on cassette ...

Also Available

WASPS **9.95*** Cassette
Defend yourself from killer insects!

GRAPHIC DUO **6.95*** Cassette
Two terrific animated cartoons.

GAME PAC **6.95*** Cassette
SUPERFROG! — AEROSOL! — WEATHER WAR!

MAGIC CARPET

P.O. Box 35115 Phoenix, AZ 85069

ARIZONA RESIDENTS ADD 5% SALES TAX.
Add \$3 per order for shipping and handling. Foreign orders add 10% for air postage. Guarantee — if for any reason, one of our programs won't load, return it for free replacement.

Ghost Programming

Aric Wilmunder
Los Angeles, CA

I will show how it is possible for 16K Atari users to write and run BASIC programs normally requiring 24 or even 32K. This method is not at all like the method given to us in the BASIC manual where small programs simply call each other and passing of variables and arrays is difficult. Instead, this method is many times more powerful than chaining. Passing of variables is easy, and chaining is unnecessary.

In this article, I will explain how it is possible to write lines of code, subroutines, even entire programs without using any memory except for the space necessary for variables, arrays, and strings. How it is even possible to call and execute programs without changing or destroying the currently stored program. However, like every silver lining, mine too has a dark cloud – there are a number of restrictions involved. I will try to cover these restrictions thoroughly, but only after explaining the technique.

I should mention that, although all of the programming examples are disk oriented, all of the techniques used can be easily modified for cassette users.

After spending nearly four weeks trying to cram close to 40K worth of program into a 32K machine, I began to re-examine the problem of conserving memory. There are many ways to save memory space on the Atari, from removing I/O buffers on the DOS to complete recoding (of which I have done quite a bit). (A list of memory conservation techniques is included as part of *De Re Atari*, and anyone interested in writing large programs should become familiar with them.)

Instant Exec

What kept nagging me were the fifty or more lines of initialization code that were executed only once during my entire program. After their execution, these lines simply took up precious memory space which could be used for other purposes. Also, many of these lines are simply variable assignment statements like `J = 12` or `I = 1`, or string assignments like `A$ = "PHASERS."` These statements must be executed at the beginning of each execution, but could be forgotten during execution.

Of the two types of assignments, variable and

string, the string assignments concerned me the most. The statements `DIM A$(26):A$ = "ABCD...Z"` does not use only the 26 bytes for storing the string, but you are also using another 26 or more bytes for the assignment. The result is that your program is using more than twice the memory that is necessary in order to store a string. This may be no problem with smaller strings of up to fifty bytes, but, when using larger strings in a program where memory is already scarce, it can be quite alarming.

The method that has solved most of my problems goes something like this: create a file with all of the assignment statements used in the opening of the program in the same structure as a LIST file but minus the line numbers. For example: rather than having a LIST file that, when dumped, looks exactly like a program listing. You have the same line of code, but with commands only. The line:

```
1000 FOR I = 65 TO 90: ?CHR$(I):: NEXT I
```

would read:

```
FOR I = 65 TO 90: ?CHR$(I):: NEXT I
```

When entered, this line would act exactly as if it were typed on the keyboard by hand. At the beginning of my main program I use the command `'ENTER"D:<filename>'`. This command causes the system to enter each line of code from my Exec program and execute it using virtually no memory space.

You can create a file with only an initialization routine, or go so far as to write an entire program with this method. To execute any of these programs you simply type `'ENTER'` or `'E.'`, the extension and the file name. BASIC will treat this Exec Program exactly as if you were typing in each statement from the keyboard, thereby using no memory space for lines used only once. The amount of memory that can be saved from this method ranges from 5% to virtually an entire program's space.

One of the restrictions with this technique is that programs must be single step or step by step executable. The program must step one line at a time executing each line separately for the entire length of the program. Another restriction is that you cannot have multi-line FOR/NEXT loops (where both the FOR and the NEXT do not reside on the same line). The difficulty is in that, by the time the NEXT is encountered, BASIC will have discarded the FOR statement, giving the loop nowhere it can return to, and causing an error.

The lines:

```
FOR I = 65 TO 90
?CHR$(I);
NEXT I
```

would have to be restructured into one single line. A simple test for writing and developing Exec Programs is to try to write the program by typing

TAKE A BYTE



**OUT OF YOUR
SOFTWARE COST!**

JOIN SOFTWARE GALORE!*

**THE FASTEST GROWING MEMBERSHIP BUYING SERVICE FOR
APPLE, TRS-80, ATARI, PET, IBM, CP/M SOFTWARE.**

*Member: Better Business Bureau

We would like to give you an opportunity to come on board and become a **MEMBER of SOFTWARE GALORE**. The largest national **SOFTWARE BUYING SERVICE**. For a limited time only, **introductory** memberships are available to you at **50% off**. Now only **\$7.50** (Reg. \$15.00 value) and will be good for the period of one year. **Only members may buy from SOFTWARE GALORE.**

You'll find **we stock** the latest releases as well as older hard to find software products that most computer stores no longer carry. We feature these manufacturers:

Accent Software	Context	IUS	Sir-Tech Software
Acorn Software	Continental Software	Lazer Systems	Softape
Activision	Dankin 5 / Level 10	LJK Enterprises	Software Emporium
Avant-garde Creations	Datamost	Micro/Lab International	Software Publishing Corp.
Adventure International	DataSoft	MicroSoft	Spectrum Computer
Arcade Plus	Delta Software	Muse	Stoneware
Astar International Co.	Denver Software	On-Line Systems	Strategic Simulations
Automated Simulations	Edu-ware	Optimized Systems Software Inc.	Sublogic
Avalon Hill Game Co.	Edu-ware East	Personal Software	Synergistic Software
Beagle Brothers	Gebelli	Piccadilly	TG Products
Big Five Software	Glostronics	Phoenix Software	The Book Company
Broderbund Software	Hayden Software	Quality Software	The Cornsoft Group
Budgeco	Highlands Computer Service	Riverbank Software	The Logical Choice
California Pacific	Howard Software	Sensible Software	Turnkey Software
Cavalier Computer	Infocom	Sentient Software	United Software of America
Computer Magic Ltd.	Innovative Design Software	Sierra Software	Versa Computing
	ISA	Sirius Software	Videx Inc.
			Voyager Software

Other "Discount" outlets "Blowout" a few items to get your business then charge you 100% list price for everything else.

At **SOFTWARE GALORE**, you'll save a full **20% OFF RETAIL** on everything you buy and be entitled to these additional services:

- An Additional 5% off on your first single item purchase.
- Access to the largest inventory of software!
- Low handling/shipping charges.
- Overnight shipments by **U.P.S.**
- 90 day guarantee on all software.
- Personalized, efficient service.

Software Galore backs its commitment of service and quality to its members with a 90 day unconditional warranty. You'll never get stuck with a lemon from us.

Catalogs and inquiries call our **Toll Free Numbers:**

1-800-772-2666 x 989 (in Calif.) 1-800-227-2634 x 989 (outside CA)

FOR IMMEDIATE ORDERS CALL 213-827-1851

Enclosed is 7.50 (for 1 yr.) 20.00 (for 2 yrs.) sign me up immediately and send a catalog, membership pack and order forms.

Please send me a catalog and application only. I am under no obligation to buy.

Name: Mr. Ms. _____

Street: _____

City: _____ State: _____ Zip: _____

Type of Computer Used: _____

Mail to: **SOFTWARE GALORE** P.O. Box 10005, Marina del Rey, CA 90291
Or Call: 1-800-772-2666 x 989 (in Calif.) 1-800-227-2634 x989 (outside Calif.)

STATISTICS FOR RESEARCHERS R-STAT

Friendly, easy to use,
well documented.

INCLUDES:

- Database with transformations
- ANOVA N - way
- Analysis of COvariance One - way
- Stepwise Multiple Regression
(with Ridge-regression)
- Univariate Statistics
- Multiple range tests
- Crosstabs
- t - tests
- Graphics
- Menu-driven

DISKETTE & MANUALS **\$350⁰⁰**

ATARI® DOS II

For a **FREE** Brochure or further information please call or write.

DSC P.O. BOX 1035
CO: CENTRALIA, WA 98531
(206) 736-7714

VISA & MASTERCHARGE ACCEPTED

ATARI™ 400/800* SOFTWARE

AT LAST! A NEW GAME
for your ATARI computer!!

Here is a game unlike any
you have played before.

Requires a good memory for
detail. Rewards strategy.

STACK ATTACK!!

For details write:

COLOR COMPUTER CONCEPTS
1275 Terry Drive,
Idaho Falls, ID 83401

or

Order a copy for \$14.95.
Specify Disk or Cassette.
32K 16K

*Trademark of ATARI, INC.

each statement directly into the machine without using line numbers and then checking the results.

Another Restriction

Still another restriction is that, because EXEC programs have no line numbers, GOTOs and GOSUBs to points within the EXEC program are not allowed. However, if you currently have a program in memory, you can call outside routines that exist in your main program without affecting program control. Say you have a delay routine at line 100 in your main program; you can have your Exec Program GOSUB that line and then return to the next line of the EXEC program. If you want, you can even have a loop that will repeatedly call that routine. This technique is shown in Program 3.

In order to create EXEC program files like the one I described, I have written a simple demo program which will write them. In this demo, you write your own program starting at line 1000 and continuing anywhere up to line 9999. The program writes itself out to disk in a LIST file containing only the lines between 1000 and 9999. This LIST file is then opened as an input file and each line is read individually, the line numbers are removed, and the line is rewritten to a new file. When the program ends, you can test your file by typing: E."D:NOMEM.EXE.

If your Exec Program was properly written, the file should be executed and your original program will remain unchanged. If you tried the disk directory program, (Program 1), you would now have a program on disk which could be called at any time and would leave no leftover lines to be deleted later.

One feature which I should mention about this demo program is the ability to test your program before making a file. By typing GOTO and the line number of the first line of your program, you can follow the program execution and even make changes where necessary before creating an Exec Program. This is important because, if an error occurs anytime during execution, the EXEC program will stop and control will return to the monitor. For testing, type E."D:<Filename> and check for proper program flow. If problems arise, you can list the line numbers, make changes, and RUN the program again until all bugs are removed.

Transfer Of Control

Two aspects of using this method merit close attention. The first is that if you wish to enter this program from a running program, it is necessary to have a GOTO (next line in Main program) as the last statement. This will turn program control over from your Exec program to your Main program when the Exec is over. If this is forgotten, when the EXEC program is over, execution will stop.

Since variables, arrays, and strings are passed on, the Main program can use variables from the Exec and vice versa.

The other interesting aspect is that keyboard input will be changed while the machine is reading from the file. The problem arises from the fact that, while the EXEC program is running, the machine acts as if all commands are being typed in directly on the keyboard. When a regular INPUT command is encountered, rather than inputting from the keyboard, the next piece of information will be read in from the disk. If a string is being input, that string will look like the next series of commands. The way around this is to open the keyboard as an input buffer. (OPEN #1,4,0,"K:") Strings and numeric values would then be entered in a loop using repeated GET commands and ending when a <CR> is encountered. The routine given will automatically terminate after a specified number of characters have been entered. (In the sample program, 20 characters are entered, but this can be changed by replacing both 20's in the routine with whatever you like.) The routine also tests for DELETE characters and modifies the string accordingly. For numeric values, you can simply let A=VAL(A\$). This is shown in Program 2.

After you have tried a number of programs, you will notice that the prompt READY will appear after each line is executed. So far, I have no cure for this problem, but if one is found I'll be sure to let you know.

In a short period of time, you can build a substantial library of Exec functions. By changing the name of the output file, you can label the functions any way you find convenient. For example; E."D:DIR would display your current directory, and E."D:HEXDEC would convert hex values to decimal. Except for variable declarations, none of these would affect the current program in memory.

All in all, I have shown only a handful of the potential uses of Exec Programs. Other uses might include complex Batch jobbing and self-deleting line numbers. Any new ideas or feedback about this technique would be greatly appreciated. Like many aspects of the Atari, I feel that we are still only beginning to understand the full potential of this fantastic machine.

Main Program

```

100 DIM A$(500)
110 TRAP 200
120 LIST"D:XYZZY.TMP",1000,9999
130 OPEN#1,4,0,"D:XYZZY.TMP"
140 OPEN#2,8,0,"D:NOMEM.EXE"
150 INPUT#1;A$
160 PRINT#2;A$(6)
170 GOTO 150
200 IF PEEK(195)<>136 THEN ?"ERROR -";

```



```

PEEK(195)
210 CLOSE#1
220 CLOSE#2
230 END

```

Program 1: Disk Directory

```

1000 GRAPHICS 0:CLOSE#1:OPEN#1,6,0,"D:*. *"
: FOR I=1 TO 999:GET#1,A: ?CHR$(A);:
IF A<>155 OR B<>83 THEN B=A: NEXT I

```

Program 2: Input A Value

```

1000 CLOSE#1:?"ANSWER?";:OPEN#1,4,0,"K:":
FOR I = 1 TO 20: GET#1,A: ?CHR$(A);:
A$(I)= CHR$(A): I=I+20*(A=155)-2*(A=
126): NEXT I

```

Program 3: Calling Outside Routines

```

500 FOR I=0 TO 127
510 PRINT CHR$(27);CHR$(I);
520 NEXT I
1000 FOR J = 1 TO 5: GOSUB 500: NEXT J

```

Program 4: List Program Variables

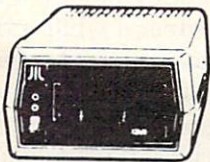
```

1000 J=PEEK(130)+256*PEEK(131)
1010 FOR J=J TO PEEK(132)+256*PEEK(133)-1:
?CHR$(PEEK(J)-128*(PEEK(J)>127));CHR$(
27+128*(PEEK(J)>127));:NEXT J
1020 I=0: FOR J=PEEK(130)+256*PEEK(131) TO
PEEK(132)+256 * PEEK(133)-1: I = I +
(PEEK(J)<127):NEXT J: ? I;" VARIABLES "

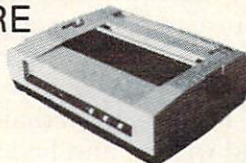
```

©

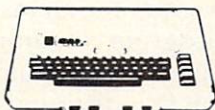
Look Out!
**MX 80
PRO/WRI**
IS HERE



ATARI D.D.
\$460.00



ATARI 800
\$735.00



PRO/WRI OFFERS YOU MORE

- Tractor & Friction Feed
- Paper Cut Off
- The Tightest Dot Matrics You've Ever Seen
- Atari to Pro/Writer Word Processor Free with Printer
- Atari
- Zenith
- Printers
- Atari to Pro/Writer Software
- Hi Res. Key & Dot Graphics
- 100 CPS
- Proportional Spacing
- Math Symbols
- And More For Less
- Paper
- Elephant Disks
- Software

Poquette's

14538 Lynshar Road, Grass Valley, CA 95945
Dealer inquiries invited (916) 272-6808

STARTING YOUR OWN MICROCOMPUTER BUSINESS

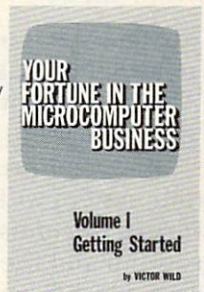
Starting your own microcomputer business is easy if you know the right steps to take. Two volumes of the new book **Your Fortune In The Microcomputer Business** describe the things you should know to start right and to build your business successfully.

Many people have good ideas for a successful microcomputer business. But they don't know how to put their ideas into action. These people are plenty smart. That's not the problem. The problem is in knowing simple things: How to analyze the market. How to select the right product or service. How to get enough startup money. How to plan your growth and success. The answers to these problems are not hard to understand. All you need is the right information. **Your Fortune In The Microcomputer Business** gives you the knowledge tools to start right, grow and prosper.

This practical reference manual has no hocus-pocus. It does not tell you how to do astrology or dating services. It does give you clear, complete, step-by-step instructions on how to get started right and insure your success!

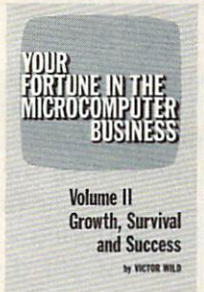
Volume I Includes:

- The hottest trends in the market
- The seven best test markets
- How to read between the lines at a trade show
- 107 ways to reach your market
- Examples of the best ads in the business
- How to get free advertising
- The 21 steps to set up your business
- How to start a manufacturing business
- How to write a newsletter
- How to give a seminar
- How to start a service business
- How to package software for the mass market
- How to be a highly paid consultant
- Franchising—the good, the bad and the ugly
- Interviews with six successful microcomputer businesses
- How to use the RLC factor to be street smart, lean, mean and successful



Volume II Includes:

- Strategies for growth
- Straight facts on incorporation
- How to build your organization
- How to manage cash flow
- How to develop your accounting system
- How to manage employees, wages and salaries
- How to survive a cash crunch
- What to do if things get really bad
- How to maximize your profits
- How to grow by acquisition
- How to value your business
- How and when to sell your business



WRITE OR CALL—DON'T WAIT!

Wildfire Publishing, 326 DJ Toro Canyon
Carpinteria, CA 93013 Ph. (805) 684-1489

Please send the following book(s) by return mail. I understand if I want to return them for any reason within 90 days of receipt, I can do so and get a **prompt full refund.**

- Your Fortune In The Microcomputer Business Vol. I, Getting Started, \$20.00.**
- Your Fortune In The Microcomputer Business Vol. II, Growth, Survival and Success, \$20.00.**

Please add \$1.50 per book for shipping, Calif. residents please add \$1.20 each sales tax.

Name _____

Street _____

City _____ State _____ Zip _____

Enclosed is _____ or charge my MasterCharge or Visa

Card # _____

Ex. Dt. _____ MCInterbank # _____

Signature _____ © 1982 Wildfire Pub.

BASIC 4.0 To Upgrade Conversion Kit

Elizabeth Deal
Malvern, PA

Q: When is a NEXT not a NEXT?

A: When it's a DCLOSE command from Basic 4, of course.

This article is intended primarily for users of the Upgrade PET/CBM systems. It discusses several BASIC 4 disk commands, as they appear on the Upgrade screen.

BASIC 4 programs can often run in the upgrade system with or without conversion. But, to convert, one must know the author's intent in the program and the Upgrade system obliterates the necessary information. Reflect on a three way analogy you might, some day, see on your screen:

NEXT = RETURN WITHOUT GOSUB = DCLOSE

It looks curious, but it makes sense.

A Bit Of History

Some time ago, I had the pleasure of using a BASIC 4 CBM. I was writing a relative file program. At one point I *had* to renumber the program, CBM couldn't do it for me, and the only sensible solution was to load the program into my trusty old Upgrade PET equipped with Toolkit™. I listed the program to see how the disk commands would behave in a new environment.

Assorted quotes from BASIC 4:

```
300 FOR I=1TONF:RECORD#(DF),(CR),(FP%(I))
310 PRINT#DF,F$(I):GOSUB230:NEXT:RETURN
```

READY.

```
2020 DOPEN#(DF),(FF$),D(DD),L(RS) :GOSUB230
2030 RECORD#(DF),(NR):GOSUB230:PRINT#(DF),
CHR$(255):GOSUB230
```

```
2040 CLOSEDF:GOSUB230:OPENDF:GOSUB230:FR
=1:RETURN
```

READY.

```
3090 SCRATCH(KY$)
```

READY.

```
4020 DCLOSE
```

READY.

As seen by the Upgrade system:

```
300 FOR I=1TONF:DATA#(DF),(CR),(FP%(I))
310 PRINT#DF,F$(I):GOSUB230:NEXT:RETURN
```

READY.

```
2020 FOR#(DF),(FF$),D(DD),L(RS) :GOSUB230
2030 DATA#(DF),(NR):GOSUB230:PRINT#(DF),
CHR$(255):GOSUB230
```

```
2040 CLOSEDF:GOSUB230:OPENDF:GOSUB230:
FR=1:RETURN
```

READY.

```
3090 GOSUB(KY$)
```

READY.

```
4020 NEXT
```

READY.

The screen showed FOR# where DOPEN# should have been (line 2020), and DATA# where a relative file statement RECORD# should have been (lines 300 and 2020). Worse still, it translated SCRATCH(KY\$) into GOSUB(KY\$) in line 3090. Finally, a conversion of a simple DCLOSE into NEXT (line 4020) seemed incredible.

Both the Toolkit and the PET left those keyword tokens intact (I did not retype the BASIC 4 keywords, doing that would have destroyed them). The program worked fine after transfer to the BASIC 4 computer. And that was that.

Recently, I had to look at that undocumented mess of code. I remembered some of the nasties, but couldn't recall them all. Several of these commands leaped out in a listing as invalid ones, but I didn't catch NEXT, of course. It seemed to belong. However, Power didn't let this one slip by.

While scrolling through the program, back and forth, looking for additional trouble, I noticed that GOSUB(KY\$) translated into STRING TOO LONG(KY\$) and there appeared a strange looking 4020 RETURN WITHOUT GOSUB statement. That was my NEXT. (I cannot provide a printout, because to print we use the LIST command, whereas these two long sentences were not done by LIST, they resulted from scrolling.)

I was lucky in that I was looking at a program I had written and had a vague idea of what it did. But imagine, for an instant, that somebody sends you a program containing BASIC 4 disk commands. How can you go about finding out which are used? How can you distinguish the true Upgrade commands, like NEXT from BASIC 4 disk commands?

Solution

It always helps to understand the process. The Power manual was useful in solving this one for me, because it explained where and how Power, and the PET for that matter, pick up the keywords and error messages contained within ROM.

One way to get at the keywords is to look in ROM in both Upgrade and BASIC 4 systems and produce a side-by-side listing of tokens and messages. The search addresses were taken from memory maps.

DISKSHARE 9000

Multi
User
System

- Works with all combinations PET/CBM models.
- 100% Hardware. No software required!
- No special commands, User TRANSPARENT!
- Up to 8 users can share a disk &/or printer.
- 10, 15, 20, & 25 foot cables available.
- Connects in minutes, no tools necessary.
- Ideal for EDUCATIONAL & BUSINESS needs.
- Increases productivity - Reduces Costs!

DISKSHARE 9000-3	3 USER SYSTEM WITH 6ft. CABLES	\$ 749.00
DISKSHARE 9000-8	8 USER SYSTEM WITH: - THREE 6ft. CABLES - THREE 10ft. CABLES - TWO 15ft. CABLES	\$1149.00
DISKSHARE 9001-6	ADD-ON CABLE (6 FOOT LENGTH)	\$ 79.95
DISKSHARE 9001-10	ADD-ON CABLE (10 FOOT LENGTH)	\$ 99.95
DISKSHARE 9001-15	ADD-ON CABLE (15 FOOT LENGTH)	\$ 119.95
DISKSHARE 9001-20	ADD-ON CABLE (20 FOOT LENGTH)	\$ 139.95

For More Information Call:

Questar International Inc.

Suite 102
7270 Woodbine Avenue,
Markham, Ontario Canada
(416) 490-8044

dealer and
distributor inquiries
invited

I used this routine:

```

140 N=0:F=1:M=128:P=127:TP=PEEK(50003)
150 S=49298:E=49812:REM UPGR & ORIG
160 IFTP=160THENS=45234:E=45858:REM 4
    80 COLUMN
170 FORJ=STOE
180 IFFTHENF=0:PRINT:PRINTN;N+M;N=N+1
190 V=PEEK(J):IFVANDMTHENV=VANDP:F=F+1
200 PRINTCHR$(V);
210 NEXTJ
READY.

```

The results are shown in Figure 1. A list nearly identical to the BASIC 4 listing was in **COMPUTE!** #15, and the list of the Upgrade tokens was in **COMPUTE!** #1. The list presented here also adds the messages which follow the list of tokens.

Note that tokens on the Upgrade PET range in number from 128 to 203. From 204 down we have the PET-people interface. On the BASIC 4 systems, tokens range from 128 to 218 with tokens 128-203 being common between the two systems. Messages follow the tokens and begin at number 219.

The tokens that give us trouble are the ones in BASIC 4 numbered 204-218. They line up with Upgrade PET's messages or with the beginning of the token list, depending who is doing the lining up, LIST or Power's scroller.

The Logic Of It All

The reason behind it goes like this (I think) : The program that runs the PET, the BASIC interpreter, takes a BASIC 4 token that was loaded in, for instance token 206 (DCLOSE). In order to print it on the screen, it scans the table looking for 206. But the Upgrade PET knows that the highest valid token number in its list is 203. When the list is exhausted, it wraps around and starts at the top of the list, goes down three more items and, consequently, returns an inconspicuous NEXT. Power, on the other hand, doesn't wrap around. When a token, invalid for the system, exists in the program, it goes down the list to number 206 and finds a clearly visible RETURN WITHOUT GOSUB message, equivalent to DCLOSE. All quite logical. And simple.

The conversion kit, therefore, consists of a list of tokens and messages. By some careful work on your part, BASIC 4 programs can be read on an Upgrade screen. If you see a strange looking command, you can find out what it means by aligning the tokens and messages.

Try to guess what BASIC 4 statement is intended when the LIST command says END and Power's scroller says NEXT WITHOUT FOR? How about LIST showing GOTO and the scroller showing REDIM'D ARRAY?

Subsequent to the disk commands having been decoded from their curious appearance, the only

remaining job is to rewrite those commands into words Upgrade PET can understand (to achieve reverse compatibility). Relative file commands cannot be converted that easily. For this you might consult reference (4) below. If you see RECORD # scattered in the BASIC 4 program, you'll need to do some work. In any case, make sure that you add a semicolon at the end of all PRINT statements. Other commands can be translated with little difficulty by consulting the disk manual, once you know what they are supposed to be.

Don't Jump To Conclusions

WARNING: Trying to write a BASIC 4 program on an Upgrade PET cannot work easily. Writing FOR#4 will not result in DOPEN#4, unless you scan the program and add 75 to the selected FOR token value leaving intended FORs alone. It makes no sense to try to do it, because you couldn't debug your hybrid creation anyway.

REFERENCES:

- 1) Butterfield's Memory maps in **COMPUTE!** issues 2 and 7.
 - 2) POWER Manual (Professional Software).
 - 3) User's Manual for CBM 5 1/4-inch Dual Floppy Disk Drives, Commodore Business Machines, part # 320899.
 - 4) Butterfield's Mixing and Matching Commodore disk system.
- I am grateful to COMPUTER FORUM of FRAZER, PA for permitting me to use their BASIC 4 equipment.*

**For your
Commodore
CBM and VIC
needs
contact:**

PETTED MICROSYSTEMS

4265 W. Loomis
 Milwaukee, WI 53221
 (414)282-4181

DR. DALEY Introduces...

THE WIZ

Data Management System

THE WIZ is here!!!

THE WIZ, a system powerful enough to manage most of your data storage and manipulation needs - yet is easy to use. A system we are so sure of that we have an offer you can't resist. First though, let's take a look at a few of the many features of this program.

Feature	Benefit
1. ON-LINE help	At your fingertips is the equivalent of a 60 page manual. At any time the computer is waiting for a response from you, you may press the 'h' key or type 'help'. THE WIZ will then provide you with an explanation of the function you are working with.
2. Plotting capability	This is a feature unique to THE WIZ. It can produce a bar graph with up to 18 bars or a histogram with up to 100 points plotted. Graphically presented data is easy to interpret.
3. Wordpro interface	This option is standard with THE WIZ. With many of the competing data managers, if available, it is an extra cost option.
4. Read a sequential file	You may reorganize your files or even read sequential files generated by other data management systems.
5. Search for keywords	Here you can search for a word in ANY field in your record. It can even ignore differences due to upper case and lower case characters.
6. Constants in data entry	You may store up to three separate sets of constant fields. Each set can have as many fields as you like filled with information. Then two keystrokes will call the appropriate set.

And there is more. There is not room enough to tell you all the features in a one page ad!

SPECIAL OFFER

You will like our system. In fact we are so convinced of this, that we are going to pay you to try it! If you have another commercially available data management program, you can receive TRADE-IN credit for your purchase of THE WIZ. Call us on our toll free number (800) 548-3289 for our offer on your present system. Remember that this offer expires March 15, 1982.

DR. DALEY'S SOFTWARE

Water St. Darby, MT. 59829

(800) 548-3289 (for Orders & Information)

(406) 821-3924 (Montana and technical assistance)

Call between 9 a.m. and 6 p.m. Mountain time Monday through Friday



UPGRADE

0 128 END
 1 129 FOR
 2 130 NEXT
 3 131 DATA
 4 132 INPUT#
 5 133 INPUT
 6 134 DIM
 7 135 READ
 8 136 LET
 9 137 GOTO
 10 138 RUN
 11 139 IF
 12 140 RESTORE
 13 141 GOSUB
 14 142 RETURN
 15 143 REM
 16 144 STOP
 17 145 ON
 18 146 WAIT
 19 147 LOAD
 20 148 SAVE
 21 149 VERIFY
 22 150 DEF
 23 151 POKE
 24 152 PRINT#
 25 153 PRINT
 26 154 CONT
 27 155 LIST
 28 156 CLR
 29 157 CMD
 30 158 SYS
 31 159 OPEN
 32 160 CLOSE
 33 161 GET
 34 162 NEW
 35 163 TAB(
 36 164 TO
 37 165 FN
 38 166 SPC(
 39 167 THEN
 40 168 NOT
 41 169 STEP
 42 170 +
 43 171 -
 44 172 *
 45 173 /
 46 174 ↑
 47 175 AND
 48 176 OR
 49 177 >
 50 178 =
 51 179 <
 52 180 SGN
 53 181 INT
 54 182 ABS

BASIC 4

0 128 END
 1 129 FOR
 2 130 NEXT
 3 131 DATA
 4 132 INPUT#
 5 133 INPUT
 6 134 DIM
 7 135 READ
 8 136 LET
 9 137 GOTO
 10 138 RUN
 11 139 IF
 12 140 RESTORE
 13 141 GOSUB
 14 142 RETURN
 15 143 REM
 16 144 STOP
 17 145 ON
 18 146 WAIT
 19 147 LOAD
 20 148 SAVE
 21 149 VERIFY
 22 150 DEF
 23 151 POKE
 24 152 PRINT#
 25 153 PRINT
 26 154 CONT
 27 155 LIST
 28 156 CLR
 29 157 CMD
 30 158 SYS
 31 159 OPEN
 32 160 CLOSE
 33 161 GET
 34 162 NEW
 35 163 TAB(
 36 164 TO
 37 165 FN
 38 166 SPC(
 39 167 THEN
 40 168 NOT
 41 169 STEP
 42 170 +
 43 171 -
 44 172 *
 45 173 /
 46 174 ↑
 47 175 AND
 48 176 OR
 49 177 >
 50 178 =
 51 179 <
 52 180 SGN
 53 181 INT
 54 182 ABS

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.

Also available, **Back Pack** unit for Commodore CBM 4040 and 8052 Dual Drive Floppy Disk.

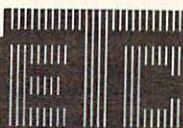
Dealer and distributor inquiries invited.

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

UPGRADE

55 183 USR
 56 184 FRE
 57 185 POS
 58 186 SQR
 59 187 RND
 60 188 LOG
 61 189 EXP
 62 190 COS
 63 191 SIN
 64 192 TAN
 65 193 ATN
 66 194 PEEK
 67 195 LEN
 68 196 STR#
 69 197 VAL
 70 198 ASC
 71 199 CHR#
 72 200 LEFT#
 73 201 RIGHT#
 74 202 MID#
 75 203 GO
 76 204 NEXT WITHOUT FOR
 77 205 SYNTAX
 78 206 RETURN WITHOUT GOSUB
 79 207 OUT OF DATA
 80 208 ILLEGAL QUANTITY
 81 209 OVERFLOW
 82 210 OUT OF MEMORY
 83 211 UNDEF'D STATEMENT
 84 212 BAD SUBSCRIPT
 85 213 REDIM'D ARRAY
 86 214 DIVISION BY ZERO
 87 215 ILLEGAL DIRECT
 88 216 TYPE MISMATCH
 89 217 STRING TOO LONG
 90 218 FILE DATA
 91 219 FORMULA TOO COMPLEX
 92 220 CAN'T CONTINUE
 93 221 UNDEF'D FUNCTION
 94 222 ERROR IN

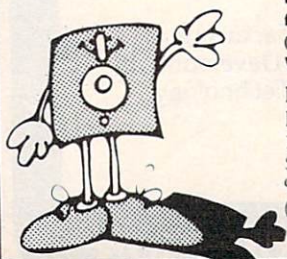
BASIC 4

55 183 USR
 56 184 FRE
 57 185 POS
 58 186 SQR
 59 187 RND
 60 188 LOG
 61 189 EXP
 62 190 COS
 63 191 SIN
 64 192 TAN
 65 193 ATN
 66 194 PEEK
 67 195 LEN
 68 196 STR#
 69 197 VAL
 70 198 ASC
 71 199 CHR#
 72 200 LEFT#
 73 201 RIGHT#
 74 202 MID#
 75 203 GO
 76 204 CONCAT
 77 205 DOPEN
 78 206 DCLOSE
 79 207 RECORD
 80 208 HEADER
 81 209 COLLECT
 82 210 BACKUP
 83 211 COPY
 84 212 APPEND
 85 213 DSAVE
 86 214 DLOAD
 87 215 CATALOG
 88 216 RENAME
 89 217 SCRATCH
 90 218 DIRECTORY
 91 219 NEXT WITHOUT FOR
 92 220 SYNTAX
 93 221 RETURN WITHOUT GOSUB
 94 222 OUT OF DATA
 95 223 ILLEGAL QUANTITY
 96 224 OVERFLOW
 97 225 OUT OF MEMORY
 98 226 UNDEF'D STATEMENT
 99 227 BAD SUBSCRIPT
 100 228 REDIM'D ARRAY
 101 229 DIVISION BY ZERO
 102 230 ILLEGAL DIRECT
 103 231 TYPE MISMATCH
 104 232 STRING TOO LONG
 105 233 FILE DATA
 106 234 FORMULA TOO COMPLEX
 107 235 CAN'T CONTINUE
 108 236 UNDEF'D FUNCTION
 109 237 ERROR IN

 **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.

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



Screen Save Routine

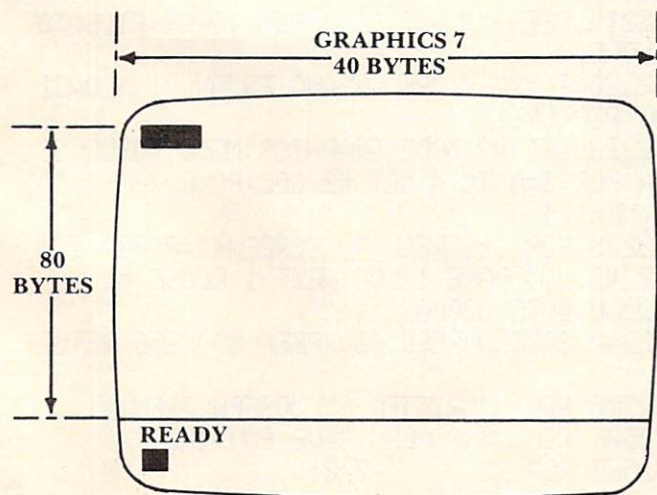
Joseph Trem
Garfield Heights, OH

A while back, **COMPUTE!** published an excellent article for drawing pictures entitled "SUPER CUBE" (**COMPUTE!** #11). Pictures are drawn to look 3-dimensional. After playing with this program, some very interesting pictures developed... all to be lost when the computer was turned off! Gee, it sure would be nice to save those Rembrandts!

The following utility program can be appended to the end of your favorite drawing programs and will enable you to save those Rembrandts. A sample drawing is included at the beginning of this utility.

The Atari computer is fascinating indeed. The more you delve, the more intriguing it becomes. This program is based on three screen-related memory addresses - 87, 88, & 89. Location 87 contains the graphics mode presently in use. Type "GRAPHICS 7", then type "PRINT PEEK(87)". The computer will respond with "7". Locations 88 and 89 store the starting addresses of screen memory. 88 contains the low byte and 89 contains the high byte. Again, type "GRAPHICS 7", then type "PRINT PEEK(88) + PEEK(89)*256". This will return the memory starting address for Graphics 7. Note that each computer may return a different number depending on the memory size of the machine. Now type "POKE(memory start), 255". This will light up one full byte at the top left corner of the screen (Figure 1).

Figure 1.



Type "POKE(memory start + 40,255", and this will light up the next full byte directly under the first byte. Knowing this, it is possible to keep track of every byte on the screen. There are 40 bytes horizontally and 80 bytes vertically in Graphics 7. In the utility program, line 33240 locates the starting address of your picture. Lines 32125 and 32225 scan and set screen memory locations. You may adapt these lines to any graphics mode using the chart provided. For example, if you happen to be using graphics 5, change the "40*80" in those lines to "20*40"

	HORIZONTAL BYTES	VERTICAL BYTES
GR.8	40	160
GR.7	40	80
GR.6	20	80
GR.5	20	40
GR.4	10	40
GR.3	10	20
GR.2	20	10
GR.1	20	20
GR.0	40	24
(full screen)		

After running this program, you may want to append only the utility part to your favorite drawing program. Here's how to do it. First, make sure your drawing program does not exceed line 30999. Now type LIST"C:",31000,32240 or LIST "D:filename", 31000,32240. This will save only lines 31000 through 32240. When completed type NEW and load your drawing program (e.g. SUPER CUBE). Now load your utility program back in. This is done by typing ENTER"C:" or ENTER "D:filename". This will append your utility to the end of any drawing program.

Some programs may have to be modified slightly, but with a little effort you may find it worth it. Run your program. Draw your masterpiece. When you are satisfied with your creation, press the BREAK key and type "GOTO 31000". This will initialize the save and load routine. Then sit back, relax and surprise someone with a genuine work of art worthy only of the great masters.

- 10 Initializes SCREEN SAVE ROUTINE
- 40-195 Draws sample picture (e.g. Space game playfield)
- 200 Reinitializes menu after drawing
- 30000 Sets GR.2 & title
- 31000 Opens IOCB for keyboard
- 32000
- to Prints menu. Gets keyboard input and directs to appropriate line.
- 32060
- 32100
- to Prints save menu. Gets keyboard input and directs to appropriate line.
- 32103

32105
to Prints disk instructions.
32208
32110
to Prints cassette instructions.
32210
32200 Prints load menu.
32122 Stores graphics mode and color register data.
32125 Stores screen RAM data.
32222 Reads graphics mode and color register data and pokes it into correct location.
32225 Reads screen RAM data and pokes into correct locations.
32240 Determines start address of screen.

```

10 GOTO 30000
40 GRAPHICS 7:SETCOLOR 0,6,6:REM %SET GR
APHICS 7 MODE
60 INC=49:CO=1:COLOR 1
65 INC=INC+.05
70 X=SIN( INC)*20:Y=COS( INC)*20
75 PLOT X+80,Y+35:SOUND 1,X+50,10,8
80 CO=CO+1:IF CO<130 THEN 65
100 CO=1
110 COLOR 3
130 INC=INC+.05
140 X=SIN( INC+1)*30:Y=COS( INC)*30
145 IF CO>49 AND CO<70 THEN 160
150 COLOR 2:PLOT X+80,Y+35:SOUND 1,X+50,
6,8
155 COLOR 3:PLOT X+81,Y+38:COLOR 1:PLOT
X+79,Y+32
160 CO=CO+1:IF CO<130 THEN 110
170 COLOR 1:FOR X=1 TO 159:PLOT X,79:DR
AWTO X,79-RND(0)*5:SOUND 1,X,10,8:NEXT X
180 FOR X=1 TO 20:COLOR RND(0)*1+1:PLOT
40,40:DRAWTO RND(0)*10,RND(0)*10:SOUND 1
,X+20,8,8:NEXT X
183 FOR X=120 TO 159:COLOR RND(0)*2+1:PL
OT X,20:DRAWTO X,RND(0)*20:NEXT X
185 COLOR 2:PLOT 130,30:DRAWTO 130,24:DR
AWTO 134,24:DRAWTO 134,30:PLOT 130,27:DR
AWTO 134,27
186 PLOT 142,25:DRAWTO 142,24:DRAWTO 138
,24:DRAWTO 138,30:DRAWTO 142,30:DRAWTO 1
42,29
187 PLOT 150,24:DRAWTO 146,24:DRAWTO 146
,30:DRAWTO 150,30:PLOT 146,27:DRAWTO 149
,27
190 COLOR 2:PLOT 0,0:DRAWTO 159,0:DRAWTO
159,79:DRAWTO 0,79:DRAWTO 0,0
195 COLOR 1:PLOT 30,70:PLOT 40,10:PLOT 1
40,30:PLOT 150,70:PLOT 105,35:SOUND 1,0,
0,0
200 GOTO 32000

```

```

30000 GRAPHICS 2:?" #6;" SCREEN SAVE ROUT
INE"
31000 CLOSE #1:OPEN #1,4,0,"K:"
32000 SCRNI=32240:GOSUB SCRNI:POKE 752,1:?"
" 1...DRAW PICTURE"
32010 ? " 2...SAVE PICTURE"
32020 ? " 3...LOAD PICTURE"
32050 GET #1,A:IF A<49 OR A>51 THEN 3205
0
32060 ON A-48 GOTO 40,32100,32200
32100 ? :?" SAVE TO 1...CASSETTE?":?"
" 2...DISK?"
32101 GET #1,A:IF A<49 OR A>50 THEN 3210
1
32103 ON A-48 GOTO 32110,32105
32105 ? :?" PLEASE INSERT DISKETTE AN
D PRESS (RETURN):GET #1,A:OPEN #2,
8,0,"D:PICTURE":GOTO 32120
32110 ? :?"PLEASE PLACE CLEAN TAPE IN R
ECORDER AND PRESS (RETURN)"
32115 OPEN #2,8,0,"C:" :REM %OPEN FILE TO
SAVE
32120 ? :?"SIT BACK AND RELAX... (SAVIN
G PICTURE)"
32122 MODE=PEEK(87):PUT #2,MODE:FOR I=0
TO 4:COL=PEEK(708+I):PUT #2,COL:NEXT I
32125 FOR I=SCREEN TO SCREEN+(40*80)-1:L
OC=PEEK(I):PUT #2,LOC:NEXT I:CLOSE #2
32130 GOTO 32000
32200 ? :?" LOAD TO 1...CASSETTE?":
?" 2...DISK?"
32201 GET #1,A:IF A<49 OR A>50 THEN 3220
1
32203 POKE 752,1
32205 ON A-48 GOTO 32210,32208
32208 ? :?" PLEASE INSERT DISKETTE AND
PRESS (RETURN):GET #1,A:OPEN #2,4
,0,"D:PICTURE":GOTO 32220
32210 ? " PLEASE INSERT TAPE AND PRESS (
RETURN)"
32215 OPEN #2,4,0,"C:" :REM %OPEN FILE TO
LOAD
32220 ? :?"RELAX AND ENJOY... (LOADI
NG PICTURE)"
32222 GET #2,MODE:GRAPHICS MODE:GOSUB SC
RNI:FOR I=0 TO 4:GET #2,COL:POKE 708+I,COL:
NEXT I
32225 FOR I=SCREEN TO SCREEN+(40*80)-1:G
ET #2,LOC:POKE I,LOC:NEXT I:CLOSE #2
32230 GOTO 32000
32240 SCREEN=PEEK(88)+PEEK(89)*256:RETUR
N
32500 REM **WRITTEN BY JOSEPH TREM**
32501 REM ** SCREEN SAVE ROUTINE **
32502 REM ** 7/81 **

```


Part I:

A Superboard II Monitor

Frank Cohen
Pacific Palisades, CA

In the last article I stated my opinion of the OSI Superboard II's video output. The result was an advanced cursor routine to supplement the powerful ROM-based Microsoft BASIC. Super-Cursor adds many functions to the output routine of BASIC. However, Super-Cursor is a very long routine (almost 500 bytes long) and entering it into the Superboard can take forever using the existing monitor program. This gave me the inspiration to write the next couple of programs.

Upon turning on the Superboard and pressing the BREAK key, one is presented with a choice of entering the BASIC, disk or monitor programs. Unless one knows enough about how BASIC works to write a machine code interface, using the monitor program is the only way to program the computer in machine language. It only takes one look at the monitor program to know that one is very limited in the things that can be done.

The monitor will perform only three different things with the Superboard. First, it allows the viewing of one memory location at a time. This gives the capability of seeing one whole byte of memory for every given keyboard entry. Imagine trying to look through a program like Super-Cursor one byte at a time, keeping in mind there are over 500 instructions. Finding one byte incorrectly entered would take hours. Second, the monitor allows the modification of only one location at a time. After a byte has been entered, the next address is displayed. A problem will occur here if you are not sure the byte you just entered was correct. In this case you would have to go back and look at the last memory location. It then becomes necessary to retype the four digits of the previous address. Finally, the monitor allows the entry of a machine language program from a cassette recorder. Of course, it doesn't allow one to store a program on a cassette recorder (which leads one to wonder what one would be loading to begin with).

An Advanced Monitor

It doesn't take long after you start programming in machine language to realize the necessity of a more advanced monitor program. This program (and

two others to follow) form an advanced monitor routine. To be quite original I have named the total program Super-Monitor. It is intended for the type of person who knows the basics of machine language programming and wants to expand his knowledge. The three programs are fully documented and in assembly language format. They are written in three separate packages so that you, the user, can modify to your specifications while, at the same time, learn some simple machine language programming techniques.

Before we start, an outline of what a monitor program should do will make the whole thing come together at the end. First, the monitor should be able to display as few or as many memory locations at one time as is desired. Second, it should allow easy entry of many bytes into the Superboard's memory along with the ability to see what was just entered. Third, it should allow the user to fill many memory locations with certain strings or combinations of bytes. Fourth, it should be able to move a whole block of data from one location to another in memory. Fifth, we should have a routine to store memory onto tape. Finally, we should have a routine to read a program from tape to memory with verification. Once all this is accomplished, entering and editing machine language programs will be a snap.

Hexdump

This program allows us to see many locations of memory at once. It will ask you for a beginning memory address and then it will print one line of eight bytes of data from the memory address specified. It will then wait for your command. If you want the next line of eight bytes to be listed, you simply hit the carriage return key. If you want to list another part of memory, you hit the line feed key and HEXDUMP will start again by asking for a new beginning address.

Before we get into seeing just how Hexdump works, here is a small word of warning. If you read the article describing Super-Cursor V1.3 in **COMPUTE! #18** you should have noted that my Superboard II has had the video modifications added to give a video display of 26 lines with 48 characters per line, using the Super-Cursor program. The modifications are simple and well described in conversion plans which can be purchased from Elcomp Publishing (Silver Spur Electronics, Chino, California.)

Hexdump does use some of the routines in Super-Cursor so it is necessary that you load Super-Cursor as well. If you don't want to use Super-Cursor, you will have to write your own output routines to allow Hexdump to display information onto the screen. Writing these routines is not very difficult and you probably could copy the individual routines out of Super-Cursor with only a few modifications.

The assembly listing of Hexdump shows that it loads into locations 1D20 through 1E38. This is the area in memory directly below Super-Cursor V1.3. There are seven bytes of memory which separate the two programs. These will be used later for another part of Super-Monitor. Hexdump may be moved to another location in memory by reassembling it; however, if you do not own an assembler, relocating Hexdump may become very difficult as it uses absolute addresses extensively.

Hexdump is an example of structured machine language programming. It uses a main supervisor routine which branches into other routines. The supervisor is labeled Hexdump in the assembly listing, and calls all of the other subroutines into play.

Upon starting Hexdump, the supervisor homes the cursor using the Home routine of Super-Cursor V1.3. This positions the solid block cursor in the upper left position of the screen. The program then goes to the subroutine labeled PAdr. This subroutine prints the two byte address held in location 00E7 and 00E8. This address is later used to find the memory location you want to display.

The program continues by jumping to another subroutine. This one called Inadr. This subroutine reads the keyboard four times, allowing the input of a four digit memory address. The resulting two byte address is put into locations 00E7 and 00E8 (ADR). Once the four numbers have been entered, the program jumps back to the supervisor which again homes the cursor. The program then jumps to another subroutine labeled Pline.

Up to this point you probably will not be modifying the program very much as the function of

the subroutines are very straightforward. However, Pline will probably need to be modified as it prints the start address of the desired memory locations and then prints the eight bytes of data contained in those locations. The number of data bytes printed is what may need to be changed, if you have not added the video modifications to your Superboard. On a 24 by 24 video display you can only print up to five bytes at a time unless you don't mind the information falling off one line and continuing on the next. The number of bytes printed is controlled by the byte at 1E24. In the assembly listing you can see that the program between 1E22 and 1E30 is concerned only with checking to see if Pline has printed eight characters and, if it has, to return back to the supervisor. To change the number of bytes printed per line, it is necessary to put the desired number at 1E23 and a copy of that number at 1E2B.

Now that Pline is finished and we have returned to the supervisor, you can see that Hexdump checks the keyboard and, if a carriage return is entered (ASCII value of 0D), it will branch back to print the next eight bytes of memory. If a line feed is entered (ASCII value of 0A), it will branch back to the part of the program which homes the cursor and starts it all again.

Next Month

We now have a program which is the first part of a very advanced monitor program. What comes next is two other routines which include the functions listed in our outline. They are smaller routines than Hexdump. The resulting Super-Monitor will allow you to enter large programs in a single bound.

```

;This program uses some subroutines from
;Super-Cursor V1.3 (COMPUTE! Nov. '81)
;
;Zero page usage is limited to only
;two bytes-
; 00E7 - ADR
; 00E8 - ADR+1
;which are the low and high bytes forming an
;address for which HEXDUMP looks into memory.
;
;
;Start of program and entry point.
;
1D20 20 80 1E    HEXDUMP JSR HOME      ;Home the Cursor
1D23 20 3C 1D    DIA      JSR PADR      ;Print address
1D26 20 80 1E    JSR HOME      ;Home the cursor again
1D29 20 93 1D    JSR INADR     ;Input address
1D2C 20 00 1E    DAL         JSR PLINE     ;Print one line
1D2F 20 BA FF    BD         JSR KEYIN    ;Reads the keyboard result in A
1D32 C9 0D      CMP #$0D     ;Key pressed = CR?
1D34 F0 F6      BEQ DAL      ;
1D36 C9 0A      CMP #$0A     ;Key pressed = LF?

```


OSI

TRS-80

COLOR-80

OSI

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 OSI

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. OSI

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) 4 back issues and subscription for 2 additional issues - \$9.00.

ADVENTURES!!!

For OSI, TRS-80, and COLOR-80. These Adventures are written in BASIC, are full featured, fast action, full plotted adventures that take 30-50 hours to play. (Adventures are interactive fantasies. It's like reading a book except that you are the main character as you give the computer commands like "Look in the Coffin" and "Light the torch".)

Adventures require 8K on an OSI and 16K on COLOR-80 and TRS-80. They sell for \$14.95 each.

ESCAPE FROM MARS (by Rodger Olsen)

This ADVENTURE takes place on the RED PLANT. You'll have to explore a Martian city and deal with possibly hostile aliens to survive this one. A good first adventure.

PYRAMID (by Rodger Olsen)

This is our most challenging ADVENTURE. It is a treasure hunt in a pyramid full of problems. Exciting and tough!

TREK ADVENTURE (by Bob Retelle)

This one takes place aboard a familiar starship. The crew has left for good reasons - but they forgot to take you, and now you are in deep trouble.

DEATH SHIP (by Rodger Olsen)

Our first and original ADVENTURE, this one takes place aboard a cruise ship - but it ain't the Love Boat.

VAMPIRE CASTLE (by Mike Bassman)

This is a contest between you and old Drac - and it's getting a little dark outside. \$14.95 each.

OSI 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 OSI

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") OSI

BARE BOARDS FOR OSI C1P

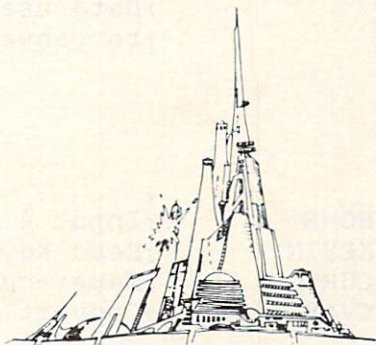
MEMORY BOARDS!!! - for the C1P - and they contain parallel ports!

Aardvarks new memory board supports 8K of 2114's and has provision for a PIA to give a parallel ports! It sells as a bare board for \$29.95. When assembled, the board plugs into the expansion connector on the 600 board. Available now!

PROM BURNER FOR THE C1P - Burns single supply 2716's. Bare board - \$24.95.

MOTHER BOARD - Expand your expansion connector from one to five connectors or use it to adapt our C1P boards to your C4/8P. - \$14.95.

16K RAM BOARD FOR C1P - This one does not have a parallel port, but it does support 16K of 2114's. Bare Board \$39.95.



Please specify system on all orders

This is only a partial listing of what we have to offer. We offer over 120 games, ROMS, and data sheets for OSI systems and many games and utilities for COLOR-80 and TRS-80. Send \$1.00 for our catalog.

AARDVARK TECHNICAL SERVICES, LTD.
2352 S. Commerce, Walled Lake, MI 48088
(313) 669-3110

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 51/4" 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. Specify 5 1/4 or 8" disk.

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 callable 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 OSI

ARCADE GAMES FOR OSI, COLOR-80 AND TRS-80 (8K OSI, 16K TRS-80 AND COLOR-80)

TIMETREK - A REAL TIME, REAL GRAPHICS STARTREK. See your torpedoes hit and watch your instruments work in real time. No more unrealistic scrolling displays! \$14.95.

STARFIGHTER - This one man space war game pits you against spacecruisers, battlewagons, and one man fighters, you have the view from your cockpit window, a real time working instrument panel, and your wits. Another real time goody. \$9.95

BATTLEFLEET - This grown up version of Battleship is the toughest thinking game available on OSI or 80 computers. There is no luck involved as you seek out the computers hidden fleet. A topographical toughie. \$9.95

QUEST - A NEW IDEA IN ADVENTURE GAMES! Different from all the others, Quest is played on a computer generated map of Alesia. Your job is to gather men and supplies by combat, bargaining, exploration of ruins and temples and outright banditry. When your force is strong enough, you attack the Citadel of Moorlock in a life or death battle to the finish. Playable in 2 to 5 hours, this one is different every time.
16K COLOR-80 OR TRS-80 ONLY. \$14.95


OSI


COLOR-80


```

1D38 F0 E9          BEQ DIA
1D3A D0 F3          BNE BD

1D3C A5 E8          PADR   LDA ADR+1          ;Print address on screen
1D3E 29 F0          AND #$F0          ;Start with high 4 bits of
1D40 4A             LSR              ;ADR +1 (00E8)
1D41 4A             LSR
1D42 4A             LSR
1D43 4A             LSR
1D44 20 72 1D      JSR CVHA          ;Convert Hex to Ascii
1D47 20 40 1E      JSR CURSOR        ;Part of Super-Cursor
1D4A A5 E8          LDA ADR+1          ;Now do the low 4 bits of ADR+1
1D4C 29 0F          AND #$0F
1D4E 20 72 1D      JSR CVHA
1D51 20 40 1E      JSR CURSOR
1D54 A5 E7          LDA ADR            ;Now work on high 4 bits of ADR
1D56 29 F0          AND #$F0
1D58 4A             LSR
1D59 4A             LSR
1D5A 4A             LSR
1D5B 4A             LSR
1D5C 20 72 1D      JSR CVHA
1D5F 20 40 1E      JSR CURSOR
1D62 A5 E7          LDA ADR            ;work on low 4 bits of ADR
1D64 29 0F          AND #$0F
1D66 20 72 1D      JSR CVHA
1D69 20 40 1E      JSR CURSOR
1D6C A9 2D          LDA #$2D          ;Print '-' on screen after address
1D6E 20 40 1E      JSR CURSOR
1D71 60             RTS

1D72 A2 00          CVHA   LDX #$00          ;Convert whats in A from Hex to
1D74 8E 78 1D      CVST   STX CON+1        ;ASCII
1D77 C9 00          CON    CMP #$00          ;This value is changed in CVST
1D79 F0 04          BEQ CFIN
1D7B E8             INX
1D7C 4C 74 1D      JMP CVST
1D7F BD 83 1D      CFIN   LDA CDATA,X      ;Put result in A
1D82 60             RTS
1D83 30 31 32      CDATA  DATA          ;Data used in both CVHA and CVAHX
1D86 33 34 35      DATA          ;to convert Hex to Ascii and back.
1D89 36 37 38      DATA
1D8C 39 41 42      DATA
1D8F 43 44 45      DATA
1D92 46             DATA

1D93 20 80 1E      INADR  JSR HOME          ;Input 4 digit (2 byte) Address
1D96 20 BA FF      JSR KEYIN        ;Read Keyboard Routine from ROM
1D99 20 40 1E      JSR CURSOR        ;Super-cursor
1D9C 20 F3 1D      JSR CVAHX        ;Convert Ascii to Hex
1D9F 0A             LSL
1DA0 0A             LSL
1DA1 0A             LSL
1DA2 0A             LSL
1DA3 8D AC 1D      STA INADC+1      ;Pokes A into 1DAC
1DA6 A5 E8          LDA ADR+1
1DA8 29 0F          AND #$0F
1DAA 18             CLC
1DAB 69 00          INADC  ADC #$ 00
1DAD 85 E8          STA ADR+1

```



```

1DAF 20 BA FF      JSR KEYIN      ;Get second digit
1DB2 20 40 1E      JSR CURSOR
1DB5 20 F3 1D      JSR CVAHX
1DB8 8D C1 1D      STA INBDC+1    ;Pokes A into 1DC1
1DBB A5 E8         LDA ADR+1
1DBC 29 F0         AND #$F0
1DBF 18           CLC
1DC0 69 00         INBDC   ADC #$00
1DC2 85 E8         STA ADR+1
1DC4 20 BA FF      JSR KEYIN      ;Get third digit
1DC7 20 40 1E      JSR CURSOR
1DCA 20 F3 1D      JSR CVAHX
1DCD 0A           ASL
1DCE 0A           ASL
1DCF 0A           ASL
1DD0 0A           ASL
1DD1 8D DA 1D      STA INCDC+1    ;Pokes A into 1DDA
1DD4 A5 E7         LDA ADR
1DD6 29 0F         AND #$ 0F
1DD8 18           CLC
1DD9 69 00         INCDC   ADC #$00
1ddb 85 E7         STA ADR
1DDD 20 BA FF      JSR KEYIN      ;Get the last digit
1DE0 20 40 1E      JSR CURSOR
1DE3 20 F3 1D      JSR CVAHX
1DE6 8D EF 1D      STA INDCD+1    ;Poke A into 1DEF
1DE9 A5 E7         LDA ADR
1DEB 29 F0         AND #$F0
1DED 18           CLC
1DEE 69 00         INDCD   ADC#$00
1DF0 85 E7         STA ADR
1DF2 60           RTS

1DF3 A0 00         CVAHX   LDY#$00      ;
1DF5 D9 83 1D      CVCON   CMP CDATA,Y    ;Convert contents of A from
1DF8 F0 04         BEQ CVFIN    ;Ascii to Hex
1DFA C8           INY
1DFB 4C F5 1D      CVFIN   JMP CVCON
1DFE 98           TYA      ;Put result in A
1DFF 60           RTS

1E00 20 3C 1D      PLINE   JSR PADR      ;
1E03 A0 00         LDY #$ 00    ;Print one line of eight bytes
1E05 B1 E7         PBYTE   LDA (ADR),Y  ;Print one byte from ADR
1E07 29 F0         AND #$F0
1E09 4A           LSR
1E0A 4A           LSR
1E0B 4A           LSR
1E0C 4A           LSR
1E0D 20 72 1D      JSR CVHA    ;Convert A to Ascii
1E10 20 40 1E      JSR CURSOR  ;Super-cursor
1E13 B1 E7         LDA (ADR),Y ;Print low 4 bits on screen
1E15 29 0F         AND #$0F
1E17 20 72 1D      JSR CVHA
1E1A 20 40 1E      JSR CURSOR
1E1D A9 20         LDA #$20    ;Print a space " " to separate
1E1F 20 40 1E      JSR CURSOR ;the bytes
1E22 C8           INY      ;Are we finished?
1E23 C0 08         CPY #$08
1E25 D0 DE         BNE PBYTE   ;If not display another byte

```



```

1E27 A5 E7          LDA ADR          ;If yes add 08 to ADR
1E29 18             CLC
1E2A 69 08          ADC #08
1E2C 85 E7          STA ADR
1E2E 90 02          BCC RCOM
1E30 E6 E8          INC ADR+1
1E32 20 95 1E      RCOM          JSR CR          ;Were finished printing one line
1E35 20 AB 1E      JSR LF          ;so carriage return and line feed
1E38 60            RTS

;
;
;
;Statistics
;
*= 1D20             ;Start
1D3C PADR          ;Print ADR and ADR+1 on screen
1D72 CVHA          ;Converts Hex to Ascii
1D93 INADR         ;Input a two byte address for ADR and ADR+1
1DF3 CVAHX        ;Converts Ascii to Hex
1E00 PLINE        ;Print a line of 8 bytes from ADR
1E40 CURSOR       ;Prints what ever is in A to where the cursor is
1E80 HOME         ;Home the cursor
1EC2 CLS          ;Clear screen
    
```

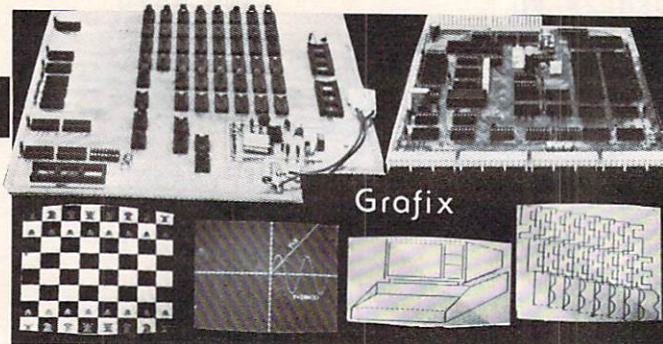


SUPER OSI EXPANSION BOARDS

FOR OSI 1P, 2-4P, 2-8P, C4P, C8P

If your Challenger can't generate displays like those shown above **WHAT ARE YOU WAITING FOR?** The SEB-1 High Resolution Graphics and Memory Board (for CIP and Superboard II) and the SEB-2 High Resolution Graphics and Disk Controller Board (for C2/4/8) simply 'plug-in' to your computer and give you instant access to over 4900 individually addressable pixels in up to 8 colors! Your Hi-Res screen can go from 32x16 alphanumerics to 256x192 point graphics in 11 software selectable modes. The standard video of your computer is left intact, so that none of your current software library is outmoded. Use the graphics for Business, Scientific, Education, or Gaming displays that were impossible—until now!

Installation of either board requires absolutely NO modification of your computer—they just 'plug-in'. Nor do they preclude your using any other OSI-compatible hardware or



Gratix

software. In addition to the Hi-Res Graphics the SEB-1 gives C1 & Superboard II users 16K of additional user memory (over and above that memory devoted to the graphics), two 16 bit timers/counters, an on-board RF modulator, and a parallel port with handshaking. The SEB-2 gives OSI 48-pin BUS users an OSI hardware/software compatible Disk controller, and an RF modulator that can be user-populated.

	SEB-1	SEB-2
Assembled and Tested Kit	\$249.00 (5K RAM)	\$239.00 (1K RAM)
	\$165.00 (No RAM)	\$199.00 (No RAM)

	SEB-1	SEB-2
Bare Board & Manual	\$ 59.00	\$ 59.00
Manual only	\$ 5.00	\$ 5.00

SOFTWARE

TARG-IT!\$11.95

An action-packed, super fast arcade game where you try to destroy Ram ships and the Evil Spectre inside the Crystal city. 8K.

PLANETARY LANDER\$11.95

Your computer generates contour maps of the surface of a strange planet as you descend looking for the landing pad. As you make your final approach, the computer displays side and top views of the terrain and your ship as you try to land while avoiding the swarms of asteroids above the planet's surface. 8K.

PROGRAMMA-TANK\$ 9.95

Programma-Tank is a complex simulation of a battle between two robot tanks as well as a fairly painless way to learn assembly language. The opponents program their tanks in 'Smalltank' a miniature programming language, which is much like assembly language. The two strategies are then pitted against one another until a victor emerges. 8K.

RUINS OF TALAMARINE\$16.95

This is the first of our "Epic Quests" programs. Epic Quests could be described as graphic adventures, but they are much more. Can you retrieve the stolen Jewels from the ruined Talamarine castle? This series of two programs allows you to create a character with the qualities that you want to do battle with the forces of darkness. 8K.

CODENAME: BARRACUDA\$19.95

Another of our "Epic Quests", in which you are an agent working for the US Government trying to rescue a defecting Soviet professor. The problem is that a middle-eastern government has kidnapped the professor and is forcing him to develop atomic weapons for them. The three programs (8K ea.) in this series allow you to create, train and send your character on his mission.

DUNGEONS OF ZORXON\$19.95

Can you explore the Dungeons of Zorxon in this "Epic Quest"? Step into a nether world of monstrous beasts and fortunes in gold where magic reigns supreme. Three programs 8K each.

Write for **FREE** catalog
International Requests please
supply 2 International Response Coupons

ORION



SOFTWARE ASSO.
147 MAIN ST, PO BOX 310, OSSINING, NY 10562



New Products



Good News For Alkemstone Seekers

Level-10 has increased the reward for the return of the Alkemstone from \$5,000 to \$7,500.

Alkemstone is a computer adventure which now offers a \$7,500 cash reward to the first person who can find the missing Alkemstone.

The Alkemstone is actually hidden somewhere on the planet

The quest for the Alkemstone will lead the player through underground paths of the lair of the original owner. There are unusual messages, fragments of words, sketches and other clues written on the walls. Some items are distributed randomly, so that one may be visible numerous times while some will only appear once in several trips. Each trip will result in a different combination of possible hints. If all bits of information are pieced together correctly, then the location of the Alkemstone will be obvious.

Alkemstone is more than just a treasure hunt. It also has the challenge and intrigue of a fascinating computer game. It features hi-res color graphics, 3-D animation, sound effects and an illustrated short story. Alkemstone is written in machine language for any Apple Computer with 48K, one 16 sector disk drive and Applesoft or language card.

Level-10
7475 Dakin St.
Suite 401
Denver, CO 80221

VIC-20 Timesharing With Printout

The MDM-1 is a MODEM driver module that plugs directly into the user port of the Commodore VIC microcomputer.

The MDM-1 has two additional serial ports for connecting a MODEM and a serial printer.

The MDM-1 does not require any external power. A terminal program supplied with the unit permits telephone line connections to large timesharing computers, and to various computer networks, such as source, Comuserve, Dow Jones, etc.

There are two indicators on the MDM-1 that illustrate the transmissions to and from the VIC. These transmissions are simultaneously recorded on the VIC TV screen and the serial printer.

The price of the MDM-1 is \$59, plus \$3 shipping. Delivery is two weeks after receipt of order.

RVR Systems
P.O. Box 265
Dewitt, NY 13214

MatheMagic™ The Ultimate Calculator

International Software Marketing, Ltd. (ISM) in Syracuse, New York has announced a unique software product for microcomputers. The product is called MatheMagic™. Essentially, the product transforms a microcomputer into a sophisticated programmable calculator with all of the power and facilities of the

computer system available to it.

"MatheMagic was created by ISM to fill a void which exists in mathematical microcomputer software," says Stephen T. Brightbill, ISM Director. "A wide variety of software is available, primarily for the business community, to manipulate numeric data in a spreadsheet format. MatheMagic is not a "spreadsheet." MatheMagic allows a wide range of users to easily handle an even wider range of mathematical applications. MatheMagic is completely programmable in commonly understood mathem-

Meet SUPERSOFT of England PET/CBM Specialists

Hi-Res Graphics Board
[320x200]
for 40 or 80 column

\$299

Introductory Price

PLUS
Assemblers, Adventures,
Programming Aids, etc.

Mail Order Catalogue Free from:

SUPERSOFT

10-14 Canning Road
Harrow, England HA3 7SJ

West Coast Computer Faire Booth 1722

NOW TWO LOCATIONS

SAVE TIME • SAVE SHIPPING



Computers
for people.™



800™ \$679

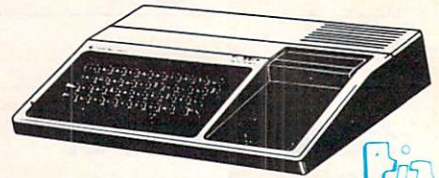
410 Recorder	.....	\$76.00
810 Disc Drive	.....	\$449.00
822 Printer	.....	\$229.00
825 Printer	.....	\$629.00
830 Modem	.....	\$159.00
820 Printer	.....	\$269.00
850 Interface	.....	\$169.00
New DOS 2 System	.....	\$21.00
CX30 Paddle	.....	\$18.00
CX40 Joy Stick	.....	\$18.00
CX853 16K RAM	.....	\$89.00
Microtek 16K RAM	.....	\$75.00
Microtek 32K RAM	.....	\$159.00
Ramcram (128K)	.....	\$539.00
One year extended warranty	.....	\$50.00



16K.... \$329
32K.... \$478
48K.... \$555

ATARI SOFTWARE

CX404 Word Processor	.....	\$119.00
CX405 PILOT (educational)	.....	\$105.00
CX413 Microsoft Basic	.....	\$68.00
CX4101 Invitation To Programming I	.....	\$17.00
CX4102 Kingdom	.....	\$13.00
CX4103 Statistics	.....	\$17.00
CX4104 Mailing List	.....	\$17.00
CX4105 Blackjack	.....	\$13.00
CX4106 Invitation to Programming 2	.....	\$20.00
CX4107 Biorythm	.....	\$13.00
CX4108 Hangman	.....	\$13.00
CX4109 Graph II	.....	\$17.00
CX4110 Touch Typing	.....	\$20.00
CX4112 States & Capitals	.....	\$13.00
CX4114 European Countries & Capitals	.....	\$13.00
CX4115 Mortgage & Loan Analysis	.....	\$13.00
CX4116 Personal Fitness Program	.....	\$59.00
CX4117 Invitation To Programming 3	.....	\$20.00
CX4118-20 Conversational Languages (ea.)	.....	\$45.00
CX4121 Energy Czar	.....	\$13.00
CXL4001 Educational Master	.....	\$21.00
CX6001 17 Talk & Teach Series (ea.)	.....	\$23.00
CX8106 Bond Analysis	.....	\$20.00
CX8107 Stock Analysis	.....	\$20.00
CX8101 Stock Charting	.....	\$20.00
CXL4002 Basic Computing Language	.....	\$46.00
CXL4003 Assembler Editor	.....	\$46.00
CXL4004 Basketball	.....	\$24.00
CXL4005 Video Easel	.....	\$24.00
CXL4006 Super Breakout	.....	\$30.00
CXL4007 Music Composer	.....	\$45.00
CXL4008 SPACE INVADERS	.....	\$32.00
CXL4009 Chess	.....	\$30.00
CXL4010 3-D Tic-Tac-Toe	.....	\$24.00
CLS4011 STAR RAIDERS	.....	\$39.00
CXL4012 MISSILE COMMAND	.....	\$32.00
CXL4013 ASTEROIDS	.....	\$32.00
CXL4015 TeleLink	.....	\$20.00
Visicalc	.....	\$149.00
Letter Perfect (Word Processor)	.....	\$109.00
Source	.....	\$89.00
CX481 The Entertainer	.....	\$75.00
CX482 The Educator	.....	\$130.00
CX483 The Programmer	.....	\$54.00
CX 484 The Communicator	.....	\$329.00



Texas Instruments

TI-99/4A \$359

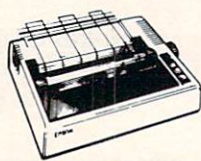
PHP 1600 Telephone Coupler	.....	\$169.00
PHP 1700 RS-232 Accessories Interface	.....	\$169.00
PHP 1800 Disk Drive Controller	.....	\$239.00
PHP 1850 Disk Memory Drive	.....	\$389.00
PHP 2200 Memory Expansion (32K RAM)	.....	\$319.00
PHA 2100 R F Modulator	.....	\$43.00
PHP 1100 Wired Remote Controllers(Pair)	.....	\$31.00
32K Expansion	.....	\$329.00
PHP Printer Solid State	.....	\$319.00

CALL FOR SOFTWARE
SELECTION AND PRICES

XEROX 820

Xerox 820	.....
System I 5 1/4"	.....	\$2450.00
System II 8"	.....	\$2950.00
CPM 5 1/4"	.....	\$169.00
Word Processing	.....	\$429.00
Super Calc	.....	\$269.00

CALL FOR MORE INFORMATION



PRINTERS

Centronics 739-1	.....	\$649.00
Diablo 630 Special	.....	\$1799.00
Epson	.....
MX70	.....	\$359.00
MX80	.....	\$469.00
MX80FT	.....	Call
MX100	.....	Call
NEC	.....
8023	.....	\$639.00
7730	.....	Call
7720	.....	Call
7710	.....	Call

Okidata	.....
82A	.....	\$499.00
83A	.....	\$769.00
84	.....	\$1129.00
Citoh Starwriter	.....
25 CPS-P	.....	\$1329.00
45 CPS-P	.....	\$1699.00
Paper Tiger	.....
445G	.....	\$699.00
460G	.....	\$899.00
560G	.....	\$1129.00
Talley	.....
8024-7	.....	\$1399.00
8024-L	.....	\$1629.00

Terminals

Televideo	.....
910	.....	\$579.00
912C	.....	\$699.00
920C	.....	\$749.00
950	.....	\$939.00
Call for computers	.....
Zenith Z19	.....	\$749.00
Adds	.....	\$549.00

Modems

Novation Auto	.....	\$239.00
D Cat	.....	\$169.00
Cat	.....	\$159.00
Hayes	.....
Smart	.....	\$239.00

HOW TO ORDER: Phone orders invited or send check or money order and receive free shipping in the continental United States. PA and NEV. add sales tax.

computer mail order west

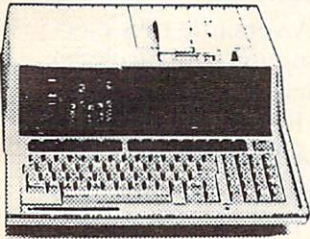
800-648-3351

IN NEVADA, CALL (702) 588-5654

P.O. BOX 6689, STATE LINE, NEVADA 89449

TO SAVE YOU MORE!

COSTS • SAVE SALES TAX



HP•85 \$1999

80 Column Printer	\$799.00
NEW! HP•125	\$2999.00
HP•83	\$1699.00
HP•85 16K Memory Module	\$249.00
5 1/4" Dual Master Disc Drive	\$2129.00
Graphics Plotter (7225B)	\$2079.00

NOW IN STOCK!
The new HP41CV Calculator
\$259

41 C	\$189.00
11 C	\$119.00
12 C	\$129.00
34 C	\$117.00
38 C	\$119.00
HP•41 Printer	\$340.00
Card Reader	\$164.00
Optical Wand	\$99.00

HPIL CALCULATOR PERIPHERALS

IL Modul	\$104.00
Digital Cassette	\$449.00
Printer/Plotter	\$419.00

CALL FOR SOFTWARE INFORMATION

Monitors

Amdex 12" B&W	\$149.00
12" Green	\$169.00
13" Color	\$349.00
Sanyo 12" B&W	\$259.00
12" Green	\$269.00
13" Color	\$449.00
TI 10" Color	\$349.00

Electronics

Pioneer Lazer Disk	\$599.00
BSR X-10 Systems	
PK 500	\$84.00
LM 501	\$16.00
AM611	\$17.00
AM286	\$17.00



CBM 8032

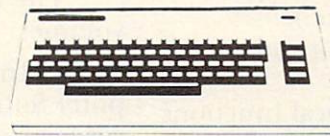
\$1039



4032	\$969.00
4016	\$769.00
8096	\$1569.00
Super Pet	\$1599.00
2031	\$529.00
8050	\$1299.00
4022	\$599.00
4040	\$949.00
8300 (Letter Quality)	\$1799.00
8023	\$769.00
Pet to IEEE Cable	\$37.00
IEEE to IEEE Cable	\$46.00
Tractor Feed for 8300	\$240.00
8010 Modem	\$229.00

VIC 20
\$259

COMPLETE



Vic 6 Pack Program	\$44.00
VIC1530 Commodore Datasette	\$69.00
VIC1540 Disk Drive	\$499.00
VIC1515 VIC Graphic Printer	\$339.00
VIC1210 3K Memory Expander	\$32.00
VIC1110 8K Memory Expander	\$53.00
VIC1011 RS232C Terminal Interface	\$43.00
VIC1112 VIC IEEE 488 Interface	\$86.00
VIC1211 VIC 20 Super Expander	\$53.00

VIC1212 Programmers Aid Cartridge	\$45.00
VIC1213 VICMON Machine Language Monitor	\$45.00
VIC1901 VIC AVENGERS	\$23.00
VIC1904 SUPERSLOT	\$23.00
VIC1906 SUPER ALIEN	\$19.00
VIC1907 SUPER LANDER	\$23.00
VIC1908 DRAW POKER	\$23.00
VIC1909 MIDNIGHT DRIVE	\$23.00
VT106A Recreation Pack A	\$44.00
VT107A Home Calculation Pack A	\$44.00
VT164 Programmable Character/Graphic	\$12.00
VT232 VICTerm I Terminal Emulator	\$9.00

New VIC Software

Household Finance	\$27.00	Terminal	\$13.00
VIC Games	\$19.00	Un Word	\$13.00
VIC Home Inventory	\$13.00	Grafix Menagerie	\$11.00
VIC Rec/Ed II	\$13.00	VIC PICS	\$15.00
I SAM	\$79.00	Ticker Tape	\$13.00
General Ledger	\$229.00	Banner Headliner	\$13.00
Accounts Receivable	\$229.00	RS 232	\$39.00
Inventory	\$229.00		

Above are cash prices, add 3% for Master Card and Visa purchases.

computer mail order east

800-233-8950

IN PA. CALL (717) 327-9575
 501 E. THIRD ST., WILLIAMSPORT, PA 17701

atical terms. Now, without the need for programming or computer knowledge, the user can access the computer as an extremely powerful calculator. In short, if the question that you have is more complicated than two plus two and less complicated than differential calculus, then MatheMagic is your answer. MatheMagic can provide the answers to mathematical questions in the business world, in engineering and science, in the classroom and in the home."

Some of the features which make this possible are:

- Menu-driven format for rapid learning and consistent ease of use.
- On-line "HELP" for every MatheMagic command and option.
- Free-form entry of expressions of up to 240 characters (including standard math operators, pre-defined functions, user-defined formulas, parentheses, variables, etc.).
- Unlimited use of formulas within formulas.
- Built-in mathematical functions (trig, logs, conversions, etc.).
- Easy to create and edit variable sets and values.
- Disk storage and recall of user-defined formulas and variable sets.
- Automatic retention of variable values for chain calculations.
- Free use of "Ask Variables" to allow "What if" and repeat types of calculations.
- Rapid calculation or stepped calculation for viewing intermediate results.
- Full hard copy support, including a trace function.

MatheMagic has been released on the Apple II and II+ and Z80 based micros running under CP/M 2.2 ISM plans to release versions for the Atari 800, TRS-80 I, II, and III, Commodore PET/CBM and the IBM PC during January and

February 1982.

ISM's Home Offices are located at:

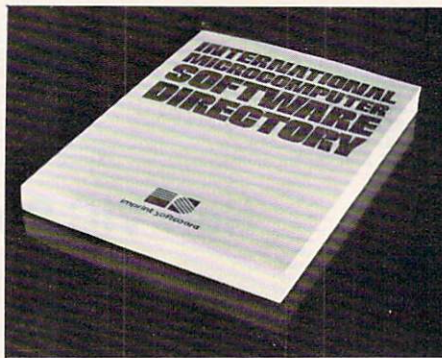
*International Software Marketing, Ltd.
Suite 421, University Building
120 E. Washington Street
Syracuse, New York 13202
(315)474-3400*

The International Software Directory

The International Software Directory lists tens of thousands of software packages and classifies them by machine, operating system, subject, vendor and price. Review information is also included. It is independent of both machine manufacturers and software houses, and thus allows for comparison and one-stop shopping. It is backed by an excellent search service and regular updates are available from the publisher. In addition, an on-line service is available through Lockheed dialog.

The ISD is available in two volumes:

1) The International Microcomputer Software Directory which contains over 7000 programs and



is available at the extremely competitive price of \$34.95 plus \$2.95 postage and handling.

2) The International Minicomputer Software Directory which is available for \$65.00

*Imprint Editions
420 South Howes
Fort Collins, CO 80521
(303) 493-2710*

Commodore Canada Announces New Mailing List Software

Toronto - A versatile new electronic mailing list software package called Scratchpad has been announced by Commodore Business Machines Limited.

Intended for business applications, the program is easy to use, flexible and rapid in accessing required data. There are 20 different data items, each with a 30-character length. A great deal of data may be stored on file as a file can consist of any number of disks.

Some of the modes of operation in Scratchpad are Edit, Global Search, Format, Recreate, Print and Backup.

Any data created with the Scratchpad, developed by Richvale Telecommunications of Richmond Hill, Ont., may be interfaced with Wordpro software by the use of a small additional program.

Suggested retail price in Canada is \$295. For further information:

*Isobel McBurney
Software Manager
Commodore Business Machines Limited
3370 Pharmacy Avenue
Scarborough, Ont. M1W 2K4.
(416)449-4292*

Dragon's Eye Now Available

Mountain View, CA - Dragon's Eye, an EPYX game from Automated Simulations, Inc., is now available for the Atari 400 and 800 computers.

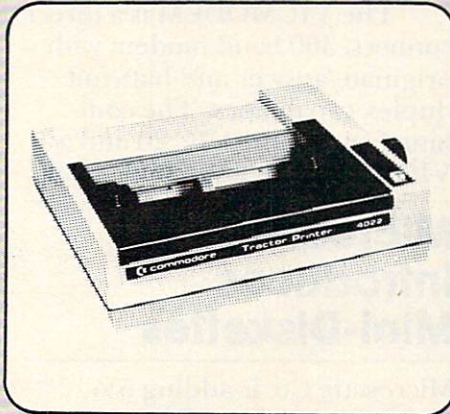
Dragon's Eye, an overland fantasy role playing game, challenges the player to find a magical gem, the Dragon's Eye, in 21 game-days (approximately half-an-hour playing time).



commodore

SHOW SPECTACULAR

8032-32K 80 COL CRT REG \$1495	\$1135
64K ADD-ON MEMORY REG \$500	\$395
9000 134K SUPER PET REG \$1995	\$1795
4032 32K 40 COL CRT REG \$1295	\$995
4016 16K 40 COL CRT REG \$995	\$795
8050-DUAL DISK 950K REG \$1795	\$1395
4040-DUAL DISK 343K REG \$1295	\$995
2031-SINGLE DISK 170K REG \$695	\$555
C2N-CASSETTE DRIVE REG \$75	\$65
4022-80 COL PRINTER REG \$795	\$649
8023P-136 COL PRINTER REG \$995	\$849
8300P-40CPS LTR QLTY REG \$2250	\$1995
8024-MANNESMAN TALLEY REG \$1995	\$1595
8024L-LETTER TALLEY REG \$2495	\$1995
25CPS-STARWRITER REG \$1895	\$1445
CBM-IEEE MODEM REG \$279	\$229
VOICE SYNTHESIZER REG \$395	\$329



PET TO IEEE CABLE REG \$39.95	\$34
IEEE TO IEEE CABLE REG \$49.95	\$39
VIC 20 REG \$299	\$269
VIC 1540 DISK 170K REG \$599	\$499
VIC 1515 30CPS PRINTER REG \$395	\$349
VIC 1011 RS 232 INTER REG \$49.95	\$39
VIC 1112 IEEE INTER REG \$99.95	\$79

MATOR SHARK HARD DISK DRIVE

- *Winchester Disk
 - *Commodore DOS 2.5
 - *24 Megabyte
- \$6475**

- Strobe 100 Plotter
 - *PET Interface
 - *Software Pack
- \$975**

SCHOOL SPECIALS
3 for 2 Pricing
CALL US!

20% Off on Software

Special pricing on Atari, Apple, Digilog, Epson, Hayes Modem, Printwheels

PHILADELPHIA COMPUTER DISCOUNT ©

P.O. Box 170 St. Davids, PA 19087 (215)687-8540

MAIL ORDER PHONE 1-800-345-1289

PREPAID ORDERS SHIPPED FREE
VISA & MASTERCARD ADD 3%
COD · UPS

H1181C

PA RESIDENTS ADD 6% SALES TAX

The Eye is hidden somewhere within one of the seven provinces, and the player must find it and return it to Fel City, where his journey began.

The player chooses one of 16 characters and gains a set of magical abilities, such as healing, flying, time travel and teleport. Which spells he gets are different each time he plays. He is equipped with his choice of four swords, a bow and arrows, and magic bolts.

While searching, the player sees a detailed map of the provinces on the screen, along with his location, strength, health, and other information.

The player encounters dragons, bats, vampires, ghosts, golems, serpents, skeletons and other monsters. He can choose between 13 commands, from firing an arrow and fighting with sword to casting magic spells and searching for hidden paths.

When a battle is engaged, fully animated graphics display the action between player and beast.

Dragon's Eye is available on cassette for the ATARI 400/800 (32K) and PET (32K), or on disk for the APPLE (48K with ROM Applesoft), and ATARI 400/800 (32K), from:

Automated Simulations, Inc.
P.O. Box 4247
Mountain View, CA 94040
\$24.95

Commodore Introduces Lowest Priced Modem In The Computer Industry

Valley Forge, PA, January 7, 1982 – A low priced modem has been introduced by Commodore Business Machines, Inc.

The new "VICMODEM," which retails for \$109.95, is an easy-to-use plug-in cartridge that connects directly to the user port

of Commodore's VIC 20™ home computer, and may be used with any modular style telephone.

The VICMODEM, which is planned for retail sale in the Spring of 1982, allows users to communicate and exchange data with other computer owners over the telephone. This latest VIC peripheral also allows users to inexpensively access telecomputing networks such as the Source™ or Compuserve™, which provide services such as stock quotes and company reports, newswire stories, research data, sports scores, airline reservations, shopping services and more.

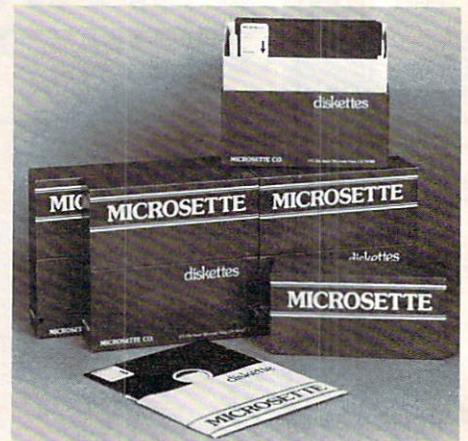
The VICMODEM is a direct connect, 300 baud modem with originate/answer and half/full duplex capabilities. The combined cost of the VIC 20 and a VICMODEM is less than \$410.00.

Microsette Introduces Mini-Diskettes

Microsette Co. is adding 5¼" diskettes to its line of computer and audio cassettes. The diskettes are useable with Apple, Atari, Commodore, Tandy TRS-80, PMC-80 and PMC-81 computers from Personal Micro Computers and many mini-computer and word processing systems.

The diskette surface is certified error free on one side and is for all soft-sectored, single or double density applications. The burnished diskette surface insures longer head life and excellent media durability. Furthermore, the diskettes feature a reinforced hub which gives longer diskette life in this high wear area.

Microsette MD-5 diskettes are attractively packaged in a sturdy green box with each of the 10 diskettes in a long-lasting Tyvek envelope. Each diskette has a corner label and each box of 10 contains 20 silver write



protect tabs and 20 large color coded labels.

Microsette MD-5 diskettes are sold by mail order in units of 10 (1 box) or 50 (5 boxes). Suggested list price is \$3.95 per diskette and mail order prices are \$2.50 each in the box of 10, or \$2.20 each in the box of 50. Prices include UPS shipping.

Further information and dealer pricing may be obtained from Microsette.

Microsette Co.
475 Ellis Street
Mountain View, CA 94043
(415)968-1604

Five New Programs From Atari

Sunnyvale, CA – January 5, 1982 – Three new home computer game programs, a bookkeeping package and a home filing system were introduced by the Home Computer Division of Atari, Inc.

Pac-Man is the Atari Home Computer version of a very popular coin-operated game. In this version, a player's character must negotiate a maze without being eaten by any of four pursuers. By eating an "energy" dot the player's character can gain the ability to attack and gobble up the pursuers. For use on both the Atari 400 and Atari 800 Home Computers, this \$44.95 game comes in cartridge form, and will be available in the second quarter of 1982.

Lyc0 Computer Marketing & Consultants

We Specialize in Quality, Knowledge, Service, and Microcomputers

717-435-5197



A Warner Communications Company
© 1981, ATARI, INC

MARCH

SPECIALS

ATARI 800 16K \$665.00

ATARI 400 16K \$329.00

32K MEMORY BOARDS \$149.00

16K MEMORY BOARDS \$75.00

for ATARI 400 & 800 with 1 year warranty!!

PROGRAMMING SOFTWARE

CX4101	INVITATION TO PROG	\$ 21.00
CX4106	INVITATION TO PROG 2	\$ 24.00
CX4117	INVITATION TO PROG 3	\$ 24.00
CXL4002	ATARI BASIC CART	\$ 45.00
CXL4003	ASSEMBLER EDITOR	\$ 45.00
CXL4015	TELELINK	\$ 24.00
CX405	MICROSOFT BASIC	\$ 69.00

EDUCATIONAL SOFTWARE

CXL4001	EDUCATIONAL SYSTEM	\$ 19.00
CX6001	U.S. HISTORY	\$ 22.00
CX6002	U.S. GOVERNMENT	\$ 22.00
CX6003	SUPERVISORY SKILLS	\$ 22.00
CX6004	WORLD HISTORY	\$ 22.00
CX6005	BASIC SOCIOLOGY	\$ 22.00
CX6006	COUNSELING PROCED	\$ 22.00
CX6007	PRINCIPLES OF ACCT.	\$ 22.00
CX6008	PHYSICS	\$ 22.00
CX6009	GREAT CLASSICS	\$ 22.00
CX6010	BUS. COMMUNICATION	\$ 22.00
CX6011	BASIC PSYCHOLOGY	\$ 22.00
CX6012	EFFECTIVE WRITING	\$ 22.00
CX6014	PRINCIPLES OF ECON	\$ 22.00
CX6015	SPELLING	\$ 22.00
CX6016	BASIC ELECTRICITY	\$ 22.00
CX6017	BASIC ALGEBRA	\$ 22.00
CX4108	HANGMAN	\$ 12.00
CX4112	STATES & CAPITALS	\$ 12.00
CX4114	EUROPE COUNT. & CAP.	\$ 12.00
CX4123	SCRAM	\$ 21.00
CX4102	KINGDOM	\$ 12.00
CX4103	STATISTICS	\$ 19.00
CX4104	MAILING LIST	\$ 19.00
CX4109	GRAPHIT	\$ 17.00
CX4110	TOUCH TYPING	\$ 19.00
CX4121	ENERGY CZAR	\$ 12.50
CX4118	GERMAN	\$ 45.00
CX4119	FRENCH	\$ 45.00

ATARI HARDWARE

410	CASSETTE RECORDER	\$ 75.00
810	DISK DRIVE	\$455.00
850	INTERFACE	\$159.00
830	PHONE MODEM	\$159.00
825	PRINTER	\$585.00

ENTERTAINMENT SOFTWARE

CXL4004	BASKETBALL	\$ 35.00
CXL4005	VIDEO EASEL	\$ 35.00
CXL4006	SUPER BREAKOUT	\$ 35.00
CXL4008	SPACE INVADER	\$ 35.00
CXL4009	CHESS	\$ 35.00
CXL4011	STAR RAIDERS	\$ 35.00
CXL4012	MISSILE COMMAND	\$ 35.00
CXL4013	ASTEROIDS	\$ 35.00
CX4015	BLACKJACK	\$ 12.50
CX4107	BIORHYTHM	\$ 12.50

ATARI PACKAGES

CX481	ENTERTAINER	\$ 85.00
CX482	EDUCATOR	\$125.00
CX483	PROGRAMMER	\$ 55.00
CX484	COMMUNICATOR	\$325.00

ACCESSORIES

CX30	PADDLES	\$ 17.00
CX40	JOYSTICKS	\$ 17.00
CX853	16K RAM	\$ 85.00

WE CARRY MANY OTHER LINES OF
MICROCOMPUTERS YOU CAN
CALL FOR PRICES ON:

**IN STOCK ORDERS
SHIPPED SAME DAY**

At Lyc0 Computers we offer our expert services to help customers make their first computer purchase, schools establish a computer program, or evaluate multiterminal systems.
to help evaluate your needs or

if you wish to make a purchase

CALL US AT 717-435-5197

LYCO COMPUTERS

P.O. BOX 10

COGAN STATION, PA 17728

WE PAY FREIGHT ON PRE-PAID ORDERS

NO EXTRA CHARGE

ON C.O.D. ORDERS

Centipede is another Atari Home Computer version of a best-selling coin-operated game. In this version, the player uses a "Bug Blaster" to defeat colorful legions of attacking spiders, fleas, scorpions, the Centipede itself, and poisonous mushrooms. The \$44.95 game can be used on both Atari 400 and Atari 800 Home Computers. It comes in cartridge form and will be available in the second quarter of 1982.

Caverns Of Mars is a fascinating new game that takes players beneath the surface of Mars. The player's character must penetrate several layers of defenses to reach the Aliens' stronghold. Floating mines, "enemy" ships on patrol and deadly laser fire menace the player constantly. This game was originally developed for the Atari Program Exchange and won a prize in the APX quarterly software contest for its 17-year-old author. This \$39.95 game can be used on both the Atari 400 and Atari 800 Home Computers with an Atari 810™ Disk Drive. It comes in diskette form and will be available in the first quarter of 1982.

The Bookkeeper is an accounting system designed to meet the needs of people who do business from their homes and for those who run their personal finances in a business-like fashion.

It is a low-cost, comprehensive accounting system that generates professional calibre reports, such as Profit and Loss Statements, Balance Sheets, Accounts Receivable and Payable. It will handle 1,000 transactions a month and up to 350 General Ledger accounts, vendors and customers.

The Bookkeeper consists of four diskettes, including a sample company data diskette that lets you familiarize yourself with The Bookkeeper before you start entering data of your own. The package requires an Atari 800 Home Computer with Atari BASIC language cartridge and 48K of Random Access Memory, an Atari 810 Disk Drive, an Atari 825™ 80-Column Printer and an Atari 850™ Interface Module.

Price and availability will be announced later.

The Home Filing Manager lets a user create, store, edit, retrieve and print information similar to that found on 3"x5" index cards. It provides a convenient way to catalog books, addresses, clothes, recipes, record collections, Christmas card lists, vocabulary words, term paper notes, and the like.

The user can search in alphabetical or reverse alphabetical order or locate an entry by its title or a phrase it contains.

Price and availability will be announced later.

Scheduled Educational Conferences

National Educational Computing Conference (NECC-82)
Kansas City, MO
June 28-30, 1982

The purpose of the conference is to provide a forum for discussion among those interested in educational computing. Based on previous conferences, approximately 1000 people from institutions at all levels are expected to attend. Between 50 and 75 vendors are expected to exhibit at the conference.

Papers will be presented which describe actual experiences with computer use in the classroom or consequences of such use on the educational process in general. The diversity of disciplines and participation by individuals from elementary, secondary, and post secondary education provide a unique opportunity for cross-pollination of ideas and experiences. Additional conference activities include pre-conference workshops, project presentations, vendor exhibits, special sessions, tutorials, and birds-of-a-feather sessions.

Additional information may be obtained from:



ALL ATARI® HARDWARE 15%-25% OFF LIST PRICE

Atari 800 16K	710.00
Atari 400 16K	359.00
Atari 410 Cassette	80.00
Atari 810 Disk	480.00

ATARI® ACCESSORIES 10%-20% OFF LIST PRICE

8K Memory Board	40.00
16K Memory Board	80.00
Joysticks (pair)	19.00
Paddles (pair)	19.00

To order: Call 617-964-3080
Ask for mail order, or write:

BBI Mail Order
P.O. Box 365
Newton Highlands, MA 02161
(617) 964-3080

PLUS 10%-20% OFF ALL ATARI® SOFTWARE ALSO 3RD PARTY HARDWARE AND SOFTWARE AT COMPARABLE SAVINGS



Intricate programming for the ATARI by

SPYDER SOFTWARE

Software which will revolutionize the ATARI'S micro-computer software market. We rewrite software repeatedly. All modifications to the software you purchase will be sent to you at no cost.

Call or mail for free catalog:
SPYDER SOFTWARE
P.O. Box 895
Beaverton, OR., 97075

(503) 642-2811



ELECTRIC SYSTEMS CORPORATION

Authorized Commodore service center
Repair of the complete line of Commodore products
In a hurry? Check our modular exchange program



HARDWARE:

CBM 8032 Computer, 80 Column	\$1095
CBM 8050 Disk Drive	1340
CBM 4032 Computer, 40 Column	995
CBM 4040 Disk Drive	995
CBM 4022 Printer	649
CBM VIC 20 Computer	263
CBM VS100 Cassette	68
PET to IEEE Cable	33
IEEE to IEEE Cable	39
BASF Diskette, Box of 10	30

SOFTWARE:

OZZ	\$299
Wordcraft 80	299
Tax Preparation System	380
IRMA	380
Dow Jones Portfolio Management System	115
Personal Tax	55
Pascal	229
Assembler Development Package	77
Wordpro 4+	329

Order TOLL FREE 1+800-527-3135

10 AM to 4 PM CDT Monday through Friday

Texas residents call 1+214-661-1370

VISA, MASTER CHARGE, MONEY ORDERS, AND C.O.D. "Certified Check" accepted.

Units in stock shipped within 24 hours, F.O.B. Dallas, Texas.

All equipment shipped with manufacturer's warranty.

Residents of Texas, Louisiana, Oklahoma City and Tulsa, Oklahoma must add applicable taxes.

Eclectic shortly will be announcing products that are designed to work with CBM systems.

1. ROMIO: two RS232 ports — three parallel ports — 26K EPROM memory-managed alternate character set, software controlled — EDOS (extended DOS).
2. Terminal program (options with ROMIO)
3. EPROM programmer
4. Front-end processor
5. Additional firmware to be announced

Be sure to write the address below for more information; dealer inquiries welcome.

P.O. Box 1166 • 16260 Midway Road • Addison, Texas 75001 • (214) 661-1370

E. Michael Staman
NECC-82 General Chairman
Campus Computing Services
University of Missouri-Columbia
305 Jesse Hall
Columbia, MO 65211

Computers in Education
Conference
Seattle Pacific University
Seattle, WA
March 12 & 13, 1982

The annual conference will include talks, workshops, and exhibits with emphasis on the use of the microcomputer in K-12 classrooms of various disciplines.

Tony Jongejan
Everett High School
2416 Colby
Everett, WA 98201

Microcomputer Conference
The University of Victoria
Victoria, British Columbia
May 6-8, 1982

Moving Microcomputers Into The Mainstream Of Education will be an opportunity for both a formal and an informal sharing of ideas, information and experiences amongst educators. The major focus of the conference will be the integration of the microcomputer into the established curriculum into the classroom, and into the administrative offices of school districts.

The conference is designed to provide educators with information regarding applications that have been tried and tested in the schools to achieve this purpose. A series of keynote addresses, workshops, papers, and short presentations have been planned. A call for presentations can be found in the upcoming issue of *Microscope*.

The conceptual threads of the conference are:

1. Classroom applications.
2. Administration applications.
3. Courseware development and

evaluation.

4. Future implications of technology in instruction.

University housing will be available at reasonable rates.

University Extension
Conference Office
721-8475

Southern California
Computers in Education
Conference
University High School
Irvine, CA
May 14-15, 1982

This second annual conference is sponsored by Computer-Using Educators.

Workshops and field trips will be held on Friday, May 14 at schools and industry scattered throughout Southern California. On Saturday all sessions will be held at University High School, Irvine starting at 9:00 a.m.

Classroom applications of computers to all areas of the curriculum will be presented covering all grade levels from kindergarten through two-year college. The major emphasis of the conference will be on getting started with microcomputers.

The Friday night banquet speaker will be Prof. Lud Braun, School of Engineering, University of New York. The keynote address on Saturday morning will be delivered by Dr. William "Sandy" Wagner.

Preregistration is \$10 for CUE members and \$16 for non-members. Preregistration must be received by April 30th, 1982. *No purchase orders accepted.* On-site registration will be available on Saturday for \$18. All checks should be made out to CUE (or Computer-Using Educators) and mailed to the address below.

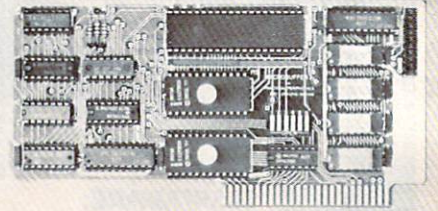
One unique feature of the conference will be several computer workshops held at sea. The unofficial slogan of the conference is "PET your APPLES in

Orange County."

Craig Walker
1982 Conference Chairperson
Arrowview Intermediate School
2299 North "G" Street
San Bernardino, CA 92405
(714)886-9118

Buffered Parallel Printer Interface

The Microbuffer II is an intelligent buffered parallel printer interface for the Apple II computer. The Microbuffer II includes 16K of on-board RAM so the computer does not have to wait for the printer to finish before continuing with other

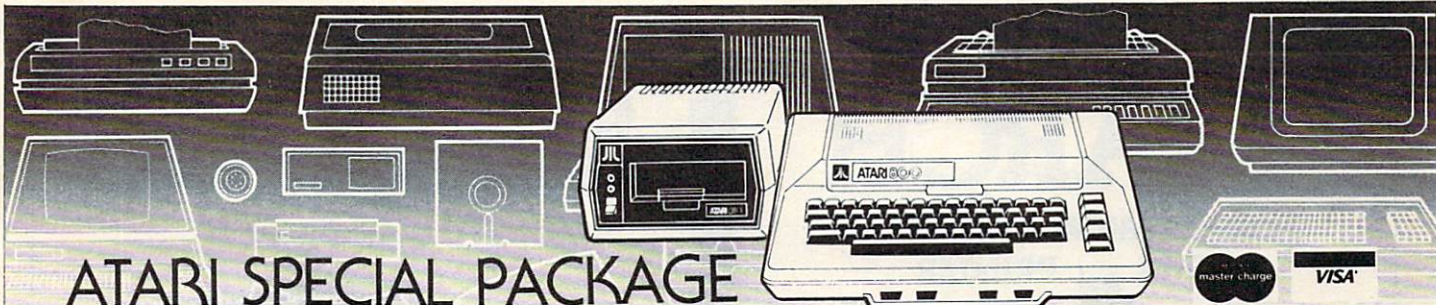


processing. Buffer memory size is user expandable to 32K using industry standard 64K RAM chips. The Microbuffer II is compatible with Applesoft, CP/M, and Pascal and includes advanced high resolution graphics print routines for the Epson MX-80 with Graphtrax, Anadex, IDS Paper Tiger, NEC Prowriter, as well as complete print formatting features. The Microbuffer II is available for \$259.

Practical Peripherals, Inc.
31245 La Baya Drive
Westlake Village, CA 91362
(213)991-8200

MIT LOGO For Apple Computers

The Krell Software Corp. Stony Brook, NY is pleased to announce that *MIT's LOGO* for Apple II computers is now available. This is the authorized version of the LOGO language for Apple developed by MIT under the sponsorship of the National Science



ATARI SPECIAL PACKAGE

800 COMPUTER WITH DISK DRIVE \$ 1,139.00

ATARI SOFTWARE							
Invit. to programg. 2	24.95	Softporn Adventure	24.95	COULDERS			
Invit. to programg. 3	24.95	Crush, Crumble, Chomp	25.95	Altos 8000-2		2895.00	
Microsoft Basic	74.95	Rescue at Rigel	25.95	Northstar Advantage		call	
Pilot	64.95	Datstones of Ryn	15.95	Zenith Z-89		2149.00	
Personal Finance	59.95	Compu-Math/Decimals	31.95	PRINTERS			
Atari Word Processor	119.95	Compu-Math/Fractions	31.95	Epson MX-80		459.00	
Missile Command	34.95	Compu-Read 3.0	24.95	Okidata 82-A		489.00	
Asteroids	34.95	LISP 2.0	119.95	NEC 8023A		529.00	
Caverns of Mars	31.95	Datasm -65	119.95	Diablo 630		2195.00	
LJK Letter Perfect	119.95	Micropainter	27.95	NEC 3510		1795.00	
LJK Mailmerge/Utility	24.95	Text Wizard	79.95	NEC 7710		2395.00	
LJK Data Perfect	79.95	Alibaba & 40 Thieves	25.95	MODEMS			
OS/A+	69.00	Q5 Forth	69.00	Hayes Micromodem II		269.00	
Basic A+	69.00	March Racers	25.95	Hayes Smartmodem		229.00	
Synapse Filemgr. 800	79.95	Andromeda	34.95	Novation DCAT		159.00	
Synapse Disk Mgr.	24.95	Pathfinder	29.95	MONITORS			
Wiz & Princess	26.95	Ghost Hunter	26.95	NEC 12" Green		179.00	
The Next Step	31.95	16K RAM	69.95	NEC 13" Color		329.00	
Road Work	31.95	32K RAM	139.95	Zenith 12" Green		119.00	
				MEDIA			
				Verbatim		25.00/box	
				Dysan		37.00/box	

UNICOMM INC.
 THE PURCHASING SERVICE FOR HOME & BUSINESS COMPUTERS
 1247 LINCOLN BLVD. SUITE F, SANTA MONICA, CA. 90401 (213) 451-8089

FREE CATALOG... offering the most complete line of computer products in the country. Your satisfaction is backed by our 30 day guarantee. ALL PRODUCTS DISCOUNTED UP TO 30%. COMPARE PRICES & KNOWLEDGE. No minimum orders. Please add 3% for shipping, handling & insurance. Showroom by appt. only Monday to Friday 9:30-5:30 (PRICES SUBJECT TO CHANGE).

Foundation.

This unique and powerful language was written specifically for educational application. It is highly graphic and ideal for introducing young people to the use of microcomputers. *MIT LOGO For Apple* is by no means an abridged version suitable to children only, it is the full programming language whose capabilities and versatility rival and at many places, supersede those of BASIC, FORTRAN, and PASCAL.

Krell's complete package includes the LOGO language system, Krell's own Instant LOGO tutorial program, and its unique introduction to LOGO, *Alice In LOGOLAND*. The entire package is fully documented for teachers and students. Since LOGO requires a disk system with 64K of memory an optional 16K RAM board extension is available at the special price of \$109.95. The entire software package is availa-

ble for \$179.95.

Krell Software Corp.
 21 Millbrook Drive
 Stony Brook, NY 11790
 (516)751-5139

Atari Special Additions

Sunnyvale, CA – January 6, 1982 – One hundred and seventeen vendors are represented with more than 400 products in *Atari Special Additions*, the first edition of a new catalog of programs, equipment accessories, furniture and publications designed for users of Atari 400 and Atari 800 Home Computers.

Atari Special Additions is intended to be a useful guide to equipment, and programs produced by other manufacturers," said Roger H. Badertscher, president of the company's Home Computer Division. "It is a measure of the continuing success of

our product line that so many vendors are offering so many products to be used with Atari Home Computers."

The catalog, with a cover price of \$3.00, is available from Atari Computer retailers, and will be mailed free to owners of Atari Home Computers who have filed warranty cards and to subscribers of *The Atari Connection*, the quarterly magazine the company publishes for owners of its computer.

New Product releases are selected from submissions for reasons of timeliness, available space, and general interest to our readers. We regret that we are unable to select all new product submissions for publication. Readers should be aware that we present here some edited version of material submitted by vendors and are unable to vouch for its accuracy at time of publication.

MARCH

**OKIDATA MICROLINE 80A
MATRIX PRINTER**



\$329.00

SPECIALS

ATARI 810 DISK DRIVE



\$429.00

PERSONAL COMPUTERS

CALL TOLL FREE!

EAST COAST

1-800-556-7586
COMPUTER SHOPPING CENTER

12 Meeting St.
Cumberland, RI 02864
1-401-722-1027
TELEX 952106

WEST COAST

1-800-235-3581
COMPUTER SHOPPING CENTER

3533 Old Conejo Rd. #102
Newbury Park, CA 91320
1-805-499-3678
CA TOLL FREE 1-800-322-1873
TELEX 182889

COMPUTER SHOPPING CENTER

We Accept C.O.D.'s • Stock Shipments Same Day or Next • No Surcharge for Credit Cards • All Equipment Factory Fresh w/MFT Warranty • We Carry the Complete Line of Personal Software • Prices do not Reflect Shipping Charges
Rhode Island and California residents please add 6% Sales Tax

NEC PC-8023 Printer	\$629.00
NEC 7710 Spinwriter	2345.00
NEC 7720 Spinwriter	2695.00
NEC 7730 Spinwriter	2345.00
NEC JC 1201 M(A) - Color 12" Monitor	359.00
NEC JB 1201 M 12" Green Monitor	159.00
Okidata Microline-80	329.00
Okidata Microline-82A	499.00
Okidata Microline-83A	729.00
Diablo 630	1995.00
M & R Sup-R-Terminal	279.00
Microsoft Soft Card (Z-80)	279.00
Hazeltine 1420	799.00
Northstar Horizon II 32K QD	2925.00
Anadex DP-9500/9501	1249.00
Televideo 910	559.00
Televideo 912C	669.00
Televideo 920C	689.00
Televideo 950	929.00
CBM 8032 Computer	1149.00
CBM 8050 Disk Drive	1349.00
CBM 4032 Computer	1029.00
CBM 4040 Disk Drive	1029.00
CBM 4022 Printer	649.00
CBM VIC-20	269.00
Leedex/Amdek 100G	159.00
Leedex/Amdek Color - 1 13" Color Monitor	329.00
Microtek 16K Ramboard for Atari 800	79.00
Microtek 32K Ramboard for Atari 400 and 800	149.00
Qume Sprint 9/45 (Full Panel)	2295.00
Atari 400 16K	339.00
Atari 410 Recorder	60.00
Atari 825 Printer	599.00
Atari 850 Interface	139.00
Atari 830 MODEM	159.00
Atari 810 Disk Drive	429.00
Atari 800 16K	749.00
Epson MX-70	349.00
Epson MX-80	449.00
Epson MX-80 FT	549.00
Epson MX-100 FT	729.00

**COMMODORE MICROTEK DIABLO
AMDEK QUME OKIDATA ATARI
TELEVIDEO EPSON LEEDEX NEC**

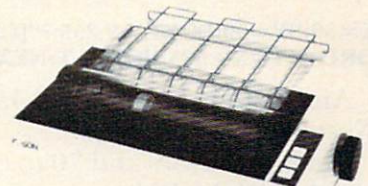
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

WE CARRY THE COMPLETE LINE OF ATARI SOFTWARE, PERIPHERALS AND ACCESSORIES

**PERSONAL COMPUTERS
COMPUTER SHOPPING CENTER**



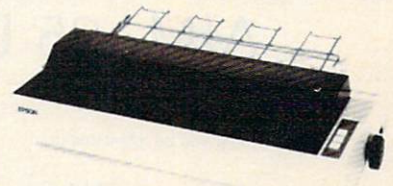
**NEC GREEN 12" MONITOR
JB 1201M
\$159.00**



**EPSON MX-80
INTERFACES & CABLES
IEEE \$55. RS-232 \$70.
TRS-80 CABLE \$35.
\$449.00**



**AMDEK COLOR-1 MONITOR
\$329.00**



**EPSON MX-100 FT PRINTER
\$729.00**

CAPUTE!:

Corrections And Amplifications

1. "Spacewar Part 2," *Home and Educational COMPUTING!*, Fall 1981, pg. 21: an ?Out Of Memory error can occur after several rounds of the game. The following changes will prevent this as well as the problem with the black hole option:

```
6 SX = 50:SY = 50:POKEV-9,255:?"[CLEAR]":X = S + A:
FORI = XTOX + 505:POKEI,T:NEXTI
```

And change lines 18 and 45 to contain GOTO 47 (instead of GOSUB47).

Change lines 59 and 70 to contain GOTO17 (instead of RETURN).

Changing line 140 to: 140 POKE52,28: POKE56,28:CLR will allow you to make modifications and debug the program without running out of memory. (Our thanks to Ken Denniston and Ronald Gruenzel for these suggested improvements.)

2. "Window Analysis," **COMPUTE!**, December, 1981, pg. 35, line 720: GOSUB FNTRC should read GOSUB FTRC.

3. "A Simple Printer Interface For Apple II," **COMPUTE!**, December, 1981, pg. 85: 220 OHMS should be 2200 OHMS (and vice versa).

4. "PET To PET Communication Over The User Port," **COMPUTE!**, December, 1981, pg. 142: The second paragraph on the second column of this page should begin, "Now the receiver can leave line 40 and read the data byte (on line 50). The transmitter is now stuck on line 90 . . ."

5. "File Recovery," **COMPUTE!**, December, 1981, pg. 164: to apply Program 1 to the 2040 Disk Drive, the following lines are required.

```
145 PRINT "ENTER TRACK NUMBER OF 1ST
DATA BLOCK": INPUT TT
```

```
414 PRINT#15,"B-P:"3;5 + 32*R-2
```

```
416 PRINT#1,CHR$(TT);
```

6. "The Beginner's Page," **COMPUTE!**, January, 1982, pg. 24: part of the Atari version of the program was missing. Here it is in its entirety:

```
100 DATA SUPER,ACHE,AMERICAN,RAINBOW,QUALITY,
INTERGALACTIC,RELIABLE,FOOLPROOF
110 DATA PROGRAMS,SOFTWARE,COMPUTERWARE,
CODE,LISTINGS,INFORMATION,MAGIC
120 DIM ADJECTIVE$(8*20),NOUN$(7*20),TEM
P$(20),L1(8),L2(7)
130 FOR I=1 TO 8:READ TEMP$:ADJECTIVE$(I
*20-19,I*20)=TEMP$:L1(I)=LEN(TEMP$):NEXT
I
140 FOR I=1 TO 7:READ TEMP$:NOUN$(I*20-1
9,I*20)=TEMP$:L2(I)=LEN(TEMP$):NEXT I
150 FOR I=1 TO 7
160 FOR J=1 TO 8
170 PRINT ADJECTIVE$( (J-1)*20+1, (J-1)*20
+L1(J));" ";NOUN$( (I-1)*20+1, (I-1)*20+L2
(I))
180 NEXT J
190 NEXT I
```

7. "Invest," **COMPUTE!**, January, 1982, pg. 39: the author suggests that the following changes be made to his program since equity buildup for an investment should be multiplied by the initial amount financed rather than the yearly payment amount. As the program stands, it makes an investment look a little better than it really is. The following will correct the problem:

```
7490 PN = PR - DP : REM THIS IS THE AMOUNT
YOU'RE FINANCING
7500 EB = PN * E1 (Y,I) : REM THIS IS THE EQUITY
BUILDUP FOR 12 MONTHS, 1ST YEAR
7502 EB = EB/12
7503 EB = EB * M : REM THIS IS THE EQUITY
BUILDUP FOR THE MONTHS YOU'LL OWN
IT, THE 1ST YEAR
7505 EB = EB/1000
7510 ET = PN * E2 (Y,I) : REM EQUITY BUILDUP
FOR THE 2ND YEAR
7515 ET = ET / 1000
```

8. "Apple Addresses," **COMPUTE!**, January, 1982, pg. 83: the program was missing from this article. The entire article is being reprinted in this issue, starting on page 163.

9. "Tinymon1," **COMPUTE!**, January, 1982, pg. 176: Jim Butterfield writes, "I bungled it! In my zeal to make the whole thing as painless and fool-proof (!) as possible, I added four bytes to the end of the program. This made the checksum straightforward, and made the hex entry a little simpler.

All of this would have been OK had I not added four bytes to the BASIC pointers, too. The 'first change' should have been:

```
:: 0028 01 04 14 08 14 08 14 08
```

If you punched the whole thing up and it doesn't work, all is not lost. Reload the program, make the above change, go back to BASIC and SAVE...and you will find yourself with a working Tinymon.

My apologies for all those nights of lost sleep. I really was trying to make it easier and bug-free...." ©

TO: AIM-65 USER

Would you be interested in a

Consulting Job

writing custom software on your own AIM-65?

If yes, are you: 1. An expert in AIM-65 use?
2. Located in the Bay Area?
3. Familiar or ready to learn AIM-65 FORTH?

Please call: Dr. Gat (415) 961-6823

MICRO



BUSINESS WORLD INC.
Information Line (213) 996-2252
TOLL FREE MAIL ORDER LINES
(800) 423-5886 Outside Calif



OUR PRICE \$1995.00 *Special Of The Month*

MSL 3250.00
Save
1255.00

The HP85
We Turn Problems Into Solutions

HP DISC DRIVE
Single Master Model 82902M
Our Price \$1099.00



Dual Master Model 82901M
\$1849.00
MSL \$1500.00 *Save* 401.00
MSL \$2500.00 *Save* 651.00

SHARP BUSINESS COMPUTER 64K SYSTEM

- 5.25" diskette
- 284K byte per disk drive
- 2 disk drives per unit
- Expandable up to 4 units
- Including SHARP's FDOS (Floppy Disk Operating System)

MSL 5995.00 **OUR PRICE \$3995.00** *Save \$2000.00*

NEC STUDENT SYSTEM 64K

*NEC PC 8001 A Computer
*NEC PC 8012 A Expansion
*NEC PC 8031 A Dual Drive
12" Grn. Phs. Video Monitor

MSL 3565.00 **OUR PRICE \$2395.00** *Save \$1170.00*

XEROX 820 WORD PROCESSING SYSTEM (INCLUDES SOFTWARE)

MSL 3495.00 **OUR PRICE \$2649.00** *Save 846.00*

Commodore COLOR COMPUTER VIC-20

Vic-TV Modual \$19.00
Vic Cassette \$69.00
Vic Disk Drive \$ Call
Vic 6 Pack program \$44.00

MSL 299.00 **OUR PRICE \$255.00** *Save 44.00*

HEWLETT PACKARD

	List	Our Price
HP-125 Microcomputer	3750.00	2750.00
HP-85 Microcomputer	3250.00	2475.00
HP-83 Microcomputer	2250.00	1777.00
16K Exp-Memory Module	295.00	255.00
Graphics Plotter 7225	2450.00	2075.00
Personality Mod. For 7225	750.00	665.00
2631B Impact/Printer/		
Hvy Dty	3950.00	3250.00
Option 020 For 2631B	150.00	125.00
8 Drives to Choose from 82902S	1300.00	1125.00
9895A 8" Dual Drive	6850.00	5500.00
Graphics Tablet 9111A	2050.00	1678.00
HP-11C Slim-Line Advanced	135.00	119.00
HP-12C Slim-Line Financial	150.00	129.00
HP-41 CV New 2.2 Bytes Mem	325.00	250.00
HP-41 C Calculator	250.00	185.00
Card Reader For 41CVC	215.00	162.00
Printer For 41CVC	385.00	289.00
Optical Wand For 41 CVC	125.00	97.00
Quad Ram Equals 4 Mem. Mods	95.00	81.00
Memory Modules For 41C		25.00
HP-97 Programmable Printer	750.00	595.00
HP-67 Programmable Calculator	375.00	295.00
HP-34C Programmable Scientific	150.00	117.00
HP-38C Programmable Bus. R/E	150.00	117.00
HP-32E Adv. Scientific	55.00	48.00
HP-37E Business Mgmt.	75.00	57.00

PRINTERS

EPSON

	List	Our Price
MX 80 FT	\$ 745.00	\$ 549.00
MX 80 IMPACT	645.00	450.00
MX 70 IMPACT	500.00	390.00
MX 100	995.00	749.00

ANADIX 9501

	List	Our Price
5510	3195.00	2445.00
5515	3295.00	2545.00
3510	2495.00	1795.00
3515	2545.00	1849.00

OKIDATA

	List	Our Price
MICROLINE 80	545.00	395.00
MICROLINE 82	649.00	549.00
MICROLINE 83	1050.00	769.00

PAPER TIGER

	List	Our Price
445G with Graphics	795.00	695.00
466G with Graphics	1,394.00	899.00
566G New full size	1,695.00	1,139.00

DIABLO (LETTER QUALITY)

	List	Our Price
630 RI02 bi-directional tractors	2,965.00	2,450.00
1640K109 keyboard tractors	4,000.00	2,899.00
630 RO Receive Only 1650K 136 keyboard tractors	2,710.00	2,250.00
	4,000.00	3,100.00

TERMINALS TELEVIDEO

	List	Our Price
910	\$ 699.00	\$ 599.00
912C	950.00	699.00
920C	995.00	795.00
950C	1,195.00	949.00

SOFTWARE FOR COMMODORE

	List	Our Price
Ozz-The Information Wizard	395.00	\$289.00
Wordcraft 80	395.00	289.00
Ima-Info Retrieval & Mgmt. Aid	495.00	389.00
Down Jones Portfolio Mgmt.	149.00	119.00
Pascal Development Pkg.	295.00	219.00
Ebs-Recipients, Inventory	750.00	569.00
Bpi-General Ledger	395.00	389.00
Word Pro 3-40 Column	250.00	175.00
Word Pro 4-80 Column	375.00	259.00
Word Pro 4 Plus	450.00	319.00

MODEMS

	List	Our Price
NOVATION CAT MODEM	189.95	140.00
NOVATION D-CAT	199.00	150.00
NOVATION APPLE-CAT	389.00	329.00
HAYES MICROMODEM	379.00	295.00
HAYES SMARTMODEM	279.00	239.00

Commodore

	List	Our Price
8032-32K 80 Col Crt	1495.00	1097.00
4032-32K 40 Col Crt	1295.00	989.00
4016-16K 40 Col Crt	995.00	788.00
8050-Dual Disk 950K	1795.00	1344.00
4040-Dual Disk 343K	1295.00	989.00
C2N-Cassette Drive	95.00	77.00
4022-80 Col Printer	795.00	639.00
8024-Mannsmann Talley	1995.00	1545.00
250PS-Starwriter	1895.00	1399.00
CBM-IEEE Modem	279.00	225.00
Voice Synthesizer	395.00	325.00
VIC 20	299.00	255.00
PET to IEEE Cable	39.95	34.00
IEEE to IEEE Cable	49.95	39.00

MONITORS

	List	Our Price
12" Grn. Phs KQ (15 Hz)	219.00	165.00
12" Grn. Phs EQ (18 Hz)	\$249.00	185.00
12" Grn Phs (20 Hz)	279.00	209.00
12" Colour Composite Hi Res.	439.00	319.00
Grn Phs 12"	275.00	165.00
NEC Grn. Phs. 12"	225.00	179.00
Zenith 12"	159.00	119.00

DISKETTES SOLD IN BOXES OF 10 (Min. Purchase) \$100

	List	Our Price
DYLAN		
104/I 5" SOFT SECTOR	6.00	3.99
104/II 5" DBL DEN. SOFT SEC.	6.40	4.60
3740/I 8" SOFT SECTOR	7.25	4.75
3740/II 8" DBL DEN. SOFT SECTOR	10.75	6.90
MAXELL		
MD-1 5" SOFT SEC. TOR/DBL. DEN.	5.00	3.50
MD-2 SOFT SECTOR/DBL. SIDE/DBL. DEN.	7.00	4.90
FD-1 8" SOFT SEC./DBL. DEN.	6.50	4.50
FD-1 8" SOFT SEC./DBL. SIDE/DBL. DEN.	8.50	5.95

CALCULATORS

	List	Our Price
CASIO		
HR-10 Paper Feed	49.95	39.00
HR-12 Paper Feed	54.95	42.00
FR-100 Paper Feed	79.95	59.00
FR-1210 Paper Feed	129.95	99.00
PQ-20	29.95	23.00
LC-785	12.95	10.00
LC-3165	12.95	10.00
FX-68 Scientific	29.95	23.00
FX-81 Scientific	19.95	17.00
FX-3600P Scientific	39.95	29.95
FX-602P "Computer Talk" 88 Memories Pro gramming Upper & Lower Case Dot Matrix 512 Step	129.95	99.00
FX-702P Solves Problems with Alpha-Numeric Clarity, uses Basic Language	199.95	159.00

XEROX

	List	Our Price
Xerox 820-1 5-1/4" Disk	2995.00	2399.00
Xerox 820-2 8" Disk	3795.00	2995.00
CP/M Operating System	200.00	169.00
Word Processing Software	500.00	429.00
Super Calc	295.00	249.00

LE MONITOR

- 9" B & W 179.00 159.00
- 9" Green Phs 189.00 165.00
- 12" B & W 209.00 185.00
- 12" Green Phs. 229.00 199.00
- 12" Green Phs. 199.00 159.00
- Anti Reflective Screen
- T.V. Grade Screen

SANYO MONITORS

	List	Our Price
13" Color (new) high quality	\$550.00	399.00
12" Green Phs.	360.00	269.00
12" B & W	340.00	239.00
15" B & W	370.00	255.00
9" B & W The Best Seller!	235.00	159.00
9" Green Phs.	275.00	199.00

DRIVES

	List	Our Price
CORVUS 5 MBYTES	3,750.00	\$3,050.00
10 MBYTES	5,350.00	4,445.00
20 MBYTES	6,450.00	5,325.00

TELE. ANSW. DEVICES

	List	Our Price
PHONE MATE		
900 Economy	119.95	86.00
905 Remote Dual Tape Sys.	199.95	144.00
910 60 Calls Per Side	159.95	115.00
920 C Vox	200.00	159.00
925 Remote Call Monitor	199.95	144.00
930 Remote Twin Cass.	239.95	173.00
950 Remote	299.95	216.00
960 Remote Built In Tele. Microcomputer Controlled	339.95	245.00
	399.95	288.00

ATARI PERSONAL COMPUTERS

	List	Our Price
400 16K Bytes of Ram	595.00	337.45
800 16K Bytes of Ram	1080.00	739.00
410 Program Recorder	80.00	77.00
810 Disk Drive	600.00	457.00
825 Printer (80 col Centronic 737)	999.95	769.00
820 Printer (40 col impact)	450.00	353.00
830 Acoustic Modem	200.00	155.00
850 Interface Module	220.00	192.00
Atari Visicalc	200.00	164.00

1 Year Extended WARRANTY \$99.00

INSURE

SAVINGS SERVICE ELECTION ATISFACTION

MICRO BUSINESS WORLD WAREHOUSE MAIL ORDER
18720 Oxnard, #108 Tarzana, CA 91356
Telox: 182852 Answer: MICKO TZNA

*California residents add 6% sales tax.
**Add 3% Shipping & Handling - Add 3% surcharge for credit cards. Orders cannot be shipped unless accompanied by payment, including shipping, handling and tax where applicable.

OUTSIDE CA CALL TOLL FREE 1 (800) 423-5886 IN CA (213) 996-2252

Name (Please print) _____
Address _____
City _____ State _____ Zip _____

Qty	Make	Model	Description	Price	Total

TOTAL ORDER \$ _____
TAX IF APPLICABLE* _____
SHIPPING & HANDLING** _____
TOTAL ENCLOSED \$ _____

Certified Check or M.O. Allow 2 weeks clearance for personal check VISA MasterCard

CREDIT CARD # _____ Exp. Date _____ Signature _____

Advertisers Index

AB Computers	66,67,183	LJK Enterprises Inc.	51
AG Associates	222	Leading Edge	IBC
Aardvark Technical Services, Ltd.	205	LemData Products	189
Abacus Software	129,169	Lycos Computers	215
Actek	123	MDS	113
Alternate Reality Software	85	MED Systems Software	157
Anderson Peripherals, Inc.	121	MIS	175
Applefest	49	Madison Computer	129
Arcade Plus	109	Magic Carpet	189
Artworx Software Company	79	Micro Business World Inc.	223
Atari, Inc.	7	Micro Printer Marketing	32
Automated Simulations	69	Micro Spec Ltd.	175
Axlon	123	Micro Technical Products, Inc.	118
Barron Enterprises	71	Micro-Ed, Inc.	97
Batteries Included	183	Micrograms, Incorporated	89
John Bell Engineering	162	The Micromint Inc.	140
Beta Computer Devices	140	Microsoft Consumer Products	4
The Bit Bucket	216	Microtek Inc.	41
R. J. Brachman Associates, Inc.	181	Miles Computing	147
Byte Microsystems Corporation	179	Mosaic Electronics	107
C-Mart	91	Mountain Computer	1FC
CE Software	116	Muse Software	162
CFI	155	National Computer Shows	59
CGRS Microtech	187	Netronics R&D Ltd.	181
CMS Software Systems	2,3	New England Electronics Company	36,37
C&O Micro Systems, Inc.	185	Nufekop	169
Canadian Micro Distributors Ltd.	24,25,27,29,31	Olympic Sales Company	127
Cansoft Data, Inc.	23	On Line Systems	18,137
Color Computer Concepts	191	Optimal Technology Inc.	65
Comm*Data Systems, Inc.	169	Optimized Data Systems	185
Commodore Computer Systems	BC	Optimized Systems Software, Inc.	35,145
COMPUTE!'s First Book of Atari	11	Orion Software	208
COMPUTE!'s First Book of PET/CBM	10	Oryx Software	177
Computer Age Software	131	PSK Evaluation Service	189
Computer Country	150	Pacific Exchanges	108,119,169,200
Computer House	145	Pendulum Software	94
Computer Mail Order	210,211	Petted Microsystems	196
Computer Shopping Center	220,221	Philadelphia Computer Discount	213
The Computerist's Directory	61	Poquette's	193
Computer Mat Software	175,185	PractEd Tapes, Inc.	187
Computertime, Inc.	42	Professional Software	1,9
Connecticut microComputer, Inc.	95	Program Design, Inc.	157
Consultors International	42	The Program Store	57
Cow Bay Computing	61,83	The Programmer's Institute	42
Creative Software	34	Protronics	181
Cursor, The Code Works	116	Quality Software	83
Cyberia Inc.	153	Quantum Data, Inc.	169
Dr. Daley's Software	197	Questar International Inc.	195
Data Equipment Supply Corp.	86,87	RC Electronics Inc.	177
Dilithium Press	99	Samurai Software	45
Dunham Software & Consulting Co.	191	Santa Cruz Educational Software	81
Dynacomp	46,47	Sebree's Computing	147
ECX Computer Company	154	Silicon Valley Systems Inc.	143
Eastern House Software	127	Skyles Electric Works	63,187
Eclectic Systems Corporation	217	Small System Design	177
Elcomp Publishing, Inc.	89	The Software Connection	73
Electronic Specialists, Inc.	99	Software Galore	191
Electronic Technology Corporation	199	Software Street	161
Execom Corp.	185	Spyder Software	216
FSS	154	Strategic Simulations, Inc.	15
GOLF	189	Street Electronics Corporation	162
Gebelli Software, Inc.	13	Sunrise Software	151
HW Electronics	133	Supersoft	209
High Country Microsystems	151	Swiftly Software, Inc.	71
Horizon Simulations	39	Syncro, Inc.	17,151
Human Engineered Software	114	Synergistic Software	77
Huntington Computing	125	T.H.E.S.I.S.	18
IDSi	21	TIS Inc.	104
Inhome Software	135	T'Aide Software Company	103
Intec Peripherals Corp.	147	United Microware Industries, Inc.	105
Interlink, Inc.	95	Unicomm, Inc.	219
Iridis, The Code Works	147	Vixel, The Code Works	85
Jini Micro-Systems, Inc.	19	Voicetek	155
Krell Software Corp.	101	Wildfire Publishing	193

For Fastest Service,
 Call Our Toll-Free
 US Order Line
800-345-8142
 In Pennsylvania call 800-662-2444

- My computer is:**
 PET APPLE ATARI OSI
 KIM SYM AIM OTHER _____
- Don't yet have one...
- Please enter my 1 year (12 issue) subscription to **COMPUTE!**
 New subscription Renewal subscription
- \$2000 US subscription
 \$2500 Canada and international surface mail Payment in US funds; drawn on US bank or money order
- Bill me (US only) \$100 billing fee
- Name, Address: _____

Charge my: Visa MC
 Number _____ Expires _____

3 4 5 6 7 8 9 10 11 12

The Editor's Feedback:

- Computer: PET ATARI APPLE VIC-20 OSI OTHER _____
- Are you a **COMPUTE!** Subscriber? Yes No I would like to see:
- | | | | |
|--|------------------------------------|--|----------------------------------|
| <input type="checkbox"/> More <input type="checkbox"/> Fewer | Specific applications programs. | <input type="checkbox"/> More <input type="checkbox"/> Fewer | Games. |
| <input type="checkbox"/> More <input type="checkbox"/> Fewer | BASIC programs. | <input type="checkbox"/> More <input type="checkbox"/> Fewer | Reviews of game software. |
| <input type="checkbox"/> More <input type="checkbox"/> Fewer | Machine language programs. | <input type="checkbox"/> More <input type="checkbox"/> Fewer | Reviews of business software. |
| <input type="checkbox"/> More <input type="checkbox"/> Fewer | Tutorials. | <input type="checkbox"/> More <input type="checkbox"/> Fewer | Reviews of educational software. |
| <input type="checkbox"/> More <input type="checkbox"/> Fewer | Educational articles. | <input type="checkbox"/> More <input type="checkbox"/> Fewer | Reviews of hardware. |
| <input type="checkbox"/> More <input type="checkbox"/> Fewer | Detailed explanations of programs. | <input type="checkbox"/> More <input type="checkbox"/> Fewer | |

What do you like best about **COMPUTE!**?
 What do you like least?

3 4 5 6 7 8 9 10 11 12

SELECTED EDP REPORTS

Characteristics, prices, user evaluations, comparisons

- All About Personal Computers \$29
 User Ratings of Computer Systems \$25
 European User Ratings of Computer Systems \$25
 Word Processing Systems User Ratings \$15
 All About 278 Small Business Computers \$15
 All About 246 Minicomputers \$15
 All About 149 Microcomputers \$15
 All About 114 Microprocessors \$25
 User Ratings of Proprietary Software Packages \$15
 A Buyer's Guide to Data Base Management Systems \$15
 All About 136 User-Programmable Terminals \$15
 All About 210 Alphanumeric Display Terminals \$15
 All About Data Communications Facilities \$15
 Management Guidelines for Office Automation \$15
 All About 90 Word Processing Software Packages \$15
 All About 125 Teletypewriter Terminals \$15
 All About 400 Modems \$15
 All About Winchester Disk Drives \$19
 All About 150 Word Processors \$19
 Directory of Nearly 1000 Suppliers \$25
- Check enclosed Bill me, add \$3.25 handling.
- State _____ Zip _____
- City _____
- Address _____
- Phone _____
- Company _____
- Title _____
- Name _____
- YES Please send me the EDP Reports I have checked.

Personal Computers Only \$29

All About _____

Newly updated for 1981 — the industry's first unbiased, objective report on the 18 most popular personal computers.

Datapro's latest report — **All About Personal Computers** — provides valuable information that will help you compare and evaluate 18 of the most popular personal computers including five new systems — Bell & Howell Microcomputer System, Commodore VIC 20, Hewlett-Packard 83 — Radio Shack's TRS-80 Model III and TRS-80 Color Computer. Over 66 fact-filled pages in a convenient standardized format let you easily compare data on models, capabilities, configurations and applications, popular options, warranties, retail availability, and discounts. In addition, you'll find detailed characteristics of each major peripheral and software product the vendor provides for his system.

All About Personal Computers also contains extensive directories on nearly 200 software vendors, over 300 peripheral equipment vendors, 34 system vendors, and 19 periodicals dedicated to users of personal computers. Tracks their development details. The report also defines personal computers, tracks their development details at future trends.

If you are considering buying a personal computer — for home entertainment or work — you owe it to yourself to save time and money. Compare the 18 most popular in **All About Personal Computers**. Available for only \$29.

18 MOST POPULAR PERSONAL COMPUTERS

Apple II & Apple II Plus	Hewlett-Packard 83
Atari 400 & 800	Hewlett-Packard 85
Bell & Howell	Mattel Intellivision
Commodore PET	North Star Horizon
Commodore VIC 20	Ohio Scientific
Exidy Sorcerer	Ohio Scientific
Health All-In-One	Challenger I
Health II	Challenger II
Computer	Radio Shack TRS-80
	Model I
	Model II
	Model III
	Radio Shack TRS-80
	Color Computer
	Texas Instruments
	99/4 Home Computer

YES Please send Datapro's \$29 report **All About Personal Computers**

Check enclosed Bill me, add \$3.25 handling

City _____ state _____ zip _____

address _____

company _____ phone _____

name _____ title _____

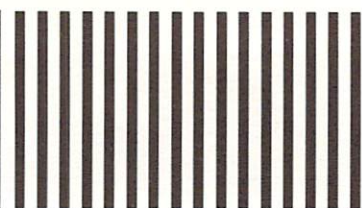
FREE with this report, Datapro's latest catalog of feature reports on EDP and office systems, selected from our monthly updated information services



datapro DATAPRO RESEARCH CORPORATION
 1805 Underwood Blvd., Denville, NJ 08075



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

COMPUTE! Magazine
Post Office Box 5406
Greensboro, NC 27403



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS / PERMIT NO. 178 / DELRAN, NJ



POSTAGE WILL BE PAID BY ADDRESSEE

datapro

DATAPRO RESEARCH CORPORATION
1805 Underwood Boulevard
Delran, New Jersey 08075



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS / PERMIT NO. 178 / DELRAN, NJ



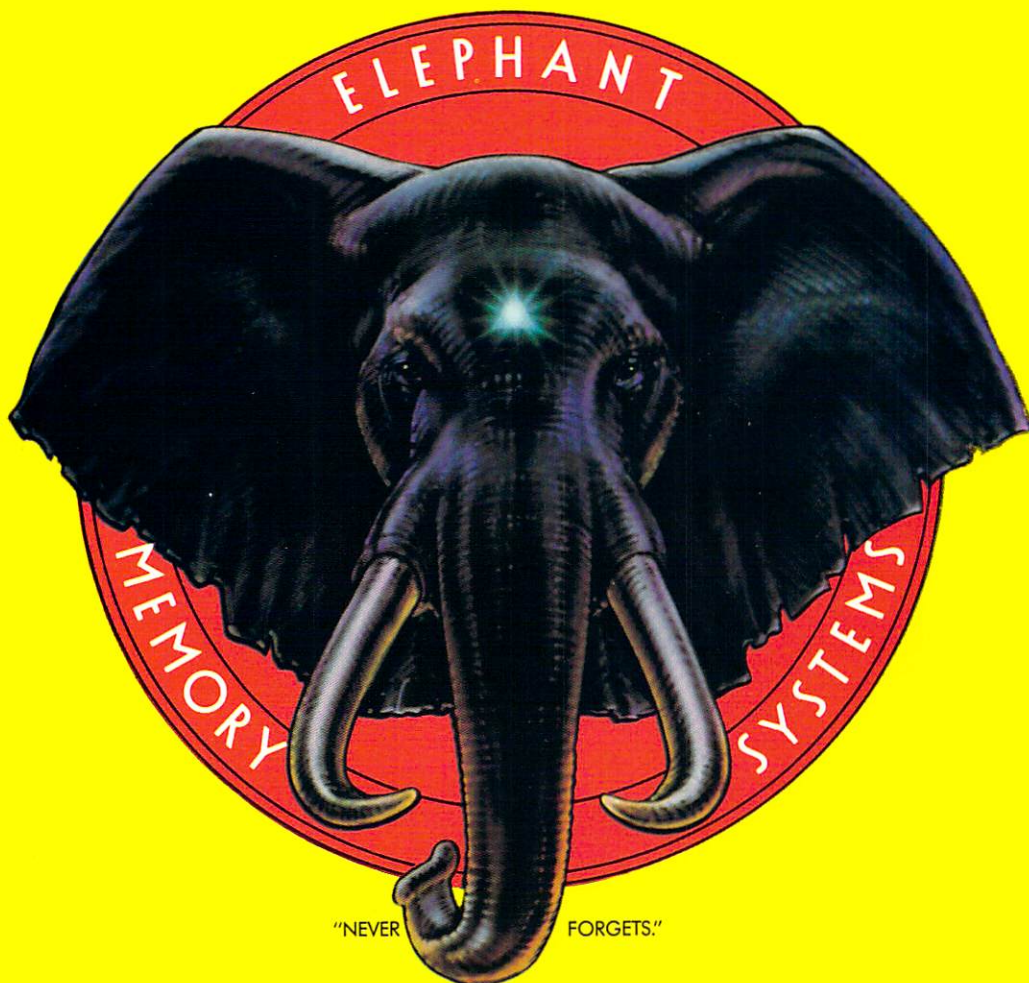
POSTAGE WILL BE PAID BY ADDRESSEE

datapro

DATAPRO RESEARCH CORPORATION
1805 Underwood Boulevard
Delran, New Jersey 08075

COMPUTE!3/82

REMEMBER.



Elephant™ floppies. They're guaranteed to meet or beat every industry standard for quality. They come standard with reinforced hub rings at no extra cost. They come in every popular 5¼" model, in both hard and

soft sector. And they sell at some of the lowest prices in the business. Elephant Flexible Disks. They're heavy duty. They work for peanuts. They never forget. Get yourself a trunkful.

HEAVY DUTY DISKS.

Distributed Exclusively by Leading Edge Products, Inc., 225 Turnpike Street, Canton, Massachusetts 02021
Call: toll-free 1-800-343-6833; or in Massachusetts call collect (617) 828-8150. Telex 951-624.

VIC-20

The Friendly Computer

\$299.95



- Full Computer Keyboard
- 16 Colors/4 Sound Generators
- 66 Graphics Characters
- Memory Expansion to 32K RAM
- Includes Microsoft™/PET® BASIC
- Connects to TV or Monitor
- Recreation, Education & Personal Computing Programs
- Peripheral Equipment: Joystick, Paddles, Disk Drive, Printer, Cassette unit
- Telephone Modem for Communicating with outside Information Sources
- 4 Programmable Function Keys

For more information on the VIC-20's exciting
Space Games, Personal Software, and Programming capabilities,
visit your Commodore Dealer, or write:

VIC-20, Commodore Business Machines, 681 Moore Road, King of Prussia, PA 19406

 **commodore**
COMPUTER