

# 80 micro

the #1 magazine for Tandy users

NOVEMBER 1986  
USA \$4.00  
CANADA \$4.50  
A CWCPI PUBLICATION

Also Inside:

The Art of Programming

The Next Step

Public Works

New Products

## THE WELL-TRAVELED PROGRAMMER

All Roads Don't  
Lead to Basic

Build Your Own  
1000 Light Pen  
For Just \$18!

**BENCHMARKS!**  
The 8087 and V20:  
Do They Really  
Speed Things Up?

Dave's MS-DOS Column:  
How to Disable  
The Hold Key



80micro

11/86

#82

A



# Run Big Spreadsheets, Manage Large Data Bases, Process More Words

## With MASTER/CARD And Your Tandy 1000.

MASTER/CARD expands your Tandy 1000's memory, plus gives you needed features such as a serial communications port, battery powered clock calendar and four useful utility programs.

### RAM EXPANSION

MASTER/CARD is available in 512K and 1 Megabyte versions. All MASTER/CARDS are designed to be expanded. Memory options let you go to the 32 megabyte limit. That's all the memory work space you will need for today's and tomorrow's more powerful software.

MASTER/CARD includes the Direct Memory Access (DMA) controller for proper memory management and is compatible with Tandy's MEMORY PLUS board and other memory expansion boards.

### SERIAL PORT

Standard RS232C serial communications port lets you connect a serial printer, mouse, modem or other serial device to enhance your system. The port is configured as COM1, COM2, or disabled for optimum system usage.

### CLOCK/CALENDAR

This feature automatically sets your computer to the correct time and date each time you boot up. Now, you can take advantage of software dating features automatically.

### UTILITY SOFTWARE

RAM DISK — You can create a high-speed, electronic disk of up to 768K for instant memory access without disk drive delays. Programs run faster. RAM disks can

be installed above the DOS 640K limit. And back banked memory is not destroyed on a warm re-boot of the system.

PRINT SPOOLING — You can create print buffers that hold up to 256K of data being sent to a printer. You can then go on to other computing tasks while the buffer empties. Buffer memory can be assigned above the 640K DOS limit.

MEMORY MANAGEMENT SOFTWARE — Enhanced memory management features let you address up to 32 megabytes of memory.

EMS EMULATION SOFTWARE — Supports the use of emerging software memory expansion standards.

MASTER/CARD prices begin at \$395.00

Call **1-800-543-2233**  
inside California (805) 684-5464.

### EXPANSION CHASSIS NOW AVAILABLE

**AFC** Automation Facilities Corporation  
6383 Rose Lane, Carpinteria, California 93013  
(805) 684-5464



# Did you know? Only one spelling checker:

- works with both Scripsit and Superscriptsit.
- integrates with all other popular word processing programs as well.
- requires *no special document placement!* Even runs on a single drive system.
- displays its dictionary so that you can find the correct spelling of words.
- offers integrated Hyphenation Option and Grammar & Style checker.

# Electric Webster

**SPELLING CHECKER • AUTO-HYPHENATION • GRAMMAR CHECKER**

**Displays Correct Spellings:** If you don't know the correct spelling of a word, EW will look it up for you, and display the dictionary.

**Verifies Corrections:** If you think you know the correct spelling of a word, EW will check it for you before making the corrections.

**Hyphenates Automatically:** (Optional). Inserts discretionary hyphens throughout text.

**Grammar & Style Checker:** (Optional). Identifies 22 types of common errors. Makes suggested corrections with the stroke of a key. Runs within EW.

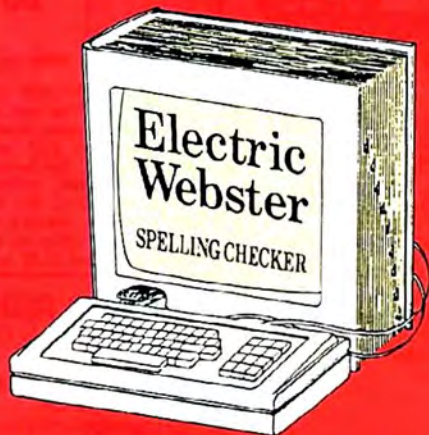
**50,000 Word Dictionary:** Uses only 2½ bytes per word; add as many words as you wish.

**Fast Correcting:** In as little as 30 seconds, Electric Webster can return you to your Word Processing program, with your text fully corrected and on your screen.

**Integrates:** with WordStar, Deskmate, Spellbinder, Volkswriter, Open Access, Allwrite, Newsprint, Lazy Writer, Superscriptsit, Scripsit, Electric Pencil, Copy Art, Powerscript, Zorlof, and LeScript (specify). Begins proofing at the stroke of a key; returns you to word processing automatically.

**When ordering, stipulate word processing program and operating system.**

**"The Cadillac"  
of spelling checkers**  
— 80 Microcomputing, 9/82



#### ACCLAIMED:

"Electric Webster is the best. Just read any review in any magazine and I don't believe that you will find even one disagreement to that statement." *CIN-TUG, Cincinnati's Users Group Mag.* 4/83

"The most helpful program I've found is Electric Webster. After looking at nine proofreading programs, I've settled on Webster." *Creative Computing* 11/83

This dictionary is not published by the original publishers of Webster's Dictionary or their successors.

Performance "Excellent"; Documentation "Good"; Ease of Use "Excellent"; Error Handling "Excellent". *Info World*, 8/82

"Electric Webster, a fantastic spelling and grammar checker." *80 Micro* 4/85

## Now see for yourself!

#### Try Before You Buy:

**F**or the second straight year, 80 Micro readers have voted Electric Webster the #1 Spelling checker. Find out for yourself how accurate, fast and easy proof-reading can be. For only the \$5 cost of postage, materials and handling, we will send you a special Electric Webster demonstration disk that works just like Webster, but proofs only half the alphabet. With it, you'll get a coupon worth \$5 towards the purchase of Electric Webster.

#### LOW PRICES:

TRS-80, Model I/III or IV	\$ 89.95
w/Correcting Feature	\$149.95
Hyphenation	\$ 49.95
Grammar & Style Checker	\$ 49.95

CP/M, PC/DOS, Model 1000/2000	
Electric Webster,	
w/Correcting Feature,	\$169.95
Hyphenation, and Grammar	

Circle 45 on Reader Service card.



# Cornucopia Software

POST OFFICE BOX 6111, ALBANY, CALIFORNIA 94706, PHONE (415) 524-8098





# PowerSoft NewsFlash #13

Thank you for reading our NewsFlash! We appreciate your support and will strive to continue to provide quality products and super support at a fair price. Write for our free catalog. *Visit us on our Compuserve™ Sig (PCS21).*

✓ *The response to our new TRSCROSS utility has been outstanding!* This product is explained in detail in our ad elsewhere in this issue, but for those that have a TRS-80, and now have a PC or compatible - *do not miss this program!* TRSCROSS allows you to read and convert your double density TRS-80 diskettes directly in your PC! BASIC programs, Superscript™, and Scripsit™ files are transferred and converted "on-the-fly" in just one pass! (And no need to re-save files in ASCII!) We have checked out our competition, and it takes *MANY* steps more than this. Also, *the competition doesn't tell you that their conversion program is written in BASIC!! We couldn't believe it!* Their conversion process is easily up to 500% slower than TRSCROSS (or more), and features less automatic BASIC conversion. TRSCROSS is the best! Just put your TRS-80 disk in your PC or compatible and read from or write directly to it! Moves files in either direction. It's easy & fast! Don't settle for second best (especially at a higher price). TRSCROSS is what you really want. The ONLY conversion/transfer utility for the TRS-80 that runs on your PC. \$89.95

**We still support the TRS-80! We carry many excellent products for it that you should know about. Below is a list of what we can do...**

✓ *Super Utility+ (or Super Utility 4/4P)* - This is the one. There is no other. This utility has been written up in every major magazine over the years as the very best set of tools you can purchase for your TRS-80. It recovers crashed disks, zaps, removes passwords, backs up "funny" disks, allows transferring of files from all kinds of other TRS-80 operating systems and much much more! 65 functions in all! FIVE Star review! \$79.95

✓ *Model 4 ToolBelt* - "The SUPER UTILITY for hard drive users". Written by the same author, it allows easy recovery and access to your data, as well as many other SUPER UTILITY type functions. Not protected. If using Mod III LDOS, order The LDOS ToolBox. Only \$49.95

✓ *PowerScript* - A major enhancement to SCRIPSIT™ (Model 4, III, or I). Allows complete control of your printer, as well as adding many new features to what you already know about SCRIPSIT™. 5 Star review! \$39.95

✓ *BACK/REST* - Our super fast "image transfer system" for backing up your Mod I, III, or 4 hard drive. Tells you how many disks you will need ahead of time, and prompts you all the way on what to do. Allows complete restoration of entire drive, or on a file by file basis. 5 star review! Only \$99.95

✓ *PowerMAIL Plus* - The very best mailing system available for the TRS-80 computer (and maybe even others). PowerMail is all machine language for FAST operation and sorts, which it will do up to 12 levels! Works on floppy or hard drives, and will handle a maximum of 92,000,000 names if you have proper storage. June '85 80-MICRO - 4 star review. \$99.95

✓ *SuperCROSS/XT* - This is similar to our new TRSCROSS program, except that it performs ALL the work on the TRS-80. Besides reading and writing PC/MS-DOS it also reads/writes most popular C/PM formats. \$99.95  
Also available - CONVERT BASIC (I/III to Mod 4 or MS-DOS) only \$29.95  
Buy both and save \$10! SuperCross with CNVBASIC only \$119.95  
*You must specify TRS-80 Model when ordering SuperCROSS or CNVBASIC.*



## PowerSoft Products

17060 Dallas Parkway, Suite 114  
Dallas, TX 75248 • (214) 733-4475

Add \$3 S/H (US) or \$10 Foreign • Prepaid orders only • TRS-80 is a trademark of the TANDY CORP.

PUBLISHER  
Peter Hutchinson

EDITOR-IN-CHIEF  
Eric Maloney

EXECUTIVE EDITOR  
Michael E. Nadeau

MANAGING EDITOR  
Marilyn G. McMaster

REVIEW EDITOR  
Jeffrey Frentzen

COPY EDITORS  
David E. Essex  
Anne Freed

TECHNICAL WRITERS  
Dave Rowell

Ryan Davis-Wright

TECHNICAL EDITORS  
Mare-Anne Jarvela

Beverly Woodbury

LOAD 80 TECHNICAL EDITOR

Keith Johnson

EDITORIAL ADMINISTRATION

Whitney Karr

ASSOCIATE EDITORS

Hardin Brothers

David Engelhardt

John B. Harrell III

Terry Kepner

Thomas L. Quindry

ADVERTISING SALES

DIRECTOR OF SALES

William J. Smith

ACCOUNT MANAGERS

Gary Ciocci

Michael Wozniak

1-800-441-4403

WEST COAST OFFICE

1060 Marsh Road

Menlo Park, CA 94025

415-328-3470

SALES MANAGER

Peter KJ Montross

ADVERTISING COORDINATOR

Judy Walker

ADVERTISING SECRETARY

Georgianna Forest

BUSINESS MANAGER

Bradford N. Dixon

MARKETING/PROMOTION DIRECTOR

Jane Butterfield



Article submissions from our readers are welcomed and encouraged. Inquiries should be addressed to: Submissions Editor, 80 Pine Street, Peterborough, NH 03458. Include an SASE for a copy of "How to Write for 80 Micro." Payment for accepted articles is made at a rate of approximately \$50 per printed page; all rights are purchased.

\*TRS-80, Scripsit, and TRSDOS are trademarks of Radio Shack, a division of Tandy Corp.

80 Micro (ISSN-0744-7868) is published monthly by CW Communications/Peterborough Inc., 80 Pine St., Peterborough, NH, 03458. Phone: 603-924-9471. Second class postage paid at Peterborough, NH, and additional mailing offices. (Canadian second class mail registration number 9563.) Subscription rates in U.S. are \$24.97 for one year, \$38 for two years, and \$53 for three years. In Canada and Mexico \$27.97—one year only, U.S. funds drawn on a U.S. bank. Nationally distributed by International Circulation Distributors. Foreign subscriptions (surface mail), \$44.97—one year only, U.S. funds drawn on a U.S. bank. Foreign subscriptions (air mail) please inquire. In South Africa contact 80 Micro P.O. Box 782815, Sandton, South Africa 2146. All subscription correspondence should be addressed to 80 Micro, Subscription Department, P.O. Box 981, Farmingdale, NY 11737. Please include your address label with any correspondence. **Postmaster:** Send address changes to 80 Micro, Subscription Services, P.O. Box 981, Farmingdale, NY 11737. Send Canadian changes of address to 80 Micro, P.O. Box 1051, Fort Erie, Ontario L2A 5N8, Canada. Return postage guaranteed.

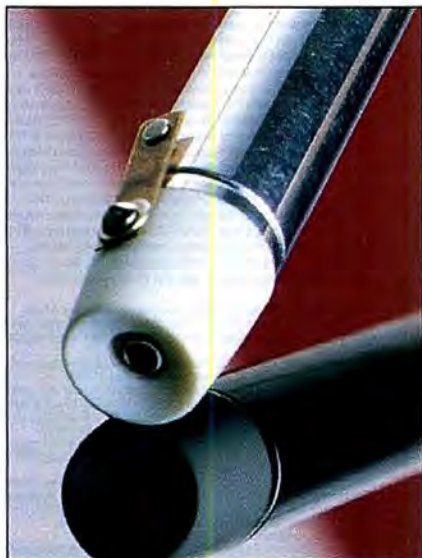
Entire contents ©copyright 1986 by CW Communications/Peterborough Inc. No part of this publication may be reprinted, or reproduced by any means, without prior written permission from the publisher. All programs are published for personal use only. All rights reserved.



page 27



page 40



page 54

## Features

- 27. **Roll Over, Beethoven** by *Bobby Ballard*  
The Music Studio: a sound investment for Tandy 1000 users.
- 40. **A Language of Choice** by *John B. Harrell III*  
An introduction to the world beyond Basic. (All systems)
- 54. **Let There Be Light Pens** by *Rod and Joyce Kreuter*  
Transform a penlight from Radio Shack into a light pen for your Tandy 1000.
- 62. **Quick Chips** by *Thomas L. Quindry*  
What you should know before installing an 8087 math coprocessor or NEC V20 chip. (Tandy 1000)
- 70. **Print No Evil** by *Debbie Cooper*  
Don't let an accidental screen-print command hang up your Tandy 1000.
- 72. **Designer Labels** by *Jacques L. Robitaille*  
Index your TRSDOS directory files. (Model 4/4P; Load 80)
- 74. **Call Me 10DD29** by *Norton C. Richardson*  
A journey to the outer reaches of the number system. (Models I, III, and 4 or the Tandy 1000 or 3000; Load 80)
- 80. **Sudden Breaks** by *Dave Rowell*  
Put the brakes on the hold, print, and break keys. (Tandy 1000)

## Departments

- |   |  |
|---|--|
| 6. <b>Load 80 Directory</b>   | 83. <b>Tidbit #38</b>  |
| 8. <b>Side Tracks</b><br>by <i>Eric Maloney</i>   | 86. <b>The Art Of Programming</b><br>by <i>Bruce Tonktn</i>  |
| 10. <b>Input</b>  | 90. <b>Public Works</b><br>by <i>Ryan Davis-Wright</i>   |
| 12. <b>Feedback Loop</b>  | 94. <b>The Next Step</b><br>by <i>Hardin Brothers</i>  |
| 19. <b>Pulse Train</b><br>by <i>Ryan Davis-Wright</i>   | 103. <b>Debug</b>  |
| 25. <b>Reader Forum</b>   | 111. <b>Express Checkouts</b><br>SmartNotes<br>Dan Bricklin's Demo Program<br>TKO<br><i>The 80286 Architecture</i> |
| 27. <b>Reviews</b><br>edited by<br><i>Jeffrey Frentzen</i><br>The Music Studio<br>The Conix Operating System<br>Multiplan 2.0<br>The Small-C Compiler<br>TSAM/BCI<br>Money Organizer Plus | 132. <b>How to Use 80 Micro Program Listings</b>   |
| 80. <b>Dave's MS-DOS Column</b><br>by <i>Dave Rowell</i>  | 140. <b>New Products</b>   |
|   | 156. <b>Fine Lines</b>   |

# LOAD 80

**L**oad 80 gathers together selected programs from this issue of *80 Micro* and puts them on a magnetic medium for your convenience. It is available on tape or disk, and runs on the Models I, III, and 4.

Load 80 programs are ready to run, and can save you hours of time typing in and debugging listings. Load 80 also gives you access to Assembly-language programs if you don't have an editor/assembler. And, it helps you build a substantial software library.

Using Load 80 is simple. If you own a tape system, load the Load 80 tape as per the in-

structions provided. If you own a Model I or III disk system, you boot the Load 80 disk and transfer the files to a TRSDOS system disk according to simple on-screen directions. If you own a Model 4, copy the Model 4 programs from the Load 80 disk to your TRSDOS 6.x disk using the COPY command.

Not all programs will run on your system. Some Model III programs, for instance, will run on the Model 4 in the Model III mode, but not in the Model 4 mode. You should check the system requirements box that accompanies the article to find out what system configuration individual programs require.

If you have any questions about the programs, call Keith Johnson at 603-924-9471. Yearly subscriptions to Load 80 are \$199.97 for disk, or \$99.97 for cassette. Individual loaders are available on disk for \$21.47 or on cassette for \$11.47, including postage. To place a subscription order, or to ask questions about your subscription, please call us toll free at 1-800-343-0728 between 9 a.m. and 5 p.m. Or, you can write to Load 80, 80 Pine St., Peterborough, NH 03458.

## Directory

### Directory Index

Article: Designer Labels (p. 72).  
System: Model 4, 64K RAM;  
ALDS editor/assembler  
(optional).

Write your own index to replace the cryptic TRSDOS directory.

Language: Assembly.  
Cassette filespec: INDEX.  
Disk filespecs: INDEX/SRC,  
INDEX/CMD.

### Base Changes

Article: Call Me 10DD29 (p. 74).  
System: Models I, III, and 4;  
32K RAM.

A base-conversion program that converts to and from any base within the range of 2 to 201.

Language: Basic.  
Cassette filespec: B.  
Disk filespec: BASECHNG/BAS.

### TRSDOS Commands

Article: The Next Step (p. 94).  
System: Model 4, 64K RAM;  
Pro-Create 4.3a editor/assembler  
(optional).

Keep up to 10 TRSDOS commands in memory.  
Language: Assembly.  
Cassette filespec: CLEB.  
Disk filespecs: CLEB/ASM,  
CLEBMAC/ASM, CLEBDEF/

ASM, CLEBFN1/ASM, CLEB-  
FN2/ASM, CLEBNST/ASM,  
CLEB/CMD.

### Checksum

Article: How to Use *80 Micro*  
Program Listings (p. 132).  
System: Models I, III, and 4;  
32K RAM.

Use our checksum program to check the accuracy of the Basic listings you type in.

Language: Disk Basic.  
Cassette filespec: D.  
Disk filespec: CHECKSUM/BAS.

### Loc-Editor

System: Models I and III; 32K  
RAM.

A program that finds errors for you.

Language: Disk Basic.  
Cassette filespec: C.  
Disk filespec: LOCEDITR/BAS.

### Bonus Program

System: Model 4, 64K RAM.

A keyboard program that turns the Model 4's function keys into "sticky" shift and clear keys.

Language: Assembly.  
Cassette filespec: None  
Disk filespecs: KEYS/JCL,  
STICKEY/FLT, STICKEY/KSM,  
README/TXT.

BAS = Basic SRC, ASM = source code CMD, FLT, KSM = object code  
JCL = job-control language TXT = ASCII text file

### ART DIRECTOR

Anne Fleming

### PRODUCTION MANAGER

Lynn Lagasse

### AD/GRAPHICS PRODUCTION

Deborah Brunfield

### GRAPHIC SERVICES MANAGER

Dennis Christensen

### MANUFACTURING MANAGER

Susan Gross

### TYPESETTING SUPERVISOR

Linda P. Canale

### PRESIDENT

James S. Povec

### VICE PRESIDENT OF PLANNING AND CIRCULATION

William P. Howard

### VICE PRESIDENT/FINANCE

Roger Murphy

### ASSISTANT GENERAL MANAGER

Matt Smith

### DIRECTOR OF CREDIT SALES

AND COLLECTION

William M. Boyer

### EXECUTIVE CREATIVE DIRECTOR

Christine Destremes

### CIRCULATION MANAGER

Frank Smith

### DIRECT MARKETING MANAGER

Bonnie Welsh

### SINGLE COPY SALES MANAGER

Linda Ruth

1-800-343-0728

### AUDITS AND STATISTICS MANAGER

Susan Hanshaw

### SPECIAL PRODUCTS DIRECTOR

Jeff DeTray

### SPECIAL PRODUCTS MANAGER

Craig Pierce

### FOUNDER

Wayne Green

Cover photograph by Edward Judice

*80 Micro* is a member of the CW Communications/Inc. group, the world's largest publisher of computer-related information. The group publishes over 50 computer publications in more than 20 major countries. Nine million people read one or more of the group's publications each month. Members of the CWCI group contribute to the *Computerworld News Service*, a daily on-line service offering the latest on domestic and international computer news. Members of the group include: ARGENTINA'S *Computerworld/Argentina*; ASIA'S *Asian Computerworld*; AUSTRALIA'S *Computerworld Australia*; AUSTRALIAN *PC World*, and *Macworld*; BRAZIL'S *DataNews* and *PC Mundo*; CHINA'S *China Computerworld* and *China Computerworld Monthly*; DENMARK'S *Computerworld/Danmark*, *PC World*, and *Run (Commodore)*; FINLAND'S *Mikro*; FRANCE'S *Le Monde Informatique*, *Golden (Apple)*, *OPC (IBM)*, *Theoreme*, and *Distributique*; GERMANY'S *Computerwoche*, *Infowelt*, *PC Welt*, *Computer Business*, and *Run*; HUNGARY'S *Computerworld Informatika*; ITALY'S *Computerworld Italia* and *PC Magazine*; JAPAN'S *Computerworld Japan*; MEXICO'S *Computerworld/Mexico*; THE NETHERLAND'S *Computerworld Netherlands* and *PC World*; NORWAY'S *Computerworld Norge* and *PC Mikrodats*; SPAIN'S *Computerworld Espana*, *PC World*, and *Commodore World*; SWEDEN'S *ComputerSweden*, *Mikrodatorn*, and *Svenska PC World*; SWITZERLAND'S *Computerworld Schweiz*; THE UNITED KINGDOM'S *Computer News*, *PC Business World*, and *Computer Business*; VENEZUELA'S *Computerworld Venezuela*; THE U.S. *Amiga World*, *Computerworld*, *InCider*, *InfoWorld*, *MacWorld*, *Micro Marketworld*, *PC World*, *Run*, *80 Micro*, *Focus Publications*, and *On Communications*.

*Problems with Subscriptions:* Send a description of the problem and your current and/or most recent address to: *80 Micro*, Subscription Department, P.O. Box 981, Farmingdale, NY 11737.

*Problems with Load 80 Circulation:* Address correspondence to Load 80, 80 Pine St., Peterborough, NH 03458.

*Problems with Advertisers:* Send a description of the problem and your current address to: *80 Micro*, Rt. 101 & Elm Street, Peterborough, NH 03458, ATTN.: Rita B. Rivard, Customer Service Manager. If urgent, call 1-800-441-4403.

*Change of Address:* Send old label or copy of old address and new address to: *80 Micro*, P.O. Box 981, Farmingdale, NY 11737. Please give eight weeks advance notice.

*Microfilm:* This publication is available in microform from University Microfilms International, United States address: 300 North Zeeb Road, Dept. P.R., Ann Arbor, MI 48106. Foreign address: 18 Bedford Row, Dept. P.R., London, WC1R6EJ, England.

*Dealers:* Contact Kathy Boghosian, Retail Sales Manager, *80 Micro*, Pine St., Peterborough, NH 03458, (800) 343-0728.



★ ★ ★ ★ ★  
**80 MICRO**  
**JUNE, 1985**  
 Easy to use: ★ ★ ★ ★ ★  
 Good docs: ★ ★ ★ ★ ★  
 Does the job: ★ ★ ★ ★ ★  
 Big free:

**CAMEO**

ROMAN

Nostalgia

LOMBARDIAN

Pump

celtic

Playbill



OUTLINE

Pretorian

CHAINED

SHADOW

Chancery Medium

POKER

HANUKAH

BACKLITE  
BUCKLE

Rotunda

REVUBAN

Calligraphy

Wide English

INCISED TRAJAN

BELLS

CITY

Mini Cubes

Small Boldface

XMAS

USA

CLIMBING

Small Bold Italics

MOON LITE

DOTWRITER

Circle 91 on Reader Service card.

DOTWRITER printed these on an Epson MX-80.

# See What You Can Do With DOTWRITER!

**D**OTWRITER lets you create spectacular, eye-catching signs, invitations, letterheads, large sideways banners, catalogs, or even books. It is just what you need to turn your dot-matrix printer into a versatile typesetting machine. And it is available for your TRS-80 Model 4/4P (yes, in native mode), as well as for the Models I and III.

## WHAT IS DOTWRITER?

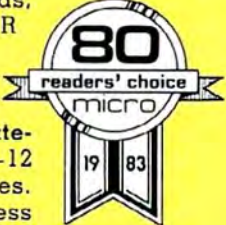
**D**OTWRITER uses the "bit-image" graphics of your printer to produce the kinds of stunning results shown inside the box. It is a full-function text printing program, so you can inter-mix different character sets, do centering, paragraphs, pagination, magnification, draw horizontal and vertical lines, reversals (black on white), and even print right-justified proportional text.

DOTWRITER includes the printing program, complete documentation, and fourteen useful typefaces (60 to 90 characters per typeface). We will include the 170-page Letterset Reference summary at half-price (\$10.00) with your order.

To use DOTWRITER, just write your text with any popular TRS-80 Word Processor (such as ALLWRITE or

SuperScripts), add the necessary formatting commands, and DOTWRITER will do the rest.

36 more letter-set disks are available separately. Each has 3-12 complete typefaces. The disks cost less than \$25 each and you may purchase them at any time.



## SIDWAYS SPREADSHEETS

**I**f your VisiCalc spreadsheets are too wide for your printer, our "LONGVIEW" option may be just what you need. It is an add-on that turns spreadsheets sideways so that DOTWRITER can print them down the page instead of across. LONGVIEW comes with three additional fonts.

## EQUIPMENT REQUIREMENTS

DOTWRITER needs a TRS-80 I, III, 4 or 4P with 2 disk drives and 48K of memory. Separate versions of DOTWRITER support EPSON MX-80 with Graftrax, MX-100 with Graftrax-Plus, and FX, JX, RX; C. ITOH 8510/1550; MICROLINE 84-2/92/93; RADIO SHACK DMP 110-2100/CGP-220; GEMINI 10X/15X and other STAR printers.

We printed our samples on an Epson; sizes may vary on other printers. Many of the fonts shown above are available at extra cost.

**S**end for free print samples! We've only shown you a few of the 240 DOTWRITER fonts. For the best in TRS-80 graphics printing, we suggest you order DOTWRITER today, toll-free.

<b>Please specify Printer and Computer when ordering.</b>	
DOTWRITER	\$99.95
LONGVIEW	29.95
Additional Letterset disks (3-12 fonts/disk)	24.95
	3 for 49.95
Letterset Reference Book	20.00
<b>FREE bonus disk with two Banner fonts when you order DOTWRITER!</b>	

ORDER NOW, TOLL-FREE  
 (800) 824-7888, oper. 422

**PROSOFT**

Dept. C, Box 560, No. Hollywood, CA 91603  
 (818) 764-3131 Information and Same-Day Processing

TERMS: VISA, MC, checks, COD. Please add \$3.00 shipping in U.S. or Canada. Sales tax in CA. Most orders filled within one day.

# Tandy's New Brood

I usually don't comment on new products until I've had a chance to use them for a while. But then, Edgar Rice Burroughs wrote his Tarzan books without ever setting foot in Africa, so what the heck.

The products are, of course, the computers Tandy introduced in New York July 30. The day was probably the most important for Tandy since it introduced the Model I in 1977, climaxing nearly three years of struggle to regain its position in the microcomputer market.

I've often been critical of Tandy's marketing strategies, but the company seems to have hit the mark this time. Though the three machines have a few peculiarities to ponder, they nicely fill out Tandy's MS-DOS line, with something for nearly every segment of the market: The 1000 EX for school and home use, the 1000 SX for serious home use and small businesses, and the 3000 HL and 3000 HD for small-to-large businesses.

The \$1,199 1000 SX will most likely be the bread-and-butter machine. It appears to be an improvement over the original 1000, with two disk drives, a faster clock speed, two more slots, more memory, and MS-DOS 3.2. This is a straightforward upgrade of a successful machine, with no real surprises in evidence; look for it to stimulate little excitement but clean up in the clone market.

The \$799 1000 EX is a bit puzzling. The all-in-one design, similar to the Color Computer's, makes sense given the machine's targeted environment. Schools don't like computers with lots of components begging to be stolen or damaged. But the system is no bargain compared to the SX. Once you upgrade the EX to match the SX in features, you've spent the same amount of money and have considerably less expandability.

If you have no need for more than 128K, won't run software that requires the direct-memory access (DMA) chip, and don't care about a second drive, the EX might be adequate, but most people will look more seriously at the SX.

The 3000 HL offers another poser. Tandy is promoting the system as an IBM PC/XT compatible meant to replace the 1200, yet the machine has an 80286 CPU, the same microprocessor used by the IBM PC/AT and Tandy 3000. Depending on your perspective, the 3000 HL could be either a supercharged XT or



a stripped-down AT. In any case, the system seems to fit snugly between the 1000 SX and the 3000.

## Who Are Those Guys?

The response of the industry has been as intriguing as the computers. Publications, analysts, and software developers have taken a renewed interest in Tandy. The company's reemergence from the black swamps of obsolescence is one of the few notable events in the microcomputer marketplace in recent years. I'm reminded of that moment in *Butch Cassidy and the Sundance Kid* when Butch peers out at the bounty hunters who have been doggedly pursuing them for days and asks, bewildered, "Who are those guys, anyway?"

Of course, two major questions still loom. First, are the machines any good? And second, will anyone buy them?

I don't want to speculate on the quality of the hardware until we've had a chance to run the systems through their paces. (Overt plug for *80 Micro*: Unlike some other magazines, we won't disguise a product preview as a review. Believe it or not, some publications will actually evaluate a machine without having used it.)

However, our experience is that Tandy rarely sells bum hardware, especially when the hardware is a refined version of an old product. Furthermore, Tandy has demonstrated a willingness to listen to customer complaints and modify future versions of its products accordingly. Unless Tandy's engineers have done something incredibly stupid, the new systems should meet expectations.

The second question is simple to an-

swer: Yes. The SX will pick up where the original 1000 left off as Tandy's all-purpose clone. The EX should do fairly well in the schools. The HL should be a more-than-adequate replacement for the 1200, appealing to businesses that want a bit more than an 8088 machine offers.

(The jury's still out on whether Tandy can compete with IBM in the Fortune 1000 arena, although they're pursuing that market aggressively.)

Whatever problems Tandy might now face with its new entries, the company no longer has to field questions about whether it can regain its position in the marketplace. The comeback is complete. The only issue remaining to be resolved is how much more of IBM's market share Tandy can chip off over the next year. I'm guessing a lot.

In the meantime, expect us to give all three computers a long, hard look. Our technical writers Dave Rowell and Ryan Davis-Wright flew to Fort Worth in August to take the machines apart, and their report will appear in December. We'll also give the computers thorough reviews in the coming months.

## The Model 4/1000?

Every once in a while a reader will write asking why no one has developed a Model 4 emulator board for the 1000. Our response has been that there isn't a market for such a product.

But times have changed. The number of 1000s has increased significantly. Furthermore, the number of Model 4 owners who also have a 1000, or who are considering buying one, is substantial.

Several third-party manufacturers have expressed an interest in developing a Model 4 board, and have gone so far as to say that such a board could be sold for under \$100. At this price, a Model 4 emulator would probably sell in enough volume to be a worthwhile venture.

Of course, some people will wonder why on earth anyone would want to run TRSDOS-based software on an MS-DOS machine. But despite the fact that the venerable TRS-80 is well past its prime, it is served by a large base of good, proven software that many people are reluctant to abandon. A Model 4 emulator would be an inexpensive solution for these folks, letting them use their old software and data files while they move into the MS-DOS world. ■

# ♥ Your family will love your new secretary

**Allwrite!**  
T.M.

You'll love your Allwrite Word Processor from Prosoft. It's like having a personal secretary at home and in your growing business, and it saves time, too.

- Reads 10 printed pages from a disk in SIX SECONDS.
- Does a global search-and-replace in under FOUR SECONDS.

Allwrite makes it easy for you to produce top-quality, professional letters and reports. Teachers can use it to generate multiple choice exams and answer keys. (Ask us for free instructions when ordering.) Your kids will write better term papers and reports because Allwrite easily handles footnotes, table of contents, and indexes. That's why your whole family will love Allwrite!

## It's the premier word processor for the TRS-80

"Allwrite is a professional system that sets a new standard in word processing. It's powerful and easy to learn and use. . . 4-1/2 star rating."—**80 Micro**, November, 1984.

"With its speed, power, and comprehensive features, Allwrite makes an impressive argument for keeping your TRS-80 instead of buying into the 16-bit marketplace. . . check-rated Best Buy."—**Consumer Guide, 1986 Computer Buying Guide.**

## ALLWRITE helps reduce errors

ALLWRITE quickly flags formatting errors. Its Preview feature shows page breaks and where you forgot to turn off underlining, boldface, etc. It gives you more time to improve the quality of what you want to say.

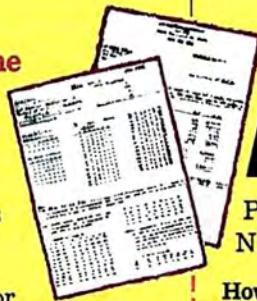


## Superb State-of-the-Art File Handling

- No upper limit on document size—chain chapters and disks together.
- Switch between chained files in six seconds, safely!
- Include stock paragraphs when printing.
- Never lose a file! Skips bad sectors, reads the rest, shows you where lost text belongs.

## Easy to learn, reduces typing time

- Store up to 22 phrases/commands at a time.
- Cue Card templates fits on keyboard.
- Natural English commands: "CE" for "Center", "Search" for "Search".
- 50 on-line HELP screens.
- Includes beginner's tutorials, hundreds of examples.
- Learn Advanced topics only when you need them.



- Comprehensive Index (over 1,000 references).
- Works with all major DOS's on Models I, III, 4, 4P, and 4D.

## Unmatched customer support

Perhaps the best reason for using Allwrite is the friendly, expert support available from Prosoft. We've supported the TRS-80 since 1980 and have worked with computers since 1962.

**Order Now, TOLL FREE**  
**1-800-824-7888**  
OPERATOR 422  
For technical information and fastest shipping, call: (818) 764-3131

**\$199.95**

Circle 30 on Reader Service card.

**PROSOFT**

P.O. Box 560  
N. Hollywood, CA 91603



### How to Order:

Please specify computer (TRS-80 Model I, III, or 4, 48K, at least two disk drives), and your printer(s). Price includes normal shipping in U.S. and Canada. The sooner you order, the sooner you will begin to benefit from the ALLWRITE! Word Processor.

Terms: VISA, MasterCard, checks, C.O.D. Please add sales tax in California.

## Portable Fantasies

I read Eric Maloney's July Side Tracks column with interest (Woof!, p. 8). Replacing the portable typewriter with a computer/word processor/type-writer is the land of opportunity for laptop makers.

The market consists of the same people who have used portable typewriters for the last half-century or longer: students, writers, journalists, lawyers, and others who need to move their typewriters around a lot. To serve such a market, the machine I foresee should have, as a minimum, the following things: a letter-quality printer (as do the \$200-\$300 daisy-wheel typewriters); 256K expandable memory; one 5 $\frac{1}{4}$ -inch drive and a second optional one; ROM-based software for communications, filing, a spreadsheet, a calendar, Basic, and moderately sophisticated word processing; built-in parallel and serial ports; an optional modem; and full MS-DOS compatibility.

Word processing is among the most-used features of home and small-business computers and the portable typewriter has obviously seen long-term success. Why, given such facts, haven't computer manufacturers combined these features?

Clark S. Spalsbury Jr.  
Grand Junction, CO

## Stardate 06.02.01

Has anyone mentioned the fact that someone at Logical Systems must be a "Star Trek" fan? On cylinder zero, sector 4 of the TRSDOS 06.02.00 to 06.02.01 upgrade disk is the message, "Shut her down, Scotty, she's sucking mud again!"

A.M. Eckard  
Port Golden, NJ

## Feedback Feedback

Why in Feedback Loop do you choose questions that probably apply to 2.17 (not percent) of your readers?

Surely you could write back to people with the answers. Must I endure reading why someone's modified Model I with Percom disks and the Joe Smith Expansion Interface is having trouble printing a Greek letter on an Odaka printer while running some long-lost word processor?

I'm not saying you never print interesting or helpful answers: I am suggesting there are rather few.

Charles R. Hague  
Stockton, CA



## Logical And Tricky

Harry Bee's "Breaking Away" (July 1986, p. 78) gives a fancy method of using And to determine whether an integer is odd or even, but beware of the hidden hazards in his method. Using the percent symbol (%) automatically converts a noninteger entry to an integer, but it must be between -32,768 and 32,767 or you'll get an "Overflow in 20" message.

Even if you delete the % in lines 20 and 30, you'll get an "Overflow in 30" message if integer input isn't within the same limits. I'll use Harry's unfancy but accurate first program and delete the %.

Robert B. Caldwell  
Sunnyvale, CA

## Smart Shopper

Jeff Joseph's comment comparing the value of a Tandy 1000 with that of a Model 4D is misleading (July 1986, p. 12).

Mr. Joseph bought a 4D for \$839 through an 80 Micro advertiser and claims an equivalently equipped 1000 (with two drives, monochrome monitor, and RS-232 serial port) costs \$1,450.

It's misleading to compare the 4D discount price with the 1000 list price. An 80 Micro advertiser lists a 1000 with a monochrome monitor for \$759. A good shopper can find an RS-232 serial port

80 Micro's BBS is open 24 hours a day. It offers programs you can download, special-interest groups, and a classified section. You can reach the board at 603-924-6985; UART settings are 300/1,200 baud, 8-bit words, 1 stop bit, no parity.

for \$27 and an extra disk drive for \$79, bringing the discount price for the 1000 to \$865.

If you add 64K to the 4D (the 1000 has 128K) and CP/M Plus, which Mr. Joseph claims is its "greatest asset," the 4D's discount price goes up to \$1,031.

Ronald P. DiVecchia  
Watertown, MA

## Conflicting CP/M Prognoses

Ed Joyce is right about CP/M's comeback ("CP/M Lives!" August 1986, p. 34). Since Radio Shack is pulling back support of its TRSDOS line, perhaps 80 Micro and its readers will take a more serious look at CP/M.

You'll do a service to your Model III and 4 readers—and lead them into the future of 8-bit computing—by devoting the attention to CP/M that you have to TRSDOS.

Bennett D. Shulman  
Lansing, MI

Sure, CP/M has been around a long time, but so has the Model T Ford.

CP/M software is awkward, largely undocumented, and lacking the fine points that would make it a real contribution to the art of programming today. I've seen nothing better than TRSDOS 6.2, and that includes MS-DOS (Mess DOS), CP/M, and any other DOS that uses backward commands.

William McMullan  
Bastrop, LA

## Disagreeing on MS-DOS

Regarding Raul Crudele's July 1986 letter ("MS-DOS Haters Unite!" p. 12): I "graduated" from DOSPLUS to MS-DOS on my Tandy 1000 and was at first saddened by the loss of several familiar and well-liked commands. At the same time, I find that the larger memory and the base of public-domain and shareware software more than make up for the loss. I've found no feature that isn't available via some external or resident utility.

At least MS-DOS isn't AppleDOS.

Barry Erick  
Dallas, PA

Send your correspondence to Input, 80 Micro, 80 Pine St., Peterborough, NH 03458. We reserve the right to edit letters.

# TRANSFER ANY MOD I/III/4 FILE CONVERT BASIC PROGRAMS for use on the IBM PC, XT, AT and all compatibles

**Conv3toPC V2.0** "Convert Mod I/III to PC package." \$139.95 Includes Hypercross Mod I/III to TRANSFER any Mod I/III file or BASIC program to a PC/MS-DOS Diskette, and Cnv3toPC.BAS to CONVERT 95% or more of each transferred BASIC program to PC BASIC syntax. Mod I's need a "disk doubler" to run Hypercross.

**Conv4toPC V1.0** "Convert Mod 4 to PC package." \$139.95 Includes Hypercross Mod 4 to TRANSFER any Mod 4 file or BASIC program to a PC/MS-DOS Diskette, and Cnv4toPC.BAS to CONVERT 95% or more of each transferred BASIC program to PC BASIC syntax.

**Our customers say we're the best!**

*"..Conv3toPC is one of the best packages  
I have ever used. It has saved me months of work!"*

Montevallo, AL

*"..Conv4toPC is the best conversion package  
I ever used. Very little re-write required."*

Plaistow, NH

Important note: Every converted BASIC program will require some user editing (the 5% or less) before it will run on a PC. To facilitate such revisions, every keyword that may need manual attention is flagged and our user guides explain why and what needs to be done. For most programs, a casual knowledge of BASIC is sufficient to make the changes. However, if a BASIC program contains machine language, it will be extremely difficult for the average user to handle some of the necessary manual revisions!

Please feel free to call us if you have any questions or doubts about whether these packages are right for you. We will candidly answer all your questions and send you our free demo disk (\$2.00 for S/H). Or, order either package; read through the entire user guide for complete details; then, if you decide it doesn't suit your needs, return it for a full refund—less a \$10.00 restocking fee. Refunds will NOT be granted if the sealed bag containing the program diskettes has been opened!

## OTHER EMSI SOFTWARE

<b>Conv3toPC V2.0</b> (Complete)	\$139.95	<b>MACH2 NEW!!</b>	\$69.95	<b>TWIN Spreadsheet</b>	\$109.95
<b>Cnv3toPC.BAS</b> (No Hypercross)	\$99.95	A tool chest of routines that do for PC BASIC what Rosenfelder's fantastic BASIC FASTER AND BETTER did for Mod III BASIC.		Lotus 1-2-3 (TM) Clone with better graphics for a fraction of the cost.	
<b>Conv4toPC V1.0</b> (Complete)	\$139.95	<b>QuickBASIC V2.0</b>	\$79.95	<b>TAS-Plus</b>	\$68.95
<b>Cnv4toPC.BAS</b> (No Hypercross)	\$99.95	Compile PC BASIC programs for speed and enhanced functions.		Relational PC Data Base plus 4th Generation Language, Screen Painter, Program Generator, Report Writer, Source Code Editor, AND Runtime Compiler. A real bargain!!	
<b>HYPERCROSS MOD I/III</b>	\$49.95	<b>RAMDISK</b>	\$44.95	<b>PROGRAMMING LANGUAGES</b>	\$39.95
<b>HYPERCROSS MOD 4</b>	\$49.95	Create superfast pseudo disk drive (eg. 90K RAM drive C: and still have 60K for BASIC on a 256K PC).		Become proficient in other popular PC languages: Utah COBOL, FORTRAN, PASCAL or PILOT. Also Utah EDIT (a full screen editor).	
<b>CROSS REFERENCE</b>	\$24.95	<b>NORTON UTILITIES V3.1</b>	\$69.95	\$39.95 each.	
For PC BASIC programs. Referenced variables, line #s, keywords.		Industry standard for directory & file recovery. Also, modify file attributes, search/sort directories etc, etc.		<b>FRACTION CALCULATOR</b>	\$24.95
<b>FASTSORT</b>	\$24.95	<b>FASTBACK</b>	\$129.95	Solve mixed number arithmetic problems on your PC. Exact common fraction answers without decimals. Instruction mode great for children.	
Machine language SORT callable from PC BASIC. Excellent replacement for Mod III CMD "O" command.		Performs 10 Meg hard disk backup on floppies in 8 minutes!		<b>LOGIC and DEDUCTION</b>	\$24.95
<b>ISAM ROUTINES</b>	\$64.95	<b>DoubleDOS</b>	\$44.95	Full color Mastermind game for the PC to challenge any age. Play 1-5 columns, 2-5 colors, direct or indirect hints. Have fun while improving your powers of deductive reasoning. Requires color monitor/adaptor.	
Use these routines in PC BASIC programs. Provides keyed access to random files & all file maint.		Load, run, toggle between two programs concurrently.			
<b>PEEKs 'N POKES</b>	\$39.95	<b>DISK OPTIMIZER</b>	\$44.95		
Utilities for PC BASIC programmers. Call for details, or see Oct. 86 review in <i>80 Micro</i> .		Improves hard disk performance by consolidating files.			
<b>INSIDE TRACK</b>	\$59.95				
More utilities for PC BASIC programmers. Call for details, or see Oct. 86 review in <i>80 Micro</i> .					
<b>EZ BASIC WINDOWS</b>	\$34.95				
Add windows to your PC BASIC programs for that professional touch. No royalties! Features—Save, Restore, Clear, Scroll Up/Down, Erase End of Line/Screen, etc.					

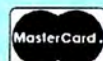
**800-922-0786**

(NJ residents 201-879-5982)

Prices subject to change without notice.

# EDUCATIONAL MICRO SYSTEMS, INC.

PO Box 471, Chester, New Jersey 07930



EMSI direct order terms: VISA, Mastercard, MO, check or COD. Add \$3.00 shipping/handling. Add \$1.90 for COD. Foreign or first class, add first class postage (package wt. 2 1/2 lbs.). NJ residents add 6% sales tax.

Send your questions or problems dealing with any area of Tandy/Radio Shack microcomputing to Feedback Loop, 80 Micro, 80 Pine St., Peterborough, NH 03458. Please include a self-addressed, stamped envelope and phone number.

### No Electric Pencil For the Model 4

**Q:** Has Electric Pencil ever been modified for the Model 4 operating in Model 4 mode? (Richard Robertson, Chautauqua, NY)

**A:** As best we can determine, there is no Electric Pencil for the Model 4, nor are there plans to develop one. There is an MS-DOS version, however, for which Discount Data is working on an update.

### Getting Organized

**Q:** I recently read about a program called Diskette Manager from Lassen Software Inc. that produces a catalog consisting of disk-directory information and user comments. It also prints labels for each disk (with comments) and lets you cross-reference the catalog. I need a program like this to organize my disks. Where can I find one? (Steven Sanders, Concord, CA)

**A:** While we haven't heard of Diskette Manager, we do know of the Model 4 TRScat (\$39.95) from SOTA Computing Systems Ltd. (213-1080 Broughton St., Vancouver, British Columbia V6G 2A8). For Model I/III users, there's Masterdirectory (\$29.95) and Superdirectory (\$39.95), available from Discount Data (2701-C West 15th St., Suite 612, Plano, TX 75075, 214-680-8268). For MS-DOS users, Diskcat-5 (\$69) is available from Ford Software (4845 Willowbend, Houston, TX 77035, 713-721-5205).

Also, David Kuzminski offers a disk manager in an August 1986 *80 Micro* article ("Good Filekeeping," p. 60), and Jacques Robitaille's "Designer Labels" in this issue provides a program that gives you a commented directory (p. 72).

### Just His Type

**Q:** I have Model III and 4 SuperScripsit and a DMP-200 printer, and I'd like to take advantage of the many type styles (large letters, for example). Is there any information you can supply me? (William F. McDermott, Blairstown, NJ)

**A:** SuperScripsit isn't set up for the expanded and condensed printing modes,



but you can program a printer code to support them.

From the initial SuperScripsit menu, select S for the system setup utility. From that menu, select C at the "Enter printer codes" prompt. Use the down and up arrows to position the cursor at the line of the desired special code, digits zero through 9, or press the enter key and use the arrows for the special code symbols. Leave the units column at zero so as not to advance the printer head. In the sequence column, type 27.14. This sends an escape character and the value 14 to the printer when the special code is encountered in a document. Now press enter until you get the setup menu, and press break to go to the main menu.

At the place in text where you want the expanded type to begin, press the clear key (this causes the program to display a copyright symbol and enter the View mode) and then type your predefined special symbol. When the printer routine encounters this sequence, it outputs the proper expansion codes to the printer. You must also program another special code to turn the expansion off.

### Bionic Model III

**Q:** Where must I turn to obtain a new keyboard for my Model III? (John Hayes, Tappahannock, VA)

**A:** The Radio Shack National Parts Division (817-870-5662) sells Model III keyboards. A new version costs \$81.68, while an older version is \$59.63.

### Please Explain

**Q:** I run a Model III with TRSDOS 1.3 and use random-access files often. The manual's descriptions of EOF (end-of-file sector), LOC (get current record number), and LOF (get end-of-file record

number) are both brief and poor.

Is there any good literature on random access? Also, if the file length is shortened (the records eliminated and consolidated), can the LOF number be changed by the program? (Jack Spencer, Redlands, CA)

**A:** *Basic Disk I/O Faster and Better & Other Mysteries*, by Lewis Rosenfelder, is a good book containing programming tips and techniques for storing and retrieving data from disk. It's published by IJG Inc. Look in *80 Micro* ads for companies that sell it.

Regarding your second question: For a file to be physically shortened, a new file must be written, and the new file's LOF will be accurate.

### Stubborn Juki

**Q:** I own a Model 4 and a Juki Model 6100 daisy-wheel printer that doesn't recognize spaces and other expressed configurations in SuperScripsit. The printer manual states that any Juki dealer will have the required program for interfacing the Model 4, but recently I was informed otherwise. Can you help me find the right driver program? (Charles K. Short, Seattle, WA)

**A:** ALPS (1502 County Road 25, Woodland Park, CO 80866, 800-232-2577) has drivers for SuperScripsit and more than 200 printer types, including the Juki 6100 printer.

### III/4 2-and-1

**Q:** I want to connect a two-drive Model III and a two-drive Model 4D to one hard-disk drive. The hard drive is a Tandy 15MB unit with a Model III hookup. I won't be operating the computers simultaneously. (Grady F. Glass, Yoakum, TX)

**A:** The Bi-Tech Multiplexer (Bi-Tech Enterprises Inc., 10 Carlough Road, Bohemia, NY 11716, 516-567-8155) lets you access a hard disk from up to four computers of different types.

### SuperScripsit Converted

**Q:** How can I convert several-hundred text pages written in Model III SuperScripsit to a format that can be read by an IBM PC or a Wang word processor? (Gerard C. O'Connell, Phoenix, AZ)

**A:** Save the SuperScripsit text in ASCII by using the ASCII option. You can then transfer the files via a modem or with PowerSoft's SuperCross (17060 Dallas Parkway, Suite 114, Dallas, TX 75248, 214-733-4475) or Hypersoft's HyperCross

# Super Specials

## The ALPHA SPEECH SYNTHESIZER

Outstanding performance and value for only:

This is your chance to experience the power and pleasure that speech adds to your TRS-80. If you could read the thousands of testimonials we have received you would be convinced. Instead, our unconditional 15-day money back guarantee fully protects you.

Watch your friends faces when your TRS-80 starts talking.

\$ **49** <sup>95\*</sup>

Thousands sold at \$75.90

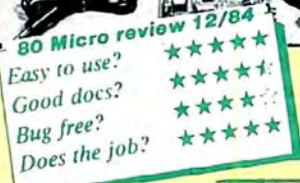
\*When purchased with text to speech software.



## TALKER 4.0

Unlimited vocabulary Text-to-Speech Software. Powerful, yet easy to use; even non-programmers can enjoy it. Talker 4.0 features:

- Automatic video and/or keyboard echo (if you want it).
  - Pitch control • Voice-speed control • Spelling mode
  - Says numbers (up to 999 trillion) • Simple BASIC commands • Much more!
- Only \$39.95



**Small Print:** Hardware Power supply, speaker and manual included. Model I unit plugs into keyboard or expansion interface 40 pin bus. Model III, 4.4P unit plugs into 50 pin I/O bus. Model 4P needs short 50 pin extension cable \$14.95. Use our "Y cable" (see next page) if your bus is already used. **Software** Works with all DOSes (not CPM), is 6.2K long, and relocates itself to the top of available memory. **Manual** available for \$5.

### Dr. SIGMUND

**Artificial Intelligence at work!**

If you want to show off your computer, run "Dr. SIGMUND" and see their expressions as your TRS-80 has an intelligent conversation with you. Even you will be impressed!

### PERSONALITY TEST

By Dr. James E. Hord, Jr. for your ultimate entertainment. This elaborate personality test will amaze you, and puzzle your friends. Besides talking to you, it will print a painfully accurate report.

### TALKING WORD PROCESSOR

By George McCoy of Rehab Research. The Alpha Speech Synthesizer was chosen for this functional word processor with full speech capability. A perfect example of computer speech.



Each of these three programs require 48K and are available on disk only. The Alpha Speech synthesizer is required for speech. Each program is only ..... \$29.95

**SPECIAL: ALL THREE FOR ONLY \$59.95**

## NEWCLOCK

**Model I \$39.95**  
**Model III, 4 \$59.95**

**The right time at the right price!** Keep the time and date with quartz accuracy, even when your computer is off. The backup lithium battery (included) will last for over 2 years. Software on tape or disk, please specify. Use "TIMESSET" once to set the clock. Use "SETCLK" to set your computer's internal clock (at power up) or use "TSTRING" so that the "TIMES\$" function reads the Newclock.

Connection: Model I: plugs into the keyboard or expansion interface. Model III, 4.4P: plugs into the 50-pin I/O bus. 4P needs short 50-pin extension cable \$14.95. Compatible with all operating systems.



**ALPHA Products**

79-04 Jamaica Ave., Woodhaven, NY 11421

Circle 17 on Reader Service card.

**800-221-0916**

Orders Only. NY & info call

(718) 296-5916

Hours: 9-5 Eastern Time

Add \$3.00 per order for shipping. We accept Visa, MC, checks, M.O. C.O.D. add \$3.00 extra. N.Y. residents add sales tax. Shipping to Canada is \$5.00 Overseas. F.P.O. APO add 10%



(P.O. Box 51155, Raleigh, NC 27609, 919-847-4779).

## Buying Time

**Q:** The last date available in the Model 4 TRSDOS 6.2 Date function is December 31, 1987. What should I do after that? Will there be a patch to clear up the problem? (*Ghislain Bossuyt, Avelgem, Belgium*)

**A:** TRSDOS 6.3 will be available for \$30 to \$40 by the end of 1986 and will accept dates through 1999. Roberto Refinetti's June 1986 article ("Time on Your Side," p. 82) lets you set any date in the Date function from Basic.

## Identifying Marks

**Q:** A graphics program I am using would run much faster if I installed an 8087 coprocessor in my Tandy 1000. I'd like to buy one, but I understand that some 1000s don't have the proper socket, although the 1000As do. I bought my computer in December 1984. How do I tell if I have the right socket, and if there is none, what else can I do? (*Tad Deffler, Mountain Lakes, NJ*)

**A:** If the model number is 25-1000A, your computer has the socket; if it's 25-1000, it has no socket. (The A suffix is the key.)

Two manufacturers sell 8087 upgrade kits for socketless 1000s: Hard Drive Specialist (16208 Hickory Knoll, Houston, TX 77059, 800-231-6671) and Trionix (3563 #B Roosevelt St., Carlsbad, CA 92008, 619-434-4439).

## Space Depression

**Q:** Is there a patch for Model 4 Basic that will switch the default for CHR\$(21) from space-compression codes to special characters?

In programs for my old Model III, I could POKE address 16420 with 1 and lock into special-character mode, but I haven't found a way to do this with the Model 4. (*Larry Meehan, Bremerton, WA*)

**A:** For special characters in TRSDOS 6.2 and 6.2.1, use:

POKE 2964, PEEK(2964) OR 8

To go back to space-compression characters, use:

POKE 2964, PEEK(2964) AND 247

These addresses may be different in other versions of TRSDOS.

## Secret Documents

**Q:** I've been doing a lot of low-level Z80 Assembly-language programming for the Model III to reduce the number of times the drive must be accessed. It seems that information on ROM and RAM addresses is hard to find. I need a copy of the source code for the Model III ROM and TRSDOS 1.3 (addresses 4000-5FFF hexadecimal [hex]). Also, I need in-

formation on important RAM addresses and port assignments. (*David Anderson, Wichita, KS*)

**A:** Many of the best sources of such information are out of print. An excellent source of DOS call routines is Hardin Brothers' Next Step column in the August 1984 *80 Micro* (A Handy Reference to DOS Addresses, p.171), which covers a variety of Model I and III DOSes. Radio Shack's *LDOS Operating System Manual* (catalog no. 26-2214) has a gold mine of DOS call addresses in its technical section. In addition, section 3 of the *NEWDOS 2.0 Disk Operating System Manual* contains valuable addresses. Radio Shack's *TRS-80 Model III Disk System Owner's Manual* (catalog no. 26-2111) contains numerous addresses in its technical section. Another good source of information is chapter 6 of Michael J. Wagner's *Machine Language Disk I/O & Other Mysteries* published by IJG Inc. and available from Montezuma Micro (Redbird Airport, Hangar #8, P.O. Box 32027, Dallas, TX 75232, 800-527-0347, \$24).

Model III port information and bit assignments can be found in Radio Shack's *TRS-80 Model III Technical Reference Manual* (catalog no. 26-2109) on pp. 15, 21-22, 45, and 58-60. There is also some valuable disk input/output (I/O) port information in the Wagner book mentioned above.

Information on ROM addresses is getting scarce. James Farvour's *Microsoft Basic Decoded & Other Mysteries* from IJG is available (also from Montezuma Micro), but it only covers the Model I. The best source I've seen is no longer in circulation: *TRS-80 Mod III ROM Commented*, published by Soft Sector Marketing. Another out-of-circulation source is volume I of *The Book from Insiders Software Consultants*, which covers the math routines extensively. *TRS-80 ROM Routines Documented*, by Jack Decker, is available from The Alternate Source (704 N. Pennsylvania Ave., Lansing, MI 48906-5319, 517-482-8270). Howard W. Sams published Earles L. McCaul's *TRS-80 Assembly Language Made Simple*, which I've found to be an invaluable aid in using ROM calls to their fullest. Also, the December 1982 *80 Micro* contains Mark D. Goodwin's article "Memory Map—Level II" (p. 298). Finally, chapter 12 of Radio Shack's *TRS-80 Model III Operation and Basic Language Reference Manual* has a good list of useful ROM addresses. Chapters 5-10 of the manual feature RAM addresses for PEEKs and POKEs.

If you have a Model I memory map, you'll find that many of the more useful routines have the same addresses on the Model III.

## Humming to Itself

**Q:** My Model III occasionally delivers a high-pitched humming sound. Sometimes if I hit the left side of the computer, the sound goes away. Do you know what the problem is and how to correct it? (*Daniel E. Roth, Grass Valley, CA*)

**A:** The hum is caused by a lead from a heavy insulated cable running from the flyback transformer to a plug in the left-rear side of your monitor. Sometimes an electric arc is produced from the lead to the glass; this creates a hissing or humming noise.

You can fix this by seating the lead firmly in the plug hole in the left-rear side of the tube. A word of caution: Make sure the computer has been off for several hours before attempting this modification. The flyback transformer can accumulate quite a static charge and won't bleed it off even if you've unplugged the system; it slowly dissipates instead.

## Unsafe Speeds

**Q:** I am considering getting an 8MHz speedup set for my Model 4. Will it noticeably increase speed, and is it a danger to the other parts of the computer? Will my Montezuma Micro CP/M and Tandy programs run faster, or will they all run at 8MHz? (*Dirk Billiet, Belgium*)

**A:** Alpha Technology Inc. (A1A Computer Division, 1902 Highway A1A, Indian Harbour Beach, FL 32937, 305-773-2956) sells a plug-in speedup kit for the Models 4 and 4P (\$49.95) that lets your computer run at 5MHz.

Scatronics (P.O. Box 4607-6202, ZA Borgharen, Holland) sells one for \$129.99 that runs at four speeds (2, 4, 6, and 8MHz). It is harder to install than the Alpha Technology kit.

Montezuma Micro says there should be no problem running CP/M programs at 5 or 6MHz, but 8MHz might cause some problems. I have no experience with such boards and don't know what other effects they might have.

## Printer Driver Found

**Q:** I seem to be caught in the abyss of progress, and I hope you can help. I recently bought a Tandy DWP 220 printer to use with my Model I. SuperScript for the Model I has no driver for this printer.

I've tried to use the driver from Model III SuperScript, but its only response to the print command is "Printer not ready." Radio Shack suggests using the DWP 410 printer driver. This appears to work fine with the 10- and 12-pitch mono-justified documents, but it doesn't support the printer codes for bold and underlined type on the proportionally spaced print wheel.

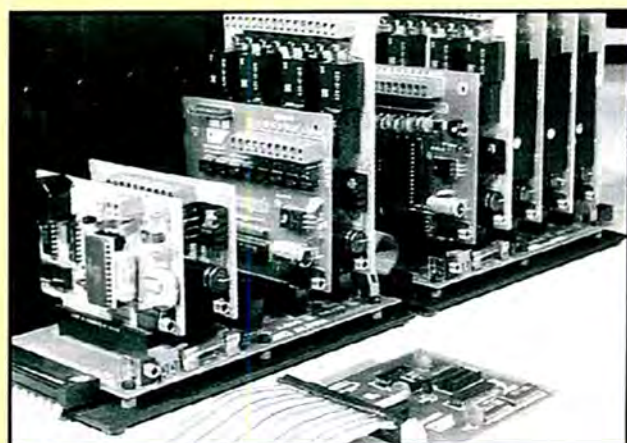
A similar problem was mentioned in a



# The Amazing A-BUS

What will you do with it?

**NEW**



An A-BUS system with two motherboards. ↑



## A-BUS Adapters ↑

IBM PC, XT, AT and compatibles.

Uses one short slot.

Tandy 1000, 1200, 2000, 3000.

Apple II, II+, IIe. Uses any slot.

TRS-80 Models 100, 200. Plugs into

40 pin socket. (Adapter has another socket).

TRS-80 Mod 3, 4, 4D. Fits 50 pin I/O bus.

TRS-80 Model 4P. Includes extra cable.

TRS-80 Model I. Plugs into 40 pin I/O bus.

Color Computers (Tandy).

AR-133...\$69

AR-133...\$69

AR-134...\$49

AR-135...\$69

AR-132...\$49

AR-137...\$62

AR-131...\$39

AR-138...\$49

## A-BUS Motherboard MB-120: \$99

Will accommodate five A-BUS cards. A sixth connector allows a second motherboard to be added to the first (with connecting cable CA-161...\$12). Up to five motherboards can be joined this way to a single adapter. The motherboard is mounted on a sturdy aluminum frame with card guides.

• A three foot cable connects the A-BUS Adapter Card to the first motherboard. CA-163...\$29

• If you use only one or two cards, the motherboard is not required. One card will plug directly into the CA-163 cable. Cable for two cards: CA-162...\$39

## Relay Card RE-140: \$129

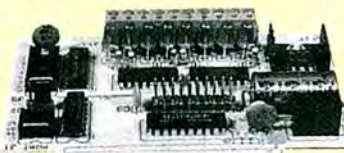
8 industrial relays on board. Contacts are rated at 3 amps. You can control up to 64 cards (512 relays) using several motherboards. Jumpers are used to simply select the card address. The card is easily controlled in BASIC with "OUT" or "POKE". For example, OUT 1,0 turns all the relays off on card #1. Eight LED's show which relays are on.

## Digital Input Card IN-141: \$49

It's safe and easy to connect and read switches, keypads, thermostats, alarm loops, etc. The eight inputs can monitor the presence of voltage or switch position. Simple INP or PEEK commands read the status (On or Off) of the inputs. Each input is optically isolated for convenience and safety.

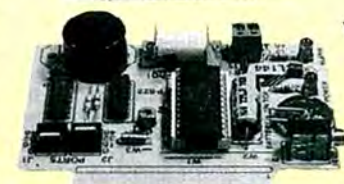
## Analog Input Card AD-142: \$119

With this 8 bit, 8 channel A/D converter, your computer can read voltages, temperatures, pressures, light levels, etc. Take over 100 readings per second in BASIC (several thousand with machine language). It's simple to use, for example: OUT 1,3 selects channel #3, then A=INP(1) reads the voltage on that channel. Input range: 0 to 5.1V. Resolution: 20mV. Conversion time 120us.



## 12 Bit A/D Converter AN-146: \$109

This high performance analog to digital converter features accuracy to 0.025%, 130ms conversion time, sign and over range indication. The basic input range is -5 to +5 volts, with 1.2mV resolution, but the gain of the on-board amplifier can be set to measure microvolts. Ideal for a strain gauge, thermocouple, pH meter, etc.



## Motor Controller ST-143: \$69

Stepper Motors are the ultimate in motion control. The special package (below) includes everything you need to get familiar with stepper motors: Each controller card drives two stepper motors (12V, bidirectional, 4 phase).

Motor: 48 steps/revolution, 300 steps/second, 1/4" shaft: MO-103...\$15. Power supply: PS-126...\$10

Special Package: the controller card, two stepper motors, and power supply. PA-181...\$99



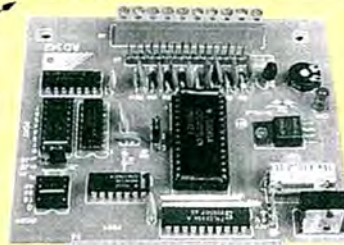
## Clock with Alarm CL-144: \$89

It's the most powerful clock/calendar available. The features: • 5 second/month accuracy. • Keeps time, date, and alarm for 5 years (even with computer off). • Can time events down to 1/100 second. • Periodic "chime" • Full time and date alarm. • Four alarm outputs: Computer, LED, Buzzer, and Reed Relay. • Easy to use.; for example H=INP(1) reads the hours, Y=INP(6) reads the year, etc.



## Latest Developments

Voice Synthesizer	VS-153
15 Bit Analog to Digital Converter	AD-155
Intelligent Stepper Motor Controller	ST-154
Digital to Analog Converter	DA-147
LCD Display (one and two line)	LD-151
Touch Tone® Decoder	PH-145
Counter Timer	CT-154
24 Line TTL Input/Output	DT-148



Order line 800 221-0916

Except in NY

Info and NY orders: (718) 298-5918

Technical info: (203) 856-1808

All lines open weekdays 9 to 5 NY time

Add \$3.00 per order for shipping.

We accept Visa, MC, checks, M.O.

C.O.D. add \$3.00 extra.

NY residents add sales tax.

Shipping to Canada is \$5.00

Overseas, FPO, APO add 10%

Circle 17 on Reader Service card.



**ALPHA Products**

79-04 Jamaica Ave., Woodhaven, NY 11421

## Program Listing. Patch/BAS.

```

00100 ; PRINTER DRIVER TO BYPASS CONTROL CODES
00110 ; FOR MODEL III NEWDOS/80 2.0
00120 ; BY DAVID GOBEN. ALL MODIFICATIONS WELCOME
00130 ORG 0FFD0H
00140 INIT LD HL,(4026H) ;GET PRINTER DRIVER
00150 PUSH HL ;SAVE COPY OF DRIVER
00160 LD DE,MAIN ;CHECK IF ALREADY THERE
00170 AND A ;RESET CARRY
00180 SBC HL,DE ;COMPUTE DIFFERENCE
00190 POP HL ;GET DRIVER BACK
00200 JR Z,EXIT ;SAME, DO NOT INSTALL
00210 LD (DRIVER+1),HL ;ELSE SET UP NEW DRIVER
00220 EX DE,HL ;NEW DRIVER TO HL
00222 LD (4026H),HL
00224 DEC HL
00230 LD (4049H),HL
00240 EXIT JP 402DH ;EXIT TO DOS
00250 ; NEW PRINTER DRIVER
00260 MAIN LD A,C ;GET CHARACTER TO OUT
00270 CP 20H ;CONTROL CODE?
00280 JR NC,DRIVER ;NO
00290 CP 0DH ;YES, CARRIAGE RETURN?
00300 JR Z,DRIVER ;YES, USE IT
00310 CP 0AH ;LINE FEED?
00320 RET NZ ;NO, IGNORE CHARACTER
00330 LD C,0DH ;YES, CHANGE TO CR
00340 DRIVER JP S-$ ;GO TO DOS DRIVER
00350 END INIT
    
```

End

February 1985 Reader Exchange letter (p. 29) regarding the DWP 210 and Model III SuperScript. Are there patches for using the Model III driver on Model I SuperScript? Does anyone have a driver for the DWP 220/Model I SuperScript? (Dick Kahoe, Hollister, MO)

**A:** Radio Shack has issued a printer-support upgrade (Printer Drivers for SuperScript, catalog no. 700-2294), which supports the DWP-220, but apparently no support for the Model I is forthcoming.

The patches in the Reader Exchange letter you mentioned work on the Model I version of the DWP410/CTL file.

If you don't have a Model I patch program, type in the Program Listing and save it as Patch/BAS. To alter DWP410/CTL for the DWP 210, merge these lines to the patch program and run it:

```

600 DATA DWP410/CTL
610 DATA 00,13,01,0A
620 DATA 00,33,01,0E
630 DATA 00,3D,01,0E
    
```

If you own a copy of the upgrade and have a way to copy the DWP220/CTL file onto your Model I, merge the following lines to the patch program and run it:

```

600 DATA DWP220/CTL
610 DATA 00,CF,03,C3,5F,BB
620 DATA 00,90,09,32,E8,37,C9,47,3A,E8,
    37,C9
630 DATA 00,F1,03,CD,63,BB
640 DATA 03,B1,03,32,E8,37
    
```

## Readers Respond

### ROM Images

In the August 1986 Feedback Loop (p. 14), R.A. Basham asked for help in getting NEWDOS80, MULTIDOS, and DOSPLUS to load the MODEL A/III file and boot on his Model 4P. Don Singer (Scotts-

bluff, NE), a subscriber to the *Northern Bytes* newsletter, says NEWDOS80 solutions were covered in Vol. 5, No. 7, p. 14, with corrections appearing in Vol. 6, No. 2, pp. 2-3; more solutions appeared in Vol. 6, No. 5, pp. 10-11, with modifications in Vol. 6, No. 6, p. 16. DOSPLUS was covered in Vol. 6, No. 1, p. 4, and in Vol. 6, No. 3, p. 38.

Mr. Basham can get these articles by writing to: *Northern Bytes*, c/o Jack Decker, 1804 W. 18th St., Lot #155, Sault Ste. Marie, MI 49783.

David Goblen (Story City, IA) writes that MULTIDOS and LDOS will boot up MODEL A/III if you copy the MODEL A/III program from a TRSDOS 6 disk (drive zero) to the MULTIDOS or LDOS disk (drive 1). Model III MULTIDOS and TRSDOS 6 will read each other.

The boot ROM checks the boot sector for four items whenever it is executed. First it checks to see if the first byte of the boot sector is X'00' or X'FE'; if not, the test has failed and nothing happens. If the test succeeds, the boot ROM checks for the sequence CD xx 00 (in which xx can be any hex byte value). This sequence is a call to a ROM address (normally the display address X'0033). If it is encountered, the boot ROM determines that the disk is a Model III disk. It then picks up relative byte 2 of the boot sector, which tells it on which cylinder the directory resides. It also checks the data-address mark (DAM) for zero or 1, an important test since TRSDOS 1.x (DAM 1) uses a sector-naming scheme of 1-18 (most DOSes, including TRSDOS 6, use names zero through 17).

With the DAM information, the ROM scans the directory sectors for the MODEL% sequence, where % can be the letters A-G. (A is the default, but you can

select the others by holding down the corresponding keys during bootup.) When the sequence is found, it is loaded and run. The Model III ROM image goes unloaded if any of these tests fails.

### Directory of Choice

In the August 1986 Feedback Loop (p. 17), Alain Guilloton asked for a patch to display the directory from SuperScript while using LDOS.

Ben R. Hunter (Howe, TX) writes that he used the LDOS 5.1.4 file editor (FED) to change the disk directly.

You must change SCR17/CTL locations 8BBC-8BBE, which currently contain 32 71 42 hex to 4F 06 00 hex. TRSDOS requires the logical drive number to be loaded in location 4271 hex for a directory, while LDOS requires that the logical drive number be loaded in the C register. Set the B register to zero to direct output to the video display.

The following patch allows the directory function to work in SuperScript version 1.2.x:

PATCH SCR17/CTL (D00.3C=D6 30 4F 06 00)

The patch for Version 1.3.x is:

PATCH SCR17/CTL (D00.95=4F 06 00)

Stephen Lardieri (Atlantic Highlands, NJ) also sent in the above patches and added a few more you can use with FED. His first patch is cosmetic: It changes a line in the menu from "<E> Exit to TRSDOS" to "<E> Exit to LDOS." You have to change bytes X'69' to X'6E' in record X'0004' by replacing the ASCII equivalent of the word "TRSDOS" with "LDOS" followed by two spaces.

The second FED patch enables directories of drives 4-7. Change byte X'40' in record X'0002' to 38, and byte X'DA' in record X'0002' to 37.

Here are additional patches that do the same thing. For version 1.2:

PATCH SCR17/CTL (D00.36=38)  
 PATCH SCR17/CTL (D00.D0=37)

For version 1.3:

PATCH SCR17/CTL (D00.7B=38)  
 PATCH SCR17/CTL (D08.33=37)

### Taking Out the Garbage

In the May 1986 Feedback Loop (p. 18), Ted C. Earle asked for a Trashman-like utility for Model III programs upgraded to Model 4 and MS-DOS Basic.

Daniel Cristini writes that both MBasic (CP/M or MS-DOS) and GW-Basic (MS-DOS only) have their own garbage-collection functions. The MBasic and GW-Basic manuals contain a function called FRE(0) that is normally used to display current available memory. An option to this function, FRE(' '), returns the available memory after forcing garbage collection. ■

**NETWORK  
VERSION  
AVAILABLE  
FOR TANDY 3000 USERS**

# INTRODUCING OPEN ACCESS® II™

FOR TANDY 1000-1200-3000

THE FULLY INTEGRATED BUSINESS SYSTEM  
WITH THE WORLD AT YOUR FINGERTIPS

Open Access II is a new, super-program which can perform virtually every managerial and business task you'll ever need with performance and ease-of-use unheard of in the industry.

Open Access II combines an extremely powerful relational database and superior spreadsheet with data communications, word processing, 3-dimensional graphics, and time management. Information is conveniently changed from module to module.

Open Access II's Database features an effective and flexible report generator and user definable screens. "Programmer," our new Database language, features simple interacting English-like commands to produce your customized applications.

Open Access II's Spreadsheet offers a unique combination of business problem solving capabilities; including goal-seeking, and an advanced table look-up command. Professional business presentations are easily produced by the enhanced graphic capabilities.

Open Access II's improved Word Processor can merge data from Spreadsheet or Database easily to produce reports, mail merge and graphic presentations.

**Come see us at Fall  
Comdex, West Hall  
Booth #W948**

Open Access II's data communications provides you with the capabilities to handle any of your micro computer communications needs. All of Open Access II's modules work together and data is easily communicated to the rest of the world.

**BEST OF ALL,  
THE PRICE**

**\$595.** \*U.S. Price

**The Open Access II super program is also available in the network version for Tandy 3000 users.** Ask for details. Call 1 (800) 621-7490 or (619) 450-1526 in California, or (800) 521-3511 if outside California for your nearest authorized dealer and expand your business base with Open Access II, the fully integrated business system. For Tandy 2000 users, Open Access I \$395.

**SPI**

SOFTWARE PRODUCTS INTERNATIONAL

10240 Sorrento Valley Road  
San Diego, California 92121  
(619) 450-1526

For Your Authorized Dealer  
In California

**(800) 621-7490**

Outside California

**(800) 521-3511**

**Open Access II  
Comparison Chart**

	Database	Form Query	Report Generator	Query Processor	Relational Database	Graphics	3-D Graphics	Spreadsheet	Goal Seeking	Word Processor	Communications	Time Management	Price
<b>Open Access II</b>	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	<b>595<sup>00</sup>*</b>
Lotus 1•2•3	✓					✓		✓					495 <sup>00</sup>
Symphony	✓	✓	✓			✓		✓		✓	✓		695 <sup>00</sup>
Framework	✓		✓	✓		✓		✓		✓	✓		695 <sup>00</sup>
Enable	✓		✓			✓	✓	✓	✓	✓	✓		695 <sup>00</sup>
Smart	✓	✓				✓	✓	✓	✓	✓	✓	✓	895 <sup>00</sup>



**"Computing at night bit into my budget..."**



**\$10.00+ per hour**

Most online information networks can drain your resources faster than you can say "Vampire." Not with GENie, the General Electric Network for Information Exchange. As part of the world's largest commercially available teleprocessing network of General Electric Information Services Company, GENie won't bite into your budget.

**Evenings, weekends, holidays. Just \$5 per hour.**

With GENie, you can make friends, schedule meetings, gather facts and figures, set up travel reservations, get the news, be entertained, even shop for a fraction of what other information services charge.

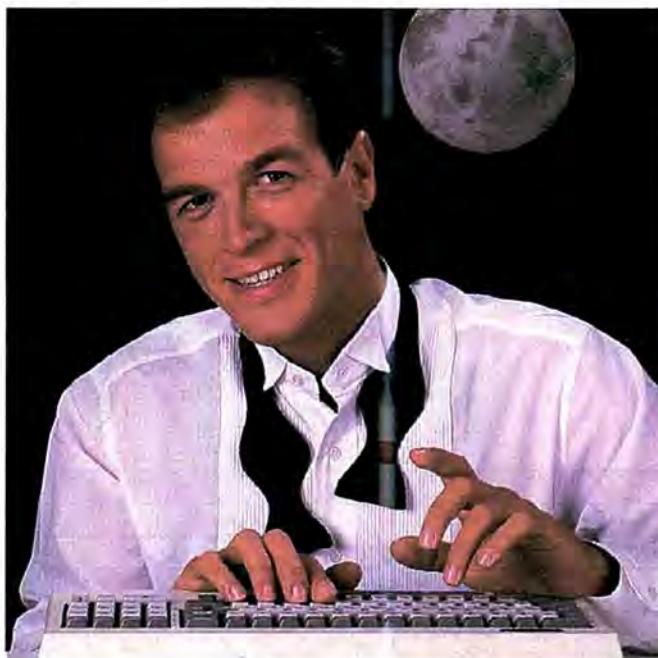
**And you get a lot more for your money.**

With GENie's Tandy† **RoundTable™** **Special Interest Group** you can discuss the latest in Tandy products and accessories; download hundreds of public domain software programs, and participate in exciting and informative online conferences. And, uploads are FREE on GENie!

**There's more!**

Meet friends old and new with GENie's **LiveWire™** CB simulator or exchange messages with **electronic mail** service. Schedule a trip with the **online travel service**. Fun and learning for the whole family with **Grolier's** electronic encyclopedia.

**"With GENie™ I get more bytes online for less."**



**\$5 per hour**

**Only \$18 to register! Save up to 60%!**

Check out the chart. Compare the savings for yourself. You'll find GENie delivers all of your favorite services for an incomparable price, at incomparable savings.

Play multiplayer and classic games in GENie's **Game Room**. Get the latest in domestic and international **computing news**. All this and there's more to come. New services are being added each and every month!

Compare & Save	Services						Pricing			
	Travel & Shopping	SIGs/User Groups	Electronic Mail	CB Simulator	News	Games	Registration Fee	Monthly Minimum	Non-prime time rates	
									300 baud	1200 baud
The Source	X	X	X	no	X	X	\$49.95	\$10.00	\$8.40	\$10.80
CompuServe	X	X	X	X	X	X	\$39.95	none	\$6.00	\$12.50
<b>GENie*</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>\$18.00</b>	<b>none</b>	<b>\$5.00</b>	<b>\$5.00</b>

\*Rates and Services shown in effect 6/86. Non-prime time applies Mon.-Fri. 6pm-8am local time, all day Sat., Sun., and nat'l holidays. Subject to service availability. Additional surcharge applies for 2400 baud service.

With services and savings like these, now you can get more bytes online without incurring blood-curdling costs. Get online with GENie. Sign up today!

**Sign up from your keyboard today.**

**4 Easy Steps:**

1. Have your Visa, MasterCard or checking account number ready.
2. Set your modem for local echo (half duplex)—300 or 1200 baud.
3. Dial 1-800-638-8369. When connected, enter HHH
4. At the U# = prompt enter **XJM11938,GENie** then RETURN.

Need help or more information? No modem yet? We can help. Call 1-800-638-9636.

† Tandy is a registered trademark of Tandy Corporation.

**GENie™**  
Stay online longer, for less.



General Electric Information Services Company, USA

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

# Tandy Steps Into the Limelight

## Tandyland

After months of speculation about its 1987 marketing plans, Tandy finally unveiled five computers at a July 30 press conference in New York. Held at the ritzy Waldorf-Astoria Hotel, the conference was a gala event attended by industry bigwigs (including Microsoft's Bill Gates, Lotus's Jim Manzi, Software Publishing's Fred Gibbons, and Ashton-Tate's Edward Esber) and more than 200 reporters, writers, and stockbrokers. As they say in the theater, everybody enjoys an opening in New York.

All of Tandy's top brass attended, including John Roach, chief executive officer; Graham Beachum, vice president of computer merchandising; Ron Stegall, senior vice president; Bernie Appel, Radio Shack president; and Ed Juge, director of market planning. The contingent presented a slide show introducing the new company motto: "Tandy... Better Again." I'm not sure if this is better than "Clearly Superior," but at least Bill Bixby isn't delivering the punch line.

John Roach and the other spokesmen talked extensively about the value of Tandy computers in the marketplace, the company's efforts to sell to corporations, the remodeling of its stores, employee training, market segments, and so forth. The company gave the impression of having it all together; based on the products I saw at the conference, there's real substance behind the image.

**Tandy's product announcements** pleased just about everybody, including Color Computer users who finally got the upgrade they've been hoping for—the Color Computer 3. The other four announcements—the Tandy 1000 SX, the Tandy 1000 EX, the Tandy 3000 HL, and the Tandy 3000 HD—target MS-DOS users in both the high- and low-end categories. (See the Table for system configurations and prices.)

Of the new computers, the one indus-



Photo 1. The Tandy 1000 EX.

try analysts will be watching most closely is the 1000 EX, a one-piece MS-DOS box aimed at the home and education markets (see Photo 1). Ron Stegall calls the 1000 EX Tandy's "Apple Killer." The standard configuration includes the CPU, keyboard, disk drive, and 256K RAM. The computer has a speed-switchable 8088-2 microprocessor, which runs at either 4.77 or 7.16 megahertz (MHz)—50 percent faster than an IBM PC. Users can upgrade to 640K, but not beyond, and the EX has no room for a second internal disk drive. The video on the EX (and on the SX) is the same as that on the old 1000, but oddly enough, Tandy dropped the lightpen port (the SX still has it, however).

The 1000 EX is a limited computer, but it might be enough for the home and education markets. Schools will probably love it, since it runs most PC software, comes in one piece, and has built-in video. Families, too, are likely to buy it, especially those that already have an MS-DOS computer at home. (Do parents really want Junior and Judy hacking away on their \$1,500 PC? For \$799, many might consider the EX a practical investment.)

The question with the 1000 EX is whether people will be put off by its lack of expansion capability. The price for the standard unit sounds good, but once you add the options needed to make it oper-

ate at full power, a maximum-configured EX costs almost the same as a minimally configured SX.

**The Tandy 1000 SX** (see Photo 2) is intended for the mainstream PC market. Outside, it looks like the old Tandy 1000, but inside is another story. The original 1000 (and 1000A) came with one disk drive, three slots, and no direct memory access (DMA) chip. To add memory in excess of the 128K that came standard, you had to install memory boards. The 1000 SX, on the other hand, comes with two disk drives, a built-in DMA chip (like an IBM PC),

384K that you can upgrade to 640K on the motherboard, and five slots, all open. You can disable the video (which is the same as that on the old 1000) and put in a graphics board, such as an IBM Enhanced Graphics Adapter (EGA). Like the EX, the SX can run at either 4.77 or 7.16MHz.

**The Tandy 3000 HL: Is it a super PC/XT** (as Tandy describes it) or a baby PC/AT? The 3000 HL has features of both IBM machines and a price tag of only \$1,699.

What distinguishes an AT? An 80286 CPU? (The Tandy 3000 HL can be speed-switched between 4 and 8MHz.) A 1.2-megabyte (MB) disk drive? (The HL has a 360K drive.) A majority of 16-bit slots? (The HL has three 16-bit slots and four 8-bit slots.) Massive RAM? (The old 3000 handles up to 12MB of RAM; the 3000 HL handles only 4MB.)

However you define power, the Tandy 3000 HL is a lot of computer for the money and might well define the standard for the next generation of 80286-based PCs.

**The Tandy 3000 HD is a higher-performance model of the old 3000.** Tandy reduced the price from \$2,499 to \$2,099, which is only \$400 more than the price of the 3000 HL. For \$4,299 you can buy a 40MB version with a claimed access

time of 28 milliseconds (ms). The 20MB version (with a slow, XT-type drive) is priced at \$3,599. Tandy is positioning the 3000 HD as either a powerful file server or a Xenix machine, with the HL as its little brother. Whether this works will depend on how the market for local-area networks (LANs) develops. So far, the market has consistently lagged behind industry projections. Tandy was tight-lipped about future LAN offerings (watch for something next year) and admitted that ViaNet (finally being shipped) was not the answer for many companies.

Xenix hasn't found much of a following yet; Tandy's version for the 3000 was supposed to have started shipping by September. Though everybody's talking about it, few people are using it.

**New versions of DeskMate come** with the 1000 SX (DeskMate II) and the 1000 EX (Personal DeskMate). DeskMate II runs faster than the original version, features task-switching (you can drop out of DeskMate to run a program, pop back, and pick up where you left off), and it is compatible with ViaNet and Network 4. The graphics-oriented Personal DeskMate resembles Microsoft Windows with pull-down menus, pop-up boxes, a calculator, notepad, calendar, phone directory, and a simple paint program. It also includes the usual DeskMate Text, Filer, Worksheet, and Telecom applications.

**The introduction of MS-DOS 3.2** (standard with the 1000 SX and an op-



Photo 2. The Tandy 1000 SX.

tion for the 1000 EX) is welcome news. The new version retains the color graphics modes and sound voicings of MS-DOS 2.11 (referred to as "the PCjr enhancements" by Dr. Scott Cutler, Tandy's senior director of software), while providing better support for high-capacity hard-disk drives and 3½-inch drives. The operating system is also compatible with a number of network packages. Owners of MS-DOS 2.11 can upgrade for a nominal fee.

**The 55-page 1987 Tandy Computer Catalog** lists a slew of peripherals for the new computers. Tandy also has a 1987 *Radio Shack Software Reference Guide*, which lists more than 600 programs available through the Express Order service. (Last year, Tandy combined Express Order Software and computer listings in one catalog—the 1986 *Radio Shack Reference and Tandy Computer Guide*.)

Also new this year is the *Educational Software Catalog*, which lists more than 500 programs for schools and educators. The guide includes programs for the Models I, III, and 4, the Color Computer, and all of Tandy's MS-DOS computers. It also lists programs that are compatible with Network 4 and ViaNet.

The 1987 *Tandy Computer Catalog* has a four-page Express Order Hardware section featuring products for the MS-DOS computers from manufacturers such as AST Research, STB, Quadram, Tecmar, KeyTronic, Western Digital, PC Technologies, Orchid Technology, Ven-

Tel, Trionix, and Omnitel. Among the products listed are video, memory, accelerator, and multifunction boards; modems; light pens; an 8087 adapter board; micro-to-mainframe communication links; keyboards; and tape backup systems.

**After two years of observing users** rush to use hard-disk cards on their PCs, Tandy is offering a 20MB hard-disk card for the 1000 SX (the card also works with the Tandy 1200 and 3000 models.) Oddly enough, Tandy doesn't offer a hard-disk version of the 1000 SX, although it did with the 1000 HD. The company probably figures it can get away with offering a hard-disk card that slides into an expansion slot.

As an option for the 1000 EX, Tandy is offering an external 3½-inch disk drive. In the future, the company will offer internal 3½-inch drives as options for all ma-

**Tandy 1000 EX; \$799**

- Intel 8088-2 microprocessor, speed-switchable between 4.77 and 7.16MHz
- MS-DOS 2.11, GW-Basic, Personal DeskMate
- 256K RAM (upgrade to 640K)
- one 360K disk drive
- connector for external 5¼-inch or 3½-inch disk drive
- three modules open for PLUS memory expansion, RS-232C, or Digi-Mouse
- parallel-printer port
- ¼-inch headphone jack
- built-in monochrome and color graphics

- RGBI color-monitor port
- composite-video outlet

**Tandy 1000 SX; \$1,199**

- Intel 8088-2 microprocessor, speed-switchable between 4.77 and 7.16MHz
- MS-DOS 3.2, GW-Basic, DeskMate II
- 384K RAM (upgrade to 640K on motherboard)
- two 360K disk drives
- five 10-inch slots
- 8087 math-coprocessor socket
- built-in monochrome and color graphics
- parallel-printer port
- light-pen port

- composite video and audio
- two joystick ports
- RGBI color-monitor port

**Tandy 3000 HL; \$1,699**

- Intel 80286 microprocessor, speed-switchable between 4 and 8MHz
- 512K RAM (upgrade to 640K on motherboard)
- one 360K disk drive
- three 16-bit (AT) slots
- four 8-bit (XT) slots
- parallel-printer port (uses ½ slot)
- three front-drive slots
- 80287 math-coprocessor socket
- built-in real-time clock

Table. Standard configurations for Tandy's new MS-DOS machines.

# TRSCROSS

More  
Software from  
the Creators of  
Super Utility™

## The SECOND Generation of Disk/File Transfer Utilities

is here from PowerSoft!



### TRSCROSS™

Copyright 1986 by Breeze/QSD, Inc.  
All rights reserved

- 1 - Copy from TRS-80™ diskette
- 2 - Copy to TRS-80™ diskette
- 3 - Format TRS-80™ diskette
- 4 - Purge TRS-80™ diskette
- 5 - Display directory (PC or TRS-80™)
- 6 - Exit

Shown above is the Main Menu displayed when running TRSCROSS on your PC or compatible.

TRSCROSS runs on your PC, yet reads your TRS-80 diskettes! Copy files in either direction! • Written completely in-house by our programmers and 100% supported by PowerSoft •

TRSCROSS is as easy to use as it looks to be! The program is very straightforward, well thought out, and simple to operate. TRSCROSS has several "help" features built into the program to keep operation as easy as possible. Just pop in your TRS-80 disk to your PC and copy the files right to your PC data disk or hard disk. *It couldn't be any faster or easier!* Packed in the PowerSoft binder is a typeset instruction manual with Index. All steps are detailed. Advanced features, for those that desire to use them, include executing menu options right from DOS or from a .BAT file or macro. This can really speed up transfers when similar operations are performed frequently.

TRSCROSS allows you to "TAG" all files to be moved in ONE pass! Wildcards are supported to increase ease in copying only selected files.

Other features include converting BASIC programs or small Superscript™ "files on-the-fly"! Forget about having to save your programs or files in ASCII first, or running a separate conversion program before transferring! TRSCROSS reads your tokenized BASIC Superscript file program or Superscript file directly off your TRS-80 disk and performs the conversion all in ONE pass while being transferred directly to your PC or compatible computer! (Does not cover PEEKs, POKEs, graphics, or machine language calls or subroutines.)

**TRSCROSS will even FORMAT a TRS-80 disk right on your PC!**

(Handy for those who use both machines!) Former TRS-80 users who no longer have their TRS-80, but still have diskettes with valuable data...this is exactly what you've been waiting for! Similar in concept to our SuperCROSS, but runs on the PC rather than the TRS-80.

TRSCROSS will READ FROM and COPY TO the following TRS-80 double-density formats: TRSDOS 1.2/1.3, TRSDOS 6.2\*, LDOS 5.1.4\*, DOSPLUS 3.5, NEWDOS/80\*\*, & MultiDOS\*.

DOS formats listed above flagged with \* signify that earlier versions of these DOS's are readable as well, but one or more sectors may be skipped due to a format problem in that version of the DOS. One or more sectors may also be skipped on some NewDOS/80 formats. (Disks that were formatted with SUPER UTILITY + or SU4/4P do not, and have never had this problem.) TRSDOS 6.02.01, or higher should not have this problem. Disks formatted in any 80 track format, any single density or mixed density (Model I "boot" disks) are not supported.

TRSCROSS requires: PC or compatible computer, 128K and a normal 360KB (40 track drive) PC drive. Double-sided operation is fully supported, but NOT 80 track. If you have more than one disk drive, fixed drive, or RAM disk, operation will be much smoother. TANDY 1000 requires extra memory card because of the required DMA chip that resides there. TANDY 3000 is supported as long as you have a 360KB drive to use for transferring, rather than the hi-density drive. TANDY 2000 is not supported at this

time due to a difference in disk controller and floppy drives. TANDY 1200 is OK. Large Superscript™ files (as well as other "special" data files like PROFILE +™) would need to be converted to ASCII on a TRS-80 first before they would be of any use on a PC or compatible.

If you plan to retire your TRS-80, TRSCROSS is for you! TRSCROSS will allow access to your TRS-80 diskettes for years after your TRS-80 is gone!

**TRSCROSS is now shipping! Place your order TODAY!**

only **\$89.95**

Available only from PowerSoft

Plus \$3 s/h (U.S.) or \$5/Canadian or \$12/Foreign Airmail

Texas Residents must add appropriate sales tax.

**POWERSOFT**

Free! SOFTWARE CATALOG

Yes! Send me TRSCROSS™

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City: \_\_\_\_\_

State: \_\_\_\_\_ Zip: \_\_\_\_\_

Chg. Card (circle one)  MasterCard  VISA  Expires: \_\_\_\_\_

Card #: \_\_\_\_\_

Signature: \_\_\_\_\_

17060 Dallas Pkwy., Suite 114 • Dallas, TX 75248 • (214) 733-4475

All products shipped from stock within 24 working hours.

chines. For now, however, Tandy is waiting to see how the market develops.

**Though the Tandy 2000 appears in the 1987 catalog, don't look for much further development.** Bernie Appel said that the company "probably won't be putting it back into production." Sounds like a Model 4 situation.

Speaking of the Model 4, Tandy is allowing the Model 4D to slowly twist in the wind at \$1,199. The 1987 catalog devotes only four pages to the computer; the 1986 catalog devoted nine. At the press conference, Tandy executives said little about the Model 4 except to praise its past performance and repeat its promise to support it. Market reports, however, indicate that the venerable Model 4 is getting creamed by the 1000 in sales.

**Tandy showed off its new 20MB 5¼-inch Internal Disk Cartridge System** in a Tandy 3000 HL at the press conference. Iomega Corp., the company that makes the Bernoulli Box, developed the system, which Tandy is the first manufacturer to offer. Tandy is also offering the 20 + 20-Megabyte Disk Cartridge System, another Iomega product that features two 8-inch, 20MB cartridges.

**An enhanced keyboard is available** for Tandy's 3000 models. The layout is similar to that of the IBM enhanced keyboard introduced earlier this year for the PC/AT and PC/RT computers. Tandy's keyboard has 101 keys, a numeric keypad, 12 programmable function keys across the top, clustered arrow keys, and light-emitting diode (LED) indicators. According to Roy Neese, a systems programmer with Tandy, both the enhanced and standard versions of the 3000 keyboard will be made available for the 1000 models in the near future. Users will have to route the keyboard through a small interface box and possibly use a device driver.

**Tandy is finally putting together a coherent printer line.** In the past, the company seemed all too willing to throw something on the wall and stand back to see if it would stick. After a while, it became difficult to keep track of the number of printers in Tandy's line. In the 1987 catalog, the company has honed its offerings down to eight, compared to 10 in the 1986 catalog. Gone are the CGP 220 color printer and the TRP 100 thermal printer. Tandy upgraded the DWP 220 and the DWP 510 to the DWP 230

and DWP 530 and reduced their prices (by \$200 and \$500, respectively). All of Tandy's daisy-wheel printers are now IBM compatible.

The 24-wire, DMP 2100P is now the DMP 2110. The 2110 is faster than the 2100P—it prints 240 characters per second (cps) compared to 160 cps on the older version—and it has a horizontal resolution of 360 dots per inch and 4,896 dots per line. It also comes with a bidirectional tractor-feed and is \$320 cheaper than the 2100P. Tandy made a big deal of the 2110 at the press conference, referring to it as an introductory product in the field of desktop publishing. (Translation: Watch for a laser printer to be introduced next year.)

**The price of the Tandy 6000 HD has been reduced again.** A 512K system with a 15MB hard drive now costs \$3,499; the 1986 catalog listed it at \$5,499. The new catalog makes no mention of a 6000 model without a hard disk. The multiuser-software section of the catalog lists programs with versions for the Tandy 3000 and 6000 (running under different versions of Xenix). Interestingly, the catalog also lists a Xenix DeskMate for the Tandy 6000. ■

Circle 202 on Reader Service card.

## SAVE YOUR DATA...AND YOUR MONEY WITH OUR UNINTERRUPTABLE POWER SUPPLY

When the power goes off your data can be lost and that costs you money. Money to pay for the time it takes to find your latest backup (you do have a backup somewhere, don't you?) and money to pay the repairman for that blown hard drive. The SPS-300 provides protection from power outages and most all types of surges and spikes.

Simply plug your computer and display/printer (up to 300 Watts total load) into the SPS-300's two outlets. When power interruptions occur the SPS-300 switches to its own internal batteries allowing uninterrupted use for up to 30 minutes with a 300 Watt load. The operator has enough time to choose between continuing to use the computer or going through an orderly shutdown thereby preserving the work performed prior to the loss of line power. Operation is completely automatic with both audible and visual power failure alarms.

The SPS-300 is compact, maintenance free and can be located in most any out of the way place. Just plug it in and forget it. This heavy-duty unit is ruggedly constructed to give you years of unattended service. Our one year warranty includes both parts and labor. Our low price lets you give your data (and wallet) the protection they have been needing. Call us and we will ship yours right away. Please add \$20 for shipping and handling in the continental US.

**\$299**  
ONE YEAR WARRANTY



### ORDER TOLL-FREE

800-527-0347 800-442-1310

USA Texas  
AEROCOMP 214-339-8324 FAX: 214-337-4981  
Telex: 882761 Dallas, Texas 75376

Prices and specifications subject to change without notice.

© 1986 by Aerocomp. All rights reserved.

Redbird Airport Hangar #6 • P.O. Box 764246 • Dallas, Texas 75376

**AEROCOMP**

**Clone 300**





# Advanced Word Processing Made Easy!

## the *LeScript* *Sampler* package

**NOW** experience the beauty and ultimate performance of LeScript's full printing capabilities at just a fraction of the cost of the complete LeScript Word Processing System. If you have sent for your free LeScript Trial-Size Disk, then you already know how easy it is to create professional looking documents and merge names and addresses into **Form Letters** using LeScript. You already know about LeScript's **Dual Screen Editing**, **50-User Programmable Macro Keys**, and on-line **Tutorials** and **Help Screens**. You also know that LeScript has on-screen display of **Underline** and **Bold-face**, integrates with a **Spelling Checker**, and has a **Directory** function more powerful than your DOS.

**NOW** see how superb LeScript will make your documents look printed out on your own printer. The proportional spacing, the boldface, the underlining, the italics, the different font sizes will absolutely dazzle you!

**PLUS**, to add to the great value of this incredible offer, the LeScript Sampler package includes the complete **100-page LeScript Instruction Manual**, handsomely bound in an attractive cloth-covered 3-ring binder and slip case.

**AND** we will even let you apply the full purchase price of the LeScript Sampler toward the future purchase of the complete LeScript Word Processing System.

### 30-DAY MONEY-BACK GUARANTEE

Available for: IBM-PC/XT/AT/jr and compatibles,  
TANDY 1000/1200/2000/3000,  
TRS-80 Model 1, 2, 3, 4, 4P, 12, 16,  
TRS-80 Model 4/4P CP/M.

**LeScript is available through  
Express Order at your local  
Radio Shack Computer Center**

The complete LeScript Word Processing System is available for \$129.95 for TRS-80 1/3/4 versions, all other versions are \$199.95. A Free LeScript Demo Disk is available by calling (305) 259-9397. Demo disk does not allow printing or save-to-disk. The LeScript Sampler does not allow save-to-disk. Demo Disk carries a \$2.00 shipping and handling charge

YES! Rush me the LeScript Sampler Package. I understand that I can apply its cost toward the future purchase of the complete LeScript Word Processing System.  
Send to: **LeScript, P.O. Box 361136, Melbourne, FL 32936**  
To order by Credit Card call (305) 259-9397

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

Telephone \_\_\_\_\_

My Computer is \_\_\_\_\_

VISA/MasterCard# \_\_\_\_\_

Exp. Date \_\_\_\_\_

\$19.95 + \$3.00 Shipping and Handling, Florida residents add 5% tax. Add \$3.00 for C.O.D. Add \$5.00 for shipment outside the U.S.

State \_\_\_\_\_ Zip \_\_\_\_\_  
Amount enclosed: \$ \_\_\_\_\_

ONLY  
**\$49.95**

# MISOSYS, Inc.

Talk to us on our Compuserve SIG  
Our page is: GO PCS49

We have professional software  
products for your Tandy Computer

**Now toll-free telephone ordering available. 800-MISOSYS**

**NEW LOW PRICE**

## LITTLE BROTHER DATA MANAGER

"... a lot of versatility in such an inexpensive program." *Hardin Brothers, 80 MICRO, Sept. 1985.*

- Menu driven for ease of use; extensive on-line help
- 65534 records, 1024 chars/rec, 64 fields/rec, 254 chars/field
- Select and sort on up to 8 fields; keeps 5 index files
- Definable input screens; up to 10 per data base
- Definable printout formats; up to 10 per data base
- Easily used by anyone for managing their data!
- Specify TRSDOS™ 6 or MS-DOS™ (PC, T1000, etc)

**Complete LB** ..... **74<sup>95</sup>**  
(Previously \$99) + \$2 S&H

**ON SALE**

## LITTLE BROTHER MAINTENANCE UTILITY

- Generate a new data file set from existing LB data.
- Add new fields or delete old fields.
- Perform special field type conversions.
- Re-chain deleted records in a Little Brother data file.

**LBMU-M4 or LBMU-MS** ..... **29<sup>95</sup>**  
+ \$2 S&H

**NEW**

## EnhComp: Enhanced BASIC Compiler

- Includes CED: a full featured line editor
- Supports LOGO-like turtle graphics: DRAW, ROT, and SCALE
- Built-in assembler for in-line Z80 code mixed with BASIC
- OPEN "X" for direct access LRLs of 2 to 32767 in length
- Both single and double precision math functions
- Strings to 32767 chars; unlimited length variable names
- Multi-line functions; fast keyed/tagged sort; REPEAT-UNTIL; break key control; structured IF-ENDIF; labeled statements; much more!

**EnhComp (I/III) or PRO-EnhComp (4)** . . . . **124<sup>95</sup>**  
+ \$3 S&H

**ON SALE**

## THE SOURCE

**While they last—only a few hundred sets left**

The complete, commented assembler source code for TRSDOS™ 6.2.0 excluding hard disk support, BASIC, and HELP.

- Volume 1—The System: 302 pages
- Volume 2—The Libraries: 486 pages
- Volume 3—The Utilities: 358 pages

**The three volume set:** ..... **99<sup>95</sup>**  
(Regular \$249) + \$5 S&H

## LDOS™ 5.1.4

LDOS™ is the Model III DOS most compatible with your TRSDOS™ 6. To run Model III software on your Mod 4, make your selection.

- LDOS™ 5.1.4 disk plus Quick Reference card plus 400 page manual ..... **\$19.95 + \$2 S&H**
- LDOS™ 5.1.4 disk + QRC plus smallLDOS user handbook ..... **\$29.95 + \$3 S&H**
- The complete LDOS™ system: 5.1.4 disk plus Quick Reference card plus 400 page manual ..... **\$49.95 + \$5 S&H**
- New Model 2/12 LS-DOS 6.2—TRSDOS 6 compatible ..... **\$49.95 + \$3 S&H**

Note: Model I systems available on request

## SOFTWARE Specials for this issue

- LED—a full-screen ASCII text editor great for JCL, KSM, or any plain old ASCII file - even BASIC programs. Regular \$29.95, This month ..... **\$9.95 + \$2 S&H**
- TBA—A BASIC text pre-processing utility that allows you to generate program code in a structured manner. Regular \$24.95, This month ..... **\$9.95 + \$3 S&H**
- DSM—A powerful and flexible disk virtual sorting utility for direct access files; Generates an index file. Regular \$59.95, This month ..... **\$39.95 + \$2 S&H**  
Specify Model I/III (LDOS only) or TRSDOS 6.2

Note: Prices good through last day of issue month

## Model I, III, and 4 Language Power!

- PRO-MC—Our FULL K&R C compiler with nearly 200 functions compatible with UNIX™ System V. Wildcards, I/O redirection, args, overlay support. Requires PRO-MRAS or M80 . . . **\$124.95 + \$4 S&H**
- PRO-MRAS—Powerful Relocating macro Assembler Development System. /REL module compatible with Microsoft! Includes full screen text editor, librarian, VM linker ..... **\$74.95 + \$3 S&H**
- PRO-CREATE The "standard" macro assembler used by professionals and novices alike. Full screen editor; cross-reference; more. .... **\$74.95 + \$3 S&H**
- PRO-HartFORTH—A full 1979 STANDARD FORTH compiler; runs under TRSDOS 6. Floating point! Access DOS files! Editor! Graphics! ..... **\$74.95 + \$3 S&H**

Note: Model I/III products available on request

MSDOS is a trademark of Microsoft Corp.  
TRSDOS and TRS-80 are trademarks of the Tandy Corp.  
UNIX is a trademark of Bell Telephone Laboratories

**MISOSYS, Inc.**  
PO Box 239  
Sterling, VA 22170-0239  
703-450-4181 MC, VISA, CHOICE  
800-MISOSYS 1P-5P EST Mon-Fri  
Orders Only!

Got a hot tip you'd like to share with our readers? Send it to Reader Forum, c/o 80 Micro, 80 Pine St., Peterborough, NH 03458. We pay \$10 for each tip we use. Sorry, but we cannot return or acknowledge submissions.



### Converting PRINT@

The short routine in Program Listing 1 changes all PRINT@ locations in Model I/III/4 programs to the proper GW-Basic values for the Tandy 1000.

For example, say you wanted to convert Program Listing 2 to GW-Basic. Just add Listing 1 to the end of your program and in place of each PRINT@ statement, put:

Here's a shortcut for loading a disk directory into Model 4 Debug. The full instruction is:

1.14.0.R.5000.18

Omitting the cylinder number (14 hexadecimal, 20 decimal) defaults to the directory cylinder. Omitting the starting sector (zero) defaults to sector zero. Omitting the number of sectors (18) defaults to the entire cylinder.

The abbreviated version of

the command is:

1...R.5000

where 1 is the drive number and R stands for "read." Similarly, the abbreviated command to write the modified sectors back to disk is:

1...\*.5000

where the asterisk is Debug's code to write to disk.

Jerry Engelbach  
New York, NY

### Out with the Old...

If you use a two-digit date code on each disk-file name, you can easily batch purge files older than you want to keep. Use the digits 1-9 for January through September and the first letters of the months October through December; use the last digit of the year. For example, a file created September 1986 might use the file name FILE-96.TXT. You can also indicate the day, if you have enough room. For example, FILE1096 indicates a date of September 10, 1986.

Kenyon McCoy  
Johnston, PA

### Invisible Protection

You can protect your MS-DOS files, to a degree, from prying eyes or accidental erasure with this simple method: Rename the file and place an ASCII character 255 (blank) within the name. You do this by holding down the alternate key and typing 255. This puts an invisible character in the file name, and you can recall this file only by typing the alternate-255 combination at the right location. You can use this trick on subdirectory names, as well.

The procedure offers no protection from MS-DOS's wildcard function (\*), however.

Martin McKee  
Tiverton, RI



Program Listing 1. Tandy 1000 PRINT@ conversion routine.

```
26000 Y=INT(X/64):R=Y*64:Z=(X-R)*1.27:Z=INT(Z+.5):Y=Y+1:IF Z=0 THEN Z=1:LOCATE Y,Z:RETURN ELSE LOCATE Y,Z:RETURN
```

End

Program Listing 2. Sample Model I/III/4 Basic listing.

```
10 CLS:CLR150
20 AS=STRING$(128,"*"):PRINT@0,AS:PRINT@267,"Demonstration of PRINT@ Conversion Routine":PRINT@341,"For the Tandy 1000/1200":PRINT@532,"By N.B. Parrish, Jr."
30 FOR T=0 TO 127:PRINT@768+T,CHR$(42):NEXT T:END
```

End

Program Listing 3. Converted GW-Basic listing.

```
10 CLS:CLR 150
20 AS=STRING$(128,"*"):X=0:GOSUB 26000:PRINT@5:;X=26
7:GOSUB 26000:PRINT@341:"Demonstration of PRINT@ Conversion Routine";X=341:GOSUB 26000:PRINT@341:"For the Tandy 1000/1200";X=532:GOSUB 26000:PRINT@532:"By N.B. Parrish, Jr."
30 FOR T=0 TO 127:X=768+T:GOSUB 26000:PRINT CHR$(42);NEXT T:END
26000 Y=INT(X/64):R=Y*64:Z=(X-R)*1.27:Z=INT(Z+.5):Y=Y+1:IF Z=0 THEN Z=1:LOCATE Y,Z:RETURN ELSE LOCATE Y,Z:RETURN
```

End

### RS-232 Misprint

A misprint in the Model III's *Operation and Basic Language Reference Manual* could drive machine-language programmers berserk. Naturally, most programmers consult the manual for the proper flags to set up the RS-232 parameters as part of a machine-language routine. Among these parameters is the 2-bit field specifying the number of bits per character: bits 5 and 6 of location 41F9 hexadecimal (hex).

The manual says that 00, 01, 10, and 11 select 5, 6, 7,

and 8 bits per character, respectively. It should really be 5, 7, 6, and 8 bits per character, in that order.

I used SETCOM to learn this. Calling SETCOM to set the flags for 9.600 baud, 7 bits per character, even parity, and 2 stop bits yielded a theoretical flag value of D4 hex. Examining the flags after using SETCOM gave a real value of B4 hex. Checking the Model III's UART specs verified the discrepancy.

Gene Kwiecinski  
Maspeth, NY



# Drive Your Model 4 Into The Future With The XLR8er

Say more faster. With H.I. Tech's new upgrade board in your TRS-80 Model 4 you can increase the speed up to 500%. No wait states under normal operation. It provides additional ram which can be configured as a high speed ram disk, user program memory or both. It is compatible with all existing Model 4, 4P, and 4D hardware and software. Simple plug in installation, no soldering or trace cuts required.

Included is the following:

- 256 KBytes of additional high speed ram memory (150ns)
- High speed HD-64180 processor (8 mhz z80 equivalent)
- System compatibility with TRSDOS 6 tm  
Montezuma Micro CP/M 2.2 tm  
Z-Systems Z CPR 3 tm

- Full one year warranty
- 2 RS232 serial expansion ports (optional)
- Ciarcia expansion bus (optional)

Introductory Price **\$269<sup>95</sup>\***  
Reg. \$299.95

Order today. It is so easy. Just call 800-835-2246 ext. 202 or 800-362-2421 ext. 202 (Kansas residents) and ask for the XLR8 upgrade board.

## H. I. Tech, Inc.

P.O. Box 25404  
Houston, Texas 77265  
800-835-2246 ext. 202  
in Kansas call 800-362-2421 ext. 202

\*Plus Shipping and Handling



# Roll Over, Beethoven

by Bobby Ballard

★★★★

**The Music Studio** runs on the Tandy 1000 (256K) and requires one disk drive and a joystick or mouse. A MIDI card is optional. Activision Inc., P.O. Box 7287, Mountain View, CA 94039, 415-940-6044. \$49.95.

**T**he Music Studio is to computer music what MacPaint or PC Paintbrush is to computer art. In fact, one feature of The Music Studio, the paint box, lets you create music by "painting" it onto a score. The Music Studio is well done and fun to use, but its complexity might make it unsuitable for some.

The Music Studio has an impressive array of tools and features. With the addition of a MIDI (musical instrument digital interface) port and a MIDI instrument, you would have a complete composer's toolkit. When you use The Music Studio to compose and play music, you can save your compositions to disk or print the entire score. Add to this a library utility that keeps track of your songs and sound effects and you have an outstanding software product.

## Getting Started

A frustrating problem occurs when you first try to load The Music Studio following the instructions in the manual. The instructions are wrong, so you're on the phone to Activision to find out how to load the program before the smell of the new disk drifts from the room. The correct command for the Tandy 1000 is:

MUSIC M M

if you are using the Tandy or Microsoft mouse and internal sound. I have the Tandy Digi-Mouse and it works great. The disk has batch files for loading The Music Studio with different MIDI-port cards.

When you load The Music Studio, it greets you with a tune and a beautiful color-graphics title screen. Once you tire of this, press the left mouse button and you're in the main composing screen.



Here you have access to everything through pop-up and pull-down menus. The entire program lets you access its many features with just a point and click of the mouse.

From the main composing screen, you can access two other screens and various menus. You can enter the paint box anytime by pressing the right mouse button. Pressing it again brings you back to the main composing screen. Under options, you pull down a menu that lets you enter the sound engineering room, where you can change, test, and save the design of various instruments.

One last major screen pops up when you select file input or output. The file menu screen greets you here. You access loading, saving, clearing the score, quitting, and printing the score through this section.

### The Star Ratings

80 Micro's star ratings reflect our reviewer's impression of a product.

The stars mean:

- ★★★★ Superior
- ★★★★ Excellent
- ★★★ Good
- ★★ Fair
- ★ Poor

## What Does It Do ?

You can compose and edit music with The Music Studio, but you can also do the same with up to four verses of lyrics. You can play the music back with or without the score and lyrics scrolling by as it plays.

After you compose your song, you can transpose it to another key automatically with a point and click. Transposing can be a grueling task even for good musicians, but with The Music Studio it is fast and easy.

Another feature lets you play back your score with different instruments. The Music Studio has 15 instruments to choose from, in-

cluding guitar, piano, trumpet, sax, bass, and white noise (a kind of blank canvas of sound). Using the sound engineering room, you can increase this to an unlimited number of instruments, but you can load only 15 at any one time. The program saves the new instruments you design with your composition and loads them when reloading the song.

The Music Studio does not play all 15 instruments at once; however, it does play up to three voices (instruments or noises) at one time. It can change voices in the middle of a song, as long as you don't use more than three voices in a column.

The Music Studio includes most musical notation. You select from a variety of rests, sharps, key signatures, notes, time signatures, ties, dotted notes, and triplets. You can also control the tempo and volume using sliders to which you point, click, and drag (hold the button down until positioned) using the mouse. You can select the entire range of tempos from grave (slowest) to prestissimo (fastest). The program defaults to allegro.

To help you move quickly and easily, a song slider helps you jump about the score by bars or columns. This works like the volume and tempo sliders with numeric indicators added to show your column position.

Rounding out the features is a trash can for disposing of your work and a key sym-

bol for locking and unlocking the "stay in current key" mode. When the key is unlocked, you can place notes anywhere on the staff. When it's locked, the program accepts notes in that key only.

The Music Studio has insert, copy, and move-block modes for quick editing. It has a global instrument-change mode, a global lengthen-duration mode for lengthening notes by a step, and a shorten-duration mode. One of the handiest features, add repeat, simplifies composition by letting you repeat sections without recomposing the phrases.

To write the music, you make your selections, then point and click notes right onto the staff. To delete a note, just go back to it and point and click again. Each note appears on the screen in a color representing the instrument selected and in the notation you've selected. While you place the notes, they sound out. If you don't wish to hear the notes, you can turn them off.

### The Paint Box

Another way of putting music to paper (screen) is with the paint box. Here you select from a color palette representing the instruments you've chosen for your orchestra. Instead of selecting particular notations, you select blocks of color in different sizes (representing different durations) while you still work on a standard staff.

While you are in the paint box, the trash can and other general-purpose features are available to you. You can slide through the song, change instruments globally, and listen to the music played back. Also, the paint box gives you a note eraser.

The paint box allows for a more free-form way of composing music. It is especially nice for the novice who cares or knows little about durations, keys, timing, and other formal parameters. I even think that the more serious user would enjoy painting music.

### The Sound Engineering Room

The most advanced section of The Music Studio is the sound engineering room. In this section, you have control over the actual design of the sounds you plan to use in your composition. Using sliders, you control attack, decay, sustain, and release (ADSR). This is a lot of fun.

Attack describes how quickly a sound is started. This is the first part in the design of a sound or instrument. Decay describes how fast the attack fades away. Sustain describes the quality of the sound after the decay. A snare drum has a short sustain compared to a trumpet. Release describes the sound after the note is no longer being played (i.e., after

---

## *An economical way to become a musician, engineer, and producer all in one.*

---

the trumpet player stops blowing). Some instruments will have a sharper or more pronounced release than others. You can modify duration of each of these.

When you combine these features to describe or design a sound, you use a graph that shows what is known as the sound envelope or ADSR. The Music Studio's sound provides you with an interactive graph that shows you the envelope as you make adjustments.

While in the sound engineering room, you have access to all the instruments and all three voices, and you have control over other features such as duration, copy, and exit. Using four other slider controls, you can adjust the duration of all four ADSR parameters. You can turn on and off the three voices and test sounds using the scales, or mix and test the voices at different octaves and in a variety of creative configurations. All of this makes the sound engineering room very impressive.

### Technical Notes

If your computer has full memory (640K), The Music Studio will recognize it at installation and let you compose longer songs. Even a minimum system (256K) has enough memory to hold a standard song with title, lyrics, instruments, and other notations with room to spare. Each song has a maximum length of 4,096 bytes under machines with minimum memory configurations. About 256 bytes are for the title and other parameters.

The actual size of the song you will be able to compose will vary according to the composition. For example, each repeat uses 3 bytes, while each letter of a lyric takes only 1 byte. The manual states, "A typical song with 400 columns should take up 2,400 bytes, leaving about 1,500 bytes unused." If you have more memory, you can compose songs up to eight times longer.

The MIDI interface was designed to let various electronic (digital) instruments connect to and communicate with one another. The MIDI standard interface provides for several types of ports, in-

cluding MIDI Out, MIDI In, and MIDI Through. Much like the RS-232C standard for communications, MIDI provides for a standard plug design for these ports and various signals and data protocols on the ports. This lets you attach various electronic instruments to each other. For example, you can attach a drum machine to a keyboard using the correct MIDI ports.

The Music Studio supports two MIDI cards: the Roland MPU-401 MIDI card and the Syntech IBM PC MIDI card. Either one includes support for a joystick or Microsoft-compatible mouse.

For those using a MIDI port, The Music Studio uses channel zero and sends out preset information with the notes. Instrument numbers in The Music Studio correspond to presets on the MIDI device. The program also supports volume and handles accents properly if your device supports different settings. The manual recommends two keyboards for use with The Music Studio: the Yamaha DX7 or Casio CZ-101. The Music Studio also has a one-instrument-only mode for use with the MIDI port found in the options menu.

### Conclusion

The 54-page manual comes with one copy-protected, read-only (unnotched) disk that you can't back up fully. The documentation doesn't mention how you could load it onto a hard drive. A warning states that attempts to duplicate The Music Studio might damage the original disk; such damage wouldn't be covered by the warranty. The disk has a 90-day warranty; after it expires you can obtain a replacement for \$7.50 and return of the defective disk.

While the loading-instructions bug in the manual could be frustrating to the new purchaser, it's easily corrected. However, I don't recommend that everyone go out and buy The Music Studio. Its very design gives it an inherently limited appeal and usefulness.

Since you must enter the music using a mouse, free-form composition can be almost impossible. Even the paint box can't make up for The Music Studio's lack of a piano keyboard or guitar neck for free-form expression and experimentation. This might be different if you are serious enough to install a MIDI port. However, you must ask yourself if composing music with a mouse complements your talents. It is a nice way to enter a score but not very effective for recording a jam session.

If you have an interest in music and The Music Studio sounds appealing to you, I recommend it highly. At \$49.95, it's an economical way to become a musician, engineer, and producer all in one. ■

## CP/M Helper

by Terry Kepner

★★★★

The **Conix Operating System** runs on the Model 4 (64K) and requires CP/M and one disk drive. Computer Helper Industries, P.O. Box 680, Parkchester Station, NY 10462, 212-652-1786. \$29.95. Programming System \$29.95. Library Utilities \$24.95.

While CP/M is a useful operating system, it lacks advanced features and is particularly user-hostile. The Conix Operating System, which comprises three modules, can help take the pain out of using CP/M. It supplies directory-path capability, the ability to write simple machine-language programs without having to learn Assembly language, and the ability to have your programs automatically search drives A and B for files.

Conix is a memory-resident system that acts as a buffer between CP/M 2.2 and the user. It removes many of the frustrations that normally accompany CP/M 2.2 operation. It also supplies many useful abilities and utilities to make your computing life easier.

Conix's set of three modules make your CP/M system more sophisticated; the modules include the Conix Operating System, Programming Language, and Library Utilities. Although I tested Conix on a Model 4P with Montezuma Micro's CP/M 2.2, it will work with almost any computer that uses a standard CP/M 2.2 or CP/M 3 implementation.

### The Conix Operating System

Conix has poor documentation on system installation, with no clue of what you need from the distribution disk to make the system work on your bootup disk. This is a problem because the first module requires two data disks to hold all the programs and files (23) available to Conix, the second module has one disk (11 files), and the third uses two disks (29 files). In fact, the instructions tell you to cold-start your computer using the Conix distribution disk. This doesn't work very well because the distribution disk doesn't have CP/M on it.

Installing Conix is simple. You need two Conix programs on your CP/M bootup disk: `Install.COM` and `CONIXR.COM`. You just run the `Install` program and press the enter key in answer to all the prompts. This gives you a standard program implementation. After you've learned how to use Conix, you can customize the installation to better suit your requirements (such as not using some of the subsystems and reducing the RAM Conix requires).

## Conix's three modules make your CP/M system more sophisticated.

However, before installation, you must make sure that your computer's memory is configured with all the options you usually use. That is, if you normally have the RAM-disk driver installed with your CP/M (to use the second bank of 64K in your Model 4), make sure that it has been loaded before you install Conix.

When you install Conix, it examines memory to see where it can fit without conflicting with other routines. If you install Conix and then load a high- or low-memory driver, it could load on top of a Conix subsystem and crash the computer. So install these options first.

You immediately notice a change when you run Conix: it changes the normal prompt, `A>`, to `<A:00>`. The two digits after A: indicate the user area of the disk you are currently logged as using. User areas are a standard CP/M feature that is poorly implemented in CP/M 2.2—it is far too restrictive. You can't be in user area A:12 and get a directory of user area B:02 without logging into that area first. Conix fixes that. You can store all your WordStar files in one area and the program in another, and still be able to use them together. This disk partitioning is called directory paths and is handy for organizing when you have many different types of files on one disk.

Conix fixes a major flaw in CP/M by letting you switch disks in a drive without warm booting (pressing control-C) your computer each time. It's smart enough to detect that you have changed disks, and it flips a bit to change the status of the disk to write-protected. It displays this by changing the DOS prompt to include an exclamation point: `<B!00>`. If you need to write to that disk, just press control-C to properly log it in on the drive.

A powerful feature is Conix's ability to set up a directory-search path. By specifying `OPT + ABM`, you can set Conix to search all three drives whenever you ask for a program or file, just as `TRSDOS` does, but in the order you specify.

Conix also lets you define up to 52 disk-based, command-line variables. The `Set` command assigns a command string to A (stored immediately on disk), which you can then recall by typing `$A` at the DOS prompt. Because Conix supports multiple commands on the DOS command line, this can be a useful feature.

Conix lets you change how much memory it uses with its memory-management command, where maximum memory is level 8 (25K) and minimum is level 1 (6.5K). You can also execute a program from memory instead of reloading MDIR from the disk whenever you are scanning several disks; typing an exclamation point (!) at the DOS prompt reruns the program from memory. In addition, Conix lets you force the command line to interpret data as all uppercase, lowercase, or mixed, regardless of what was typed; do direct number conversions between hexadecimal (hex), binary, decimal, and ASCII (similar to the `&H` and `ASC` commands in Basic); perform input/output (I/O) redirection (direct device direction of anything to anywhere else, including all kinds of character filtration and print spooling); replace the PIP utility with Copy; set file attributes; convert from binary to decimal and back; display Conix's top and bottom memory addresses; convert ASCII characters to hex and back; clear the screen; delete files with confirmation; echo output from the command line; examine memory; fill memory; input data from a port; output data to a port; find a string; copy memory; read a file into memory; search memory for a byte; enable and disable keyboard type-ahead; and more.

Included with Conix is ARM, an archive-maintenance system that lets you store and use files in 25 to 50 percent less disk space. ARM sets up an archive file that it uses to store programs and data files without leaving wasted room between records. Each archive file has its own directory, so you can store far more than CP/M's limit of 64 programs on a disk.

ARM lets you append files to the archive, create a new archive, delete a file in the archive, list the archive directory, type a file to the printer, rename a file, restore a deleted file, edit and save an archive, and extract a file from the archive.

### The Conix Programming Language

The programming module takes up where the Conix Operating System leaves off: It provides a way for you to create custom programs that interact directly with the Conix machine-language code. You use commands and syntax similar to those found in Basic and Pascal to create a source-code file. Then you run the source file through a special program, `XCC.COM`, that compiles the source and generates a machine-code, DOS-executable COM file that uses the Conix in-memory system as a run-time code area. The result is a memory-efficient pseudo-machine-language program

using Conix's built-in routines. The programs will not work with standard CP/M; to prevent crashes should you attempt to use one that way, each program starts with C9, an immediate return that Conix ignores but CP/M does not.

All Conix's capabilities are supported, including I/O redirection, variable support, and the ability to call other XCC-compiled programs as "daughters," with control returning to the "mother" when the daughter finishes execution.

The primary commands are a lot like Basic's: And, Or, If...Then...Else...ENDIF, IBRK (break out of If construction), GOTO, GOSUB, and Return. These commands have been added: Switch...Case...ENDSW (compare two strings, take one action if they are equal, another if they are not), SBRK (break out of a Switch construction), SPOP (pop the Switch stack), GPOP (pop a GOSUB stack), POS (get/set the next position at which program is to execute), While...Do (do something while a specified condition is true), Trap (catch errors), WBRK (break execution of a While construction), ONINT (catch interrupts), and Exit (leave execution).

Other supported programming commands include BDOS (execute system calls), Center (center output string on video), CLPRINT (clear a waiting interrupt), CNT (count the arguments on the command line), CTRL (print control characters), FNAME (break up and print the specified file-name sections), GETC (read an input character), GETL (read an editable input line), HI (print the high-order byte of a 16-bit number), ISC (check whether a string is all printable characters), ISN (check whether the string is all numbers), ISX (check whether a string contains legal hex characters), Match (search for a match of a pattern of bytes in a file), PARG (print the requested argument), Pipe (send text to the screen until an exclamation point is reached on a line by itself), Pop (pop a string from the memory stack), Push (put a string on the memory stack), RPT (repeat a string), SCMP (compare two strings), Shift (shift the argument variables to the left), SHX (set the contents of the 16 hex variables), Sleep (idle the CPU for the given time), Strip (remove leading characters), Sub (subtract two numbers), SUBSTR (print string subsection), Sum (add two numbers), Test (test two numbers for equality), and VSET (set the numeric argument variables to the quantity given).

What you end up with is a curious mix of Basic, Pascal, and Assembly code. But it does work and works well. You can even set breakpoints in your program and continue execution afterward (try that with Pascal).

Finally, you have four utilities that increase the power of your XCC-compiled programs: COM2HEX (converts COM files to HEX files for use with the CP/M Load command), EXPR (an expression analyzer for handling numeric manipulations too complex for Conix), HEX2MEM (converts CP/M-load-compatible HEX files into machine-executable form), and MKREL (lets you generate relocatable programs for use with the built-in Conix memory-relocation feature).

The Conix Programming Language module is complex and powerful. It lets a Basic programmer break into machine-language speed and efficiency with a minimum of work. The compiled programs take up anywhere from 25 to 75 percent less room than the source-code files, giving you the low-memory requirements of machine language while retaining the readability of Pascal or Basic in the source code.

### The Conix Utility Library

Conix's final module is a utility library that will make you the envy of other CP/M users. And the complete XCC source-code files, as well as executable versions of the programs in an ARM archive file, are supplied for you to peruse and modify.

The programs supplied include MKUser (assigns a text name and description to a user area—information is stored on the disk), CU (changes from one named user area to another), PWU (prints all user-area names and descriptions assigned by MKUser), MKDIR (creates a directory-tree path, stored on disk), CD (changes from one directory to another in a directory-tree path), RMDIR (removes a directory-tree path from the disk), LS (lists files of the directories and subdirectories), and others.

These 23 programs provide a host of extra features well worth the asking price. In fact, I have seen programs for just one of these functions advertised at the purchase price for this entire library.

### Conclusion

Conix dramatically improves CP/M by making it more efficient, powerful, and friendly. The Programming Language gives you the power and speed of machine language with the programming ease of Basic or Pascal. The Library Utilities also serve as useful examples for the Programming Language.

Overall, the manuals are thorough, with an extensive table of contents and indexes. Each chapter explains its subject and includes a chapter summary that reviews the commands and features explained in the chapter. The manuals' only drawback is that they don't go into enough detail; they should have more examples of how the commands work. ■

## Easier Than 1-2-3 by John B. Harrell III

★ ★ ★ ★

**Multiplan 2.0** runs on the Models 1000/1200/2000/3000 (256K) and requires one disk drive. Microsoft Corp., 10700 Northup Way, Bellevue, WA 98009. \$195.

**M**ultiplan has always been my favorite spreadsheet, whether it was the CP/M, TRSDOS, or MS-DOS version. And Microsoft has improved it over the years. The recent improvements in version 2.0 make it a viable alternative to Lotus's 1-2-3.

### Against 1-2-3

Because it was originally written for CP/M, Multiplan has always had a severe restriction on worksheet size. The most significant improvement in version 2.0 is that the increased number of rows and columns lets you use all your available memory.

Multiplan allows 4,095 rows and 255 columns, and provides improved memory-management techniques similar to the newer version of 1-2-3. For example, under the original version of 1-2-3, you could not store a number in the upper-left corner and then go to the opposite corner and store a second number; 1-2-3 would allocate all the cells defined by the diagonal corners that you had entered. Multiplan lets you store these numbers and any other combinations of widely scattered data.

Microsoft has dramatically improved Multiplan's calculation speed. It is still slower overall than 1-2-3, but you won't notice it. Once the program has recalculated the information on the screen, it places the remainder of the calculation in the "background," letting you enter data while the calculations continue—not a bad stunt, and it sure improves the program's perceived performance.

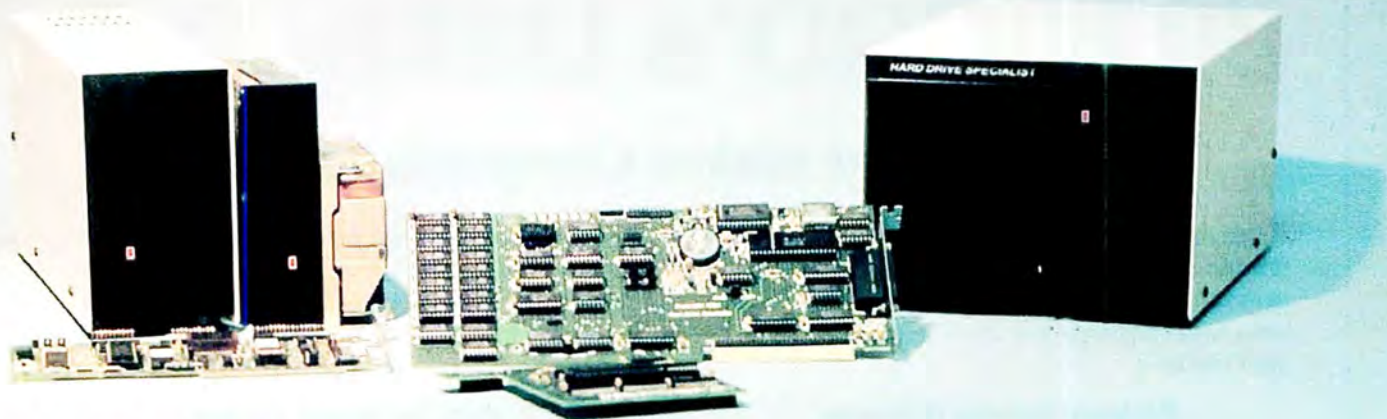
Communication with other software is important in today's office-automation programs. Multiplan is no slouch in this area. It lets you directly read and write 1-2-3 worksheet files and provides a utility program for text, delimited, DIF (VisiCalc), symbolic-data-format (dBase II), symbolic-link-format (Microsoft), and 1-2-3 worksheet files.

The ability to handle 1-2-3 files directly is a blessing. Multiplan reads these files without any special preparation and you can use them immediately. 1-2-3's macro definitions don't work and are preserved in the converted file as text strings; Multiplan has its own powerful macro facility. You might have to make some minor

*Continued on p. 37*



# The Best Money Can Buy . . .



## Model 1000 Multifunction Boards

### TanPak™

The TanPak™ expansion board has been designed to allow expansion beyond the scope of the standard Model 1000. Seven of the most needed functions/features have been combined into one package using only one expansion slot. Your remaining spaces are left free for future expansion needs. Features include memory up to 512K, RS232 Serial Port, Clock-Calendar, DMA, Printer Spooler, Memory Disk, and an Expansion System.

TanPak™ 0K . . . . . \$ 179 .

### TanPak™ Secondary

If you already have a Model 1000 memory board and do not wish to replace it, the TanPak™ Secondary is for you. It retains all the features of the TanPak™, except for the DMA.

TanPak™ Secondary 0K . . . . . \$ 139 .

## TANDY 1000

RS232C Serial— Clock/Calendar  
Piggy/Back Card by Hard Drive Specialist

**NEW**

Now available for the TanPak, the Tandy Memory Expansion PLUS Card, the HDS Memory Expansion Plus Card, and other boards that configure their expansion port with side A (component side) routing conductors to the top side of the 62 conductor dual row header.

**RS232C Serial Port** features a standard female RS232C female just like the Tandy boards, or specify the male version. The port can be set up as COM 1 or COM 2.

**Clock/Calendar port** features a perpetual clock for automatic time/date input into your programs as well as power up routine. The clock has an interchangeable port selector that allows the use of another clock on line.

Please order your Board by part number

	Part Number	
RS232C for Memory Expansion PLUS Cards	EPRS 232	\$85.
RS232C for TanPak and Other Cards	TPRS232	\$85.
Clock/Calendar for all Boards	CLCA	\$85.
Clock/Calendar-RS232C for PLUS Cards	EPRS232CL	\$170.
Clock/Calendar-RS232C for TanPak and Others	TPRS232CL	\$170.

(If you need a male RS232C connector, add the letter M to the end of the above Part #'s)

## Tandy 1000 Hard Drives

Shop and compare. Hard Drive Specialist has been building hard drive systems for years and have sold thousands of subsystems to satisfied Radio Shack/Tandy customers. Our drives all use buffered seek logic and plated media to result in almost one-fourth the average access found on our competitor's drives. Internal drive systems include an interface card and a half-height hard drive that replaces the top disk drive in both size and power consumption. External units include an interface card, case, power supply, and hard drive unit. All units require a memory board with DMA compatible with the Tandy 1000.

10 Meg Internal . . .	\$ 449	External . . . . .	\$ 599 .
20 Meg Internal . . .	\$ 549	External . . . . .	\$ 699 .
42 Meg Internal . . .	\$ 1195	External . . . . .	\$ 1345 .
20 Meg Internal for use with 2 disk drives . . . . .			\$ 569 .

## TANDY 3000 HARD DRIVES NEW

Now available for the TANDY 3000, Hard Drives that meet or beat the Tandy Products at a fraction of the cost. All drives include a controller card that also replaces the floppy card to save you a card slot.

10 MEGABYTE Subsystem . . . . .	\$649.
20 MEGABYTE Subsystem . . . . .	\$849.
42 MEGABYTE Subsystem . . . . .	\$1449.

(add \$150 for external systems)

## Model 1, 3, 4 Hard Drives

	Primary
5 Meg	\$ 495 .
10 Meg	\$ 695 .
20 Meg	\$ 845 .
30 Meg	\$ 1395 .

(Model 1 add \$50.)

Model 3/4 RS232 Kit . . . . .	\$69.
Model 3/4 Disk Controller Board . . . . .	\$99.

## HARD DRIVE SPECIALIST

### Order Line

1-800-231-6671  
1-713-480-6000

16208 Hickory Knoll  
Houston, Texas 77059

### Ordering Information:

Use our WATS line to place your order via Visa, MasterCard, or Wire Transfer. Or mail your payment directly to us. Any non-certified funds will be held until proper clearance is made. COD orders are accepted as well as purchase orders from government agencies. Most items are shipped off the shelf with the exception of hard drive products that are custom built. UPS ground is our standard means of shipping unless otherwise specified. Shipping costs are available upon request.

# Special for Model 4 Users!

## 80 MICRO's Utility Pak

### Software That Makes Computing Easier

Introducing the Load 80 **Utility Pak**—created specifically for Model 4\* users. Featuring 15 outstanding **80 Micro** programs designed to help you write better software and utilize all the features of your Model 4.

#### Problem Solving Software

No matter what the task, the **Utility Pak** is a source of ideas, solutions, tricks, and shortcuts. There's something for everyone on this disk, from machine language devotees to Basic neophytes.

■ **M3TOM4** converts Model III Basic programs to the Model 4, listing all potential errors.

■ **Finder** is an extension to your Basic editor that lets you replace, copy and move line numbers; find strings in your program; build a cross-reference table; restore an erased program, and more. Eleven enhancements in all.

■ **Crosscheck** automatically cross-references Basic keywords, variables, and GOSUB, GOTO, and Restore statements.

■ **PF/FLT** lets you program your function keys, either permanently or dynamically from DOS.

■ **ECI/CMD** gives you a Unix-like shell that lets you issue multiple commands from DOS Ready, call a library of your last 10 keystrokes, and reissue

any of those commands with a single keystroke. Requires TRSDOS 6.2.

And that's only the beginning. In all, you get **15 top-notch Model 4 utilities**, direct from **80 Micro** to you.

#### A Must for Model 4 Users!

As a Model 4 user, you'll wonder how you ever got along without the **Utility Pak**. It's that terrific. And, we've put all necessary instructions right on the disk.

Don't wait until your next programming project has you baffled in the middle of the night. Order your own copy of Load 80's **Model 4 Utility Pak** while supplies last! It's the best LOAD 80 package yet.

Simply return the coupon or attached order card today. Or call toll-free **1-800-258-5473**. (In NH, dial 1-924-9471.)

**YES!** I want to be a more productive programmer. Please send me the Load 80 Model 4 **Utility Pak** disk for \$26.50 ea. (Price includes postage and handling.)

Payment Enclosed    Visa    AE    MC

Card # \_\_\_\_\_

Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

\* Model 4 and Model III are registered trademarks of Radio Shack, a division of Tandy Corporation.

**LOAD 80 • Elm St • Peterborough, NH 03458**

11-86B



**Upgrading to  
MS-DOS?**

**LET'S  
GET  
SERIOUS.**

# THE COMPUTER WITH A FUNNY NAME.

## THE CLONE™

Frankly, this is the best computer value in America. Better than IBM. Better than Tandy. Complete MS-DOS™ compatibility. . lightning fast processing. . tons of RAM. This machine has everything the Boys in Blue promise. . and more. All at a price you can afford.

### WE DIDN'T NAME IT "CLONE" FOR NOTHING.

What we have here is a computer that is truly IBM PC/XT compatible. The Clone computer is completely MS-DOS compatible and it has all the hardware capability of the IBM PC/XT (except cassette) plus some and comes with MS-DOS 3.2 (the latest version), GW-BASIC and reference manuals (manuals are extra cost on the Tandy 1000!). With the Clone you get eight IBM compatible expansion slots, seven of them a full 13" long. You have six additional slots available; something a Tandy 1000 owner can only dream about.

### IBM COMPATIBLE? YOU BET.

Flight Simulator, one of the classic tests of compatibility, runs perfectly. Lotus 1-2-3® can't tell it's not running on an IBM. In fact, we have not discovered an off-the-shelf MS-DOS software package that wouldn't run properly on the Clone. The ability to run standard, off-the-shelf, software is important because it allows you to obtain software from any number of sources.

### STANDARD FEATURES:

The Clone computer comes complete, ready to run, with lots of standard features. Like the maximum 640K of system memory installed. Like an IBM standard parallel printer port, a clock/calendar with automatic battery backup, a speaker, two serial ports (one populated), a game adapter/joystick port, a light pen port, a 2-drive floppy disk controller, and the newest AT style keyboard. The video output is IBM standard color graphics with a special port that allows you to view color software on a monochrome monitor as well as 80 x 25 text. A 360K ultra-reliable floppy drive is included with space for three additional half-height floppy or hard disk drives. The 135 Watt power supply runs cool and assures you of adequate power for future expansion.

PC-DeskMates, a powerful multi-function memory resident utility, is included so you can start using the Clone when you receive it. You get an alarm, clock, calculator, calendar, notepad, phone dialer, typewriter, and access to DOS level commands. The Clone also comes with Qmodem, the famous modem program which enables you to access the world of telecommunications. PC-Write, probably the best shareware word processor available, is also furnished. Your Clone comes ready to work for you.

### WHAT'S MISSING?

The Big Blue price tag.



# For serious users only.

## OPTIONAL FEATURES:

The Turbo Clone is equipped to run at the standard 4.77MHz clock rate or at a blazing 8MHz. That's almost 70% faster processing than a standard IBM. Front panel lights indicate Turbo operation, power status and hard disk activity. A key-lock switch allows the keyboard to be electrically "locked out" for unattended security. Imagine a lengthy Lotus 1-2-3 spreadsheet recalculation with an 8MHz processor! It's awesome.

## HOW TO BUY A COMPUTER WITHOUT LEAVING YOUR CHAIR.

Zero effort required. Just pick up your phone and call us toll-free.



Clone equipped with all standard features.  
(Keyboard and monitor included) \$699

Your American Express, MasterCard and Visa are welcome at no extra charge as well as your check, money order, or COD order. Your Clone ships right away. In just a few days the UPS man delivers it to your door.

Too long to wait? Ask for our Expedited Service. Our distribution experts will get you a Clone OVERNIGHT, almost anywhere. (Some restrictions apply).

## A WORD OF EXPLANATION.

We sell Clones exclusively by mail. And there's a good reason why. Supporting the expensive overhead of a chain of retail stores is not our idea of keeping costs down. You're buying the Clone computer at wholesale prices, directly from the manufacturer. Your Clone comes with an ironclad guarantee that exceeds most other manufacturers'. We guarantee your satisfaction or we'll refund your purchase price within thirty days, no questions asked. Our guarantee is backed by a reputation earned in years of experience in the mail order business. Think about it. Repeat orders come from satisfied customers. This makes us work very hard to get it right the first time.

# US VS. THEM

FEATURES	CLONE	IBM PC/XT	TANDY 1000 EX (SX)	LEADING EDGE Model D
Microprocessor: Intel 8088 @ 4.77MHz	YES 8MHz Optional	YES NO	YES 7.16MHz STD	YES NO
Power Supply Rating	135 WATT	63.5 WATT	54 WATT	130 WATT
IBM Standard Bus:	YES	YES	NO	YES
Operating System:	MS-DOS 3.2	EXTRA	MS-DOS 2.11 (3.2)	MS-DOS 3.1
Disk BASIC:	YES	IN ROM	YES	YES
MS-DOS and BASIC Ref. manuals:	YES	EXTRA	EXTRA	YES
Standard System RAM:	640K	256K	256K (384K)	512K
Cost to Expand RAM:	-0-	\$\$	\$259 (\$129)	\$
Keyboard:	'AT' STYLE	STD	NON-STD	STD
Video Monitor:	INCLUDED	EXTRA	EXTRA	INCLUDED
Video Outputs:	BW/NTSC/RGB	EXTRA	NTSC, RGB	B/W, RGB
Disk Drive Capacity:	1-360K	1-360K	1-360K (2-360K)	2-360K
Max Number of Internal Drives:	4	4	1 (2)	2
Internal Expansion Slots:	8	5	1 (5)	4
Accepts Standard IBM Cards:	YES	YES	NO (10" Only)	YES
8087 Math Co-Processor Option:	YES	YES	NO (YES)	YES
Sturdy Steel Case:	YES	YES	PLASTIC	PLASTIC
Standard Parallel Ports:	1	0	1	1
Standard Joystick and Light Pen Ports:	YES	NO	J (J/LP)	NO
Standard Serial Ports:	2 (1 Optional)	0	0	1
Warranty	1 YEAR	90 DAYS	90 DAYS	15 MONTHS
Clock/Calendar	YES	NO	NO	YES
<b>Cost Ready-to-Run</b>	<b>\$699</b>	<b>\$3,063</b>	<b>\$1,398 + (\$1,683 +)</b>	<b>\$1,295</b>
<b>8MHz Option</b>	<b>\$799</b>			

Add \$35 for ground delivery; \$70 for air.

IBM XT cost figures\*: Video Display Adapter \$250; Video Display \$275; IBM XT computer \$2,145; Additional Ports, serial port, game port, parallel port, 640K RAM \$308; DOS 3.2 and BASIC \$85; Total \$3,063. Does not include the battery back-up clock calendar. No light pen port.

\*The above prices are list prices as best we could determine. Both the IBM and Tandy are available at a discount.

Tandy 1000 cost figures\*: DOS 2.11 and BASIC reference manuals \$29 +; Memory Plus Expansion Board (to 384K) \$129 +; 256K Additional RAM \$129 +; One serial Port \$79 +; Battery Back-up Clock Calendar \$99 +; Composite Monochrome Monitor \$129 +; Model 1000 EX Computer \$799; Model 1000 SX Computer \$1199; We were not able to equip the Tandy 1000 to directly compare with the Clone because of the 1000's inherent design limitations.

## CLONE OPTIONAL EQUIPMENT AND FEATURES

2nd 360K TEAC Half-height Floppy Drive .....	\$99	HiRes RGB Color Monitor 640 x 200 .....	\$299
20mb 65ms Seagate Internal HD .....	399	HiRes Mono Graphics Card 720 x 348 .....	129
30mb 40ms Seagate Internal HD .....	699	HiRes Mono Monitor 720 x 348 .....	110
80286 SpeedKit. Makes XT faster than AT .....	399	5151 Accounting Keyboard .....	79
300-1200 Internal Modem & Software .....	149	300 Watt Uninterruptable Power Supply .....	299

## OUR GUARANTEE

Simply, if anything is wrong with your Clone or any of its peripherals, we'll fix it free for up to one year after you've received your Clone. You have probably read other manufacturers' warranties, and gotten confused, suspicious or even mad. You're probably skeptical about anything as simple and straightforward as our warranty. So here's the fine print.

You can void your warranty by failing to exercise normal care when hooking up or operating your Clone. Or trashing the guts with a hammer. Or running it over with something. Or burning it up.

You have thirty days after receipt of your Clone to see if you and it are going to be compatible. If you are not satisfied with your Clone for any reason within that time you may return it to us for a full refund, less shipping charges. Just don't write in the manuals or lose anything that was in the original container as it all has to be intact.

The other guys only give a 90 day guarantee. Ever wonder why? Ever try to get a refund? Complete warranty details are available on request.

## NO ORPHANED CUSTOMERS

We have been supplying serious customers with high quality hardware and software since 1980. Sound engineering, high performance, quality construction, outstanding warranties and a reputation for doing the right thing have been our way of doing business since Day One. As the manufacturer of Clone computers, we stand behind each computer sold with a 100% commitment to our customers' satisfaction. Price, Performance, Value. . . Clone is the clear choice for serious computer users. To order, call us today. REMEMBER. . . YOUR BEST FRIEND MAY BE A CLONE!

Clone Computers; 2544 W. Commerce St; Dallas, Texas 75212; 214-637-5400; Telex 882761; FAX 214-634-8303;

800-527-3582 U.S.A.

800-442-1310 Texas

Clone 

©1989 by Clone Computers. IBM is a registered trademark of International Business Machines. MS-DOS is a trademark of Microsoft. PC-DeskMate is a trademark of Alternative Decision Software. Omnidisk is a trademark of the Forbin Project. PC-Write is a trademark of Quicksell. Lotus 1-2-3 is a trademark of Lotus Development Corp. Prices and specifications are subject to change without notice. Warranty details are available upon request.

# 1-800-527-3582

Continued from p. 30

cell-formatting changes before you store your new Multiplan worksheet.

Macros are handy and provide a shortcut for repeated operations. This feature was missing from the previous version. Multiplan now implements a complete macro capability that has all the power and flexibility of 1-2-3. Couple this with the outstanding power of Multiplan in areas such as windowing and external file links, and you get an unbeatable combination.

Multiplan's macro capability has one significant improvement over 1-2-3's: You can use a "macro record" mode to store the appropriate keystrokes while you perform one sequence. If you have ever written an extensive 1-2-3 macro, you will appreciate this capability. Repetitively executing macros to find out that they do not work because I entered a wrong keystroke has always frustrated me.

### Performance

I used Multiplan and 1-2-3 (version 1A) on a Tandy 2000 with 512K and a hard disk. This is by no means an extensive test of either product and is merely to show you some of the relative merits of each.

After loading DOS, I had 455,024 bytes of memory available to each program. I loaded the upper-left cell with a constant value and each cell below it with a simple formula that incremented the value above it. Then I copied this column down and right until I filled the worksheet to capacity.

Under these conditions, Multiplan could accommodate 137 rows and 100 columns. 1-2-3 could handle an equivalent spreadsheet of only 106 rows by 100 columns. When the Multiplan spreadsheet was filled with this test worksheet, I could still store a number in the cell at row 4095, column 255. Even in an empty worksheet, 1-2-3 cannot store a number in cell A1 and the cell at the maximum spreadsheet limits without exceeding memory size.

For timing purposes, I reduced each of these spreadsheets to a uniform 100 by 100 cells. 1-2-3 stores this spreadsheet on disk using 291,328 bytes, and Multiplan uses 214,347 bytes. I conducted the timing run by entering a new constant value into the upper-left cell and waiting for the calculations to complete.

1-2-3 required 11.3 seconds. Multiplan appears much faster, completing the visible calculations on the screen in 4.4 seconds. But the actual time for the calculations was 28.3 seconds. This is quite a bit slower than 1-2-3, but you can begin entering the next data item as soon as the screen calculations are done. Multiplan performs the remainder of the calculations in the background.

---

## Multiplan implements a complete macro capability that has the power and flexibility of 1-2-3.

---

### Conclusion

This new version of Multiplan is a big improvement over the previous MS-DOS release. The features I have mentioned put it in a class with 1-2-3, except for the graphics capabilities.

Installation for your MS-DOS computer is easy. If you can't find your video display among the 54 supported devices, you can design your own support by following clear instructions and prompts. Two of these installations even support TopView and Windows.

Documentation has always been a strong feature for Microsoft products, and Multiplan's documentation is no exception. A clear instruction section teaches everything you need to know to get started. The reference manual is complete and is organized alphabetically by command and by function. Separate appendices provide information for macros, file transportation, iterative calculations, and using Multiplan with a mouse.

If you need graphics capability, don't give up. Multiplan is fully compatible with its companion software application, Microsoft Chart, which produces exquisite graphics directly from spreadsheet data. Unlike 1-2-3's graphics, which can produce relatively simple graphs from a single range of data, Microsoft Chart and Multiplan can draw from a gallery of chart representations—columns, bar and line charts, scatter and area plots, to name a few—that also support a wide range of printers and plotters. Using the linked Microsoft software, you can rotate charts for display and combine pie and bar graphs for colorful presentations. On the down side, the Chart software does not automatically line up text from a Multiplan file, so you cannot produce adequate bulletin charts or text viewgraphs using this system.

This linked graphics package is infinitely better organized than the 1-2-3 software. The relationship between Multiplan and Microsoft Chart is so strong it blows 1-2-3 right out of the water, especially when you consider that the total cost of the two Microsoft programs is approximately the same as the cost of 1-2-3. ■

## Is Small-C Too Small?

by Hardin Brothers

★★★

**The Small-C Compiler** runs on the Model 4 (64K) and Model II/12/16 (64K) and requires two disk drives. Simply The Best Software Inc., 2709 N. Sibley, Metairie, LA 70003. \$59.95. *The Small-C Handbook*, Reston Publishing Co., c/o Prentice-Hall, 200 Old Tappan Road, Old Tappan, NJ 07675, 201-767-5049. ISBN 0-8359-7012-4. \$17.95.

Perhaps you've noticed: There's been a quiet revolution among microcomputer programmers. They've been leaving behind the traditional Basic and Assembly languages as development tools, and turning to C as the language of choice for developing everything from system-level programs to complex applications.

One popular early version of C for CP/M computers was Small-C, a subset of the C language. Small-C was originally written in 1980 by Ron Cain, presented in *Dr. Dobbs Journal*, and placed in the public domain. Later, James E. Hendrix greatly revised and expanded it and presented it in *The Small-C Handbook*. It has since been rewritten for several different computers and operating systems, most recently for the TRS-80 Model 4 and Models II/12/16. I reviewed the Model 4 TRSDOS 6 version.

### A Small C

The most obvious difference between Small-C and standard C (as defined in Brian Kernighan and Dennis Ritchie's *The C Programming Language*) is that Small-C supports only two types of objects: signed integers and signed characters. It does not support any kind of floating-point representation, nor does it allow such modifiers as long, short, or unsigned. However, it does allow arrays of both characters and integers.

You can create useful programs without using real (or floating-point) numbers. As long as you aren't writing mathematical or business applications, this limitation will probably not bother you too much. However, Small-C is missing some standard C features that can cause real problems.

A hallmark of C programming is a heavy reliance on pointers to storage areas, to arrays of pointers, and to pointers to such arrays. The levels of indirection that most C compilers allow are either unlimited or limited only by the programmer's ability to keep track of the levels of indirection.

However, Small-C supports only one level of indirection. Because C defines the name of an array as a pointer to the first element in that array, Small-C will not even allow a normal opening statement such as:

```
main(argc,argv)
int argc;
char *argv[];
```

Those three lines are normally at the beginning of any C program that accepts command-line arguments, but Small-C sees the third line as defining a pointer to a pointer and therefore complains. Similarly, Small-C does not allow multi-dimensional arrays.

As you might expect, Small-C does not support structures or unions, and therefore does not recognize the sizeof operator. Surprisingly, it also does not support the C conditional operator "? :", although that operator is not difficult to include in a compiler. Small-C does include all other standard C operators.

Small-C's preprocessor supports eight commands: #include, #define, #ifdef, #ifndef, #else, #endif, #asm, and #endasm. All work as they would with any standard implementation of C except #define. You can use Small-C's #define to give a value to a constant but not to define a macro command.

For example, near the beginning of a program, many C programmers will include a statement like:

```
#define PR(x) printf("x = %d\n",x)
```

and later in the program include a statement that says:

```
PR(i);
```

Most C preprocessors recognize the first line as defining a macro command and replace the second line with:

```
printf("i = %d\n",i);
```

Small-C's preprocessor knows nothing about macro substitution, so instead it produces the ungainly and incorrect line:

```
(x) printf("x = %d\n",x)(i);
```

Naturally, the compiler rejects this line as filled with errors.

Finally, and these limitations are probably the easiest to live with, Small-C does not support typedef or bit fields, but there are some close-to-full C compilers on the market that do not support those features of C either.

All in all, Small-C is a useful subset of standard C but has some serious limitations. You can write many useful programs with it, but you should not expect to be able to copy programs out of magazines and programming books and compile them successfully in Small-C. Even if the programs you are copying do not use floating-point numbers, they are likely to

## **Small-C is a useful subset of standard C but has serious limitations.**

use more than one level of indirection or the conditional operator, or depend on the macro ability of the C preprocessor. On the other hand, almost any program you write in Small-C will be portable, with few changes, to a full C compiler.

### **Included Programs**

The Small-C compiler produces Assembly-language output that you must assemble and link in order to produce a usable program. Because Small-C was originally written for CP/M, the Assembly language it produces is written in 8080 mnemonics, not the Z80 mnemonics that most TRS-80 assemblers accept.

Besides the compiler, the Small-C disk includes a macroassembler, a linking loader, a library manager, an archive utility, and a program to reconfigure the assembler to accept 8080 or Z80 mnemonics (or those for any other CPU). All these utilities and the Small-C compiler itself are written in Small-C; the source code for each is also included, so you can add new features whenever you want.

Apart from the compiler itself, the most interesting part of the Small-C package is a configuration utility that lets you change the mnemonics that the assembler will accept. The assembler contains a translation table that it uses to convert source code to machine code. With the configuration utility, you can change that table at any time. The disk includes translation tables for 8080 and Z80 mnemonics, but it would not be difficult to create your own translation table and use the assembler to create programs that could run on other computers as well.

### **The Small-C Library**

One of the characteristics that distinguishes one C compiler from another is the completeness of its library. No standard exists by which to judge a C compiler's library, although the ANSI C committee is working on one. For the most part, C programmers expect to add their favorite routines to the standard library of any compiler, as well as create their own libraries of special-purpose functions.

Small-C lacks two kinds of library functions that might cause some problems for users; you would probably have

to write these functions in Assembly language if you had a need for them. The first is the ability to look at or create a string as if it were an input/output stream. Small-C has no equivalent of the printf() and scanf() routines that are included with most compilers.

Second, although Small-C can manage memory blocks, it has no functions that move or copy a block of memory, such as memcpy() and memcmp(). Unlike the string-handling routines above, memory routines are generally easy to write in either C or Assembly language, and you could add them to the standard library with little trouble.

### **TRSDOS Implementation**

Even with all its limitations, I like the Small-C compiler. I am not at all impressed with Simply The Best Software's implementation of the TRSDOS 6 version of Small-C, however. If I decide to continue using Small-C on my Model 4, I will probably rewrite and recompile much of their TRSDOS-specific code. This implementation seems to have been made with little consideration or understanding of TRSDOS 6.

First, and most dangerous, nothing in this Small-C package checks or respects the system value HIGH\$. The authors have left unchanged the CP/M assumption that any program can have all memory space up to 0F3FF hexadecimal. If you have no filters or other programs loaded into high memory, this assumption robs you of 3K bytes of memory space. If you use more than 3K bytes of high memory for special filters and drivers (and I often do), Small-C and any program written in it will overwrite your high-memory routines and nearly always cause a system crash. The authors could have avoided this problem with about 30 extra bytes of code.

Second, this implementation of Small-C accepts only a source-code text file and can open only data files that have a logical record length of 1. Every Model 4 text editor I know of creates files with a logical record length of 256 bytes and therefore is incompatible with this version of Small-C. The solution is to write a source-code file with your favorite text editor or word processor, use the TRSDOS Copy command and its LRL parameter to copy the source to a new file with a record length of 1, and then compile the second file. You will have to do the same to work with any data files that other programs have created.

Like the problem with HIGH\$, this incompatibility with most Model 4 text and data files is easy to fix. A total of two additional lines of Assembly-language code could have made this Small-C work with any Model 4 text or data file.



CP/M users are accustomed to pressing control-C to abort a program and control-S to pause video output. TRS-80 users have learned to use the break key and shift-@ instead. In fact, TRSDOS provides special support for the break key and shift-@, but this Small-C implementation ignores and overrides that support, so the normal TRSDOS keys have no effect at all.

The authors of this implementation apparently did not understand the TRSDOS 6 keyboard interface. They have (inadvertently, I would guess) disabled type-ahead while any programs created with Small-C (including the compiler, assembler, and linker) are running.

TRSDOS includes a simple method to check the syntax of a file name, convert it to uppercase, and add a standard extension if necessary. This is another TRSDOS feature that is disabled in this version of Small-C. You must enter all file names in uppercase and, when the compiler or one of the other programs is expecting to add an extension onto a file name itself, you must let it do so or the program will stop with an error message.

One of the features of C and its original Unix environment is the ability to redirect input and output. That ability is lacking in CP/M, so the original author of Small-C had to create a method of simulating it.

The author of this version of Small-C has ignored the device independence of TRSDOS 6, as well as the device names that most users know (\*PR, \*DO, \*KI, and so on), and instead retained the CP/M-like interface of the original Small-C. If you want to send output to the printer, you must redirect it to the LST: device, not to \*PR, for example. If you are familiar with CP/M, this might not bother you much, but if you are used to working in the TRSDOS environment, you will be at least annoyed by this compiler's ignorance of TRSDOS.

I am more saddened than angered by Small-C's incompatibilities with TRSDOS, because all of them could be easily avoided and very little extra code (in fact, sometimes even less code than is already in Small-C) is needed to correct these faults. In many ways, TRSDOS 6 is the most powerful small-computer DOS available, but this package goes a long way to cripple it.

### The Small-C Handbook

James E. Hendrix's *The Small-C Handbook* is not included in the Small-C package but is absolutely necessary to use Small-C intelligently. The documentation from Simply The Best Software describes how to run the compiler, assembler, linker, librarian, archiver, and configuration program for the assem-

bler, but it tells you nothing at all about how to write Small-C programs. The documentation strongly suggests that you buy *The Small-C Handbook*, a suggestion you should not ignore.

The handbook begins with an introduction to 8080 Assembly language, then describes the subset of C that Small-C supports. It includes a complete description of the Small-C library functions and a discussion of how to write efficient programs. It also presents and explains the source code for the Small-C compiler and library.

One of the seven appendixes in the handbook claims to list the incompatibilities between Small-C and standard C, but lists only the possible ways in which a Small-C program might be incompatible with a standard compiler. It would be helpful to have a similar list of incompatibilities that a programmer might face when moving a standard C program to Small-C.

It is possible to use the source code of the Small-C compiler and library to figure out just what is and what isn't allowed in this subset of C, but the process would be tedious. *The Small-C Handbook* is almost mandatory if you are going to use Small-C at all.

### Conclusion

The documentation supplied with this version of Small-C is clear and concise. Its purpose is to explain how to run the system but not how to use it to write a program, and it fulfills that purpose well.

At one point, the documentation says that the purpose of Small-C is to be "simple, adaptable, and educational." It fulfills those objectives admirably. The nicest aspect of this package is that it includes all source code for the compiler, assembler, linker, librarian, archiver, configuration program, and standard library. *The Small-C Handbook* explains in detail how to modify Small-C to suit your own needs and computer.

If you enjoy modifying programs and making them work the way you think they should or you want a gentle introduction to the C language, this is a good package and is much cheaper than the other versions of C available for the Model 4 in TRSDOS 6 mode. I wish that the TRSDOS 6 implementation had been made with a better understanding of the operating system and its power, but the beauty of this system is that it is easy to alter and improve.

However, if you want to run C programs written for other compilers or listings published in magazines and books, Small-C's limitations might cause you a lot of frustration. In such a case, you'd do better to use a more full-featured version of C for the Model 4. ■

## A Better Access Road

by Mark D. Goodwin

★★★

TSAM/BCI runs on the Model III (48K) and requires LDOS 5.1.x and one disk drive. Terasoft Inc., 34 Greenfield Court, Berea, OH 44017. \$99.

Storage and retrieval of valuable information is perhaps the most important use for a computer. One of the most efficient access methods is the index sequential access method (ISAM). ISAM uses a unique key for each record in a disk file. Locating a particular record is easy; you find the record's key, which leads you to the desired record.

ISAM is a widely used access method, but it can be difficult to implement in a program. While TSAM/BCI isn't the first TRS-80 ISAM utility, it is unique in its approach to implementing ISAM. Other ISAM utilities use collections of Basic subroutines to implement the necessary ISAM routines. However, TSAM/BCI adds 20 new commands (see the Table) to the LBasic interpreter. Through the proper use of these commands, you can greatly simplify writing ISAM programs. Furthermore, you can use the helpful TSAM/BCI commands to simplify random-access file handling; they are many times faster than an equivalent Basic subroutine.

### New Commands

Executing TSAM/BCI can be as simple as entering TSAMBCI at the DOS Ready prompt. However, TSAM/BCI allows quite a few command-line options: manual specification of the run-time module's memory address, bypassing the loader menu, automatic execution of a CMD file, purging of the run-time module from memory, automatic execution of a Basic program, execution of the TSAM/BCI utilities menu, suppression of nonfatal error messages, building error-handling routines, erasing a Basic variable or array, undeleting (or restoring) a deleted record, passing of LBasic parameters to the LBasic interpreter, and passing of a Basic command line to the LBasic interpreter. TSAM/BCI's chief purpose is to install a run-time module into high memory, load LBasic, and link the run-time module with the LBasic interpreter.

TSAM/BCI modifies a few LBasic commands to make them compatible with TSAM/BCI. For the most part, these modifications are invisible to the programmer. All TSAM/BCI Basic commands are implemented in a program via the LBasic CMD statement. The fol-

*Continued on p. 106*

# A Language of Choice

Is the thrill gone from Basic?  
Meet some of the alternatives, up close and personal.

by John B. Harrell III

**W**hat language are you using on your computer? If you are a beginning programmer, chances are you're using the Basic interpreter that came with your system. Even if you're not a beginner, you might be using Basic out of habit or because you're confused by the multitude of alternatives.

One of the oldest languages in existence, Basic has survived the transition from mainframe to mini- to microcomputer. Even so, it has become a controversial language. Many experienced programmers berate Basic's slowness, its unstructured programming methods, its failure to make full use of the computer's memory, and its lack of true functions and procedures.

In this article, I'll describe alternatives to Basic that overcome some, if not all, of these limitations. The majority of languages I'll discuss are available for both TRSDOS and MS-DOS computers (a few are restricted to MS-DOS).

Refer to the Table for a list of available implementations along with prices. The index on p. 49 contains the manufacturers' names and addresses.

Throughout the discussion, I'll refer to a program called the

Sieve of Eratosthenes Prime Number Generator, which has become a de facto standard for forming compiler benchmarks. Program Listing 1 shows this program as it would appear in Basic. For each language I discuss (except Prolog), I'll provide the equivalent code required to write the Sieve of Eratosthenes number generator.

A word of advice before I begin: Though the market is filled with interesting and powerful alternatives to Basic, you shouldn't feel compelled to stop using Basic just because other languages exist. Many good programs are written in Basic. Its interpreter is widely available, and Basic code is relatively transportable. For whipping up short programs, Basic is nearly unsurpassed. Even for more complex programs, you can make Basic do almost anything by adding a little imagination.

## Fortran

Fortran (an acronym for formula translator) was one of the first high-level languages. Developed in the late 1960s, it has been the mainstay of the scientific community for nearly two decades. (A close relative, Algol, is widely used by the European scientific community.) The language has undergone several revisions, the most current of which is Fortran-77, a powerful implementation

used primarily on mainframe computers.

Fortran has many features in common with Basic. In fact, Basic was originally modeled after Fortran, with additions that made it more suitable for student programmers. Fortran, however, is a true compiled language: the code it generates runs in the machine's environment.

## The Fortran File

Fortran allows you to call procedures (subroutines) and functions with a flexible parameter specification. Its static definition of these procedures and associated data areas, however, prohibit reentrant modules or recursive-function definitions.

Designed to support punch-card input and line-printer output environments, Fortran's formatting capabilities are limited by today's standards. Implementing the full-screen video and keyboard-manipulation routines normally used on microcomputers requires a major programming effort.

Fortran's string-handling capabilities are limited, as well. You have to use arrays to hold characters as parts of an integer word (later versions have a character data type) and then write the software to manipulate characters.

Fortran provides a Do statement, which takes the form:

```
DO n var =i1,i2,i3
```

This looping control statement is essentially equivalent to Basic's For statement.



## System Requirements

All systems



Unlike its Basic counterpart, however, the Do statement executes one time, even if the loop's starting value is greater than the limit.

Fortran also has If, GOTO, Call, and function-invocation statements. The If statement, like Basic's, tests the validity of an expression and executes the statement following it. Unlike Basic's, Fortran's If statement can contain only one executable statement. The language also has a variation of the If statement that you can use as a three-way switch.

Program Listing 2 is the Fortran equivalent of the Sieve of Eratosthenes Prime Number Generator. To generate the prime numbers, the algorithm examines a flag array whose index value ranges from zero to 8,190. The program illustrates one of Fortran's most serious limitations: its inability to address arrays using natural index values. To do so, you either have to introduce program overhead or resort to programming tricks. (Failure to recognize this limitation and program around it can produce some spectacular crashes.)

The trick I used was to create a common data-storage area, which forces the compiler to allocate space for FLAG0 prior to the FLAGS array. An index value of zero addresses the word designated by FLAG0.

## Fortran vs. Basic

Fortran offers the following advantages over Basic:

- Compiled Fortran code executes faster than interpreted Basic code.
- Fortran directly supports modular programming by using separately compiled subroutines and functions.
- Fortran programs make use of all available memory (on MS-DOS machines) and the programmer has control over storage layout and use of the data area.

In its favor, Basic provides a graphics interface, which Fortran lacks, and its screen- and keyboard-handling capabilities are more flexible. String manipulation also is easier in Basic. Microsoft Basic provides more control statements than For-

tran, including While...Wend, and it has an excellent program editor and built-in user interface. Fortran requires a separate program editor (not supplied), and its user interface is often confusing.

Fortran-4, the version of Fortran for the Models I, III, and 4, supports the American National Standards Institute (ANSI) document X3.9-1966, with some restrictions and extensions. The most significant restriction is the omission of the complex data type used in mathematics. Fortran-4 is also available for CP/M operating systems.

The Microsoft Fortran Compiler for MS-DOS computers is a subset of Fortran-77. It supports the standard described in ANSI document X3.1978. Most of the extensions implement the features of the full ANSI Fortran compiler. Others provide minor, but useful, enhancements.

## Pascal

Until recently, you could find as many versions of Pascal in the market as you could computers. This was because, for many years, no formal Pascal standard existed. Vendors embellished the language (defined by Professor Niklaus Wirth) with enhancements and changed features at will to overcome perceived inadequacies.

Two events stemmed the flow of these deviant Pascal compilers: the introduction of the International Standards Organization (ISO) Pascal standard, and the introduction of Borland International's micro-computer implementation, Turbo Pascal.

The Microsoft Pascal Compiler available for MS-DOS computers implements the full ISO standard with two supersets of extensions and some minor limitations. It has two extension levels, which add features to the language's file-handling and processing capabilities and its system-access functions. The first extension level also adds string-handling capability.

Borland International's Turbo Pascal is almost a language in its own right. While it supports most of the ISO standard, its powerful extensions are a major contribution that put the full power of your com-

puter at your fingertips. You simply cannot find another compiler that is as flexible and that has as many features. On a Tandy 2000, compilation speeds of 9,000 lines per minute are normal.

Turbo Pascal 3.0 limits the code and data of programs produced with it to 64K. Fortunately, Turbo Pascal has a flexible overlay structure that allows you to overcome this limitation. Borland has promised a new version of the compiler (probably to be released early in 1987) that will generate code modules linkable with other languages.

Turbo Pascal also runs on Model 4 computers operating under CP/M. It is the best Pascal compiler in the CP/M environment, especially if you intend to transport code to the MS-DOS environment.

## Structural Notes

Designed as an instructional language, Pascal is rich with features that support top-down structured—or modular—programming. (Professor Wirth is a staunch advocate of structured programming, as are most computer-science instructors. Not surprisingly, Pascal is taught in the computer-science programs of many institutions.)

Program Listing 3 is a Pascal equivalent of the Sieve of Eratosthenes program. Unlike Basic and Fortran, Pascal does not require the use of the nefarious GOTO statement to make the program work. Its control structures make the GOTO unnecessary.

Notice the required declaration of variables and named constants at the beginning of the program. Pascal is a strongly typed language, which means you have to identify data before you can use it. Also, once you've defined the data, you can't use it for other purposes without resorting to programming tricks.

Pascal provides character, integer, real, and Boolean data types. If these don't suit your needs, you can make up types using Pascal's Type statement and its variety of array structures, records, enumerated types, and subranges.

Language	MS-DOS computers	Models I and III	Model 4/4P/4D TRSDOS 6.2	CP/M 2.2 and CP/M Plus
Fortran	Microsoft Fortran Radio Shack Catalog no. 26-5255 \$349.95	Fortran-4 Radio Shack Catalog no. 26-2200 (Model III) \$99.95	Fortran-4 Radio Shack Catalog no. 26-2219 \$99.95	Microsoft Fortran-80 Microsoft Inc. \$99
Pascal	Microsoft Pascal Radio Shack Catalog no. 26-5256 \$299.95  Turbo Pascal Borland International \$69.95	Alcor Pascal Radio Shack Catalog no. 26-2211 \$249.95	Alcor Pascal Radio Shack Catalog no. 26-2212 \$249.95	Turbo Pascal Borland International \$69.95
Modula-2	Modula-2/86 Logitech Inc. \$189	Not available	Not available	Modula-2 System for Z80 CP/M Hochstrasser Computing (Distributed in the U.S. by The Alternate Source) \$165
C	Microsoft C (Version 4) Microsoft Inc. \$300  Mix C Compiler Mix Software Inc. \$40-\$80	Aztec C80 Manx Software Systems \$199-\$299  MC MISOSYS Inc. \$124.95	Aztec C80 Manx Software Systems \$199-\$299  PRO-MC MISOSYS Inc. \$124.95	Aztec C80 Manx Software Systems \$199-\$349  Mix C Compiler Mix Software Inc. \$30-\$80
Prolog	Turbo Prolog Borland International \$100	Not available	Not available	Not available

Table. Refer to this manufacturers' price list to find the language implementation best suited to your system.

Pascal has a For statement, but compared to Basic's and Fortran's, it is extremely limited. The Pascal For statement can count up to a limit or down to a limit only by integral units. The language gains flexibility, however, by using enumerated data types as the index value of the For statement. The following program fragment illustrates this feature:

```
Type
  colors = (red, orange, yellow,
           green, blue, violet);
...
Var
  newcolor = colors;
...
FOR newcolor := red TO green
DO "statement";
```

Another Pascal control structure is the While...Do statement, which is similar to Basic's While...Wend. Pascal's Repeat...Until statement performs a similar function (it has no equivalent in either Fortran or Basic). The difference is in loop initialization and execution. If the control expression is invalid, the While statement won't execute, while the Repeat statement executes once.

Pascal also has a powerful Case statement for selecting the matching path in a

multipath logic statement. The code fragment in Program Listing 4, for example, takes appropriate action when the designated key is pressed. Pascal allows a compound statement defined by surrounding multiple statements with Begin and End. You can include any valid Pascal statement within this compound-statement block. The If statement in Listing 3, for example, consists of one compound statement that executes if the flag being tested is true. The statement contains several others, including a While statement.

### A Few Pointers

Like all newer languages, Pascal has such features as pointers, dynamic memory allocation, and recursive-procedure definition. Program Listing 5 demonstrates the use of pointers and dynamic memory allocation to perform the algorithm for storing numbers. The program uses a binary tree, of which each node, or leaf, consists of a number value and two pointers: one to the left subtree and one to the right subtree. After the tree is constructed from the input values, the tree limbs are "walked" in post-order form to generate a list of sorted output values.

The tree nodes and the elements of the

sorted output list are dynamically allocated from available memory. After generating the sorted output list, the program searches the list and prints elements in ascending order.

The program section labeled "traverse tree" is an example of a recursively defined procedure. Beginning at the node defined by the subtree parameter, the procedure recursively calls itself to reach the bottom of the leftmost limb. The node at that location is entered in the sorted data queue, and the procedure recursively traverses the entire right branch of the node.

### Modula-2

Modula-2, like Pascal, was designed by Niklaus Wirth. The language provides several features that aren't in Pascal, including separate module compilation. The kernel of the language (the core of reserved words) is not as large as you'd expect in a language with as many features as Modula-2 has. Its flexibility, however, resides in its ability to use functions prepared independently of your program.

To distinguish between a normal program module and a library module, Modula-2 requires that you specify the library module in two parts. The definition mod-

ule identifies the module's interface to other tasks; it indicates what data is required and what data is available to other modules. The implementation module states what actions will be carried out by the module.

Program Listing 6 demonstrates how this scheme might appear in a program. The first part of the program indicates what library module will be referenced and what data items, functions, and procedures will be used by the program module.

Modula-2's statement syntax is an improvement over Pascal's. Modula-2 relaxes the requirement for the grouped Begin and End statements that populate a Pascal listing. If you compare Listings 3 and 6, you'll notice the difference in the structure of the For and While loops particularly.

Modula-2 also implements a broader structure for the If statement and incorporates the ELSIF feature. For example, the following code fragment:

```
IF X < 5 THEN
  performAction1;
ELSIF x <= 10 THEN
  performAction2;
ELSE
  performAction3;
```

performs action 1 if X is less than 5, action 2 if X is between 5 and 10 inclusive, and action 3 otherwise. This is a compact way of performing a series of complex testing operations.

Another improvement contained in Modula-2 is the short-circuit expression evaluation. The following Pascal code fragment aborts on run-time error any time the value of X is zero:

```
IF (X <> 0.0) and
  ((1.0/X) < 0.01) then
  perform_math_statements;
```

The compiler generates code that evaluates the entire logical expression of the If statement prior to making the decision test.

Modula-2 ensures strict left-to-right evaluation of the logical expression and terminates evaluation whenever a partial expression is false. A similar situation exists for logical expressions connected with the Or operator. In this case, the conditional code executes immediately when the partial expression is true.

Modula-2 provides a conformal-array scheme that allows you to write array-handling procedures not bound to a single array type and without fixed upper and lower bounds. This allows access to vector arrays element by element.

### Best Buys

Two implementations of Modula-2 are worth your consideration. Hochstrasser Computing's Modula-2 System for Z80 CP/M is an excellent system for the Model 4 (or any other Z80 computer running CP/M). Logitech Inc.'s Modula-2/86 Software Development System is the implementation of choice for MS-DOS computers.

# SEE WHAT WE OFFER.



**TANDY 1000 H.D.**  
640K/1 D.D./10 MEG. H.D.



**TANDY 1200**  
From \$1098<sup>00</sup>  
256K/2 D.D.  
(monitor, etc. not included)

## Someday, our competition will give as much!

**TANDY computers are created equal. . . all retailers are not.**  
A good price is, obviously, very important but there are "other important differences" which the buyer should be aware of, before parting with any money.

A good example is "the retailers buy-back policy\*", to insure the buyer against that expensive mistake, "the call free number for easy price comparison and "credit card ordering for convenience and safety. The price quoted should be "the total price with no road-freight charges (to be added later). Under normal circumstances the order should be "shipped the next business day and a "same day rush-service" should be available.

The fact that the majority of orders are from "repeat-buyers is a strong indication of the great satisfaction and trust that our customers feel. However, for those still not convinced we offer "references to prove our bona fides and "that the Radio Shack warranty and service will be available, to our customers, NATIONWIDE.

These eight important considerations will be yours when you order from Fort Worth Computers. Call (free) for a price comparison.

\* For a small restocking fee, hardware, ask for details.

**TANDY 2000 H.D.**  
768K/1 D.D./10 MEG. H.D.  
8 MHz CLOCK SPEED



**TANDY 3000 H.D.**  
1 MEG RAM/1 D.D./25 MEG. H.D.  
8 MHz CLOCK SPEED



CUSTOMER SERVICE/QUESTIONS ABOUT  
YOUR ORDER and in TEXAS 1-817-573-4111  
(9 am-5 pm TEXAS TIME MONDAY-FRIDAY)

Fort Worth Computers  
377 Plaza  
Granbury, Texas 76048

**FORT WORTH COMPUTERS**

(WE ARE SERIOUS ABOUT SAVING YOU MONEY)  
Located 30 miles from Ft. Worth



**FOR LATEST PRICES**  
**CALL FREE (1-800) 433-S-A-V-E**

In terms of power, Modula-2/86 rivals Turbo Pascal. It is not nearly as fast when compiling, but it generally executes faster than any equivalent Turbo Pascal. Also, the compiler tools available from Logitech are mind-boggling. (I received 11 disks worth.) One of them, the Turbo Pascal to Logitech Modula-2/86 Translator, is truly innovative and lives up to its promise of easing the conversion process. I found I had to make relatively few changes to the translated code.

Neither Hochstrasser's nor Logitech's documentation is sufficient for teaching you how to program in Modula-2. Both manuals, however, cite a number of reference materials that are available in bookstores.

## C Language

Bell Laboratories designed and used C to write most of the Unix operating system. It contains many high-level language features and allows easy access to the machine architecture. Program Listing 7 is the Sieve of Eratosthenes program written in C.

Like Modula-2, C has a small kernel of reserved-word features and relies heavily on its function library for support. C is also a modular language and supports separately compiled functions.

Unlike Modula-2 and Pascal, C is not rigidly bound to its data structures. Your program is only loosely bound to the data types you establish. As in Assembly language, you can alter a data item's definition.

## Key of C

C is a language of statement blocks. Each block is enclosed in brackets {}. In Listing 7, the variable declarations appear at the beginning of the block associated with the main program function. Note that the program defines the flags array as type "char." This allocates the smallest storage unit (1 byte), allowing you to treat each element as a byte.

C provides looping controls like those in Pascal and Modula-2, with a few differences. C's for statement consists of an initialization expression, a logical test expression, and an increment expression. The loose definition of expressions can lead to some bizarre-looking statements, as in the following:

```
for (i = 1, j = i + 2, k = 5;
     s[j] = t[k];
     j = -.k + + );
```

The initialization expression is:

```
i = 1; j = i + 2; k = 5
```

The logical test is:

```
s[j] = t[k]
```

and the increment is:

```
j = -.k + +
```

Notice that the for statement does all the work; the executed statement is null.

Program Listing 1. The Sieve of Eratosthenes Prime Number Generator written in Basic.

```
100 DEFINT A-Z
110 SIZE = 8190
120 ITERATION = 10
130 OPTION BASE 0
140 '
150 DIM FLAGS(SIZE)
160 '
170 PRINT ITERATION;" Iterations: ";
180 '
190 FOR ITER = 1 TO ITERATION
200   COUNT = 0
210   FOR I = 0 TO SIZE
220     FLAGS(I) = -1
230   NEXT I
240   FOR I = 0 TO SIZE
250     IF NOT FLAGS(I) THEN GOTO 330
260     PRIME = 2 * I + 3
270     K = I + PRIME
280     WHILE K <= SIZE
290       FLAGS(K) = 0
300       K = K + PRIME
310     WEND
320     COUNT = COUNT + 1
330   NEXT I
340 NEXT ITER
350 '
360 PRINT COUNT;" primes."
370 END
```

End

Program Listing 2. To generate prime numbers in Fortran, the algorithm examines an array whose index value ranges from zero to 8,190.

```
PROGRAM ERATOS
INTEGER FLAG0, FLAGS(8190), SIZE, ITER, I, COUNT, PRIME, K
COMMON // FLAG0, FLAGS
SIZE = 8190
ICNT = 10
WRITE(*,800) ICNT
800 FORMAT(1X,I2,' Iterations: ')

DO 700 ITER = 1, ICNT
COUNT = 0
DO 100 I=0, SIZE
100 FLAGS(I) = 1
DO 400 I=0, SIZE
IF ( FLAGS(I) .EQ. 0 ) GOTO 400
PRIME = 2*I+3
K = I+PRIME
200 IF ( K .GT. SIZE ) GOTO 300
FLAGS(K) = 0
K = K+PRIME
GOTO 200
300 CONTINUE
COUNT = COUNT + 1
400 CONTINUE
700 CONTINUE

WRITE(*,810) COUNT
810 FORMAT(1X,I4,' primes.')
```

End

Program Listing 3. Unlike Basic and Fortran, the Pascal code does not require the use of GOTO statements.

```
PROGRAM eratos;
CONST
  size = 8190;
  iterations = 10;
VAR
  count, i, iter, k, prime : Integer;
  flags : ARRAY[0..size] OF Boolean;
BEGIN
  Write(iterations, ' Iterations: ');
  FOR iter := 1 TO iterations DO
    BEGIN
      count := 0;
      FOR i := 0 TO size DO
        flags[i] := True;
      FOR i := 0 TO size DO
        IF flags[i] THEN
          BEGIN
            prime := i*2+3;
            k := i+prime;
            WHILE k <= size
              BEGIN
                flags[k] := False;
                k := k+prime;
              END;
            count := count+1;
          END;
        END;
      END;
      WriteLn(count, ' primes.');
```

End

*Great Christmas Savings from Radio Shack*

# 64K Color Computer 2<sup>®</sup>

ONLY \$99.95\*

Save \$60 on a colorful gift  
for the whole family



## Here's a perfect gift that's sure to fit

Give your family Radio Shack's remarkable Color Computer 2 (26-3127, Reg. \$159.95), and start computing the first thing Christmas morning—even if you've never used a computer before! Simply attach to your TV, and you're set.

Everyone in your family can use the Color Computer 2 year round for education, entertainment, and home management tasks. It can even be used for writing your own sophisticated programs—simply pop in an instant-loading Program Pak™

cartridge, or choose ready-to-run cassette software (requires optional recorder) to set up a family budget, monitor investments, create an inventory of household items or play exciting games with sound effects. Your children will use the Color Computer 2 to help strengthen their math, spelling and reading skills, too.

## Save \$100 on the matching disk drive.

The Color Computer 2 lets you access 32,000 characters of memory with the built-in BASIC language. As your family's interests and skills grow, the Color

Computer 2 can be expanded to keep up with everyone's needs. Add the FD-501 Color Thinline Disk #0 (26-3131, Reg. \$299.95, Sale 199.95) to access the full 64K memory and to store over 156,000 characters of data. Plus, you can add a telephone modem for communications, a printer, joysticks and much more.

Put the Color Computer 2 in its place—at the top of your family's gift list—and do your shopping early at Radio Shack.

**Radio Shack<sup>®</sup>**  
**The Technology Store™**  
A DIVISION OF TANDY CORPORATION

Circle 75 on Reader Service card.

\*TV, platform and disk drive not included. Prices apply at Radio Shack Computer Centers and participating Radio Shack stores and dealers. Sale begins 10/21, ends 12/24.

You can perform multiple operations in each expression separated by a comma; the operations are executed from left to right. The logical test expression moves the data item from  $t[k]$  to  $s[j]$ —a normal assignment. The loop repeats until the data item moved is zero.

C also contains a while statement, which is identical to those in Pascal and Modula-2. C's do...while statement is synonymous with Pascal's Repeat...Until. C's if statements are similar to Modula-2's, and the language supports the short-circuit features that Modula-2 does when evaluating complex logical expressions.

C includes a switch statement for selecting multiple cases in code execution. It is identical to the Case statement in Modula-2 and Pascal, with one important difference: The C switch statement does not automatically terminate execution at the end of a selected block. It continues to execute the succeeding code until directed by some program feature (usually the break statement) to deviate.

One of C's nicest features is its preprocessor language. In Listing 7, this macro language is used to define the two constants in the program—a common application. You could also define a generic function that returns the maximum value of two numbers, regardless of either type, as follows:

```
#define MAX(A,B) ((A) > (B)) ? (A) : (B)
```

The statement uses the conditional operator:

```
expr1 ? expr2 : expr3
```

(If expression 1 is true, then expression 2, else expression 3.) The extra parentheses around the A and B parameters ensure proper evaluation of the expression (even if A and B represent expressions).

The example illustrates the price you pay for C's flexibility: Using macros can force evaluation of the same expression more than once. In a complex program, this can exact a steep penalty. In such cases, you might want to consider writing a simple function to replace the more elegant macro definition.

The C preprocessor also allows you to merge one file into another, encouraging the production of modular code. You define the module interface as an "include" file, which each user program references. Couple this with C's sophisticated conditional-compilation capabilities and you can easily produce code for any working environment.

## Standard References

C has no clearly defined standard, though most vendors strive to implement the de facto standard set by Bell Labs' Brian Kernighan and Dennis Ritchie. ANSI has proposed a standard for C, which supports Kernighan and Ritchie's implementation with a number of useful

Program Listing 4. A sample use of Pascal's Case statement.

```
Var
  ch : Char;
...
REPEAT
  Write("Enter menu selection (A/B/C): ");
  Read(Kbd,ch);
  CASE ch OF
    'a','A': (actions for this menu item);
    'b','B': (actions for menu item B);
    'c','C': (actions for menu item C);
  default:
    WriteLn("Error");
  END;
UNTIL ch IN [ 'A','B','C','a','b','c' ];
End
```

Program Listing 5. Sample code demonstrating use of pointers and dynamic memory allocation in Pascal.

```
PROGRAM binary_tree_sort(Input, Output);
TYPE
  { Each element in the tree consists of a node with a value
  assigned and two pointers: one to the left subtree and one
  to the right subtree. Each of these pointers may be NIL to
  signify no subtree. }
  treepointer = ^element;
  element = RECORD
    entry : Integer;
    leftpointer : treepointer;
    rightpointer : treepointer;
  END;
  { each sorted element will be entered into a FIFO queue for
  easy output }
  sorted = ^sortedelement;
  sortedelement =
  RECORD
    number : Integer;
    next : sorted;
  END;
VAR
  i : Integer;
  j : Integer;
  k : Integer;
  n : Integer;
  number : Integer;
  tree : treepointer;
  p : sorted;
  front : sorted;
  rear : sorted;
  seed : Integer;
FUNCTION rnd(maxvalue : Integer) : Integer;
BEGIN
  rnd := 1+Random(maxvalue);
END;
{ "enter" is a recursively defined procedure which will the
parameter "newvalue" and enter it into the appropriate subtree
corresponding to numerical ascending order. If "subtree" is
NIL on entry then a new node is created and the "newvalue"
assigned to it. If "subtree" is a valid pointer to a sub-node
then the procedure "enter" is called recursively to enter the
"newvalue" into the appropriate sub-node. }
PROCEDURE enter(newvalue : Integer; VAR subtree : treepointer);
BEGIN
  IF subtree = NIL
  THEN
    BEGIN
      New(subtree);
      WITH subtree^ DO BEGIN
        entry := newvalue;
        leftpointer := NIL;
        rightpointer := NIL;
      END
    END
  ELSE
    IF newvalue < subtree^.entry
    THEN enter(newvalue, subtree^.leftpointer)
    ELSE enter(newvalue, subtree^.rightpointer)
  END;
PROCEDURE enterqueue(value : Integer; VAR front, rear : sorted);
VAR
  addition : sorted;
BEGIN
  New(addition);
  addition^.number := value;
  addition^.next := NIL;
  IF front = NIL
  THEN front := addition
  ELSE rear^.next := addition;
```

Listing 5 continued



Listing 5 continued

```

    rear := addition
END;
PROCEDURE traverse_tree(subtree : treepointer);
BEGIN
    { Traverse the binary tree and produce a sorted output to
    the array "sorted". The output of the algorithm is the
    sorted array. This can be changed to produce any desired
    output }

    WITH subtree^ DO BEGIN
        IF leftpointer <> NIL
        THEN traverse_tree(leftpointer);
        enterqueue(entry, front, rear);
        IF rightpointer <> NIL
        THEN traverse_tree(rightpointer)
    END;
END;
                                { traverse_tree }
BEGIN                                {Binary_tree_sort}
    ClrScr;
    tree := NIL;
    front := NIL;
    rear := NIL;

    WriteLn('*** Binary Tree Sort Demonstration ***');
    WriteLn;
    WriteLn;
    WriteLn;
    WriteLn;
    Write('Enter the number of values to be sorted: ');
    ReadLn(k);

    WriteLn('The list of input numbers to the sort:');

    FOR i := 1 TO k DO                { build the tree of numbers }
        BEGIN
            number := rnd(9999);
            enter(number, tree);
            Write(number:8)
        END;
    WriteLn;

    k := 0;
    traverse_tree(tree);              {travel tree/generate queue}

    WriteLn;
    WriteLn('The sorted queue is:');

    p := front;
    WHILE p <> NIL DO                  {output the queue elements}
        BEGIN
            Write(p^.number:8);
            p := p^.next
        END;
        WriteLn
    END;

                                {Binary_tree_sort}
END.
                                End

```

Program Listing 6. Modula-2 requires that you specify the library module in two parts.

```

MODULE eratost;

FROM TTextIO IMPORT
    ReadInt, ReadCard, ReadChar, ReadString, ReadLn, ReadBuffer,
    WriteInt, WriteCard, WriteChar, WriteString, WriteBool,
    WriteLn, Eoln, SeekEof, SeekEoln;
FROM TKernelIO IMPORT
    File, FileType, OptionMode, StatusProc, ReadProc, WriteProc,
    ErrorProc, stdinout, input, output, con, trm, kbd, lst, aux,
    usr, conStPtr, conInPtr, auxInPtr, usrInPtr, conOutPtr,
    lstOutPtr, auxOutPtr, usrOutPtr, errorPtr, IOresult,
    KeyPressed, IOBuffer, IOCheck, DeviceCheck, CtrlC,
    InputFileBuffer, OutputFileBuffer;

CONST
    size = 8190;
    iterations = 10;

VAR
    count, i, iter, k, prime: INTEGER;
    flags: ARRAY [0..size] OF BOOLEAN;

BEGIN
    WriteInt(stdinout, iterations, 0);
    WriteString(stdinout, ' iterations: ', 0);

    FOR iter := 1 TO iterations DO
        count := 0;
        FOR i := 0 TO size DO
            flags[i] := TRUE
        END;
        FOR i := 0 TO size DO
            IF flags[i] THEN
                prime := i*2+3;
                k := i+prime;
                WHILE k <= size DO
                    flags[k] := FALSE;

```

Listing 6 continued

extensions. When you shop for a C compiler, be sure to buy a version that supports the proposed standard features.

A plethora of C compilers exists for just about every computer in the market. Prices range between \$40 for a full-featured system to over \$1,000 for a full software-development system. The difference between compilers is summarized in a word: performance. As a rule, the more expensive compilers generate smaller code modules, which execute lightning fast, while implementing the fullest measure of the proposed standard.

## Prolog

Artificial intelligence—one of the oldest topics in the minicomputer realm—has recently become a hot microcomputer topic. For years, computer scientists have dabbled in list processing and artificial intelligence (AI) using Lisp and a few other languages. These languages are very slow for lengthy processes, however, and the applications they generate usually require the resources of a mainframe with megabytes of memory.

The newest language for AI applications is Prolog (short for programming in logic). Developed in France during the early 1970s, it is essentially shorthand notation for describing common facts and relationships. The code is primarily descriptive and not intended for computational purposes. Prolog uses the facts and relationships in the code to construct goals or conclusions. Afterward, it can add these conclusions to its knowledge bank.

## Examining the Facts

The Prolog example in Program Listing 8 provides code for solving a "whodunit" problem. The program's goal is to search a list of potential suspects and identify one as Susan's murderer. The program is divided into four main sections: domains, predicates, clauses, and suspect definitions.

The domains define the symbols and objects used in the program. The predicates define the form of the action elements. They resemble function calls, but are really quite different. The first predicate:

```
person(name, age, sex, profession)
```

might be read as:

```
<name> is a <sex> person whose
age is <age> and profession is <profession>
```

The first group of clauses uses this first predicate to establish the known people in the case. The next group of clauses establishes pertinent facts and relationships among the people. The next clause establishes the crime: Susan was killed with a club.

The next group of clauses states possible motives and provides additional facts known to the police. Since the allowable terms for weapons are somewhat restrictive, I added a group of predicates (operates\_identically) to establish additional

## WORD PROCESSING SOFTWARE SALE

Allwrite 35% off	\$ 129.99
Lescrypt 30% off	\$ 83.99
Lazy Writer 40% off	\$ 74.99
PowerScript 25% off	\$ 29.99
Electric Webster Speller 30% off w/Correcting Feature	\$104.97

"The Cadillac" of Spelling Checkers - 80 Micro, 3/82  
 El. Web. Hyphenation 30% off \$ 34.97  
 E.W. Grammar & Style 30% off \$ 34.97  
 "A fantastic ... Grammar Checker" - 80 Micro, 4/85

For TRS-80 Models 1,3,4,4p,4d - Call for MS-DOS Prices.

**Order Now, Toll-Free:**  
**1-800-343-2432**  
**in Calif. 415-528-7002**

Visa, MasterCard, checks O.K. Add \$3 for C.O.D. Add \$5 for shipping & handling. Add sales tax in Calif. Prices good until 12/10/86 while supplies last!

**Software Sales Co.**  
**Box 5028, Walnut Creek, CA 94596**

**NEW**

## MODEL 4 USERS INTERACTIVE COMMAND LINE EDITOR

- Use the arrow keys to quickly recall any one of 20 commands .
- Edit your command with 9 user defined keys.
- Define up to 20 string substitutes.

for example:



then enter the command



**Software package \$14.95**

\* TRSDOS 6.2



Accounting Information Systems Enterprise  
 1799 S. Lee #D  
 Lakewood, CO 80226 303-989-6068

\* Trademark of the Tandy Corporation.



# Mail-Order Electronics • Worldwide • Since 1974

### TRS-80 MODEL 100



Easy to install module plugs right into the socket increasing memory in 8K increments. Three modules will increase your memory to its full capacity. Complete with module & documentation for installation.

M1008K (TRS-80 Model 100 Expansion)... \$24.95 ea. or 3/\$59.95

### TANDY 200

Easy to install module plugs right into the socket increasing memory in 24K increments. Complete with module and documentation for installation.

M200R (Tandy 200 Expansion)... \$74.95 ea. or 2/\$129.95

### TRS-80 MODEL I AND III

Model I: 16K equipped with Expansion Interface can be expanded to 48K with 2 Kits. Model III: Can be expanded from 16K to 48K using 2 Kits. Each Kit will expand computer by 16K increments (8 ea. 16K RAMs). Documentation incl.  
 TRS-16K3 200ns (Model III)... \$5.95  
 TRS-16K4 250ns (Model I)... \$5.49

### TRS-80 MODEL 4, 4P

Easy to install Kits come complete with: TRS-64K-2 (8 each 4164N-20 (200ns) 64K Dynamic RAMs); TRS-64K-2PAL (8 each 4164's plus PAL chip) and documentation for conversion.

TRS-64K-2 Expands Model 4 from 16K-64K or Model 4P from 64K-128K... \$11.95

TRS-64K-2PAL Expands Model 4 from 64K-128K... \$29.95

### TRS-80 COLOR AND COLOR II

Easy to install Kit comes complete with 8 each 4164N-20 (200ns) 64K Dynamic RAMs and documentation for conversion. Converts TRS-80 Color Computers with D, E, ET, F and NC circuit boards to 32K. Also converts TRS-80 Color Computer II to 64K. Flex DOS or OS-9 required to utilize full 64K RAM on all computers.

TRS-64K-2... \$11.95

TRS-CoCo (New Models Only - Includes two 50464's (41464) and documentation for conversion)... \$12.49

### TANDY 1000 OWNERS!!

**NEW!**

## ZUCKERBOARD Expansion Memory Half Card and Clock/Calendar for the Tandy 1000



The Zuckerboard Expansion Memory Board allows you to expand the memory of your Tandy 1000 (128K System) as much as 640K. 256K DRAM chips increase your computer's memory by either 256K or 512K, bringing your total system memory up to either 384K or 640K. The memory board also includes a DMA controller chip. Optional clock/calendar plugs directly onto the memory board. Manual included.

TAN-Clock	Clock/Calendar Option (only)...	\$ 39.95
TAN-EM256K	Includes 256K RAM...	\$ 99.95
TAN-EM512K	Includes 512K RAM...	\$139.95

### NEW! MULTIFUNCTION BOARD NEW! with Clock Calendar, RS232 Port and RAM Disk Printer Spooler for Tandy 1000

MTAN-256K	Includes 256K RAM...	\$199.95
MTAN-512K	Includes 512K RAM...	\$239.95

\$20.00 Minimum Order - U.S. Funds Only  
 California Residents Add 6% or 6½% Sales Tax  
 Shipping - Add 5% plus \$1.50 Insurance  
 Send S.A.S.E. for Quarterly Sales Flyer!

Spec Sheets - 30¢ each  
 Send \$1.00 Postage for your  
**FREE 1986 JAMECO CATALOG**  
 Prices Subject to Change



1355 SHOREWAY ROAD, BELMONT, CA 94002  
 11/86 Phone Orders Welcome (415) 592-8097 Telex: 176043

©1986 Jameco Electronics

Listing 6 continued

```
        INC(k, prime);
    END;
    INC(count, 1);
END
END;
END;
WriteInt(stdout, count, 0);
WriteString(stdout, ' primes.', 0);
WriteLn(stdout);
END eratos.                                     End
```

Program Listing 7. The Sieve of Eratosthenes program written in C.

```
#define SIZE      8190
#define ITERATIONS 10

main()
{
    int count, i, iter, k, prime;
    char flags[SIZE+1];

    printf("%d Iterations: ", ITERATIONS);

    for ( iter = 0; iter <= ITERATIONS; iter++ ) {
        count = 0;

        for ( i = 0; i <= SIZE; i++ )
            flags[i] = 1;

        for ( i = 0; i <= SIZE; i++ ) {
            if ( flags[i] ) {
                prime = 2 * i + 3;
                k = i + prime;
                while ( k <= SIZE ) {
                    flags[k] = 0;
                    k += prime;
                }
                count++;
            }
        }

        printf("%d primes.\n", count);
    }
}                                               End
```

Program Listing 8. Solving a "whodunit" problem with Prolog.

```
/*
** This program investigates the potential suspects given the
** facts concerning the crime.
*/

domains
    name, sex, profession, weapon, motive_type, covering = symbol
    age = integer

predicates
    person(name,age,sex,profession)
    had_affair(name,name)
    killed_with(name,weapon)
    motive(motive_type)
    smeared_in(name,covering)
    owns(name,weapon)
    owns_probably(name,weapon)
    operates_identically(weapon,weapon)
    suspect(name)

clauses
    person( allan, 25, m, football_player ).
    person( allan, 25, m, butcher ).
    person( barbara, 22, f, hairdresser ).
    person( bert, 55, m, carpenter ).
    person( john, 25, m, pick_pocket ).

    had_affair( barbara, john ).
    had_affair( barbara, bert ).
    had_affair( susan, john ).

    killed_with( susan, club ).

    motive( money ).
    motive( jealousy ).

    smeared_in( catherine, blood ).
    smeared_in( allan, mud ).

    owns( bert, wooden_leg ).
    owns( john, pistol ).

/* Background Knowledge */

operates_identically( wooden_leg, club ).
operates_identically( bar, club ).
operates_identically( pair_of_scissors, knife ).
operates_identically( football_boot, club ).

owns_probably(X,football_boot) if
```

Listing 8 continued

potential weapons. The next group of predicates (owns\_probably) provide links between the suspects and the weapons.

The fourth section of the program—suspect definitions—uses four clauses to generate suspects. The first clause names Allan and Bert as suspects, since both own items that could be used as a club. The second clause names John, since he had a motive (jealousy). The third clause generates Barbara's name, since she had an affair with a man Susan knew. The fourth clause names John again because of a different motive and his past criminal record.

The final part of a Prolog program is goal definition. I omitted this in Listing 8 intentionally. When the compiled program executes, you are prompted for the goal. Entering a phrase such as "suspect (Name)" causes the program to search for the names of all possible suspects.

## Manufacturers

### Alcor Systems

1132 Commerce  
Richardson, TX 75081  
214-238-8554

### The Alternate Source

704 N. Pennsylvania Ave.  
Lansing, MI 48906  
517-482-8270

### Borland International

4113 Scotts Valley Drive  
Scotts Valley, CA 95066  
408-438-8400

### Hochstrasser Computing AG

Chratzstrasse 14  
8954 Geroldswil, Switzerland

### Logitech Inc.

805 Veterans Blvd.  
Redwood City, CA 94063  
415-365-9852

### Manx Software Systems

Box 55  
Shrewsbury, NJ 07701  
201-530-7997

### Microsoft Inc.

10700 Northrup Way  
Box 97200  
Bellevue, WA 98009  
206-882-8080

### MISOSYS Inc.

P.O. Box 239  
Sterling, VA 22170-0239  
703-450-4181 or 800-647-6797

### Mix Software Inc.

2116 East Arapaho  
Suite 363  
Richardson, TX 75081  
214-783-6001

### Tandy/Radio Shack

One Tandy Center  
Fort Worth, TX 76102  
817-390-3011

The most outstanding implementation of Prolog for microcomputers is Borland International's Turbo Prolog. It is an exceptional product providing a full Prolog implementation with additional features such as window manipulation and full operating-system access. Turbo Prolog also provides a complete programming, editing, and debugging environment.

## Cobol and Beyond

Many other programming languages exist for microcomputers besides the few I've mentioned. Cobol (short for common business-oriented language) is widely used in business and was one of the first languages that attempted to let you program as you write. It is a verbose language, however, and is used mostly by programmers who have access to a mini-computer or mainframe system.

The Ada programming language resembles Modula-2. The Department of Defense is behind its development and plans to use it exclusively for software-development projects beginning in fiscal 1987. The Janus/Ada compiler is a subset of Ada. ■

You can write to John B. Harrell III c/o 80 Micro, 80 Pine St., Peterborough, NH 03458.

Listing 8 continued

```

person(X,_,_,football_player).
owns_probably(X,pair_of_scissors) if
    person(X,_,_,_) .
owns_probably(X,Object) if
    owns(X,Object) .

/*
** Suspect all those who own a weapon with which susan could
** possibly have been killed
*/

suspect(X) if
    killed_with(susan,Weapon) and
    operates_identically(Object,Weapon) and
    owns_probably(X,Object) .

/*
** Suspect men who have had an affair with susan
*/

suspect(X) if
    motive(jealousy) and
    person(X,_,m,_) and
    had_affair(susan,X) .

/*
** Suspect females who have had an affair with a man
** susan knew
*/

suspect(X) if
    motive(jealousy) and
    person(X,_,f,_) and
    had_affair(X,Man) and
    had_affair(susan,Man) .

/*
** Suspect pickpockets if the motive could be money
*/

suspect(X) if
    motive(money) and
    person(X,_,_,pick_pocket) .

```

End

## THE SMART WAY TO SAVE YOUR 80 Micro

You'll find all your favorite issues of **80 Micro** in minutes—and in great condition—with smart-looking binders or file cases from Jesse Jones.

Sturdy, protective file cases make for easy access to each issue, while rugged binders allow magazines to lay flat for easy reference. Both hold 12 issues, are custom-designed in green with gold spine lettering, and are **unconditionally guaranteed**.

Order today!

File Cases: \$6.95 ea.; 3/\$20; 6/\$36.

Binders: \$8.50 ea.; 3/\$24.75; 6/\$48.

**YES!** Please send me protection for my  
**80 Micro:**

\_\_\_\_\_ File Cases    \_\_\_\_\_ Binders

I enclose my check or money order for \$ \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

US currency only. Outside US, add \$2.50 per  
item for postage and handling.

Please allow 4-6 weeks for delivery.

MAIL TO: Jesse Jones Box Corp., PO Box  
5120, Dept. 80M, Philadelphia, PA 19141



# Dealers Sell

Selling **80 Micro** will make money for you. Consider the facts:  
Fact #1: Selling **80 Micro** increases store traffic—our dealers tell us that **80 Micro** is the hottest-selling computer magazine on the newsstands.

Fact #2: There is a direct correlation between store traffic and sales—increase the number of people coming through your door and you'll increase sales.

Fact #3: Fact #1 + Fact #2 = INCREASED SALES, which means money for you. And that's a fact.

For information on selling **80 Micro**, call 800-343-0728 and speak with our direct sales manager. Or write to **80 Micro**, Direct Sales Dept., 80 Pine St., Peterborough, NH 03458.

# F-15 STRIKE EAGLE

## For Fighter Pilots—*Not* Sightseers

Enjoyed by  
over **200,000**  
satisfied computer  
fighter pilots!



### THE FIRST. THE BEST. THE **ONLY REAL** COMBAT FLIGHT SIMULATOR.



MAJOR BILL  
OVER  
3000 FLYING HOURS

F-15 STRIKE EAGLE is the most realistic, accurate and fun combat flying simulation available. Others have tried to copy it. But none of them have ever strapped on a fighter to experience the thrill and excitement of real combat fighter missions like our Major Bill<sup>®</sup> has. Compare F-15 STRIKE EAGLE versus our famous competitors, better known for their fancy hangar graphics. If you want a **slow sightseeing hangar queen, buy theirs!** If you want a product that has had over 50 outstanding reviews, thrilled over two hundred thousand satisfied computer fighter pilots, and gives you **real** fighter pilot action, then you want F-15 STRIKE EAGLE!

### COMPARE —

COMPARE	F-15 STRIKE EAGLE	IMITATION GAME
SPEED	4 TIMES FASTER	<i>SLOW AND UNRESPONSIVE**</i>
COMBAT AREA	7 REAL MISSIONS—LIBYA TO THE PERSIAN GULF	2 SMALL, FICTITIOUS FLYING AREAS
COCKPIT	SOPHISTICATED NAVIGATION MAP, MULTIPLE RADAR AND WEAPONS DISPLAY	TWO LINES OF TEXT
ACTION	MULTIPLE MISSION OBJECTIVES AND THREATS	PICK ONE MISSION OR ONE SET OF THREATS
VALUE	GREAT VALUE—(HUNDREDS OF HOURS OF PLAY TIME)	<i>OVERPRICED</i>

\*\*C-84 COMPARISON

F-15 STRIKE EAGLE is for Commodore 64/128, Atari 800/XE/XL series, Apple II+ family, IBM PC and PC JR computers for a suggested retail price of only \$34.95. Call or write for more information or Money Order, MC/Visa orders. Add \$2.50 for shipping and handling.

Registered trademarks of Commodore Business Machines, Inc., Atari, Inc., Apple Computer Inc., and International Business Machines, Inc., respectively

Major Bill Stealey, USAF Reserve, President, MicroProse

# MICRO PROSE

SIMULATION • SOFTWARE

120 Lakefront Drive • Hunt Valley, MD 21030

(301) 667-1151

Circle 212 on Reader Service card.

Complete the coupon below,  
or CALL TOLL FREE  
**1-800-258-5473**  
(In NH, dial 1-924-9471)



**YES**, please send me the  
80 Micro Special Collection(s)  
I've checked below:

**For the Model III:**

- The Best of the Model III,  
15 programs, just \$21.45\*

**For the Tandy 1000**

- Starter Pack 1000,  
13 programs, just \$26.50\*

**For the Model 4:**

- Utility Pack, 15 programs,  
just \$26.50\*
- Best of the Model 4,  
12 programs, just \$21.45\*

- Payment enclosed**  
**Amount \$** \_\_\_\_\_

**CHARGE MY:**

- Amex  Visa  MC

Card # \_\_\_\_\_ Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_

Name (print) \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

\* Includes postage and handling. Foreign air-  
mail, please include US \$1.90 each. Please  
allow 4-6 weeks for delivery.

11-86BI

**MAIL TO:**

Load 80  
Elm St.  
Peterborough, NH 03458

# SELECT THE 80 MICRO POWER PACK FOR YOUR MACHINE!

- Tandy 1000  Model III  Model 4

Software written especially for *YOU!*

Here's a lineup of *80 Micro's* most popular software, fully tested by our technical staff. And now ready-to-run on top quality disks. It's one of the most outstanding values in the industry! Complete documentation is included.

## FOR THE MODEL III

**Best of the Model III** —15 exceptional utilities and applications from the pages of *80 Micro*. Includes debugging aid to let you single-step through Basic programs and display and change variables, spelling checker, the famous Hinrichs Basic Word Processor, printer spooler, machine-language terminal program, printed circuit board designer, disk drive timer, project manager...

...upgraded version of our Easydata data base manager, full-featured spreadsheet in Basic, full-screen graphics editor, patch editor and library, screen blank-out utility, macro builder for setting program parameters and customizing DOS commands, and utility to let you execute a group of DOS commands with a single command line.

## FOR THE TANDY 1000

**Starter Pack 1000** —13 exciting and useful programs to get you up and running. Includes spelling checker, futures trading simulator, project manager, graph generator, critical path scheduler, custom sort generator, simple-interest and Rule-of-78s calculator, routine to solve for roots of linear and nonlinear equations, data base manager, statistics program, memory-resident video blank-out utility, and six sub-routines to calculate math functions in double precision.

**ORDER NOW,  
WHILE SUPPLIES LAST!**

## FOR THE MODEL 4

**Utility Pak** —15 outstanding programmer's aids. Includes III-to-4 Basic converter, disk drive timer, string sorter to replace TRSDOS 1.3's CMD"O", pop-up help screen generator, disk-space mapper (**previously unpublished**), enhanced Debug, Model 100-like bar cursor directory program, routine to add Point, Set, and Reset to Basic...

...killed-file restorer, Basic cross-checker, function key programmer, Unix-like DOS shell with command library and multiple command feature, load-address locator, memory locator for scroll protection, the cursor character, and the function keys...

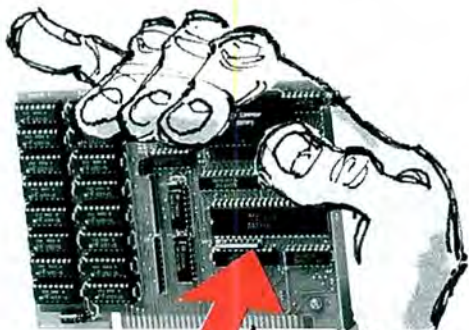
...and Basic editor extension with 11 features including string searcher, cross reference restorer, and line-number replace, copy, and move. (**Note:** some of these programs will not run on the 4D in double-sided mode.)

**Best of the Model 4** —A dozen of the finest programs to appear in *80 Micro*. Includes Scripsit enhancement, JCL file editor, Life, window driver, statistics program, project manager, data base manager, III-to-4 Basic converter, utility to let you run TRSDOS 1.3 cassette programs from TRSDOS 6.X disks, DOS setup JCL file, Model 100-like bar cursor directory program, and routine to add Point, Set, and Reset to Basic, (**Note:** some of these programs will not run on the 4D in double-sided mode.)

Complete the coupon or CALL TOLL FREE  
**1-800-258-5473** (In NH, dial 1-924-9471)

# TANDY IS DANDY...

...until you want more



**DMA  
CHIP**

“...the Zuckerboard is a high-quality, reliable alternative to the high prices of Tandy’s expansion memory boards.”

June 1986 Issue

**PCM**

Magazine

**MADE  
IN  
U.S.A.**

TANDY 1000	Zuckerboard Expansion Memory	Tandy Memory Plus
DMA with 256K	Inc. \$109	Inc. \$319.95
with 512K	\$149	\$519.90
Options:		
Clock/Calendar	\$49	\$ 99.95*
256K Upgrade	\$49	\$199.95
RAM Disk/Print Spooler	\$49	N/A
Warranty	2 Years	90 Days *with mouse

“... High Power Low Price.” PCM

**It's another**

# ZUCKERBOARD



235 Santa Ana Court • Sunnyvale, CA 94089 • (800) 233-6874 (CA) • (800) 222-4920

# Let There Be Light Pens

Tandy doesn't sell one, but it has most of the parts for you to build your own Tandy 1000 light pen.

by Rod and Joyce Kreuter



If you've been wanting a light pen for your Tandy 1000, there's no need to wait around any longer for the folks in Fort Worth to make one. We've fashioned a homemade version out of a pen-sized flashlight and a few components sold at any Radio Shack store (see Table 1). If you prefer the convenience of purchasing a kit containing all necessary parts, Radiokit will supply one for \$29.95 (see the box on p. 58).

Unlike most electronics projects, the light-pen unit must be crammed into the smallest possible space. The parts are therefore small, and you must be pretty good at soldering. But with the help of the photographs and diagrams that follow, you should have no trouble finishing the project. We've even provided tips on programming the light pen in Basic, along with three programs that show it in action.

## Just Like TV

To understand the basics of light-pen operation, you need to know how a computer's cathode-ray tube produces the screen display.

A typical monitor operates with a horizontal sweep rate of 15.75 kilohertz (kHz) and "paints" a new, 262-line screen every 30 milliseconds (ms). The electron beam starts at the upper-left corner and reaches the upper-right corner in 63 microseconds ( $\frac{1}{16}$  kHz). The computer then issues a horizontal sync pulse that sends the beam quickly to the left.

This continues until the beam sweeps past the area covered by the light pen. When the light pen issues a pulse, the computer determines which line it was painting, and when it last sent out a horizontal sync pulse, to calculate the position of the light pen.

## Schematic Variations

Diode D1 is a pin photodiode operating in a photoconductive mode: If light hits the diode, a current flows through it (see Fig. 1). The typical current is 1-3 microamps. (You could use another diode, but nothing Radio Shack sells is fast enough to work here.)

Q1 and Q2 form a transimpedance am-



## System Requirements

Tandy 1000  
GW-Basic

plifier that converts the current from D1 into a voltage. The signal at the Q2 emitter is 15-45 millivolts (mV). Shield the circuit before testing this signal or the horizontal sync pulses will throw off the reading.

Transistor Q3 is a post amplifier with a gain of about 10. It boosts the signal enough to trigger the comparator.

The LM311 comparator (IC1) converts the analog signal to the transistor-transistor logic (TTL) level required by the Tandy 1000. The output is a negative-going pulse about 2 microseconds wide (the exact width depends on the monitor type and brightness level, but it need only be less than 10 microseconds).

Consult Figs. 1-3 for the voltages you may need in troubleshooting. Note that all measurements were made with no light showing on the diode.

### Soldering Time

Now to the nitty-gritty. First, you must modify the flashlight so the cables can exit the rear. Remove the on/off switch by pushing the button down the length of the barrel (a piece of brass tubing and a hammer work well). The switch mechanism will hang up when it reaches the threads at the front of the flashlight (see Photo 1). Then remove the black-plastic insert—without damaging the flashlight—with either a knife or heat.

The circuit is built on a 0.5- by 3.5-inch piece of perforated board (10 holes per inch). Leads are lap soldered, and in some cases two components share the same hole. The top and bottom view drawings

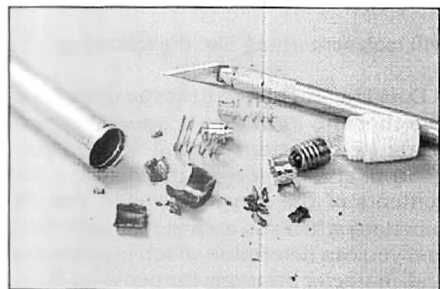


Photo 1. Removing black-plastic insert from penlight without damaging metal case takes patience.

Reference	Description	Cost
C1,C4	.01 $\mu$ F	40 cents
C2,C3	.1 $\mu$ F	40 cents
C5	100 $\mu$ F, 10 volt	50 cents
D1	Motorola MRD500	\$3.50
IC1	LM311	\$1
R1,R10,R12	1 Kohm	30 cents
R2	15 Kohm	10 cents
R3	220 ohm	10 cents
R4	470 ohm	10 cents
R5	47 ohm	10 cents
R6	10 ohm	10 cents
R7,R9	100 Kohm ( $\frac{1}{8}$ watt)	20 cents
R8	2.2 Kohm ( $\frac{1}{8}$ watt)	10 cents
R11	4.7 ohm	10 cents
Q1,Q2,Q3	2N3904 or Radio Shack 276-2016	\$2.10
S1	Homemade	—
Flashlight	Radio Shack 61-2626	\$2
Connector	Radio Shack 276-1538	\$2.50
Hood for connector	Radio Shack 276-1539	\$2

Table 1. Parts list for the Tandy 1000 light pen.

Function	Description
Pen On	Enables event trapping. Basic will check it after each program line to see if the light pen has been activated.
Pen Off	Disables event trapping.
Pen Stop	Temporarily suspends light-pen event trapping until Pen On is executed.
On Pen GOSUB	Tells program where to transfer control when pen is activated. Pen On must have been executed previously.
Pen (0)	Returns a -1 if the pen button has been pressed since the last poll. If not, it returns a zero.
Pen (1)	Returns the horizontal coordinate where the pen was last activated.
Pen (2)	Returns the vertical coordinate where the pen was last activated.
Pen (3)	Returns a -1 if the pen button is being pressed, a zero if not.
Pen (4)	Returns the last known horizontal coordinate.
Pen (5)	Returns the last known vertical coordinate.
Pen (6)	Returns the character row position where the pen was last activated.
Pen (7)	Returns the character column position where the pen was last activated.
Pen (8)	Returns the last known character row position.
Pen (9)	Returns the last known character column position.

Table 2. Light-pen functions in Basic.

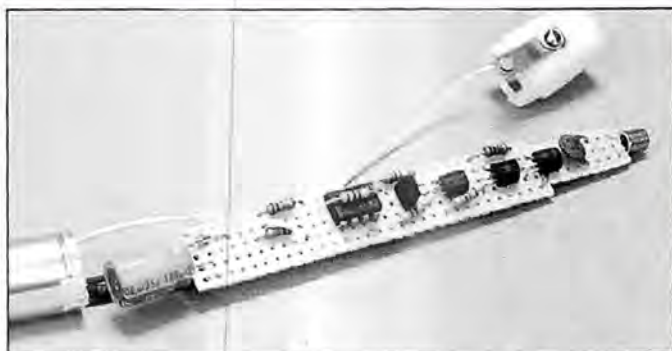


Photo 2. Top view of assembled circuit board. Tape on metal tube keeps switch open when it is not being pressed.

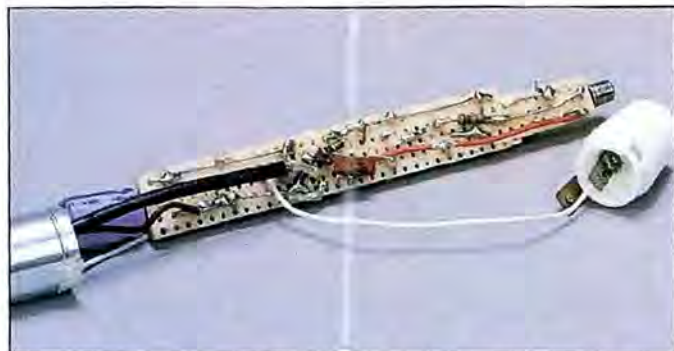
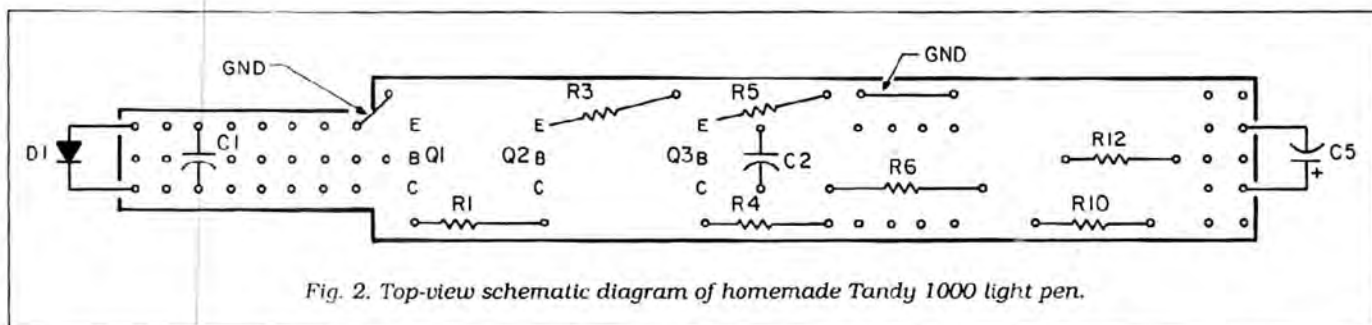
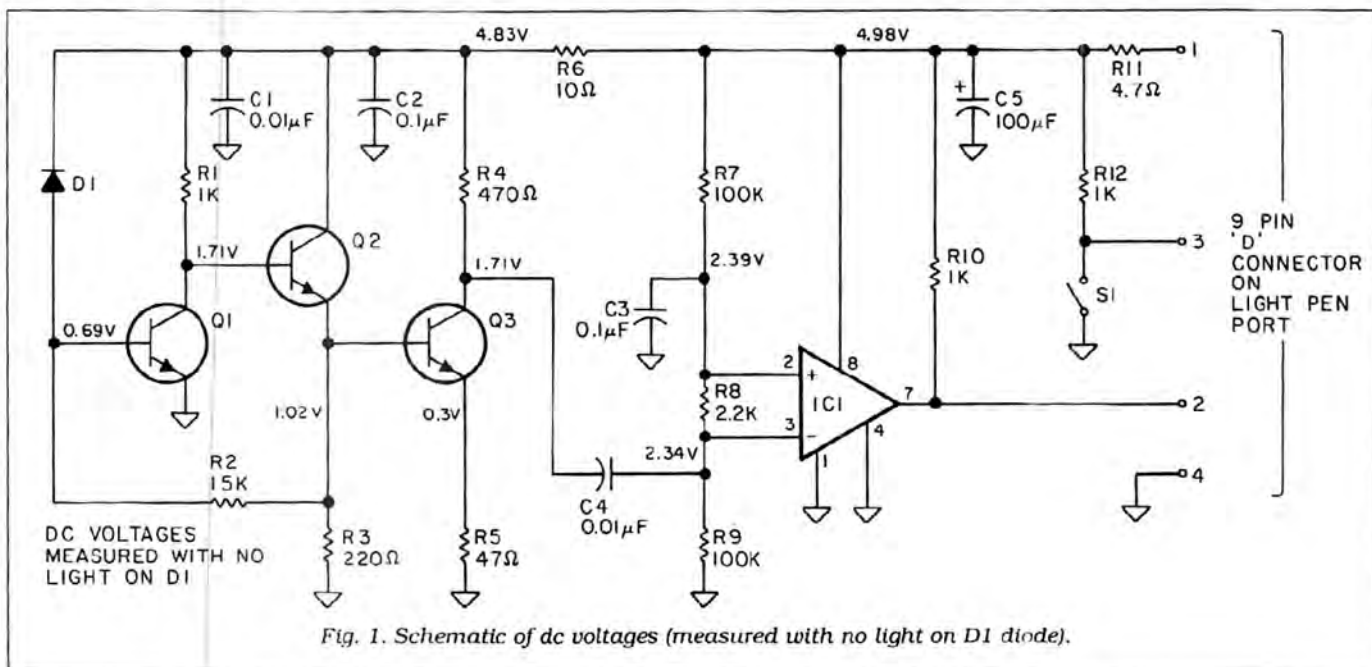


Photo 3. Bottom view of assembled circuit board. White wire is soldered to switch mechanism inside plastic cap.



show the layout (see Figs. 2 and 3). Photos 2, 3, and 4 show three views of the finished board.

Resistor R6 straddles IC1 on the top side. Resistors R7, R8, and R9 are all 1/4-watt resistors. Resistor R11 is mounted in the D connector hood (see Photo 5).

You must make switch S1 yourself by mounting a piece of spring brass (an old relay contact works well) on the flashlight's plastic lamp holder. Ground the flashlight's metal case by "pinching" a wire from ground between the case and

the plastic end piece. (If anyone can think of a way to mount the switch *inside* the flashlight, please let us know.)

### Grow Your Own Software

Few Tandy 1000 programs use a light pen. We've provided three that do, along with a description of Basic light-pen functions to help you with your own programming (see Table 2).

The Pen On statement must be executed before the Pen (0) through Pen (9) functions. The latter are function statements that

will look something like the following:

X = PEN (9)

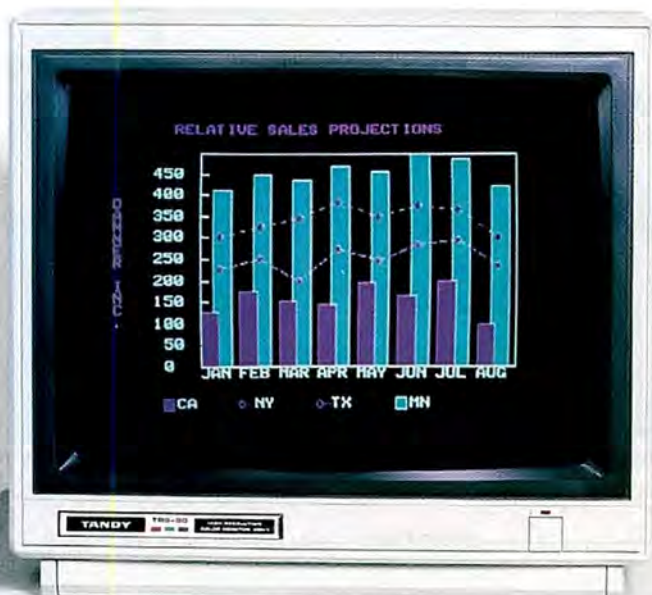
Dots is a program to help you determine whether the light pen is operating correctly (see Program Listing 1). The program paints the screen and displays the contents of the Pen (0) through Pen (9) functions when you activate the light pen, and you can determine which coordinates and character positions the pen is reading. The program then resets the pixel. To exit, use control-break.

Quiz is a trivia game that features a

# TANDY®... Better Again™

## The New Tandy 3000 HL

Four times the power  
of the IBM® PC/XT  
...for less.



The Tandy 3000 HL isn't just compatible with IBM's PC/XT—it's better. Better because of its new 16-bit microprocessor that lets you process twice the data of IBM's older, 8-bit design. Better because it has nearly twice the clock speed of the PC/XT.

Better because you get more for less: only \$1699.

The Tandy 3000 HL's 512K RAM lets you run the software that you've grown accustomed to—at a much higher speed for greater efficiency. And you can expand with hard disk drives, modems, and more.

The high power and low price of the Tandy 3000 HL make it perfect for offices requiring several workstations. And the ViaNet local area network can bring your 3000 HLs together with your existing MS-DOS based computers. Users and departments can be more efficient.

Plus, the American-made Tandy 3000 HL is backed with total support, including our leasing, service and training plans.

Get the facts today, and you'll agree: the Tandy 3000 HL (25-4070) is your basic building block for total office automation.

Available at over 1200  
Radio Shack Computer Centers and at  
participating Radio Shack stores and dealers.

**Radio Shack®**  
**COMPUTER CENTERS**

A DIVISION OF TANDY CORPORATION

Send me an RSC-17 Computer Catalog.

Mail to: Radio Shack, Dept. 87-A-299A  
300 One Tandy Center, Fort Worth, TX 76102

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_ ZIP \_\_\_\_\_

Phone \_\_\_\_\_

Price applies at Radio Shack Computer Centers and participating stores and dealers. Monitor sold separately. IBM/Registered TM International Business Machines Corp. MS-DOS / Registered TM Microsoft Corp. ViaNet/TM ViaNetix, Inc.

Circle 75 on Reader Service card.

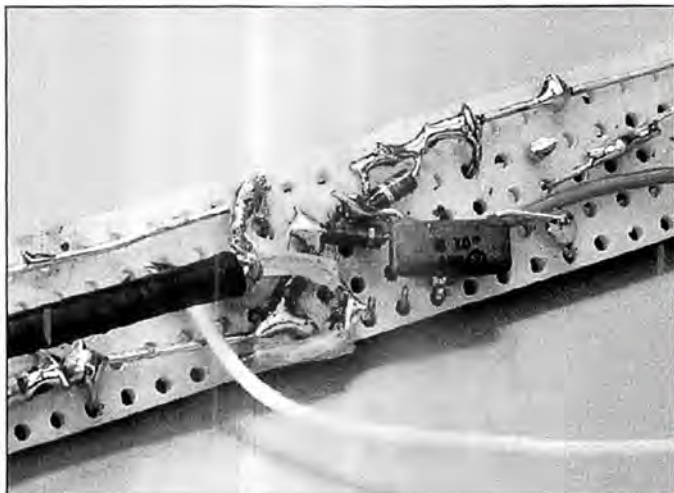


Photo 4. Bottom view shows connections under IC1.



Photo 5. Pin connections showing location of resistor R11.

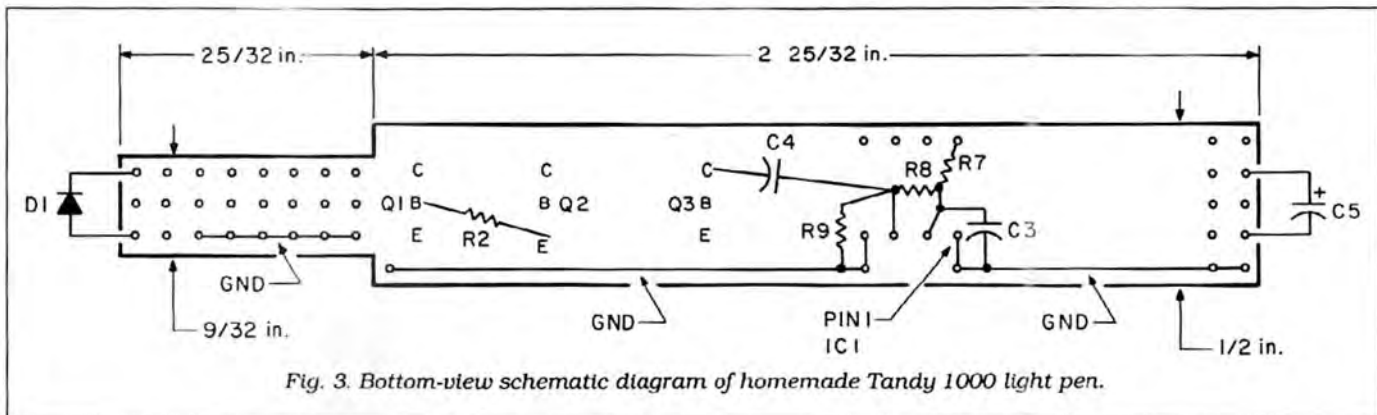


Fig. 3. Bottom-view schematic diagram of homemade Tandy 1000 light pen.

screen display consisting of the question and a row of possible answers, each with a corresponding box (see Program Listing 2). You choose your answer by activating the light pen in front of the proper box. If the choice is correct, the program quickly poses another question. If the choice is incorrect, the program flashes the box next to the correct answer and continues.

You might have to press the switch on the light pen several times if the program fails to read it. Adjusting the screen brightness might help.

Calc (Program Listing 3) is a calculator program with a keypad display; MIN means memory in, MRE means memory recall, EXP means raise the entered number to the next entered power, and CLR means clear. You choose numbers and

functions by pointing to the appropriate screen location. A beep lets you know the pen has read your choice, and each entry is displayed. (The Basic on some Tandy 1000As has a bug in the sound enable. Try Beep Off instead of Beep On.)

You must include the equals sign be-

tween arithmetic operations. For example, "2 + 4 + 5 =" must be entered as "2 + 4 = + 5 =". Finally, use control-break to exit the program. ■

You can reach Rod and Joyce Kreuter at 7686 S. Garland St., Littleton, CO 80123.

**Program Listing 1. Dots. (See p. 132 for information on using the checksums in Listings 1-3.)**

```

10 ' PROGRAM DOTS                                     ** 97
20 ' THIS IS A PROGRAM TO HELP TEST A LIGHT PEN.     ** 98
30 ' FIRST THE ENTIRE SCREEN IS PAINTED.             ** 99
40 ' THEN WHEN THE LIGHT PEN IS ACTIVATED BY PRESSING THE SWITCH, ** 100
50 ' THE RESULTS OF FUNCTIONS PEN (0) THROUGH PEN (9) ARE ** 101
60 ' DISPLAYED AND THE PIXEL READ BY THE LIGHT PEN IS RESET. ** 102
70 KEY OFF                                           ** 619
80 SCREEN 2                                          ** 666
90 CLS                                              ** 363
100 LINE(0,0)-(639,199),,BF                         ** 1413
110 PEN ON                                           ** 594
120 ON PEN GOSUB 170                                 ** 1195
130 GOTO 110                                         ** 671
140 '                                                 ** 220
150 '                                                 ** 221
160 ' READ PEN                                       ** 151
170 FOR N=0 TO 9                                     ** 918
180   V(N)=PEN(N)                                    ** 973
190 NEXT N                                           ** 615
200 '                                                 ** 217
210 ' PRINT RESULTS                                   ** 147
220 FOR N= 0 TO 9                                    ** 946
230   LOCATE N+1,70:PRINT N;V(N)                    ** 1935
240 NEXT N                                           ** 611
250 '                                                 ** 222
260 ' RESET PIXEL                                    ** 152
270 PRESET(V(4),V(5))                               ** 1216
280 PEN STOP                                         ** 771
290 RETURN                                           ** 667
End

```

**Light Pen Kit**

Radiokit  
P.O. Box 973  
Pelham, NH 03076  
603-635-2235  
Light pen kit, \$29.95 plus \$3 shipping in the U.S. and Canada (UPS). International inquiries welcome.

## Program Listing 2. Quiz.

```

10 ' PROGRAM QUIZ * 97
20 ' THIS IS A LIGHT PEN TRIVIA PROGRAM. * 98
30 ' FIRST THE QUESTION AND THE ANSWERS ARE DISPLAYED. * 99
40 ' TO PICK AN ANSWER THE USER SHOULD AIM THE LIGHT PEN AT THE * 100
50 ' BOX NEXT TO THE ANSWER AND PRESS THE SWITCH ON THE PEN. * 101
60 ' IF YOU DO NOT PICK AN ANSWER, A TIMEOUT OCCURS. * 102
70 ' IF THE USER PICKS THE CORRECT ANSWER THE PROGRAM DISPLAYS * 103
80 ' "CORRECT" AND SWIFTLY CONTINUES. * 104
90 ' IF THE USER PICKS AN INCORRECT ANSWER OR LETS THE TIMEOUT OCCUR * 105
100 ' THE PROGRAM DISPLAYS "INCORRECT. CORRECT ANSWER IS FLASHING", * 145
110 ' AND FLASHES THE CORRECT ANSWER. * 146
120 ' AFTER ALL THE QUESTIONS HAVE BEEN ASKED AND ANSWERED THE * 147
130 ' NUMBER OF QUESTIONS AND THE NUMBER OF CORRECT ANSWERS IS * 148
140 ' DISPLAYED. * 149
150 ' IT IS EASY TO ADD QUESTIONS, JUST FOLLOW THE FORMAT * 150
160 ' OF QUESTION, NUMBER OF ANSWERS, ANSWERS AND NUMBER INDICATING * 151
170 ' THE CORRECT ANSWER. THE LAST RECORD OF DATA MUST BE " ". * 152
180 ' IF ANY PROBLEMS OCCUR TRY ADJUSTING THE BRIGHTNESS OF THE SCREEN. * 153

190 ' * 225
200 ' INITIALIZE * 146
210 ' * 218
220 KEY OFF * 664
230 SCREEN 2 * 711
240 PEN ON * 598
250 ON PEN GOSUB 950 * 1285
260 NUMQUES = 0 * 915
270 NUMCORR = 0 * 908
280 BOXOFF = 20 * 861
290 BOXSIZE = 8 * 948
300 ' * 218
310 ' READ AND DISPLAY QUESTION * 148
320 ' * 220
330 READ Q$ * 615
340 CLS * 409
350 IF Q$ = " " GOTO 840 * 1234
360 NUMQUES = NUMQUES + 1 * 1582
370 LOCATE 22,20,0,7 * 1091
380 PRINT Q$ * 733
390 ' * 227
400 ' READ AND DISPLAY ANSWERS AFTER BOXES * 148
410 ' * 220
420 READ NUMANS * 964
430 FOR J = 1 TO NUMANS * 1387
440 GOSUB 910 * 818
450 READ A$ * 666
460 Y1 = J*2 * 679
470 LOCATE Y1,15,0,7 * 1198
480 PRINT A$ * 782
490 NEXT J * 614
500 ' * 220
510 ' READ CORRECT ANSWER. LOOP UNTIL USER CHOOSES ANSWER WITH PEN. * 150
520 ' * 222
530 READ RANS * 808
540 PENFLAG = 0 * 867
550 FOR J = 1 TO 5000 * 1121
560 IF PENFLAG = 1 GOTO 610 * 1637
570 NEXT J * 613
580 ' * 228
590 ' IF USER ANSWER IS INCORRECT FLASH THE CORRECT ANSWER * 158
600 ' * 221
610 LOCATE 23,20,0,7 * 1089
620 IF PENANS = (RANS*2)-1 OR PENANS = (RANS*2) GOTO 770 * 3331
630 PRINT "INCORRECT. CORRECT ANSWER IS FLASHING" * 3307
640 Y1 = ((RANS*2)-1)*8 * 1284
650 Y2 = Y1 + 6 * 750
660 FOR I = 1 TO 30 * 1024
670 LINE (40,Y1)-(50,Y2),0,BF * 1626
680 FOR J = 1 TO 30 * 1091
690 NEXT J * 600
700 LINE (40,Y1)-(50,Y2),1,BF * 1621
710 NEXT I * 608
720 GOTO 790 * 690
730 ' * 225
740 ' IF USER ANSWER IS CORRECT DISPLAY "CORRECT" AND ADD TO THE * 155
750 ' NUMBER OF CORRECT ANSWERS * 156
760 ' * 228
770 PRINT "CORRECT!" * 1250
780 NUMCORR = NUMCORR + 1 * 1572
790 GOTO 330 * 687
800 ' * 223
810 ' DISPLAY TOTAL NUMBER OF QUESTIONS AND TOTAL NUMBER OF CORRECT * 153
820 ' ANSWERS * 154
830 ' * 226
840 PRINT "TOTAL NUMBER OF QUESTIONS ";NUMQUES * 3331
850 PRINT "TOTAL NUMBER OF CORRECT ANSWERS ";NUMCORR * 3526
860 END * 485
870 ' * 230
880 ' THIS IS THE DRAW BOX ROUTINE * 160
890 ' THE ROW THE BOX IS DRAWN IN IS INDICATED BY J*2 * 161
900 ' * 224
910 Y1 = ((J*2)-1)*8 * 1050
920 Y2 = Y1 + 6 * 750
930 LINE (40,Y1)-(50,Y2),,BF * 1513
940 RETURN * 669
950 ' * 229
960 ' THIS IS THE READ LIGHT PEN ROUTINE * 159
970 ' THIS ROUTINE READS THE LIGHT PEN ROW COORDINATE ONLY * 160

```

Listing 2 continued on p. 120

FOR TRS-80 MODELS 1, 3, 4, 4P  
IBM PC/XT, AT&T 6300, ETC.The MMSFORTH  
System.  
Compare.

- A total software environment: custom drivers for printer, video and keyboard improve speed and flexibility. (New TRS-80 M.4 version, too!)
- Common SYS format gives you a big 395K (195K single-sided) per disk, plus a boot track!
- Common wordset (79-Standard plus MMSFORTH extensions) on all supported computers.
- Common and powerful applications programs available (most with MMSFORTH source code) so you can use them compatibly (with the same data disks) across all supported computers.
- Very fast compile speeds and advanced program development environment.
- A fantastic full-screen Forth Editor: Auto-Find (or -Replace) any word (forward or back), compare or Pairs-Edit any two ranges of blocks, much more.
- Temporary dictionary areas.
- QUANs, VECTs, vectored I/O, and many more of the latest high-performance Forth constructs.
- Manual and demo programs are bigger and better than ever!
- Same thorough support: Users Newsletter, User Groups worldwide, telephone tips. Full consulting services.
- Personal Licensing (one person on one computer) is standard. Corporate Site Licensing and Bulk Distribution Licensing available to professional users.

# mmsFORTH

A World of  
Difference!The total software environment for  
IBM PC/XT, TRS-80 Model 1, 3, 4  
and close friends.

- Personal License (required):  
MMSFORTH V2.4 System Disk . . . . . \$179.95  
(TRS-80 Model 1 requires lowercase, DDEN, 140-track drive.)
  - Personal License (additional modules):  
FORTHCOM communications module . . . . . \$ 49.95  
UTILITIES . . . . . 49.95  
GAMES . . . . . 39.95  
EXPERT-2 expert system . . . . . 69.95  
DATAHANDLER . . . . . 59.95  
DATAHANDLER-PLUS (PC only, 128K req.) . . . . . 99.95  
FORTHWRITE word processor . . . . . 99.95
  - Corporate Site License  
Extensions . . . . . from \$1,000
  - Bulk Distribution . . . . . from \$500/50 units.
  - Some recommended Forth books:  
FORTH: A TEXT & REF. (best text!) . . . . . \$ 18.95  
THINKING FORTH (best on technique) . . . . . 16.95  
STARTING FORTH (popular text) . . . . . 19.95
- Shipping/handling & tax extra. No returns on software.  
Ask your dealer to show you the world of  
MMSFORTH, or request our free brochure.

**MILLER MICROCOMPUTER SERVICES**  
61 Lake Shore Road, Natick, MA 01760  
(617) 653-6136



# COMPU SERVE. YOU DON'T HAVE TO KNOW HOW IT WORKS TO APPRECIATE ALL IT CAN DO.

You don't have to know about hardware. You don't have to know about software. All you have to know is that CompuServe is a computer information service. You subscribe to it.

And in return, you have access to an incredible amount of information, entertainment, communications and services right at your fingertips.



**Here are a few of the hundreds of things you can do with CompuServe.**

## COMMUNICATE

Even beginners can compose, edit, send and file messages the first time they go online with CompuServe's **EasyPlex™ Electronic Mail**. Friends, relatives and business associates—anywhere in the country—can stay in constant, convenient touch.

**CB Simulator** features 72 channels for "talking" with thousands of other subscribers throughout the country and Canada. The chatter is frequently hilarious, the "handles" unforgettable and the friendships hard and fast.

More than 100 CompuServe Forums welcome your participation in discussions on all sorts of topics. There are

Forums for gourmet cooks, golfers, musicians, pilots, sailors and more, all designed to show you how easy and fun it can be to get the most out of your computer.

If you want to learn more about your computer system, CompuServe's at your service. Our **Users Forums** cater to specific computer makes and models, and offer information and expertise on many different types of machines. You'll find electronic editions of popular computer periodicals. You can even find free software.

And if you need answers to software questions, seek out a **Software Forum**. You can often find solutions quickly and easily online.

**Bulletin Boards** let you post messages where thousands will see them. Use our National Bulletin Board or the specialized bulletin boards found in almost every Forum.

## HAVE FUN

You'll find all sorts of sports and entertainment trivia games, plus brain-teasing educational games. You can go it alone or compete against

players from all over the country. Test your wits in the only online TV-style game show with real prizes. Then, when you're ready, go for the ultimate in excitement and get into one of our interactive space adventures.

CompuServe's **movie reviews** keep that big night at the movies from being a five-star mistake. **Soap opera updates** keep you up on all the latest turmoils and tragedies on your favorite daytime dramas.

For leisure-time reading and relaxing, look into the electronic editions of some of your favorite magazines, including OMNI On-Line.

## SHOP

CompuServe's **ELECTRONIC MALL™** lets you take a coast-to-coast shopping spree without ever leaving home. It's an exciting and easy way to shop online, buying name-brand goods and services from nationally known merchants.

## SAVE ON TRIPS

CompuServe's travel services let you control your own travel arrangements through the convenience of your personal computer. Scan flight availabilities on almost any airline worldwide. Find airfare bargains, then book your own flight online.



With CompuServe you've got direct and connecting schedules for national and international flights. Plus complete listings of over 28,000 hotels around the world.

### MAKE PHI BETA KAPPA

When you run out of the answers at homework time, it's time to turn to CompuServe for the complete set of continuously updated encyclopedias that doesn't take up an extra inch of shelf space.

**The College Board**, operated by the College Entrance Examination Board, gives tips on preparing for the SAT, choosing a college and getting financial aid.



### KEEP HEALTHY

**HealthNet** will never replace a real, live doctor—but it is an excellent and readily available source of health and medical information.

On a more personal note, **Human Sexuality** offers information on a variety of topics concerning this very important aspect of human behavior. Hundreds turn to it for honest, intelligent and candid answers.

### BE INFORMED

CompuServe puts all of the latest news at your fingertips. Our sources include the AP news wire (covering all 50 states, plus national news), the *Washington Post*, the *St. Louis Post-Dispatch*, specialized business and trade publications and more.

Find out instantly what Congress did today, who finally won the game and what's happening back in Oskaloosa, with the touch of a button. And, our executive news service lets you tell us what to watch for. We'll electronically find, "clip" and file news for you...to read whenever you'd like.

### INVEST WISELY

Our comprehensive investment help just might tell you more about the stock you're looking at than the Chairman

of the Board already knows. (Don't know who the chairman is? Chances are, we can fill you in on that, too.)

CompuServe gives you complete statistics on over 10,000 NYSE, AMEX and OTC securities. Historic trading statistics on over 90,000 stocks, bonds, funds, issues and options. Five years of daily commodity quotes. Standard & Poor's. Value Line. And more than a dozen other investment tools.

**SUPERSITE** facilitates business decisions by providing you with demographic and sales potential information by state, county and zip code for the entire country.

The national business wire provides continuously updated news and press releases on hundreds of companies worldwide.

### GET SPECIALIZED INFORMATION

Pilots can get personalized flight plans, weather briefings, weather and radar maps, etc. Entrepreneurs use CompuServe too for complete step-by-step guidelines on how to incorporate the IBMs of tomorrow. Lawyers, doctors, engineers, military veterans and businessmen of all types use similar specialized CompuServe resources pertinent to their unique needs.

### So much for so little.

CompuServe makes the most out of any computer, and all you pay is a low, one-time cost for a Subscription Kit (suggested retail price \$39.95). Usage rates for standard online time (when CompuServe is most active) are just 10¢ a minute.

In most major metropolitan areas you can go online with a local phone call. Plus, you'll receive a **\$25.00 Introductory Usage Credit** with the purchase of your CompuServe Subscription Kit.

### So easy the whole family can go online.

CompuServe is "menu-driven," so beginners can simply read the menus (lists of options) that appear on their

screens and then type in their selections. Experts can skip the menus and just type in GO followed by the abbreviation for whatever topic they're after.

If you ever get lost or confused, just type in H for help, and we'll immediately cut in with instructions that should save the day. Plus, you can always ask questions online through our feedback service or phone our Customer Service Department.

### Here's how to subscribe.

To access CompuServe, you need a computer, a modem (to connect your computer to your phone) and, in some cases, some simple communications software.

Now you're ready to order your CompuServe Subscription Kit.

For your low, one-time subscription fee, you'll receive:

- a complete, easy-to-understand, 170-page spiral-bound Users Guide
  - your exclusive preliminary password
  - a subscription to CompuServe's monthly magazine, *Online Today*
- All this, plus:
- a \$25.00 usage credit!

To order your Subscription Kit or to receive more information, call **800-848-8199** (in Ohio, 614-457-0802).

CompuServe Subscription Kits are also available in computer stores, electronic equipment outlets and household catalogs. You can also subscribe with materials you'll find packed with many computers and modems sold today.

CompuServe. You don't have to know how it works to appreciate all it can do—for you.

## CompuServe®

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

An H&H Block Company

EasyPlex and ELECTRONIC MAIL are trademarks of CompuServe, Incorporated.

Circle 78 on Reader Service card.



# Quick Chips

If speed is your need, then these two chips just might be your ticket.

You can choose from a number of ways to make your MS-DOS computer perform computations more quickly. A programmer can enhance the code to improve execution speed or write compiled programs using Assembly language, Fortran, Pascal, C, or compiled Basic. But even if you can't program, you can make hardware modifications, such as adding an Intel 8087 math coprocessor chip, a NEC V20 chip, or a speedup board, without affecting your computer's warranty.

I will discuss the uses, advantages, and disadvantages of the Intel 8087 coprocessor and NEC V20 chips, as well as the Microsoft QuickBasic Compiler and other software products as they relate to these chips. (For installation instructions, see the sidebar, "Installing the 8087 and V20 Chips.") The math coprocessor is a special-purpose microprocessor programmed to perform complex math routines. The V20 is a replacement chip for the Intel 8088 microprocessor. It is reportedly faster than the 8088 and has other features.

Among the suppliers for 8087 chips are Radio Shack, Microway, Trionix, PG Designs, Hard Drive Specialist, and Hauppauge (see the product index on p. 69). I bought my 8087 chip for my Tandy 1000A from Radio Shack; it includes installation instructions specific to the Model 1000. I used Microway's 87Basic patch to the Microsoft QuickBasic compiler for 8088/8087 comparisons. Microway specializes in 8087 support and

includes various software and hardware speedup packages, including patches for 8087 support in Basic compilers and accelerator boards. Microway also sells the V20 chip. Hauppauge sells a similar package for use with the QuickBasic Compiler.

If you own an older Tandy 1000 that does not have a place for the 8087 chip, you can install a kit from Trionix, Hard Drive Specialist, or PG Design. The kit from Trionix includes an 8087 and a V20 chip (optional).

The V20 is an inexpensive way to speed up your computer. Prices for the chip range

from \$13 to \$25, depending on supplier and availability. The amount of speedup is slight, and you must determine whether this is worth even the modest cost.

Speeding up your computer is a by-product of the V20's main function. The V20 and its sister microprocessor chips by NEC offer an extended instruction set. These chips can shift among three modes—a native mode, an 8080 mode, and a standby mode—that are mutually exclusive. In the native mode, the chip can execute all instructions and thus can replace the 8088. In the 8080 mode, the

Table 1. Turbo Pascal surface computation and video graphics.

	Computation time	Improvement over 8088	Drawing time	Improvement over 8088
8088 only	181.8		91.9	
8088 and V20	174.8	1.04	89.7	1.02
8087	33.3	5.46	92	1.00
8087 and V20	32.4	5.61	89.6	1.03

Table 2. Conversion of lower- to uppercase letters.

	Conversion time	Improvement over 8088	Video time	Improvement over 8088
Basic with 8088 only	502		629	
Basic, 8088, and V20	483	1.04	613	1.03
Compiled with 8088	87	5.77	149	4.22
Compiled with 8088 and V20	84	5.98	150	4.19
Compiled with 8087	91	5.52	155	4.06
Compiled with 8087 and V20	89	5.64	150	4.19

## System Requirements

Tandy 1000

Table 3. Computer-aided design.

	Drawing time	Improvement over 8088	Reading time	Improvement over 8088	Computation time	Improvement over 8088	Printing time	Improvement over 8088
Shuttle picture								
	Computations also included in print time							
8088 only	191.1		75.5		79.1		251.9	
8088 and V20	176.8	1.04	72.3	1.04	73.3	1.08	241.5	1.04
8087	97.8	1.95	52.3	1.44	30.8	2.57	186.1	1.35
8087 and V20	92.9	2.06	51.8	1.46	28.9	2.74	182.3	1.38



# Battle Stations! Battle Stations!

A sure-fire arsenal of more than 50 specially selected subroutines designed to help you—pro or beginner—write better Basic programs for the Models I, III and 4!

Bring your periscope up and focus on NUCLEAR SUBROUTINES, a hot, new collection of the best Model I, III and 4 subroutines ever published in 80 Micro, *many never before published on disk!*

From scrolling to graphics, . . . screen handling to sorting, you'll write the smoothest running programs ever, REGARDLESS OF YOUR LEVEL OF SKILL! Here on this atomic-powered "flippy" disk are literally dozens of the neatest subroutines in every size and shape. Some are in Basic, ready for merging with your own programs. Others are in machine language, to be loaded from DOS and called by Basic. Either way, your Basic programs will never be the same again!

Model I & III programs are on one side, and Model 4 programs on the other. Documentation is right on the disk. Just boot up NUCLEAR SUBROUTINES, and you're set for unparalleled programming power! Space is too tight to list them all, but here's a sampling of what awaits you on this once-in-a-lifetime disk, divided into six major categories:

## MATHEMATICS

Double Precision—Make your Basic programs more accurate with routines that calculate values with up to 16 significant digits.

Calculator—A two line calculator that gives you the four basic math operations in double precision and exponentiation in single precision.

Random Number Generator—Enter fractions as input, which are converted to decimal values for computation, and output as fractions.

**AND MORE! . . .**

**YES!** I want to get 80 Micro's NUCLEAR SUBROUTINES working on my Model I, III and Model 4 programming projects! Please send my disk at \$21.45 for more than 50 subroutines, specially selected by the programming pros at 80 Micro!

Payment enclosed     AMEX     Visa     MC

Card# \_\_\_\_\_ Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_

Name (print) \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Mail to: LOAD 80 • Elm St. • Peterborough, NH 03458

Includes postage & handling. Foreign airmail add \$1.00 per item.  
Models I, III, and 4 are registered trademarks of Radio Shack, a division of Tandy Corp.

11-86NS

## SCROLL

Horizontal Scroll—Scrolls messages horizontally across the screen.

Window Scroll—Reserves a block portion of the screen (the window) in which information can be viewed, moving new information into the window and shuffling the old out.

## SCREEN

Screen Border—Draw a border around your screen.

Screen Locator—Use PEEKs and POKEs to locate screen positions when speed is a necessity.

Screen PRINT—Use the arrow keys to move a nondestructive cursor while each PRINT location is displayed.

Screen Dump—Model I/III graphics screen dump program for an Epson MX-80 with Graftrax Plus or an RX-80.

Screen Fill—Fill the screen in assorted ways to create the effect you desire.

Screen Save and Restore—Save and restore the screen contents whenever you wish.

Screen Invert—Reverse the content of your Model I or III screen.

**AND MORE! . . .**

## SORTS

VisiCalc Sort—Sort alpha or numeric data in ascending order, and numeric data in descending order.

Model 4 Sort—A lightning-fast string sort for Model 4 Basic that has the feature of Model III Basic's CMD "O".

**PLUS MANY MORE! . . .**

## GRAPHICS

Upgraded Graphics—Add the Point, Set and Reset commands to Model 4 Basic.

Better Graphics—Run Model I/III Basic graphics up to eight times faster than normal using the LSET and RSET commands.

**AND MANY OTHERS! . . .**

## GENERAL USE

Input Routine—A user input routine.

Menu Routine—Add some life to your menus with this routine.

Paint Routine—Draw any shape on your Model I or III screen and fill it in with a touch of the space bar.

Sound—Enhanced sound for the Model 4.

Word Processor—A two line word processor.

**PLUS MORE, MORE, MORE!**

Complete the coupon or card and mail today.

Or, for immediate service, **CALL TOLL FREE 1-800-258-5473**  
(in NH, dial 1-924-9471) and charge it to your credit card!

microprocessor emulates the 8080 chip. You enter the standby mode with a Halt instruction from your program, and the V20 remains in standby until execution of a Reset, NMI, or INT instruction. It returns to the mode in use prior to standby.

One advantage of the V20's 8080 mode is that it lets your MS-DOS computer run CP/M, which you normally couldn't do. (A number of MS-DOS programs let you run CP/M; *80 Micro* reviewed one of them, the CP/Emulator, in June 1986.) However, you can run only programs that have 8080 instructions; Z80 instructions won't work.

The V20 has gained much notoriety because of its ability to speed up general math operations. It speeds up computer processes via its unique chip architecture. Instead of only the main data bus, the V20 also has a subdata bus. It supports a limited amount of parallel command processing and has other efficiencies in its design. But, since this chip must interface with 8088 operation, it has only one input and one output, which causes the bottleneck

in data flow that puts limits on speed.

The most noticeable improvement with the V20 in use is for general math functions. The Norton Utilities' CPU speed test, Sysinfo, reports a benchmark of 1.7 compared to the normal Tandy 1000 rating of 1. This benchmark is math intensive and gives the first clue to where most of the V20's speed advantage lies. Other tests have shown addition and subtraction speedup ratings of about 1.24, and multiplication and division speedup ratings of about 1.39. Recalculating a 1-2-3 spreadsheet is faster by about 1.25 times. This is fine, but your computer performs other tasks besides math.

The 8087 provides more noticeable improvements in raw computational power than the V20, but at a price. In addition to a cost of approximately \$110, the 8087 requires support software. The majority of software programs do not support the 8087. The 8087 does not interrupt the 8088 and bypass it to perform faster computations; instead, it has its own instruction set of unique commands. The system

analyzes commands and passes them to either the 8088 or the 8087 depending on which chip executes that command. A program written with just 8088 commands never uses the 8087 for computations even if the chip is in your computer.

Plain-vanilla Basic, 1-2-3 version 1A, and many compilers do not have 8087 support. 1-2-3 version 2, Framework II, and later versions of Symphony do have 8087 support. Turbo Pascal is available with 8087 support, and programs from Microway and Hauppauge Computer Works enhance the Microsoft QuickBasic or IBM Basic Compiler for 8087 support. Hauppauge also has 8087 software to enhance several other compilers for Pascal and Fortran. Whichever compiler enhancements you buy, you must get the software for the exact version of your compiler.

Short of using machine language, if you are doing your own programming and want to use the 8087, you must have a compiler with 8087 support. With a Basic compiler, 8087 software support can add about \$65

## Installing the 8087 and V20 Chips

The Tandy 1000 and the 1000 EX do not have a place to install the 8087 chip, but kits are available for the 1000. The Tandy 1000A and the 1000 SX have a socket reserved for 8087 installation.

Installing the Intel 8087 in a Tandy 1000A is about as simple as it gets. Before picking up your 8087 chip, remember that static electricity can damage it, so work with caution and avoid touching the chip's pins as much as possible. Static isn't much of a problem under normal circumstances, but if you know you have a problem with static electricity in your house, follow more precautions. It's best to work with your computer on a kitchen table or hard-surfaced floor. Also, put the cat in the garage or it will be sitting on your computer board the first time you turn your back.

Stand in front of your computer, disconnect the power and keyboard cords, and remove the two screws in the lower-front corners holding the case on the computer frame. Then slide the case forward. As you look down at the main CPU board, which lies flat in the bottom of the chassis, you will see an empty 40-pin socket near the front left. This is where you place the 8087 chip. Just to the right of this socket is the 8088 chip, the heart of your computer.

Notice the little detent at the front end of the 8088 chip. Your 8087 and all other chips have a similar detent to ensure that you install your chip with the proper orientation. Position the 8087 over the empty socket in the same orientation as the 8088 chip and make sure

that all pins line up with the holes in the socket. Usually they will be spread out slightly; you can bend all the pins on one side at once by pressing the side of the chip lightly on a tabletop. If the pins are bent in too far, again put the chip edge on a tabletop, but put something on top of the pins and bend them the other way to straighten them out in a single plane.

Once everything is in position over the socket, press the chip in place by using a slight rocking motion and keeping the chip as level as possible until it goes all the way in. Push on one side of the chip and then the other. Check all pins to make sure they are in the socket and not bent under or out. If you must remove the chip to try again, use a small screwdriver. Place it between the socket and chip and use it as a lever to pry the chip up. Again, try to keep the chip as level as possible by working on one end and then the other.

To the left of the 8087 socket is a two-pin jumper. Remove this jumper when you have the 8087 installed. If you push the jumper over only one pin, you'll be able to find it if you ever need it again. Before you close your computer case, plug in the keyboard and power cord and turn it on with a system disk in drive A to see if everything works. If not, turn off the computer, remove the power cord, and check all pins on the 8087. Make corrections if necessary and try again until everything works.

Installing the NEC V20 chip takes about the same amount of effort as the 8087. Each of these chips works inde-

pendently of the other, so installing one does not mean that you have to install the other. The NEC V20 replaces the Intel 8088 chip in either the 1000 or the 1000A. Remove the 8088 chip the same way as described above for the 8087 chip and just replace it with the V20, using the same procedures as above. Since your computer sees the V20 in much the same way electronically as the 8088, you don't need to change any jumpers with this installation.

However, if you are using a hard drive with your Tandy 1000, you should be aware that your hard disk might not boot once you have installed the NEC V20. Evidently, the boot ROM of some hard-drive controllers gets confused by the V20. While this problem affects all Tandy disk controllers, it doesn't affect all hard-disk controllers.

If you are installing the 8087 and the V20, it is a good idea to turn on your computer and test the installation after plugging in each chip. Then, if you have a problem, you will know where to look.

If you have an older Tandy 1000 that has no socket for the 8087 and you wish to install one, you will need a kit. Trionix, PG Design, and Hard Drive Specialist supply circuit boards just for the Tandy 1000. Remove the 8088 chip from your Tandy 1000 and plug the circuit board into the same socket. There should already be an 8087 in the right socket of the Trionix board; put your 8088 chip or a V20 chip in the left socket. These kits are not for the Tandy 1000A. ■

—Thomas L. Quindry

to \$200 to the cost. As you will see from the benchmark tests below, compiling a Basic program can often give you a more dramatic improvement than the 8087 can over a program compiled without 8087 support. Basic compilers are relatively easy to use and follow most of the conventions of simple Basic programs.

### Benchmarks

I used several practical benchmarks to test the effectiveness of the V20 and 8087 chips. Most of the programs I used were written in Basic and Microsoft QuickBasic. For testing the 8087, I used Microway's 87Basic patch for QuickBasic. I ran tests with the 8088 and then with the V20 for those comparisons. I used regular and 8087 versions of Borland's Turbo Pascal for graphics computations, and regular and 8087 versions included in the computer-aided design package Prodesign II from American Small Business Computers to time operations to compute, display, and print two of the sample CAD files that were part of the program.

Table 1 gives benchmarks for a three-dimensional surface plot using Turbo Pascal. These benchmarks show a 5.5 times improvement in computational speed for the 8087. The 8087 showed no improvement for drawing the plot on the screen. The V20 showed a consistent improvement of around 3 percent for both computation and drawing. To read relative improvements from this table and all other tables, note that the V20 computation divides the computation time for the line above the value given by the computation time for the line that contains the value given. Computations for the 8087 versus the 8088 divide the computation time for the line that is two above the value given by the computation time for the line containing the value given. For example, the first value for V20 improvement is  $181.8 \div 174.8 = 1.04$  and the first value for 8087 improvement is  $181.8 \div 33.3 = 5.46$ .

Table 2 gives computer times for converting lower- to uppercase letters in a disk file. To avoid the disk input/output (I/O) effects, which are tested separately, I used a memory disk program to place the file in RAM so disk access is not measured. More improvement comes from using a Basic compiler than from the V20 or the 8087. The V20 showed from 2 to 4 percent improvement with one anomaly shown. The 8087 showed no improvement as expected, since mathematical computations are not used. The 8087 actually showed a decrease in time of about 4 percent. The first column of times represents conversion without displaying the file characters on the video screen. The second column of times represents characters displaying after each character conversion.

Table 3 provides comparisons of computing times for various aspects of CAD for an already created file. Again, the files

Available for Apple II/III/IV/SE (4 compatibles), Apple requires 48K, one 5-sector disk drive, IBM requires 128K, one disk drive, Color graphics card. Color monitor suggested but not required. Apple is a registered trademark of Apple Computer, Inc. IBM is a registered trademark of International Business Machines Corporation.

**A Space Flight Simulator**

- Out-the-window 3-D color views. See the lunar landscape, constellations, moon bases, and the Apollo 11 landing site.
- Flight origin from 3 vantage points: landing pad, close approach, lunar orbit.
- Lunar Landing Vehicle realistically simulates flight dynamics of future NASA spacecraft.
- Cargo Run Game. After training, become part of a Mobile Mining Team.
- 96-page illustrated training manual.

**From the publishers of WILDERNESS:  
A Survival Adventure.**

**ELECTRIC TRANSIT**

501 Marin Street, Suite 116  
Thousand Oaks, CA 91360  
805/373-1960

were on a memory disk to avoid disk I/O effects. The column labeled "Drawing time" includes reading the file, computing screen plotting points, and displaying the drawing. The next three timing columns are related to printing the drawing with an Epson MX-80 printer and time three distinct operations. The file is first read and computations are made. Then, after selections are made regarding size of the drawing, additional computations are made for dot-graphics printing. After the computations, printing begins. Depending on the density and complexity of the drawing, additional pauses for computations occur.

Overall, the V20 improvements are 6 to 8 percent. Computation improvements are in the range of 2 to 2.5 times for the 8087. Transferring a data file into the program is 1.45 times faster. This can account for the slightly lower 8087 drawing-time improvements and the slightly higher V20 drawing-time improvements. The V20 has strengths in all three aspects of computer operations used in that process: transfer, computation, and graphics display.

Table 4 compares simple computer functions, and Table 5 compares various mathematical functions. Most results of these tests were consistent with each other. The major failing in the accuracy and reliability of these tests is the relatively short time it takes to complete one cycle in compiled Basic. These tests are thus repeated many times and are dominated by For...Next loops. This fact might have affected the results. Eliminating For...Next loops and using a routine that times operations to 1/100 of a second (actual resolution is  $\frac{1}{10}$  of a second due to clock pulses) did not help. Individual routine time was still so short that repetition was necessary to increase resolution. The fact that nonmathematical operations did not show significant improvements and those with mathematical operations showed more improvements for the 8087 would indicate that the use of For...Next loops did not significantly affect the timing results.

Many math functions executed 1.10 to 1.25 times faster with the V20, while the 8087 mostly gave improvements of 1.3 to 1.7 times faster. Exponential computations gave improvements of about 5.7 times faster for the 8087. The most significant improvements were between Basic and compiled Basic irrespective of the chips used. Eratosthenes Sieve computations showed a 72-times improvement from Basic to compiled Basic and, with either the V20 or 8087, almost doubled this improvement.

In general, the V20 can show improvements from around 4 percent for general computational routines to around 25 percent for simple mathematical functions, with some functions giving a 200 percent improvement. The 8087 generally gives an improvement for math functions on the order of 1.6 to 2.5 times faster for

Table 4. Comparison of simple computer functions.

	Computation time	Improvement over 8088
Disk I/O—Read		
Basic with 8088 only	8	
Basic with 8088 and V20	9	0.89
Compiled with 8088	7	1.14
Compiled with 8088 and V20	5	1.60
Compiled with 8087	7	1.14
Compiled with 8087 and V20	5	1.60
Disk I/O—Write		
Basic with 8088 only	14	
Basic with 8088 and V20	13	1.08
Compiled with 8088	10	1.40
Compiled with 8088 and V20	9	1.56
Compiled with 8087	9	1.56
Compiled with 8087 and V20	9	1.56
String Sort—Sort		
Basic with 8088 only	136	
Basic with 8088 and V20	130	1.05
Compiled with 8088	40	3.40
Compiled with 8088 and V20	37	3.68
Compiled with 8087	34	4.00
Compiled with 8087 and V20	32	4.25
For...Next Loop		
Basic with 8088 only	21	
Basic with 8088 and V20	20	1.05
Compiled with 8088	14	1.50
Compiled with 8088 and V20	13	1.54
Compiled with 8087	8	2.62
Compiled with 8087 and V20	7	3.00
Arithmetic Variable		
Basic with 8088 only	61	
Basic with 8088 and V20	58	1.05
Compiled with 8088	13	4.69
Compiled with 8088 and V20	12	4.83
Compiled with 8087	8	7.63
Compiled with 8087 and V20	8	7.63
Arithmetic Variable/Constant		
Basic with 8088 only	63	
Basic with 8088 and V20	60	1.05
Compiled with 8088	10	6.30
Compiled with 8088 and V20	9	7.00
Compiled with 8087	5	12.60
Compiled with 8087 and V20	5	12.60
Counting		
Basic with 8088 only	82	
Basic with 8088 and V20	78	1.05
Compiled with 8088	13	6.31
Compiled with 8088 and V20	13	6.31
Compiled with 8087	7	11.71
Compiled with 8087 and V20	8	10.25
GOSUB with Array		
Basic with 8088 only	199	
Basic with 8088 and V20	187	1.06
Compiled with 8088	43	4.63
Compiled with 8088 and V20	40	4.98
Compiled with 8087	29	6.86
Compiled with 8087 and V20	28	7.10
String Sort—Video		
Basic with 8088 only	8	
Basic with 8088 and V20	7	1.14
Compiled with 8088	5	1.60
Compiled with 8088 and V20	5	1.60

Table 4 continued

Table 4 continued

Compiled with 8087	5	1.60
Compiled with 8087 and V20	5	1.60
<b>GOSUB with Dimensioned Array</b>		
Basic with 8088 only	126	
Basic with 8088 and V20	120	1.05
Compiled with 8088	34	3.71
Compiled with 8088 and V20	32	3.94
Compiled with 8087	21	6.00
Compiled with 8087 and V20	20	6.30
<b>Simple GOSUB</b>		
Basic with 8088 only	68	
Basic with 8088 and V20	65	1.05
Compiled with 8088	10	6.80
Compiled with 8088 and V20	9	7.56
Compiled with 8087	6	11.33
Compiled with 8087 and V20	5	13.60
<b>MID\$</b>		
Basic with 8088 only	35	
Basic with 8088 and V20	34	1.03
Compiled with 8088	14	2.50
Compiled with 8088 and V20	13	2.69
Compiled with 8087	12	2.92
Compiled with 8087 and V20	12	2.92
<b>Sieve of Eratosthenes</b>		
Basic with 8088 only	144	
Basic with 8088 and V20	138	1.04
Compiled with 8088	2	72.00
Compiled with 8088 and V20	1	144.00
Compiled with 8087	1	144.00
Compiled with 8087 and V20	1	144.00
<b>STRING\$</b>		
Basic with 8088 only	117	
Basic with 8088 and V20	112	1.04
Compiled with 8088	18	6.50
Compiled with 8088 and V20	17	6.88
Compiled with 8087	18	6.50
Compiled with 8087 and V20	17	6.88

Table 5. Comparison of various mathematical functions.

	Computation time	Improvement over 8088
<b>Matrix Multiplication</b>		
Basic with 8088 only	137	
Basic with 8088 and V20	132	1.04
Compiled with 8088	8	17.13
Compiled with 8088 and V20	7	19.57
Compiled with 8087	6	22.83
Compiled with 8087 and V20	5	27.40
<b>Matrix with Eigen Values/Vectors</b>		
Basic with 8088 only	169	
Basic with 8088 and V20	162	1.04
Compiled with 8088	8	21.13
Compiled with 8088 and V20	7	24.14
Compiled with 8087	6	28.17
Compiled with 8087 and V20	5	33.80
<b>Lagrangian Interpolation</b>		
Basic with 8088 only	95	
Basic with 8088 and V20	90	1.06
Compiled with 8088	10	9.50
Compiled with 8088 and V20	9	10.56
Compiled with 8087	6	15.83
Compiled with 8087 and V20	6	15.83

Table 5 continued

higher floating-point math and around 1.10 times faster for general computational routines.

All "average" values given within the text are not true averages, but impres-

## 8087 Compatibility

Certain programs that use the 8087 math coprocessor don't acknowledge its existence on the Tandy 1000 (not the 1000 SX). Lotus's 1-2-3 (release 2), SuperCalc 3, and some 8087 diagnostic programs are examples. These programs all check a bit in low memory to see if an 8087 is installed. IBM computers and most clones check for an 8087 during bootup and set this bit accordingly (1 if present, zero if not). The 1000's BIOS (basic input/output system) doesn't check for the 8087 during bootup and the 8087 bit isn't set.

If you set the bit yourself, you solve the problem. The following one-line Basic program will let you do the trick:

```
10 DEF SEG = 0:POKE &H410,PEEK
    (&H410) OR 2:DEF SEG
```

The BIOS equipment list is stored as a 16-bit word starting at hexadecimal address 0000:0410. Bit 1 is the 8087 bit. Other bits indicate the presence and number of floppy drives, serial ports, and printers—among other things.

You can also use the Program Listing below with Debug to make a small machine-language program that sets the bit. Using EDLIN or a word processor, create an ASCII text file of MathChip.SRC and put it on the same disk as Debug.EXE.

Create MathChip.COM (the working program) by typing DEBUG < MATHCHIP.SRC. You can then invoke MathChip from your AUTOEXEC.BAT file. Don't use this program if you don't have an 8087 installed; your computer will hang up when a program tries to access the 8087. ■

—Dave Rowell

*Program Listing. Debug script to create MathChip.SRC. The blank line is necessary.*

```
N MATHCHIP.COM
A
XOR AX,AX
MOV DS,AX
MOV AX,[410]
OR AX,2
MOV [410],AX
MOV AX,4C00
INT 21

RCX
12
W
Q
```

End

*Specially  
Selected*

by the Editors of  
80 Micro...

HERE'S WHAT YOU  
WILL GET...

**N**ow on disk and ready for action! A special year-end collection of the very best programs published by 80 Micro in 1986. Business programs, utilities, graphics, and applications... they're the best programs from a whole year of the #1 magazine for Tandy users!

And as a special convenience, our tech editors have compiled separate Best of 1986 disks for the Model III and Model 4, each with its own on-disk documentation.

# The Best of 1986!

## The Best of 1986 — Model III:

**Commando** — Build macros that let you set program parameters with a single command and customize DOS commands.

**Trace** — Trace and locate assembly language bugs.

**Copykey** — Copy text from one part of your screen to another in Basic and enter Basic keywords by pressing shifted letter keys.

**Wildcard** — Three wildcard utilities for copying, killing, and attributing files.

**Easydata** — Design a database with sorting capabilities.

**Unpatch** — Automatically reverses patches for removal.

**Index** — Set up a commented disk directory.

**Precision** — Calculate double precision mathematical results for an octet of basic math functions.

**Microtab** — Record and tabulate statistical data.

**Makedata** — Enter data statements automatically for fast entry of machine language code from Basic.

**Crypt** — Encrypt and decrypt your private text code.

**Teaser** — Create and solve long division puzzles.

**Hamcode** — Make your file recoverable with a matching parity check file.

## The Best of 1986 — Model 4:

**Sounder** — Enhance your Model 4's sound capability.

**Basic Data Base Management System** — Customize your own database manager.

**Restored Art** — Use this machine language subroutine to add graphic commands to Basic.

**Helper** — Create customized help files.

**Extended Command Interpreter** — Provide multiple commands on a single line in DOS and a history of the last ten command lines executed.

**Timer** — Measure your elapsed computer time.

**Diskcat** — Catalog up to 800 files in a master disk directory.

**Framer** — Add Get and Put to your Model 4 graphic commands.

**Mark 4** — Keep track of school grade records.

**Precision** — Calculate double precision mathematical results for an octet of basic math functions.

**Microtab** — Record and tabulate statistical data.

**Makedata** — Enter data statements automatically for fast entry of machine language code from Basic.

**Crypt** — Encrypt and decrypt your private text code.

**Teaser** — Create and solve long division puzzles.

**Hamcode** — Make your file recoverable with a matching parity check file.

Send me The Best of 1986 disk(s) for just \$21.45 each! If I order both the Model III and Model 4 versions, I save \$5 off the total price (2 disks for \$37.90!)

Model III dual drive version     Model III single drive version     Model 4 version  
 Payment Enclosed     Visa     AmEx     MC

Card # \_\_\_\_\_ Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Price includes postage and handling. Foreign airmail, please add \$1.00 each (US currency).

Model III and Model 4 are registered trademarks of Radio Shack, a division of Tandy Corporation. Available in November 1986. 11-86 SI

Mail to: Load 80, Elm Street, Peterborough, NH 03458

**W**ith the holidays right around the corner, The Best of 1986 is just the thing to brighten up your favorite Tandy user's Christmas! Order today for Christmas gift-giving!

Return the coupon or attached order card today, or Call Toll Free

**1-800-258-5473**

In New Hampshire, dial 1-924-9471

Table 5 continued

Polynomial with Complex Coefficient		
Basic with 8088 only	59	
Basic with 8088 and V20	57	1.04
Compiled with 8088	10	5.90
Compiled with 8088 and V20	9	6.56
Compiled with 8087	6	9.83
Compiled with 8087 and V20	6	9.83
Polynomial Differentiation		
Basic with 8088 only	29	
Basic with 8088 and V20	28	1.04
Compiled with 8088	5	5.80
Compiled with 8088 and V20	4	7.25
Compiled with 8087	2	14.50
Compiled with 8087 and V20	3	9.67
Polynomial Integration		
Basic with 8088 only	79	
Basic with 8088 and V20	75	1.05
Compiled with 8088	11	7.18
Compiled with 8088 and V20	10	7.90
Compiled with 8087	7	11.29
Compiled with 8087 and V20	6	13.17
Roots of Fourth-Order Equation		
Basic with 8088 only	131	
Basic with 8088 and V20	124	1.06
Compiled with 8088	12	10.92
Compiled with 8088 and V20	11	11.91
Compiled with 8087	7	18.71
Compiled with 8087 and V20	6	21.83
N Equations in N Unknowns		
Basic with 8088 only	128	
Basic with 8088 and V20	123	1.04
Compiled with 8088	5	25.60
Compiled with 8088 and V20	4	32.00
Compiled with 8087	3	42.67
Compiled with 8087 and V20	3	42.67
Third-Order Differential		
Basic with 8088 only	102	
Basic with 8088 and V20	96	1.06
Compiled with 8088	14	7.29
Compiled with 8088 and V20	12	8.50
Compiled with 8087	8	12.75
Compiled with 8087 and V20	8	12.75
Complex Exponential		
Basic with 8088 only	70	
Basic with 8088 and V20	65	1.08
Compiled with 8088	17	4.12
Compiled with 8088 and V20	15	4.67
Compiled with 8087	3	23.33
Compiled with 8087 and V20	3	23.33
Fourier Analysis		
Basic with 8088 only	39	
Basic with 8088 and V20	37	1.05
Compiled with 8088	5	7.80
Compiled with 8088 and V20	4	9.75
Compiled with 8087	4	9.75
Compiled with 8087 and V20	3	13.00
Multiple Regression		
Basic with 8088 only	337	
Basic with 8088 and V20	322	1.05
Compiled with 8088	15	22.47
Compiled with 8088 and V20	14	24.07
Compiled with 8087	10	33.70
Compiled with 8087 and V20	9	37.44

Table 5 continued

sions and conclusions I reached by reviewing the data in the tables without benefit of additional computation. I obtained timing values in Tables 1-3 by stopwatch to 0.1-second accuracy, not considering reflex time. Timing values in Tables 4 and 5 were computer generated to one-second accuracy.

The advantage of each chip is relative when compared to the cost involved in the upgrade. The V20 is inexpensive and requires no additional software. Whether an across-the-board improvement of 4 to 10 percent is worth the small cost is up to you. At that level, the speed increase is hardly noticeable without some sort of benchmark. The 8087 costs more and requires specialized programs.

Computer speed is relative. It depends on what you are doing, how long you have to do it before you do it again, and whether you can leave your computer unattended and do something else while you are waiting for it. These benchmarks should give you a chance to make an educated decision about which speedup technique suits your needs. ■

Address correspondence to Thomas L. Quindry, 6237 Windward Drive, Burke, VA 22015.

## Product Index

### Hard Drive Specialist (HDS)

16280 Hickory Knoll  
Houston, TX 77059  
800-231-6671 or 713-480-6000  
8087 Board: \$249 (Model 1000)  
8087 Upgrade: \$119 (Model 1000A)

### Hauppauge

358 Veterans Memorial Hwy.  
Commack, NY 11725  
516-360-3827  
87 Chip: \$129

### MicroWay

P.O. Box 79  
Kingston, MA 02364  
617-746-7341  
87Basic: \$150  
NEC V20: \$16

### PG Design Electronics

66040 Gratiot  
Richmond, MI 48062  
313-727-2744  
Speed Ticket: \$249 (Model 1000); \$149 for the 8087 only

### Tandy/Radio Shack

One Tandy Center  
Fort Worth, TX 76102  
8087 Math Co-Processor  
(catalog no. 25-1012): \$229.95

### Trionix

3563 #B Roosevelt St.  
Carlsbad, CA 92008  
619-434-4439  
8087 Board: \$235 (Tandy 1000);  
\$110 without the 8087

# Print No Evil

Prevent accidental screen-print commands from hanging up your Tandy 1000.

If you're like me, you often press the Tandy 1000's shift and print keys together by mistake, invoking a ROM subroutine that dumps the contents of the screen to your printer. If the printer isn't connected or ready to accept data, the computer hangs in limbo. Pressing the dreaded reboot button is your only recourse.

To deactivate this often unwanted screen-print program, I've written a small interrupt-driven routine called NoPrint that sounds a bell and gives you back control of the computer.

## Setting Up

To create NoPrint, type in and assemble Program Listing 1 using your editor/assembler program. You must also create a COM file by using the MS-DOS EXE2BIN utility.

If you don't have an editor/assembler, type in Program Listing 2, a Basic program that creates the NoPrint program file for you.

To execute the program, put it in your Autoexec.BAT file (which enables the program whenever you turn on or reboot the system), or type in its name at the MS-DOS command prompt. DOS returns you to the familiar A > prompt after installing the program. From now on, you'll hear a beep whenever you press shift-print—whether intentionally or not.

You can modify NoPrint to test whether the interrupt routine has already been installed, and if it has, to allow the option of removing it for regular operation of the screen-print routine. For a useful enhancement, add a form feed to the end of the screen-print routine to move the paper to the top of the next page.

## Program Notes

In developing NoPrint, I first converted it to a COM file. A COM program is shorter and quicker to load than a regular EXE program, but it must reside within 64K of

Program Listing 1. Assembly-language version of NoPrint (file name DISPRT.ASM).

```

;=====
;DISPRT.ASM - disable PRINT-SCREEN routine, sound bell instead
;               by Debbie Cooper
;=====
codesg segment
    assume cs:codesg
    org 100h ;make this a com file
disprt: jmp short replace ;jump over the resident program
bell:   proc far ;this is our routine here
        mov al,07h ;sound a bell
        mov ah,0eh ;display function
        int 10h ;call bios
        iret ;return to previous operations
finish equ $ ;mark end of routine
bell:   endp ;end of our routine now
replace: mov dx,offset bell ;put offset of routine into DX register
        mov al,5 ;interrupt vector # (shift+print keys)
        mov ah,25h ;function to set vector
        int 21h ;set the vector now
        lea dx,finish ;set offset of resident routine
        int 27h ;quit and routine stays resident
codesg ends
end disprt ;end of program

```

End

**From now on,  
you'll hear a  
beep whenever  
you press  
shift-print—  
intentionally  
or not.**

memory. Notice that I didn't use data, extra, and stack segments.

At the DISPRT label, the program jumps to the Replace routine. The ROM BIOS service to activate a screen-print operation is defined as INT 05 hexadecimal (hex). Control passes to this operation when the keyboard routine senses the shift-print key combination.

The assembler sets the address in the vector table for the INT 05 hex interrupt to the address of the routine that starts with the Bell label. Next, it designates the program lines that fall between the Bell and Finish labels as the portion to be left memory-resident and excludes the setup routine whenever MS-DOS requires more memory.

The code for sounding the bell is simple. Most programs that sound a tone ac-

Program Listing 2. Use this Basic program to create NoPrint (file name DISPRT.BAS).

```

30 OPEN "DISPRT.COM" AS #1 LEN=1
40 FIELD #1,1 AS D$
50 FOR B=1 TO 24
60 READ A$
70 LSET D$=CHR$(VAL("6H"+A$))
80 PUT #1:NEXT
90 CLOSE
100 DATA EB,07,B0,07,B4,0E,CD,10,CF
110 DATA BA,02,01,B0,05,B4,25,CD,21
120 DATA 8D,16,09,01,CD,27

```

End

tually send an ASCII 7 character to the screen. NoPrint loads the AH register with OE hex, which tells the system to display the byte held in the AL register when the INT 10 hex line is executed. The character-print routine doesn't print this byte on the video screen, however, because it is a control byte that tells the computer to sound a beep.

The last line of NoPrint contains a return-from-interrupt (IRET) instruction that tells the computer to go back to what it was doing before the special routine was called. ■

*Debbie Cooper welcomes your comments and questions regarding this program. You can write to her at 2466 W. 13th Ave., Vancouver, British Columbia V6K 2S8.*

## System Requirements

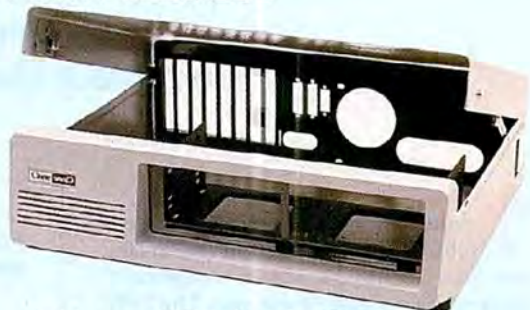
Tandy 1000  
Editor/assembler optional



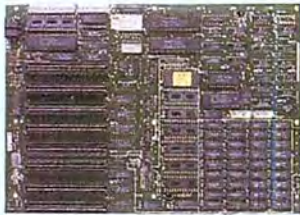
# BUILD YOUR OWN IBM CLONE

OR BUY ONE OF OURS COMPLETE FOR LESS THAN A TANDY 1000 AND GET REAL IBM COMPATIBILITY PLUS A ONE YEAR WARRANTY \*8 SLOTS  
 \*ACCEPTS FULL SIZE CARDS (Not the puny Model 1000 type)  
 \*COMPLETE COMPATIBILITY \*NO DMA FUNNY BUSINESS

Start with our high quality steel case with a flip-top that makes changing cards a snap. You won't void our warranty by opening the case. This is the foundation of your system. No cheap, flimsy plastic here. There are 8 slots and 7 of them accept both short and regular full length IBM add-on cards. You have room for up to 4 half-high drives. There is even a place for an additional fan. A speaker and all hardware are included. All you need is a Phillips screwdriver. . . . . \$ 89



Add our 135W (twice IBM's) power supply for all the power you are likely to ever need. It has outputs for the main board plus up to 4 disk drives. The IBM-style side switch mates with our case . . . . . \$ 99



Now for the heart of your IBM clone: the Main Board. No cost has been spared in manufacturing this fully IBM compatible, 640K RAM (already installed on the main board), 8 slot Clone of the IBM XT. The latest technology has been applied such as an 8087 socket and DMA along with our ROM BIOS giving you compatibility that Tandy 1000 and 2000 owners dream about but will never have. The board fits the case perfectly. You merely plug in the power connector, hook up the speaker and install the rest of your peripherals . . . . . \$249



**2X THE POWER OF AN IBM**

The Multi I/O card provides for 5 major functions—floppy disk drives (up to 4 DS/DD 360K drives); IBM parallel printer port; 2 serial (RS-232) ports, 1 populated, 2nd optional (\$10); Game port; Battery backup clock/calendar. Includes clock software and internal disk drive cable . . . . . \$ 149



Standard . . . . . \$ 89



Deluxe . . . . . \$ 129

Keyboards are one area where nobody copied IBM. Many feel the standard IBM keyboard leaves a lot to be desired. We have the most popular aftermarket keyboards. The 5150 and the 5151 are capacitive types with the feel professionals demand. Both models offer lighted NumLock and Caps keys and the deluxe model has lighted Power and Cursor Pad keys along with a Reset key and a separate cursor and numeric keypad.

Want to go with a hard drive? How about a 20MB half-high, low-power hard disk drive? Our complete kit includes the drive, cables, controller and software. It fits right inside your Clone and you can forget the floppy. Boot directly from the hard disk. Future expansion is assured as the controller accepts a second hard drive whenever you are ready . . . . . \$ 489



The standard floppy disk controller is also available. It controls 2 internal and 2 external floppies like the Multi I/O card. This card comes with the internal 2-drive cable . . . . . \$ 59



Two video boards are available. The color graphics video card has 3 outputs; RGB TTL; composite color; composite monochrome, plus a light pen port and a connector for an RF modulator. Standard IBM resolution of 320 x 200 four color graphics and 640 x 200 monochrome graphics . . . . . \$ 99



Hi-Res Monochrome . . . . . \$ 129



Color Graphics . . . . . \$ 99

Our monochrome graphics display card is Hercules compatible with a 720 x 348 TTL monochrome output. It runs Lotus 1-2-3 graphics and also has a parallel port . . . . . \$ 129



In order to finally see what you are doing we offer 2 monochrome video displays. The TTL display is able to display the hi-res output (720 x 348) of the Hercules or compatible card. This 12" video display has a non-glare display. Green or amber . . . . . \$ 110  
 The composite model is also able to display hi-res monochrome characters and graphics. Green or Amber with a 12" display . . . . . \$ 99

IF YOU THINK THAT'S A GOOD DEAL. . . TRY THIS,  
 WE'LL PUT IT TOGETHER FOR YOU  
 AND GIVE YOU A DISCOUNT ON TOP OF EVERYTHING ELSE.

SPECIAL #1	\$ 795	SPECIAL #2	\$ 888	SPECIAL #3	\$ 1299
Steel Flip-top Case		Steel Flip-top Case		Steel Flip-top Case	
135W Power Supply		135W Power Supply		135W Power Supply	
640K RAM Main Board		640K RAM Main Board		640K RAM Main Board	
1 Half-high 360K Floppy		Multi I/O Card		20MB Hard Drive	
Color Graphics Card		1 Half-high 360K Floppy		Multi I/O Card	
Composite Monochrome Display		Color Graphics Card		1 Half-high 360K Floppy	
5150 Standard Keyboard		Composite Monochrome Display		Color Graphics Card	
DOS 2.11 and BASIC		5150 Standard Keyboard		5150 Standard Keyboard	
		DOS 2.11 and BASIC		DOS 2.11 and BASIC	

Clone smolD

AEROCOMP

TEL: 214-339-8324 TELEX: 882761 AEROCOMP FAX: 214-337-4981  
 Redbird Airport, Hangar #8—PO Box 762426—Dallas, Texas 75376

Prices and specifications are subject to change without notice.  
 14 day money-back guarantee if you are not satisfied for any reason. Must be complete and in original shipping carton with all documentation. Shipping charges are not included.

Add \$70 for air delivery (\$35 for ground) in the lower 48  
 IBM is a trademark of International Business Machines  
 Tandy is a trademark of Tandy Corp.  
 Lotus and 1-2-3 are trademarks of Lotus Development Corp.  
 Hercules is a trademark of Hercules Computer Technology  
 Clone is a trademark of Aerocomp

CALL TOLL FREE WITH YOUR ORDER

800-527-0347 USA  
 800-442-1310 Texas  
 214-339-5104 Info

# Designer Labels

Write your own index  
to replace that cryptic TRSDOS directory.

**T**rying to name a file to reflect its contents is a confusing and frustrating experience that grows in complexity along with your disk directories. The TRSDOS directory isn't much help: it lists the name of each file along with information you don't normally care about, such as logical record lengths, extensions, the end-of-file byte, and so on.

Index, a machine-language program listed in Basic Data statements, gives you a second directory with room for a 60-character description of each file (see the Program Listing). It creates Index/CMD, a 1.5K machine-language program that works like the DIR command in TRSDOS. The new descriptions replace the technical file information and are recorded in a data file called Index/DAT.

## Thumbing Through

Index/CMD becomes another command file available from TRSDOS Ready after you copy it to your system disks. As with other commands and utilities, you can either type INDEX—which returns the index for drive zero—or INDEX :n, where n stands for a valid drive number. As with DIR, you can omit the colon before the drive number.

When you first invoke Index, the program scans the drive to load the Index/DAT file. Since that file doesn't yet exist, the program creates an empty one for the moment. This operation is invisible to the user.

The new directory has a cursor and scrolling capabilities. The status line at the bottom lists the three operations available from the command mode when the large cursor appears: / enters a comment, P prints the Index, and Q quits, returning you to TRSDOS Ready. Also shown are the drive number, the name of the disk in that drive, and the number of free kilobytes available on it. The latter number is

*Program Listing. Index. (See p. 132 for information on using the checksums in this listing.)*

```

100 'This program creates an executable M/L file named 'INDEX/CMD'. ** 145
110 ' ** 217
120 DATA 5,9,0,0,0,73,78,68,69,88,32,5,9,0,32,78,32,32,32,32,32,1 ** 3191
130 DATA 3,141,78,3,1,85,170,78,68,73,83,75,32,73,46,68,46,58,32,3 ** 3335
140 DATA 67,97,110,39,116,32,97,99,99,101,115,115,32,3,60,47,62,69 ** 3335
150 DATA 110,116,101,114,32,99,111,109,109,101,110,116,32,32,32,60 ** 3269
160 DATA 80,62,114,105,110,116,32,32,32,60,81,62,117,105,116,32,32 ** 3278
170 DATA 124,32,32,68,114,105,110,101,32,58,48,32,32,32,78,97,109 ** 3263
180 DATA 101,58,32,1,9,5,79,32,32,70,114,101,101,56,1,5,16,79,32,107 ** 3388
190 DATA 3,1,13,24,79,68,105,115,107,32,69,77,80,84,89,13,1,254,187 ** 3388
200 DATA 137,225,1,79,0,33,154,76,62,45,119,35,11,120,177,40,2,24 ** 3250
210 DATA 245,33,233,76,62,13,119,14,14,62,2,239,1,16,0,33,142,78,17 ** 3344
220 DATA 0,0,54,0,11,120,177,40,3,35,24,246,225,126,254,58,40,6,254 ** 3331
230 DATA 13,40,15,24,18,35,126,254,13,40,7,254,32,40,3,195,9,138,62 ** 3346
240 DATA 48,119,24,0,126,33,243,78,119,33,117,191,119,33,146,78,6,40 ** 3423
250 DATA 144,119,6,4,62,15,239,34,142,78,6,6,33,152,58,62,15,239,6 ** 3321
260 DATA 32,14,32,17,35,79,98,107,113,35,112,35,229,33,35,79,17,152 ** 3370
270 DATA 58,25,209,229,183,237,82,225,40,2,24,232,33,35,79,17,62,78 ** 3382
280 DATA 1,79,0,237,176,33,32,78,237,75,146,78,6,4,62,34,239,33,32 ** 3333
290 DATA 78,17,253,78,1,8,0,237,176,42,50,78,17,19,79,62,97,239,33 ** 3352
300 DATA 20,79,17,12,79,1,4,0,237,176,237,75,146,78,6,1,33,15,142,62 ** 3409
310 DATA 34,239,194,249,138,62,2,50,148,78,33,20,142,34,150,78,42 ** 3272
320 DATA 150,78,17,5,0,237,82,203,94,32,31,33,35,79,237,91,148,78,25 ** 3425
330 DATA 84,93,42,150,78,1,11,0,237,176,62,1,254,163,138,58,18,42 ** 3268
340 DATA 148,78,17,80,8,25,34,148,78,42,150,78,17,13,0,25,126,254 ** 3269
350 DATA 255,202,220,138,42,150,78,17,18,0,25,34,150,78,24,188,42 ** 3262
360 DATA 148,78,34,154,78,42,20,142,58,148,78,254,2,202,240,138,195 ** 3385
370 DATA 204,140,33,24,79,62,10,239,62,22,239,33,182,78,62,10,239,33 ** 3413
380 DATA 107,161,62,10,239,62,22,239,62,0,50,156,78,14,15,62,2,239,6 ** 3407
390 DATA 3,38,22,46,0,62,15,239,33,35,79,237,91,152,78,25,6,62,15 ** 3373
400 DATA 239,33,154,76,62,10,239,33,196,78,62,10,239,46,2,205,75,140 ** 3420
410 DATA 6,1,62,15,239,254,32,40,51,46,0,205,75,140,14,191,62,2,239 ** 3342
420 DATA 62,1,239,254,81,202,105,148,254,113,202,195,140,254,80,202 ** 3332
430 DATA 64,141,254,112,202,64,141,254,47,202,243,139,254,10,202,130 ** 3388
440 DATA 139,254,11,202,171,139,195,52,139,58,156,78,61,50,156,78 ** 3292
450 DATA 205,78,139,195,52,139,205,230,139,58,156,78,103,36,46,2,6 ** 3375
460 DATA 3,62,15,239,6,1,62,15,239,254,0,202,52,139,58,156,78,254,21 ** 3415
470 DATA 202,217,139,103,60,50,156,78,195,52,139,205,230,139,58,156 ** 3379
480 DATA 78,254,0,1,254,179,139,202,189,139,61,50,156,78,195,52,139 ** 3399
490 DATA 42,152,78,1,0,0,229,103,237,66,225,202,52,139,42,152,78,17 ** 3368
500 DATA 80,0,237,82,34,152,78,195,13,139,42,152,79,17,80,0,25,34 ** 3266
510 DATA 152,78,195,13,139,245,46,0,205,75,140,14,32,62,2,239,241 ** 3261
520 DATA 201,14,14,62,2,239,205,230,139,46,15,205,75,140,33,35,79 ** 3253
530 DATA 237,91,152,78,25,229,33,80,0,58,156,78,79,62,91,239,101,111 ** 3434
540 DATA 84,93,225,25,17,15,0,25,229,46,15,205,75,140,209,213,33,78 ** 3367
550 DATA 78,1,62,0,237,176,33,78,78,62,10,239,46,15,205,75,140,225,6 ** 3424
560 DATA 61,14,0,62,9,239,120,95,22,0,25,62,32,119,195,13,139,58,156 ** 3413
570 DATA 78,103,6,3,62,15,239,201,33,243,78,126,33,117,161,119,33 ** 3264
580 DATA 107,160,17,107,161,6,75,62,58,239,201,205,230,139,205,85 ** 3271
590 DATA 140,205,117,148,195,172,141,17,0,0,237,83,148,78,33,35,79 ** 3322
600 DATA 237,91,148,78,25,34,144,78,17,2,0,25,126,254,32,42,144,78,33 ** 3324
610 DATA 40,38,34,144,78,17,15,0,25,126,254,32,42,144,78,40,38,17,2 ** 3348
620 DATA 0,25,17,195,141,1,74,0,237,176,33,1,254,175,140,195,141,17 ** 3353
630 DATA 107,161,62,75,239,24,7,17,107,161,62,60,239,201,42,148,78 ** 3323
640 DATA 17,80,0,25,34,148,78,24,176,205,85,140,17,107,161,33,195 ** 3272
650 DATA 141,62,67,239,194,222,140,195,228,140,205,185,140,195,8,139 ** 3433
660 DATA 17,0,0,237,83,148,78,33,35,79,237,91,148,78,25,17,2,0,25,34 ** 3428
670 DATA 144,78,126,254,32,202,207,140,17,158,78,42,144,78,1,11,0 ** 3264
680 DATA 237,176,1,11,0,17,195,141,33,158,78,120,177,40,8,26,190,32 ** 3366
690 DATA 4,237,160,24,244,202,38,141,195,52,141,237,91,144,78,33,195 ** 3428
700 DATA 141,1,74,0,237,176,6,0,42,148,78,17,80,0,25,34,148,78,24 ** 3261
710 DATA 171,28,23,46,0,6,3,62,15,239,33,62,78,62,10,239,205,230,139 ** 3407
720 DATA 38,23,46,0,6,3,62,15,239,33,170,78,62,10,239,14,74,62,2,239 ** 3404
730 DATA 33,195,141,14,0,6,65,62,9,239,218,13,139,14,15,62,2,239,33 ** 3361
740 DATA 195,141,62,14,239,33,154,76,62,14,239,14,13,62,6,239,42,154 ** 3422
750 DATA 78,17,80,0,25,17,35,79,25,62,13,119,229,33,37,79,62,14,239 ** 3386
760 DATA 225,62,32,54,32,33,154,76,62,14,239,195,13,1,26,171,141,139 ** 3415
770 DATA 33,152,58,6,5,62,15,239,42,142,78,37,37,37,6,3,62,15,239 ** 3431
780 DATA 62,22,239,1,3,14,142,13,1,14,107,161,73,78,68,69,88,47,68 ** 3332
790 DATA 65,84,58,48,13,2,2,187,137 ** 1805
800 CLS:FOR T%=1 TO 1224:READ A:TTI=TTL+A:NEXT T% ** 3074
810 IF TTI<>1093891 THEN PRINT"CHECKSUM ERROR:"TTI:END ** 3569
820 PRINT"WRITING FILE TO DISK:"OPEN"O",#1,"INDEX/CMD" ** 3431
830 RESTORE:FOR T%=1 TO 1224:READ A:PRINT #1,CHR$(A);:NEXT T%:CLOSE ** 4225
840 PRINT:PRINT"FILE 'INDEX/CMD' NOW READY." ** 1362

```

End



## System Requirements

Models 4 and 4P  
64K RAM  
TRSDOS 6.x  
Basic

## You can now type up to 60 characters to describe the file.

```

INDEX  DIR: set up index program
INDEX  TXT: deleting program samples
RECOVER QD: recover a Scripsit file
CHECKSUMPT: print basic listing with checksums
ERASE  QD: editor/assembly (MOS)
CHECKSUMS: verify checksums of basic program
ERASE  BR: totally erase file with zeros
AREAM  TXT: Model 4 conversion for area calculation program
$      QD: Scripsit
AREAM  BR: calculate shape areas
TERM   QD: set up term program
INDEX  QD: print directory with descriptions
INDEX  DIR: data file for Index utility
LDRIVE : proposed programs
  
```

Photo. Sample Index directory.

always an integer rounded upward; 7.5K, for instance, appears as 8K.

Use the arrow keys to move the large cursor next to a file name you want to describe, and press the slash key (/). The large cursor will disappear, and a small, blinking cursor will appear to the right of the file name. You can now type up to 60 characters to describe the file. Press enter to end input; the blinking cursor will disappear and the large block will return to the left of the selected file.

From the command mode, press P to list your index on the line printer. Index then asks for a disk ID; whatever you type here becomes the first line printed in the listing. The program then prints a line of dashes and lists the index; a second line of dashes ends the listing. If you press P by accident, press the break key to return to the command mode. (Break isn't recognized once printing has started.) You're returned to command mode after the list has been printed.

If you're using a printer wider than 80 columns, you must install the forms filter before printing the index. The *Model 4 Disk System Owner's Manual* explains how to do this. Set the maximum characters per line at 80.

The third option, Q, records your entries in the Index/DAT file and returns you to TRSDOS Ready and the original screen. Index functions like the Help command in this respect.

Index/DAT stores only file names that have been assigned a descriptor. Moreover, each time you use Index it compares the contents of Index/DAT with your disk directory and removes from the Index any comments that go with a file that no longer exists. Index/DAT's size is kept to a minimum this way. Its 1.5K can hold up to 20 descriptors; beyond that, it grows in chunks of 1.5K.

## Cross Referencing

I've included only two error messages in the program to limit its length. "Can't access Index/DAT:n" appears when the program can't open or create its data file. This happens if you specify an illegal drive number, if no disk is present in a legal drive, or if a disk is full. "Disk empty" appears if the target disk has no visible files. (You won't get this message if you apply the patch described below.)

Index displays only the names of visible files. You can, however, access the invisible and system files as well. To do this, apply the following patch to Index/CMD by typing, from TRSDOS Ready:

```
PATCH INDEX/CMD (X'8AA2' = 0000)
```

To revert to visible files only, run the Index/BAS program to re-create the original Index/CMD file.

If you revert to visible files, you lose all the descriptors entered for invisible files. Index deletes all recorded descriptors that no longer apply to a directory.

I've tested Index on a hard-disk system. It accommodates the maximum of 256 files that can be stored on each logical drive of a hard disk. ■

*Jacques Robitaille welcomes questions on his program. You can contact him at The Standards Council of Canada, 350 Sparks, Ottawa, Ontario K1R 7S8.*

Circle 289 on Reader Service card.

# Available Now . . . LIGHT PENS FOR TANDY 1000

The **WARP SPEED Light Pen** is now available through RADIO SHACK Express Order. Order # 90-2069 for a Lightpen that plugs directly into the TANDY 1000, or order # 90-2074 for a Lightpen that plugs into the TANDY 1200 or 3000.\*

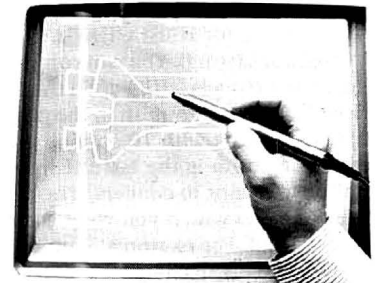
The WARP SPEED Light Pen is a professional quality, stainless steel pen that has been selected by the nation's leading Corporations to perform computer control operations, data input, high resolution graphics and many other applications. The Light Pen is now plug compatible with the TANDY computers and immediately available.

\*Models 1200/3000 may need additional display adapter or light pen convertor card.



Warp Speed Light Pen

## FREE SOFTWARE FOR TANDY DESKMATE



The WARP SPEED Light Pen comes with a software disk containing CONTROLLER, a fast file management program, a driver for Microsoft WINDOWS, and a driver for TANDY DESKMATE. In addition, software is available for Light Pen control on AUTOCAD, LOTUS 123, SYMPHONY, WORDSTAR, GEM and a Mouse to Light Pen convertor called PENMOUSE that will convert most major mouse driven software to Light Pen control.

**Light Pen for TANDY 1000 . . . . . Cat. # 90-2069 . . . \$199.99**  
**Light Pen for TANDY 1200/3000 . . . Cat. # 90-2074 . . . \$199.99**

For more information call:

# 1-800-874-4315

(In California 1-800-826-1563)



**WARP SPEED COMPUTER PRODUCTS, INC.**  
 5555 South Inglewood Boulevard • Los Angeles, CA 90230 • (213) 822-0647  
 Tandy and Radio Shack are trademarks of Tandy Corporation.

# Call Me 10DD29

Hold onto your decimal points. Here's a base-conversion program that will take you to the outer limits of the number system.

Anyone who works with computers probably knows how to convert decimal numbers into other base systems such as binary, octal, and hexadecimal (hex). If you're like me, however, you've grown bored with the usual base-conversion programs that cover and recover bases 2-16.

To spice the pot, I've written a base-change program that converts to and from any base within the range of 2 to 201. The high range introduces a galaxy of new numbers represented in novel and sometimes amusing ways.

Though the program's primary purpose is to entertain, you can put it to practical use for converting binary code to hex and vice versa. If you're interested in cryptography, you'll find it rich in ciphering possibilities, as well.

## Making Converts

Begin your journey to the far reaches of the number system by typing in and running the code for BASECHNG/ASC (see the Program Listing). You can run the program on the Models I/III/4 or on the Tandy 1000/3000. When you run it, the program produces a menu with 10 options (see Table 1). The origin is the base of whatever number you want to convert. The answer is the base into which you want the number converted. For example, suppose you want to convert 1,234 in base 10 to its equivalent in base 16. You'd enter 10 as the origin base, 16 as the answer base, and 1,234 as the number.

When you've typed in your choices, press the enter key to make the program display the answer. You probably won't be surprised by the appearance of the answers for the lower bases. For bases 2-10, I used the normal number set from zero to 9; bases 11-16 employ the first seven letters of the alphabet in conjunction with

Program Listing. BASECHNG/ASC. (See p. 132 for information on using the checksums in this listing.)

```

10 CLS' BASECHNG VERSION 1.7 NCR 04/08/86          '* 355
20 PRINT"Program to make base change calculations. (Range 2 to 2          '* 5615
   01).                                           '* 2522
30 ON ERROR GOTO 390:DIM G(54):DEFDBL Q,N        '* 3809
40 INPUT"ORIGIN BASE ";S:INPUT"ANSWER BASE ";D   '* 1263
50 INPUT"NUMBER ";N$                             '* 2034
60 N=0:IF S>10 THEN X=54 ELSE X=47              '* 2235
70 IF INT(S)<>S OR INT(D)<>D THEN 380             '* 1625
80 IF S>201 OR D>201 THEN 360                   '* 3558
90 FOR K=1 TO LEN(N$):I%=ASC(MID$(N$,K,1)):IF I%-X>S THEN 370          '* 1151
100 IF I%<48 THEN 370                             '* 1706
110 IF I%>57 AND I%<65 THEN 370                  '* 1772
120 M$=MID$(N$,K,1):M=ASC(M$)-48                  '* 1233
130 IF M>9 THEN M=M-7                              '* 1433
140 IF M>=0 THEN N=N*M+S+M                         '* 745
150 NEXT:M=0
160 M=M+1:Q=INT(N/D):Q$=STR$(Q):IF INSTR(Q$,".")THEN 360 ELSE G(          '* 5541
   M)=N-Q*D:N=Q:IF N=0 THEN 160
170 PRINT"ANSWER ->";FOR K=M TO 1 STEP -1:R=G(K):IF R>9 THEN R=          '* 4147
   R+7                                           '* 3521
180 R=R+40:X$=X$+CHR$(R):NEXT:PRINT X$;PRINT" <- ";PRINT              '* 4950
190 A$="":PRINT"1 To cross-check.                6 To Increment th          '* 5141
   e NUMBER.                                     e NUMBER.
200 PRINT"2 To Increment ORIGIN base.           7 To Decrement the NU          '* 5870
   MBER.                                         MBER.
210 PRINT"3 To Decrement ORIGIN base.           8 Swap S,Comp./Alt. C          '* 5226
   hars.                                        hars.
220 PRINT"4 To Increment ANSWER base.           9 Swap Special/Alt. C          '* 5775
   hars.                                        hars.
230 PRINT"5 To Decrement ANSWER base.           0 Input new NUMBER. (          '* 5036
   Retain Bases)
240 PRINT TAB(7)"(Tap any other key to input new parameters.)
250 A$=INKEY$:IF A$=" "THEN 250 ELSE IF A$="1" THEN T=S:D=D:T=N          '* 4577
   $=X$:GOTO 350
260 IF A$="2" THEN S=S+1:GOTO 350                '* 1880
270 IF A$="3" THEN S=S-1:GOTO 350                '* 1884
280 IF A$="4" THEN D=D+1:GOTO 350                '* 1854
290 IF A$="5" THEN D=D-1:GOTO 350                '* 1858
300 IF A$="6" THEN N$=LEFT$(N$,LEN(N$)-1)+CHR$(ASC(RIGHT$(N$,1))          '* 4296
   +1):GOTO 350
310 IF A$="7" THEN N$=LEFT$(N$,LEN(N$)-1)+CHR$(ASC(RIGHT$(N$,1))          '* 4300
   -1):GOTO 350
320 IF A$="8" THEN PRINT CHR$(21):GOTO 350        '* 2430
330 IF A$="9" THEN PRINT CHR$(22):GOTO 350        '* 2433
340 IF A$="0" THEN R=0:X$="":GOTO 50 ELSE RUN     '* 2615
350 X$="":CLS:PRINT"ORIGIN BASE ";S:PRINT"ANSWER BASE ";D:PRINT"          '* 6134
   NUMBER ->";N$:PRINT" <- ";GOTO 60             '* 4484
360 PRINT"Parameter out of program range.":PRINT:RUN 30              '* 4741
370 PRINT"Invalid character/number entered.":PRINT:RUN 30
380 PRINT"This program does not compute fractional bases.":PRINT          '* 6661
   :RUN 30
390 PRINT"Illegal function call encountered.":PRINT:RUN 30          '* 4844

```

End

the traditional number set (see Table 2). To anyone familiar with hex numbers, this is standard fare.

You'll get a better picture of how the program works by converting numbers into the higher bases. For example, enter 10 as the origin base, 1,105,193 as the number, and 36 as the answer base. The answer is NORT, my nickname. Base 36 is an extension of the representation system used by bases 11-16. It encompasses the numbers zero through 9 and all the capital letters of the alphabet.

This system opens some interesting ciphering opportunities. You can represent words as numbers and vice versa by con-

verting them to other bases. To extend the example using my nickname, try entering 36 as the origin base, NORT as the number, and 101 as the answer base. This time, the answer will be 17YJ. Enter your own name in base 36 and devise a pseudonym-by converting it to something higher.

Using the numbers zero through 9 and the capital letters of the alphabet gives the program 36 separate base systems. But what happens beyond base 36?

## A Trip to ASCII

In order to represent numbers in the higher bases, I drew my symbols from the ASCII character set, beginning with ASCII

LOAD  
80

## System Requirements

Model I/III/4 or  
Tandy 1000/3000  
64K RAM  
Basic

# POWER TOOLS

## C Compiler

Alcor C is a full implementation of the C language. It includes a standard function library and a 450 page manual. The manual contains a 130 page tutorial so you won't have to buy any other books to learn the language. You also get our programmable full screen editor. It's everything you need to become a productive C programmer.

*"a serious, comprehensive implementation"*  
*"superlative work, I recommend it highly"*

**Creative Computing Nov. 85**

*"the most comprehensive manual"*

*"the professionalism presented is very apparent"*

*"we would not hesitate to use it in a large programming effort"*

### Features Include

char	8 bits	initializers
short	8 bits	typedef
int	16 bits	static
unsigned	16 bits	auto
long	32 bits	extern
float	32 bits	struct/bit fields
double	64 bits	union

**Computer Language Feb. 85**

Execution speed on the Model 3 for 10 iterations of the prime number program published in Byte, Jan 83, page 284.

LC Compiler	105 secs.
Alcor C	78 secs.

## Multi-Basic Compiler

Alcor Multi-Basic is a powerful and versatile BASIC compiler. While remaining compatible with both MS-BASIC™ and CBASIC™ programs, it extends the BASIC language to include features normally found only in Pascal or C. Now you can take advantage of features like multi-line functions, recursion, and dynamic memory allocation without having to switch to another language. Multi-Basic has the features you need to improve the way you program. You can get rid of line numbers and actually write programs that other people can read. Multi-Basic is the most portable version of Basic you can buy. You can write a program on the TRS-80 Model 4 and then move it with no changes to the Tandy 1000. Multi-Basic also includes our programmable full screen editor.

*"the most comprehensive BASIC"*  
*"the manual is thorough and well organized"*  
*"the compiler is fast and efficient"*  
*"did exceptionally well on the benchmarks"*

**Computer Language May 85**

*"a superior compiler"*

*"Anybody who wants to compile existing programs or write BASIC programs in a Pascal-like fashion should consider Multi-Basic a must purchase"*

**80 Micro Nov. 85**

Execution speed on the Model 3 for 10 iterations of the prime number program published in Byte, Jan 83, page 286.

BASIC Interpreter	4570 secs.
Multi-Basic	89 secs.

## New Low Price: Only \$69.95 Your Choice

Alcor C Compiler          \$69.95  
 In Texas add \$4.28 sales tax           
 Add shipping           
 (\$5 USA/\$25 Foreign)  
 Total \$         

Name                                   
 Street                                   
 City                                   
 State                                  Zip                                   
 Country                                  Phone                                 

Alcor Multi-Basic          \$69.95  
 In Texas add \$4.28 sales tax           
 Add shipping           
 (\$5 USA/\$25 Foreign)  
 Total \$         

Check One:

- Model I TRSDOS
- Model III TRSDOS  Works with LDOS,
- NEWDOS, DOSplus, Multi-DOS

### Method of Payment

- MC  Visa  Money Order  Check
- Card #                                  Exp.

Check One:

- Model I TRSDOS
- Model III TRSDOS
- Model 4 TRSDOS
- Model 4 Montezuma CP/M
- Model 4 Radio Shack CP/M
- Tandy 1000/1200 MSDOS
- Tandy 2000 MSDOS

Multi-Basic is a trademark of Alcor Systems.  
 TRS-80 is a registered trademark of Tandy Corp.  
 MS-Basic/MSDOS are trademarks of MicroSoft  
 CBASIC/CP/M are trademarks of Digital Research  
 LC is a trademark of Misosys

TRSDOS version also works with LDOS, NEWDOS, DOSPLUS and MULTIDOS



- |                              |  |
|------------------------------|--|
| 1. To cross-check.           | 6. To increment the number.                      |
| 2. To increment origin base. | 7. To decrement the number.                      |
| 3. To decrement origin base. | 8. Swap special characters/alternate characters. |
| 4. To increment answer base. | 9. Swap special/alternate characters.            |
| 5. To decrement answer base. | 0. Change number; retain bases.                  |

Table 1. The program's option menu. Press any nonnumeric key (except break) to enter new parameters.

```

Base 11 count: 1 2 3 4 5 6 7 8 9 A 10
Base 12 count: 1 2 3 4 5 6 7 8 9 A B 10
Base 13 count: 1 2 3 4 5 6 7 8 9 A B C 10
Base 14 count: 1 2 3 4 5 6 7 8 9 A B C D 10
Base 15 count: 1 2 3 4 5 6 7 8 9 A B C D E 10
Base 16 count: 1 2 3 4 5 6 7 8 9 A B C D E F 10           (Hex)

```

Table 2. You can create bases higher than 10 by using the letters of the alphabet.

ASCII codes	Program base	Operation or video display
zero to 31	Not used	Control and special characters.
32-47	Not used	Space, punctuation, math symbols.
48-57	1-10	Numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, 9.
58-64	Not used	Punctuation, math symbols, and the "at" sign (@).
65-90	11-36	Capital letters of the alphabet.
91-96	37-42	Brackets, exponents, and so forth.
97-122	43-68	Lowercase letters of the alphabet.
123-127	69-73	Brackets, vertical line, and so forth.
128-191	74-137	Graphics characters.
192-255	138-201	Space-compression codes or alternate characters when options 8 or 9 are selected.

Table 3. Relationships between ASCII code and the program's mathematical bases.

code 48 (zero). For an overall picture of the relationship between the ASCII code and the program's mathematical bases, see Table 3. You might also want to have a complete ASCII character set in front of you. (If you have a Model III, you'll find the ASCII character set on pp. 228-234 of the *Operation and Basic Language Reference Manual*. If you have a Model 4, consult pp. A-46 through A-59 of the *Disk System Owner's Manual*. Tandy 1000/3000 owners, see pp. 71-74 of the Basic reference guide.)

ASCII codes 48-57 represent the numbers zero to 9. Codes 65-90 are the capital letters of the alphabet. (The program does not use ASCII codes zero to 47 and 58-64, which represent cursor movements, punctuation marks, special video-display operations, and other unneeded symbols.)

To represent the number 36 in base 37, the program uses ASCII code 91 (a right-facing bracket). Code 92 (a backslash) stands for the number 37 in base 38, and so on through ASCII code 255. (The lowercase letters of the alphabet are represented by ASCII codes 97-122.) Keep in mind that the extended (non-ASCII) character set begins at code 128. Also, codes 128-191 are graphics characters and 192-255 can be either space-compression codes or special characters.

## A New Face on Things

The program now has a rather large tiger by the tail, and almost anything might pop up on the screen when you type in your choices. For a sampling of what you might expect, take a look at Table 4, which shows some possible permutations of 80 Micro's name.

## An Historical Accounting

Most people today count in base 10 using the numbers 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. But this numbering system and the symbols it employs have not always existed. Our predecessors in prehistoric times probably didn't need to count: The few possessions they owned could be easily accounted for without a numbering system. The evolution of the bartering system might have given rise to a primitive form of currency. A pile of stones, perhaps, represented an equal number of animals, pots, or tools, and could be exchanged as deeds of ownership. At a later date in history, we probably used our fingers to count.

About 3000 B.C., the Egyptians devised the first written numbering system, using vertical marks to represent numbers. Three-thousand years later, the Romans found a way to improve on the Egyptians' method: They still used single vertical marks for the numbers 1,

2, 3, and 4, but they invented the symbol V for 5, X for 10, and so on.

The ancient Mayas of Central America invented an ingeniously simple and efficient numbering method. They could represent any number with only three symbols—a dot, a stroke, and an oval character. Interestingly, they used special characters shaped like human faces to record dates. Could it be that the happy face represented by ASCII decimal code 196 has Mayan origins?

Slowly, through a progression of Hindu (A.D. 800), Arabic (A.D. 900), Spanish (A.D. 1000), and Italian (A.D. 1400) influences, the traditional symbols 1, 2, 3, 4, 5, 6, 7, 8, 9, and 0 developed. But as history shows, we might have ended up with symbols that look completely different from these.

Just as we didn't start out with the symbols we now recognize as numbers, neither did we start counting in base 10.

About 2000 B.C., the Chinese invented a binary system, which was later perfected by Gottfried Leibnitz in the 17th century. Interestingly, some Australian aborigine tribes use the words "neecha" and "boola" to mean the number 1 and the number 2. The words constitute their entire numerical language.

The Babylonians introduced the concept of place value in base 60. The Greeks and Europeans relied on this system for mathematical and astronomical calculations until the 16th century. The system survives in the modern world in the division of hours into 60 minutes and 60 seconds.

Base 10 was developed by the Hindus and introduced to Europe during the late Middle Ages. Though no one can be sure, scholars suspect the first base ever used was base 5—the number of fingers on one hand. ■

—Norton C. Richardson

You might be amused by the result when the program executes ASCII code 196. The symbol is a smiling face, which represents the top character in base 142. To see it on screen, enter 10 as the origin base, 142 as the answer base, and 141 as the number. For an answer, you'll get a space-compression code (four blank spaces surrounded by arrows). Select option 8 from the menu to swap the space-compression code for an alternate character. The smiling face becomes your answer. If you cross-check (option 1), the answer will be 141 in base 10.

Whenever a space-compression code (up to 63 blank characters) executes, the program places arrows (-> <-) around the answer. The same happens when you cross-check (option 1). You can always replace the space-compression codes with visible characters by selecting either option 8 or 9.

Option 2 allows you to increment the origin base; option 3 allows you to decrement it. Similarly, options 4 and 5 allow you to increment/decrement the answer; options 6 and 7 let you increment/decrement the number. Option zero lets you change the number while retaining the bases. Press any nonnumeric key (except the break key) to enter new parameters.

Here's a brief description of how the program works. Line 30 sets up an error-trapping routine for errors not handled elsewhere in the program. It also sets the number of significant figures the program will display (54 in base 2). Lines 40 and 50 collect the input data. Line 60 allows the variable X to be set, making the program skip ASCII codes 58-64 if the origin base is greater than 10. Line 70 prevents you from typing in fractional bases, such as 6.5 or 8.2. Line 80 is another special trap that prevents you from typing in a base higher than 201, which is the program's limit.

Lines 90-160 contain four additional error traps: three for invalid characters and one for parameters out of range. With these restraints, you should get the correct answer or none at all. The lines also contain the conversion coding. The program looks at each character in the number and converts the original ASCII code to the appropriate ASCII code for the new base. Lines 170 and 180 print the answer; lines 190-240 print the menu. After line 250 fetches your choice, lines 260-340 act on it. Line 350 reprints the parameters and 360-390 print error messages.

## Master of Control

If you're wondering how to type in some of the characters the program uses to represent numbers in the higher bases, look at p. A-37 of the Model 4 reference manual; it tells all you need to know for that system. (I'll get to the Models I/III and Tandy 1000/3000 in a moment.) The numbers are written in hex (base 16), so you might want to convert them to decimal for

easy comparison to the ASCII codes.

You can type in any ASCII decimal code up to 250 (FA in hex) by pressing combinations of the clear, control, and shift keys. Look at the block for the letter D as an example. In the upper-left portion of the block is the number 84 (hex), which converts to ASCII decimal code 132. If you press and hold the clear, control, and D keys at the same time, you can print ASCII decimal code 132 (a graphics character), just as if you executed the command PRINT CHR\$(132).

Unfortunately, ASCII codes above 127 cannot be typed in directly on the Models I and III. You can derive them, however, by converting from lower to higher bases, as you did with the happy face.

The special characters in MS-DOS are different from those in TRSDOS. To produce them on screen with the Tandy 1000 and 3000, type in the appropriate ASCII number while holding down the alternate key.

Though my base-conversion program stops at base 201, nothing prevents you from inventing base 5,000 or 500,000, so long as you have the proper hardware, software, and an extensive notation set. ■

*Norton C. Richardson is a computer hobbyist and the founder of Richardson Software. Write to him at 655 Caribbean Road, Satellite Beach, FL 32937.*



Table 4. The many faces of 80 Micro.

## Base Maneuvers

The modern world counts in base 10 (the decimal system) and uses a unique number set to represent values from zero to nine. At 10, the place count changes, and you begin combining numbers to represent higher values.

The decimal system is one of many methods for counting and manipulating values. The lifeblood of computer operations is the binary system (base 2), which has two values representing the microprocessor's on and off conditions. Machine-language programmers rely on hex notation to translate binary numbers into more wieldy code.

In addition to binary, decimal, and

hex, other common base systems are ternary (base 3), quinary (base 5), seximal (base 6), and octal (base 8). As shown in the Table, each system provides a unique context for assigning values to a set of symbols. For example, the octal system (base 8) uses seven numbers to represent values from one to seven. After the number 7, the place count changes (add zero to the first number in the set) and you combine symbols to represent values equal to and greater than eight. In base 8, the number 11 is the value equivalent of the number 9 in base 10. ■

—Norton C. Richardson

Base 10 count:	1 2 3 4 5 6 7 8 9 10	(Decimal)
Base 9 count:	1 2 3 4 5 6 7 8 10	
Base 8 count:	1 2 3 4 5 6 7 10	(Octal)
Base 7 count:	1 2 3 4 5 6 10	
Base 6 count:	1 2 3 4 5 10	(Seximal)
Base 5 count:	1 2 3 4 10	(Quinary)
Base 4 count:	1 2 3 10	
Base 3 count:	1 2 10	(Ternary)
Base 2 count:	1 10	(Binary)

Table. Bases 2-10 use numbers to represent all values. Only numbers shown within a base count are legal. The numbers 7, 8, and 9 do not exist in base 7, for example.



# MONTEZUMA MICRO

PRESENTS

## MONTE'S TOOLKIT

# \$49

WOW!  
ANOTHER  
NEW  
PRODUCT  
FROM  
MONTE

REQUIRES: Montezuma Micro CP/M® 2.2 version 2.21+

Monte's Toolkit is a collection of utilities that will prove useful to every owner of Montezuma Micro CP/M (you all are owners, aren't you?). It's a disk full of programs that perform functions that are difficult, cumbersome or expensive to do any other way. Monte has tried, in his own way, to briefly explain each function for you below. Read on and be saved.

**DOUBLECROSS™** allows unlimited file transfers between CP/M™, IBM-DOS and Model 3/4 LDOS™ /TRSDOS™ with unsurpassed ease and speed. In fact, you can move just about anything from any disk to any other disk but you might have to make changes for program operation. Lotus 123™ just flat won't run on your Model 3 and I doubt that you could ever modify Scripsit™ enough to run on the IBM. Simple menu guide you through the operation with minimal keystrokes. Just tag the files you want in the directory display and go. You won't get doublecrossed with **DBLCROSS**.

**FREEFORM™** formats and backs up Model 3/4 LDOS/TRSDOS and IBM MS & PC-DOS (versions 1.x, 2.x and 3.x), both single side and double side plus there is a special "clone" copy when you just don't know or care what you have. Just insert a disk and copy away. All you have to know about the disk is how to get it into the drive. The Analysis feature lets you look at and print the actual structure of a disk - even the ones with "funny" formats.

**WSPR** lets you print to almost any printer using almost any control code. It's nearly magic and does a whole lot more than I can talk about here including letting you print *anything* your printer can print.

**FILEFIX™** gives you the ability to "fix" your "files" by adding line-feeds when your files are going from CP/M or IBM-DOS to LDOS/TRSDOS or take them away if you are transferring the other way. You can remove the control codes from a WordStar™ document thereby converting it to a non-document file. The fix will also fix up Scripsit files so they can be used by CP/M and IBM-DOS based wordprocessors (you know - the real ones). All this is accomplished with the use of simple menus and boy, it is fast.

**SY2M** requires 128K and our CP/M. The CCP and the BDOS are moved to drive M and the BIOS is modified to allow a Warm Boot from Drive M. So what you say. Well, you still have to have a disk in drive A but it no longer has to have the CP/M system resident. It can be anything. This little jewel copies frequently used programs to drive M and searches there first for all program requests resulting in much faster program loading. Slick isn't it?

**AUTO** is a little goodie that lets you issue multiple commands from the command line. Eliminates the *pain* of Submit. As in all the other parts of **MONTE'S TOOLBOX**, complete and comprehensive instructions are included and it's available right now.



# MONTEZUMA MICRO

PRESENTS

## MONTE'S WINDOW™



WINDOWS ON  
YOUR MODEL 4!



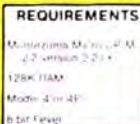
TAKES NO  
USER RAM!



Pop Up Menus!



INDEX  
CARD FILE



# \$49

Easy to Use!

A touch of the keyboard opens a window in your screen for a Note Pad, an Appointment Calendar, a Calculator, even a Mini Data Base. All yours for just \$49! Need RAM? Monte's Christmas gift to you - 64K and the window, both for \$99!

Once Upon A Time,

Monte Zuma, our Founder, President and King, has always had trouble keeping his desk organized. The Sidekick™ from Borland International would solve the problem, but alas, it was not available for CP/M™. So Monte asked his favorite nephew, the legendary LaMont E. Zuma (distant cousin to Rondo Talbot, a direct descendant of Monte Zuma himself) to work on the problem as best he could during recess at the home. LaMont, a true legend in his own time, really outdid himself this time. A touch of both Shift keys halts your application program in its tracks and up pops Monte's Window™ ready to use. What could be simpler? Put an end to the fumbling and pawing around the pile of papers on your desk. You will find Monte's Window™ indispensable. When you are finished, break back to your application program and it resumes without error. Monte's Window™ is truly a breakthrough. See for yourself - Look Through Monte's Window™ on your Model 4. How did you ever get along without it? See the page opposite for order information. Monte's Window™ is available right now.



# MONTEZUMA MICRO

PRESENTS

## MONTE'S BASIC

Your TRSDOS BASIC (01.01.00) will work the same, for the most part, under CP/M as it does under TRSDOS. However, for the most part isn't good enough. But, with some changes provided by our **BASCON™** program, you can be 100% compatible with the standard BASIC used with CP/M. True, you lose some of the TRSDOS BASIC features while gaining new features such as FILES, NULL, RESET, etc. **BASCON** alters your TRSDOS BASIC, which was included with your Model 4 when you bought it, so that it will function under CP/M. You must have the unaltered original TRSDOS BASIC as above in order to convert with **BASCON**. The program operation is fully automatic and quick. The resulting BASIC runs any CP/M 2.2 BASIC program that previously required MBASIC™. Programs written for TRSDOS BASIC may require modification to run correctly under the converted BASIC. Fully compatible with MBASIC. We even provide for additional documentation that is keyed by page number to your TRSDOS BASIC manual. **MONTE'S BASIC** is available right now.

# \$49

© Copyright 1985 by Montezuma Micro. All Rights Reserved.



# Can we talk? CP/M vs TRSDOS

By moving to CP/M on your Model 4 you achieve two things. First you open the door to a wealth of existing software. More 8-bit software runs under CP/M than any other operating system. This includes virtually all of the "big name" programs which have set the standards by which all others are measured. Programs like **WordStar**, **dBASE II**, and **Turbo Pascal** are available for CP/M, but not TRSDOS. Public domain software, almost unknown under TRSDOS, fills hundreds of megabytes of disk space. Valuable public domain programs like the **Small C Compiler** are just a toll-free phone call away. Most importantly, hundreds of applications programs are available from a multitude of vendors. Many include the source code. Wouldn't you like to be able to choose from scores of Accounts Receivable or General Ledger programs, instead of the meager selection you now have? Circle our special Reader Service number 600 on the Reader Service Card to receive our comprehensive free listing of suppliers of application programs that run under CP/M.

## What about the future?

When the time comes to move up to another computer it will almost certainly use MS-DOS. That's when CP/M users get a pleasant surprise. Since MS-DOS was a derivative of CP/M it operates in almost the same manner. Even better, most of the same software packages are available in 16-bit form and they operate in virtually the same way that they did under CP/M.

## Is it easy to use?

Montezuma Micro's CP/M has been carefully crafted to present a maximum of features while taking a minimum of memory. It supports all of the standard features of the Model 4/4P/4D computers, as well as most of the optional ones. Our CP/M has been consistently been awarded the highest ratings in industry magazines. It is version 2.2, the most popular and reliable of all the versions of CP/M produced. Our CP/M has been made as easy to use as possible. All customer-selected features are chosen from simple menus in our CONFIG utility. This includes the ability to configure a disk drive to run like that of scores of other CP/M com-

puters for maximum ease of software portability. Using the unique DBLCROSS program in our Monte's Toolkit utility package you can move files back and forth between CP/M, TRSDOS (1.3 and 6.x), and MS-DOS.

## Why use Montezuma CP/M?

We have already told you why our CP/M is the best for the Radio Shack Model 4 computer. The only question left to answer is "Why buy CP/M at all?" Radio Shack has abandoned TRSDOS — all of their new machines use MS-DOS. Most of the software producers have followed, leaving no new software development and saddling the TRSDOS user with whatever software "left-overs" he can find. Which DOS do you want to head into the future with: the one originally written for the Model I or the one that served as the basis for MS-DOS? Make the right choice right now for just \$169.

## If I need support?

We don't forget you after the sale. If you have a problem you will find our phones are answered by people, not answering machines or hold buttons. Our philosophy is very simple — we want you to be happy and satisfied with your purchase. If you have a problem then we have a problem, and we'll do whatever we can to resolve it.

## Cost to update?

Our owners are protected against instant obsolescence by our lifetime upgrade policy. At any time you can return your original CP/M disk to be upgraded to the latest version free of charge, except for a small shipping and handling fee. Periodically we publish **NEW STUFF**, a newsletter for registered users of Montezuma Micro CP/M. This publication carries news about new products, tips for getting more out of CP/M, and other valuable information for our users. It is sent free of charge to registered owners.

## Can I use a hard disk drive?

CP/M hard disk drivers are available for Radio Shack, Aerocomp, and most other popular brands of hard disk drives. These drivers allow the hard drive to be partitioned into one to four logical drives of varying sizes.

These drives may all be used by CP/M, or may be divided between CP/M and TRSDOS. A head-parking utility is included on the driver disk to minimize the risk of damage when the hard disk drive is not in use. Also included at no charge is a utility which will copy, compress, list, print, and delete files with ease. There isn't much you can say about a driver. It either works or it doesn't. Ours works supremely and it only costs \$30.

## Hard disk backup?

Unlike the high-priced, underpowered backup utilities available for backup of TRSDOS hard drives, our CP/M **HARDBACK** utility makes the backup of a hard disk to floppies quick and painless. Only **HARDBACK** gives you the choice of backing up the entire drive or only those files which it knows have been changed since the last backup. Daily backup is no longer a chore, since only new data must be copied. With **HARDBACK** you can quickly restore an entire drive, or only a single file if necessary. Only **HARDBACK** will perform a complete check of the hard disk drive and lock out tracks which have become flawed to prevent the use of those tracks for later data storage. Add this supreme program to your hard disk for just \$49. Isn't your time and data worth it?

## Specs?

**Size of Transient Program Area (TPA):** 56,070 bytes in a 64k system, 55,046 bytes in a 63k system (with optional hard disk driver). **CP/M IOBYTE:** Fully implemented. **Device Drivers:** Disk (35, 40, 77, & 80 track, single/double density single/double sided, 3, 5, or 8 inch. (More than 85 disk formats supported)) **Maximum Disk Capacity:** 40T SS=220k, 40T DS=440k, 80T DS=880k **RS-232:** All word lengths, parity, & baud rates. **Parallel Printer:** With or without line-feed and/or formfeed. **Video:** 24 by 80 with reverse video. **Keyboard:** Full ASCII with 9 function keys. **RAM Disk:** 64k, automatic on 128k systems. **Hard Disk:** Optional drivers available at extra cost for most popular models. **Standard CP/M programs included:** ASM, DDT, DUMP, ED, LOAD, MOVCPM, PIP, STAT, SUBMIT, SYSGEN, and XSUB.

## Order Information

Give us a call now with your order and we will ship immediately. Prices include delivery to your door in the lower 48 States including APO/FPO. All others please add an amount commensurate to shipping requested. Any excess will be refunded. Credit cards will not be charged before we ship your order. The suitability of software selected is the responsibility of the purchaser as there are **NO REFUNDS ON SOFTWARE**. Defective software will be replaced upon it's return, postpaid.

The toll-free lines are for orders only.  
Specifications/prices are subject to change without notice.

Montezuma CP/M: Model 4 version 2.30 ..... \$ 169

The following items require Montezuma CP/M 2.2 version 2.20 or later.

Optional Hard Disk Driver (specify exact hard drive) ..... \$ 30

HARDBACK ..... \$ 49



ORDER NOW ... TOLL-FREE

800-527-0347 U.S.A.

800-442-1310 TEXAS



**MONTEZUMA  
MICRO** "We Keep You Running"

For Information:  
214-339-5104  
Redbird Airport, Hangar #18  
Post Office Box 763009  
Dallas, Texas 75376-3009 U.S.A.

# Sudden Breaks

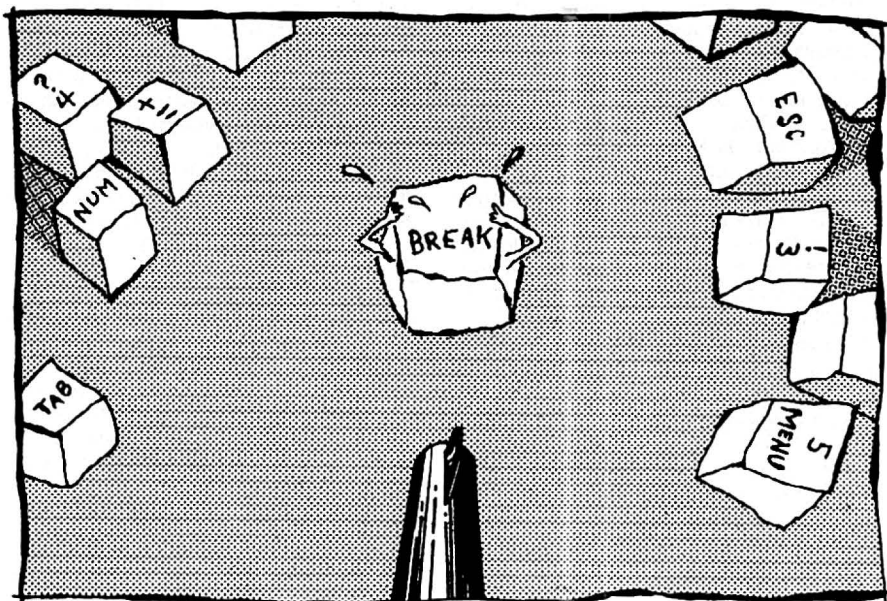
If you're a Basic programmer trying to write armor-clad code, you probably spend much of your time defending against keyboard errors. The Tandy 1000 keyboard has three soft spots where a user can break program flow or even hang up a computer. Inadvertently pressing the hold key can make someone think the computer has checked out for good. Even worse is the print key: Pressing control-print without a printer hitched up stops Basic cold, requiring a reset. Pressing shift-print with no printer freezes programs while the 1000's BIOS (basic input/output system) attempts to print the screen to nowhere for an interminable 20 seconds. If you don't know the hold is temporary, you reset.

Lastly, there's the break key. The latest version (1.01) of the 1000's GW-Basic follows IBM's standard: control-break alone halts a Basic program. Although most people who press this disrupting combination know what they're doing, someone who doesn't is bound to come across it and to harm. Good form suggests that you disable the break key in programs you write for other people.

With some Basics, you can do anything with a POKE. MS-DOS provides some useful PEEKs and POKEs, but not for disabling keys. GW-Basic's On Key trapping statement gives you some control over any key (see my column in the April 1986 issue, p. 90) but only enough to partially disable one key. To completely disable three problem keys requires the programming equivalent of strong medicine, but it can be done in Basic.

## Routine Written

The hold, print, and break keys trigger actions at the lowest level in the operating system. Only machine language can filter out their results. The Basic routine in Program Listing 1 creates and activates low-level machine code that intercepts the keyboard interrupt (Interrupt 9), checks out keyboard input be-



Program Listing 1. A Basic routine to disable the break, print, and hold keys on the Tandy 1000.

```

0 'The machine code is 89 bytes long. Entry point is 46 to enable it. This
  *Basic routine pokes it into memory 96 bytes (6 16-byte paragraphs) below
  *the top of Basic's 64K data area. (Lower it for 128k Tandy 1000s.)
10 CLEAR ,,16384: CLEAR ,65439: 'Use Clear ,,32768 for video modes 5&6.
  *Clear video memory first and separately or disaster results.
  *65439 leaves 96 bytes (6 paragraphs) below the top of 64K (65535).
11 DATA 4, 0, 0, 0, 251, 80, 228, 96, 36, 127
12 DATA 60, 70, 116, 15: 'HOLD Key (70) Substitute 144s (NOP)
13 DATA 60, 84, 116, 11: 'BREAK Key (84) for all four bytes on
14 DATA 60, 55, 116, 7: 'PRINT Key (55) any line to enable key.
15 DATA 88, 250, 46, 255, 46, 0, 0, 250,
  228, 97, 12, 128, 230, 97, 36, 127, 230, 97,
  176, 32, 230, 32, 88, 207, 80, 83, 82, 30,
  6, 46, 139, 22, 0, 0, 46, 142, 30, 2
16 DATA 0, 176, 9, 180, 53, 205, 33, 46, 137, 30,
  0, 0, 46, 140, 6, 2, 0, 176, 9, 180,
  37, 205, 33, 7, 31, 90, 91, 88, 203
17 DSBLR.LEN=89: DSBLR.OFF=46:
  DEF SEG=0: DSBLR.SEG=PEEK(&H510)+PEEK(&H511)*256+&H1000-6 '6 paras from top
18 DEF SEG=DSBLR.SEG: FOR I#=0 TO DSBLR.LEN-1: READ A#: POKE I#,A#: NEXT:
  POKE 2, VAL("&H"+RIGHT$(HEX$(DSBLR.SEG),2)):
  POKE 3, VAL("&H"+LEFT$(HEX$(DSBLR.SEG),2)): DEF SEG
19 DEF SEG=DSBLR.SEG: CALL DSBLR.OFF: DEF SEG
  
```

End

fore the BIOS or Basic sees it, and cancels input from the problem keys.

As it's written, you must put this routine at the start of any program (because it uses Data statements). The routine squeezes into 10 consecutive lines. You can leave out comments (especially line zero) and ignore the fancy, multiline format (line feeds created by pressing alternate-10 on the numeric keypad).

If you're going to use video modes 5 or 6 (on the Tandy 1000 only) at any time in your program, change the value following

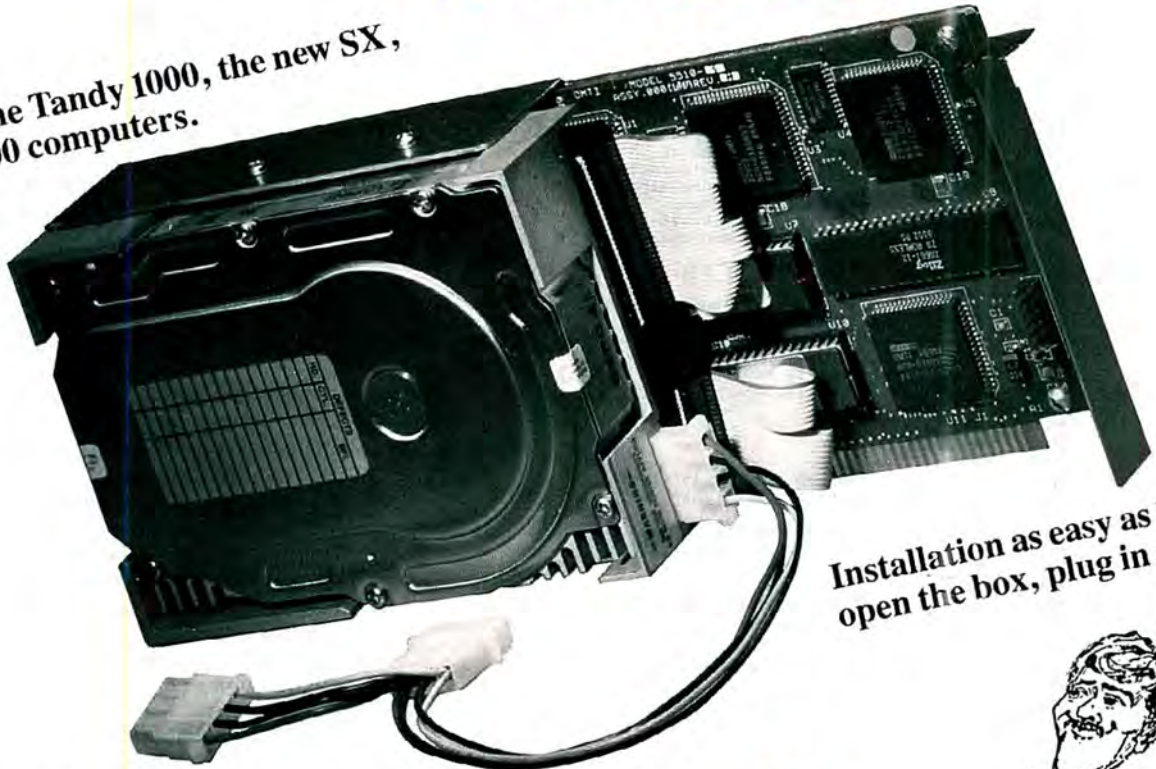
the first Clear statement in line 10 from 16384 to 32768. Because of a flaw in the 1000's Basic, you must protect high memory in a separate Clear statement after setting aside video memory. Don't use a Clear statement later in the program to change video memory (disaster results). The value of 65439 in the second Clear statement (line 10) protects 96 bytes of memory at the top of Basic's 64K work space (where your program and variables reside). If you have a 128K 1000, this value must be lowered to some-

## System Requirements

Tandy 1000  
Basic

# New From **Zuckerboard** 20 Mega Byte Hard Card **\$599 vs. \$799**

*Fits in the Tandy 1000, the new SX,  
and 3000 computers.*



*Installation as easy as 1-2-3  
open the box, plug in and play.*

### Compare Ours to Theirs

	ZUCKERBOARD	TANDY
Price	\$599	\$799
Availability	Now	Soon
Warranty	2 Years	90 Days
Installation	Preformatted for Plug & Play	Need to Format
Reliability	3x More Reliable Than a Seagate	Unknown
Access Time	66 Millisecond	Unknown
Slot Usage	1 Slot	Unknown



**Dr. Dr. Zucker**

# It's another **ZUCKERBOARD**



235 Santa Ana Court • Sunnyvale, CA 94086 • (800) 233-6874 (CA) • (800) 222-4920

ZUCKERBOARD is a registered trademark of Advanced Transducer Devices Inc.  
Tandy 1000/1200 are Trademarks of Radio Shack, a Division of Tandy Corporation.

All prices subject to change without notice due to fluctuations in the chip market.

Program Listing 2. Debug script to create machine code for the keyboard-interrupt handler. The blank line near the end is necessary.

```

n disabler.bin
a
dw 0004 0000
sti ;enable interrupts
push ax
in al,60 ;read 8255A-5 keyboard data
and al,7f ;whether pressed or released
cmp al,46 ;HOLD scan code
jz lld
cmp al,54 ;BREAK scan code
jz lld
cmp al,37 ;PRINT scan code
jz lld
pop ax
cli ;disable interrupts
cs: ;process as usual at
jmp far [0] ;previous keyboard routine
;lld: bypass normal keyboard processing
cli ;disable interrupts
in al,61 ;Port B of PPI 8255A-5
or al,80 ;toggle keyboard clear bit on
out 61,al ;and
and al,7f ;off (bit 7 of Port B)
out 61,al
mov al,20 ;end-of-interrupt signal to
out 20,al ;8259A interrupt controller
pop ax
iret
;Basic calls here to set up new interrupt
push ax ;save registers
push bx
push dx
push ds
push es
cs: ;set up for new interrupt
mov dx,[0000] ;stored offset into dx
cs:
mov ds,[0002] ;stored segment into ds
mov al,9 ;get current keyboard int
mov ah,35
int 21
cs: ;store current interrupt
mov [0000],bx
cs:
mov [0002],es ;reestablish new interrupt
mov al,9
mov ah,25
int 21
pop es ;restore registers
pop ds
pop dx
pop bx
pop ax
retf

rcx
59
w
q

```

End

where around 20000 to fit in memory.

Lines 10-18 set up memory and then POKE the machine code into place. Line 19 invokes key disabling. Using the sequence of statements in line 19 repeatedly toggles key disabling on and off. You can switch key disabling on and off at any point in your program as long as the address variables DSBLR.SEG and DSBLR.OFF stay defined. Toggle the routine off before using the Shell statement. If you don't want all three keys disabled, you can modify line 12, 13, or 14 for the appropriate key. Replace all four numbers in the chosen line with 144 (four in a row). A 144 (NOP) is the 8088 code for "do nothing."

Because of the PEEK in line 17, the key-disabling routine works only with the new 1000 GW-Basic (Tandy version 1.01). Although still flawed, the new version is superior to the original unfinished release, and the update is free. The

program also happens to work on IBM PCs and on the Tandy 1200 (with MS-DOS 2.11.41 and Basic) if you remove the first Clear statement from line 10. The scan code for the print key is the same as IBM's print screen key, and the 1000's code for the hold key is the same for an IBM PC's scroll-lock/break key, so break is disabled. The 1000's break-key scan code has no IBM equivalent. The IBM equivalent of a hold key is control-number lock, but you shouldn't disable it because you need the number-lock key for other purposes. The key-disable routine can't be used with Borland International's SideKick.

### Basic Fine Points

IBM PC Basic stores the segment address of the 64K user-data area down in its own data scratch pad at address 0000:0510 hexadecimal (hex). Tandy wrote the new version of the 1000's Ba-

sic to simulate certain addresses in this data area. PEEKs and POKEs to these addresses seem to give the proper information, but if you invoke Debug from the Shell statement, you'll find nothing (zeros) stored there. The PEEKs in line 17 of the Basic key-disable routine grab the simulated segment address and convert it to the decimal form needed for the DEF SEG (define segment) statement. Adding 1000 hex (64K) to this address puts you at the top of the data segment. Subtracting six 16-byte paragraphs puts the routine 96 bytes under the top. So that you can toggle key disabling on and off with a simple Call statement (without passing the segment address), the POKEs at offsets 2 and 3 store the segment in the interrupt-handling routine.

POKE the machine code in place only once; if you POKE it when it's running, you replace an interrupt address currently used by the program with an inappropriate one and the system hangs up. You don't need to turn off the machine-code routine before leaving Basic, because Basic restores the keyboard-interrupt vector that was in place before it loaded. Returning from a child process (via a Shell statement) does, too, so the routine should be disabled before a Shell statement.

POKEing in machine language from Data statements instead of BLOADing a memory image of the routine has some disadvantages. You must be careful of installing the disable routine in a Basic program that has its own Data statements. That's why I put it down low in line numbers. If you like your subroutines high in memory, you can put this one there, in spite of the Data statements, with a little trick. To be sure that the POKEs use the correct data, put a Restore statement in the subroutine (with the line number of the subroutine) before POKEing and another generic Restore before returning:

```

10000 RESTORE 10000
10010 DATA 04.00 . . .
10020 REM Routine to install machine code.
10050 RESTORE:RETURN

```

You must call this subroutine before reading other data in a program. I wrote the call to the subroutine (line 19) so that it can be called as a separate subroutine.

### Machine Code

The machine code (Program Listing 2) has two parts: the keyboard-interrupt handler, which filters out the unwanted keystrokes, and a program that links the keyboard handler into the operating system using DOS functions designed for this purpose. The installation routine uses the two-word address stored at offset zero in the handler to tell DOS where

to go when a key is pressed. It first gets the address of the current keyboard-interrupt routine (using DOS function 35 hex) and stores that so that it can reinstate the old routine when called again.

Once installed as the keyboard-interrupt routine, the key-disabling machine code is called at offset 4 whenever the user presses or releases a key. It looks at the scan code sent by the keyboard and decides if it belongs to one of the three unwanted keys. If it doesn't, the routine issues a far jump to the old keyboard-handling routine (the address stored in bytes zero to 3), where key input is handled as usual. If the key is one of the chosen few, the routine talks back to the hardware, essentially saying "Next key." (For more details on writing interrupt-handling routines, see "Taking Up Residence," April 1986, p. 60.)

## Talking to Keyboards

You won't find much information on direct keyboard access with IBM clones unless you have an IBM technical reference manual that provides the BIOS source code. I had to debug SideKick and the 1000 BIOS for hints. The keyboard has its own processing chip that handle

key debounce and repeat rates. Each key on the keyboard has a scan code that the keyboard sends when you press a particular key. When you release a key, it sends a code that is 128 higher than the scan code.

In the Tandy 1000, the 8255A-5 programmable peripheral interface (PPI) chip accepts the code and directs information flow from the keyboard. When it receives a scan code, the PPI prods the 8259A interrupt controller to butt in on the 8088 CPU with a low-level keyboard interrupt.

The 8088 issues an Interrupt 9, which calls a keyboard-handling routine. This routine reads the scan code from port A of the PPI. The BIOS keyboard routine either performs a special routine, like a screen dump or reset, or stores the scan code and whatever ASCII code it deems appropriate in a buffer. From the buffer, key-press information is fed through other BIOS or DOS functions.

The keyboard routine must also let the PPI know that a code has been read (by toggling bit 7 of the PPI's port B on and off) and signal the interrupt controller that the interrupt procedure is complete. Only then can another key code arrive and be processed.

The key-disable machine code checks the code in port A of the PPI (port 60 hex) and clears the high bit. Whether a key has been pressed or released becomes irrelevant. If the disable routine passes control to the old keyboard routine, the information is available in port A. When the break, hold, or print key is pressed or released, control stays with the disable routine. It then reads the contents of PPI port B (port 61 hex) and sets bit 7 (the clear-keyboard bit) and sends it back; then it clears bit 7 and sends the byte out port 61 hex again. Code 20 hex sent out port 20 hex tells the interrupt controller that the current interrupt is complete. The end result is that the three keys are ignored at the lowest level accessible with software. ■



*Dave Rowell is an 80 Micro technical writer specializing in MS-DOS computing. Address correspondence to him to 80Micro, 80 Pine St., Peterborough, NH 03458.*

## TIDBIT #38

How many times have you needed to open just one or two lines in a program to insert new commands without renumbering the whole program? My One-Number Renumber program does just that. Here's how it works. Suppose you had the following program:

```
10 PRINT "1"
15 PRINT "2"
16 PRINT "2.5"
20 PRINT "3"
```

Say you wanted to insert a PRINT "2.3" in the sequence. With One-Number Renumber, you could renumber line 15 or 16 lower or higher, respectively, and then enter the new line number.

My program will prompt you to "Input old number, new number." For my example, you could enter 15.14 at the prompt and then enter the new line 15 PRINT "2.3".

You cannot renumber a line out of the

previous sequence. Also, you must correct any GOTOs or GOSUBs to reflect the renumbering.

One-Number Renumber can go anywhere in a program, but probably works best at the end of the program where you can easily delete it later. Keep a copy of it on tape or disk and load it first when you start to write a program. Type RUN 60000 to use it.

The NL variable in line 60000 represents free memory's starting address. This address varies depending on your system:

Model I Cassette Basic	NL = 17129
Model III Cassette Basic	NL = 17385
Model III Disk Basic/TRSDOS 1.3	NL = 27261

If you have a different DOS, PEEK locations 16637 and 16638 to find the correct starting address.

*John H. Davidson  
Seattle, WA*

### Program Listing. One-Number Renumber.

```
60000 INPUT "Input old number, new number";NS,NN:NL=27261          ** 4344
60002 NA=PEEK(NL)+PEEK(NL+1)*256:IF NA>32767 THEN NA=NA-65536     ** 3601
60004 NC=PEEK(NL+2)+PEEK(NL+3)*256:IF NC>32767 THEN NC=NC-65536   ** 3706
60006 IF NC=NS OR NC=NS-65536 THEN POKE NL+2,NN-256*INT(NN/256):
      POKE NL+3,INT(NN/256):PRINT:PRINT"***Renumber completed***"
      ":END                                                         ** 8482
60008 IF NC<59998-65536 THEN PRINT:PRINT"***Number";NS;"not foun
      d***":END                                                     ** 4941
60010 NL=NA:GOTO 60002                                             ** 1288
```

# Foreign Dealers

You have a large technical audience that speaks English and is in need of the kind of microcomputer information that **CW Communications/Peterborough** provides.

Provide your audience with the magazines they need and make money at the same time.

For details on selling *80 Micro*, *inCider*, *AmigaWorld*, and *RUN* contact:

**SANDRA JOSEPH WORLD WIDE MEDIA**  
386 PARK AVE. SOUTH  
NEW YORK, N.Y. 10016  
PHONE-(212) 686-1520 TELEX-620430

SAVE 48% RIGHT NOW!

**"I have found something in almost every issue that has been worth the price of the subscription. I am amazed at the broad spectrum of the technical articles you publish, with ample material for both novice and advanced programmer."**

**Roger L. Holstege...MD**

And with 6 to 12 new programs for your Tandy computer in every issue, you too will find something each month that's worth the low cost of your subscription! Just type them in, and they're yours. Spreadsheets, word processors, all kinds of home, business and personal applications, plus helpful utilities that make all your programs easier to write, debug and use.

### VALUABLE HARDWARE PROJECTS

Want more value? How about *80 Micro's* money saving hardware projects you build yourself... or our frequent patches and enhancements that make commercial software programs even better.

### PROGRAMMING TECHNIQUES & TUTORIALS

You'll add to the value of your computer and get more out of every hour you spend computing with expert guidance from *80 Micro's* programming techniques that help you streamline and improve programs. In addition, *80 Micro's* step-by-step tutorials keep you ahead of today's fast-moving technologies like nothing else.

### HARDWARE & SOFTWARE REVIEWS

Avoid even one chancey hardware purchase, and you've saved enough to repay years of *80 Micro* subscriptions! You'll save yourself a bunch of time and hassle, too, with *80 Micro* checking out new software for you. Zero in on programs and products you want and skip the clunkers.



### THE MOST WIDELY READ MAGAZINE IN ITS FIELD

*80 Micro* is the most widely read magazine serving Tandy users today, with the largest editorial staff in its field. It's the oldest and most authoritative, too, so you know you can trust the help and advice you find in every issue.

### START SAVING NOW WITH 48% OFF THE COVER PRICE!

Yes it's true. You don't even have to wait for your first issue to start saving with *80 Micro!* Just use the coupon below or return the postpaid card opposite and you'll start receiving *80 Micro* every month at a full 48% off the Newsstand Rate. *If you're ever dissatisfied, for any reason, you'll be reimbursed for all un-delivered issues. Guaranteed!* So do it now. And get *80 Micro's* value working for you, every month from now on!

\* TRS-80 is a trademark of Radio Shack, a division of Tandy Corp.

**YES, I want to add the value of *80 Micro* every issue.** Enter my no-risk subscription for 12 monthly issues at the Introductory Rate of just \$24.97! I save a full 48% off the newsstand price!

Payment enclosed     Bill me

Name (Please Print) \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Canada and Mexico, \$27.97, Foreign surface \$44.97, 1 year only. Foreign airmail, \$79.97. US funds drawn on US bank. Please allow 6-8 weeks for delivery.

36AB8

**80 Micro • Box 981 • Farmingdale, NY 11737**

► For even quicker service, **CALL TOLL FREE 1-800-258-5473** (in NH, dial 1-924-9471) and charge it to your credit card!

## TANDY Model 1000 & MS-DOS TRS-80™ Models 1, 3 & 4 SOFTWARE

### SMALL BUSINESS ACCOUNTING with PAYROLL \$99.95

This program is based on the **Dome Bookkeeping Record #612** and handles **bookkeeping** and **payroll** for a small business. Bookkeeper provides single entry ledgers with category breakdowns for both income and expenses. Monthly, through last month, and year-to-date summaries. Fiscal year can start with any month.

Payroll handles up to 99 employees with **automatic computation** of F.I.C.A. and federal income tax. State tax and three optional deductions also included. Prints both payroll and expense checks on same forms. Monthly, quarterly, and yearly summaries as well as automatic computation of Form 941 reports and W-2 forms. Simple and easy to learn — ideal for first-time computer users.

### MAILING LIST \$99.95

Build and maintain mailing lists of up to **32,767** names. Up to five-line labels including first and last names, optional second line, address, city, state, zip code, and optional fifth line. Optional lines can be used for telephone numbers, account numbers, or any data, and may be printed at your option. Sort or search names by **any** field. Each name record can be associated with up to 14 different **key groups**. File can be printed by any combination of key groups. Print labels in 1, 2, 3, or 4 adjustable columns, on envelopes or in master index format. Runs on floppies or hard disk, limited only by disk capacity.

### HOME BUDGET and CHECKBOOK ANALYST \$59.95

A complete checkbook program together with budgeting, income and expense analysis, comparisons, and projections. Enter and print checks, enter deposits, and compute your current checking balance. Program also handles non-check expenses, bank debits, and income. Monthly and year-to-date summaries and yearly projections based on data through a known month. Monthly expenses compared to a pre-established budget.

### SMALL BUSINESS MANAGEMENT SYSTEM \$299.95

A complete **point-of-sale** program for a small business. Handles **order entry, invoicing, inventory, and bookkeeping**, including general ledger, accounts receivable, and accounts payable.

**Order desk** handles order entry and invoicing. Items ordered are automatically deducted from inventory, accounts receivable updated. Includes up to 999 8-character part numbers (1,999 for MS-DOS). Handles both customer accounts and single orders. Invoices printed on forms or plain paper and include discounts, sales taxes, and shipping and handling charges.

**Bookkeeper** keeps general ledger, accounts receivable and payable, produces customer statements. General ledger produces monthly and year-to-date totals. Receivables tracked to invoices, automatically updated as income entered.

**Inventory** produces sales and inventory reports showing items in stock, amounts sold, monthly rates of sale, and profits.

**Installation** tailors program to your business.

## SOFTWARE FOR TRS-80™ MODELS 1, 3, and 4 Only

### TYPITALL Word Processor \$69.95 TYPITALL with Spelling Checker \$99.95

Word Processor upwardly compatible with SCRIPSIT — it reads your old SCRIPSIT files and uses the same formatting and cursor movement commands. But it is a completely new word processor with many features more advanced than SCRIPSIT, SUPERSCRIPSIT, or other word processors.

Send any control or graphic/special character to the printer. Control/graphic characters included in the text so that you have complete control of all features of your printer. Print the formatted text on the screen before going to the printer. Send formatted text to a disk file for later printing. Merge data from a file during printing. Names, addresses, and other text can be inserted during printing. No need for a separate program for "mail merge" capabilities. Print while editing (spooling). Assign any sequence of keystrokes to a single control key. Call up to 16 help screens at any time. Move cursor forwards or backwards by character, word, line, or page. Reenter the program with all text intact if you accidentally exit without saving the text. Optional spelling checker comes with 29,500 word dictionary. Verify a 3,500 word document in less than two minutes. This is a full-featured word processor — not a demonstration disk!

### SYSTEM DIAGNOSTIC \$69.95

Is your computer working correctly? **Are you sure?** System Diagnostic has complete tests for every component of your TRS-80 Model 1, 3, or 4 (separate versions for each model).

**ROM:** checksum test. **RAM:** three tests including every location and data value. **Video display:** character generator, video RAM, video signal. **Keyboard:** every key contact tested. **Line printer:** character tests with adjustable platen length. **Cassette recorder:** read, write, verify data. **Disk drives:** disk controller, drive select, track seek, read sectors, formatting, read/write/verify data with or without erasing, disk drive timer, disk head cleaner. Single or double density, 1-99 tracks. **RS-232-C interface:** connector fault, data transmission, framing, data loop, baud rate generator.

### SMART TERMINAL \$39.95

The **Intelligent** telecommunications program for your TRS-80 Model 1, 3, or 4, or Model 2 CP/M. **Memory buffer** for sending and receiving files. **Automatic transmission** of outgoing data. **Automatic storage** of incoming data. **Character translations.** True BREAK key. Help screens, line feed filters, echo and line printer toggle switches, and more.

### TRS-80 MODEL III ASSEMBLY LANGUAGE \$29.95

A complete course in assembly language, written for the **beginner**. Contents include: the Z-80 instruction set, ROM and RAM, Using the Editor/Assembler, reading, printing and moving data, arithmetic operations with integers, floating-point and BCD numbers, logical and bit operations, cassette input and output, USR subroutines in BASIC, RS-232-C data communications, disk input and output, and the TRSDOS 1.3 disk operating system.

With the book you also receive **Monitor #5**, a comprehensive machine language monitor and debugging program. **These are the last copies of the book in print.**

## HOWE SOFTWARE

64 Windmill Road  
Armonk, New York 10504-2832

Information and same day orders:

**(914) 273-3998**

**30-day Money Back Guarantee!**

**When ordering, please give your computer model number.**

™TRS-80 is a trademark of Tandy Corp.

24-Hour TOLL-FREE Order Number:

Outside California call:

**(800) 428-7825, ext. 169**

Inside California call:

**(800) 428-7824, ext. 169**

**Please allow 2-3 weeks for delivery.**

Terms: checks, Visa, Master Card, or C.O.D.

Shipping and handling: \$3.00. Canada, Mexico, Hawaii: \$6.00

Air mail overseas: \$17.00. New York residents add sales tax.

# Checks and Balances

**H**ave you ever run a program and been unable to tell what you're supposed to do, or received an error message that you couldn't figure out? If so, the program was at fault. It needed better prompts and edits.

Prompts are short messages that appear while a program is running. They tell the user what kind of data the computer expects. Edits are checks built into the program. They ensure that data entered into a program is valid.

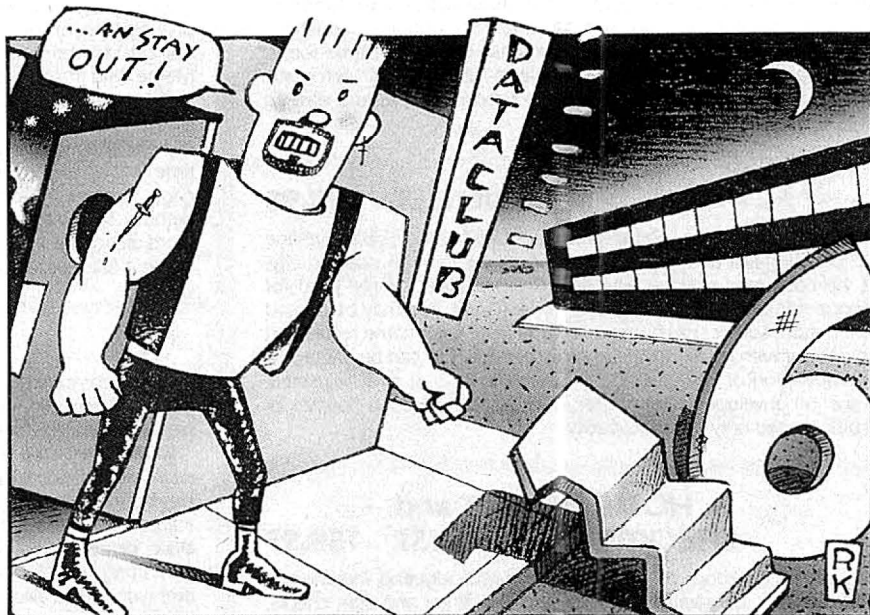
Writing edits and operator prompts requires care and a degree of programming talent. Unfortunately, many programmers have neither the gift nor the inclination to write them the way they ought to be. Commercial programs abound with inscrutable messages (like "Error 247") and condescending prompts (like "What?").

Meaningful prompts and edits are an essential part of any program that deserves to be called such. Together, they provide the single best way of preventing computers from collecting and processing garbage. This month, I'll describe some general-purpose routines I've written for editing alphabetic input. Once you've experimented with them, I think you'll find there's as much artistry in writing edits as in any other programming activity.

## Garbage Route

To make sure an operator inputs only letters, you can write two kinds of routines: one that edits each character as it's entered, or one that checks all the characters after they've been entered. The first method is more reliable, but it often results in "garbage collection"—a term for the Basic interpreter's attempt to free up string space. (When the interpreter runs out of space, it sifts through memory and throws away changed or no-longer-valid character strings. It then reorganizes the memory that's left.)

One problem with garbage collection is



that it takes time. While the interpreter searches through memory, the program stops and the computer appears to hang up for a minute or two. This isn't a serious problem if the operator understands what's happening. In most cases, however, it's impossible for the programmer to anticipate when garbage collection will occur. If you can't anticipate it, you can't warn the operator, who might think the computer is malfunctioning and turn it off—with catastrophic consequences for unclosed files.

One way to minimize the problem of garbage collection is to compile your Basic programs. This speeds up the collection time and makes the process almost invisible to the operator. Alternatively, you could use an MID\$ statement (which, when used on the left of an equals sign, will not result in garbage collection), or use LSET to change character strings into blanks.

Let's consider an example. Suppose you want the operator to input a string of no more than eight letters, where each letter should be capitalized and no spaces should appear between letters. If you're working on a TRSDOS machine, you might write a routine like the example in Program Listing 1. The routine converts lowercase entries to uppercase (see line 2040) and permits entry of eight characters before returning. If the oper-

ator presses the enter key (see line 2060), it will return sooner. It also backspaces correctly, as long as the data entry fits on one line.

To run this routine on MS-DOS machines, you'd need to change it slightly to prevent the backspace key from printing something on screen. Program Listing 2 is a modified version for MS-DOS computers. It assumes that the input field doesn't wrap over more than one line. If it does, line 2050 produces an error when the value of P becomes zero. You can modify either version of the routine for accepting input of different lengths. The number 8 in lines 2000 and 2010 could be a variable passed to the subroutine. You could also check the value of a variable in line 2060. If you want to make sure that some fields are completely filled, line 2060 might read:

```
2060 IF BS=CHR$(13) THEN IF V=1 THEN
      RETURN: ELSE IF V=0 THEN 2010:
      ELSE 2020
```

The only problem with this routine is that it can result in garbage collection. For that reason, it's best suited for compiled programs. Program Listing 3 is a routine for use in interpreted programs. This routine helps avoid garbage collection, but it won't eliminate it completely. The comparisons in line 2030 cause Basic to generate strings internally, which will eventually build up.

## System Requirements

All systems  
Basic





# Rose

## QUALITY DISK DRIVES

These drives are complete with power supply, cover and external drive connector. For TRS-80 Model I, III, 4, IBM PC and others. All drives are Double Density and step at 6ms or less. SS means single head, DS is double head. Specify white or silver color cover for no additional charge or my beautiful new Stainless Steel cover for only \$9 additional. Add \$5 per drive shipping unless otherwise specified. All drives have a one year warranty on parts and labor. Bare drives, that is, just the drives themselves are also available for those of you who don't need or want one of my power supplies.

### COMPLETE 3.5" - 5.25" - 8" DISK DRIVES

1ea. 40tk DS TEAC FD-35B in a dual case	157
2ea. 40tk DS TEAC FD-35B in a dual case	255
1ea. 80tk DS TEAC FD-35F in a dual case	177
2ea. 80tk DS TEAC FD-35F in a dual case	285
40tk SS Tandon TM100-1	\$ 147
40tk DS Tandon TM100-2	157
1ea. 40tk SS TEAC FD-55A in dual case	\$ 127
2ea. 40tk SS TEAC FD-55A in dual case	217
1ea. 40tk DS TEAC FD-55B in dual case	137
2ea. 40tk DS TEAC FD-55B in dual case	257
1ea. 80tk DS TEAC FD-55F in dual case	157
2ea. 80tk DS TEAC FD-55F in dual case	277

Add \$10 S & H per case for these 8" drives	
2ea. SS TM848-1E's in dual case with fan	\$ 647
2ea. DS TM848-2E's in dual case with fan	697

### BARE 5.25" & 8" DISK DRIVES

Add \$4 shipping per drive	
40tk SS, Full Size, Tandon TM100-1	\$ 99
40tk DS, Full Size, Tandon TM100-2	119
40tk SS, Half-High, TEAC FD55-A	99
40tk DS, Half-High, TEAC FD55-B	109
80tk DS, Half-High, TEAC FD55-F	129
8" SS, Thinline, Tandon TM848-1E	259
8" DS, Thinline, Tandon TM848-2E	333

### TRS-80 MODEL III/4 DISK DRIVE KITS

Internal drive kit complete with disk controller, power supply, mounting brackets, cables and all hardware plus step-by-step instructions. This kit contains everything you need (except the Disk Operating System, drive and a screwdriver) to convert your cassette Model III or 4 to fast reliable disk operation. Don't confuse this quality kit with the high-priced ripoffs. Thousands of satisfied customers cannot be wrong. You can join them for only \$189. Same as above but with 1-40tk SS drive \$289. Same as above but with 2-40tk SS drives \$388.

### TRS-80 MODEL I DOUBLE DENSITY CONTROLLERS

Add \$3 shipping	
Aerocomp "DDC" Really the best by test	\$ 99
Aerocomp "DDC" with LDOS	159
Aerocomp "DDC" with NEWDOS 80 v2.0	179

### OTHER DRIVE GOODIES

Add \$7 shipping	
TRSDOS 1.3 Disk & Manual for Model III	\$ 24
TRSDOS 2.3 Disk & Manual for Model I	24
TRSDOS 6.x Disk & Manual for Model 4	34
LDOS for the Model I or III	69
NEWDOS 80 v2.0 for the Model I or III	99
2-drive cable for Model I/III/4	24
2-drive external cable for IBM PC	40
4-drive cable for Model I	34
Extender cable, 7' long	9
5.25" power supply & encl., white or silver	59
Stainless Steel Covers	12
8" power supply, fan & enclosure, beige	149

# You've Got TOTAL ACCESS

(specializing in TRS80 \*)

## TO YOUR COMPUTER HARDWARE & SOFTWARE NEEDS. CALL ROSE TODAY!

# ROSE GETS RIGHT! NOW---ROSE'S MOD 4 CP/M \$ 69

Complete with Manual

Rose has latched onto this slick version of CP/M 2.2 that allows you to run most of your favorite CP/M programs with ease. It even lets you read and write other manufacturers' disk formats. What could be nicer? They are in stock ready for you to use and enjoy.

### TRS-80 SPECIAL EQUIPMENT

12" Green Comp. Monitor. Add \$10 for TTL	89
12" Amber Comp. Monitor. Add \$10 for TTL	84
16K 200 nsec RAM Guaranteed 1 year(8 chips)	9
64K 200 nsec RAM Guaranteed 1 year(8 chips)	19
64K RAM plus Genuine PAL for Model 4	29
256K 150 nsec RAM 1 yr guarantee (8 chips)	39

### MEDIA & SUPPLIES

5" Diskettes SSDD, Lifetime Guarantee, 10pk	\$ 16
5" Diskettes DSDD, Lifetime Guarantee, 10pk	19
5" Flipsort, holds 75 Diskettes	16
8" Diskettes SSDD, Lifetime Guarantee, 10pk	24
8" Diskettes DSDD, Lifetime Guarantee, 10pk	29
8" Flipsort, holds 50 Diskettes	22
5.25" or 8" Head Cleaning Kit	9
Letter Size 20 lb. Tractor Paper, 2900 sheets	25

### SPECIAL SOFTWARE DEALS

WordStar 3.3 (Specify MM or R/S format)	Add \$4 shipping \$ 195
MailMerge, SpellStar, Starindex, all 3 for just	99
WordStar Professional (Above 4 Programs)	275
DataStar Data Entry & Retrieval	125
ReportStar Report Generator	105
InfoStar Advanced DBMS (Above 2 Programs)	195
dBASE II Complete With Disk Tutorial	345
Super Utility Plus 3.2 by Kim Watt	59
CP/M 2.2 for Model 4 by Monte Zuma	169
Turbo PASCAL by Bor Land. Requires CP/M	44
Turbo TOOLBOX by Bor Land	45
Turbo TUTOR by Bor Land	35
Pickles & Trout CP/M 2.2m for the Model 2-12-16. Floppy Version	179
Same thing but the Radio Shack Hard Disk	219

### CP/M & 80 COLUMN for your MODEL III

No need to buy a new computer when you can use the Holmes VID-80 modification and get CP/M 2.2, 64K RAM and 80 column video. This kit is easy to install and requires no soldering. Even a dolt like you can end up with a complete 64K CP/M computer with an 80 column screen that is still able to run all your existing Model III software. For the first time you will be able to use CP/M programs that normal people do, such as dBASE II and WordStar. The regular price of this kit is \$524. Now Rose will get you going for only \$299. Add \$5 shipping \$ 299.

I'll ship you the Holmes deal above PLUS WordStar 3.3 installed, complete with original manuals ready to run for only \$399.

## ORDER NOW!

## TOLL-FREE

# 800-527-3582

## Orders Only Please

Call in your order or write to us at the address below. Texas residents call us at 214-337-4346 and deduct \$2.00 from your order but you should remind me 'cause sometimes I forget. If you need technical information or service please call the Texas number as the Toll Free lines are just for orders only. Prices are subject to change without notice and are mail order only. I accept AMERICAN EXPRESS, MASTERCARD and VISA and I will not charge your card until I ship your goodies. You can send a check or a money order. I also accept COD orders but they require cash or a cashier's check upon delivery. If shipping charges are not shown please call for the correct amount. Add \$5.00 handling charge if your order is less than \$50.00. Shipping charges quoted in this ad are for the lower 48 states only. Orders to Canadian address add \$20.00 to pay for doing all those papers for customs. Texans add State Sales tax. No tax collected on shipments outside of Texas. Be sure you know what you are buying. SOFTWARE IS SOLD ON A REPLACEMENT BASIS ONLY - NO REFUNDS. If it is defective call us for instructions. Please order from me now--I need the money and I will not jack you around. I reserve the right to charge up to a ten percent restocking charge if you jack me around. All merchandise carries the original manufacturers' warranty and all repairs or adjustments will be made by the manufacturer or his designated representative.

NEXT DAY SHIPMENT of Goods in Stock.

## TOTAL ACCESS

P.O. Box 790276

Dallas, Texas 75379

214-337-4346

Program Listing 1. A routine to check a string of no more than eight letters (for TRSDOS machines).

```

2000 A$=STRING$(8,32):I=0
2010 I=I+1:IF I>8 THEN RETURN
2020 B$=INKEY$:IF B$="" THEN 2020
2030 IF B$>"A" AND B$<="Z" THEN MID$(A$,I,1)=B$:PRINT
B$;:GOTO 2010
2040 IF B$>"a" AND B$<="z" THEN
MID$(A$,I,1)=CHR$(ASC(B$)-32):PRINT B$;:GOTO 2010
2050 IF B$=CHR$(8) THEN MID$(A$,I,1)=" ":I=I-1:
IF I>0 THEN I=I-1:
MID$(A$,I,1)=" ":PRINT B$; " ";B$;:GOTO 2010:
ELSE 2020
2060 IF B$=CHR$(13) THEN RETURN:ELSE 2020

```

End

Program Listing 2. A routine to check a string of no more than eight letters (for MS-DOS machines).

```

2000 A$=STRING$(8,32):I=0
2010 I=I+1:IF I>8 THEN RETURN
2020 B$=INKEY$:IF B$="" THEN 2020
2030 IF B$>"A" AND B$<="Z" THEN MID$(A$,I,1)=B$:PRINT
B$;:GOTO 2010
2040 IF B$>"a" AND B$<="z" THEN
MID$(A$,I,1)=CHR$(ASC(B$)-32):PRINT B$;:GOTO 2010
2050 IF B$=CHR$(8) THEN MID$(A$,I,1)=" ":I=I-1:
IF I>0 THEN I=I-1:
MID$(A$,I,1)=" ":P=POS(0):CP=CSRLIN:LOCATE
CP,P-1:PRINT " "; LOCATE CP,P-1:GOTO 2010:
ELSE 2020
2060 IF B$=CHR$(13) THEN RETURN:ELSE BEEP:GOTO 2020

```

End

Program Listing 3. A general-purpose input routine for interpreted programs.

```

2000 A$=STRING$(8,32)
2010 LINE INPUT B$:IF INSTR(B$," ") OR LEN(B$)>8 THEN
ERROR 255
2020 FOR I=1 TO LEN(B$)
2030 IF MID$(B$,I,1)>"a" AND MID$(B$,I,1)<="z" THEN
MID$(B$,I,1)=CHR$(ASC(MID$(B$,I,1))-32)
2040 NEXT I:LSET A$=B$:RETURN

```

End

Program Listing 4. An 11-line routine that can handle almost any input.

```

100 X$=STRING$(SIZE,32):P=POS(0)+80*(CSRLIN-1)-1:I=0
110 I=I+1:IF I>SIZE THEN RETURN
120 XX$=INKEY$:IF XX$="" OR LEN(XX$)=2 THEN 120
130 IF XX$=CHR$(8) THEN I=I-1:
IF I>0 THEN MID$(X$,I,1)=" ":
LOCATE 1+P\80,1+(P MOD 80):PRINT " ";:
LOCATE 1+P\80,1+(P MOD 80):GOTO 120:
ELSE 110
140 IF XX$=CHR$(13) THEN IF MUST=0 THEN RETURN
150 IF XX$<CHR$(32) THEN 120
160 IF INSTR(MASK$(1),CHR$(0)) THEN
MID$(X$,I,1)=XX$:PRINT
XX$;:GOTO 110
170 IF INSTR(MASK$(1),XX$) THEN MID$(X$,I,1)=XX$:PRINT
XX$;:GOTO 110
180 IF XX$>"a" THEN XX$=CHR$(ASC(XX$)-32):
IF INSTR(MASK$(1),XX$) THEN MID$(X$,I,1)=XX$:PRINT
XX$;:GOTO 110:
ELSE 200
190 IF XX$>"A" THEN XX$=CHR$(ASC(XX$)+32):
IF INSTR(MASK$(1),XX$) THEN MID$(X$,I,1)=XX$:PRINT
XX$;:GOTO 110
200 BEEP:GOTO 120

```

End

```

ISDIGIT$ = "0123456789"
ISNUM$ = "+ - . " + ISDIGIT$
ISUPPER$ = "ABCDEFGHIJKLMNOPQRSTUVWXYZ"
ISLOWER$ = "abcdefghijklmnopqrstuvwxyz"
ISPUNC$ = ".,:;!?"

```

Table. Variables for comparing characters entered during data input.

## The Generic Model

Suppose you were to list the conditions a general routine for checking data input should handle. Such a list might specify the following:

- The routine must accept only the correct number of characters (if that's desired).
- It must allow backspacing to correct errors.
- Each character must be individually specifiable. If the entry must have a capital letter in the third position and numbers in every other position, the routine should ensure that the data conforms to this format.
- It should translate uppercase letters to lowercase or vice versa.
- It should allow the data entry to take up as many lines as necessary and start anywhere on the screen.

A routine that can handle these conditions must be able to monitor operator input one character at a time. A routine that handles all of these conditions probably would result in garbage collection and run very slowly if used with an interpreter. Thus, it's best suited for a compiler.

Also, for the routine to work correctly, the program must know where it is at every moment. Merely knowing that is entering the third character isn't sufficient; it must know where the third character is on screen and how to move to another character position. The requirement implies that the language, or the terminal, can tell the program where it is, as well as where to move.

Another consideration is the backspace requirement. Most terminals that permit backspacing won't go past the beginning of the line. Unless you're sure that data entry will never require more than one line, a simple backspace isn't adequate.

Program Listing 4 is a routine written for Microsoft's GW-Basic that handles each of the conditions. The SIZE variable specifies the correct number of characters to enter. The MUST variable indicates whether the entry must fill the available space. The only condition under which the entry need not fill the available space is if MUST equals zero.

The string-array variable MASK\$ represents the number of allowable characters in each field position. MASK\$(1) represents the allowable characters for the first character entered; MASK\$(2) represents the allowable characters for the second character, and so on. The only exceptions are if MASK\$(1) contains nothing, in which case the computer accepts any character, or if MASK\$(1) contains the ASCII null character (zero), in which case no translation is done.

To make life easier, I've defined some variables for comparing characters entered. (See the Table.) To ensure an ap-

## A simple 11-line routine can handle almost any series of inputs.

appropriate entry for a zip code, for example, set MASK\$(1) = ISDIGIT\$ for 1 from 1-5; then set MUST = 1 and call the subroutine. The routine will return the entry in X\$, refuse to accept numbers that are more or less than five digits, and demand that each entry be a digit.

The routine also uses three other variables: P indicates the position at which the cursor starts; I is a loop counter; and XX\$ is a temporary variable.

The routine contains several tricky parts. The first is in line 100, where the value of P is computed. The screen locations are numbered, beginning with zero and continuing through 1,999. This permits inputs to wrap easily from line to line (line 130) even when backspacing. Line 130 correctly backspaces and positions the cursor on screen no matter where the input begins and ends (provided it doesn't fall off the bottom of the screen).

Lines 180 and 190 convert lowercase letters to uppercase, and vice versa, as a final way of forcing the input to match the specification. If the conversion fails to produce acceptable input, then line 200 executes and the user hears a beep, indicating that the input is invalid.

As you can see, a simple 11-line routine with a few constants can handle any conceivable series of inputs. Well, almost. The routine won't check for multiple decimal points in a number, a number with too many digits to the left or right of the decimal point, and so on. But you can easily add such checks once you understand how the routine works.

I'd suggest you compile programs when using this routine, though it will probably work well enough even in an interpreted program—just watch out for garbage collection! ■



Bruce Tonkin is an independent software developer, industry critic, and author of *The Creator data-base manager*. You can write to him at 34069 Hainesville Road, Round Lake, IL 60073.

Circle 282 on Reader Service card.

**TANDY®  
COMPUTERS**  
with the Manufacturers Warranty.  
Write for free copy of warranty

**ALWAYS AT SALE PRICES  
AND WE SHIP FAST!**

(Normally next business day...)

### Do You Want A Real Warranty...

or will you settle for a vague promise?

**S**ince 1977, we have sold Radio Shack merchandise in the city of Grapevine, Texas. This will be significant for you only if (a) you want a warranty which you can exercise easily, if necessary and (b) the reassurance of our long term stability and business ethics.

When you buy a Tandy/Radio Shack product from us the Tandy/Radio Shack limited warranty will accompany it and the warranty and service will be available to you, in any Radio Shack owned store in the U.S.

We will NOT install any foreign parts which might, and probably will, have an adverse affect upon your warranty. We will assist you in obtaining local support, should you experience difficulty, and will make an offer to buy-our-product-back\* (hardware) if it dissatisfies you, within 30 days.

"We ship fast," has always been our motto and if anyone is offering you a lower price, we suggest you ask about the foreign parts (and warranty) before closing the deal. We will "NOT meet-or-beat" a lower price so you can be sure you have our best quote the first time, and our toll-free phone lines (outside Texas) make the quote easy for you to get, from 9 a.m.-5 p.m. central time, Monday thru Friday. (\*For a small handling charge)

ORDER INQUIRIES AND CUSTOMER SERVICE  
(817) 481-SALE



**COMPUTER  
DW  
CENTER**



DFW Computer Center  
326 Main Street  
Grapevine, TX 76051

Customer Service & in Texas  
(817)-481-SALE 9am-5pm  
Central Time

CALL  
FOR  
PRICES

**TOLL FREE 1-800-433-SALE**

# All in the Game

Everybody likes to play games, and the public domain contains a multitude of them—interactive ones, crossword puzzles, board games, mystery-adventures, and simple shoot-'em-ups. Many are versions of familiar games—such as Centipede and Scrabble—or takeoffs of adventure games.

This month's Public Works covers some of the public-domain games we've received for the Tandy 1000, as well as a short Model III terminal program you can use to access 80 Micro's bulletin-board system (BBS), which has all the programs mentioned in this column.

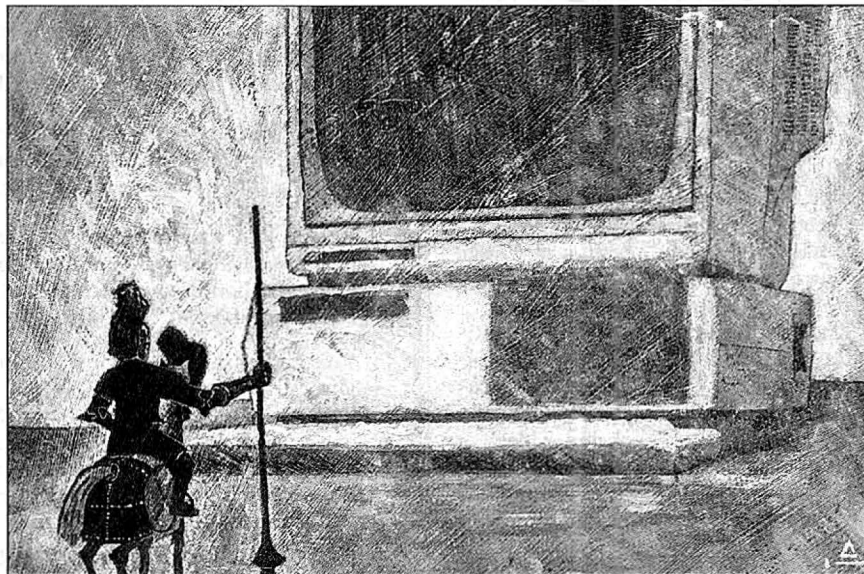
## Swap Talk

The 80 Micro Disk Swap was a big success. We received over 200 programs, which we've been processing and trying out for the last four months. Our thanks to everyone who sent programs.

Jim Schmidt (Wheeling, IL) submitted two games: Chess and Disk Crash. Chess is a full-board, black-and-white chess game that plays to a high level. It's you against the computer, and you have the choice of setting the look-ahead level against your opponent. The graphics are sharp and the play is intense. Disk Crash is a fun little arcade game. You have to negotiate a floppy disk through different levels on a grid and avoid the falling magnets to win points. If you get hit, you're zapped.

Glenn Bullock (Colleyville, TX) sent in XWing and WordWars, two Basic programs. XWing pits you against the dreaded Deathstar, the main spaceship of an alien fleet. Before you can destroy the Deathstar, however, you have to fight off a number of smaller starfighters and the evil Darth Vader. WordWars is a pressure-packed word game. You are given 13 letters and three minutes to form words of varying lengths, beginning with three-letter ones. You're limited, however, to five words of one length. The program tells you when you have 60, 45, 30, and 10 seconds remaining. When the countdown reaches 10, a red warning bar starts flashing and beeping. It's quite unnerving.

Greg Wood (Tustin, MI) sent in Pango, an arcade "beat-the-bees" game. Pango sets you in a maze and instructs you to



Program Listing. MiniMaker/BAS. (See p. 132 for information on using the checksums in this listing.)

```

10 '                               MINIMAKER/BAS                               '* 97
20 '                               By Pat Anderson                               '* 98
30 '   Creates MiniTerm/cmd Downloading Terminal Program                       '* 99
40 '                               6/7/86                                       '* 100
45 '                               '* 105
50 IF PEEK(16561) <> 78 OR PEEK(16562) <> 195 THEN CLS : PRINT "MEMORY
   SIZE NOT SET CORRECTLY! MUST BE SET TO 50000" : CMD "S" '* 7432
60 '                               '* 173
70 CLS                               '* 361
80 PRINT "CREATING MINITERM/CMD. . ." '* 2328
90 PRINT "TIME APPROXIMATELY 20 SECONDS" '* 2665
100 '                               '* 145
110 AD=50000!                          '* 650
120 FOR X=0 TO 1322                      '* 1066
130 READ N#                              '* 675
140 POKE AD+X-655361,N#                  '* 1346
150 NEXT X                                '* 621
160 '                                     '* 222
170 CMD "I","DUMP MINITERM/CMD (START=0C350,END=0C87A,TRA=0C866)" '* 3960
180 '                                     '* 224
1800 DATA 80,84,69,82,77,32,84,101,114,109,105,110,97,108 '* 2870
1810 DATA 32,42,80,114,101,115,115,32,60,66,82,69,65,75 '* 2760
1820 DATA 62,32,116,111,32,69,120,105,116,42,32,3,80,65 '* 2743
1830 DATA 82,65,77,83,58,32,51,48,48,32,66,65,85,68 '* 2607
1840 DATA 44,32,55,47,49,47,69,3,80,65,82,65,77,83 '* 2552
1850 DATA 58,32,51,48,48,32,66,65,85,68,44,32,56,47 '* 2598
1860 DATA 49,47,78,3,80,65,82,65,77,83,58,32,49,50 '* 2556
1870 DATA 48,48,32,66,65,85,68,44,32,55,47,49,47,69 '* 2614
1880 DATA 3,80,65,82,65,77,83,58,32,49,50,48,48,32 '* 2548
1890 DATA 66,65,85,68,44,32,56,47,49,47,78,3,80,32 '* 2556
1100 DATA 84,32,69,32,82,32,77,3,66,121,32,80,97,116 '* 2626
1110 DATA 32,65,110,100,101,114,115,111,110,3,87,105,116,104 '* 2965
1120 DATA 32,68,67,50,47,68,67,52,32,80,114,111,116,111 '* 2765
1130 DATA 99,111,108,32,68,111,119,110,108,111,97,100,105,110 '* 3041
1140 DATA 103,32,40,65,117,116,111,32,67,97,112,116,117,114 '* 2949
1150 DATA 101,32,66,117,102,102,101,114,41,3,83,69,76,69 '* 2805
1160 DATA 67,84,32,68,69,83,73,82,69,68,32,67,79,77 '* 2629
1170 DATA 77,85,78,73,67,65,84,73,79,78,83,32,83,69 '* 2634
1180 DATA 84,84,73,78,71,83,3,60,65,62,32,51,48,48 '* 2547
1190 DATA 44,55,47,49,47,69,32,60,66,62,32,51,48,48 '* 2599
1200 DATA 44,32,56,47,49,47,78,32,60,67,62,32,49,50 '* 2586
1210 DATA 48,48,44,32,55,47,49,47,69,32,60,68,62,32 '* 2593

```

Listing continued

# PRINTER SALE

## CANON LASER PRINTER

# \$1999. \*THE PRICE SAYS IT ALL.



LBP-8 A1



LBP-8 A2

## THE STATE OF THE ART

The C.I.TOH 3500 is fully IBM/Tandy 1000-1200-2000 compatible and FAST. Using bidirectional, logic-seeking printing across a full width of 13.2 inches, this little beauty prints at a speed of 350 characters per second (CPS). Letter quality printing is available at a rapid 87 CPS—more than twice the speed of most daisywheel printers. Couple that with a quick linefeed of 30 milliseconds per line and a standard buffer of 2K (16K optional, \$50) and you have just about the fastest throughput around. Only 4.7" high and a low noise level of 58 dBA.

Maximum versatility is offered for data and wordprocessing output, spreadsheets and business graphics by a variability of print densities, speeds, character sets and fonts, spacing, forms control and other attributes realized by operator and computer alterable functions, allowing the printer to be tailored to almost any application.

We could rave on and on about this fantastic printer but the proof is using this printer in your application. Try it on our 14 day money-back-if-not-satisfied plan. Don't be printer bound any longer. Call today.



**350 CPS only \$1295**  
(Please Specify Serial or Parallel)  
(Shipping Included)

ORDER TODAY CALL TOLL FREE **800-527-0347/800-442-1310**



# MONTEZUMA MICRO

P.O. Box 32027  
Redbird Airport, Hangar #8  
Dallas, TX 75232  
214-339-5104



get rid of all the bees. The theme is entertaining, and both the action and the graphics are pretty good.

Different versions of Frogger—the popular arcade game—have been popping up all over the place. Kim Pakiewicz (Phoenix, AZ) sent in a Basic version called Hopper. While the movement is a bit slow, Hopper has good graphics and sound. The listing is well documented.

"Do you love New York?" asks Nuke-NY, a submission from Mary Kindman (Wilton, NH). The program isn't really a game, but rather an educational look at the effects of nuclear war. The program simulates the effects of nuclear warheads dropped on New York City. Ten 1-megaton warheads are dropped on the city first, followed by a single 20-megaton bomb for comparison. Blast areas and kill ratios are defined on screen. Not exactly a good time (depending on whether you like New York), but the program does educate by showing the widespread effects of nuclear-bomb blasts.

## Terminally Yours

Many public-domain programs are on BBSes, and to access them you need a telecommunications program and modem. You can easily buy a cheap 300-baud modem, but it won't do you much good unless you have a telecom program. To help all you would-be telecommunicators, Pat Anderson of Fall City, WA, sent in MiniTerm, a short (less than 1K) Model III machine-language terminal program (see the Program Listing). You create MiniTerm by typing in the Basic program, MiniMaker/BAS, which generates the machine-language program. Actually, Pat called her program PTerm, but since 80 Micro already has a public-domain terminal program called PTerm, we renamed Pat's to avoid confusion.

MiniTerm is a useful program with a lot of capability. From its main menu, you select 300/1.200 baud and word/stop/parity settings. The program also has a large capture buffer, which you can activate from your computer or a host computer.

To create MiniTerm, enter Basic with memory set at 50000 to protect the machine-language program. Then type in and run MiniMaker/BAS.

While you are in terminal mode, the communications settings are displayed at the top of the screen. You can exit to DOS without breaking the phone connection by pressing the break key. Pressing the clear key puts you in buffer command mode, which suspends transmission from the host and displays a buffer menu.

If you want to have error-checking capability, which is essential if you are downloading machine-language pro-

grams, Pat gave directions for navigating CompuServe and downloading X-modem. However, you can download the same file from 80 Micro's BBS. The file is available on the Model III/4 area, under the name XMODMAKR/BAS. Download the file and run it from Basic with memory set at 50000. To use X-modem, exit MiniTerm and type XMODEM R. You will then be able to receive machine-language programs.

Both MiniMaker/BAS and the Assembly-language source listing for MiniTerm/CMD are available on 80 Micro's BBS (603-924-6985, 300/1.200, 8-bit words, 1 stop bit, no parity). Many thanks to Pat

for this useful terminal program.

We are attempting to get a public-domain version of X-modem for MS-DOS users. Call the 80 Micro BBS to check on its availability, or look for it in next month's Public Works column. ■



*As a technical writer for 80 Micro, Ryan Davis-Wright covers TRS-80 and MS-DOS computers. Write to him c/o 80 Micro, 80 Pine St., Peterborough, NH 03458.*

### Listing continued

```

1220 DATA 49,50,48,48,44,32,56,47,49,47,78,3,80,82
1230 DATA 69,83,83,32,60,67,76,69,65,82,62,32,70,79
1240 DATA 82,32,66,85,70,70,69,82,32,77,69,78,85,3
1250 DATA 32,32,60,79,62,80,69,78,44,32,60,67,62,76
1260 DATA 79,83,69,44,32,60,83,62,65,86,69,44,32,60
1270 DATA 90,62,69,82,79,44,32,32,60,82,62,69,84,85
1280 DATA 82,78,32,84,79,32,84,69,82,77,73,78,65,76
1290 DATA 3,32,66,85,70,70,69,82,32,73,83,32,60,79
1300 DATA 80,69,78,62,32,32,3,32,66,85,70,70,69
1310 DATA 82,32,73,83,32,60,67,76,79,83,69,68,62,32
1320 DATA 3,70,73,76,69,78,65,77,69,58,32,3,32,66
1330 DATA 85,70,70,69,82,32,73,83,32,60,69,77,80,84
1340 DATA 89,33,62,32,3,32,66,85,70,70,69,82,32,73
1350 DATA 83,32,60,70,85,76,76,33,62,32,3,0,96,0
1360 DATA 0,0,0,0,0,0,0,0,62,0,50,20,66,205,201
1370 DATA 1,42,248,83,249,195,45,64,33,64,60,17,65,60
1380 DATA 1,63,0,54,32,237,176,201,62,19,50,240,65,205
1390 DATA 85,0,42,32,64,34,251,83,205,14,84,33,64,60
1400 DATA 34,32,64,33,94,83,205,27,2,205,43,0,254,1
1410 DATA 202,255,83,254,79,204,121,84,254,67,204,139,84,254
1420 DATA 83,204,99,86,254,90,204,114,84,254,82,202,93,84
1430 DATA 194,57,84,205,14,84,205,173,85,42,251,83,34,32
1440 DATA 64,62,17,50,240,65,205,85,0,201,33,0,96,34
1450 DATA 245,83,201,33,150,60,34,32,64,33,151,83,205,27
1460 DATA 2,62,1,50,247,83,201,33,150,60,34,32,64,33
1470 DATA 172,83,205,27,2,50,250,83,62,0,50,247,83,50
1480 DATA 250,83,201,42,32,64,34,251,83,205,121,84,42,251
1490 DATA 83,34,32,64,201,42,32,64,34,251,83,205,139,84
1500 DATA 42,251,83,34,32,64,201,205,201,1,33,91,60,34
1510 DATA 32,64,33,130,82,205,27,2,33,152,60,34,32,64
1520 DATA 33,148,82,205,27,2,33,0,61,34,32,64,33,164
1530 DATA 82,205,27,2,33,128,61,34,32,64,33,220,82,205
1540 DATA 27,2,33,192,61,34,32,64,33,3,83,205,27,2
1550 DATA 62,0,50,250,65,205,43,0,254,1,202,255,83,254
1560 DATA 65,202,38,85,254,66,202,66,85,254,67,202,94,85
1570 DATA 254,68,202,122,85,194,7,85,62,85,50,248,65,62
1580 DATA 164,50,249,65,205,90,0,33,39,60,34,32,64,33
1590 DATA 40,82,205,27,2,195,150,85,62,85,50,248,65,62
1600 DATA 100,50,249,65,205,90,0,33,39,60,34,32,64,33
1610 DATA 64,82,205,27,2,195,150,85,62,119,50,248,65,62
1620 DATA 164,50,249,65,205,90,0,33,39,60,34,32,64,33
1630 DATA 88,82,205,27,2,195,150,85,62,119,50,248,65,62
1640 DATA 100,50,249,65,205,90,0,33,39,60,34,32,64,33
1650 DATA 113,82,205,27,2,195,150,85,205,14,84,201,62,3
1660 DATA 50,20,66,201,33,0,60,34,32,64,33,0,82,205
1670 DATA 27,2,201,33,79,60,34,32,64,33,64,83,205,27
1680 DATA 2,201,33,128,60,17,129,60,1,63,0,54,131,237
1690 DATA 176,201,237,115,248,83,205,201,1,205,154,85,205,195
1700 DATA 84,205,201,1,205,160,85,205,173,85,205,186,85,33
1710 DATA 192,60,34,32,64,205,43,0,254,1,202,255,83,254
1720 DATA 31,204,28,84,254,0,202,255,85,50,240,65,205,85
1730 DATA 0,205,80,0,58,232,65,254,0,40,222,254,18,204
1740 DATA 163,84,254,20,204,179,84,205,38,86,245,205,50,86
1750 DATA 241,204,90,86,203,191,205,51,0,195,231,85,50,250
1760 DATA 83,58,247,83,254,1,50,250,83,201,33,254,255,237
1770 DATA 91,245,83,183,237,82,192,42,32,64,34,251,83,33
1780 DATA 150,60,34,32,64,33,225,83,205,27,2,42,251,83
1790 DATA 34,32,64,205,28,84,201,201,42,245,83,119,35,34
1800 DATA 245,83,201,237,91,245,83,33,0,96,245,183,237,82
1810 DATA 204,118,86,196,160,86,241,201,245,33,150,60,34,32
1820 DATA 64,33,204,83,205,27,2,241,201,205,14,84,33,64
1830 DATA 60,34,32,64,33,193,83,205,27,2,33,192,89,6
1840 DATA 15,205,64,0,205,186,85,201,205,133,86,33,192,89
1850 DATA 17,133,80,205,20,60,33,130,87,17,133,88,6,0
1860 DATA 205,32,68,194,255,86,205,214,86,17,133,88,205,40
1870 DATA 68,194,255,86,205,14,84,33,64,60,34,32,64,33
1880 DATA 94,83,205,27,2,201,229,213,33,0,96,34,253,83
1890 DATA 42,253,83,17,133,88,126,205,27,0,42,253,83,35
1900 DATA 34,253,83,237,91,245,83,183,237,82,250,222,86,202
1910 DATA 222,86,209,225,201,229,213,197,245,205,14,84,33,64
1920 DATA 60,34,32,64,241,193,209,225,246,192,205,9,60,201
1930 DATA 0,229,213,197,33,80,195,17,0,82,1,22,5,237
1940 DATA 176,193,209,225,195,200,85

```

End



# MARYMAC

## INDUSTRIES INC.

Radio Shack

# Tandy®

Radio Shack

# Tandy®

★ COMPUTERS ★  
 ★ PRINTERS ★ SOFTWARE ★  
 ★ MODEMS ★  
 ★ CELLULAR PHONES ★  
 ★ AND MORE ★

OVER  
 100,000  
 SATISFIED  
 CUSTOMERS

OVER  
 23 MILLION  
 DOLLARS  
 IN SALES

### We Always Offer:

- Our 10 years of experience as an authorized sales center.
- McManus family owned and operated
- References in your area
- 100% pure Tandy products
- Best possible warranty
- Lowest discounted prices—call: **We will MEET OR BEAT**
- Mastercard, Visa, American Express
- We always pay freight and insurance
- Most items shipped Same Day UPS

*“World’s largest independent authorized computer dealer.”*

22511 Katy Fwy., Katy (Houston), Texas 77450  
 (713) 392-0747 Telex 774132

OPEN MON.—FRI 8–6 CST 6 phone lines to serve you better!

## CALL TOLL FREE 800-231-3680

# Command Headquarters

Much of the power of the TRSDOS 6 operating system comes from its many library commands and the options available in them. The List command alone has eight different parameters that let you view a file in ASCII or hexadecimal form, number the lines of a file, send output to the screen or printer, begin listing at a particular line or record number, and more.

It's easy to make a typing error when you're entering one of these long commands, however. If you lack a special utility for editing the previous contents of the command-line buffer, each slip of the finger forces you to reenter the whole line. In addition, it's often helpful to issue two commands in succession several times.

With this month's demonstration program, Command Line Editor and Buffer (or CLEB; see Program Listings 1 through 6), you can keep up to 10 TRSDOS commands in memory, select from them at any time, edit them, and send edited or unedited versions to TRSDOS for execution. The lines are held in a circular buffer in high memory, and you can decide when you assemble the program how much memory to dedicate to the buffer.

CLEB is designed to run as a stand-alone program or as a substitute for the normal TRSDOS 6 command interpreter. You get to decide whether it will replace the standard TRSDOS Ready prompt or be available (along with its unchanged buffer) for special command sets.

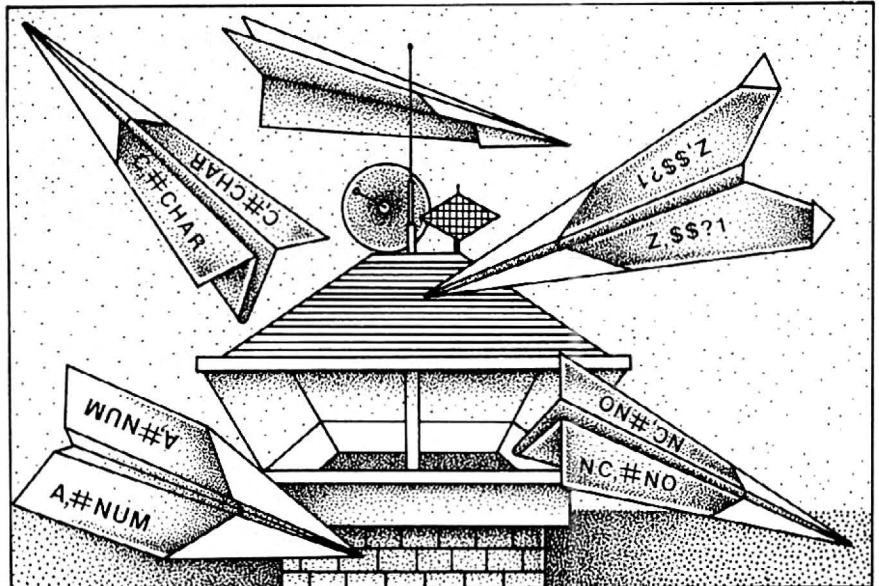
## Command Central

Like many modern operating systems, TRSDOS 6.2 can switch from its own command interpreter to one supplied by the user. The substitution process is simple. Whenever TRSDOS is about to load the command interpreter

LOAD  
80

## System Requirements

**Model 4**  
**Assembly language**  
**Editor/assembler**  
**(PRO-Create 4.3a or MRAS)**



## Execution Made Simple

You can turn any Model 4 CMD program into an immediate execution program (IEP) by copying it into SYS13/SYS.

First, make sure there's a copy of the original SYS13/SYS on your system disk, then copy the CMD program to it with the following command:

```
COPY ANYPROG/CMD SYS13/SYS.LSI-
DOS (C=N)
```

The program will now appear immediately after you type in and enter an asterisk from TRSDOS Ready. It will terminate and return to TRSDOS Ready in the usual way.

The extended command interpreter (ECI) is like the IEP, but it runs whenever the computer would normally return to TRSDOS Ready. To create an ECI, first write a CMD program and debug it. Then include the following two lines near the beginning of the program:

```
SVC @FLAGS
LD (IY+4),-1
```

Now copy your program into SYS13/SYS as above. It will replace TRSDOS

Ready the first time you run it by typing and entering an asterisk.

To make an ECI give control back to TRSDOS, insert the following lines at the end:

```
SVC @FLAGS
LD (IY+4),0
LD HL,0
SVC @EXIT
```

To have an ECI take control of the computer when the user reboots, do everything described above and test the program thoroughly (fatal bugs make boot disks unusable). Load your program into SYS13/SYS as above; then type (from TRSDOS Ready):

```
MEMORY (ADD="E")
```

TRSDOS will respond with a line that begins:

```
X'nnnn' = . . . . .
```

Now type:

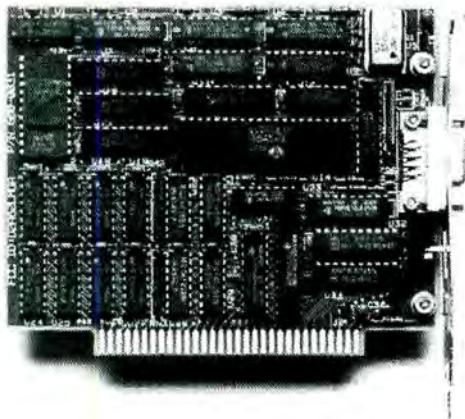
```
PATCH CONFIG/SYS.CCC (X'nnnn' = FF)
(The "nnnn" in both lines must be the same.)
```

Finally, reboot the computer. The ECI should now take control instead of the first TRSDOS Ready prompt. ■



# FULL POWER.

## PCA offers maximum IBM compatability for your TANDY 1000.



### Monographics Adapter

The addition of monochrome graphics makes your Tandy 1000 much more versatile. Programs such as CAD systems, paint programs, etc. can show more detail. Graphics based systems such as Microsoft Windows and GEM show much clearer pictures. It will be possible to use Lotus 1-2-3 Version, 2A with the PCA Multiboard and have a 2MB spreadsheet with 38 rows and 90 columns!

- Compatible with software written for the IBM Monochrome Display Adapter.
- Compatible with software written for the Hercules Graphics Card.
- Uses the same style standard character set used by the IBM Monochrome Display Adapter.
- Supports 720h x 348v monochrome graphics resolution making the PCA Plus fully compatible with Hercules graphics software.
- Flicker free display/
- 64K RAM on board will support two separate pages of graphics or text.
- Co-exists with an IBM compatible color graphics adapter (or IBM Enhanced Graphics Adapter) residing in another slot.
- Up to 100% video speed increase
- One Year Warranty.

### FREE TTL MONITOR

with purchase of PCA Monographics Adaptor for the Tandy 1000 or any IBM compatible.

with Free Monitor **\$249**



### Multiboard

The PCA Multiboard includes everything you'll ever need on one 10' card; serial port, clock/calendar, RAM Disk, Print Spooler, and room for up to 2MB of Lotus/Intel compatible RAM.

The Multiboard is also very easy to use, thanks to the PCA Technology Smart Setup program. By using Setup, you can change or disable the serial port, set or disable the clock, and allocate any amount of memory you wish without opening the case on your computer, and without having to set any switches.

- Memory chip type : 41256, 256K DRAM
- Chip speed : 150ns
- Number of chips : 64 (8 per bank of 256K)
- Serial Port : Standard IBM compatible, COM1, COM2, or OFF
- Clock/Calendar : Set bit setup, system set automatic (can be disabled)

Multiboard **\$ 299**

Combine these two boards and take the Tandy 1000 to the max!

PCA Multi Board with the PCA Monographic adapter and **FREE TTL MONITOR**

\*Special package price -

**\$499**

RAM \$40 per bank installed



805/392-1714

Dealer Inquiries Invited

2512 Pegasus Drive  
Bakersfield, CA 93308

in the SYS1/SYS system file, it first looks at its flag table in low memory. If EFLAG\$ (the fifth byte of the flag table) isn't zero, TRSDOS loads and executes the program in SYS13/SYS instead.

To use your own command interpreter or shell, you need only copy it into SYS13/SYS with the following command:

```
COPY MYPROG/CMD TO SYS13/SYS.LSIDOS
(C=N)
```

Your program will run when you type in and enter an asterisk from TRSDOS Ready, supplanting the TRSDOS command interpreter completely if the program sets EFLAG\$ to a nonzero value.

TRSDOS provides another ingredient that helps programmers develop alternative command interpreters: a supervisory call (SVC) called @CMNDI that sends a string to TRSDOS as if it had been typed in from the keyboard. Unlike MS-DOS, which demands that any shell be able to understand users' commands, TRSDOS will parse and execute the commands from an alternate shell automatically.

An additional TRSDOS capability makes programs like CLEB easy to build. Although the program loads from disk when run, its buffers remain in protected high memory, and it can look at the memory buffer to find the command you last issued. The program does this by assigning a special name to its memory buffer—in this case CBUF—and by using the @GTMOD SVC to search through protected memory for a particular memory module.

The @GTMOD SVC depends on a specific format for every module in protected memory. Each must begin with a relative jump, followed by the address of the next memory block, the length of the block's name, and the name itself. If a memory block—be it data buffer or filter program—doesn't begin with the standard TRSDOS memory header, everything in high memory is still protected, but @GTMOD will be unable to find that block or one stored above it in protected memory.

## Building Blocks

I must admit that I don't consider this month's program to be finished. It works and is useful in its current form, but I would make several improvements if I had the time.

From the beginning, I knew the program would be somewhat complex, so I decided to write it as a series of separate modules. All six listings are necessary to form the completed program, but each was developed and debugged separately. They depend heavily on the macro-command and conditional-assembly capabilities of the MISOSYS PRO-Create and MRAS assemblers. Change the program if you use a different assembler.

The first module, Listing 1, controls how the rest of the program is assembled. The file containing definitions of macro instructions, CLEB/MAC, should come first since you must define a macro in the source file before invoking it. The order of the other modules isn't critical. The sidebar describes two alternative ways of loading any command program, including Listing 1.

Listing 2 contains all the macro defi-

nitions. (The listing is longer and the macros are more complex than those I normally use in this column.) By using these 13 macro instructions, I've avoided having to write about 900 additional lines of source code. Writing macro commands carefully makes the source code shorter and easier to debug.

Several macros, including PUSH3, POP3, SHOWCRS, and NOCRS, are easy to understand. Others require some ex-

*Program Listing 1. Assembly-language program that loads the other five modules of Command Line Editor and Buffer.*

```
00170      ORG      3000H          ;Memory load position
00180 *GET  CLEBMAC          ;Macro commands
00190 *GET  CLEBDEF          ;Data storage and EQUates
00200 *GET  CLEBFN1         ;Main functions
00210 *GET  CLEBFN2         ;Secondary functions
00220 *GET  CLEBNST         ;Buffer installation routine
00230      END      ENTRY
```

End

*Program Listing 2. CLEBMAC/ASM.*

```
00100 ;-----
00110 ;      C L E B   Macro Commands
00120 ;      Save as      CLEBMAC/ASM
00130 ;-----
00140 ;
00150 PUSH3  MACRO          ;;Save HL, DE, & BC registers on stack
00160      PUSH  HL
00170      PUSH  DE
00180      PUSH  BC
00190      ENDM
00200 ;
00210 POP3   MACRO          ;;Recover HL, DE, & BC from stack
00220      POP   BC
00230      POP   DE
00240      POP   HL
00250      ENDM
00260 ;
00270 SVC   MACRO #NUM,#SWITCH ;;Call an SVC and handle errors
00280      LD   A,#NUM
00290      RST 20H
00300      IFNE %%,2          ;;Only handle error if one arg.
00310      JR   Z,$$?1        ;;Go if okay
00320      LD   C,A          ;;Else get error number
00330      LD   A,@ERROR     ;;Report error and end
00340      RST 28H
00350      $$?1 EQU $
00360      ENDIF
00370      ENDM
00380 ;
00390 PRINT  MACRO #STRING    ;;Send string to video
00400      PUSH3
00410      LD   HL,#STRING    ;;Point to the string
00420      SVC @DSPLY        ;;Display it
00430      POP3
00440      ENDM
00450 ;
00460 RANGE  MACRO #LOW,#HIGH,#NO ;;Check range of byte in A
00470      CP   #LOW          ;;Below bottom?
00480      JR   C,#NO        ;;Yes -- go
00490      CP   #HIGH+1      ;;Above top?
00500      JR   NC,#NO      ;;Yes -- go
00510      ENDM              ;;Else do next instruction
00520 ;
00530 CHROUT MACRO #CHAR      ;;Display character #CHAR
00540      PUSH3
00550      IFLT #CHAR,256    ;;If its a specific character
00560      LD   C,#CHAR      ;; put it in C
00570      ELSE              ;;If #CHAR is an address
00580      LD   A,(#CHAR)     ;; load the character into A
00590      LD   C,A          ;; then put it in C
00600      ENDM
00610      SVC @DSP          ;;Display the character in C
00620      POP3
00630      ENDM
00640 ;
00650 MOVBUF  MACRO #DESTPTR,#SRCPTR ;;Copy memory from (#SRCPTR) to
00660      PUSH3              ;; (#DESTPTR)
00670      LD   HL,(#DESTPTR) ;;Get destination address
00680      EX   DE,HL         ;;Put it in DE
00690      LD   HL,(#SRCPTR)  ;;Get source address
00700      LD   BC,BUF_LNGTH+1 ;;Note -- no overlap check
00710      LDIR              ;;Move it all
00720      POP3
00730      ENDM
```

Listing 2 continued

Listing 2 continued

```

00740 ;
00750 SHOWCRS MACRO CURSON ;;Turn on the cursor
00760 CHROUT CURSON
00770 ENDM
00780 ;
00790 NOCRS MACRO ;;Turn off the cursor
00800 CHROUT CURSOFF
00810 ENDM
00820 ;
00830 GETCRS MACRO ;;Save the cursor position
00840 PUSH3 ;;Save registers
00850 LD B,4 ;;Function: get current cursor
00860 SVC @VDCTL
00870 LD (SAVCRS),HL ;;Put cursor position in SAVCRS
00880 POP3 ;;Restore registers
00890 ENDM
00900 ;
00910 SETCRS MACRO #ARG1,#ARG2 ;;Set the cursor position
00920 PUSH3 ;;Save registers
00930 LD B,3 ;;Function: set cursor position
00940 IFEQ %%,2 ;;If 2 arguments,
00950 LD HL,#ARG1<8+#ARG2 ;; the 1st is row, 2nd is column
00960 ELSE
00970 LD HL,(SAVCRS) ;;Else get value in SAVCRS
00980 IFEQ %%,1 ;;If 1 argument
00990 LD L,#ARG1 ;; it is the new column
01000 ENDF
01010 ENDF
01020 SVC @VDCTL ;;Set the new cursor position
01030 POP3 ;;Restore registers
01040 ENDM
01050 ;
01060 MATCH MACRO #CHAR,#RTN,#LOOP ;;Take action if #CHAR is in A
01070 CP #CHAR ;;Test A register & #CHAR
01080 JR NZ,$$?1 ;;If not equal, leave
01090 IFEQ %%,2 ;;Else, if there are two arguments
01100 JP #RTN ;; then JUMP to the second
01110 ENDF
01120 IFEQ %%,3 ;;If there are three arguments
01130 CALL #RTN ;; then CALL the second
01140 JP #LOOP ;; and JUMP to the third
01150 ENDF
01160 $$?1 EQU $
01170 ENDM
01180 ;
01190 SETMODE MACRO #MODE ;;Set a new program mode
01200 LD A,#MODE ;;Load the mode letter into A
01210 LD (MODE),A ;; move it to (MODE) for storage
01220 CALL SHOWLINE ;; and reprint command line
01230 ENDM

```

End

planation. Once I describe the SETCRS and SVC instructions in detail, you will understand the other macros with little trouble.

GETCRS is a simple macro that finds the current cursor position and saves it in a location called SAVCRS. The SETCRS macro does the opposite: It sets the cursor to a specific location. Both use the @VDCTL SVC to manipulate the cursor directly.

I needed three versions of SETCRS: one to set the cursor to any arbitrary screen location, another to set it to any place in the current screen row, and the third to read the value in SAVCRS and set the cursor to that location. I combined the three into one macro and let it decide which function to fulfill based on the number of parameters received. Three examples should make this clear: SETCRS 23,30 sets the cursor to row 23, column 30; SETCRS 5 sets it to column 5 of the row in SAVCRS; and SETCRS sets it to the row and column in SAVCRS.

SETCRS does all this by using the special PRO-Creatc/MRAS symbol of two percentage signs (%%) to count the arguments it receives during each invocation. By testing that number, it determines how to handle the arguments and whether to load the value at SAVCRS before starting.

The SVC macro also uses the %% symbol, but for a different reason. Many of the TRSDOS 6 supervisory calls return a status value in the A register and set the zero flag to indicate whether the call was successfully completed. Other SVCs always succeed, however; the value they return in the zero flag is indeterminate and can vary from one call to the next.

The SVC macro in Listing 2 reports an error and returns to TRSDOS Ready if an SVC resets the zero flag. (You can turn error checking off by adding a second argument to the SVC invocation.) The value of the second argument makes no difference; its presence or absence tells the macro command whether to perform error checking or reporting.

The third module defines variable-storage space and symbolic constants for the program. If you don't like the keys I've chosen to implement commands, change the key definitions in this module before assembling the program. You might also want to expand the instruction page, since it gives only a sketchy idea of how to use the program.

Two constants in Listing 3 are particularly important. The first, BUF\_LNS, defines how many separate commands the high-memory buffer can store. The program assumes it is set to 10 or less.

The second constant, BUF\_LNGTH, determines each command line's maxi-

Program Listing 3. CLEBDEF/ASM.

```

00100 ;-----
00110 ; C L E & B Constant & Data Definitions
00130 ; Save as CLEBDEF/ASM
00140 ;-----
00150 ; SVC Table
00160 ;-----
00170 @KEY EQU 01H
00180 @DSP EQU 02H
00190 @KEYIN EQU 09H
00200 @DSPLY EQU 0AH
00210 @VDCTL EQU 0FH
00220 @EXIT EQU 16H
00230 @CMNDI EQU 18H
00240 @ERROR EQU 1AH
00250 @GTMOD EQU 53H
00260 @MUL16 EQU 5BH
00270 @HIGH$ EQU 64H
00280 @FLAGS EQU 65H
00290 @CLS EQU 69H
00300 ;-----
00310 ; Symbolic Constants
00330 ; Key Names
00340 ;-----
00350 ENTER EQU 0DH ;<ENTER> Key
00360 UP EQU 0BH ;Up arrow
00370 DOWN EQU 0AH ;Down arrow
00380 LEFT EQU 08H ;Left arrow -- Backup, no erase
00390 RIGHT EQU 09H ;Right arrow -- Forward, no erase
00400 BREAK EQU 00H ;Break key
00410 CTRL_S EQU 13H ;Enter "Select" mode
00420 CTRL_E EQU 05H ;Toggle "Edit" mode
00430 CTRL_N EQU 0EH ;Enter "New" mode
00440 ;-----
00450 ; Display Control
00460 ;-----
00470 LF EQU 0AH ;Line feed for display strings
00480 CR EQU 0DH ;Carriage return <enter> char.
00490 ETX EQU 03H ;"Soft" cr for @dsply
00500 EOL EQU 1EH ;Erase to end of line
00510 CURSON EQU 0EH ;Turn on cursor
00520 CURSOFF EQU 0FH ;Turn off cursor
00530 ;-----
00540 ; Buffer Control

```

Listing 3 continued

mum length. It is set to 75 in the program; if you don't need so much room, change it to a lower value to conserve high-memory space.

## Right to the Heart

The modules named CLEBFN1/ASM and CLEBFN2/ASM are the heart of the program. The first contains the program's overall organization; the second contains the low-level routines that make everything run.

By studying Listing 4 carefully, you'll see that the program begins by looking for its memory buffer in protected high memory. If it doesn't find one, it calls a routine that installs an empty buffer in high memory and jumps into new mode. Usually, the program finds the buffer in memory, copies the command from the most recently used buffer into its own work space, and enters rerun mode.

The main program is organized into four modes. (You can move between the modes by pressing control keys.) The comments before each program section tell which keys are allowed in each mode. Generally, the command appearing on screen will run any time the user presses the enter key.

If you plan to expand the program, add the new code to Listings 4 and 5. A simple improvement would be to add a delete key and insert mode to the editing section, which currently uses simple type-over editing. You can also change some modes to be sensitive to what the user types in. For example, if the program is in rerun mode and the user presses an up or down arrow, the program could automatically switch into select mode.

If the user types a new command, the program could go into new mode immediately instead of waiting for the control-N command. You must duplicate the TRSDOS @KEYIN supervisory call to make such changes, otherwise a jump from rerun or select to new will lose the first keystroke.

The last module is the shortest. It is responsible for moving the memory buffer to high memory and protecting it there. Most of this module is taken from the standard "move and protect" routine I've used in several programs in earlier columns.

Near the end, however, is a macro command I haven't used here before. The program could have created the buffer entirely in high memory as it installed it; instead, I've held the empty buffer inside the program so it only has to be moved to high memory. Since the program can store between one and 10 commands in a high-memory buffer, I wanted a way to have the assembler create an appropriately sized buffer for me.

Listing 3 continued

```

00550 ;-----
00560 BUF_LNS      EQU      04H      ;Number of lines in buffer
00570 BUF_LNGTH   EQU      75      ;Length per line
00580 ;-----
00590 ;          Memory locations:
00600 ;-----
00610 SAVCRS      DW      $$          ;Current cursor position
00620 BINBUF      DB      3          ;Line number in binary form
00630 INBUF       DW      WORKBUF    ;Address of work buffer
00640 MEMBUF      DW      $$-$$     ;Address of high mem buffer
00650 HIPTR       DW      $$-$$     ;Address of data area in hi.mem.
00660 EDPTR       DB      0          ;Pointer to cursor location in buffer
00670 ;
00680 PROMPT      EQU      $          ;Beginning of line prompt
00690 ASCBUF      DB      '3'        ;Current line buffer
00700 MODE        DB      'N'        ;Current program mode
00710             DB      '>',ETX     ;Rest of prompt string
00720 PRMPTLEN    EQU      $-PROMPT-1
00740             IFGT             PRMPTLEN+BUF_LNGTH,79
00750             ERR             'Buffer is too large for one screen line'
00760             ENDIF
00780 WORKBUF     DC      BUF_LNGTH,' ' ;Spaces
00790             CR              ; and a carriage return
00810 WAIT        DB      'Press any key to begin ',ETX
00830 TITLE       DB      '          TRSDOS 6.2 Command Line Editor & Buffer'
,LF
00840             DB      LF
00850             DB      'This program saves up to ',BUF_LNS+30H,' TRSDOS commands,
'
00860             DB      'and lets you edit them, scroll',LF
00870             DB      'from one to another, and send any one to TRSDOS.',LF,LF
00880             DB      'To leave the program and return to the normal TRSDOS '
00890             DB      'command interpreter',LF
00900             DB      'simply press <*> or <BREAK>. You can return to this prog
ram
00910             DB      'from TRSDOS by',LF
00920             DB      'pressing <*> <ENTER>, with all the current commands still
in '
00930             DB      'the buffer.',LF,LF
00940             DB      ' You can change from one mode of operation to another wi
th '
00950             DB      'control keys:',LF
00960             DB      '          CTRL-N enters the "New Command" mode.',LF
00970             DB      '          CTRL-S enters the "Select Buffer" mode.',LF
00980             DB      '          CTRL-E enters and leaves the "Edit" mode.',LF
00990             DB      CR

```

End

Program Listing 4. CLEBFN1/ASM.

```

00100 ;-----
00110 ;          C L E & B          High-Level Routines
00120 ;
00130 ;          Save as          CLEBFN1/ASM
00140 ;-----
00150 ;          Enter Program Here
00160 ;
00170 ENTRY      EQU      $
00180 ;-----
00190 ;          Add next two lines ONLY after debugging
00200 ;          and only if you want CLEB to be an ECI or IEP
00210 ;-----
00220 ;          SVC      @FLAGS,1      ;Get the flag table
00230 ;          LD      (IY+4),-1     ;Set us as ECI routine
00240 ;
00250 ;          LD      DE,BUFNAME     ;DE ==> name of memory buffer
00260 ;          SVC      @GTMOD,0      ;Is it in memory?
00270 ;          JP      Z,ENTRY1      ;Yes -- we've been here before
00280 ;-----
00290 ;          First time setup
00300 ;-----
00310 ;          CALL     INSTALL      ;Install memory buffer
00320 ;          NOCRS    ;Turn off cursor
00330 ;          SVC      @CLS        ;Clear the screen
00340 ;          PRINT   TITLE        ;Print title page
00350 ;          SETCRS   23,30       ;Cursor to bottom of screen
00360 ;          PRINT   WAIT         ;Pause message
00370 NEW_1      SVC      @KEY,0     ;Wait for a key
00380             OR      A          ;Did we get one?
00390             JR      Z,NEW_1    ;No -- keep waiting
00400             SVC      @CLS        ;Clear screen again
00410             GETCRS   ;Get line number into memory
00420             JP      MODE_N     ;Enter in "NEW" mode
00430 ;-----
00440 ;          Normal Entry
00450 ;          The buffers are in high memory, DE & HL point
00460 ;          to the high memory block. Enter here EXCEPT
00470 ;          the first time program is invoked.
00480 ;-----
00490 ENTRY1      LD      DE,0DH      ;Offset to data area
00500             ADD     HL,DE        ;HL ==> 1st data byte
00510             LD      (HIPTR),HL  ;Save the pointer
00520             LD      A,(HL)      ;Get last buffer number
00530             LD      (BINBUF),A ;And save it
00540             ADD     A,30H       ;Make buffer ASCII
00550             LD      (ASCBUF),A ;And save it
00560             CALL   BUFPTR      ;Get address of buffer

```

Listing 4 continued

Listing 4 continued

```

00570      MOVBUF   INBUF,MEMBUF   ;Copy buffer to work space
00580      GETCRS   ;What line are we on?
00590      ;-----
00600      ;      Fall into RERUN mode
00610      ;      Valid keystrokes: CR, CTRL_N, CTRL_S, CTRL_E, BREAK
00620      ;-----
00630      MODE_R  EQU      $
00640      SETMODE  'R'
00650      NOCRS
00660      ;-----
00670      R_1     SVC      @KEY      ;Get a keystroke
00680      MATCH   ENTER,RUNBUF
00690      MATCH   CTRL_N,MODE_N
00700      MATCH   CTRL_S,MODE_S
00710      MATCH   CTRL_E,MODE_E
00720      MATCH   BREAK,GOODBYE
00730      MATCH   '*',GOODBYE
00740      JR      R_1      ;Loop back if no match
00750      ;-----
00760      ;      End of RERUN Mode
00770      ;-----
00780      ;      "NEW" Mode -- Enter & run a new command
00790      ;-----
00800      MODE_N  EQU      $
00810      CALL   NEXTBUF   ;Move to next buffer
00820      SETMODE 'N'
00830      CALL   CLRBUF    ;Erase buffers
00840      CALL   SHOWBUF   ;Display new (empty) buffer
00850      SHOWCRS ;Display the cursor
00860      LD     BC,BUF_LNGTH<0+B ;B = buf length, C=0
00870      LD     HL,(INBUF) ;HL ==> working buffer
00880      SVC   @KEYIN     ;Get command
00890      JP    C,GOODBYE ;Leave on <BREAK>
00900      LD     A,(HL)    ;Get first char.
00910      CP    '*'      ;Want out?
00920      JR    Z,N_3    ;Maybe -- go
00930      ;-----
00940      N_2     JP     RUNBUF   ;Save & run command
00950      ;-----
00960      N_3     DEC     B        ;Was there just one char?
00970      JP     Z,GOODBYE ;Yes -- go
00980      INC     B        ;Else restore B
00990      CALL  RUNBUF    ;Send command to TRSDOS
01000      ;-----
01010      ;      End of NEW Mode
01020      ;-----
01030      ;      Enter SELECT Mode.
01040      ;      Valid keys: UP, DOWN, CR, CTRL_N, & CTRL_E
01050      ;-----
01060      MODE_S  EQU      $
01070      SETMODE  'S'
01080      NOCRS
01090      S_1     SVC      @KEY      ;Get a keystroke
01100      MATCH   ENTER,RUNBUF
01110      MATCH   CTRL_N,N_1
01120      MATCH   CTRL_E,MODE_E
01130      MATCH   UP,PREVBUF,S_1
01140      MATCH   DOWN,NEXTBUF,S_1
01150      JR      S_1
01160      ;-----
01170      ;      End "SELECT" Mode
01180      ;-----
01190      ;      Begin "EDIT" Mode
01200      ;      Valid keys: all ASCII characters (20h - 7fh) plus
01210      ;      CTRL_E (abort edit), ENTER, LEFT, RIGHT, BACKSP
01220      ;-----
01230      MODE_E  EQU      $
01240      SETMODE  'E'
01250      SETCRS  PRMPTLEN ;Set at beg. of text
01260      SHOWCRS ;Show the cursor
01270      XOR     A        ;A = 0
01280      LD     (EDPTR),A ;Begin at beginning of line
01290      E_1     SVC      @KEY      ;Get a keystroke
01300      RANGE   20H,7FH,E_2 ;Go if not in range
01310      CALL   INSERT   ;Else insert character
01320      JR      E_1     ;And get another
01330      ;-----
01340      E_2     MATCH   ENTER,RUNBUF
01350      MATCH   LEFT,BACKUP,E_1
01360      MATCH   RIGHT,FORWARD,E_1
01370      CP     CTRL_E    ;End edit?
01380      JR     NZ,E_1    ;No -- wait for valid key
01390      MOVBUF  INBUF,MEMBUF ;Else get new copy of memory
01400      JP     MODE_R    ;And back to RERUN mode

```

End

Program Listing 5. CLEBFN2/ASM.

```

00100      ;-----
00110      ;      C L E B      Low-level routines
00120      ;-----
00130      ;      Save as      CLEBFN2/ASM
00140      ;-----
00150      ;      Redraw prompt and buffer on screen
00160      ;-----
00170      SHOWLINE EQU      $
00180      CALL   SHOWPRMPT

```

Listing 5 continued

Note the statements REPT BUF\_LNS in line 00480. This special macro command is like a For...Next loop in Basic, but it is interpreted by the assembler, not by the finished program. REPT is one of three pseudo-operations supported by PRO-Create. It tells the assembler to read the value of BUF\_LNS and use it to count the number of times it should assemble the next two source code lines. If BUF\_LNS is set to four, the assembler creates a buffer large enough to hold four commands.

I've touched lightly this month on some of the special macro pseudo-ops that make Assembly-language programming easier. Several other assembler pseudo-ops and macros deserve an explanation, but they'll have to wait for a later column. ■



Write Hardin Brothers at 280 N. Campus Ave., Upland, CA 91786. Enclose a stamped, self-addressed envelope for a reply. You can also contact Hardin on CompuServe's WE-SIG (PCS-117).

Circle 374 on Reader Service card.

**PRINTER DRIVERS**  
**For SUPERSCRIPIT**

Match YOUR Printer to a Great Word Processing System !!!

Easily and automatically attach your printer to SuperSCRIPIT with an ALPS software printer driver program. No need to learn special printer codes. Call or write for info describing features supported on each printer (underline, bold, proportional, scripts, etc.).

Over 200 Different Printers Supported.  
 Custom Printer Driver for Each Printer.  
 Supports all possible printer features.  
 4 years experience. Customer Support !!!  
 \$49 or \$59 each, depending on printer.

---

For Your MSDOS Computer

Tandy 1000/1200/2000/3000 and PCs

**RAMDISK** (\$49)

Use spare memory to simulate one or more super-fast disks. Any size. Greatly speed up existing applications. Appears to programs as a disk, but gives instant access. Highly efficient, compact, and thoroughly tested. Includes program to install and change RAMDISK size, and RAMDISK I/O access report.

---

**FULLBACK** (\$88)

A Perfect File Backup System !!!

Finally, an easy to use backup program that keeps exact images of your files on backup floppies, cartridges, or hard disk. Automatically backup one, several, or ALL subdirectories. Backup modified only, or ALL files. Keeps perfectly organized backups - backup structure and file format are identical to original. Supports backup by date, multiple backup copies, large files (up to 32MB). Far superior to DOS BACKUP, easier to use, and much more reliable. Absolutely a MUST for hard disk users.

---

**HIP-POCKET HELPERS** (1)

The ALPS Hip-Pocket Helpers is a collection of powerful and easy to use utility programs. They include a slick Directory Tree, a sorted 5-across directory display, a sophisticated keyboard substitution aid (only 5K of RAM), utilities to search through ALL directories for file names or even strings within a file, and much, much more. 29 utilities in all. Call or write for info. Price and performance you can't find elsewhere.

ALL ALPS Software is Fully Guaranteed !!!  
 Full Customer Support on our Hotline - 303-587-1442  
 Call or Write for our complete catalog of products.

**ALPS**  
 1502 County Road 25  
 Woodland Park, Colorado 80866  
 800-232-ALPS (Toll-Free)

# Give A Gift That Will Be Opened Every Month

*This Season, Give 80 Micro*

Why give a present that will be opened just once when you can give one that will be opened year-round? You'll be remembered this season, and every season, when you send the perfect gift for Tandy users—an **80 Micro** subscription.

Month after month, **80 Micro** will be a valuable, practical, and sometimes surprising guidebook for the dedicated Tandy user. And for an incredibly low price, it offers more assistance and inspires more efficiency than most peripherals and software packages. Just look at the benefits:

- Shop-at-home convenience with concise new product information.
- Answers to both common and unusual

computing problems in "Feedback Loop".

- Thorough evaluations and quality ratings of the latest Tandy-compatible products.

Plus, a variety of type-and-run program listings, up-to-the-minute industry trends, and much more.

All in the **only** system-specific source on the market for TRS-80 users.

All for just \$24.97—12 issues at **48% off** the cover price. And you won't be billed until **after** the holidays.

Send an All Seasons Greetings to someone special this season by returning the coupon, or by calling 1-800-258-5473. (In NH, dial 1-924-9471.)

## **YES!** I Want To Give A Year-Round Gift.

Please send an **80 Micro** gift subscription to the person listed below. I'll pay \$24.97 for 12 issues—a 48% savings.

Payment Enclosed       Bill me after the holidays!

Please make checks payable to **80 Micro**.

Name of Gift Recipient \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

My Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Canada & Mexico \$27.97, 1 year only, US funds drawn on US bank.  
Foreign Surface \$44.97, 1 year only, US funds drawn on US bank. Foreign Airmail, please inquire.  
All gift subscriptions will begin with the first available issue in 1987.

**80 Micro • PO Box 981 • Farmingdale, NY 11737**



66NB8

Listing 5 continued

```

00190      CALL   SHOWBUF
00200      RET
00210 ;-----
00220 ;      Place prompt string at beginning of line
00230 ;-----
00240 SHOWPRMPT EQU $
00250      SETCRS 0           ;Set cursor
00260      PRINT  PROMPT.     ;And print it
00270      RET
00280 ;-----
00290 ;      Place contents of work buffer on screen
00300 ;-----
00310 SHOWBUF EQU $
00320      SETCRS PRMPTLEN   ;Set cursor
00330      CHROUT EEOL      ;Erase previous line
00340      PUSH3
00350      LD HL,(INBUF)     ;HL ==> buffer
00360 SB_1 LD A,(HL)        ;Get one character
00370      CP CR             ;End of line?
00380      JR Z,SB_2        ;Yes -- leave
00390      LD C,A           ;Else send character
00400      SVC @DSP         ; to the display
00410      INC HL          ;And point to next character
00420      JR SB_1        ;Repeat until done
00430 ;
00440 SB_2 SETCRS PRMPTLEN ;Put cursor at beginning
00450      POP3             ;Clear stack
00460      RET
00470 ;-----
00480 ;      Run the command that is currently in the WORKBUF area.
00490 ;      First, save it to the hi.mem. buffer.
00500 ;-----
00510 RUNBUF LD HL,(HIPTR)   ;HL ==> Line # storage
00520      LD A,(BINBUF)     ;Get the line number
00530      LD (HL),A        ;And save it
00540      MOVBUF MEMBUF,INBUF ;Save command buffer
00550      LD HL,(INBUF)   ;HL ==> workbookfer
00560      SVC @CMNDI     ;Do it
00570 ;
00580 ;      There is no return
00590 ;
00590 ;      User wants to return to normal TRSDOS command entry
00600 ;-----
00610 GOODBYE SVC @FLAGS,1 ;IY ==> flag table
00620      LD (IY+4),0      ;Turn off ECI flag
00630      LD HL,0         ;Show "no error"
00640      SVC @EXIT
00650 ;-----
00660 ;      Clear the current contents of the workbookfer
00670 ;-----
00680 CLRBUF PUSH3
00690      LD HL,(INBUF)     ;HL==> beginning of buffer
00700      LD DE,(INBUF)
00710      INC DE           ;DE==> 2nd byte of buffer
00720      LD BC,BUF_LNGTH-1 ;Length to clear -1
00730      LD (HL),' '     ;Blank the first byte
00740      LDIR            ;Then do all of them
00750      EX DE,HL        ;HL ==> last byte of buffer
00760      LD (HL),CR      ;Mark end of line
00770      POP3
00780      RET
00790 ;-----
00800 ;      Get address of current working buffer in hi.mem.
00810 ;-----
00820 BUFPTR PUSH3
00830      LD A,(BINBUF)     ;Get current buffer number
00840      LD C,A           ;Get ready to multiply
00850      LD HL,BUF_LNGTH+1 ;Get length of each line
00860      SVC @MUL16,1    ;Multiply HL * C
00870      LD H,L          ;Move byte 2 to H
00880      LD L,A          ;HL = product
00890      LD DE,(HIPTR)   ;Get address of memory area
00900      INC DE          ;Point to area past buffer num
00910      ADD HL,DE       ;HL ==> memory buffer
00920      LD (MEMBUF),HL ;Save the address
00930      POP3
00940      RET
00950 ;-----
00960 ;      Move to next buffer forward in chain, and display it
00970 ;-----
00980 NEXTBUF LD A,(BINBUF) ;Get current buffer number
00990      INC A           ;Bump once
01000 NB_2 CALL INRANGE    ;Force into range
01010      LD (BINBUF),A  ;Then save it
01020      ADD A,30H     ;Turn into ASCII
01030      LD (ASCBUF),A ;And save that
01040      CALL BUFPTR    ;Set pointer
01050      MOVBUF INBUF,MEMBUF ;Move the new buffer
01060      CALL SHOWLINE  ;Display it all
01070      RET
01080 ;-----
01090 ;      Move to the previous buffer in chain, and display it
01100 ;-----
01110 PREVBUF LD A,(BINBUF) ;Get current buffer number
01120      DEC A          ;Move back one step
01130      JR NB_2       ;Join common code
01140 ;-----
01150 ;      Force new line number into range
01160 ;-----
01170 INRANGE ADD A,BUF_LNS ;Force above 0
01180 NR_1 SUB BUF_LNS ;Bring back into range
01190      JR NC,NR_1     ;Repeat until < 0

```

Listing 5 continued

# ENHANCE YOUR TANDY

The Full House will expand your Tandy 1000 to its full I/O and memory configuration for only \$315.

## Features:

2 parallel ports (centronics)  
2 serial ports (RS232)  
Real Time clock/calendar  
Memory, up to 512K  
DMA Controller

The Full House is actually a combination of two boards that can be joined into one. You have the option of buying either the I/O or memory section first and later combining the two without using an additional slot. Each can also be used separately.

Full House	I/O	\$170
Full House	Memory (256K)	\$130
Full House	Memory (512K)	\$165
Full House	Combination (512K)	\$315

Shipping &amp; Handling \$6

Dealer inquiries welcome.

Mastercharge/Visa accepted.

To order, in California call:  
800 626-9541 ext. 1131

Elsewhere:  
800 452-4445 ext. 1131

Call now to get the value and flexibility that *nobody else* offers.

SJS Engineering  
P.O. Box 998  
Milbrae, CA 94030

Circle 297 on Reader Service card.

# Back Issues

**July 1984:** Guide to Disk Operating Systems, GW-Basic, and a Machine-language minimizer.

**August 1984:** Games issue, Model 4 ED-TASM, dBase II, Scripsit extras, and quality sales reports.

**September 1984:** Disk drive repair and maintenance and a guide to Editor/Assemblers.

**October 1984:** Bar codes, educational programs for teachers and speech synthesis.

**November 1984:** Special utilities issue, cassette Basic enhancements, and a hybrid text editor.

**December 1984:** Gift guide, football strategy game, wind chill calculator, and an easy data base manager.

**January 1985:** Basic compiler, Scripsit enhancements, custom graphics characters, and TRSDOS 1.3 patches.

**February 1985:** Line and bar graph program, GW-Basic, and easy Assembly-language programming.

**March 1985:** Tandy's 1200 HD reviewed, fathom disk error messages and salvage flawed disks, and a deluxe graphics editor.

**April 1985:** Hi-res line and bar graphs, Tandy's 1000, and a Model 4 disk zap utility.

**May 1985:** Tandy's DeskMate reviewed, combat simulator, guide to surge protectors, and restricted input entry program.

**June 1985:** Tandy 1000 tips and hints, added strength for your DOS, more workspace with SuperScripsit, and Critical Path Scheduling.

**July 1985:** BBS directory, display up to 16 help screens, create custom sorts, and a type-ahead feature for Model III.

**August 1985:** Model 4 and GW-Basics, swap between two programs running on 128K Model 4, and more patches for TRSDOS 1.3.

In each back issue, you'll also find our regular features, reviews of popular software and hardware, and dozens of useful programs that are yours for the typing.

Each back issue costs \$4.50 plus \$1 shipping and handling. On orders of 10 or more back issues, there is a flat \$7.50 shipping and handling fee. Quantities are limited. Send your orders to 80 Micro, Attn: Back-Issue Orders, 80 Pine St., Peterborough, NH 03458.

## Listing 5 continued

```

01200      ADD      A,BUF_LNS      ;Now correct (0 <= A < buf_lns)
01210      RET
01220      ;-----
01230      ;      Move cursor forward one position
01240      ;-----
01250 FORWARD LD      A,(EDPTR)    ;Get current location
01260      CP      BUF_LNGTH-1    ;At the end?
01270      RET      NC             ;Yes -- return
01280      INC      A              ;Else move pointer
01290      LD      (EDPTR),A      ;And save it
01300      CHROUT 19H            ;Move cursor on screen
01310      RET
01320      ;-----
01330      ;      Move cursor back one position
01340      ;-----
01350 BACKUP LD      A,(EDPTR)    ;Get current location
01360      OR      A              ;Is it at beginning?
01370      RET      Z             ;Yes -- return
01380      DEC      A              ;Else backup once
01390      LD      (EDPTR),A      ;And save it
01400      CHROUT 18H            ;Move cursor on screen
01410      RET
01420      ;-----
01430      ;      Insert character in A at the current cursor position
01440      ;-----
01450 INSERT PUSH3
01460      PUSH     AF             ;Save character
01470      LD      HL,(INBUF)      ;HL ==> work buffer
01480      LD      A,(EDPTR)        ;Get position in line
01490      ADD     A,L            ;Add the current position
01500      LD      L,A             ;And save it
01510      JR      NC,IN_1        ;Go if no carry
01520      INC     H              ;Else add carry to H
01530 IN_1   POP      AF          ;Get back character
01540      LD      (HL),A          ;Put in string
01550      LD      A,(EDPTR)      ;Get position again
01560      CP      BUF_LNGTH      ;At the end?
01570      JR      NC,IN_2        ;Yes -- go
01580      INC     A              ;Else add one
01590 IN_2   LD      (EDPTR),A    ;Save new position
01600      ADD     A,PRMPTLEN      ;Position from beg. of line;
01610      LD      HL,(SAVCRS)    ;Get old line position
01620      LD      L,A            ;Save new position
01630      LD      (SAVCRS),HL    ;Put it back
01640      CALL   SHOWLINE       ;Display new line
01650      SETCRS                   ;Set new cursor
01660      SHOWCRS                  ;And display it
01670      POP3
01680      RET

```

End

## Program Listing 6. CLEBNST/ASM.

```

00100 ;-----
00110 ;      C L E & B      Install high-memory buffers
00120 ;
00130 ;      Save as      CLEBNST/ASM
00140 ;-----
00150 ;      Check high$ first
00160 ;-----
00170 INSTALL PUSH3
00180      LD      HL,0             ;Function: get value
00190      LD      B,L             ;Function: of HIGH$
00200      SVC     @HIGH$          ;Do it
00210      LD      (OLDHI),HL      ;Store in module
00220      PUSH   HL              ;Transfer old high$
00230      POP    DE              ; To DE
00240      LD      HL,BUFEND      ;HL==> end of buffer
00250      LD      BC,BUFLLEN     ;BC = length of buffer
00260      LDDR
00270      EX     DE,HL            ;New HIGH$ in HL
00280      LD      B,0             ;Function: work with HIGH$
00290      SVC     @HIGH$          ;Reset high$
00300      LD      DE,@EH         ;Offset to data area
00310      ADD     HL,DE           ;HL ==> hi.mem. data area
00320      LD      (HIPTR),HL    ;Save it
00330      POP3
00340      RET
00350 ;-----
00360 ;      The buffer to move
00370 ;-----
00380 BUFTOP EQU      $             ;Beginning of buffer
00390      JR      MODDCB          ;Start with jr token
00400      OLDHI DW      $-$        ;Place for old HIGH$
00410      DB      MODDCB-BUFTOP-5 ;Length of name
00420 BUFSIZE DB      'CBUF'     ;Name of buffer
00430      MODDCB DW      $-$     ;Unused for this module
00440      DW      $-$            ;Reserved by TRSDOS
00450 ;
00460      DB      0              ;Last buffer used
00470 ;
00480      REPT   BUF_LNS          ;Repeat for each line
00490      DC      BUF_LNGTH, ' ' ;Fill with spaces
00500      DB      CR              ;End with Carriage Return
00510      ENDM
00520 BUFBND EQU      $             ;End of buffer
00530 BUFBLEN EQU     BUFBND-BUFTOP+1 ;Length of buffer

```

End



Seeing Double

In Hardin Brothers' September 1986 The Next Step column (Presto Change-O Video, p. 100), we accidentally printed Program Listing 2 twice and left out Program Listing 1.

Herewith is the real Listing 1 for tracking video-control codes (see the Program Listing), which we've also placed on the 80 Micro BBS for downloading.

Our Brains Were Broken

"Brain Breakers," (September 1986, p. 82) contains several errors that might have caused confusion. Change the program line numbers in Fig. 1 (70, 80, 340, and 380) to 10, 20, 120, and 150, respectively.

Also, the option of deleting the program's scoring section (mentioned in the next-to-last paragraph, p. 84) involves modifying line 570—not line 1860. ■

Program Listing. Video-control tracking program from September's The Next Step (original Program Listing 1).

```

00100 ;-----
00110 ;           Video Control Tracking Program
00120 ;-----
00130 ; Assemble as a /FLT program, install with SET, and
00140 ; then link to the *DO device.
00150 ;-----
00160 ;           SVC List
00170 @DSPLY EQU 0AH
00180 @VDCTL EQU 0FH
00190 @CHNIO EQU 14H
00200 @EXIT EQU 16H
00210 @GTMOD EQU 53H
00220 @HIGH EQU 64H
00230 @FLAGS EQU 65H
00240 ;-----
00250 ;           Bit masks for video status
00260 INVMSK EQU 1 ;Inverse display possible
00270 I_ENMSK EQU 2 ;High-bit routine on
00280 SPCMSK EQU 4 ;Special characters selected
00290 ALTMSK EQU 8 ;Alternate characters selected
00300 PTYMSK EQU 16 ;40-character mode
00310 ;-----
00320 ;-----
00330 ;           Macro commands
00340 SVC MACRO #NUM
00350 LD A,#NUM
00360 RST 28H
00370 ENDM
00380 ;-----
00390 PRINT MACRO #ADDR
00400 LD HL,#ADDR
00410 SVC @DSPLY
00420 ENDM
00430 ;-----
00440 GETCRS MACRO ;Return cursor position in HL
00450 LD B,4
00460 SVC @VDCTL
00470 ENDM
00480 ;-----
00490 SETCRS MACRO ;Set cursor position in HL
00500 LD B,3
00510 SVC @VDCTL
00520 ENDM
00530 ;-----
00540 DISPCH MACRO #MASK,#ROW,#COL,#CHAR
00550 LD A,(HL) ;Get current mask
00560 AND #MASK ;Is this bit set?
00570 JR Z,$?1 ;Jump if off
00580 LD BC,2<B+#CHAR ;Else show this flag
00590 JR $$?2 ;And jump forward
00600 $$?1 LD BC,2<B+'_' ;Show nothing here
00610 $$?2 PUSH HL ;Save HL
00620 LD HL,#ROW<B+#COL ;H = row, L = col
00630 SVC @VDCTL ;Put character at HL
00640 POP HL ;Recover registers
00650 ENDM
00660 ;-----
00670 ;-----
00680 ;-----
00690 ORG 3000H
00700 ;-----
00710 ;-----
00720 ; Filter header
00730 ;-----
00740 BEGIN JR START ;jump over header
00750 OLDHI DW $-$ ;Word for old HIGH$
00760 DB MODDCB-BEGIN-5 ;Length of module name
00770 DB 'VCTRL' ;Our "in-memory" name
00780 MODDCB DW $-$ ;Word for DCB address
00790 DW $-$ ;Reserved for TRSDOS
00800 ;-----
00810 ;Storage area
00820 ;-----
00830 VSTATE DB 0 ;Bit-mapped current video state
00840 LOWCTRL DB 0 ;Flag for printing low-vid characters
00850 CURSOR DW $-$ ;Space for saving cursor position
00860 ZCHAR DB 0 ;Flag set if last char. was CHR$(0)
00870 ;-----
    
```

Listing continued

Circle 427 on Reader Service card.



master utility



new! The DOS makes that makes using your Model 4/4P/4D a snap. Just a few short keystrokes and you can select one or more files that can be Executed/Renamed/Listed/Removed and Copied at the touch of a key! Then there's a unique feature that lets you type in more than one DOS library command on the same line, and that's only a few of the features that are provided in this impressive utility! For fast relief from the headaches of dealing with TRSDOS 6.2, take "DIRECT" relief from SOTA Computing Systems Limited



If what you need is a professional appointment/calender program, here's a full featured economical alternative to those expensive and awkward multi-function utilities like DESKMAT. Day-by-Day is the practical choice for users who want to use their Model 4/4P/4Ds to help organize their busy schedules. With features like auto-reminders, an address book, and printer options, you'll find all the power you could ever want in this well-crafted application. Start doing things everyday with Day-by-Day.



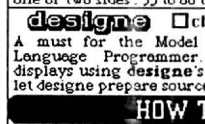
At least there's a disk catalogue program for the Model 4/4P/4D. End the frustrating hours of searching for disk files and turn your file cataloging chores over to TRScat. The program includes options for saving, loading, viewing, and sorting files as well as options for preparing printouts of your sorted files. Don't waste your valuable time any longer, order TRScat for your computer today!



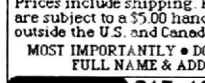
The best BBS for the Model 4/4P/4D just got better! fast80 now supports 300/1200 baud operation and is compatible with every Radio Shack direct connect auto-answer modem (Hayes and compatibles too). With minimum disk access, lightning fast response, hard drive compatibility, and a large message and user base, fast80 is the BBS of choice for the discriminating SYSOP. (Requires 128K and runs with TRSDOS 6.2.x or DOSPLUS 4.x) Try before you buy! Call the SOTA BBS at (604) 688-5061 • 24 Hours a Day



No other FORTH has such features at such an affordable price. Includes a complete string handling package, floating point math, screen editor and beginner's tutorial. With FORTH from SOTA you can run in native (direct disk) or DOS (DOS file) mode. You can easily create /CMD files too! No royalties or site licensing required - for all the programming power you wish you had - order FORTH from SOTA today.



The ultimate disk zapping utility for the Model 4/4P/4D. Runs with TRSDOS 6.2.x or DOSPLUS 4.x and will read Model I-III-4 and CP/M sectors, single or double density, one or two sides, 35 to 80 tracks.



A must for the Model 4/4P/4D BASIC or Assembly Language Programmer. Create imaginative screen displays using designer's powerful screen editor - then let designer prepare source files to reproduce your art.



Four powerful functions to complement your every activity. T.K.O. is a terminal/modem program, screen-oriented line editor, print spooler and macro-key utility that can be called from just about any program. Just think, you can leave BASIC, dial up a file, jump to listing, to the printer, grab a line of text from the screen and return to BASIC without losing a stitch. We can only hint at the power of T.K.O., you owe it to yourself to give it a try today! (for Model 4/4P/4D with TRSDOS 6.x)

check here to order T.K.O. @ \$69.95

check here to order DIRECT @ \$59.95

check here to order DAY-BY-DAY @ \$59.95

check here to order TRScat @ \$39.95

check here to order fast80 (2nd Edition) @ \$79.95

check here to order FORTH @ \$149.95

check here to order microzap @ \$49.95

check here to order designer @ \$39.95

ORDER TODAY 213-1080 Broughton Street Vancouver, B.C. Canada • V6G 2A8 Order by Mail or Phone (604) 688-5009

**This Publication  
is available in  
Microform.**



**University Microfilms  
International**

Please send additional information  
for \_\_\_\_\_  
Name \_\_\_\_\_  
Institution \_\_\_\_\_  
Street \_\_\_\_\_  
City \_\_\_\_\_  
State \_\_\_\_\_ Zip \_\_\_\_\_

300 North Zeeb Road  
Dept. P.R.  
Ann Arbor, Mi. 48106

Listing continued

```

00880 ; Link to *DO chain
00890 ;-----
00900 CHAIN PUSH IX ;Save old value
00910 LD IX,(MODDCB) ;Get old DCB address
00920 REL_1 EQU $-2
00930 SVC @CHNIO ;Move down the chain
00940 POP IX ;Recover pointer
00950 RET
00960 ;-----
00970 ; Start of filter code
00980 ;-----
00990 START JR C,CHAIN ;Go on @GET request
01000 PUSH AF ;Save our registers
01010 PUSH HL
01020 LD HL,ZCHAR ;Was last character 0?
01030 REL_2 EQU $-2
01040 LD A,(HL) ;Get the flag
01050 OR A ;Is it 0?
01060 LD A,0 ;In any case, make it 0 now
01070 LD (HL),A ;Set flag to 0
01080 JR NZ,OUT2 ;If flat wasn't 0, leave
01090 LD A,C ;Get character being sent
01100 OR A ;Is this character 0?
01110 JR NZ,START2 ;No -- go
01120 CPL ;Else set to 0FFh
01130 LD (HL),A ;Store flag
01140 JR OUT2 ; and leave
01150 ;
01160 START2 CP ' ' ;Displayable character?
01170 JR NC,OUT2 ;Yes -- go
01180 LD HL,LOWCTRL ;Get Low-character mask
01190 REL_3 EQU $-2
01200 AND (HL) ;Is it set?
01210 JR Z,CHK1 ;Go if mask not set
01220 PUSH BC ;Else save this character
01230 PUSH HL ;And the pointer
01240 LD C,0 ;Send out a CHR$(0)
01250 OR A ;Set NC,Z for PUT
01260 CALL CHAIN ;Send it out
01270 REL_4 EQU $-2
01280 POP HL ;Recover the pointer
01290 POP BC ;And original character
01300 DEC HL ;Now point HL at VSTATE
01310 OUT CALL STATUS ; and display video state
01320 REL_5 EQU $-2
01330 OUT2 POP HL ;Recover HL
01340 POP AF ; and AF
01350 JR CHAIN ;And move down the line
01360 ;
01370 CHK1 LD HL,VSTATE ;Get flags
01380 REL_6 EQU $-2
01390 LD A,C ;Get character again
01400 SUB 16 ;One of our characters?
01410 JR C,OUT ;No -- go
01420 JR Z,REVOFF ;Turn reverse on
01430 DEC A ;Test for 17
01440 JR Z,REVOFF ;Turn reverse off
01450 SUB 4 ;Test for 21
01460 JR Z,TGLSPC ;Toggle space/special chars.
01470 DEC A ;Test for 22
01480 JR Z,TGLALT ;Toggle alternate special chars.
01490 DEC A ;Test for 23
01500 JR Z,SFOURTY ;Start 40-char display
01510 CP 5 ;Test for 28
01520 JR Z,HOME ;Turn off everything
01530 JR OUT ;And leave
01540 ;-----
01550 ; Turn reverse video on -- {16}
01560 ;-----
01570 REVOFF LD A,(HL) ;Get mask
01580 OR INVMSK ;Set Inverse-on
01590 OR I_ENMSK ;Enable high-bit routine
01600 SETMSK LD (HL),A ;Save again
01610 JR OUT ;And leave
01620 ;-----
01630 ; Set high-bit routine off -- {17}
01640 ;-----
01650 REVOFF LD A,I_ENMSK ;Get mask bit
01660 CPL ;Reverse the bits
01670 AND (HL) ;Leave other bits on
01680 JR SETMSK ;And go
01690 ;-----
01700 ; Toggle Space/Special characters {21}
01710 ;-----
01720 TGLSPC LD A,(HL) ;Get old mask
01730 XOR SPCMSK ;Toggle special/alternate bit
01740 JR SETMSK ;And go
01750 ;-----
01760 ; Toggle Special/Alternate characters {22}
01770 ;-----
01780 TGLALT LD A,(HL) ;Get old mask
01790 XOR ALTMSK ;Toggle space/special bit
01800 JR SETMSK ;And go
01810 ;-----
01820 ; Start 40-character mode {23}
01830 ;-----
01840 SFOURTY LD A,(HL) ;Get the mask
01850 OR FTYMSK ;Set the 40-char. mask

```

Listing continued

# DEBUG

Listing continued

```

01860      JR          SETMSK          ;And go
01870      ;-----
01880      ; Home cursor / turn off inverse, high-bit & 40-col. display {28}
01890      ;-----
01900 HOME   LD          A,INVMSK      ;Get inverse-on mask
01910      OR          PTYMSK          ;Add 40-col mask
01920      OR          I_ENMSK        ;Plus High-Bit mask
01930      CPL          ;Reverse the bits
01940      AND         (HL)          ;Turn these bits off
01950      JR          SETMSK          ;And go
01960      ;-----
01970      ; This is the routine which displays the video status
01980      ; on the screen. It must display its information in
01990      ; even-numbered columns to that they will be visible on
02000      ; a 40-column display.
02010      ;-----
02020 STATUS PUSH      BC              ;Save working registers
02030      PUSH      DE
02040      PUSH      HL
02050      GETCRS          ;Get current cursor
02060      LD          (CURSOR),HL      ;And save it
02070 REL_7   EQU          $-2
02080      POP          HL              ;Recover pointer to mask
02090      DISPCH ALTMSK,0,74,'A'      ;"A" if alternate characters on
02100      DISPCH INVMSK,0,76,'I'      ;"I" if inverse is on
02110      DISPCH PTYMSK,0,78,'4'      ;"4" if 40-col. mode
02120      DISPCH SFCMSK,1,74,'C'      ;"C" if special characters on
02130      DISPCH I_ENMSK,1,76,'H'      ;"H" if high-bit routine is on
02140      INC          HL              ;HL==> LOWCTRL byte
02150      DISPCH 0FFH,1,78,'L'      ;"L" if low-character routine on
02160      LD          HL,(CURSOR)      ;Get original cursor pos'n
02170 REL_8   EQU          $-2
02180      SETCRS          ;Put cursor back
02190      POP          DE              ;Restore registers
02200      POP          BC
02210      RET              ;We're done
02220      ;-----
02230 FLTEND EQU          $-1
02240 FLTLEN EQU          $-BEGIN
02250      ;-----
02260      ;-----
02270      ; The rest of the program is initialization code that
02280      ; is thrown away when the program is relocated to protected
02290      ; high memory.
02300      ;-----
02310      ;-----
02320 INIT   EQU          $
02330      ;-----
02340 *GET   INSTALL
02350      ;-----
02360 RELTAB DW          REL_1,REL_2,REL_3,REL_4
02370      DW          REL_5,REL_6,REL_7,REL_8
02380      DW          0
02390      ;-----
02400 CR    EQU          13
02410 LF    EQU          10
02420      ;-----
02430 MODNAME DB        'VCTRL',0
02440      ;-----
02450 SIGNON DB        'Model 4 Video Control Tracking Program',LF,CR
02460      ;-----
02470 SUCCESS DB        'Installation successfully completed.',LF
02480      DB        'Use the FILTER command to connect to *DO.',LF,CR
02490      ;-----
02500      END

```

End

Circle 51 on Reader Service card.

## H-P LASERJET® on TRS-80®

Word Processing with ALLWRITE®  
**LASERJET PLUS** Downloadable Fonts  
 TRS-80 Models 1,3,4,4P,4D -- TRSDOS / DOSPLUS / LDOS

Call or write for details:

**PROSOFT® 818-764-3131**

Box 560, No. Hollywood, CA 91603

Circle 133 on Reader Service card.

## World of Computers

No Sales Tax Collected  
 (N.J. Residents add 6%)

### Tandy 1000 SX Color System



- Tandy 1000 SX with 640K and 2 disk drives
- Tandy CM-5 Color Monitor
- Tandy MS-DOS/GW-BASIC Reference Manual
- Tandy Deskmate II
- Okidata 292 Color Printer
- Deluxe Table Top Printer Stand
- Package of Computer Paper
- Printer Cable
- Okidata 292 Color Ribbon
- Maxell Diskettes (Box of 10)
- Head Cleaning Kit
- EPD EC-I Surge Protector

Includes  
 200 CPS  
 Color Printer!  
 640K of RAM!  
 SAVE OVER \$600.

Total List Price \$2425.00

**Now Only \$1799.00**

Complete Ready-To-Run Systems from World  
 of Computers, no missing part or cables.  
 We guarantee it!

We stock the entire Tandy Line.  
 Please call for pricing on:

Tandy 1000 SX — Tandy 1000 EX  
 Tandy 3000 HL — Tandy 3000 HD

No-Risk 30 Day Satisfaction Guarantee  
 If you're not 100% satisfied with any hard-  
 ware or accessories you've purchased from  
 World of Computers we will refund your  
 purchase price. 100% No questions asked!

Write or call for our 48 page catalog featuring:

- Tandy • Epson • IBM • Apple • Okidata
- Diskettes • Software • Surge Protectors
- Monitors • Modems • And More!

ORDER TOLL FREE

**800-526-5313**

IN NJ 201-728-8080

Order via telephone — Mon.-Fri. 9-9 EST  
 Sat. 10-4 EST or Order via Compuserve—  
 Electronic Mall 24 Hours a day!

Freight — Add 2% for UPS ground shipping  
 5% for UPS Blue (2 day delivery)

Include address and phone #.

Payment: Cashiers Checks, Money Orders,  
 Credit Card will ship immediately. No COD's!  
 Personal and company checks allow 15 days.

WORLD OF COMPUTERS  
 31 Marshall Hill Road • West Milford, NJ 07480

Continued from p. 39

lowing programming sequence illustrates one use of a TSAM/BCI command:

```
1000 CMD TSAM OPEN FILE "CUSTFILE"
1010 MODE = INOUT
1020 BUFFER = COMMON
1030 UPD=YES EXIT
```

As this illustrates, all TSAM/BCI Basic commands are delimited by starting the command with CMD TSAM (or optionally CMD #) and ending the command with EXIT (or optionally \*). You can write TSAM/BCI commands as a single Basic program line or they can span multiple program lines.

Besides the TSAM/BCI run-time module, Terasoft includes four rather useful utility programs: Analyze for displaying and printing a file's vital statistics, Filecalc for estimating a project's file sizes, Reorg for file conversions and reconstructions, and Verify for testing the integrity of disk files.

**Docs and Demos**

The TSAM/BCI documentation chiefly consists of an excellent 200-page manual. It covers TSAM/BCI installation, file concepts, detailed explanations for the TSAM/BCI commands, advanced programming information, and complete information for using the TSAM/BCI utilities. The manual is well written and contains an astonishing amount of detail. The advanced programming information should prove particularly helpful to seasoned programmers.

Terasoft has included two demo programs and help files on the TSAM/BCI system disks. The demo programs comprise a simple but effective checkbook system. Demo1 is a file-maintenance

**The TSAM/BCI manual is written for the Model III owner familiar with Basic programming.**

program for adding, changing, deleting, and undeleting records in the checkbook file. Demo2 displays the recorded checks by check number, check date, or payee name. Through careful study of these two demo programs, you should gain a great deal of insight into the use of TSAM/BCI and ISAM programming in general.

**Conclusion**

TSAM/BCI provides an easier method for writing ISAM programs. Also, TSAM/BCI programs are fast and can be more effectively error trapped than normal LBasic programs. While the documentation is far superior to most packages, the TSAM/BCI manual is written for the Model III owner who possesses a fair degree of familiarity with Basic programming. Furthermore, a high degree of knowledge in disk file-handling techniques is desirable.

If you possess the necessary knowledge and write many information-handling programs, TSAM/BCI should be a worthwhile investment. ■

**Get Rich And Organized**  
by Gary A. Ludwick

★★★

**Money Organizer Plus** runs on the Model 4 (128K) and requires two disk drives. It is also available for MS-DOS machines. Practical Software, 186 Murray Drive, Aurora, Ontario L4G 2C5, 416-727-4747. \$195.

**M**oney Organizer Plus is a collection of integrated financial and personal-productivity modules designed for those who need more than an electronic checkbook.

The program handles complicated stock transactions, tax records, rental and investment properties, and interest and mortgage calculations. It also provides a daily appointment schedule, a household-inventory listing, and a somewhat unusual phone directory/data base.

Money Organizer Plus, although written entirely in Basic, is integrated in the sense that it automatically updates all required data files with just data entry. However, the program still needs some work, particularly in error trapping and recovery, before it lives up to its potential.

**Startup Problems**

Money Organizer Plus didn't waste any time giving me problems. As is usual with unprotected programs, the manual urged me to back up the master disks; I then spent over an hour trying to comply.

Practical Software neglected to inform users of one little detail: They use a 42-track format instead of the usual 40. That fact should be in boldface type on the first page of the manual.

Once I solved that problem, Money Organizer Plus was simple to use. The program actually uses three disks: a boot disk that creates a RAM disk in the machine's upper 64K, a program disk that holds about 80 percent of the program files, and a data disk that contains your particular data files.

After creating its own MEMDISK, Money Organizer Plus asks you for the current exchange rate of U.S. and Canadian dollars. It does this on a monthly basis, not on each boot-up. If you have investments in Canada, this is a helpful feature. But if you keep your dollars at home, it's a pain. An on/off toggle would be useful to many of us.

**Modules**

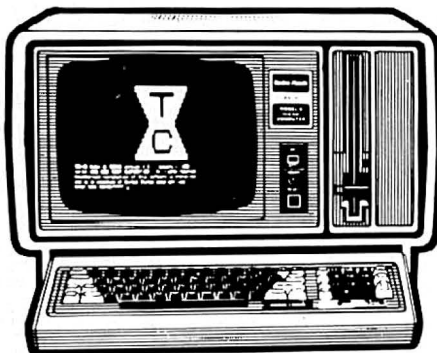
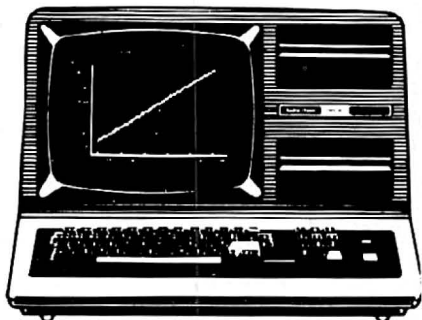
Money Organizer Plus performs four types of interest calculations: compound daily or yearly, regular semi-annual, mortgage amortization, and monthly reinvestment.

Command	Definition
Close	Discontinue processing of a file
Define	Define a TSAM/BCI file
Delete	Logically delete a record
Handle	Set up error-handling routines
Kill	Kill a file
LOC	Return current record number
LOF	Return file length
Open	Open a file
Purge	Release TSAM/BCI memory space back to LBasic
Read	Read a record
Readnext	Read the next record
Readprev	Read the previous record
Release	Erase a Basic variable or array
Reset	Close all files and release memory space back to LBasic
Rewrite	Replace a record
Start	Position the file to a certain record
Test	Disable automatic reset
Undelete	Restore a deleted record
Update	Update the file's directory information
Write	Add a record

Table. TSAM/BCI commands.

# NOCONA

## ELECTRONICS



256K MOD 1000 EX 1 DR.....	529.00
384K MOD 1000 SX 2 DR.....	779.00
512K MOD 3000 HL 1 DR.....	1139.00
512K MOD 3000 1 DR.....	1629.00
512K MOD 3000 20 MEG 1 DR.....	2479.00
640K MOD 3000 40 MEG 1 DR.....	2929.00
512K MOD 6000 15 MEG 1 DR.....	2099.00
24K MOD 102 PORTABLE.....	369.00
24K MOD 200 PORTABLE.....	599.00
32K MOD 600 PORTABLE.....	1149.00
64K MOD 4D 2 DR.....	839.00
VM-4 MONO MONITOR.....	94.00
VM-3 MONO MONITOR.....	155.00
VM-1 MONO MONITOR.....	149.00
CM-1 COLOR MONITOR.....	399.00
CM-5 COLOR MONITOR.....	219.00
CM-10 COLOR MONITOR.....	319.00
DMP 105 PRINTER.....	145.00
DMP 130 PRINTER.....	249.00
DMP 430 PRINTER.....	479.00
DMP 2110 PRINTER.....	889.00
DMP 2200 PRINTER.....	1149.00
DWP 220 DAISY WHEEL.....	319.00
DWP 230 DAISY WHEEL.....	299.00
DWP 510 DAISY WHEEL.....	549.00
DWP 520 DAISY WHEEL.....	689.00

10 MEG HARD DISK.....	499.00
10 MEG BACK UP.....	1529.00
20 + 20 MEG B/U.....	2339.00
20 MEG HARD CARD.....	569.00
35 MEG HD PRIMARY.....	2049.00
35 MEG HD SECOND.....	1829.00
70 MEG HD PRIMARY.....	2679.00
70 MEG HD SECOND.....	2239.00
3½ DRIVE MOD 102.....	149.00
3½ DRIVE MOD 1000.....	225.00
5½ DRIVE MOD 1000.....	170.00
360K DRIVE MOD 3000.....	135.00
1.2M DRIVE MOD 3000.....	209.00
128K COCO 3.....	169.00
PRINTER SWITCH.....	80.00
PRINTER CONTROLLER.....	179.00
8 COLOR PLOTTER.....	569.00
STANDBY POWER.....	439.00
300/1200 MODEM BRD.....	155.00
CELLULAR PHONE.....	929.00
SATELLITE ANTENNA.....	1519.00
ROBIE SR ROBOT.....	139.00
TRACTOR DWP 220.....	79.00
TRACTOR DWP 230.....	80.00
TRACTOR DWP 510.....	159.00
TRACTOR DWP 520.....	109.00

**100% RS COMPONENTS NO FOREIGN DRIVES OR MEMORY FULL WARRANTY**

**ALL RS SOFTWARE 20% OFF CATALOG PRICE**

**CASHIERS CHECK OR MONEY ORDER MUST ACCOMPANY ALL ORDERS**

**(817) 825-4027**

**NOCONA ELECTRONICS • BOX 593 • NOCONA, TX 76255**

Circle 301 on Reader Service card.

# WHY PAY MORE...

## When you can own for MUCH LESS!

Enjoy year round Sale prices with credit card convenience or special discount prices for Cash Purchases.

Same day processing for speedy delivery

Special 30 day return policy.

**FULL CATALOG SELECTION**

**Customer Service**  
9 AM  
to  
5 PM  
Texas time



# BIG D COMPUTERS

ROANOKE CENTER-ROANOKE, TX 76262

CALL 1-800-FOR BIG D  
(1-800-367-2443)



In Texas call (817)491-2461

**Money Organizer Plus could be a useful program for anyone with a varied portfolio.**

Its inventory feature is a data-base style module that lets you enter descriptions of home inventory and each item's category, serial number, and value. The program alphabetizes your list, and it's available for searching, editing, or printing.

The phone-directory module is not intended to be a constant source of phone numbers, but a data base of persons and companies with which you do business. In addition to storing names and phone numbers, it lets you create your own electronic yellow pages by designating each number with a service, such as plumber or carpenter. The phone directory also contains a label-printing function for bill paying or address changes.

Unlike an appointment book, the calendar module shows you an entire month's activities at one glance. It also lets you register regularly occurring events, such as meetings, birthdays, or anniversaries, on an annual basis. It will even carry annual events over into a new year's calendar. Printouts of blank or filled-in calendars are also available from this module.

Since it has eight submodules, the tax program is not easy to explain. It uses all the tax-relevant information from other modules (such as stocks or rental-property income and expenses) and your input of additional information (such as deduction amounts, interest earned, and salary) to create a profile of your current tax position. It works well but requires that you have the discipline to enter tax information throughout the year, not just on April 14.

The stocks module will handle not only stocks but options, bonds, commercial paper, and treasury bills. This set of programs will handle all record-keeping details of buys, sells, options, dividends, splits, and tax liabilities. It will also let you compare your holdings to the current market trends and project gains or losses based on those trends. It will list your current portfolio alphabetically and by type, create a table of all transactions and dividends (in U.S. or Canadian dollars), produce a projection estimate for

net profit or loss on securities based on their previous performance, and display a creative review of all the options you may have written or purchased. After you have made all your transactions, the program automatically updates tax liabilities and adjusts all relevant files—quite a help if your stock calculations are complex.

All in all, Money Organizer Plus is a powerful program, which is astounding for a program written entirely in Basic.

**Money Shortage**

If Money Organizer Plus has one fault, it is in error handling. A program as extensive and complicated as this one needs error-handling ability commensurate with its complexity. Right now, it doesn't have it.

One of the software reviewer's responsibilities is to try to crash the program. With Money Organizer Plus, I didn't have to try. My first run—in the mortgage-amortization module—produced an on-screen loop that I had to escape by using the break key. I had similar experiences in other branches of the program, as well. Loops, illegal function calls, and the acceptance of faulty or nonexistent data all cause major problems here, and are indicative of the program's Jekyll/Hyde nature. You cannot save your data to disk at will, so there is a chance that crucial information could be lost before Money Organizer Plus automatically updates the disk file.

**Conclusion**

Money Organizer Plus could be a useful program for anyone with a varied investment/financial portfolio. The stock module alone is worth the price just for the way it handles complicated tax-liability computations. I would like to see mutual funds added to its capabilities, along with a reinvestment-of-dividends feature. And the mortgage-amortization program could stand some expansion to handle balloon payments and variable-rate mortgages.

But error handling is a major problem, particularly when you are dealing with financial records. The way the program is set up, it would be hard to lose any current records (disk files), but you could spend a lot of time entering new data only to see it disappear.

So let me give Money Organizer Plus an equivocal recommendation: If you're heavily into stock trading and want to make your life easier in terms of record keeping, tax-exposure computation, and projections, this program will do it for you, as long as you are careful and recognize the possibility of a crash. In my opinion, that risk is worth the benefits. Casual users should wait for a cleaner version. ■

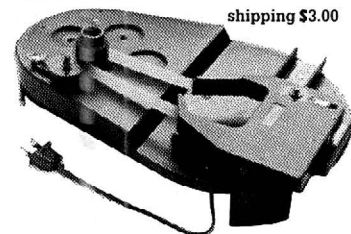
**MAC INKER™**  
Re-ink Any Fabric Ribbon  
Automatically for less than 5 cents.

Dedicated Units start at **\$54.95**

Universal Cartridge **\$68.50**  
MAC INKER

Universal Spool **\$66.95**  
MAC INKER

shipping \$3.00



Lubricated, Dot Matrix Ink \$3.00, bottle available in black/brown/red/green/yellow/purple/orange/gold and silver.

Over 50,000 MAC INKER(s) in the field.

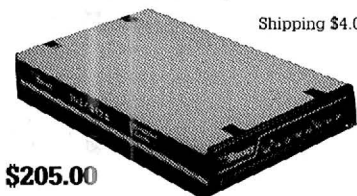
Over 7500 printers supported.

**MERCURY MODEM**

Really 100% Hayes\* Compatible.

- 300/1200 baud.
- audio monitor/front panel lights.
- 18 months warranty.

Shipping \$4.00



**\$205.00**

\*Hayes is a trademark of Hayes Microproducts.

**DATA SWITCHES**

All types, all lines switched, all metal, heavy duty switch, elegant design, best value for money.



- 2 Ports Parallel or Serial **\$ 75<sup>00</sup>**
- 4 Ports Parallel or Serial **\$150<sup>00</sup>**
- 2 Computers/2 Printers Parallel or Serial **\$150<sup>00</sup>**

We have cables too. Please inquire or specify at time of order.

Order Toll Free.  
Call or write for free brochure.

**1-800-547-3303**

In Oregon 503-297-2321 (24 hours line)

**Computer Friends®**

6415 SW Canyon Ct., #10, Portland, OR 97221,  
telex 4949559

Dealer inquiries welcome.

Circle 261 on Reader Service card.

# ACTUAL SIZE.



Turner Hall Publishing

Circle 225 on Reader Service card.



## NEW!

### SafeSkin™

#### KEYBOARD PROTECTOR

*Finally! A keyboard cover that remains in place during use!*

SafeSkin prevents damage from liquid spills, dust, ashes, paper clips, staples, etc. This custom fit cover is made of ultra-thin, ultra-tough, clear flexible plastic, molded to fit every key and contour, allowing normal key response and feel. Available for the Model 100, Tandy 1000/2000, Model 3 & 4, IBM-PC, AT, Apple, DEC, Wyse and many others. Send \$29.95, Check or M.O., Visa & MC include expiration date. Specify computer type. Dealer inquiries invited. Free brochure available.

Merritt Computer Products, Inc.  
2925 LBJ Fwy., Suite 180  
Dallas, Texas 75234  
(214) 339-0753

Circle 174 on Reader Service card.

# ACTUAL PRICE.

Introducing The Turner Hall™ Card. The lowest priced complete 256K memory expansion board you can buy.

We made it so inexpensive by using the very latest 256K RAM chips instead of four times as many 64K chips.

That same technology makes the Card fit in a half length PC/XT™ slot. And the reduced chip count increases reliability, so we can offer a 30-day money-back guarantee and 1-year warranty.

The Card comes with a clock/calendar with replaceable battery backup, illustrated Owner's Manual, and software including clock, print spooler, and disk emulator.

That's everything the most popular

multifunction boards have. Except a couple of extra ports and a lot of extra cost.

IBM® or Compaq® owners will find the Card remarkably easy to install. And if you have any questions after you buy, call our Help Hotline.

The Turner Hall Card is just \$99.95,\* plus \$2.00 shipping (\$12.00 outside of U.S.A.).

Order by phone. We accept MasterCard or Visa. Or send us a check or money order with your business card attached.

**Turner Hall Publishing**  
10201 Torre Ave., Cupertino, CA 95014

## 1-800-556-1234 x526. (In CA 800-441-2345 x526).

\*CA residents add 7% sales tax (\$7.00). Requires IBM PC, PC/XT, Portable PC, or Compaq with at least 256K of memory. Turner Hall is a trademark of Turner Hall Publishing. IBM is a registered trademark, and PC/XT is a trademark of International Business Machines Corp. Compaq is a registered trademark of Compaq Computer Corp.

## Tax Preparers TAXSTAR★

For Tandy-1000, Tandy-1200,  
TRS-80 Model 3 or 4

- Will do schedules 1040, A, B, C, D, E, SE, G, W, 6251
- Tax calculations—tables, rates, income averaging
- Uses IRS prescribed computer generated printouts or overlays. User friendly
- Automatically calculates excess FICA earned income credit, alternate minimum tax
- Change one figure, program recalculates entire tax return in 10 seconds

**\$310 with users manual**

Professional Tax Software, Inc.  
43 Spring Pond Dr.  
Ossining, NY 10562  
914-941-7879



## SmartNotes

★★★★

**SmartNotes** runs on the Tandy 1000/1200/3000 (256K) and requires one disk drive. Personics Corp., 2352 Main St., Bldg. 2, Concord, MA 01742, 617-897-1575, \$79.95.

Memory-resident utilities are rarely described as cute, but SmartNotes is adorable: Personics has turned the idea behind 3M's Post-It notes (better known as "yellow sticky pads") into on-screen comments for almost any word-processing, spreadsheet, data-base, program-listing, or DOS-directory file. Whether it's a reminder to yourself ("Omit reference to addressee's mother before mailing.") or a hint to another ("Fourth-quarter loss reflects supplier strike."), SmartNotes trades 91K for easy-to-use convenience—notes that hide behind your files, popping up as you reveal their subjects with a page-up or page-down scroll.

The secret to SmartNotes is context: a string of five to 47 (the default) characters, counted backward from the cursor, that call the note from disk when they appear. SmartNotes automatically saves notes to a specified file as you create them.

If you avoid a few pitfalls—contexts should be long enough to be unique, and a note goes into limbo if you change or delete its context (such as WordStar page-break hyphens)—you can clutter your text with up to 50 addenda per disk file, overlapping notes of five or 10 lines of 23 characters in a choice of colors or border styles. SmartNotes' editor has wordwrap and elementary editing commands; a few menus and function keys handle every operation you need. (The on-line help disappears if you leave the SmartNotes subdirectory.)

In a spreadsheet, notes stick to a cell's address instead of its volatile contents. SmartNotes has modes for Multiplan, VisiCalc, SuperCalc, and Symphony, but it's magical with Lotus's 1-2-3, clinging to a cell even if its address changes as you insert or delete rows or columns. That feat is reserved for 1-2-3, but SmartNotes works with almost all software, including other background tools like Borland's SideKick (although the combination slowed my Tandy's typing response). Exceptions include Reflex, ProKey, and graphics-based (instead of ASCII-based) programs like Microsoft Word 3.0 and Framework II, although both of the latter work in text or monochrome display mode. One hardware incompatibility exists: The command to disable SmartNotes, control-alternate-zero, wasn't recognized from my 1200 HD keyboard.

SmartNotes isn't psychic. Even if you start it from an AUTOEXEC.BAT file, you'll have to tell the user which note file

to open if you want him or her to view your annotated work in your absence. Otherwise, it's sure to be as popular as Post-It notes are for paperwork. After the Information Age, with record numbers of documents in circulation, we're heading into the Annotation Age, with more information per document.

—Eric Grevstad

## Dan Bricklin's Demo Program

★★

**Dan Bricklin's Demo Program** runs on the Models 1000/1200/3000 (256K) and requires one disk drive. Software Garden Inc., P.O. Box 238, West Newton, MA 02165-9990, 617-332-2240, \$74.95.

Dan Bricklin's Demo Program is an interesting little package intended for use as a software developer's productivity tool. You can use it to create a series of screens as they would appear in a final program. Then Demo can help you create a "slide show" of the screens to use in demonstrating your program concept to others. However, Demo's inadequate documentation and limited graphics make it less than useful.

The documentation package consists of 29 pages of dot-matrix text. The manual is not well organized and doesn't provide enough application of the program's features and commands. Only by experimenting with the different commands do you become aware of some of Demo's finer points. The program supports text and has limited graphics capability (it does not support bit-mapped graphics). Demo does support such character attributes as underline, reverse video, and blinking, as well as the background and foreground character-color attributes. Demo lacks any real graphics capability but does support drawing lines.

Serious software developers will find the graphics limitations hard to overcome. Since the program purports to supply the software developer with a means to showcase an application, the omission of bit-mapped graphics capability is serious.

I doubt that any software developer will find much utility in the Bricklin package other than its price. Demo is inexpensive, which should appeal to PC users on a budget.

I found the program's command structure clumsy and the manual of little help in learning how to use the program. It was much easier to use the on-line help facility than the manual.

Demo's documentation states that it is a "developer's productivity tool." I don't agree. Many other packages on the market do exactly what Demo does and do it

better (IBM's PC Storyboard is one example). Although they are more expensive than Bricklin's Demo, these packages don't limit your graphics options and are easier to use. I suggest you save your money and spend a few extra dollars on an alternative to Demo.

—Gary Shade

## TKO

★★★★

**TKO** runs on the Model 4 (64K) and requires TRSDOS 6.2 and two disk drives. SOTA Computing Systems Ltd., 213-1080 Broughton St., Vancouver, British Columbia V6G 2A8, 604-688-5009, \$69.95.

TKO is a diverse collection of TRSDOS 6.2 utilities that includes a screen editor, keyboard access to the TRSDOS 6.2 scroll-protection feature, macro keys, key click, keyboard lock, and a simple terminal program. Because you install TKO as a high-memory keyboard filter, all of its utilities are available at any time from TRSDOS or an application program. The only limit to TKO access is that all application programs must honor the TRSDOS 6.2 keyboard driver.

TKO's best feature is its screen-editor utility. Essentially, you use the screen editor to edit and capture any line on the video display. Once the editor captures the line, you can have the line returned as the keyboard input by pressing control-D. The TKO screen editor is particularly useful for editing Basic programs. Furthermore, TKO makes it child's play to duplicate Basic program lines; you just change the line number.

TKO also provides up to nine macro keys. However, only four of the nine keys are for everyday use. The other five macro keys are reserved as two printer-control keys and three dialer keys. TKO imposes a maximum length of 31 characters each for the general-use macros and up to 15 characters each for the printer-control and dialer keys. Once you program them, you execute the macros by pressing the clear key and a number key from 1 to 9.

TKO includes a simple terminal program. While it is fairly dim-witted, it does provide for dual output to the printer. And you can call up the TKO terminal program at any time. For example, you can activate it while in Basic. Once you finish with the terminal program, you can easily return control to Basic with the display and the program undisturbed.

TKO has a few minor but quite useful features: enabling and disabling the TRSDOS scroll-protection feature, a keyboard-click filter, locking up the keyboard until you intentionally unlock it, a dump-typewriter feature, and returning

# DeskHelp™ unlocks DeskMate™

## CREATE...

- MAIL MERGE
- DIRECT MAIL
- FORM LETTERS
- LABELS
- CHECKS
- CUSTOM FORMS
- INVOICES
- COLLECTION LETTERS
- ROLODEX™ CARDS
- OUTPUT TO DISK
- PRINTER CODES

## PLUS...

- 100% ML, FAST
- WINDOWS
- INDEXING
- EASY TO LEARN
- EASY TO USE
- MANUAL RECORD SELECTION
- TEXT FILTER
- CUSTOMIZE DEFAULTS
- ERROR CHECKING

## Now you can with DeskHelp!

DeskHelp was written especially for you, the DeskMate owner, by Bobby Ballard, nationally known DeskMate expert.

**\$59.95**  
INTRODUCTORY OFFER  
**\$49.95**  
Expires 12/31/86

Write for Details

**FREE DEMO**

## ATMOSPHERES

1207 Eighth Avenue Dept. #4  
Brooklyn, NY 11215 718-788-6799

Include \$3.00 SH, NYS residents add tax.  
DeskMate is a trademark of Tandy Corp. Requires DOS 2.0x or higher and 384K. DeskHelp is a trademark of Atmosphere.

## TANDY 1000

8087



## CO-PROCESSOR KIT

- Does Not Require Expansion Slot! —
- Operates w/Autocad, Lotus 123, And More —
- Includes Demo Software, Software Guide, Instructions —

## FAASSSSTTTT

- \$145 — Tandy 1000 'A'
  - \$130 — Tandy 1000 — Adapter Board Only
  - \$245 — Tandy 1000 — Adapter Board w/8087
- (Prices Include Shipping)

## TRIONIX

3563 'B' Roosevelt St. Carlsbad, CA 92008  
(619) 434-4439

CA Residents Add 6% Sales Tax

## ADVANCED SCIENTIFIC ANALYSIS & GRAPHICS

**BASICA sourceware:** 48 short, computer-aided analysis tools for scientists; 1/4 are listed below. Concise scientific handbook & IBM-compatible disk. Unique graphics include 64-color display with any CGA. Programming skill: any.

### 2&3D GRAPHICS TECHNIQUES

- 3-D Surface Plotting & Contouring
- 512-color Palette (80 x 100 display)
- On-Screen Interactive Diagrammer

### IMAGING & TRANSFORMS

- Fourier Transform & Convolution
- Optical Ray Tracing & SNR
- Image Enhancement

### PROBABILITY & STATISTICS

- Histograms, Scatter & Correlation
- Multiple/Polynomial Regression
- Random Fractals

### MATRIX OPERATIONS

- 3-D Perspective Projections
- Inversion & Determinants
- Eigenvalues & Vectors

\$59.95 or send for information to:

**SIMPLIFICATION UnLtd.**

P.O. Box 654, Menlo Park, CA 94026

END MENU-DRIVEN FRUSTRATION!

## EXPRESS CHECKOUTS

the system date at any time.

The TKO documentation consists of an excellent 36-page manual. Besides covering all the basic facts about TKO, it provides excellent tutorials on the use of TKO's major features. While the manual is well written, it has one problem. The macro-key tutorial section says to press control-1 to execute a macro instead of clear-1. Anyone who reads the macro-key section carefully shouldn't have a problem with this.

Overall, TKO is an excellent group of utilities that has something for everyone. My only complaint is the price. While TKO is a useful program, I feel that it is a bit overpriced.

—Mark D. Goodwin

## The 80286 Architecture

★★★★

**The 80286 Architecture**, by Stephen P. Morse and Douglas J. Albert. Softcover, 400 pp. Wiley Press Inc., 605 Third Ave., New York, NY 10158. \$24.95.

*The 80286 Architecture* is an informative, well-written source of information on the Intel 80286 microprocessor. The 80286 is the processor made famous by the IBM PC/AT and used in many computers, including the Tandy Model 3000.

The authors of this book are certainly not strangers to the 8086 family, of which the 80286 (or simply the 286) is a member. Albert, now an independent computer consultant, was an Intel staff engineer. Morse, also an independent consultant, was the principal architect of the 286's predecessor, the 8086, and wrote *The 8086 Primer* (Hayden Book Company, 1980). *The 8086 Primer* has been a valuable part of my library for years and was my introduction to 8086 architecture.

*The 80286 Architecture* is written at a level basic enough for readers who are new to microprocessors, yet complete enough for advanced readers who are familiar with microprocessors in general but might not know all the 286's architectural peculiarities.

The book begins with a brief history of microprocessors leading up to the development of the 286, then presents a short discussion on computer fundamentals, including terminology and number systems. Readers already familiar with these concepts can skip this introductory material. Readers who are familiar with the 8086 processor and interested only in learning about the differences in the 286 can skip other areas of the book also.

After the introductory chapter, the text moves into the 286 machine organization. This covers the 286's register,

memory, and I/O structures, and its real-address and virtual-address modes of operation. It also covers operand-addressing modes and how the different addressing modes affect the binary patterns in the 286's machine code.

A complete discussion of the 286's instruction set follows, including coverage of instructions that support high-level languages as well as the instructions used with the 80287 floating-point math coprocessor. Since the IBM PC/AT incorporates support for an optional 80287 math coprocessor, inclusion of the 287's instructions is important to covering the 286 instruction set. This book nicely handles that coverage.

Chapter 5, "The Operating System's View," was the most interesting chapter. While I was already familiar with most of the other material presented, some of the specifics of the 286's virtual-mode operation were new to me. The chapter discusses 286 memory management and physical-address calculation in real and virtual modes.

While the book presents some advanced and complex concepts, particularly in the discussion of virtual-mode operation, Morse and Albert provide easy-to-understand explanations of these concepts. However, microprocessor novices might have a difficult time following the discussion.

Chapter 5 also covers levels of system-software protection and how interrupts and exceptions are handled in real and virtual modes.

Chapter 6 concludes the book's text portion with a presentation of the basic construction of a 286-based system. It describes the processor's bus interface, pin-out, and bus timing, along with the interface to the 82284 clock-generator chip, the 82288 bus-controller chip, system memory, and other peripheral devices. While the authors do not provide in-depth interfacing discussions, they give the reader a good idea of what makes up a 286 system and present some of the design considerations involved in such a system. The discussion assumes that the reader has only a basic knowledge of digital logic.

*The 80286 Architecture* is a complete information source on the 80286 microprocessor's architecture and instruction set. It does not provide comprehensive coverage of hardware timing and interfacing, but that information is generally available for the designer in the manufacturer's data sheets and application notes. For people who want to know what makes up the 286, how it operates, and how to program it, I highly recommend this book as the first place to look.

—Roger C. Alford

You knew the Tandy 2000<sup>®</sup> was good. Now it can be great!



- NEW • 640K RAM Memory Board (T2K-640) \$495.00
- NEW • 896K RAM Plus Coprocessor (T2K-896C) \$895.00
- NEW • 20MB Internal Hard Disk (T2K-20HD) \$995.00

### Envision Designs shows you how.

Take full advantage of your Tandy 2000<sup>®</sup>'s capabilities with products from Envision Designs. Call for information on the complete product line and availability.

For ordering and information call (509) 627-5291, 9:00-5:00 PST.

We accept check, MO, Visa & Mastercard. WA residents, add 7.8% sales tax. Shipping & handling charges will vary.



Tandy 2000<sup>®</sup> is a trademark of Tandy Corporation.

# MISOSYS

## PRO-WAM

### Window controller and Applications' Manager

Formerly known as **PRONTO**—no longer confused with Chemical Bank's Pronto electronic banking system. **PRO-WAM** supplied applications can turn your 128K Model 4,4P TRS-80 into a sophisticated business or personal machine rivaling the best of them. That's because **PRO-WAM** comes with many useful and powerful menu-driven time savers and work organizers. **PRO-WAM** includes eleven applications, a complete HELP facility, a data file sort program, a 99-page user manual, and is easily installed. While you operate other programs, you can request its services with a single key-stroke. **PRO-WAM** saves you typing with its EXPORT and IMPORT functions which allow you to move data across windows between programs. Requires 128K TRSDOS 6.2.

**PRO-WAM** ..... 59<sup>95</sup>  
+ \$3 S&H

**Here's Mister ED:** more powerful applications for your **PRO-WAM**. This pac includes an editor for your every need. You get:

- DED—edit disk sectors on any drive
- FED—edit file records in any disk file
- MED—edit any page of memory in any bank
- TED—a pop-up full screen text editor
- VED—edit the video screen; gives cut & paste
- CARDFORM—populate CARD with a form
- DOLOAD—brings DOSAVED files back to the video
- REGENBU—shrinks BRINGUP/DAT file

**Mister ED** ..... 59<sup>95</sup>  
+ \$3 S&H

**What? You don't have PRO-WAM yet?**

**Order both PRO-WAM and Mister ED for just \$105 and \$5 S&H. Save \$15**

*PRO-WAM is also available at Radio Shack via Express Order (90-0353).*



### MISOSYS, Inc.

PO Box 239  
Sterling, VA 22170-0239  
703-450-4181 MC, VISA, CHOICE  
800-MISOSYS 1P-5P EST Mon-Fri Orders Only!

VA residents add 4% sales tax. S&H: CANADA add \$1; Foreign use S&H times 3

# GOLF



All programs & 3 courses on two diskettes! Skill/knowledge Wind-Trees-Traps Water-Slopes & More. Hours of FUN for everyone. 1 to 4 players.

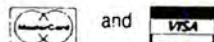
Model 4	Model 3/4
GOLF \$34.50	CASINO \$22.50
BASEBALL 29.50	FOOTBALL 29.50
ARCADE 45.00	STALAG-12 22.50

GOLF TOURNAMENT FEB 15 - MAR 10  
PRIZES - GOLF CLUBS - GOLF BALLS  
SEND FOR DETAILS - WATCH OUR AD



P O BOX 394  
NOTTINGHAM, PA 19362

24 hour PHONE  
(215) 932-5395



Circle 437 on Reader Service card.

# Your Number One Choice

**NEW!**  
256K MODEL 100

PG Design RAM modules have become the number one choice for Model 100, Tandy 200 users, not just because more people are using PG Design RAMs than any other brand—But because our name has become synonymous with **PREMIUM QUALITY, RELIABILITY,** and **IMMEDIATE CUSTOMER SERVICE.**



MODEL 100 128K RAM MODULE



MODEL 100 8K RAM MODULE



TANDY 200 24K RAM MODULE

When you purchase any PG Design RAM module, you're buying directly from the people who design, manufacture and service the product.

We develop the most advanced products of their kind by using the latest technology and the highest quality components available. Before we bring any product to market, it is carefully evaluated in the field by professionals. If it doesn't meet their standards, it doesn't meet ours. And when we finally bring our product to market, it's the finished product. It works as we say it will, and it will keep on working reliably. "Our reputation for excellence is riding on each and every RAM module we ship."

Whether it's an 8K or 128K RAM module to expand the memory of your Model 100 or a 24K RAM module for your Tandy 200, be assured you are buying the best when you buy PG Design RAM modules.

**Model 100**  
64K RAM module—\$299. ea. 128K RAM module—\$425 ea. 224K upgrade—CALL  
8K RAM Modules—\$24.95 ea. Set of three—\$69. (available for NEC 8201A)

**Tandy 200**

24K RAM modules—\$75 ea. \$70 ea. two or more.

We absolutely guarantee the quality and perfect performance of all PG Design RAM modules or your money back!

We supply easy to follow instructions with each of our products. And, we are eager to assist you on the phone if you should need help with the installation or operation of your RAM module.

To order, call us (313/727-2744), or write. All orders are shipped within five working days after receiving your order. We accept VISA, Master Card, personal checks or money orders.

**PG Design Electronics, Inc.** 37560 Thirty-one Mile Rd., Richmond, MI 48062 (313) 727-2744  
Dealer inquiries invited. TANDY is a registered trademark of TANDY CORP.

**PG Design**

# Back Issues

**January 1984:** Tandy's Model 2000 and an MS-DOS overview; also, an Assembly language tutorial.

**February 1984:** The Creator—new and improved data base management, also, tabulate and analyze opinion polls.

**March 1984:** Hinrich's word processor, a III to 4 conversion program, and a Machine-language arcade game.

**April 1984:** CP/M digest, Model III/4 conversion program, pie and bar chart program, and new Scripsit characters.

**May 1984:** Telecommunications special, VisiCalc enhancements, Pascal, and a program that eases math anxiety.

**June 1984:** Tape to disk transfer program, award-winning graphics, and a business report analyzer.

**July 1984:** Guide to Disk Operating Systems, GW-Basic, and a Machine-language minimizer.

**August 1984:** Games issue, Model 4 ED-TASM, dBase II, Scripsit extras, and quality sales reports.

**September 1984:** Disk drive repair and maintenance and a guide to Editor/Assemblers.

**October 1984:** Bar codes, educational programs for teachers, and speech synthesis.

**November 1984:** Special utilities issue, cassette Basic enhancements, and a hybrid text editor.

**December 1984:** Gift guide, football strategy game, wind chill calculator, and an easy data base manager.

**January 1985:** Basic compiler, Scripsit enhancements, custom graphics characters, and TRSDOS 1.3 patches.

**February 1985:** Line and bar graph program, CW Basic, and easy Assembly-language programming.

In each back issue, you'll also find our regular features, reviews of popular software and hardware, and dozens of useful programs that are yours for the typing.

Each back issue costs \$4.50 plus \$1 shipping and handling. On orders of 10 or more back issues, there is a flat \$7.50 shipping and handling fee. Quantities are limited. Send your orders to 80 Micro, Attn: Back-Issue Orders, 80 Pine St., Peterborough, NH 03458.

# 15 WAYS TO GET THE MOST FROM YOUR MODEL III



Here are 15 applications and utilities, selected from dozens published in *80 Micro*. They're designed for a wide range of business, home and personal use. "The Best of the Model III" features our most popular programs, complete and ready-to-run. You get **ALL 15** programs for just \$21.45, complete with on-disk documentation.

Now you can enjoy *80 Micro's* best. Add to your personal Model III repertoire with this exclusive software collection, created specifically for your machine, **INCLUDING:**

**SINGLE STEP** • Machine language debugging aid which lets you single-step through Basic programs, display and change variables, and change the screen at any point during execution.

**SPELLING CHECKER** • Check the spelling on any ASCII file. You build your own dictionary as you check files.

**THE HINRICH'S WORD PROCESSOR** • Word processor lets you include graphics in the text, inserts data from a separate file; shifts words between lines of a selected block of text for the best fit; deletes a block of lines; edits; formats; inserts; justifies; moves blocks; search and replaces; and has a help function.

**EXECUTION INTERPRETER** • Interprets an execution file which you have written in ASCII. It will execute a group of DOS commands with a single command line; accept up to nine parameters when executing the file; display messages during execution; temporarily suspend execution for user intervention, and pass data to a program or conditionally execute commands in a file.

**SOFTWARE PRINTER SPOOLER** • Temporarily stores all text in a disk file, and sends it to the printer as the printer buffer empties. Meanwhile you can be running other programs.

**TERMINAL** • Machine-language terminal program which will send and receive regular and compressed ASCII text and /CMD machine-language files. It loads disk files from, and saves and verifies downloads through, a 34K buffer. Includes an auto-dial interface.

**PC BOARDS** • Design a printed circuit board on your screen, then make a full-scale template from the printout.

**DISK TIMER** • Measures your disk drive speed and displays it on an easy-to-read chart.

**PROJECT MINDER** • Keeps track of the amount of time each employee spends on a particular assignment and totals the time all employees spend on any one project. It computes the approximate personnel cost of a project and can track several projects simultaneously.

**EASYDATA** • 200-record, memory-resident database manager. You can create, extend, edit, search, print, display, format and sort files or selected records. New improved version.

**NOVACALC** • Full-featured, menu-driven Basic spreadsheet which includes a rapid-entry mode to let you enter information without waiting for recalculation. It totals and averages a series of cells and has a built-in four-function calculator that lets you make calculations before entering the results in the spreadsheet. Accepts label, numeric, and formula entries up to 12 characters.

**GRAPHICS** • A full-screen graphics editor which lets you draw lines and circles; mix different backgrounds into a single design; create mirror-image, upside-down, or rotated displays; and switch the video from standard format to reverse and back. You can store part of a screen and redisplay it anywhere you want and store screens on disk for inclusion in Basic or Machine-language programs.

**PATCHMAKER** • Build a library of patches and select the patches you wish to install. Over two dozen patches included.

**BLANKER** • Blanks out the screen so you can input confidential material such as passwords without worrying about onlookers.

**COMMANDO** • Builds macros that let you set program parameters with a single command and customize DOS commands.

Any one of these top rated programs would be well worth the low cost of this collection. But you get them **ALL** for only \$21.45! Act now to get more out of every minute you spend at your computer. Unlock the full power of your Model III for business, home management, or just plain enjoyment.

**YES!** I want to get "The Best of the Model III" working for me! Please send me "The Best of the Model III" on disk for just \$21.45\*

Payment enclosed     VISA     AMEX     MC

Card # \_\_\_\_\_ Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

\* Price includes postage and handling. Foreign airmail, please add US \$1.90 each.

\*\* Model III is a registered trademark of Radio Shack, a division of Tandy Corporation. "The Best of the Model III" is available on disk only.

**11-86M3**

▶ **Return the coupon, or ☎ CALL TOLL FREE 1-800-258-5473** (In NH, dial 1-924-9471)

Mail to: Load 80 • Elm Street • Peterborough, NH 03458

*And now,  
a couple of words about high-quality  
TRS-80 software at a very low price:*

The image shows the cover of the August 1985 issue of '80 micro' magazine and a floppy disk. The magazine cover features a photograph of a man and a woman on a beach. The woman in the foreground is wearing a red cap and sunglasses, looking at a manual titled 'The New DISK SYSTEM OWNERS MANUAL TRS-80 Model 4'. The magazine title '80 micro' is in large yellow letters, with 'the magazine for TRS-80\* users' below it. A red banner in the top right corner lists items reviewed in the issue: Superlog 4, GW-Basic Compiler, 3 Portable Printers, and Monte's Window. The main headline is 'MASTERING MODEL 4 BASIC' with the sub-headline 'What Better Way To Spend Your Summer?'. Other articles include 'PATCH WORK REVISITED' (13 More Ways To Upgrade TRSDOS 1.3) and 'MODEL 4 MAGIC' (Run 2 Programs Simultaneously With LDOS 5.1). A yellow box at the bottom left says 'SOFTWARE RIOT! Our Techies Pick Their Dream Libraries'. A barcode is at the bottom left. The floppy disk is black with a white label that says 'LOAD 80', 'CW Communications/Peterborough', and '© 1985 Peterborough, NH 03458'. A yellow sticker on the disk says 'FEATURE: S-DOS Coll'. The disk is labeled 'SIDE B' and '500 Baud'.

**80 micro**  
the magazine for TRS-80\* users

AUGUST 1985  
USA \$4.00  
CANADA \$4.50  
A CWCT PUBLICATION

**Reviewed in This Issue:**  
Superlog 4  
GW-Basic Compiler  
3 Portable Printers  
Monte's Window

**MASTERING  
MODEL 4 BASIC**  
What Better Way  
To Spend  
Your Summer?

**PATCH WORK  
REVISITED**  
13 More Ways  
To Upgrade  
TRSDOS 1.3

**MODEL 4 MAGIC**  
Run 2 Programs  
Simultaneously  
With LDOS 5.1

**SOFTWARE  
RIOT!**  
Our Techies  
Pick Their  
Dream  
Libraries

LOAD 80  
CW Communications/Peterborough  
© 1985 Peterborough, NH 03458

FEATURE:  
S-DOS Coll

SIDE B  
500 Baud  
CW Communications/Peterborough  
© 1985 Peterborough, NH 03458

# LOAD 80

*Utilities, tutorials, home and hobby applications from 80 Micro.*

If you've been shopping for software lately, you've discovered that new car buyers aren't the only ones who experience "sticker shock".

For the price of one commercial program, you can fill your gas tank at least three times. Or treat a friend to dinner. Or buy a year's worth of Sunday papers.

But with *Load 80* software, you can spend a lot less and *still* wind up with hundreds of dollars worth of outstanding TRS-80 programs every month.

On every *Load 80* cassette or disk (your choice!), you'll get more than a dozen "ready to run" programs listed in *80 Micro*... tutorials, utilities, games, word-processing, and much more.

Build a versatile software library, quickly and economically. Past issues have included programs such as:

## ***NovaCalc***

... a full-featured Model I/III spreadsheet with all the capabilities offered on more expensive commercial products.

## ***Easydata***

... a 200-record data base manager for fast information from your Model I/III/4.

## ***Grade-A Graphics***

... a deluxe Model III graphics editor that's loaded with options!

And to enjoy your favorite program, all you have to do is "load 80" into your computer. It's that simple. No keyboarding, no debugging. You get complete loading instructions, but should you need assistance, the *Load 80* and *80 Micro* technical editors will be glad to answer your questions.

Don't let software sticker prices stop you from building a top-notch

library. Get a variety of winning programs, for a fraction of the cost, with *Load 80* cassettes or disks.

To order by the month or by the year, simply complete the coupon and drop it in the mail with payment.

**For Faster Service, call**  
**☎ 1-800-258-5473**  
(In NH, please dial 1-924-9471.)

**Yes.** *I want to build an exciting and economical software library with Load 80.* Please send me:

- |   |  |
|---|--|
| <input type="checkbox"/> 1 year of Load 80 on disk for \$199.97   | <input type="checkbox"/> This month's Load 80 disk for \$21.47     |
| <input type="checkbox"/> 1 year of Load 80 on cassette for \$99.97  | <input type="checkbox"/> This month's Load 80 cassette for \$11.47 |
| <input type="checkbox"/> Check/MO <input type="checkbox"/> MC <input type="checkbox"/> VISA <input type="checkbox"/> AE |  |

Card # \_\_\_\_\_

Exp. Date \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

Zip \_\_\_\_\_

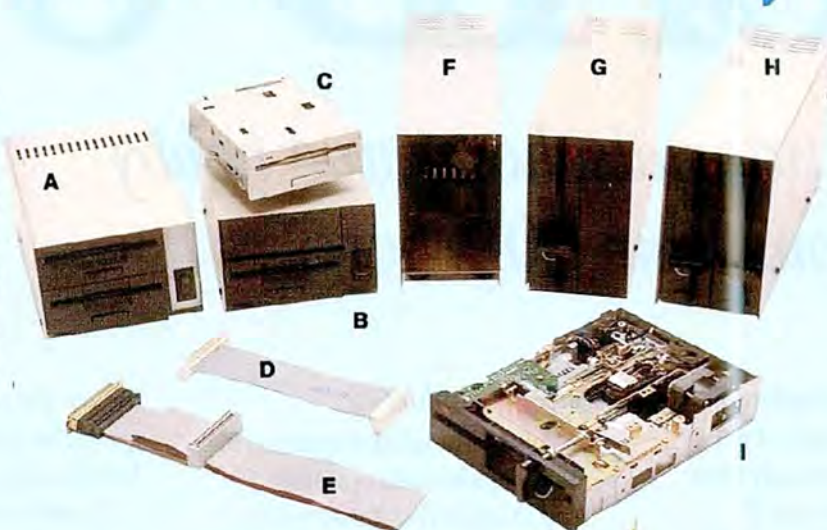
Prices include postage and handling. Foreign airmail, please add \$1.90 per item or \$25.00 per subscription. US funds drawn on US banks only.

**Load 80 • Elm Street • Peterborough, NH 03458**

8611

# NEW FLOPPY DISK DRIVES For Mod 1-3-4-1000, IBM

- A. 2-40k DS 3.5" TEAC ..... \$259
- 8-80k DS 3.5" TEAC ..... 289
- B. 1-40k DS 3.5" TEAC ..... 159
- 1-80k DS 3.5" TEAC ..... 179
- Add \$13 for Stainless Steel
- C. Bare 40k DS 3.5" TEAC ..... 109
- Bare 80k DS 3.5" TEAC ..... 129
- D. Extender cable wigold ..... 10
- E. IBM 1-3-4 external cables
- 2 drive cable ..... 24
- 4-drive cable ..... 34
- Disk Operating Systems
- M1 TRSDOS 2.3 complete ..... 25
- M3 TRSDOS 1.3 complete ..... 25
- M4 TRSDOS 6.2 complete ..... 35
- LDOS (specify M1 or M3) ..... 45
- Montezuma CP/M for M4 ..... 159



- F. 5.25" Power supply ..... \$ 59
- G. 1-40k SS 5.25" TEAC ..... 129
- 1-40k DS 5.25" TEAC ..... 139
- 1-80k DS 5.25" TEAC ..... 169
- H. 2-40k SS 5.25" TEAC ..... 219
- 2-40k DS 5.25" TEAC ..... 259
- 2-80k DS 5.25" TEAC ..... 299
- Add \$17 for Stainless Steel
- I. Bare 40k SS 5.25" TEAC ..... 99
- Bare 40k DS 5.25" TEAC ..... 109
- Bare 80k DS 5.25" TEAC ..... 139
- Bare 40k SS TM100-1 ..... 109
- Bare SS 8" TM848-1E ..... 260
- Bare DS 8" TM848-2E ..... 335
- TEAC FD55A/B/F Ser. Man ..... 20
- TM100-1/2 Service Manual ..... 20
- TM848-1/2 Service Manual ..... 20

Aerocomp continues to lead the way to the BEST value in disk drives and related peripheral products for your computer. Sound engineering, high performance, quality construction, no-risk free trial, outstanding warranty service and a reputation for doing the right thing make your decision to buy AEROCOMP the correct one. Please look over our selection and call our toll-free order number with your selection now. If you are not sure of

what you need just call our technical assistance number and we'll help you out. All drives are new—not factory blemes, seconds, closeouts or defunct manufacturers surplus (MPI, Qume, Shugart, etc). Instruction manuals are included at no extra cost and service manuals are available. We appreciate your business and will do our very best to support you.

Add \$4 shipping for non-drive items; \$6 for single drives; \$10 for dual drives.

## INCREASED DISK STORAGE FOR YOUR MODEL I Add 80% more capacity to your disk drives with our Double Density Controller (DDC).

Add double density to your TRS-80 Model I by installing our DDC in your expansion interface. Lets talk about density. The Model I was designed to store data on diskettes in single density. Single density refers to the method used to write data to the disk. Your diskette is organized into tracks and sectors. Early Model I's had 35 track drives while later models, and most aftermarket drives, had 40 tracks. In single density the tracks on the diskette surface are divided into 10 sectors. Each sector contains 256 bytes of data for a total of 2,560 bytes or 2.5k per track times the number of tracks your drive is capable of addressing. Double density, on the other hand, allows each track to be divided into 18 sectors. As in single density each sector contains 256 bytes but now there are 18 sectors instead of 10 giving an new storage capacity of 4,608 bytes or 4.5k per track. The result is 80% more data in the same space. You may wonder why Radio Shack did not choose to use double density in the beginning. The reason is simple. It costs more money. Double density disk storage techniques were more expensive to implement back then.



Reliable double density operation required a better disk drive than Radio Shack was furnishing in addition to better quality components and diskettes. Therefore, no double density for the Model I. We went to work and came up with a design that allowed

reliable double density operation on the Model I. In fact, our DDC had a higher probability of data recovery than any other disk controller on the market then or since. Our analog design phase lock loop data separator has a wider capture window than the digital types others use. This allows high resolution data centering. Our "DDC" analog circuit allows infinitely variable tuning with optimum attack and settling times. The oft-stated fears of adjustment problems rumored by digital dilettantes have been proved groundless by thousands of satisfied users the world over. The bottom line is state-of-the-art reliability and performance. TRS-80 Model I disk system owners who are ready for reliable double density operation will get 80% more storage per diskette; single and double density operation with far fewer disk I/O errors; single density compatability; simple plug-in operation. You will need a disk operating system that has the necessary double density software driver. All the popular DOS's (except TRSDOS) have the software driver. We have a special combination offer that saves you \$10 and includes the LDOS operating system in the event you do not already have a DOS.

- DDC by itself ..... \$ 99
- DDC including the latest version LDOS ..... 139

Please add \$5 shipping



# LOW COST HARD DISK DRIVES FOR YOUR TRS-80



**\$ 495 & up  
COMPLETE  
5 Megabyte  
Primary**  
Add a Secondary  
for only

Add \$20 shipping **\$395** Add \$30 for Stainless Steel



**STAINLESS  
STEEL!**

Our hard disk systems provide you with the latest integrated designs, proper controllers and pre-tested drives to ensure no unwelcome surprises. Our systems are engineered to provide years of trouble free service. These systems come complete ready to go to work. There is nothing else to purchase. Your choice of either CP/M, LDOS or TRSDOS software drivers at no charge. Additional drivers may be purchased for \$30.

Each unit is guaranteed for one full year, parts and labor, at no additional cost. We provide the little things that are so important to a long troublefree life. Things like state-

of-the-art continuous duty switching power supplies; buffered seek drives; plated media; filtered forced-air ventilation for cool operation and extended life; power line EMI filter; solid steel construction; gold plated connectors; front panel LED indicators for Power—Ready—Select—Read—Write; built-in diagnostics; automatic error correction; provision to add a secondary drive; plus attention to details and a dedication to provide quality service that is unequalled. We are so sure you will be satisfied that we offer a 14 day

free trial. If you are unhappy with your hard drive, for any reason, just let us know within 14 days of your receipt and we will promptly refund your purchase price (less shipping). You can't go wrong. Start enjoying the real power and speed of your computer with one of our hard disk drives. Do it today! Use our toll-free ordering lines now.

## ADDITIONAL SIZES AVAILABLE

	PRIMARY	SECONDARY
10 Megabyte	\$699	\$599
20 Megabyte	849	749
30 Megabyte	999	899

## SAVE YOUR MONEY WITH OUR NEW INTERNAL HARD DISK DRIVES

When you shop and compare hard disk drives for your Tandy 1000 or IBM you will find the best values here. Our hard drive specialists put together a hard disk system that you can count on to give you years of dependable service.

These systems allow you to boot directly from the hard drive. The controller automatically goes into a self test diagnostics mode at power up that verifies optimum system performance. The latest in error checking and correction is built-in allowing extremely reliable handling of your data. Our installation kit comes complete with everything you need to install it into your computer. Complete illustrated instructions as well as all cables and software needed are included. All connectors and card edges are gold plated and keyed so correct assembly is assured with no possibility of damage to your computer, the controller or hard disk drive. These kits are warranted for one year including parts and labor. Our half-high drives have low power requirements making it unnecessary to modify or change your factory power supply. Model 1000 computers require a memory board (Tandy or other) with DMA. Use your standard PC or MS-DOS version 2.1 or later.

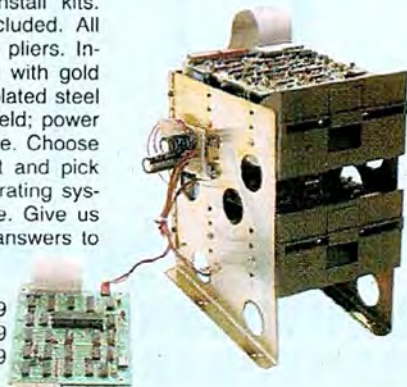
We promise your satisfaction with a 14 day money back guarantee. If, for any reason, you are unhappy with your hard drive just let us know within 14 days of receipt and we will arrange the return and a full refund of your purchase price (less shipping). Why wait? Call us now toll-free.

## ADD DISK DRIVES TO YOUR MODEL 3/4

Convert your cassette Model 3 or 4 to disk operation with one of our easy to install kits. Detailed illustrated instructions are included. All you need is a screwdriver and pair of pliers. Included is our own advanced controller with gold contacts capable of 4-drive operation; plated steel mounting towers complete with RFI shield; power supply plus all the cables and hardware. Choose a 1 or 2 drive system or the basic kit and pick the drives you want and your disk operating system from the list on the opposite page. Give us a call. We are ready to help with the answers to your questions.

Complete system, less drives . . .	\$ 159
1-Drive system . . . . .	259
2-Drive system . . . . .	349
Substitute DS drives for only \$10 each.	
Add \$10 shipping.	
Disk Controller Only . . . . .	110
RS-232 Board complete . . . . .	69

Add \$4 shipping.



**CALL TOLL-FREE**  
**800-527-3582 USA**  
**800-442-1310 Texas**  
214-339-8324 Information



Have your American Express, MasterCard or Visa ready. We will not charge your card until the day we ship your order. Mail orders are welcome. Money orders are accepted as well as your company and personal checks as long as they are bank printed and have your address and telephone number. We will ship surface COD with no deposit on most items but all COD's require cash or a Cashier's Check on delivery. Texas residents add State Sales Tax. No tax collected on out of state shipments. There is a one year warranty on all hardware items against defects in materials or workmanship. Your satisfaction is guaranteed on all hardware products. If you are not satisfied, for any reason, call us within 14 days of receipt and we will arrange the return of the hardware product and the cheerful refund of your money (less shipping). All original materials must be intact and undamaged as well as the original shipping container. This offer does not apply to software. Defective software will be replaced. No other software warranty applies. Prices and specifications are subject to change without notice.

**AEROCOMP**

Redbird Airport Hangar #8 \* P.O. Box 764246 \* Dallas, Texas 75376  
TELEX: 882761 \* FAX: 214-337-4581 \* SERVICE: 214-337-4346

© 1986 by Aerocomp. All rights reserved.

## Listing 2 continued

```

980 ' THIS ROUTINE ALSO SETS A PENFLAG TO 1 SO THE LOOP CAN EXIT ** 161
990 ' AT THE PROPER TIME ** 162
1000 ' ** 264
1010 PENFLAG = 1 ** 909
1020 PENANS = PEN(8) ** 1169
1030 RETURN ** 708
1040 ' ** 268
1050 ' THIS IS THE DATA ** 198
1060 ' FORMAT OF DATA IS: ** 199
1070 ' QUESTION IN QUOTES ** 200
1080 ' NUMBER OF ANSWERS (NO QUOTES) ** 201
1090 ' ANSWERS IN QUOTES ** 202
1100 ' NUMBER INDICATING CORRECT ANSWER (NO QUOTES) ** 194
1110 ' NOTE: THE LAST RECORD OF DATA MUST BE " " ** 195
1120 DATA "WHAT IS THE CAPITAL OF PENNSYLVANIA?" ** 3101
1130 DATA 4 ** 595
1140 DATA "HARRISBURG" ** 1373
1150 DATA "PHILADELPHIA" ** 1482
1160 DATA "PITTSBURGH" ** 1394
1170 DATA "ALBANY" ** 1054
1180 DATA 1 ** 597
1190 DATA "HOW MANY LEGS DOES A SPIDER HAVE?" ** 2829
1200 DATA 6 ** 595
1210 DATA "1" ** 659
1220 DATA "2" ** 661
1230 DATA "4" ** 664
1240 DATA "6" ** 667
1250 DATA "8" ** 670
1260 DATA "10" ** 712
1270 DATA 5 ** 601
1280 DATA "WHO IS THE LARGEST MAKER OF TRUCKS IN THE WORLD?" ** 3878
1290 DATA 4 ** 602
1300 DATA "DODGE" ** 965
1310 DATA "TONKA" ** 992
1320 DATA "TOYOTA" ** 1092
1330 DATA "MACK" ** 897
1340 DATA 2 ** 596
1350 DATA "WHICH IS THE BINARY REPRESENTATION OF THE NUMBER 14?" ** 4146
1360 DATA 4 ** 600
1370 DATA "1110" ** 812
1380 DATA "1011" ** 813
1390 DATA "1110" ** 814
1400 DATA "0111" ** 806
1410 DATA 3 ** 595
1420 DATA "WHAT IS THE NAME OF CP/M'S DEBUGGER?" ** 2137
1430 DATA 4 ** 598
1440 DATA "DEBUG" ** 974
1450 DATA "DDT" ** 836
1460 DATA "ASMD" ** 910
1470 DATA "ZBUG" ** 930
1480 DATA 2 ** 601
1490 DATA "WHAT WAS THE FIRST CMOS MICRO?" ** 2687
1500 DATA 5 ** 597
1510 DATA "6502" ** 818
1520 DATA "65C02" ** 886
1530 DATA "6800" ** 821
1540 DATA "1802" ** 819
1550 DATA "6809" ** 832
1560 DATA 4 ** 602
1570 DATA "WHICH DOESN'T BELONG?" ** 1365
1580 DATA 4 ** 604
1590 DATA "JOYSTICK" ** 1245
1600 DATA "LIGHT PEN" ** 1248
1610 DATA "PRINTER" ** 1162
1620 DATA "MOUSE" ** 1008
1630 DATA 3 ** 599
1640 DATA " " ** 649

```

End

## Program Listing 3. Calc.

```

10 ' PROGRAM CALC ** 97
20 ' THIS IS A PROGRAM TO USE A LIGHT PEN WITH A CALCULATOR ** 98
30 ' FIRST THE CALCULATOR IS DISPLAYED. ** 99
40 ' WHEN THE USER PICKS A NUMBER IT IS "ENTERED" ON THE DISPLAY. ** 100

```

Listing 3 continued

## Listing 3 continued

```

50 ' THEN THE USER PICKS A SYMBOL (SUCH AS +,-,X OR /), AND THE ** 101
60 ' MATHEMATICAL FUNCTION IS CARRIED OUT. ** 102
70 ' FIRST FILL THE DISPLAY ARRAY ** 103
80 BEEP ON ** 609
90 CLS ** 363
100 KEY OFF ** 661
110 ARRAY$(1,1) ="7" ** 1036
120 ARRAY$(1,2) ="8" ** 1039
130 ARRAY$(1,3) ="9" ** 1042
140 ARRAY$(1,4) ="MIN" ** 1183
150 ARRAY$(1,5) ="MRE" ** 1185
160 ARRAY$(2,1) ="4" ** 1071
170 ARRAY$(2,2) ="5" ** 1074
180 ARRAY$(2,3) ="6" ** 1077
190 ARRAY$(2,4) ="X" ** 1113
200 ARRAY$(2,5) ="/" ** 1065
210 ARRAY$(3,1) ="1" ** 1065
220 ARRAY$(3,2) ="2" ** 1068
230 ARRAY$(3,3) ="3" ** 1071
240 ARRAY$(3,4) ="+" ** 1065
250 ARRAY$(3,5) ="-" ** 1069
260 ARRAY$(4,1) ="0" ** 1070
270 ARRAY$(4,2) ="." ** 1087
280 ARRAY$(4,3) ="=" ** 1265
290 ARRAY$(4,4) ="EXP" ** 1246
300 ARRAY$(4,5) ="CLR" ** 219
310 ' ** 149
320 ' PRINT OUT THE DISPLAY ** 221
330 ' ** 973
340 FOR I = 1 TO 5 ** 1007
350 FOR J = 1 TO 5 ** 1337
360 LOCATE I*5,J*10,0,7 ** 1370
370 PRINT ARRAY$(I,J) ** 644
380 NEXT J ** 612
390 NEXT I ** 219
400 ' ** 149
410 ' INITIALIZATION ** 221
420 ' ** 678
430 RNUM = 0 ** 556
440 ACC = 0 ** 871
450 DOTFLAG = 0 ** 602
460 PEN ON ** 1203
470 ON PEN GOSUB 530 ** 687
480 GOTO 460 ** 404
490 END ** 220
500 ' ** 150
510 ' READ THE LIGHT PEN AND DETERMINE WHAT CHARACTER IT HAS ** 222
520 ' ** 746
530 I = PEN(8) ** 749
540 J = PEN(9) ** 1106
550 SOUND 880,4,15,1 ** 558
560 I = I/5 ** 605
570 J = J/10 ** 1349
580 WHAT$ = ARRAY$(I,J) ** 645
590 FLAG = 0 ** 1874
600 IF WHAT$ = "+" THEN GOSUB 910 ** 1877
610 IF WHAT$ = "-" THEN GOSUB 910 ** 1921
620 IF WHAT$ = "X" THEN GOSUB 910 ** 1881
630 IF WHAT$ = "/" THEN GOSUB 910 ** 1936
640 IF WHAT$ = "=" THEN GOSUB 1010 ** 2073
650 IF WHAT$ = "EXP" THEN GOSUB 910 ** 1928
660 IF WHAT$ = "." THEN GOSUB 1240 ** 2109
670 IF WHAT$ = "MIN" THEN GOSUB 1310 ** 2111
680 IF WHAT$ = "MRE" THEN GOSUB 1410 ** 2109
690 IF WHAT$ = "CLR" THEN GOSUB 1500 ** 866
700 MINFLAG = 0 ** 1350
710 IF FLAG = 1 GOTO 860 ** 1190
720 NUM = ASC(WHAT$) ** 1008
730 NUM = NUM - 48 ** 226
740 ' ** 228
750 ' IF THE CHARACTER IS A NUMBER ADD IT TO RNUM AND DISPLAY ** 1960
760 ' ** 1583
770 IF NUM < 0 OR NUM > 9 GOTO 860 ** 1528
780 IF DOTFLAG = 1 GOTO 810
790 RNUM = (RNUM*10) + NUM

```

Listing 3 continued

Listing 3 continued

```

800 GOTO 830
810 RNUM = RNUM + (NUM*(.1^NUMTIMES))
820 NUMTIMES = NUMTIMES + 1
830 LOCATE 3,10,0,7
840 PRINT RNUM;"
850 MINFLAG = 1
860 PEN OFF
870 RETURN
880 "
890 " THIS IS THE +,-,*,/,EXP GOSUB
900 "
910 FLAG = 1
920 SAVSGNS = WHAT$
930 ACC = RNUM
940 RNUM = 0
950 DOTFLAG = 0
960 NUMTIMES = 1
970 RETURN
980 "
990 " THIS IS THE = GOSUB
1000 "
1010 NUMTIMES = 1
1020 DOTFLAG = 0
1030 FLAG = 1
1040 IF SAVSGNS <> "+" GOTO 1070
1050 ACC = ACC + RNUM
1060 GOTO 1170
1070 IF SAVSGNS <> "-" GOTO 1100
1080 ACC = ACC - RNUM
1090 GOTO 1170
1100 IF SAVSGNS <> "*" GOTO 1130
1110 ACC = ACC * RNUM
1120 GOTO 1170
1130 IF SAVSGNS <> "/" THEN GOTO 1160
1140 ACC = ACC / RNUM
1150 GOTO 1170
1160 ACC = ACC
1170 PRINT ACC;"
1180 RNUM = ACC
1190 RETURN
1200 "
1210 "
1220 " THIS IS THE . GOSUB
1230 "
1240 FLAG = 1
1250 DOTFLAG = 1
1260 NUMTIMES = 1
1270 RETURN
1280 "
1290 " THIS IS THE MIN GOSUB (MEMORY IN)
1300 "
1310 FLAG = 1
1320 IF MINFLAG = 1 GOTO 1350
1330 MEM = ACC
1340 GOTO 1360
1350 MEM = RNUM
1360 RETURN
1370 "
1380 " THIS IS THE MRE GOSUB (MEMORY RECALL)
1390 "
1400 FLAG = 1
1410 ACC = MEM
1420 RNUM = MEM
1430 LOCATE 3,10,0,7
1440 PRINT ACC;"
1450 RETURN
1460 "
1470 " THIS IS THE CLR GOSUB (CLEAR)
1480 "
1490 FLAG = 1
1500 ACC = 0
1510 RNUM = 0
1520 LOCATE 3,10,0,7
1530 PRINT ACC;"
1540 RETURN

```

Circle 186 on Reader Service card.

**PROfix \* IV™**  
**RESTRUCTURE & TRANSFER UTILITY**

**NEW!** For PROFILE® 4 PLUS **NEW!**  
 Model 4—TRSDOS® 6.2

49.95  
 For PROFILE® III PLUS **ALSO** For PROFILE® PLUS  
 Model III/4 Model II/12  
 LDOS® or TRSDOS® 1.3 \$89.95  
**\$49.95**

PROfix allows you to reorganize your data base TO MEET TODAY'S NEEDS, and then moves ALL or SELECTED fields and/or records of existing data into your new file structure.



**\*\*\*FEATURES\*\*\***

- WORKS WITH HARD DISK OR FLOPPY
- CREATE ENTIRELY NEW FILES—selected fields, records
- PROVIDES ARCHIVING—hard disk to floppy
- RE-ARRANGE FIELDS—even across segments
- DROP OR ADD FIELDS
- SHORTEN YOUR FILE—drop unused expansion records
- CHANGE FIELD LENGTHS—R/L justify data
- CHANGE NUMBER OF SEGMENTS
- CREATE SORTED FILE—drop deleted fields
- LITERAL INSERTION—specified fields
- COMPLETE USER MANUAL—with examples

**-TO ORDER-**  
 Send \$49.95 (Model III/4) or \$89.95 (Model II/12)  
 Plus \$2.50 for Handling and Postage  
 Check, M.O., VISA/MC or COD  
 (for charge card, give expiration date, number)

-To- **BLUE RIDGE SOFTWARE**  
 230 Chesterfield Road  
 Lynchburg, VA 24502  
 For phone orders or more information  
**Call (804) 239-0574**  
 \$1.00 off on phone orders!  
 Virginia residents add 4% sales tax  
 Most orders filled within 24 hours  
 (allow 2 weeks for checks to clear)  
 PLEASE SPECIFY VERSION

Profile, TRSDOS are registered trademarks of Tandy Corp.  
 LDOS is a registered trademark of Logical Systems, Inc.

Circle 145 on Reader Service card.

## Automatic Desktop Publishing

with the

# PowerText Formatter

With an HP LaserJet or other laser printer and word processing software, all you need for Desktop Publishing is the new **PowerText Formatter**.

For books, manuals, manuscripts, television scripts, screenplays, letters, memos, proposals, newsletters, contracts or ads like *this*, add the **PowerText Formatter** to your word processor for in-house printing. Write without concern for layout. Publish without type-setting. Everything is totally *automatic*.

**Automatic Selection** of up to 16 typestyles, Proportional justification, Text layout, Page

layout, Hyphenation, Multi-column layout, Table of contents, Sorted bibliography, Two level index, Footnotes on same page, Newsletter formats, Boxed text, Outline numbering, and much more.

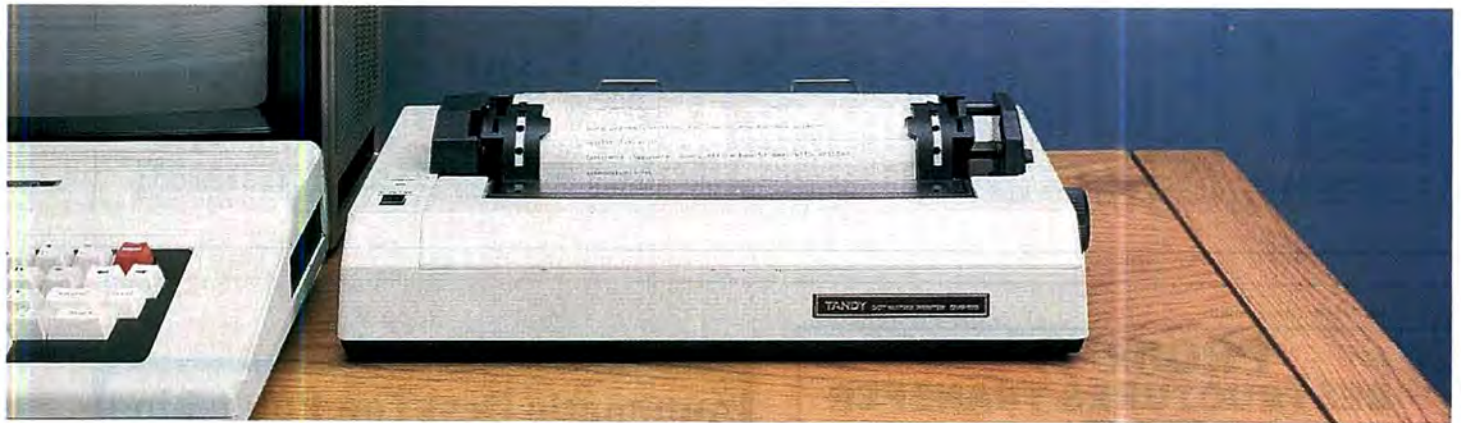
**Works with** all of the popular word processors and any ASCII Editor.

**For PC/MS-DOS computers.**

**Beaman Porter, Inc.**  
 417 Halstead Avenue  
 Harrison, NY 10528  
 (914) 835-3156  
 (800) 431-0007

Introductory price: **\$89.95**  
 plus \$5 shipping and handling

# Next to your Tandy® or



## nothing beats a

### High-quality printers— at hard-to-beat prices!

Now that you have the home or office computer you wanted, get the printer you need. A Tandy printer!

Tandy printers are designed to give you exceptional print quality, graphics and high performance—all at affordable prices. Your nearby Radio Shack Computer Center has a complete line of printers, from high-speed dot matrix to letter-quality daisy wheels. There's sure to be one that will suit your particular printing requirements—and budget—to a tee.

### Budget-priced high performer

The DMP 105 (26-1276, \$199.95) is the low-cost solution for data-processing and general-purpose use. The DMP 105 features a bidirectional head that prints 80 characters per line at 43 lines per minute (10 cpi). Elongated and condensed modes are also available. Prints up to 80 characters per second. Parallel and Color Computer-compatible serial interfaces.

### Triple-mode “personal printer”

The low-cost, versatile DMP 130 (26-1280, \$349.95)

features word-processing and data-processing, as well as dot-addressable graphics modes. You can choose from four character styles: standard or italic cursive, in draft or correspondence modes. The DMP 130 supports super/subscripts, double-width, bold, double-strike and micro-fonts. The bidirectional, logic-seeking print head prints original, plus two copies on 4" to 10" fanfold paper or single sheets. Prints up to 100 characters per second. Built-in tractor. Parallel and Color Computer-compatible serial interfaces. IBM® PC compatible.

# PC-compatible computer,



## Tandy printer.

### Low-cost business printer

The DMP 430 (26-1277, \$699.00) is a dot-matrix printer with an 18-wire print head that delivers superior correspondence fonts in a single pass. Prints 10, 12, or 16.7 cpi, plus elongated, standard, elite and condensed. You can also get micro, italic and double-high fonts. Prints original, plus two copies at 180 characters per second. IBM PC compatible.

### Power for business

Get high speed and high performance with our finest printer, the DMP 2200 (26-1279, \$1695.00). Efficient,

fast printing means no long and costly delays for reports. Supports elongated, double-high, bold, underline, super/subscripts, italics and double-strike modes, plus bit-image graphics. Prints up to 380 characters per second. Features a true pin-driven tractor—not sprocket. Prints original, plus up to six copies. Parallel interface only. IBM PC compatible.

### In Business . . . for Business

For the best value and selection in printers, shop Radio Shack. We've got the right match for your machine!

**Radio Shack®**  
**The Technology Store™**

A DIVISION OF TANDY CORPORATION

Circle 75 on Reader Service card.

Send me an RSC-17 Computer Catalog.

Mail To: Radio Shack, Dept. 87-A-1015  
300 One Tandy Center, Fort Worth, TX 76102

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

State \_\_\_\_\_

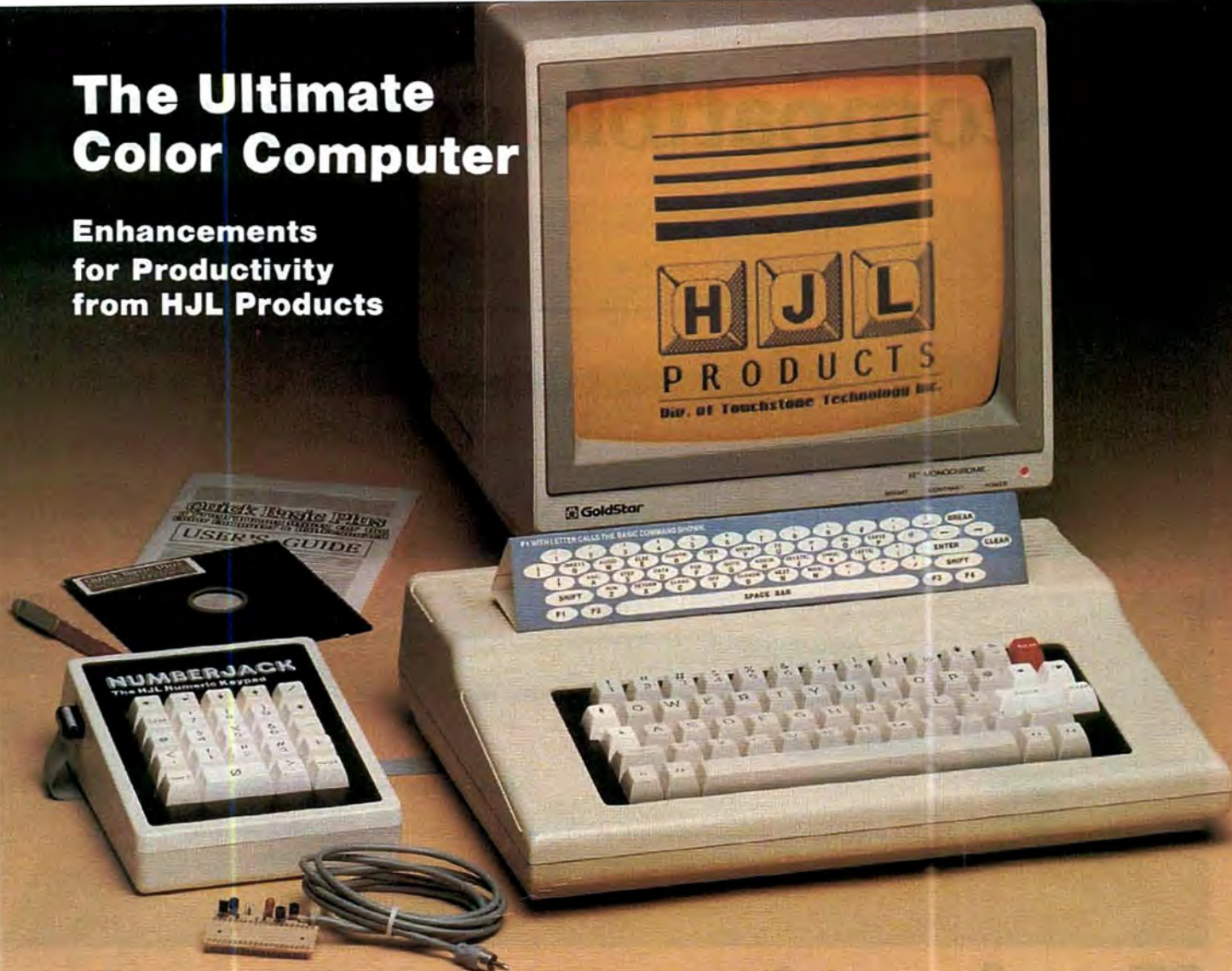
ZIP \_\_\_\_\_

Phone \_\_\_\_\_

Prices apply at Radio Shack Computer Centers and at participating stores and dealers. The DMP 430 may require special order. IBM/Registered TM International Business Machines Corp.

# The Ultimate Color Computer

Enhancements  
for Productivity  
from HJL Products



To achieve maximum productivity with your Color Computer, you have to make it as easy as possible to get information into and out of the system.

This is why we developed the HJL family of high-performance enhancements for ALL MODELS of the Color Computer.

## The Keyboard - \$79.95

The overwhelming favorite of serious Color Computer users worldwide, the HJL-57 keyboard has the smooth, consistent feel and reliability you need for maximum speed with minimum input errors. Includes 4 Function Keys and sample function key program. Installs in just a few minutes with no soldering.

## The Numeric Keypad - \$89.95

The NumberJack is a self-contained, cable-connected keypad for heavy-duty number-crunchers. Besides the number keys, it has all the cursors, symbols and math keys, including autoshifted (one-touch) ADD and MULTIPLY. Comes complete with 3-foot cable and all necessary connectors for quick and easy installation without soldering.

## The Monitor Adapter - \$25.95

This universal driver works with all monochrome monitors, and is easily installed without clips, jumpers or soldering (except in some later CoCo 2s with soldered-in video chips). Here's crisp, clear, flicker-free monitor output with all the reliability you've come to expect from HJL Products.

## The Monitor - \$89.95

The GoldStar high-resolution amber monitor brings you the monochrome display that's preferred by most computer professionals today. Once you've used it you'll never connect your computer to a TV set again. The 12-inch diagonal CRT has an etched non-glare faceplate. (Requires adapter sold below)

## The BASIC Utility - \$25.95

Quick Basic Plus, a high-performance programming utility, can be used with any color computer that has four function keys. 26 pre-defined BASIC statements, 10 user-defined macros at a time (you can save as many sets of macros as you like), automatic line-numbering, word wrap, global search,

and instant screen dump to printer, make this software the BASIC programmer's dream come true. Comes with re-legendable 3-way reference chart. Specify disk or cassette.

## The HJL Warranty

Every HJL product comes with a full, one-year warranty and the exclusive HJL 15-day unconditional guarantee (except software).

## Pick a Pair & Save 15%

Now, for a limited time, we'll give you 15% off the price of any two or more products shown here. Just mention this ad when you order.

**Call Now, Toll Free**

**1-800-828-6968**

In New York 1-800-462-4891  
International calls: 716-235-8358



PRODUCTS

Div. of Touchstone Technology Inc.

955 Buffalo Road • P.O. Box 24954  
Rochester, New York 14624

Circle 491 on Reader Service card.

**Ordering Information:** Specify model (Original, F-version, or CoCo 2 Model Number). Payment by C.O.D., check, MasterCard, or Visa. Credit card customers include complete card number and expiration date. Add \$2.00 for shipping, 3.50 to Canada; except monitors (call for shipping charges before ordering monitors). New York state residents add 7% sales tax. **Dealer Inquiries Invited**

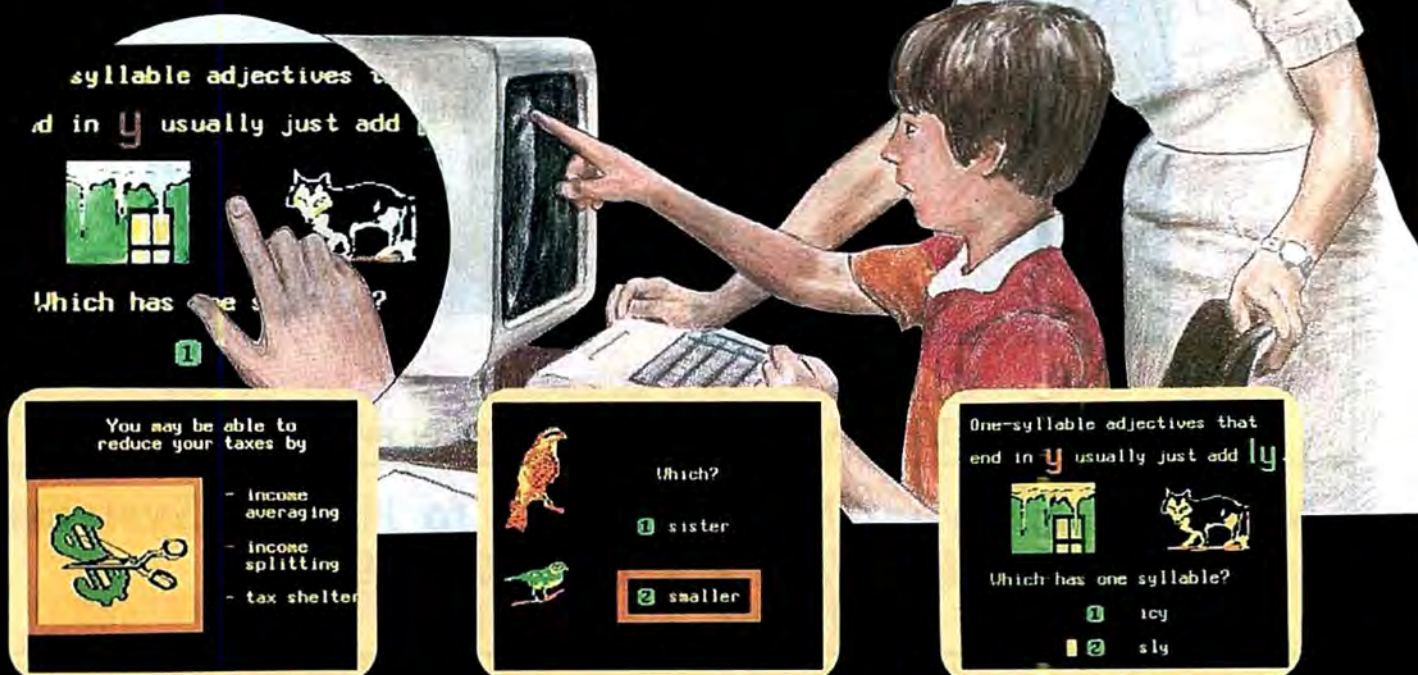
Now! 500 new programs for the Tandy 1000!

# For Your TRS-80 Color Computer

Apple - Atari - Commodore - TRS 80 I, III, 4 & Color - IBM PC Jr. - Tandy 1000

## New Educational Programs for Grades K-12 and Adult Self-Studies

### 32 Programs Now Available on Disk for TRS Color Computers



## Interactive Tutorial Programs for Home or Classroom Use

Over 1000 programs for your selection with 32 now available on disk for the Color Computer and 500 now available for the Tandy 1000.

### "We're Your Educational Software Source"

Subject	No. of Programs
Reading Development	256 (4 on disk)
Reading Comprehension	48 (4 on disk)
Mathematics	128
Algebra	16 (16 on disk)
History	32 (4 on disk)
Spelling	16
Government	16
Physics	16 (4 on disk)

### 16 Programs in each of the following:

Children's Tales - Carpentry - Electronics  
Health Services - Office Skills - Statistics  
First Aid/Safety - Economics - Business  
Accounting - Psychology - MUCH MORE!

Send for our free catalog of over 1000 Dorsett educational programs for Atari, TRS 80, Apple, IBM PC Jr., Commodore, Tandy 1000, etc.

Apple II, TRS 80 I, III, & 4, and Commodore 64 computers require respective conversion kits (plug-in board and stereo cassette player), \$99.00. Atari 400/600/800/1200 computers require the Atari cassette recorder and the Dorsett 4001 Educational Master Cartridge, \$9.95. For the IBM PC Jr. a cassette adapter cable and a good cassette recorder are required. The Tandy 1000 requires the Dorsett M1001 speaker/PC board kit, \$69.00, and a standard cassette recorder. A Radio Shack CCR-81 or CCR-82 is recommended.

**CASSETTES:** \$59.90 for an album containing a 16-program course (8 cassettes with 2 programs each); \$8.80 for a 2-program cassette.

**DISKS:** \$14.95 for a one-program disk; \$28.95 for two disks; \$48.95 for four disks. All disks come in a vinyl album.

Dealer Inquiries Welcome

### Dorsett Educational Software features:

- Interactive Learning
- User Friendly
- Multiple Choice and Typed
- Program Advance with Correct Response
- Full-time audio narration (Cassette Programs Only)
- Self-Paced Study
- High Resolution Graphics
- Easy Reading Text

For more information, or to order call:

**TOLL FREE 1-800-654-3871**  
**IN OKLAHOMA CALL (405) 288-2301**



# DORSETT

**Educational Systems, Inc.**  
Box 1226, Norman, OK 73070

Prices Change

**DEALER**

Every Day.

**INQUIRIES**

Please Call

**INVITED**

1-800-343-8841

For Lower Prices

# PRICE

## Sizzling Summer Specials Announcing MEGADISK PLUS +

Complete Systems! for the TRS 80 Model I/III/IV/4P, Color Computer, IBM-PC & AT, Max/80  
Software Drivers: LDOS, NEWDOS/80, DOSPLUS, TRSDOS 6.x, CP/M available



**Drive a 5 to 40 Megabyte Hard Bargain Starting at \$399.95**  
REMOVEABLE CARTRIDGE Systems Now Available!!!

**MEGAPLEX your Megadisk — 2 to 10 Port Systems**  
Prices Start at a LOW \$199.95  
Models III/ IV 4P

Call Toll Free Ordering **1-800-343-8841**



**\$259.95**

Disk Drive Upgrade Kit for Model III/IV easy to install system—no soldering. Complete with controller, towers, power supply, 1 Half High Disk Drive, cables, and easy to follow instructions. Second Drive **\$89.95**



High Quality Low-price Drive 0, 1, 2, 3 for the Color Computer Starting at **\$189.95.**

**CANADIAN CUSTOMERS PLEASE CALL 514-383-5293**

**Software Support Inc.**

**TERMS and CONDITIONS:**

All prices are cash discounted. However, we do accept MC, VISA, AMEX & DISCOVER credit cards. C.O.D.'s are accepted—No deposit required. Purchase Orders—Corporate, Government & School P.O.'s are accepted. Please call for details. Shipping Costs are calculated per order. Please call for total. Shipments of all in-stock products are made within 24 hours. Same day service is available upon request — no added cost. Not responsible for typographical errors. Terms and Specifications may change without notice.

**MicroSmart Inc.**

**OUR NEW ADDRESS**

**200 Homer Avenue  
Ashland, MA 01721  
1-617-872-9090**

Hours: Mon.-Fri. 10 am to 5:30 pm (est) Sat 4:00 pm

**Toll Free Ordering 1-800-343-8841  
Dealer Inquiries Invited**

**Our New Company**

Service & Returns: It is our policy to repair all service returns within 24-48 hours. Normally same day turn-around is accomplished. It is necessary to have a (R)eturn (M)aterial (A)uthorization to insure speedy service.  
IBM, TAVA, COLUMBIA, 5151, COMPAQ, EAGLE, TRS/80, HEATH/ZENITH are registered trademarks of IBM Corp., Tava Corp., Columbia Computer Corp., Key Tronics Corp., Compaq Corp., Eagle Computer, Tandy Corp., Zenith Corp., respectively.  
© 1986 Software Support, Inc. All rights reserved.  
© 1986 MicroSmart, Inc. All rights reserved.



# BREAKTHROUGH

**DEALER  
INQUIRIES  
INVITED**

Prices Change  
Every Day.  
Please Call  
1-800-343-8841  
For Lower Prices

## MEGADISK™ HARD DISK DRIVE SYSTEMS

**TOLL FREE ORDERING 1-800-343-8841**

For the **IBM/PC, Tandy 1000, TRS/80 Models I/III/IV/4P, Compaq, Tava, PC Workalikes, Color Computers, Heath/Zenith, Max/80**  
Complete with Hardware, Cables, Software and Quickfit Installation

5 Megabytes Internal Mount IBM/PC .....	Starting at \$229.95
11 Megabytes Internal Mount IBM/Tandy 1000 .....	starting at 349.95
22 Megabytes Internal Mount IBM/Tandy 1000 .....	starting at 449.95
5 Megabytes External System .....	starting at 399.95
10 Megabytes External System .....	starting at 549.95
20 Megabytes External System .....	starting at 699.95
Tape Backup System — Internal or External (IBM/PC) .....	starting at 449.95

**WOW! NEW LOW PRICES  
IMMEDIATE DELIVERY\***

**DOS Drivers:** IBM/Heath — DOS, 1.0, 2.0, 2.1, 3.0, 3.1 or later  
TRS/80-LDOS, TRSDOS 6.x, Newdos/80, Dosplus, CP/M, COCO DOS, Max/80 LDOS, OS9

**FULLY WARRANTEED — PARTS AND LABOR — CALL TOLL FREE - 1-800-343-8841**

## FLOPPY DISK DRIVES, POWER SUPPLIES AND CABINETS

Our Disk Drives are UL approved — Our Floppy Drive Cabinets and Power Supplies are Underwriters Laboratory Listed and have passed the required Federal Communications Part 15 Section B-EMI/RFI tests.  
**Warranty on all disk drives is one full year parts and labor. Warranty on floppy disk drive power supplies is five (5) years. In warranty or out of warranty service is 24 hour turn-around on all disk drives and power supplies.**

### Full Height —

100-1 Single Sided 40 tk Bare .....	\$99.95
In Case with Power Supply .....	139.95
Dual Drives in One Cabinet .....	239.95
100-2 Dual Sided 40 tk Bare .....	109.95
In Case with Power Supply .....	149.95
Dual Drives in One Cabinet .....	259.95

### Half High Drives

Single Sided 40 tk Bare .....	79.95
In Case with Power Supply .....	119.95
Dual Drives in One Cabinet .....	209.95
Dual Sided 40 tk Bare .....	109.95
In Case with Power Supply .....	149.95
Dual Drives in One Cabinet .....	259.95

### Apple/Franklin Disk Drives

35/40 Track in Case with Cable and Software .....	129.95
---	--------

## COLOR COMPUTER DISK DRIVE SYSTEMS AND ADD IN PRODUCTS

40 Track Single Head Drive with Case, Power Supply, Cable Controller, Instruction Booklet, Diskettes .....	\$189.95
Above with Dual Drives in One Cabinet .....	269.95
40 Track Dual Head with Case, Power Supply, Cable Controller, Instruction Booklet, Diskettes .....	229.95
Above with Dual Drives in One Cabinet .....	329.95

## CALL FOR MODEM SPECIALS

**Modem Special 300/1200..... \$199.95**

\* ALL IN-STOCK ITEMS SHIPPED WITHIN 24 HOURS. SAME DAY SHIPPING PROVIDED BY REQUEST WITHOUT ANY EXTRA HANDLING CHARGES.

## TURBO-M™ PC

FREE—The Wiz™

TURN TO PAGES

**130-131**

Trademark of MicroSmart, Inc.

### PRINTERS

Dot Matrix	
Citizen .....	\$ Call
Star Micronics—N.X. Series .....	starting at \$299.95
Daisy Wheel	
Silver Reed 440 80 Column 12 CPX .....	315.95
550 132 Column 19 CPS .....	439.95
770 132 Column 36 CPS .....	895.00
Olympia 132 Column 14 CPS WITH Form and Tractor Feed .....	399.95
Printer Cables .....	starting at 9.95
Printer Paper — Microperf Edge 1000 Sheets .....	16.95

### ELECTRICAL

Surge protectors-Line Filter-6 Outlets with Switch .....	\$29.95
Uninterruptable Power Supplies .....	399.95

### MISCELLANEOUS

Diskettes in 10 Pack .....	from \$7.95
Two print switches .....	from 49.95
Disk Drive Cables .....	from 16.00
Maintenance Cleaning Kits .....	12.00
Parallel Printer Buffers 8K .....	149.95
Floppy Disk Drive Cables	
1 Drive .....	16.00
2 Drives .....	18.95
Heath/Zenith 2 Drive Cables — Shielded .....	24.95

## Software Support Inc.

### TERMS and CONDITIONS:

All prices are cash discounted. However, we do accept MC, VISA, AMEX & DISCOVER credit cards. C.O.D.'s are accepted-No deposit required. Purchase Orders Corporate, Government & School P.O.'s are accepted. Please call for details.  
\* Shipping Costs are calculated per order. Please call for total.  
Shipments of all in-stock products are made within 24 hours. Same day service is available upon request — no added cost.  
Not responsible for typographical errors.  
Terms and Specifications may change without notice.

## MicroSmart Inc. Our New Company

**OUR NEW ADDRESS**

**800 Homer Avenue  
Ashland, MA 01721  
1-617-872-9090**

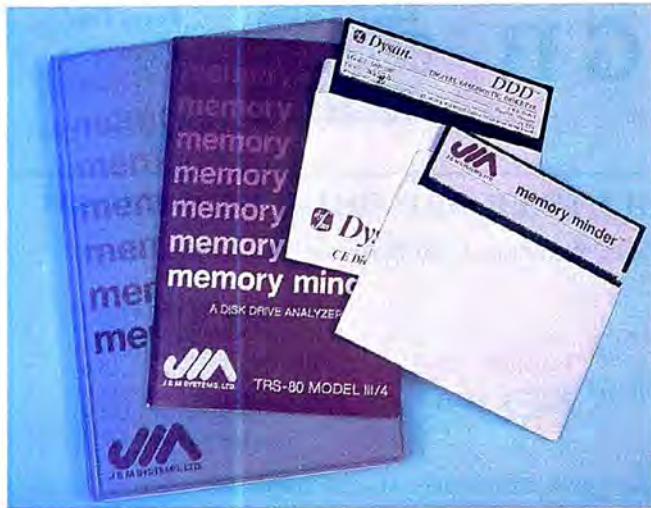
Hours: Mon.-Fri. 10 am to 5:30 pm (est) Sat 4:00 pm

**Toll Free Ordering 1-800-343-8841**

**Dealer Inquiries Invited**

### Service & Returns:

It is our policy to repair all service returns within 24-48 hours. Normally same day turn-around is accomplished. It is necessary to have a Return Material Authorization to insure speedy service.  
IBM, TAVA, COLUMBIA 5151, COMPAQ, EAGLE, TRS/80, HEATH/ZENITH are registered trademarks of IBM Corp., Tava Corp., Columbia Computer Corp., Key Tronics Corp., Compaq Corp., Eagle Computer, Tandy Corp., Zenith Corp., respectively.  
1986 Software Support, Inc. All rights reserved.  
1986 MicroSmart, Inc. All rights reserved.  
TURBO M™ of MicroSmart Inc.



## MEMORY MINDER

Memory Minder is the most comprehensive disk diagnostic program available for microcomputers. It quickly and easily checks the vital operating parameters on your floppy drives, including spindle speed, head alignment, read sensitivity and others. Early detection and correction of possible problems prevents loss of valuable data.

Begin with the Quick Test, which analyzes six of the most important parameters in less than one minute; then proceed if necessary to one of the more in-depth tests.

A technician can use Memory Minder to align the drives without the use of an oscilloscope. The users manual helps interpret the screen graphics for each test, and where adjustment is possible, provides general guidelines for adjustment of the drive. No special tools required!

### Model III/4

- (48 tpi Single Side) ..... \$ 79
- (48 or 96 tpi Double Side) ..... \$ 89
- (Combo 48 and 96 tpi Double Side) ... \$129

**Model 1000 & IBM Compatibles** ..... \$ 99

### Color Computer

- (Single Side) ..... \$ 59
- (Double Side) ..... \$ 75

(Add \$4 for shipping.)

Replacement Alignment diskettes available from \$33.



## HARD DRIVE FOR TANDY 1000

Give your Tandy 1000 the hard drive advantage—increased disk access speeds and a vast amount of storage—with our 10 MByte hard drive. The drive fits in the second floppy drive position in the Tandy 1000, and because it is low power, it does not strain the system's power supply. The complete system consists of a low power hard drive, controller, cables, and easy-to-follow installation instructions. The system will boot from the hard drive after installation.

### 10 MByte Hard Drive for

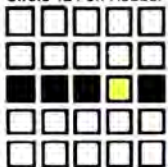
**Tandy 1000** ..... \$495

(Add \$7 for shipping.)

We accept VISA, Mastercard, and prepayment. Or we can ship COD for cash or certified check. We ship via UPS ground within the continental US. Blue Label and international orders extra.



15100-A Central SE  
Albuquerque, NM 87123  
(505) 292-4182



# PERRY COMPUTERS



CALL

1-800-248-3823

COLOR COMPUTERS		LIST PRICE	OUR PRICE
26-3127 64K Extended Color Computer 2	\$199.95	\$169.00	
26-3131 Thinline Disk Drive 0 for Color Computer	299.95	240.00	
26-3018 Extended Basic Kit	39.95	36.00	
26-3030 OS-9 With Editor Assembler	69.95	59.50	
26-3012 Deluxe Joystick	29.95	25.00	
26-1208 CCR-81 Recorder	59.95	50.00	
30001170 VIP Integrated Library	149.95	139.00	
30001110 VIP Writer	69.95	59.00	
30001210 Telewriter 64 Tape	49.95	42.00	
30001220 Telewriter 64 Disk	59.95	49.00	
30009110 Botek Interface		59.00	
<b>TANDY 3000</b>			
25-4001 Tandy 3000 One Disk 512K	\$2599.00	\$1900.00	
25-4010 Tandy 3000 One Disk & 20 Meg HD 512K	3599.00	2600.00	
25-4030 512K to 2 Meg Expansion Board	499.00	395.00	
25-4033 Math Co-Processor for 3000	399.95	339.00	
25-4050 1.2 Meg Disk Drive Kit for 3000	299.95	255.00	
25-4062 20 Meg Hard Disk Kit	799.00	679.00	
25-4101 MS-DOS 3.1/Basic/DeskMate	99.95	85.00	
<b>TANDY 100, 200, 600</b>			
26-3901 Tandy 600 Port Comp 32K 3 1/2 DD	\$1599.00	\$1195.00	
26-3904 Basic Rom for Tandy 600	129.95	110.00	
26-3910 92K RAM Upgrade for Tandy 600	399.95	340.00	
26-3860 Tandy 200 Port Comp 24K	799.00	650.00	
26-3866 24K RAM Memory Exp Chip for 200	199.95	170.00	
26-3802 Tandy 100 Port Comp 24K	499.00	425.00	
26-3816 8K RAM Upgrade for Tandy 100	49.95	42.00	
26-3808 Port 3 1/2 Disk Drive for T100 T200	199.95	169.00	
26-3815 Portable Disk Case	24.95	21.00	
26-3805 Acoustic Coupler	39.95	34.00	
26-1409 Printer Cable	14.95	12.70	
26-1410 Modem Cable	19.95	17.00	
<b>MODEL 4D</b>			
26-1070 Model 4D 64K 2 FD w/DeskMate	\$1199.00	\$895.00	
26-1122 64K Memory Expansion	69.95	65.00	
26-1123 Model 3 to Model 4 Upgrade Kit	399.00	385.00	
26-1134 Model 4 HD Kit for 15 Meg	79.95	67.95	
26-1530 Multiplan Model 4	199.00	169.00	
26-1595 Super Scripsit Model 4	199.95	169.00	
26-1608 DeskMate for Model 4	195.00	175.00	
26-1635 Profile 4 Model 4	249.95	200.00	
26-2216 CP/M Plus Model 4	149.00	127.00	
26-2231 Double Duty Utility	69.95	58.00	
<b>MODEL 6000 COMPUTERS</b>			
26-6021 Model 6000 512K 2 FD Comp	\$4499.00	\$2125.00	
26-6022 Model 6000 512K 1 FD 15 Meg HD	5499.00	2975.00	
26-6019 Model 6000 256K Memory Kit	199.95	185.00	
26-6052 DT-100 Data Terminal	795.00	600.00	
26-1245 10 Meg Disk Cartridge System	2195.00	1750.00	
26-6018 6000 Interface Kit for 26-1245	119.95	102.00	
25-3022 1000/1200/3000/Interface Kit for 26-1245	199.95	160.00	
26-4171 35 Meg Hard Drive Primary	2995.00	2545.00	
26-4172 35 Meg Hard Drive Secondary	2695.00	1895.00	
26-4173 70 Meg Hard Drive Primary	4295.00	3350.00	
26-4157 Installation Kit for Primary HD	349.00	295.00	

**RADIO SHACK PRINTERS**

	LIST PRICE	OUR PRICE
26-1276 DMP-105 Dot Matrix Printer	\$ 199.00	\$ 169.00
26-1275 TRP-100 Portable Thermal Printer	299.00	230.00
26-1280 DMP-130 100 cps Triple Mode Printer	349.95	285.00
26-1268 CGP-220 Color Ink-Jet Printer	699.00	595.00
26-2830 PC-695 8-Color Digital Plotter	799.00	680.00
26-1277 DMP-430 24 Wire Matrix Printer	899.00	635.00
26-1270 DWP-510 43 cps Daisy Wheel	1495.00	1225.00
26-1274 DMP-2100P 24 Dot Matrix Printer	1495.00	1195.00
26-1279 DMP-2200 HiSpeed Matrix Printer	1695.00	1440.00
26-1269 PT-64 Printer Controller	249.95	210.00
26-1498 SW-302 Printer Switch	119.95	100.00
26-1447 Bi-Directional Tractor for DWP 510	219.95	186.95

**TANDY 1200**

25-3000 Tandy 1200 One FD & 10 Meg HD	\$1999.95	\$1525.00
25-3001 Tandy 1200 Two FD 256K	1499.00	1200.00
25-3044 Graphics Master	695.95	540.00
25-3061 Captain Multifunction Board	599.95	475.00
25-3020 TCS-100 Tape Cartridge System	1999.00	1555.00
25-3021 TCS-100 Interface Kit 1000/1200	149.95	120.00
25-3130 MSDOS/BASIC	89.95	76.50

**TANDY 1000**

25-1000 Model 1000 128K 1 FD & DeskMate	\$ 999.95	\$ 705.00
25-1001 Model 1000 256K 1 FD 10 Meg HD	1999.00	1475.00
25-1003 300-Baud Modem Board 1000/1200	149.95	125.00
25-1005 Disk Drive Expansion 1000	199.95	170.00
25-1014 RS-232C Plus Interface 1000/1200	99.95	85.00
25-1013 1200-Baud Modem Board 1000/1200	299.95	230.00
25-1025 10 Meg Hard Disk Drive	699.95	559.00
25-1007 Hard Disk Control Board	299.95	255.00
30051030 PJB Multifunction Board 512K		310.00

**MONITORS AND DISPLAY ADAPTERS**

25-1020 VM-4 Monochrome Monitor	\$149.95	\$125.00
26-5111 VM-1 Monochrome Monitor	199.95	165.00
25-3010 VM-3 Green Monitor	219.95	185.00
25-1021 CM-4 Color Monitor	299.95	225.00
25-1022 CM-10 Color Monitor	459.95	380.00
26-5112 CM-1 Color Monitor	599.95	475.00
25-3043 Graphics Display Adapter	299.00	185.00
25-3046 Deluxe Text Display Adapter	249.95	199.00
26-3047 Deluxe Graphics Display Adapter	499.95	295.00

**EPSON PRINTERS**

20001015 Homewriter 10	\$295.00	\$215.00
20001025 LX-80 Dot Matrix Printer	329.00	250.00
20001035 FX-85 Dot Matrix Printer	549.00	385.00
20001050 HI-80 4 Pin Plotter	599.00	390.00
20002010 RX-100 Dot Matrix Printer	499.00	400.00
20002030 FX-286 Dot Matrix Printer	799.00	550.00
20003020 LQ-800 24 Pin Head Dot Matrix	799.00	565.00
20003030 LQ-1000 24 Pin Head Dot Matrix	995.00	695.00
10081010 DX-10 Daisy Wheel Printer	299.00	255.00
10081020 DX-20 Daisy Wheel Printer	459.00	390.00
10081030 DX-35 Daisy Wheel Printer	899.00	765.00

For Technical Questions and Information on our complete line of computer accessories and current prices:

CALL 1-517-625-4161

FOR ORDERS ONLY CALL 1-800-248-3823

Monday-Friday 9-5, Saturday 9-3

124 S. MAIN ST. PERRY, MICH. 48872

All prices and offers may be changed or withdrawn without notice. Advertised prices are cash prices. C.O.D. accepted (\$10.00 charge per carton on C.O.D. Call for further C.O.D. information.) M.C., Visa, add 2%. AX, add 3%. All non-defective items returned will be subject to 10% restocking fee. Defective items require return merchandise authorization. Call for R.M.A. Number before returning. Delivery is subject to product availability.

# TURBO-M™

Check Out Our Systems — High **QUALITY TURBO** motherboard at the **LOWEST** prices.  
Our hard drive systems have **EXTRA** megabytes of **FREE** storage — **CALL**  
(more megabytes for less megabucks)

**Our monitors are high resolution TTL** — They even have their own tilt and swivel base **FREE**  
Powered by a heavy duty power supply, and offering **TRUE** — 8Mhz turbo speed  
**ONE FULL YEAR WARRANTY**

## COMPARE OUR SYSTEMS — TURBO M is the COMPETITION



**SYSTEM A**  
FLOPPY SYSTEM  
**\$799.95**

**SYSTEM 22**  
HARD DRIVE SYSTEM  
22 MEGABYTE SYSTEM  
**\$1,299.95**

**TURBO M PC COMPLETE SYSTEM**  
Dual Speed CPU — 4.77 AND 8Mhz TURBO  
**IBM COMPATIBLE**

640 K memory	1 parallel port
8 slot motherboard	Clock calendar
150 Watt Power Supply	Game Port
Monochrome TTL Card	Keyboard 5151 style
Monochrome Display High Res.	Ram spooler
Tilt and Swivel Base Monitor	Printer spooler
Serial port (2nd port opt.)	
360K Floppy Drive	

**Toll Free Ordering 1-800-343-8841**

## TURBO M/AT—COMPLETE SYSTEMS STARTING AT \$1,795.95!!!



**ONE FULL YEAR WARRANTY**  
Comes Complete with 80286 processor  
6 and 8 Mhz Switch Selectable  
8 Slot Motherboard  
192 Watt Power Supply  
1.2 Megabyte Floppy Drive  
1 Full Megabyte of Memory on Motherboard  
2 Parallel Ports — 2 Serial Ports  
Clock Calendar  
Hercules Compatible Monochrome Card  
Monochrome Display-High Resolution  
Tilt and Swivel Base  
AT Keyboard

### ADD-IN BOARDS TO HELP YOU BUILD YOUR SYSTEM

TURBO-M Motherboard Dual Speed <b>\$199.95</b>	Monochrome Graphics Card with Printer Port <b>\$79.95</b>	Floppy I/O Card Controls Two Floppy Drives, Serial Port Parallel Port Clock Calendar Game Port <b>\$99.95</b>	Winchester Hard Drive Controller <b>\$134.95</b>	10 Megabyte and 20 Megabyte Drives Complete System Drive Controller Cables (and easy to follow instructions) <b>\$349.95 — \$449.95</b>	Color Graphics Card with Printer Port <b>\$94.95</b>	
150 Watt Power Supply <b>\$79.95</b>	Multi Function Card with Space for 384K of Memory, Serial Port Parallel Port Clock Calendar, Game Port <b>\$79.95</b>	5151 Compatible Keyboard with Separate Cursor and Number Pads <b>\$89.95</b>	Monochrome Monitor with High Resolution Tilt/Swivel Base <b>\$159.95</b>	Floppy Drive Card Control up to Four Drives <b>\$39.95</b>	PC DOS 3.1 <b>\$80.00</b>	Flip Top Cabinet with Speaker <b>\$49.95</b>

### MEGADISK™ HARD DRIVES

**Our Hard Drive Systems Are Compatible With**

IBM PC and AT, HEATH/ZENITH, COMPAQ, COLUMBIA, PC CLONES, TAVA, EAGLE  
TRS/80 Models I / III / IV / 4D / 4P / MAX 80 / COLOR COMPUTER, Tandy 1000

Systems come complete with drive, controller, cables,  
hardware and easy to follow instructions.

5 megabytes ..... starts at \$229.95  
11 megabytes ..... starts at \$349.95  
22 megabytes ..... starts at \$449.95

**IBM  
ETC.**

**REMOVABLE MEDIA SPECIAL**  
**5 Megabyte Cartridge Hard Drive Now**  
**\$399.95**

Systems come complete with one free software driver for TRSDOS 6,  
LDOS 5.1.x, DOSPLUS 3.4/4, or NEWDOS 80.CP/M is available

5 megabytes ..... \$399.95  
10 megabytes ..... \$ 549.95  
20 megabytes ..... \$ 699.95  
10mb + 5mb removable ..... 949.95  
20mb + 5mb removable ..... 1199.95  
5 megabyte removable ..... 499.95

**TRS/80**

#### Warranty Information:

TURBO-M systems come with a full year warranty for parts and labor.  
TURBO-M systems are guaranteed to run all programs such as LOTUS, SYMPHONY, AUTOCAD,  
FLIGHT SIMULATOR, DBASE, MICROGRAFX, WORDSTAR, LEADING EDGE W/P, RBASE.  
**MEGADISK hard drives are fully warranted for parts and labor.**

#### Software Support Inc.

**TERMS and CONDITIONS:**  
All prices are cash discounted. However, we do  
accept MC, VISA, AMEX & DISCOVER credit cards.  
C.O.D.'s are accepted. No deposit required.  
Purchase Orders Corporate, Government & School  
P.O.'s are accepted. Please call for details.  
Shipping Costs are calculated per order.  
Please call for total.  
Shipments of all in stock products are made within  
24 hours. Same day service is available upon  
request — no added cost.  
Not responsible for typographical errors.  
Terms and Specifications may  
change without notice.

#### MicroSmart Inc.

**OUR NEW 200 Homer Avenue**  
**ADDRESS Ashland, MA 01721**  
**1-617-872-9090**

Hours: Mon-Fri 10 am to 5:30 pm (est) Sat 4:00 pm

**Toll Free Ordering 1-800-343-8841**

**Dealer Inquiries Invited**

**Reader Service-Call 1-800-343-8841**

#### Our New Company

**Service & Returns:** It is our policy to repair all service  
returns within 24-48 hours. Normally same day turn-  
around is accomplished. It is necessary to have a  
Return Material Authorization to insure  
speedy service.  
IBM, TAVA, COLUMBIA, 5151, COMPAQ, EAGLE,  
TRS/80, HEATH/ZENITH are registered trademarks  
of IBM Corp., Tava Corp., Columbia Computer Corp.,  
Key Tronics Corp., Compaq Corp., Eagle Computer,  
Tandy Corp., Zenith Corp. respectively.  
© 1986 Software Support Inc. All rights reserved.  
© 1986 MicroSmart Inc. All rights reserved.

# TURBO-M™



**Now Shipping  
from stock!**

## COMPARE OUR SYSTEMS

— **TURBO M is the  
COMPETITION**

### **TURBO M PC COMPLETE SYSTEM**

Dual Speed CPU  
— 4.77 AND 8Mhz TURBO  
IBM COMPATIBLE

**SYSTEM A  
FLOPPY SYSTEM  
\$799.95**

**SYSTEM 22  
HARD DRIVE SYSTEM  
22 MEGABYTE SYSTEM**

**\$1,299.95**

640 K memory  
8 slot motherboard  
150 Watt Power Supply  
Monochrome TTL Card  
Monochrome Display High Res.  
Tilt and Swivel Base Monitor  
Serial port (2nd port opt.)  
360K Floppy Drive

1 parallel port  
Clock calendar  
Game Port  
Keyboard 5151 style  
Ram spooler

A Norton Utilities style program, but even more.  
™ Norton Utilities Peter Norton.

**Toll Free Ordering 1-800-343-8841**

### Software Support Inc.

**TERMS and CONDITIONS:**  
All prices are cash discounted. However, we do accept MC, VISA, AMEX & DISCOVER credit cards. C.O.D.'s are accepted. No deposit required. Purchase Orders-Corporate, Government & School P.O.'s are accepted. Please call for details. Shipping Costs are calculated per order. Please call for total. Shipments of all in-stock products are made within 24 hours. Same day service is available upon request — no added cost. Not responsible for typographical errors. Terms and Specifications may change without notice.

### MicroSmart Inc. Our New Company

**OUR NEW ADDRESS:** 300 Homer Avenue  
Ashland, MA 01721  
1-617-872-9090

Hours: Mon-Fri 10 am to 5:30 pm (est) Sat 4:00 pm

**Toll Free Ordering 1-800-343-8841**

**Dealer Inquiries Invited**

Reader Service-Call 1-800-343-8841

Service & Returns. It is our policy to repair all service returns within 24-48 hours. Normally same day turn-around is accomplished. It is necessary to have a R/Return (Material) Authorization to insure speedy service.  
IBM, TAVA, COLUMBIA, 5151, COMPAQ, EAGLE, TRS/80, HEATH/ZENITH are registered trademarks of IBM Corp., Tava Corp., Columbia Computer Corp., Key Tronics Corp., Compaq Corp., Eagle Computer Tandy Corp., Zenith Corp. respectively.  
© 1985 Software Support, Inc. All rights reserved.  
© 1986 MicroSmart, Inc. All rights reserved.

# How to Use 80 Micro Program Listings.

Basic program listings in 80 Micro include a checksum value at the end of each line. This value is the sum of the ASCII values of all characters and spaces in the line, excluding remarks. With our Checksum program, you can use these values to test the accuracy of your typing after you copy the listings from the magazine.

To check your typing, follow these steps:

- Type in the program *exactly* as listed, omitting the indentations where program lines continue to a second or third magazine line, the '\*' characters, and checksum values. Checksum ignores all comments marked with an apostrophe, so type them in or leave them out, as you wish.

- Save the program in ASCII format with the command SAVE"filespec".A.

- Load and run Checksum (see the Program Listing). It gives you the option of sending the line numbers and checksum values to the printer or screen. Enter P for printer, S for screen. When printing to the screen, Checksum lists 14 lines and then waits for you to press the enter key.

- Compare the displayed line numbers and checksum values with the checksums shown in the listing. The program asks you if you want to reload the original program. Enter Y for yes. Finally, find and correct errors in lines having checksum values that don't match.

—Beverly Woodbury  
Technical Editor

## Program Listing. Checksum.

```

10 'CHECKSUM/BAS by Beve Woodbury -- 8/7/86          '* 97
20 ' Enhancements by Henry Herdragen, Arthur Walker, Al Arena '* 98
30 CLEAR 1000:CLS:PRINT@140,"VERIFY CHECKSUMS ON PROGRAM" '* 3715
40 ON ERROR GOTO 410                                 '* 1241
50 PRINT:PRINT:INPUT "Enter name of File to verify";F$ '* 4280
60 PRINT:PRINT:PRINT "List Checksums to:"           '* 3236
70 PRINT TAB(20) "<P>Printer":PRINT TAB(20) "<S>Screen" '* 3631
80 PRINT:PRINT:PRINT TAB(30);"? ";                 '* 2151
90 K$=INKEY$                                         '* 729
100 IF K$="P" OR K$="p" OR K$="S" OR K$="s" THEN 110 ELSE 90 '* 3356
110 PRINT K$:IF K$="P" OR K$="p" THEN LP=1           '* 2481
120 OPEN "I",1,F$                                    '* 901
130 IF EOP(1) THEN CLOSE:GOTO 370                   '* 2001
140 LINE INPUT#1,L$:L=VAL(LEFT$(L$,6))              '* 2278
150 IF Z=2 AND L=0 THEN 130 ELSE Z=2                '* 2095
160 A=VARPTR(L$):GOSUB 300:Q=PEEK(A)                '* 2241
170 LS=PEEK(A+1):MS=PEEK(A+2):A=MS*256+LS:GOSUB 300 '* 3112
180 IF INSTR(L$,"") THEN GOSUB 310                  '* 990
190 IF RIGHT$(L$,1)="" THEN IQ=Q:GOSUB 330          '* 2513
200 FOR K=1 TO Q:P=PEEK(A):CS=CS+P:A=A+1:NEXT K      '* 2939
210 IF CS=0 THEN 130                                 '* 1128
220 IF CS<100000 THEN D$="-"                        '* 1532
230 IF CS<10000 THEN D$="- "                       '* 1484
240 IF CS<1000 THEN D$="- "                        '* 1469
250 IF CS<100 THEN D$="- "                          '* 1454
260 IF LP=1 THEN LPRINT "Line";L;D$;CS,:CS=0:GOTO 130 '* 3376
270 PRINT "Line";L;D$;CS:CS=0:X=X+1                 '* 2205
280 IF X=14 THEN X=0:PRINT TAB(30) "Press <ENTER> to continue." '* 4933
    ELSE 130                                         '* 2714
290 K$=INKEY$:IF K$<>CHR$(13) THEN 290 ELSE 130    '* 3269
300 IF A>32767 THEN A=(655361-A)*-1:RETURN:ELSE RETURN '* 944
310 I=INSTR(L$,""):IQ=I-1                            '* 1463
320 IF LEN(L$)=INSTR(L$,"") THEN RETURN             '* 1483
330 FOR I=IQ TO 1 STEP -1                             '* 1264
340 C=ASC(MID$(L$,I,1))                               '* 1379
350 IF C<33 THEN NEXT I                              '* 2321
360 RL$=LEFT$(L$,I):Q=LEN(RL$):RETURN                '* 3246
370 PRINT:PRINT"CHECKSUM/BAS now in Memory"
380 PRINT "Do you want to reload the PROGRAM that you are workin
    g on? (Y/N)                                     '* 6161
390 Q$=INKEY$:IF Q$="Y" OR Q$="y" THEN CLS:LOAD F$  '* 3023
400 IF Q$="N" OR Q$="n" THEN END ELSE GOTO 390      '* 2704
410 PRINT "File not found...Please try again.":PRINT:RESUME 50 '* 4827
    End
    
```

# 80 MICRO'S LIST of ADVERTISERS

## Index for 80 Micro Magazine—NOVEMBER 1986

Reader Service Number	Page	Reader Service Number	Page	Reader Service Number	Page			
82	Aerocomp	71, 110, 119	Instant CoCo	136	424	Montezuma Micro	91	
202	Aerocomp	22	Jesse Jones	50	524	Montezuma Micro	79	
302	Aerocomp	33, 34, 35, 36	Load 80 Back Issues	53	281	Nibble Notch	137	
486	A.I.S.E.	48	Load 80 Utility pak	32	232	Nocona Electronics	107	
215	Alcor Systems	75	Load 80 Specials	68	492	PCA Technologies	95	
30	Allwrite (Prosoft)	9	Load 80 Subroutines	63	470	PG Design Electronics	114, 150	
17	Alpha Products	13, 15	Load 80 Subscriptions	116, 117	124	Perry Computers	129	
374	ALPS	99	Moving	153	437	Portable Software	113	
141	Anitek Software Products	23	Say You Saw It	152	108	Powersoft	21	
378	ATD	52, 52A, 81	Subscription Problems	153	308	Powersoft	4	
259	Atmospheres	112	Subscription	84	51	Prosoft (LaserJet)	105	
238	Automation Facilities	CII	University Micro	104	174	Professional Tax Software	110	
152	BCCompco	147	191	Electric Transit Inc.	65	449	Professor Jones/Frogg House	134
145	Beaman Porter	121	45	Electric Webster	1	75	Radio Shack	45, 57, 122, 123
301	Big D Computers	108	181	Envision Design	113	371	Seatronics	144
186	Blue Ridge Software	121	178	EZWare	151	287	Simplification Unlimited	112
86	Compulogic Corp.	144	214	Ft. Worth Computers	43	360	Software Products International	18
78	Compuserve	60, 61	90	Freedom Electronics	153	*	Software Support/Micro Smart	
133	Computer Discount of America	105	*	GE Information Services	17		126, 127, 130, 131	
357	Computer Friends	109	185	Gotho Software	141	245	Software Sales	48
18	Computer Plus	133	199	Group Technology	137	427	SOTA Computing Systems Ltd.	103
415	Computer System Consultants	134	9	H & E Computronics	CIV	444	Southwestern Digital	146
532	Contract Services Associates	148	455	Hard Drive Specialist	31	456	Sunlock Systems	137
45	Cornucopia Software	1	209	H.I. Tech	26	297	SJS Engineering	101
397	DAC Software	CIII	491	HJL Products	124	520	TCE	135
282	DFW Computer Center	89	175	Howe Software	85	385	Telotrends	151
114	Digital Vision	141	46	Hypersoft	145	81	Total Access	87
204	DiskCount Data	2, 3	101	J & M Systems, Ltd.	128	227	Trisoft	150
294	Dorsett Educational	125	534	Jameco Electronics	48	*	Trionix	112
91	Dotwriter (Prosoft)	7	*	Lindbergh Systems	153	247	True Data Products	138, 139
452	Dresselhaus Computer	152	235	LSR Learning Associates	145	281	Turner-Hall Publishing	110
85	Educational Micro Systems	11	274	Lyons Products	153	289	Warp Speed Computer Products	73
	80 Micro		250	Marymac Industries, Inc.	93			
	Back Issues	102, 114	225	Merritt Computer	110			
	Best of Model III	115	464	Micro Labs, Inc.	149			
	Christmas Subscriptions	100	212	Microprose	51			
	Classified	137	137	Miller Microcomputer Services	59			
549	Classified Ads	155	107	Micosys, Inc.	24, 113			
	Dealer Sell	50	411	Montezuma Micro	78			
	Foreign Dealers	83, 134	416	Montezuma Micro	142, 143			

For further information from our advertisers, please use the Reader Service card. \*This advertiser prefers to be contacted directly.

Advertising Sales (603) 924-7138  
or (800) 441-4403  
West Coast Sales (415) 328-3470

From Computer Plus to YOU...

# PLUS after PLUS after PLUS



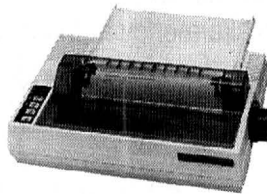
Tandy 200 24K \$649  
Tandy 600 32K \$1269  
Tandy 102 32K \$395



Tandy 3000 \$1759  
Tandy 3000 HD \$2699  
Tandy 3000 HL \$1229



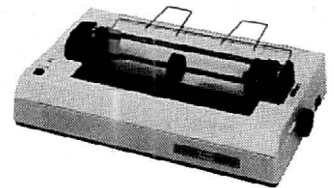
Tandy 1000 EX \$569.00  
Tandy 1000 SX \$839.00



DMP-130 \$269



Color Computer 3  
w/128K Ext. Basic \$169



DMP-105 \$160

## BIG SAVINGS ON A FULL COMPLEMENT OF RADIO SHACK COMPUTER PRODUCTS

### COMPUTERS

Tandy 1000 EX 1 Drive 256K	569.00
Tandy 1000 SX 2 Drive 384K	839.00
Tandy 3000 HL 1 Drive 512K	1229.00
Tandy 3000 1 Drive 512K	1759.00
Tandy HD 40 Meg. 640K	3179.00
Model IVD 64K with Deskmate	889.00

### PRINTERS

Radio Shack DMP-130 100 CPS	269.00
Radio Shack DMP-430 180 CPS	559.00
Radio Shack DWP-230 Daisy Wheel	359.00
Silver Reed EXP-550P Daisy Wheel	339.00
Star LV-1210 120 CPS	199.00
Star NX-10 120 CPS	279.00
Star SG-15 120 CPS	410.00
Panasonic P-1080 100 CPS	229.00
Panasonic P-1091 120 CPS	259.00
Panasonic P-1092 180 CPS	339.00
Okidata 292 200 CPS	529.00
Okidata 192+ 200 CPS	375.00
Okidata 182 120 CPS	225.00
Epson LX-80 100 CPS	275.00
Epson FX-85 160 CPS	419.00

### TANDY 1000 ACCESSORIES

Tandy 1000 Disk Drive Kit	135.00
Tandy 1000 EX External Drive	199.00
Tandy 1000 20 Meg. Hard Card	659.00
256K Memory Plus Expansion Brd.	155.00
128K Memory Plus Expansion Adp.	110.00
PBJ Multi-Function Board (512K)	229.00
PBJ Mini I/O (RS-232, Clock, Par.)	110.00
128K Ram Upgrade Kit (NEC)	78.00
256K Ram Upgrade (for 1000SX)	69.00
Summa RS-232 Serial Mouse	99.00
1200 Baud Modem Board	179.00
Plus 300 Baud Modem Board	85.00
Plus RS-232 Serial Board	69.00
Digi-Mouse/Clock Board	89.00

### TANDY MONITORS

Tandy VM-4 Green Monitor	99.00
Tandy CM-10 RGB Color Monitor	379.00
Tandy CM-5 RGB Color Monitor	249.00
Tandy VM-3 TTL Green Monitor	179.00
Tandy CM-8 Analog Color Monitor	249.00
Tandy 1200 Deluxe Display Adapt.	299.00
Tandy 1200 Dual Display Adapt.	210.00

### \*\*COMPUTER PLUS SPECIALS\*\*

The PBJ MFB-1000 Multi-Function Board with 512 Ram, DMA, RS-232 Serial Port, Clock Calendar with Battery Backup, and Ram Disk Software.....229.00

The PBJ XRAM Expanded Memory Board with 256K Ram, Upgradable to 2 Megabytes of Additional Memory, EMS Compatible, with Ram Disk Software.....249.00

Tandy 1000 20 Megabyte Internal Hard Drive Kit with Controller, Cables and Mounting Hardware.....499.00

Tandy 1000 20 Megabyte External Hard Drive with Controller, Cables, Case and Power Supply.....649.00

### \*\*FREE SOFTWARE BONUS\*\*

Order the PBJ MFB-1000 with 512K or the PBJ XRAM Board and receive the Leading Edge Word Processor and THE TWIN-Spreadsheet, Graphics, and File Manager Software a \$99.00 Value at NO CHARGE!!

**CALL TOLL FREE  
1-800-343-8124**

- LOWEST POSSIBLE PRICES
- BEST POSSIBLE WARRANTY
- KNOWLEDGEABLE SALES STAFF
- TIMELY DELIVERY
- SHOPPING CONVENIENCE




# computer plus

P.O. Box 1094  
480 King Street  
Littleton, MA 01460

**SINCE 1973**

IN MASSACHUSETTS CALL (617) 486-3193



**PROF JONES**  
1940 WEST STATE ST.  
BOISE, IDAHO 83702  
(208) 342-6939

**PROFESSIONAL HANDICAPPING SYSTEMS**

**PROFESSIONAL SERIES**

**PROFESSIONAL SERIES™ (Tho/Grey/Trot)**  
The all new Professional Series™ represents the most advanced handicapping software available.

**Analysis Module™**  
Complete bet analysis highlights this basic Professional Series™ module. Full 50 tracks/kennels/etc. \$249.95

**Factor Value/Multiple Regression Module™**  
Factor Value Weighting highlights this addition module™ \$149.95

**Data Base Manager Module™**  
Automatic storage of last 11 races highlights this module. (\$99.95 with Factor Value Module) \$149.95

**GOLD EDITION™ (Tho/Grey/Trot)**  
The classic Gold Edition™ from Prof. Jones offers flexibility, results, and ease of use.

Gold Edition™ ..... \$159.95  
Enhanced Gold Edition™ ..... \$199.95  
Limited Gold Edition™ ..... \$298.95  
Ultra Edition™ ..... \$399.95

**Basketball Analysis™** — \$99.95; With win/loss power ratings, \$149.95

**PC-3 Portable Computer (4k)** — Choice of Thoroughbred/Greyhound/Trotter Gold Edition™ software on a hand-held computer. \$249.95

**Model 100 Portable Computer (32k)** — Choice of Thoroughbred/Greyhound/Trotter Gold Edition™ software on a lap-top computer. \$649.95

**Professor Picks Football™** — \$99.95; With win/loss power ratings, \$149.95; Professional Series with "built in" schedules, last four game analysis for entire season, "single entry" setup, expanded results section and more, \$199.95

**Bookie Buster™ Football Analysis** — A 10-year statistical database highlights this analysis. Individual games are evaluated using up to 21 separate criteria with even more room for "user generated" systems. Includes complete data through 1985 season. \$149.95

**Lottery/Lotto Statistical Analysis™**  
— Lottery: 3-4 digits — \$79.95; Lottery/Lotto: max. of 99 digits — \$99.95; Enhanced Lottery/Lotto: with Dimitrov betting systems — \$129.95

**PHS-Link™** — The only Handicapper's bulletin board with Professional Football and Basketball analysis, statistics, and tips from the pros. Call (208) 342-6948 (with modem) between 5 p.m. and 8 a.m. (MST) for pricing and more information.

**Master Handicapper™ Video Instruction Series**  
— Have Prof. Jones himself guide you through all the intricacies of the Professional Series software as well as provide valuable insights into the world of computerized handicapping. Designed to get you up and running fast!  
Tape #1 (Thoroughbred/Greyhound/Trotter) — Analysis Module™ and Bet Analysis™ — \$39.95  
Tape #2 (Thoroughbred/Greyhound/Trotter) — Multiple Regression™ and Data Base Manager™ — \$29.95

Terms: Free shipping all software. Add \$6.00 COD / \$6.00 UPS Blue / \$9.00 Out-of-country / ID residents add 5% / 3 weeks personal checks / cash price only add 2% Visa, MC, AMEX. Prices subject to change.

**FREE CATALOG**

**MS-DOS AND COCO SOFTWARE**

**CMODEM TELECOMMUNICATIONS PROGRAM \$100-FLEX, OS/9, MS-DOS OBJECT-ONLY versions: EACH \$50**  
menu-driven with terminal mode, file transfer, MODEM7, XON-XOFF, etc.

**SUPER SLEUTH DISASSEMBLERS EACH \$99-FLEX \$101-OS/9**  
OBJECT-ONLY versions: EACH \$50-FLEX, OS/9, COCO  
interactively generate source on disk with labels, include xref, binary editing specify 6800, 1, 2, 3, 5, 8, 9/6502 version or Z80/8080,5 version

**NEW: 68010 disassembler \$100-FLEX, OS/9, OS/9-68K, MS-DOS**

**CROSS-ASSEMBLERS EACH \$50-FLEX, OS/9, MS-DOS \$100 for 3 \$200 for all**  
specify for 180x, 6502, 6801, 6804, 6805, 6809, Z8, Z80, 8048, 8051, 8085, 68000 modular cross-assemblers in C, with load utilities and macros  
**NEW: OS/9-68K**

**Computer Systems Consultants, Inc.**  
1454 Latta Lane,  
Conyers, GA 30207

**Telephone 404-483-4570 or 1717 to order or to request a catalog.**

**Most programs in source: you must provide computer, O.S., disk type. VISA and MASTER CARD accepted; US funds only; add 5% shipping**

FLEX™ Technical Systems Consultants; OS/9™ Microsoft; MS-DOS™ Microsoft.

# Foreign Dealers

You have a large technical audience that speaks English and is in need of the kind of microcomputer information that **CW Communications/Peterborough** provides. Provide your audience with the magazines they need and make money at the same time.

For details on selling **80 Micro, inCider, AmigaWorld,** and **RUN** contact:

**SANDRA JOSEPH WORLD WIDE MEDIA**  
386 PARK AVE. SOUTH  
NEW YORK, N.Y. 10016  
PHONE-(212) 686-1520 TELEX-620430

U.S. Postal Service  
**STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION**  
Required by 39 U.S.C. 3685

1. TITLE OF PUBLICATION: 80 MICRO  
2. PUBLICATION NO: 07447868  
3. DATE OF FILING: Aug. 22, 1986  
4. FREQUENCY OF ISSUE: MONTHLY  
5. ANNUAL SUBSCRIPTION PRICE: \$24.97  
6. SA. NO. OF ISSUES PUBLISHED ANNUALLY: 12  
7. ANNUAL SUBSCRIPTION PRICE: \$24.97

8. COMPLETE MAILING ADDRESS OF KNOWN OFFICE OF PUBLICATION (Street, City, County, State and ZIP+4 Code) (Not printers)  
80 Pine Street, Peterborough, N.H., Hillsborough County 03418

9. COMPLETE MAILING ADDRESS OF THE HEADQUARTERS OF GENERAL BUSINESS OFFICES OF THE PUBLISHER (Not printers)  
80 Pine Street, Peterborough, N.H., Hillsborough County 03458

10. FULL NAMES AND COMPLETE MAILING ADDRESS OF PUBLISHER, EDITOR, AND MANAGING EDITOR (This item MUST NOT be blank)  
PUBLISHER (Name and Complete Mailing Address): Peter Hutchinson, 80 Pine Street, Peterborough, N.H. 03458  
EDITOR (Name and Complete Mailing Address): Eric Maloney, 80 Pine Street, Peterborough, N.H. 03458  
MANAGING EDITOR (Name and Complete Mailing Address): Michael E. Nadeau, 80 Pine Street, Peterborough, N.H. 03458

11. OWNERS (If owned by a corporation, its name and address must be stated and also immediately thereunder, the names and addresses of its stockholders owning or holding 1 percent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a partnership or other unincorporated firm, its name and address, as well as that of each individual must be given. If the publication is published by a nonprofit corporation, its name and address must be stated.)

12. FULL NAME: INTERNATIONAL DATA GROUP  
COMPLETE MAILING ADDRESS: P.O. Box 1450, 5 Spear Street, Framingham, MA 01701

13. KNOWN BONDHOLDERS, MORTGAGEES, AND OTHER SECURITY HOLDERS OWNING OR HOLDING 1 PERCENT OR MORE OF TOTAL AMOUNT OF BONDS, MORTGAGES OR OTHER SECURITIES (If there are none so state)  
FULL NAME: Patrick J. McGovern  
COMPLETE MAILING ADDRESS: P.O. Box 1450, 5 Spear Street, Framingham, MA 01701

14. FOR COMPLETION BY NONPROFIT ORGANIZATIONS AUTHORIZED TO MAIL AT SPECIAL RATES (Section 4212 (2)(B) only)  
The purpose, function, and nonprofit status of this organization and the exempt status for Federal income tax purposes (Check one)  
 HAS NOT CHANGED DURING PRECEDING 12 MONTHS  HAS CHANGED DURING PRECEDING 12 MONTHS (If changed, publisher must submit explanation of change with this statement.)

15. EXTENT AND NATURE OF CIRCULATION  
AVERAGE NO. COPIES EACH ISSUE DURING PRECEDING 12 MONTHS  
ACTUAL NO. COPIES OF SINGLE ISSUE PUBLISHED NEAREST TO FILING DATE

A. TOTAL NO. COPIES (Net Press Run)	126,248	115,728
B. PAID AND/OR REQUESTED CIRCULATION 1. Sales Through Dealers and Carriers, street vendors and counter sales 2. Mail Subscriptions (Include Inland Postpaid)	14,085 71,171	13,137 64,544
C. TOTAL PAID AND/OR REQUESTED CIRCULATION (Sum of B1 and B2)	85,256	77,681
D. FREE DISTRIBUTION BY MAIL, CARRIER OR OTHER MEANS, SAMPLES, COMPLIMENTARY, AND OTHER FREE COPIES	3,646	1,834
E. TOTAL DISTRIBUTION (Sum of C and D)	88,902	79,515
F. COPIES NOT DISTRIBUTED 1. Office use, left overs, unaccounted, spoiled after printing 2. Return from News Agents	3,205 34,061	1,656 34,557
G. TOTAL (Sum of E, F1 and F2—should equal net press run shown in A.)	126,248	115,728

16. I certify that the statements made by me above are correct and complete

SIGNATURE AND TITLE OF EDITOR, PUBLISHER, BUSINESS MANAGER, OR OWNER  
*[Signature]*  
15 Form 3526, July 1984



# TCE's 5th Anniversary Catalog is now available!

**IF YOU OWN A TANDY COMPUTER THERE'S SOMETHING FOR YOU!**

## **PROGRAMMING TOOLS**

DEFT PASCAL WORKBENCH  
DEFT EXTRA  
DEFT 3D GRAPHICS SAMPLER

## **WORD PROCESSING**

CHILD WRITER  
MEMO WRITER  
BUSINESS WRITER

## **DATA MANAGERS**

CHILD FILER  
LIST MANAGER  
BUSINESS MANAGER

## **SPREADSHEETS**

CHILD CALC  
SIMPLE CALC  
BUSINESS CALC

## **EARLY LEARNING**

ABC's IN COLOR  
ALPHA MEMORY  
HAPPY COUNT  
MIX AND MATCH  
MR. BEAR COUNT  
MR. BEAR SPELLER  
MR. PIGGY  
SEE AND SPELL  
TEACHING CLOCK

## **MATH SERIES**

BASIC MATH  
CRISS CROSS MATH  
CRISS CROSS PLUS  
FLASH CARD  
FRACTIONS  
FRACTION DESTROYER  
FRIEND OR FOE  
MATH BOMBER  
MATH REVIEW  
MR. BEAR FLASH CARD  
MR. BEAR MATH  
PLACE VALUES  
REDUCING FRACTIONS  
RESCUE MATH

## **LEARNING ACTIVITIES**

ALPHA ATTACK  
CAPITAL MATCH  
HISTORY QUIZ  
MATH QUIZ  
MEMORY MATCH  
QUIZ GAME  
UNITED STATES  
VOCAB BRUSH-UP

## **LANGUAGE ARTS**

ALPHABETIZE  
ANTONYM EXPRESS  
ANTONYM MATCH  
COMPUTER EASE  
CRISS CROSS SPELL  
ENGLISH REVIEW  
HOMONYMS  
NOUNS  
NOUNS REVIEW  
PLURALS  
PRONOUNS  
SAVE THE FISH  
SPELL BOMBER  
SPELLING RULES  
SUPER SPELL BOMBER  
SYNONYM EXPRESS  
SYNONYM MATCH  
TORPEDO SCRAMBLE  
VERB REVIEW  
WEEKLY SCRAMBLER  
WEEKLY SPELLER

**100%  
SATISFACTION  
GUARANTEE**

**PREMIUM COLOR DISKETTES FROM SENTINEL**

**A VARIETY OF COLORED COMPUTER PAPER**

**HIGH QUALITY A2D DELUXE JOYSTICK**



CALL us at 1-(800)-4TC-4TCE or 1-(301)-963-3848  
for a FREE TCE Software catalog and the latest copy of TCE NEWS.

It's Here!

# instant CoCo's Best of '85



## A Software Feast for You and Your Color Computer

No matter where, why, or how you use your Color Computer, don't let another day slip by without getting instant CoCo's **Best of '85**. It's a 30-program bonanza of software—the best programs from a whole year of **HOT CoCo** magazine—shipped to you on a single high quality cassette.

### The Best of the Best

Highlights of this year's collection include "Homespread," a simple-to-use, yet full featured spreadsheet program. You'll be amazed at your own artistry as you create hi-res graphics with "Paint King." For entertainment, let "Five Card CoCo" turn your Color Computer into a tough Blackjack foe.

You get utilities, games, business and home

applications. In short, the best of the best, carefully selected for you by the editors of **HOT CoCo**.

### The Year's Top Programs

From every month of 1985, we've chosen the most popular and significant programs. Software you'll find challenging, entertaining, practical, perhaps even indispensable, including...

- **JANUARY**—"The Adding Advantage"
- **FEBRUARY**—"Space Hawk"
- **MARCH**—"Don't Print There!"
- **APRIL**—"Orbital Observations"
- **MAY**—"Closed for Inventory"
- **JUNE**—"Fabulous Fonts"
- **JULY**—"Date Minder"
- **AUGUST**—"Screen Symmetry"
- **SEPTEMBER**—"Disk Data Recovery"
- **OCTOBER**—"Master World Geography"
- **NOVEMBER**—"Mathematics Helper"
- **DECEMBER**—"Crossword Creator"

### No Keyboarding, No Debugging!

Get these programs, and many more, all thoroughly debugged, updated, and ready to run on your Color Computer. All 30 programs run in 32K or less, with many requiring just 16K. Complete documentation is included with each cassette.

Make '86 your year to buy nothing but the Best. Order your copy of instant CoCo's **Best Of '85** today. And while you're at it, order that other great software package... instant CoCo's **Best of '84**, still available in limited quantities!

To order, simply return the enclosed coupon, or call **1-800-258-5473**. (In NH, please call 1-924-9471.)

11-861C

**Yes!** I want to buy the Best.

Please send me instant CoCo's **Best of '85** for \$16.47 ea.\*

Payment Enclosed ( ) Visa ( ) MC ( ) AE ( )

Card # ..... Exp. Date .....

Signature .....

Name .....

Address .....

City ..... State ..... Zip .....

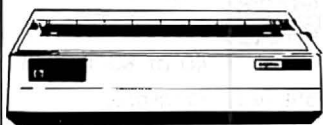
**I WANT EVEN MORE!** Please send me the **Best of '84** cassette, while supplies last, for \$16.47 ea. \*Prices include postage and handling.

instant CoCo • 80 Pine St. • Peterborough NH 03458

# PRINTER SALE

We have among the lowest prices in the country on brand name printers.

## FEATURED SPECIAL



OKIDATA ML93 \$299 LIST \$699

### Features

- 100 cps bidirectional printing
- 40 cps correspondence quality printing (NCR)
- Enhanced, emphasized and expanded printing
- 136 columns with standard characters
- 233 columns with condensed characters
- 160 columns with twelve pitch
- 8-pin, longlife print head
- Short line seeking logic
- ASCII 96-character set
- Superscripts and subscripts
- True descenders
- Underlining
- Proportional spacing
- Dot addressable graphics
- Six program-selectable character sizes
- 6 and 8 line per inch vertical spacing
- 12 channel electronic VFI for extensive forms control
- Tractor and friction feed paper handling
- Self-test, operator accessible
- Parallel interface

Epson	List	Sale	Star	List	Sale	NEC	List	Sale
RX-80	\$299	\$239	NXT0	\$449	\$269	P760	\$895	589
RX-100	499	399	SG10	399	239	P660	695	479
LX-80	329	249	SG10c	335	249	P560	1445	999
FX-85	549	399	SG15	499	399			
FX-286	789	569	SD10	449	349	Brother		
LQ-800	799	549	SD15	599	469	HK-25	695	469
LQ-1000	995	699	SR10	649	499	HK-35	995	699
DX-10	299	249	SR15	799	599	2024L	1295	809
DX-35	899	649	SB10	759	549	Twin 5	1295	849
SC-2000	2395	1599	NR15	1449	1049	M1509	459	349
4201	2195	1439	P.Type	499	329			
Okidata			Citoh			Toshiba		
ML-18Z	299	249	ProWer	329	239	1340P	799	439
ML-182S	359	279	8510SP	499	339	321P	699	519
ML-B3	549	359	8510SCP	649	469	341P	1099	819
ML-183	549	389	8510SR	629	439	351P	1549	1059
ML-192	469	369	1550SCP	899	599	351 Trac	149	119
ML-192S	578	439	1550SP	749	499	341 Trac	149	119
ML-93	699	299	1550SCH	949	619	321 Trac	99	89
ML-292*	589	459	1550SR	849	549	Citizen		
ML-293*	789	599	C310	599	419	120D	269	199
*Int'nc.	110	89	Y10-20	1295	799	MSP10	449	299
			F10-40	1199	799	MSP15	599	399
			F10-55	1449	949	MSP20	499	349
			D10-40	949	639	MSP25	749	519
						Prém 35	699	499

### SUNLOCK SYSTEMS

210 Connor Rd. □ Mechanicsville, Va. 23111

TO ORDER CALL TOLL FREE 800-368-9191

□ In Virginia call collect: 804-746-1600

(We accept payment on VISA, MC, Am. Express and COD)

(Prices subject to change without notice. Not responsible for typographical errors.)

## Our Breadboards and Texts Let you Acquire Data and Control Devices with your Microcomputer

Learn interfacing on the Tandy 1000, 2000, IBM-PC, and compatibles with our BG-Board Special: Buffered interface board, cable, and cablecard, with experiments. All for \$325.00 or \$305.00 for TRS-80 Model III or 4. Includes shipping.

Learn interfacing on the CoCo with our CoCo Special Offer: Model CC-100 Expansion Connector Breadboard; Book 21893, *TRS-80 Color Computer Interfacing, With Experiments*, Model CC-150 Experiment Component Package. All three for \$108.00 includes shipping.

Maryland residents, add 5% tax. VISA and Master Card accepted. 301-298-5716.

Write for our catalog of books, interface boards, and scientific software.

PUTTING  
HANDS  
AND  
MINDS  
TOGETHER



*Group Technology, Ltd.*

6925 Dogwood Road  
Baltimore, MD 21207  
301-298-5716

Trademarks: Tandy 1000, Tandy 2000, TRS-80; Tandy Corp. IBM-PC; IBM Corp.

# NEW FROM 80 MICRO Classifieds

## GET THE ATTENTION YOU DESERVE

Tell more than 200,000 dedicated, interested TRS-80 users about your product or service with an efficient and economical *80 Micro* classified ad.

You'll reach the most people in the market for the least amount of money!

With *80 Micro's* well-established audience of involved buyers, sellers, and swappers, your ad is bound to get fast results!

For more information, write to:

**80 Micro**  
Attn. Classified Manager  
80 Pine Street  
Peterborough, NH 03458

## IT'S LIKE FREE DISKETTES



Your 5 1/4" single side disks are usable on the other side. You paid for one side, why not use the other... **IT'S FREE!**

Nibble Notch will **open** your new disk. It's easy... won't harm existing data. Try it, you'll be glad you did!

U.S. PAT. 4,488,358



## nibble notch II

Cuts square notch and 1/4" round "index hole." For TRS 80 I, III, and IV, Osborne, TI, Kaypro, IBM and others needing "index hole."

Call for  
**HIGH QUALITY DISKETTES**  
as low as  
**99¢**

**ONLY \$21.90\***  
PLUS P&H

**SATISFACTION GUARANTEED  
OR YOUR MONEY BACK!**

TOLL FREE 1-800-642-2536

215-828-8600, 9 am-6 pm ET

or send check  
or money order to:

\*Add \$2  
(\$5 foreign) for  
postage & handling.  
PA residents  
add 6% Sales Tax.

**ORDER  
TODAY**



**nibble notch**  
computer products

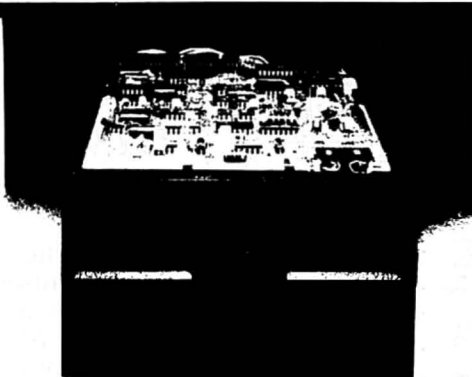
1020 Ford Rd #2 West  
West Conshohocken, PA 19428  
215-828-8600

# NEW DISK DRIVES

STARTING AT

## \$ 89.<sup>95</sup>

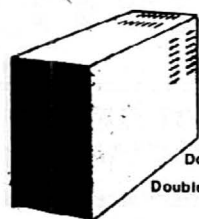
**WITH CASE &  
POWER SUPPLY  
\$129.95**



TANDON MPI TEAC

Speed 6 ms tk to tk and up  
Capacity 250k unformatted  
Tracks 40  
Warranty **now 1 YEAR**

New Low Price!



40Tks 6Ms  
Double Sided  
Double Density

40 or 80 Tracks

1/2 Hght Teac/Panasonic



We carry only the finest quality disk drives • no seconds • no surplus

**SATISFACTION GUARANTEED!!**

ALL DRIVES FULLY TESTED & WARRANTED

Complete Disk Drive with Power Supply & Case ..... Teac..... \$129.95

Two Drives in Dual Case & Power Supply ..... Teac..... ~~\$279.95~~ CALL

1/2 ht double sided double density Disk Drives (Panasonic/Teac) <sup>Tracks: 40</sup> \$ ~~119.95~~

1/2 ht double sided double density Disk Drive with ps & case..... <sup>Tracks: 40</sup> ~~\$199.95~~ CALL



How to use your new drive system on audio cassette

Single ps & case \$44.95 Dual 1/2 ht ps & case .... \$54.95 Dual ps & case ... Call

Color Computer Controller (J&M)

\$129.95

**DRIVE Ø FOR RADIO SHACK COLOR COMPUTER**

TANDON, MPI OR TEAC DRIVE (SINGLE SIDED 40 TRACKS SPEED 5MS TRK TO TRK & UP)

POWER SUPPLY and CASE, TWO DRIVE CABLE WITH ALL GOLD CONNECTORS

J&M CONTROLLER, MANUAL and DOCUMENTATION ..... \$249.95 ..... **\$ SALE!**

**DRIVE Ø FOR RADIO SHACK COLOR COMPUTER**

PANASONIC 1/2 HEIGHT DOUBLE SIDED DOUBLE DENSITY DRIVE 500K unformatted

POWER SUPPLY and CASE, 2 DRIVE CABLE WITH ALL GOLD CONNECTORS

J&M CONTROLLER, MANUAL and DOCUMENTATION ..... \$279.95 ..... **Super!! SALE!**

TAKE ADDED SAVINGS ON TWO DRIVE SYSTEMS

DISKETTES with free library case ..... <sup>10 Diskettes</sup> **\$17.95**

Unadvertised Specials ..... <sup>GD CONTROL DATA</sup> **\$Call**

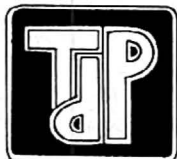
Drives cleaned, aligned & tested ..... **\$29.95**

TECHNICAL STAFF ON DUTY, PLEASE CALL FOR ASSISTANCE.

**CALL US TODAY!!  
ORDER TOLL FREE**

**(617) 278-6555  
1-800-635-0300**

\* DEALER INQUIRIES INVITED.  
**(617) 278-6555**





**TRUE DATA PRODUCTS**

9. S. Main  
Uxbridge, MA 01569  
**(617) 278-6555**

HOURS MON - SAT 9-6 (EST)

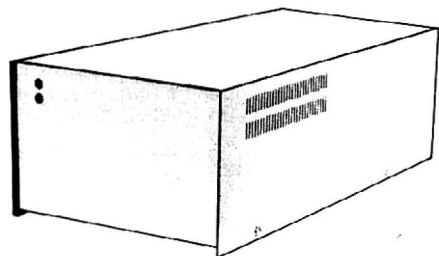
We welcome

- Visa / Master Charge  
- Checks (allow 2 weeks for clearing)
- C.O.D. Add \$2.00

# NEW HARD DRIVES

— COMPLETE SYSTEM — JUST PLUG IN —

5 MEG HD SYSTEM	399 <sup>95</sup>
10 MEG HD SYSTEM	599 <sup>95</sup>
20 MEG HD SYSTEM	799 <sup>95</sup>



HARD DRIVE SYSTEMS READY TO RUN ON THE TRS 80 MODEL 1/III/IV/4P AND COLOR COMPUTER

# TANDY CORNER

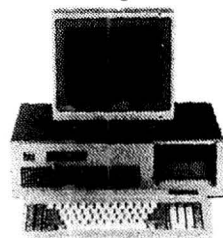
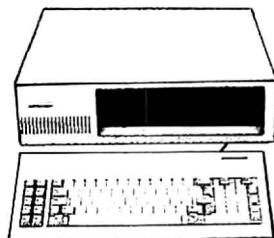
New Multifunction Card	Call
Clock/Calendar Option	39 <sup>95</sup>
256K Memory Board	99 <sup>95</sup>
512K Memory Board	139 <sup>95</sup>
10 MEG Kit	359 <sup>95</sup>
20 MEG Kit	429 <sup>95</sup>

# PRINTERS

STAR LV1200	199 <sup>95</sup>
STAR NX10	239 <sup>95</sup>
Panasonic 1091	239 <sup>95</sup>
Panasonic 1092	359 <sup>95</sup>
Epson LX 80	Call
Epson FX 85	Call
Epson FX 286	Call

FCC APPROVED

# I.B.M. Compatibles XT's AT's & Baby AT's



## Xt System

XT Case  
8088 (4.77Mhz)  
150 Watt PS  
5150 Keyboard  
1 360K Floppy  
256K expandable to 640K  
8 Slots

Only 469<sup>95</sup>

## AT System

AT Case  
80826 (8Mhz)  
200 Watt PS  
640K  
1.2Meg Floppy  
Floppy & HD Controller

Only 1495<sup>95</sup>

## Baby AT System

AT Case  
8088 Turbo  
150 Watt PS  
AT Style Keyboard  
360K Floppy  
256K expandable to 640K

Only 499<sup>95</sup>



**TRUE DATA PRODUCTS**

9 S. Main  
Uxbridge, MA 01569



**CALL US TODAY!!  
ORDER TOLL FREE**

**(617) 278-6555  
1-800-635-0300**

## MS-DOS

### Page One

FrontPage is an icon-based, desktop-publishing program from Studio Software that lets users create newsletters, brochures, reports, and other documents on an IBM PC/XT/AT or compatible and a laser printer.

A type-font library and preformatted document layouts are designed to increase the program's flexibility and ease of use. Also featured are full hyphenation and justification, the ability to mix type styles and sizes, and on-screen editing. You can combine graphics files from 1-2-3, AutoCad, and popular PC draw packages with typset-quality text on a single page.

FrontPage requires 512K RAM (640K is highly recommended), math coprocessor, graphics card and monitor, and a laser printer. The program sells for \$695.

Contact Studio Software, 17862-C Fitch, Irvine, CA 92714, 714-474-0131.

Circle 568 on Reader Service card.

### C-Worthy

Lifeboat Associates has introduced a C-language interpreter for professional software developers.

Run/C Professional combines object-code management and source-code debugging features with a built-in, full-screen editor and interpreted program execution. Several of these features are enhancements over Lifeboat Associates' earlier product, Run/C, The C Interpreter.

A 580-page manual is included. The interpreter runs on IBM PC/XT/ATs and compatibles and requires 320K RAM (512K is recommended) and DOS 2.0 or higher. It sells for \$250; an upgrade from Run/C, The C Interpreter (through version 1.32) sells for \$85.



Studio Software's FrontPage desktop-publishing program includes a type-font library.

For more information, contact Lifeboat Associates, 1651 Third Ave., New York, NY 10128, 212-860-0300. Circle 563 on Reader Service card.

### Digital Traffic Cop

Corporate Microsystems' MLink Data Communications System 5.0 is a software package for general-purpose asynchronous data transfer that runs on MS-DOS systems.

MLink now includes session capture, DEC VT100 terminal emulation, and three file-transfer protocols: sliding frame, Kermit, and x-modem. The sliding frame lets you send up to 15,360 characters before it requires acknowledgement. A built-in script language is also provided.

MLink is available for PC-DOS-, MS-DOS-, Unix-, Xenix-, and CP/M-based systems. It sells for \$195 to \$2,500, depending on the configuration. For details, contact Corporate Microsystems Inc., P.O. Box 277, Etna, NH 03750, 603-448-5193.

Circle 556 on Reader Service card.

### Hacker 007

Activision Inc. has released Hacker II: The Doomsday Papers, an adventure-simulation sequel to Hacker.

In the original, the user is confronted with a simulated computer malfunction that

causes the accidental breakdown of a private computer system. There are no rules and no clues; the user must seek out information and determine what to do with it.

In the sequel, the government has uncovered a plot to destroy the United States and has asked the player to gather intelligence. A top-secret operations document serves as a guide.

Hacker II: The Doomsday Papers runs on the IBM PC and Tandy 1000. It sells for \$39.95. For details, contact Activision Inc., 2350 Bayshore Frontage Road, Mountain View, CA 94043, 415-960-0410.

Circle 551 on Reader Service card.

### Business Expansions

The Dac-Easy Business Series from Dac Software Inc. has four new additions: Dac-Easy Port, Dac-Easy Mate, Dac-Easy Accounting Tutor, and Dac-Easy Payroll Tutor. The first two are utilities that expand the capabilities of the company's Dac-Easy Accounting and Dac-Easy Payroll programs. The second two are tutorials for beginners. The programs require 256K RAM and are designed to run on the IBM PC and compatible computers.

Dac-Easy Port (\$29.95) transports information from

the account, vendor, customer, inventory, or payroll files of Dac-Easy Accounting and Dac-Easy Payroll to many popular spreadsheets. Dac-Easy Mate (\$39.95) adds several new features to the accounting and payroll packages, including file windowing, a road map for moving among modules, macro capabilities, and a built-in calculator.

Dac-Easy Accounting Tutor and Dac-Easy Payroll Tutor are stand-alone reference supplements that provide step-by-step instructions for using the programs. Each is priced at \$19.95.

For more information, contact Dac Software Inc., 4801 Spring Valley Road, Building 110 B, Dallas, TX 75244, 214-458-0038.

Circle 557 on Reader Service card.

### Faster Backups

Intelligent Backup DMS/PC from Sterling Software is designed to eliminate reprocessing of the 80 percent of data that normally remains unchanged during backup. It runs on IBM PC/XT/ATs and compatibles.

You can choose the type of backup and restore functions required and select incremental, consolidated, and full backup functions for one or several hard disks. You can list, rename, delete, create, and move files and directories without using DOS commands (the latter are also accessible from within the program).

Intelligent Backup DMS/PC is not copy-protected. It is fully compatible with MS-DOS computers, local-area networks (LANs), windowing/multitasking systems, and micro/mainframe links. It sells for \$149.95.

For further information, contact Sterling Software, Software Labs Division, 202 E. Airport Drive, Suite 280, San Bernardino, CA 92408, 714-889-0226.

Circle 567 on Reader Service card.

## NEW PRODUCTS

### Windows Spell

Windows Spell from Palantir Software lets you check the spelling in most Microsoft Windows documents, including complex formats like Windows Write, Windows Draw, In\* a \* Vision, and Microsoft Word.

The program calls on a 65,000 root-word dictionary to help you correct misspelled words; you can also create your own dictionary of special words. Windows Spell can run simultaneously with other Windows applications. It costs \$79.95.

For further information, contact Palantir Software, 12777 Jones Road, Suite 100, Houston, TX 77070, 713-955-8880.

Circle 565 on Reader Service card.

### Squiggly Lines

PDP is the new plotter-driver from BV Engineering that makes multicolor scientific and financial graphs on popular pen plotters.

The menu-driven, interactive program lets you enter data manually or automatically from files generated by Lotus's 1-2-3, Paperback Software's VP-Planner, Basic, Fortran, and others. A graph may contain six plots, each containing up to 1,000 data points from several files.

PDP can draw legends on each data point, and dotted, dashed, or solid lines may be mixed in one graph. The program is available for the PC-DOS, MS-DOS, and CP/M-80 operating systems for \$72.95.

For information, contact BV Engineering, 2200 Business Way, Suite #207, Riverside, CA 92501, 714-781-0252.

Circle 553 on Reader Service card.

### Color TV

The Chroma Pro CM 3000 is a high-resolution RGB color monitor from C. Itoh Digital Products Inc.

For color graphics applications, the monitor offers 640 by 240 resolution; flipping a switch on the back turns it into a true monochrome monitor with 720 by 350 resolution. Text-switch, brightness, contrast, vertical hold,

vertical size, and horizontal positioning controls are located on a side panel. A tilt/swivel base is optional.

The CM 3000 runs with IBM PC/XT/ATs and compatibles and is supported by such interface boards as IBM's Color Graphics Adaptor (CGA) and Tecmar's Graphics Master. It sells for \$699 and comes with a one-year warranty on parts and labor. For further information, contact C. Itoh Digital Products Inc., 19750 S. Vermont Ave., Suite 220, Torrance, CA 90502, 213-327-2110 or 800-423-0300.

Circle 554 on Reader Service card.

### Data-base Combination

TAS-Plus from Business Tools Inc. is a programmable data base designed to combine the features of a file manager, relational data base, and application-development system.

Front-end facilities include a 1-2-3-type format and on-line help screens. A special utility lets you convert files from Ashton-Tate's dBase III to TAS-Plus and vice versa. Up to 16 files may be open simultaneously.

TAS-Plus runs on IBM PC/XT/ATs (or 100 percent compatibles) with MS-DOS 2.0 or higher, and requires 384K of RAM. It sells for \$69.

For more information, contact Business Tools Inc., 4038-B 128th Ave. S.E., Suite 266, Bellevue, WA 98006, 206-644-2015.

Circle 552 on Reader Service card.

### Annotated Programs

James Halstead & Associates' Refer is a programming tool that reprints listings and cross-references variables, values, line numbers, labels, and reserved words.

Refer is designed to read any program on any disk saved in PC-standard ASCII source code. It can run in batch, command, or prompt mode; the MS-DOS compiled version prints code at a page a minute. Applicable languages include Assembly, Basic, C, Cobol, Fortran, Pascal, and Ada.

Circle 114 on Reader Service card.

## DIGITAL VISION

### NEW FOR TANDY 1000/1200 COMPUTERS

# COMPUTEREYES™

### VIDEO IMAGES ON YOUR COMPUTER!

Finally — an inexpensive way to capture real-world images on your computer's graphics display! COMPUTEREYES™ interfaces to any standard video source (video camera, VCR, etc.) to capture images for use with graphics programs, desktop publishing, picture databases, entertainment, etc. Hundreds of applications!

COMPUTEREYES™ features include:

- Half-card size
- Simple, menu-driven software control of all functions—capture routines, brightness and contrast adjustments, disk access
- Keyboard-controlled video switching to allow previewing the video source on the computer monitor.
- Works with standard CGA or EGA graphics capabilities — no additional boards needed
- Images compatible with almost all graphics handling programs
- Available as a complete system including quality video camera



ONLY \$249.95

Available for:

- TANDY and IBM PC compatibles
- Apple II, II+, IIe and IIC
- Commodore 64/128
- Atari 800/800XL/130XE

Consult factory for pricing.

See your dealer or order direct. Mass. residents add 5% sales tax. Mastercard, Visa accepted. To order, or for more information, write or call:

DIGITAL VISION, INC.

14 Oak Street — Suite 2 Needham, MA 02192 (617) 444-9040, 449-7160

Circle 185 on Reader Service card.

## 70 INCOME TAX PROGRAMS

(For Filing by April 15th, 1987)

TRS-80 Models I, II, III, 4/4P, 12 and 16  
also for PC-DOS and MS-DOS\*

### FEATURES: —

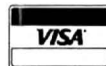
1. Our 8th year in TAX Programming
2. Menu Driven Programs
3. "SAVE" on Disk
4. View on Screen before Printing
5. Correctable
6. BASIC, Unprotected
7. Don't change paper ALL SEASON!
8. We Stand Behind our Programs!
9. Write for Details.

For the Tax Preparer, C.P.A., Lawyer and Individual. Hundreds of long-time Users. You buy ONLY the disks you need.

Programmed for easy-use. Programs follow the Forms closely. Check-points along the way. Results on screen before printing; can be corrected.

70 TAX PROGRAMS include: Forms 1040, 1040A, 1120, 1120A, 1120S, 1065 and 1041. Also ALL Schedules, and Forms 1116, 2555, 2106, 2119, 2210, 2441, 3468, 3800, 3903, 4136, 4137, 4255, 4562, 4684, 4972, 4797, 5695, 5884, 6251, 6252, 6765, 8027, 8283, 8332 and 8379. Also Tax Preparer HELPER disks.

There are 14 disks (@ \$24.75) for the Model I; 7 disks (@ \$49.50) for the Models III, 4/4P, PC-DOS and MS-DOS; and 3 disks (@ \$125) for the Models II, 12 and 16. Buy only the disks you'll need. MO & ME buyers, add Sales Tax, please. Write for details.



For TRSDOS Programs, WRITE: —  
GOOTH TAX PROGRAMS  
931 S. Bemiston • St. Louis, MO 63105

\*For PC-DOS and MS-DOS Programs, write:  
MICROCRON SYSTEMS  
P.O. Box 561, Old Town, ME 04468

# SAVE A BUNDLE

WITH ONE OF OUR BUNDLES

We have put together special bundles of software just in time to save you a bundle of money. Didn't you ever wonder why CP/M was so popular? The reason is the software availability. All programs (except EP) are for the Model 4/4P and have been optimized to install and run without hassle. For example, we have memory-mapped WordStar® and it runs circles around the standard version available elsewhere. We also added printer drivers for the Daisywheel II and the DMP-2100. Our CP/M® 2.2 is the best around. Read the reviews. You *know* the programs. You *know* the prices. This is the years' best value. You owe it to yourself to let these CP/M® programs and thousands of others (many in the public domain) start serving your needs.

**Bundle #1**  
 WordStar®  
 MailMerge™  
 SpellStar™  
 StarIndex™  
 Montezuma Micro CP/M®  
**\$299**  
 Delivered  
 RETAIL VALUE \$1009

**Bundle #5**  
 Electric Pencil™  
 Red Pencil™  
 Blue Pencil™  
**\$79**  
 Delivered  
 Works with TRSDOS, NEWDOS-80,  
 DOSPLUS and MULTIDOS  
 (Model 1,3,4)  
 RETAIL VALUE \$240

**Bundle #2**  
 WordStar®  
 DataStar™  
 ReportStar™  
 CalcStar™  
 Montezuma Micro CP/M®  
**\$333**  
 Delivered  
 RETAIL VALUE \$1354

**Bundle #3**  
 WordStar®  
 MailMerge™  
 SpellStar™  
 StarIndex™  
 DataStar™  
 ReportStar™  
 CalcStar™  
 Montezuma Micro CP/M®  
**\$444**  
 Delivered  
 RETAIL VALUE \$1699

**Bundle #4**  
 WordStar®  
 MailMerge™  
 SpellStar™  
 StarIndex™  
 dBASE II®  
 TurboPascal™  
 Montezuma Micro CP/M®  
**\$555**  
 Delivered  
 RETAIL VALUE \$1553

## Save A Bundle on these books and disks

Take advantage of our volume discounts. Buy any three items from this list and deduct \$5 from your total order. Buy four...deduct \$10. Buy five...deduct \$15. Buy six...deduct \$20 and so on. Buy a bunch, save a bundle. Please add \$1 each for shipping. Add \$5 to orders under \$50 for handling.



- TRS-80 Disk & Other Mysteries.** The "How to" book of data recovery for the TRS-80 Model I disk operating system. 128 pages. Retail \$22.50 **Now \$18**
- Microsoft BASIC Decoded & Other Mysteries.** The complete guide to Level II and BASIC. 312 pages. Retail \$29.95 **Now \$24**
- The Custom TRS-80 & Other Mysteries.** The complete guide to customizing TRS-80 Hardware and Software. 336 pages. Retail \$29.95 **Now \$24**
- BASIC Faster & Better & Other Mysteries.** The complete guide to BASIC programming tricks and techniques. 290 pages. Retail \$29.95 **Now \$24**
- BASIC Faster & Better Library Disk.** Contains 121 functions, subroutines and user routines. Search merge, compare and listing routines plus array handlers, BASIC overlays and video drivers. Retail \$19.95 **Now \$16**
- BASIC Faster & Better Demonstration Disk.** Contains 32 demos of the Library Disk contents above. Retail \$19.95 **Now \$24**
- BASIC Disk I/O Faster & Better & Other Mysteries.** Programming tips and techniques to store/retrieve data from disk. 432 pages. Retail \$29.95 **Now \$24**
- BASIC Disk I/O Faster & Better Demonstration Disk.** All of the major demo programs and library of disk I/O subroutines in 25 BASIC programs. Random, Indexed Sequential and TREESAM file handlers included. Retail \$29.95 **Now \$24**
- Machine Language Disk I/O & Other Mysteries.** A guide to machine language disk I/O for the TRS-80. 288 pages. Retail \$29.95 **Now \$24**
- TRSDOS 2.3 Decoded & Other Mysteries.** Detailed explanation of the Model I disk operating system. 298 pages. Retail \$29.95 **Now \$24**
- How To Do It On The TRS-80.** A complete applications guide to the TRS-80 Model I, II, III, 100, and Color Computer. 352 pages. Retail \$29.95 **Now \$24**
- The Custom Apple & Other Mysteries.** Who cares? Retail \$29.95 **Now \$19**

©1984 by Montezuma Micro. WordStar®, SpellStar™, StarIndex™, MailMerge™, DataStar™, ReportStar™ and CalcStar™ belong to MicroPro® International Corporation. CP/M® belongs to Digital Research Inc. dBASE II® belongs to Ashton-Tate, Inc. All the Pencils™ belong to Michael Strayer. Turbo Pascal™ belongs to Borland International.



# MONTEZUMA MICRO

214-339-5104  
 Redbird Airport, Hangar #8  
 P.O. Box 32027  
 Dallas, Texas 75232 "WE KEEP YOU RUNNING"



ORDER NOW . . . TOLL FREE  
**800-527-0347**  
**800-442-1310**

The Toll Free lines are for orders only. Specifications subject to change without notice.





# MONTEZUMA MICRO

P.O. Box 2169  
Camp Verde (Lizard Flats)  
Arizona 86322

WE KEEP YOU RUNNING

## MONTE SEES THE LIGHT!!!

After much thought and deliberation our founder, Monte Zuma, has decided (admitted) the future lies with MS-DOS and the Model 4/P/D using Montezuma CP/M. Consequently, from this time forward, our efforts will be directed toward Model 3/4 hardware, CP/M and MS-DOS. Thanks to all of you who have placed your confidence in us in the past. We invite you to join with us as we journey into the next generation. We offer a wide range of products for both MS-DOS and CP/M. Should you need an item not listed just ask about it. We have much more than can be shown here. Our friendly staff and near-perfect service is just a toll-free call away.

## CALL TOLL-FREE FREE SHIPPING!\*

\* (For orders over \$100)

**BUY FROM US RIGHT NOW!**  
(Please read the fine print first)

Our inventory is so large it can not be listed completely. Please call us if you do not see what you want. Chances are we have it or can get it right away. Because of the time lag in magazine advertising our prices are subject to change without notice. Our prices are for mail order only. We are only human so we decline responsibility for typographical errors. We welcome your company and/or personal checks. We use TeleCheck. Please follow these simple rules so your order will not be delayed. The check must be drawn on a US or Canadian bank and be payable in US Dollars. Your check must be bank printed and contain your street address (not PO Box or APO/FPO) and telephone number. The signature must exactly match the name printed on the check. That's all there is to it. We also accept American Express, MasterCard, Visa, Cashier's Checks, electronic funds transfer and we ship COD. COD's and motor freight shipments may require a deposit. Some special items may require a deposit. **ALL COD's** require cash on delivery. Company and/or personal checks can **NOT** be accepted in payment of COD shipments. Your credit card is not charged until we ship your order. Ground shipping charges are included on all orders over \$100. Add \$10 handling plus shipping to all orders under \$100. We do not collect State Sales Tax on orders shipped outside of Texas. Orders placed by 5PM will be shipped the next day if stock is on hand. Your order will leave before we go home. The responsibility of suitability of software rests with the purchaser. Due to the nature of the business and product there are **NO REFUNDS ON SOFTWARE**. Please do not buy software from us if you are not sure it will work for you. **SOFTWARE IS NOT RETURNABLE**. Software support is provided by the manufacturer. We will **PROVIDE A REPLACEMENT ONLY** if your disk is defective if you notify us within 30 days after delivery of your merchandise. Please call us for help and instructions should you have a problem.

### WARRANTY

All items carry the manufacturers' warranty and any problem in service will be handled by his service organization. We will be happy to mail you a copy of the warranty on request.

CALL TOLL FREE FROM ANYWHERE IN THE USA

**800-527-0347**  
**800-442-1310**



### MS-DOS BUSINESS SOFTWARE

Accounting Partner I	\$ 279
Accounting Partner II	699
Borland Turbo Lightning	53
BPI AP/AR/GL/Payroll	319
BPI Inventory	477
DAC Easy Accounting	49
DAC Easy Payroll	49
dBase III Plus	379
Framework II	469
Lotus 1-2-3, Use Twin	79
Microsoft Multiplan	127
Microsoft Word	249
MultiMate	239
PFS:File	88
PFS:Graph	88
PFS:Report	79
PFS:Write	88
R:Base 5000 1.01	379
R:Base Extended Report Writer	85
Reflex: The Analyst	53
Sidekick, non-protected	49
Superkey	37
Twin, 1-2-3 Clone	79
V P Planner	56
Word Perfect 4.1	239
WordStar 2000 Plus 1.01	299
WordStar 3.31	189

### MS-DOS RECREATIONAL SOFTWARE

F-15 Strike Eagle	\$ 23
Gato	23
Hitchhikers Guide to the Galaxy	25
Jet	35
Kings Quest	32
Microsoft Flight Simulator	32
Sargon III	32
Wizardry	38
Zork I	25

### MS-DOS HOME SOFTWARE

Bank Street Writer	\$ 51
Dollars and Pence	115
Micro Cookbook	29
Managing Your Money	113
Newsroom	30
Print Shop	38
Print SShop Graphics Library	22

### CABLES

TRS-80 Printer cable 26-1401	\$ 89
IBM Parallel Printer Cable 6'	15
IBM Parallel Printer Cable 10'	22
Keyboard Extender Cable, 6'	10
TTL Monitor Extender Cable 6'	10
Standard 25 pin RS232 Cable 10'	20
Gender Changer, Specify M/M or F/F	9
Printer A/B Switch Box Cable 6'	20

### MS-DOS EDUCATIONAL SOFTWARE

Mastertype	\$ 26
Math Blaster	29
Mind Prober	30
Spell It!	29
Typing Tutor III	32
Word Attack	29

### MS-DOS

SYSTEMS - UTILITIES - LANGUAGES

Bourbaki "1 Dir"	\$ 59
Crosstalk XVI	99
Microsoft Windows	63
Microsoft Quick BASIC Compiler	69
Norton Utilities	55
Sideways	39
Smartcom II	88
Superkey	39
Turbo Editor Toolbox	39
Turbo Gameworks	39
Turbo Graphics Toolbox	30
Turbo Pascal	39
Turbo Tutor	19

### RODENTS

Microsoft Parallel w/PC Paint	\$ 129
Microsoft Serial w/PC Paint	139
Mouse Systems Mouse w/PC Paint	139
Willard/Ben Combo w/Friends	CALL

### ADD-ON MEMORY & UPGRADES

16K RAM, 200nsec, 8 chips	\$ 9
64K RAM, 150/200nsec, 8 chips	16
Model 4 128K RAM kit w/PAL chip	26
64K RAM Upgrade set of 9 chips	18
256K RAM Upgrade set of 9 chips	39
8087 Numeric coprocessor, std	119
8087 Numeric coprocessor, fast	149
80287 Numeric coprocessor, std	179
80287 Numeric coprocessor, fast	399
NEC V20 Wonder Chip, 5mHz	13
NEC V20 Wonder Chip, 8mHz	23
Model 1 RS-232 Kit complete	89
Model 3/4 RS-232 Kit complete	69
Model 3/4 Internal Drive Kit	169

### MODEMS

Anchor Signalman 1200 external	\$ 279
Anchor Signalman 2400 external	415
Anchor 1200 int w/software	199
Anchor 2400 int w/software	335
Hayes 300 external	149
Hayes 1200 external	399
Hayes 1200B internal w/SCom	369
Hayes 2400 external	599
Hayes 2400B internal w/SCom	569

### ACCESSORIES

Sony 5" 2DD disks, box of 10	\$ 13
Our own 5" 2DD disks, bag of 10	9
Flipsort, holds 50 5" diskettes	15
Tilt and Swivel Monitor Stand	19
Vert CPU Stand PC/XT/CLONE	25
2-position Printer Switch	49
2-position RS-232 Switch	49
Standby Power Supply, 300 Watt output for 20 minutes	249

### CP/M SOFTWARE

WordStar 3.3	\$ 250
WordStar Professional	450
ReportStar	150
DataStar	175
CalcStar	95
Multiplan	159
Supercalc II	199
Turbo Pascal	45
Turbo Tutor	23
Turbo Editor Toolbox	45
Turbo Holiday Pak	99
Pickles & Trout CP/M Mod 2, 12, 16	180

*All of the above CP/M software is available in various 5-1/4" formats as well as 8" standard CP/M format. Please specify format and include \$10 per disk additional.*

### IBM - CLONE - MS-DOS BOOKS & MANUALS

IBM BASIC Faster & Better	\$ 22
IBM BASIC Disk for above	16
IBM BASIC Manual 3rd Ed	19
Running MS-DOS 2nd Ed	17
Using 1-2-3 Release 2	14
Using Wordperfect 4.1	13
Using Displaywrite 3.0	13
PC-DOS Performance Guide	14
Norton Programmer's Guide	15
1-2-3 Tricks, Tips, Traps	13
1-2-3 Macro Library	15

See opposite page for more books.

### TRS-80 BOOKS & SOFTWARE

Modem 80 M1/3 Com Program	\$ 33
Trackcess. M3, Orig Copy Program	19
Super Utility Plus 3.2 M1/3/4	49
Super Utility Plus M4-4P only	49
SuperCROSS/XT Specify M1/3/4	79
Convert 3 to PC M3 BASIC to PC	119
Convert 4 to PC M4 BASIC to PC	119
TRS-80 Beginners Guide	13
Using Super Utility Plus	16
TRS-80 M4/4P Technical Manual	33
TRS-80 M1000 Technical Manual	25
Using Super Utility Plus 3.x	16

See opposite page for more books.

# THE RS-232

## MODEL III                      MODEL 4

TRS-80 MODEL III  
TRS-80 Model 4  
RS-232 SERIAL INTERFACE  
MODIFICATION KIT

Manual Number 1006002

4831 South Hampton Road • L.B.#1  
DALLAS, TEXAS 75232  
214/330-1332

State of the art technology in board design, our direct replacement of Radio Shack's internal RS-232 board, mounts inside the Model III or 4 on the existing brackets. All cables, screws and complete mounting instructions are included. Non-technical people will find that installation is quick, straight forward and simple requiring less than 15 minutes to complete.

Total compatibility with Radio Shack® and all existing software is maintained. Software programmable baud rates from 50 to 19,200 baud are supported along with programmable word length, stop bits, and parity. May be utilized in either half of full duplex operation.

**Outstanding Value**  
**At Only \$69.95**  
Guaranteed One Full Year  
*Dealer Inquiries invited*

**Please forward payment by a cashier's check or money order.**  
Visa or Mastercharge also accepted.  
Add \$3.00 shipping & handling  
(Foreign orders quoted on request)

Circle 371 on Reader Service card.

## 8 MHZ SUPER SPEED-UP

FASTEST SPEED-UP AVAILABLE  
(models 1,3,4,4P,4D - all versions)  
BESTSELLER!!! MAKE YOUR COMPUTER THE FASTEST IN TOWN!  
No Wait-States -  
software and/or hardware controlled ..... **\$129.99**

### SUPER-RAM

(ramdisk version) 4.14  
Ramdisk program to use 128k -1 megabyte memory, the most extended program on the today market. New-dos-80 or TRSDOS 6.X ..... **\$ 49.50**  
upgrade for older versions \$4.00 + old diskette

### ONE MEGABYTE MEMORY BOARD

FOR MODEL 4 (non gate array. All versions) . . . . **\$175.00**  
FOR MODEL 4P (gate array & non gate array) . . . **\$175.00**  
FOR MODEL 4 (gate array) . . . . . **\$225.00**  
FOR MODEL 4D (gate array) . . . . . **\$225.00**

### 1/2 MEGABYTE MEMORY BOARD

FOR MODEL 4 (non gate array. All versions) . . . . **\$125.00**  
FOR MODEL 4P (gate array & non gate array) . . . **\$125.00**  
FOR MODEL 4 (gate array) . . . . . **\$175.00**  
FOR MODEL 4D (gate array) . . . . . **\$175.00**

Memoryboards without 256k(150ns) Chips. Price \$40 a set (8 chips). 1/2 MEG = 16 chips.  
1 MEGABYTE = 32 chips

---

## SEATRONICS

P.O.B. 4607 - 6202 ZA MAASTRICHT - HOLLAND  
TELEX 56509                      **MONEY BACK GUARANTEE**  
Please specify exact system configuration for orders or requests  
VISA - MASTER CARD - ACCES - EUROCARD -  
TRAVELERS CHEQUES                      *S & H \$4 for software; \$8 for hardware*

## NEW PRODUCTS

Refer requires 128K RAM, a printer, and MS-DOS or PC-DOS. It sells for \$45. For more information, contact James Halstead & Associates, 1551 Plainfield, Joliet, IL 60435, 815-725-0346.

Circle 560 on Reader Service card.

### Science in Print

CMI Software has released TechWriter 2.2, a word processor that blends scientific and mathematical characters and equations with regular text.

TechWriter 2.2 displays and prints more than 280 special characters, including Greek, mathematical, chemical, boldface, underlining, super- and subscript, and two number sizes. Macro keys let you call on building blocks to draw carbon rings and other chemical symbols. An optional 120,000-word spelling checker is available; common word-processing features are standard, including automatic pagination, visible page breaks, and mail merge. Sixty-five printer drivers are also included.

TechWriter 2.2 runs on IBM PC/XT/ATs and compatibles and sells for \$595 (the spelling checker is \$100). For more information, contact CMI Software, 1395 Main St., Waltham, MA 02154, 617-899-7244.

Circle 555 on Reader Service card.

### Index-a-matic

The Text Indexer from Publishers Software Network scans text files to create glossaries and indexes. It was developed in cooperation with the University of Utah Writing Program.

After you enter word-processor file names, the program generates a word list (excluding connecting words like "through," "above," "as," and so on) that you can edit and cross-reference. A separate index lists the words by page number or by other categories you choose yourself.

Text Indexer runs on the IBM PC and compatibles. It requires 256K RAM and PC-DOS or MS-DOS 2.0 or higher; two disk drives are also required, but a hard disk is recommended. The pro-

gram sells for \$239; demonstrations containing a sample index and instructions sell for \$9.

For more information, contact Publishers Software Network, 4314 Sage Circle, Salt Lake City, UT 84124, 801-263-1512.

Circle 566 on Reader Service card.

### A Directory Of Directories

Lassen Software Inc. has released Diskette Manager Plus, a program designed to replace the original Diskette Manager.

The program reads directories from up to 20 disks to create a catalog tailored by the user. You can also produce printed labels with space for six lines of comments on each disk, including such information as the creation date, number of files, and amount of remaining disk space.

The IBM PC/XT version of Diskette Manager Plus costs \$59.95 and requires 128K RAM, an 80-character display monitor, DOS 2.x or 3.x, two double-sided drives (or one double-sided and one fixed-disk drive), and a printer. A version for the IBM PC/AT and compatibles sells for \$79.95.

For further information, contact Lassen Software Inc., P.O. Box 1190, Chico, CA 95927, 916-891-6957.

Circle 562 on Reader Service card.

### Words And Pictures

EnerMerge from Enertronics Research Inc. lets you combine graphics with text and print the result with the word processor's Print command.

Screen images can be saved from within a graphics program and stored in a special file that you call up later from your word processor. From there, you can modify the images' size and appearance and send it to the printer. The program is memory-resident and supports most word processors and 35 popular printers.

EnerMerge runs on IBM PC/XT/ATs and compatibles; it requires a hard-disk or double-sided, double-density

## NEW PRODUCTS



The half-board integral modem from OmniTel is compatible with industry transmission standards.

drive, 85K of separate RAM space, a graphics or laser printer, an IBM or compatible color graphics board, and DOS 2.0 or higher. The program sells for \$199.

Contact Enertronics Research Inc., 5 Station Plaza, 1910 Pine St., St. Louis, MO 63103, 314-421-2771.

Circle 558 on Reader Service card.

### Keeper Of the Keys

Commander is a multiwindow user interface from Keyword Office Technologies Ltd.; it provides access to 253 applications through user-defined function keys.

The program is designed to help system integrators and other microcomputer users bypass complicated DOS commands and tailor menus to their needs. It runs on 128K IBM PCs and compatibles with DOS 2.0 or higher. Two floppy disks or one hard disk and one floppy disk are required.

Commander sells for \$49.95. Contact Keyword Office Technologies Ltd., 2816 11 St. N.E., Calgary, Alberta T2E 7S7, 403-250-1770.

Circle 561 on Reader Service card.

### Encore, Encore

OmniTel Inc. has introduced a half-board integral modem for IBM PC/XT/ATs and compatibles.

The Encore 2400 HB is a Hayes-compatible, asynchronous modem that runs at 300, 1,200, and 2,400 baud.

Features include software-controlled volume, call-progress reporting, and automatic speed selection and fallback.

The modem comes with a two-year warranty and sells for \$399. For information, contact OmniTel Inc., 5415 Randall Place, Fremont, CA 94538, 415-490-2202.

Circle 564 on Reader Service card.

### Generic Teammates

Generic Software Inc. has released four new products in its line of CADD (computer-aided drafting and design) software for IBM PCs and compatibles.

Generic CADD 2.0 (\$99.95) features plot spooling, macros, global editing, and greater speed. Other new features include word-processor-like editing and tree-structured menus.

FirstCADD (\$49.95) is a shorter, introductory CADD program for beginners. It requires 256K RAM, a graphics board, and two drives.

Auto-Convert (\$24.95) is a modular add-on package for transferring files from Generic CADD to AutoCADD.

AutoDimension (\$49.95) adds dimensions and legends to drawings generated by Generic CADD.

All four programs come with a 60-day, money-back guarantee. Contact Generic Software Inc., 8763-148th Ave. N.E., Redmond, WA 98052, 206-885-5307.

Circle 559 on Reader Service card.

Circle 235 on Reader Service card.

More than Speed Reading!

# POWER READING

...with the Personal Learning System

Use your computer to double or triple your reading speed without skipping words. Power Reading trains you to read groups of words at a glance—in clusters. No skipping words as in Speed Reading. Learn to instantly switch from pleasure reading to study reading; always at increased speeds. Automatically adjusts to individual abilities. With Power Reading techniques, you read every word to increase comprehension and make reading easier and more enjoyable. Better than expensive classes.

READ FASTER — UNDERSTAND MORE ...

... AND HAVE MORE FREE TIME!

**\$69.50 Complete Package** • No computer knowledge needed  
• Unlimited back-ups • Single keystroke operation!  
• Grades 7 through Adult—tested!

**NO RISK!**

**MONEY-BACK GUARANTEE**

**DOUBLE YOUR READING SPEED IN 15 DAYS OR YOUR MONEY BACK!**

- At school: Easier test-taking; get better grades
- At work: Be more productive; save hours of time
- At home: Keep up with news, magazines, books

Model III/4

MS-DOS T/1000, 1200, 3000, IBM

Call Toll-Free (Day or night)

**800-628-2828 Ext. 832**

or send your order to:

**LSR Learning Associates, Inc**

**Box 3264 Farmingdale, New York 11735**

Circle 46 on Reader Service card.

**TRS80 - CP/M - MS-DOS - CoCo!**

**Hypercross 3.0 - The Third Generation in File Transfer.**

Using HYPERCROSS 3 you can COPY files between TRS-80 disks and those from many CP/M and IBM-PC type computers on your own TRS-80 model I, III, 4/4P or Max-80. If you have access to more than one kind of computer, or you are changing to a new machine then you need HYPERCROSS to transfer your text files, BASIC, FORTRAN PASCAL or C programs. Viscalc files, general ledger and accounting files, data bases and even binary files. You can FORMAT alien disks, read their directories, copy files to and from them, even copy directly from one alien disk to another.

**Formats supported:** IBM-PC and MS-DOS compatibles include DOS 1.1, 2.0-3.2 Tandy 2000, single and double sided, 3.5 and 5 inch. CP/M from Aardvark to Zorba, including all popular TRS80 formats such as Holmes, Montezuma, and Omikron TRS-80 Color Computer format also supported.

**Hypercross converts Basic files** Now Hypercross includes a feature to automatically change the tokens in a TRS-80 file to the correct format for CP/M or MSDOS. As you copy, Hypercross automatically converts the Basic files, putting in spaces, changing PRINT @, correcting syntax errors and flagging parts needing manual modification.

**Tried and Tested** in 1000s of installations world wide, by Industry, Universities, Government Institutions and nice TRS-80 owners everywhere. Prices include disk, manual, and shipping. Upgrades from any version of Hypercross or SuperCross for old disk + \$5 + price difference (\$15 min).

Hypercross 2.0 for CoCo format (No Basic convert) .....	\$49.95 ppd
Hypercross 3.0 CP/M 40 single sided CP/M formats .....	\$54.95 ppd
Hypercross 3.0 PC with popular MSDOS formats .....	\$54.95 ppd
Hypercross XT/3.0 with 90 CP/M and PC formats .....	\$89.95 ppd
Hypercross XT/3.0-Plus. Now with 220 formats inc CoCo .....	\$129.95 ppd

**Specify TRS-80 Model I (needs doubler), III, 4/4P or MAX-80.**  
Dual model versions e.g. Mod 3/4 on one disk add \$10 extra.

**Amazing HYPERZAP 3.2G Disk Magic!**

Do you want to back up your precious copy of Copycat 3, or SU. Do you want to fix or modify a disk - if so then you need HYPERZAP! On the market for 3 years, HYPERZAP is more than just another disk copying program - it is the program for analyzing, copying, repairing, creating floppy disks of all kinds. It works with TRS-80 formats as well as many others such as CP/M, PC, CoCo etc. Designed to handle mixed density sectors on any track in any sequence. Many features for reading, writing, editing track and sector data. Hyperzap is the tool that lets you be in charge. **Make your own self booting disks.** Take your own CMD file and turn it into a dual booting Mod 1/III/IV disk. **Autopilot mode** allows learns, saves and repeats procedures. Disk comes with fascinating examples. Use Hyperzap as a learning tool - find out how things are done!  
HYPERZAP 3.2G - nothing else even comes close! .....

**Arranger II Disk Index System**

World's finest TRS80 disk cataloging system. Now you can find that file when you want it. Arranger will CATALOG, SORT and FIND you to 11000 files fast! Runs on any Model I, III or IV and automatically recognizes any DOS even double sided.  
Arranger II from Triple D - highly recommended .....

**Xenocopy II for the PC!**

Read and write up to 275 different formats on your IBM PC or compatible. Includes CP/M, CoCo, UCSD Pascal, NECDOS, Atari ST, etc .....

**HYPERSOFT**

PO Box 51155, Raleigh, NC 27609  
(919) 847-4779 8 am-11 pm EST



# Tandy 1000 Memory Card

another high quality product from Southwestern Digital

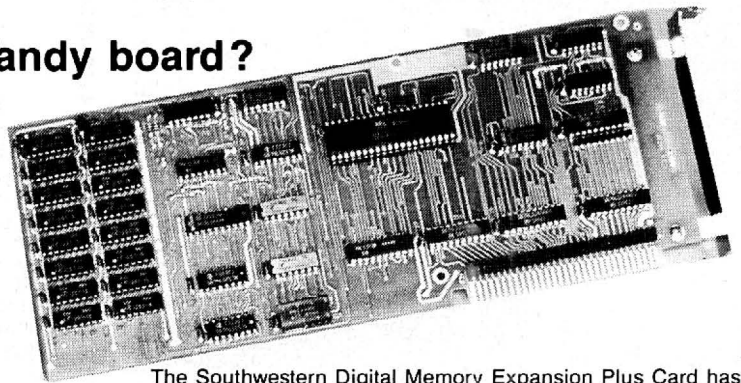
## Why spend a bundle on a Tandy board?

## Our Board is only

# \$135.

### Features:

- 512K of Memory
- DMA
- Expansion Port
- Gold Edge Cards
- Easy Installation
- 30 Day Satisfaction Guarantee Policy



The Southwestern Digital Memory Expansion Plus Card has all the features of the Radio Shack Board but the price; you save almost \$400. Features include 512K installed, burned in, and tested to give you a total of 640K, a DMA circuit that is fully tested for hard drive operation, and an expansion port that will work with any of the Radio Shack Memory Plus Expansion Card options. High quality manufacturing, and features such as gold plated card edges make this the logical choice in upgrading your memory.

## Tandy 1000 Add on Boards Serial, Clock, or Both

The Southwestern Digital new Add-On boards were developed for use with the Plus Card Port, ( a piggy-back type, add on port established by Tandy to eliminate the need for an additional card slot ). These cards are fully compatible with the Memory Expansion Plus Card from Southwestern Digital and the Memory Expansion Plus Board from Tandy.

### RS232C PLUS Option Board

Mounts on a PLUS expansion board, and features selectivity between COM Port 1 and COM Port 2. The RS232C output connector is the standard Tandy female DB25, and is fully compatible with the Tandy output. \$85.

### Clock/Calendar PLUS Option Board

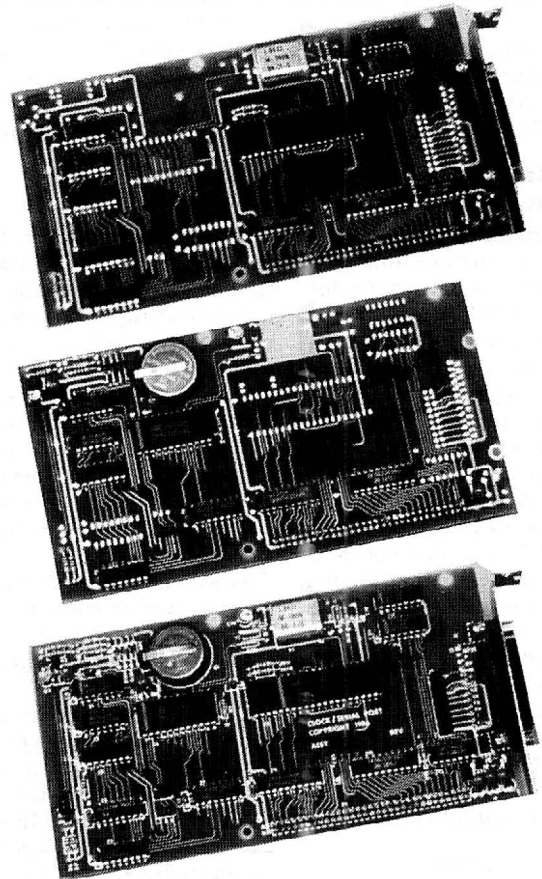
Mounts on a Plus expansion board, and features selectivity between two ports so that you can run two clocks at one time. The Clock Calendar Board gives you perpetual time/date so that you don't have to re-input time and date into your application programs as part of your power up routine. \$85.

### RS232C-Clock/Calendar PLUS Option Board

Features options of both of the above boards on just one board. \$170.

### Save on the Combination

512K, RS232C-Serial Port, and Clock ..... \$245.  
(Includes RAM DISK and PRINTER SPOOLER)



Order Line  
1-713-480-3296

**Southwestern Digital**  
17333 El Camino Real  
Houston, TX 77058

### Ordering Information

Call us or mail your order in. We accept Visa, Mastercard, and Certified Funds for quickest shipment. Personal checks are held for clearance. Add \$5. for ground shipment, or \$10 for UPS 2nd day air service. All products carry a 30 day satisfaction guarantee, and are warranted for a full year.

## NEW!

20 Megabyte Tandy 1000 HARD DRIVE ..... \$550.  
(for use with 1 or 2 Disk Drives)

### Tandy 1000 Computer System

Tandy 1000 with 640K, RS232 Serial Port, Clock/Calendar, and a 20 Meg Hard Drive ..... \$1450.

# TRSDOS

## Chapter and Verse

Fax Plus Computing is offering the complete King James Version of the Bible on disk. The KJV Bible-on-Disk contains all 66 books of the Bible with a separate file for each of the 1,189 chapters. The 64-column text format permits printing with standard margins and allows for easy reading on screen. Chapter and verse bear the traditional notation, with inferred readings given in brackets.

The text files are in ASCII and can be extracted, emphasized, and otherwise manipulated with a word processor for personal Bible study. The disks are not copy-protected and may be circulated in the public domain.

The KJV Bible-on-Disk is available in MS-DOS 2.11,

TRSDOS 1.3 and 6.2, and over 100 CP/M formats for \$99. For more information, contact Fax Plus Computing, 373 Wilson St., Derry, PA 15627, 412-694-5750.

Circle 571 on Reader Service card.

## Portable Expansion

The Portable Computer Support Group (PCSG) has added Expansion Basic, a new snap-in ROM feature, to its Model 100 RAM+ software. The new feature allows users of the PCSG 128K memory expansion to create data files using all available memory, thus ending the frustration of squeezing code into the 32K typically available on the Model 100.

Expansion Basic permits Model 100 users to create programs that read and write files to any memory bank. If a program uses all of the memory in the first bank, it spills over into the other banks and

uses memory as needed. To the user, the file appears as one continuous 128K of RAM.

The ROMware works only with the PCSG/Cryptronics Model 100 RAM+ memory expansion. The price for the 128K memory expansion is \$425. Current owners of the 64K module can upgrade to 96K for \$50. For information, contact the Portable Computer Support Group, 11035 Harry Hines Blvd., Dallas, TX 75229, 214-351-0564.

Circle 573 on Reader Service card.

## Helpful Hands

Poor Person Software announces Cut and Paste, Auto-Dialing, and Keys—three new functions for Write-Hand-Man, its desktop organizer for use with CP/M 2.2 and 3.0 systems. With the addition of these functions, Write-Hand-Man now contains nine applications. The original features are Notepad, Phonebook, Cal-

endar, DIR, View, Calculator, Hex, and Termcomm.

Cut and Paste allows you to transfer information among files when using the program's Notepad, View, or Calculator applications. Auto-Dialing, now a standard feature of Phonebook, lets you make phone calls automatically on a Hayes-compatible modem. The third function, Keys, lets you define up to eight keys on the keyboard.

Write-Hand-Man is available for CP/M 2.2, CP/M 3.0 and ZRDOS systems for \$49.95. Upgrades of earlier versions are available for a \$7 handling fee.

For information, contact Poor Person Software, 3721 Starr King Circle, Palo Alto, CA 94306, 415-493-3735.

Circle 572 on Reader Service card.

## Test Patterns

Shenandoah Software's Exams II is a test generator

Circle 152 on Reader Service card.

NEW PRINTERS ADDED! FIND YOURS BELOW. <b>RIBBON SALE</b>		EXACT REPLACEMENTS			
Good This Month		RIBBON SIZE	NEW CARTRIDGES	RELOADS	INSERTS EZ-LOAD™
PRINTER	MAKE, MODEL NUMBER	Inches by Yards	From the various manufacturers or made in our own shop. Ready to use.	You SEND your used CARTRIDGES to us. WE put OUR NEW INSERTS in them.	DROP IN. NO WINDING! EXACT REPLACEMENTS made in our own shop. Cartridges NOT included.
Contact us if your printer is not listed. We have many more in stock. We can probably RELOAD your old cartridges.					
C ITOH Prowriter	1550-8510, NEC 8023-8025, APPLE DMP-IMAGEW	1/2 x 18	\$15/2 \$42/6 \$ 78/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
C ITOH STARWRITER F-10-40	Carbon Film Black	5/16 x 130	\$18/3 \$60/12 \$342/72	\$5 ea 3-11 \$4 ea 12 or more	\$24/6 \$42/12 \$234/72
DIABLO HYTYPE II	Fabric Black	1/2 x 130	\$18/2 \$51/6 \$ 96/12	\$8/1 \$7 ea 2 or more	\$21/3 \$78/12 \$432/72
RADIO SHACK-TOSHIBA-COMMODORE-PANASONIC-RICOH	Black (1445)	1/2 x 52	RS DMP-2200	\$18/1 \$16 ea 2 or more	\$30/3 \$57/6 \$108/12
Carbon Film - DWP 210 (Hytype II)	Black (1419)	5/16 x 145	\$18/3 \$60/12 \$342/72	\$5 ea 3-11 \$4 ea 12 or more	\$24/6 \$42/12 \$234/72
DW II, DWP 410-510, RICOH 1200-1300-1600	Black (1419)	1/4 x 145	\$18/3 \$60/12 \$342/72	\$5 ea 3-11 \$4 ea 12 or more	\$24/6 \$42/12 \$234/72
Red, Green, Blue, Brown	Colors (1419)	1/4 x 130	\$21/3 \$72/12 \$414/72	\$6 ea 3-11 \$5 ea 12 or more	\$30/6 \$54/12 \$234/72
Fabric (Long Life), DWP 210 (Hytype II)	Black (1458)	5/16 x 17	\$18/2 \$51/6 \$ 96/12	\$8/1 \$7 ea 2 or more	\$21/3 \$78/12 \$432/72
DW II, DWP 410-510, RICOH 1200-1300-1600	Black (1449)	NOTES LOAD 1/4 x 25	\$18/2 \$51/6 \$ 96/12	\$8/1 \$7 ea 2 or more	\$21/3 \$78/12 \$432/72
DMP-100, LP VII, COMMODORE 1525, GORILLA BANANA (1424)	(1296) (1483)	Inker Loop	\$18/2 \$51/6 \$ 96/12		
DMP-200, 120, (430 Inserts & Reloads Only)	(1296) (1483)	1/2 x 20	\$20/2 \$57/6 \$108/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
DMP-400-420, LP VI-VIII, PANASONIC KXP-130-1093	(1418)	5/16 x 14	\$15/2 \$42/6 \$ 78/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
DMP-500 (130 Inserts & Reloads Only)	(1236) (1482)	1/2 x 20	\$22/2 \$63/6 \$120/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
DMP-2100, TOSHIBA P1340-1350-1351-351	(1442)	1/2 x 20	\$15/2 \$42/6 \$ 78/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
LP I-II-IV, CENTRONICS 730-737-739-779 (Zip Pack)	(1413)	9/16 x 16			\$12/3 \$45/12 \$252/72
LP III-V, CANON A1200 (New Only) (1/2 x 5)	(1414)	1/2 x 15	\$15/2 \$42/6 \$ 78/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
EPSON LQ 1500, (LQ 800, LQ 1000 Inserts and Reloads Only)		1/2 x 14	\$18/2 \$51/6 \$ 96/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
MX-FX-RX 70-80-85, LX 80-90 (5/16 x 7), IBM PC (5152)		1/2 x 20	\$14/2 \$36/6 \$ 66/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
MX-FX-RX 100-185-286, IBM PROPRINTER (7/16 x 20) (4201)		1/2 x 30	\$18/2 \$51/6 \$ 96/12	\$8/1 \$7 ea 2 or more	\$18/3 \$66/12 \$360/72
DX 20-35 Carbon Film (Multistrike), OLIVETTI ET-121-221		5/16 x 290	\$21/3 \$72/12 \$414/72	(Call for Correctable Prices)	
NEC Spinwriter-Carbon Film - 2000-3500 (Reloads BCCOMPCO Only)		5/16 x 145	\$18/3 \$60/12 \$342/72	\$5 ea 3-11 \$4 ea 12 or more	\$24/6 \$42/12 \$234/72
-Fabric	- 5500-7700 (Can Reload Most Types)	NOTES LOAD 1/4 x 145	\$18/3 \$60/12 \$342/72	\$5 ea 3-11 \$4 ea 12 or more	\$24/6 \$42/12 \$234/72
-Fabric	- 2000-3500 (Can Reload All)	1/2 x 14	\$18/2 \$51/6 \$ 96/12	\$8/1 \$7 ea 2 or more	\$15/3 \$54/12 \$288/72
-Fabric	- 5500-7700 (Can Reload All)	1/2 x 13	\$15/2 \$42/6 \$ 78/12	\$8/1 \$7 ea 2 or more	\$15/3 \$54/12 \$288/72
Pinwriter P1-P2-P6		1/2 x 20	\$25/2 \$69/6 \$126/12	\$7/1 \$6 ea 2 or more	\$15/3 \$54/12 \$288/72
P3-P7		1/2 x 27	\$30/2 \$84/6 \$156/12	\$8/1 \$7 ea 2 or more	\$18/3 \$66/12 \$360/72
OKIDATA Pacemark 2350-2410 Black		1/2 x 100	\$25 each	\$20/1 \$18 ea 2 or more	\$36/3 \$132/12 \$702/72
Microline 182-183-192-193		Inker Loop	\$20/2 \$57/6 \$108/12		
ML-80-82-83-92-93 (Call for ML-84 Prices)		1/2 x 16	\$21/6 \$36/12 \$198/72		
MANNESMAN-TALLY MT-160, RITEMAN INFORUNNER (Inker Loop)		9mm x 11	\$19/2 \$54/6 \$102/12		
MT-180-290		9mm x 13	\$20/2 \$57/6 \$108/12		
-SPIRIT 80 (SP80) COMMODORE 1526 (Multistrike)		1/2 x 35	\$16/2 \$45/6 \$ 84/12		
PANASONIC KXP-1080-1090-1091-1092-1592-1595		Inker Loop	\$20/2 \$57/6 \$108/12		
BROTHER HR-15-25-35	Carbon Film (Multistrike)	5/16 x 82	\$18/3 \$60/12 \$342/72		
COMREX DX-15, II	Fabric (Call for Comrex 420 Prices)	5/16 x 17	\$15/2 \$42/6 \$ 78/12		

SEND CHECK, MONEY ORDER, OR C.O.D. TO:

**BCCOMPCO**

800 South 17 Box 246

Summersville, MO 65571 • (417) 932-4196

WE PAY UPS GROUND SHIPPING ON PREPAID ORDERS.

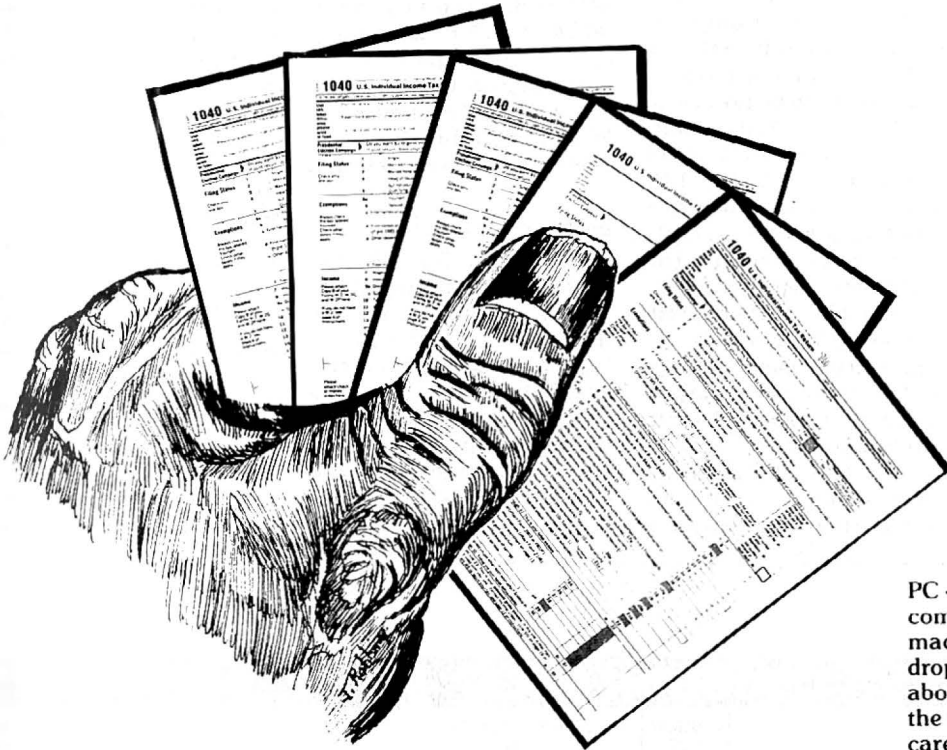
PLEASE INCLUDE STREET ADDRESS FOR UPS DELIVERY

FOREIGN ADD 15% U.S. FUNDS.

MISSOURI RESIDENTS ADD 5% SALES TAX

**the winning hand!**

# PC-Tax™ for TaxPros



**win the  
income  
tax game!**

Your tax knowledge and skill combined with PC - TAX make a win - win combo. Don't miss out!

PC - TAX will run on your MS - DOS computer, or all major Radio Shack machines. Once you power-up and drop in our disk, you can forget about the bugbear of changes in the income tax forms. We take care of it for you.

## **PC-TAX WINS BY:**

Offering a Tax System that has been in use for more than nine years and has prepared over ten million returns for users all over the United States and in many foreign countries.

Supplying unlimited telephone support through the tax season.

Shipping systems to your order far in advance of the tax season, giving you time to learn its use and hone your skills.

Computing all tax amounts, all fixed and income-related limitations. Automatically totals W-2's, income averages, computes depreciation, etc.

Doing returns twenty times faster than anyone can do them manually.

## **PC-TAX DOESN'T LOSE:**

Doesn't require you to buy some oddball and expensive "operating system." You put our disk in your machine and it does taxes. That's all!

Doesn't offer a "hot-shot amateur" or two or three-times failed system. Each year many of these are offered. Then they fail, taking the accountant's money down the tube with them.

If you do tax returns, you need PC-TAX, the truly professional computerized income tax preparation system. Look into it today!

**CALL: (602) 753-1133**  
**Contract Services Assoc.**  
**507 Lead St. Kingman, Az. 86401**

**Manual - "Computerizing the Professional Tax Office" - \$7.50**  
**Demonstration Disk - Specify computer make and model - \$7.50**

**CSD CONTRACT SERVICES ASSOCIATES**

For FINAL solutions

that maintains a data base of multiple-choice, true-or-false, fill-in-the-blank, short-answer, and essay test formats. The program uses standard print-formatting commands and allows you to insert instructions anywhere on the printed test.

Test items are chosen with keywords, screen-review, and random-selection options and can be edited at any time. The format is flexible: Users can insert space before test items for illustrations and after test items for students to write their answers. Exams II also allows insertion of instructions anywhere within printed text.

Exams II, a revision of the Exams program installed in many schools across the country, is available for the Models III and 4 for \$99. For more information, contact Shenandoah Software, P.O. Box 776, Harrisonburg, VA 22801, 703-433-9485.

Circle 574 on Reader Service card.

## Etc.

### A Low-Decibel Daisy

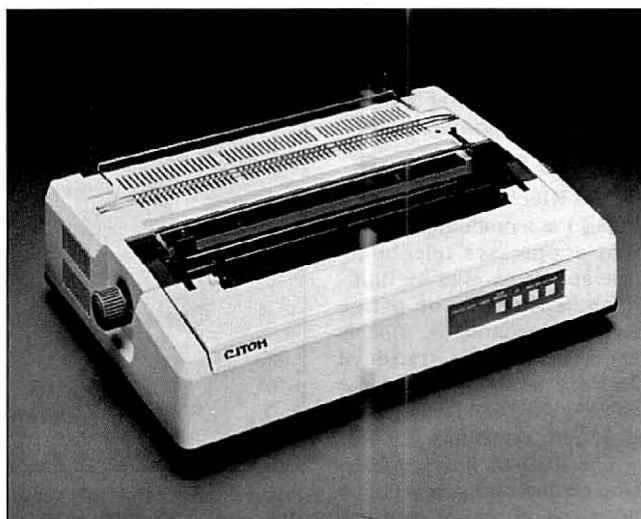
The D10-40 daisy-wheel printer from C. Itoh Digital Products prints at speeds up to 40 characters per second with an acoustic noise level of less than 60 decibels. The printer has three character pitches, allowing the creation of spreadsheets up to 203 columns wide. Other features include 8-bit parallel and RS-232C serial interfaces, an 8K data buffer, and compatibility with all Diablo print wheels.

The suggested retail price is \$949. For further information, contact C. Itoh Digital Products Inc., 19750 S. Vermont Ave., Suite 220, Torrance, CA 90502, 213-327-2110 or 800-423-0300.

Circle 577 on Reader Service card.

### Box of Surprises

Black Box Corp. has issued the second edition of its *Personal Black Box Catalog* featuring a variety of products for microcomputer users.



The D10-40 printer prints up to 40 characters per second—quietly.

The new catalog lists 20 percent more items than the original. New product lines covered include data-acquisition products for laboratory

use, management software, and reference books. Also listed in the 88-page, full-color catalog are cables, switches, test equipment, tools, modems, spoolers, protocol converters, and terminal-emulation boards.

Circle 577 on Reader Service card.

Circle 464 on Reader Service card.

# Graphics Solutions

## High-Resolution Software and Hardware

**GBASIC 3.0** - Radio Shack Model 4/4D/4P/III hi-res board owners take note of an enhanced graphics Basic: GBASIC 3.0. It not only provides an equivalent for each of the BASICG commands but adds a number of important new ones while using less memory. Without having to exit Basic, the hi-res screen can be saved to disk, loaded from disk, or printed on any of 30 popular printers: Epson, Star Micronics, Radio Shack, Okidata, C. Itoh, NEC, etc. The software works with TRSDOS 1.3, 6.1.2, 6.2; DOSPLUS 3.4, 3.5, 4; LDOS; and NEWDOS80. The disk contains 40 graphics programs/files. Also included is a detailed manual with assembly language entry addresses. \$49.95. (Specify Model 4 or III mode or add \$10 for both.)

The following eleven programs run on a Model 4/4D/4P/III equipped with a Radio Shack graphics board and GBASIC 3.0 or a Micro-Labs Grafyx Solution board:

**DRAW** - A powerful full screen graphics drawing and editing program. \$39.95.

**BIZGRAPH** - Create business graphs from hand-entered or VisiCalc data. \$75.00.

**xT.CAD** - Professional drafting aid which outputs to a printer or plotter. \$345.00.

**SURFACE PLOT** - Plot three-dimensional equations of the form  $Z=F(x,y)$ . \$39.95.

**3D-PLOT** - View three-dimensional data from any perspective or angle. \$39.95.

**MATHPLOT** - Plot equations of the form  $Y=F(x)$  with auto scaling. \$39.95.

**CHESS** - A very powerful program with 10 skill levels, 40 play options. \$49.95.

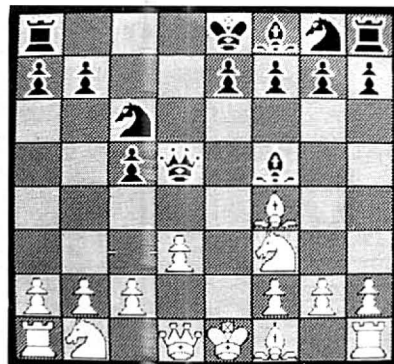
**REVERSI** - Play Othello with 10 skill levels, 20 execution options. \$29.95.

**3D Tic-Tac-Toe** - Play the computer or a friend on a  $4 \times 4 \times 4$  matrix. \$19.95.

**SLIDESHOW** - Create a sequence of hi-resolution picture displays. \$19.95.

**Biorhythm/USA** - Plot your biorhythm or learn the states and capitals. \$19.95.

**JOY-MOUSE** - Allows a Radio Shack Color Computer joystick, mouse, or touch pad to be connected to any Model 4/4D/4P/III. Hardware provides X, Y position values from 0 to 255. \$129.95.



**GRAFYX SOLUTION** - A plug-in, clip-on board enhances any Model 4/4D 4P/III to provide  $640 \times 240$  dot graphics. ( $512 \times 192$  on a Model III) The board comes with a 56 page manual and a disk containing both model 3 and 4 mode versions of over 40 programs and files including GBASIC 3.0 which adds over 20 graphics commands to Basic. \$199.95.

Please specify your exact system configuration when ordering or requesting information. Payment may be by check, Visa, Mastercard, or COD. Domestic shipping is free on pre-paid orders. Texas residents add 5% sales tax.

**MICRO-LABS, INC.** 214-235-0915  
902 Pinecrest, Richardson, Texas 75080

For a free copy of the catalog, contact Black Box Corp., P.O. Box 12800, Pittsburgh, PA 15241, 412-746-5500.  
Circle 576 on Reader Service card.

## Modem Protector

The Kleen Line Security PDS-11 is a modem protector that suppresses telephone-line spikes caused by lightning, spherics, or office switch mechanisms. Models are available for standard four-pin telephone modular connectors (RJ-11) and wider eight-pin connectors (RJ-45).

The PDS-11 has suppression on red and green phone lines (pins 3 and 4) with yellow and black lines brought straight through. Standard modular four-pin telephone connectors provide trouble-free hookup.

The PDS-11 costs \$73.95. Contact Electronic Specialists Inc., 171 S. Main St., P.O. Box 389, Natick, MA 01760, 800-225-4876.

Circle 580 on Reader Service card.



Protect your modem against telephone-line spikes with the Kleen Line Security PDS-11.

## Report Writing

Clay Watts Software announces Proaid III+ and Proaid 4+, relational report writers for Profile III Plus and Profile 4 Plus data files. The software can print reports relating three files and print text anywhere on the report.

It also can print any number of fields, lines, and columns per record and up to six title lines per page, with date and page number.

Other standard reporting capabilities include trimming blanks between fields; setting left, top, and bottom margins; setting the number of lines per

page; specifying printer control codes; specifying number of lines between records; suppressing printing of blank lines; sorting on up to four fields; selecting records based on and/or criteria; and printing grand totals for all records.

The product is now available for the special direct-mail price of \$49. Custom versions are available for a small additional cost. For more information, contact Clay Watts Software, 68C North Loop, Cedar Hill, TX 75104, 214-291-1171.

Circle 570 on Reader Service card.

## Down to Earth

The Northeast Regional Agricultural Engineering Service (NRAES) is offering a free catalog of software for agricultural applications. Many of the programs run on Radio Shack Models III and 4 and the Tandy 1000 (MS-DOS). Among the programs listed are Dairy Ration Analyzer, Beefgain, Feedsheet, and

Circle 470 on Reader Service card.

Circle 227 on Reader Service card.

# NEW Tandy 1000 SPEED UNLIMITED 8087

If you're programming, running spreadsheets or CAD software on your Tandy 1000—fasten your seatbelt!

PG Design has developed an 8087 adapter card, **SPEED TICKET**, for the Tandy 1000 which allows you to dramatically accelerate the running time of your programs. Programmers' tools like MicroWay's 87BASIC™, spreadsheets like Lotus 1-2-3™, or CAD software like Autodesk's AutoCAD™ run as much as 500 percent faster when you get yourself a **SPEED TICKET** from PG Design.

Just pop the hood on your Tandy 1000, unplug the 8088 chip, plug it into the **SPEED TICKET**, and plug the **SPEED TICKET** back into the original 8088 socket. Wipe the windshield and you're off.

**SPEED TICKET** comes with test software and our guarantee that it works perfectly, or your money back!

**SPEED TICKET** - \$249

**5MHz V20 Processor** - \$19.95

(boosts performance speed an additional 3-5 percent)

**8087 processor with test software for Tandy 1000A** - \$149.

# PG Design

We accept Master Card, VISA, money orders, and checks.  
We ship within five days of receiving your order.

PG Design Electronics, Inc.  
Dept. B, 37560 Thirty-one Mile Rd,  
Richmond, MI 48062  
313/727-2744

## Pickles & Trout

available from  
**TriSoft**

**All your Tandy Model-II, -12, -16,  
and -6000 CP/M-2.2 and CP/M-68K  
needs!**

From:  
**TriSoft**  
1825 East 38½ St.  
Austin, Texas 78751

1-800-531-5170  
(512) 472-0744



## NEW PRODUCTS

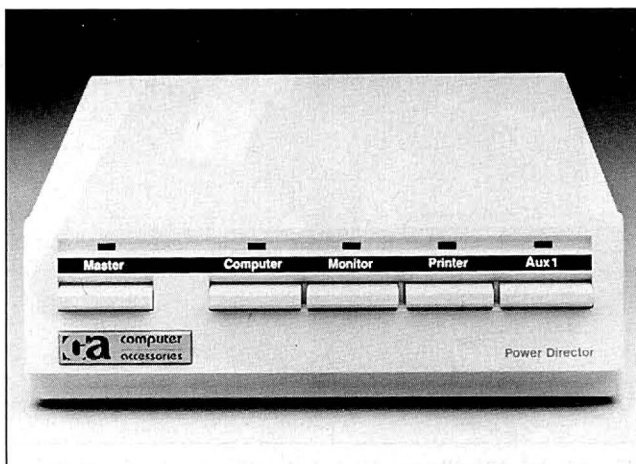
Milk-Hauling Cost Analysis. Spreadsheet templates are available for estate-tax planning, dairy-farm cash-flow analysis, growing cattle performance, and dairy engineering.

Most of the programs listed in the catalog were developed by professors at Cornell University. For a copy, contact the NRAES, Riley Robb Hall, Cornell University, Ithaca, NY 14853, 607-255-7654 or 607-255-2472.

Circle 585 on Reader Service card.

### New Power

Computer Accessories Corp. has added the Power Director Model P25 to its line of power-protection and control products. The Model P25 protects personal computers from spikes, surges, and electromagnetic and radio-frequency interference. It also provides static-discharge and fingertip control of power to all components of the micro-computer system.



The Power Director Model P25 offers power protection for your personal computer.

The Power Director meets IEEE 587-1980 Class A and Class B performance standards, allowing it to withstand a minimum of 6,000 volts at 500 amps. The device features sine-wave tracking for superior surge-suppression capability.

The suggested retail price

is \$99.95. For more information, contact Computer Accessories Corp., 6610 Nancy Ridge Drive, San Diego, CA 92121, 619-457-5500.

Circle 578 on Reader Service card.

### One for the Archives

Permalife is a durable, acid-free paper available in contin-

uous form from Jerome Business Forms Inc. The paper has a life expectancy of 400 years under archival storage conditions and 100 years under normal conditions.

The Permalife paper is designed for universities, art museums, chemical-research companies, attorneys, doctors, botanical gardens, and other individuals or groups interested in keeping documents for posterity. The paper is shrink-wrapped in packages of 125 continuous sheets; it can be bought wholesale in 10-package bundles for \$80.

For more information, contact Jerome Business Forms Inc., 20 Millpark Court, Box 42, St. Louis, MO 63043-0042, 314-428-7799.

Circle 582 on Reader Service card.

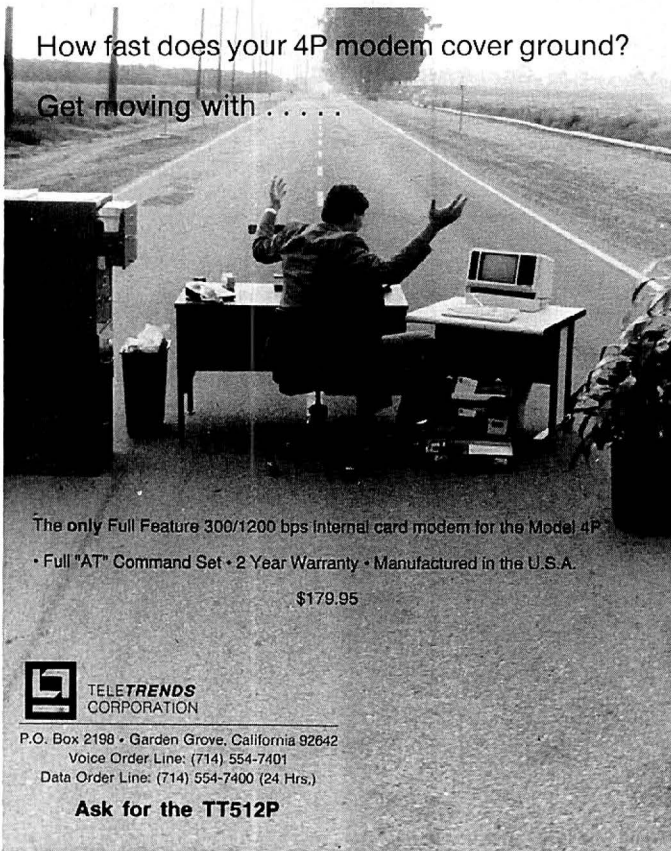
### High-Density Drive Tester

AVA Instrumentation Inc. announces the Model 409 Floppy Disk Drive Tester,

Circle 385 on Reader Service card.

How fast does your 4P modem cover ground?

Get moving with . . . . .



The only Full Feature 300/1200 bps internal card modem for the Model 4P

• Full "AT" Command Set • 2 Year Warranty • Manufactured in the U.S.A.

\$179.95



P.O. Box 2198 • Garden Grove, California 92642  
Voice Order Line: (714) 554-7401  
Data Order Line: (714) 554-7400 (24 Hrs.)

Ask for the TT512P

Circle 178 on Reader Service card.

## EZTax-PREP™

TRIAL OFFER—\$15.00

The fast, easy, accurate tax preparer  
for use with  
Multiplan®, Lotus 1-2-3® or Excel®.

It doesn't matter if tax preparation is your business or if you prepare your own tax returns—EZTax-PREP will save you time and money, while reducing the possibility of errors. It's the ideal micro tool for accountants, small CPA firms, and individuals.

For just \$15.00, we'll send you a copy of EZTax-PREP '86 so that you can try it out on your 1985 returns. That \$15.00 can be credited to EZTax-PREP '87 available in January for \$130.00.

**EZTax-PREP has every feature you want:** Fully documented and supported / Includes 23 IRS schedules and forms / Enter data once—the system applies it to all forms and schedules / Automatic computation of income averaging, depreciation, alternative minimum tax / Easy recall of any form or location for changes / Prints IRS-approved, signature-ready returns / "What if" planning / Proven track record with thousands of users nationwide.

**To order your EZTax-PREP trial copy:** Just call 1-800-543-1040 (in PA 215-667-4064) to order with VISA, MasterCard or American Express; or include a check with your letter for \$15.00 plus \$3.00 shipping and handling. (Add 6% sales tax in PA.) **Please specify computer (TRS-80, Model 4, 4P, Tandy 1000, 1200, 2000, 3000, CPM) and spreadsheet you use.**

After just a few minutes with EZTax-PREP, you'll wonder how you managed without it.

## EZWARE

EZWare Corporation  
Dept. E  
29 Bala Avenue  
Bala Cynwyd, PA 19004

800-543-1040  
(in PA 215-667-4064)

which interfaces with standard and high-density floppy drives. The tester has a non-volatile RAM for storing drive parameters and testing programs with the power off.

In addition to giving accurate and repeatable window-margin and asymmetry measurements, the Model 409 uses the Dysan Digital Diagnostic Diskette (DDD) to verify proper head alignment without using an oscilloscope. The tester can format a disk and perform all read/write testing in single- or double-density IBM formats.

The tester displays results on a 48-character liquid-crystal display (LCD). Users can program the tester from the front panel, using interactive menu-driven firmware. Test programs can be stored in memory and on disk for future use. The device can test four drives in sequence, without operator intervention.

The Model 409 costs \$3,200. The package price in-



The Model 409 Floppy Disk Drive Tester checks standard and high-density drives.

cludes a 90-day warranty, one DDD, and complete documentation.

For information, contact AVA Instrumentation Inc., 8010 Highway 9, Ben Lomond, CA 95005, 408-336-2281.

Circle 575 on Reader Service card.

#### New Listings

A revised and expanded

version of *The Computer Phone Book* is available from New American Library. The new version is available in two volumes: *The Computer Phone Book: Guide to Using Online Systems* and *The Computer Phone Book: Directory of Online Systems*. The first (\$14.95) is a hands-on manual that explains tele-

communications and how to use the variety of services available worldwide. The second volume (\$18.95) is a reference guide profiling 800 of the most important information services.

The author, Mike Canc, is a telecommunications industry marketing consultant. His other books include *The Computer Phone Book: Online Guide to Commodore Computers* and the original edition of *The Computer Phone Book*.

For information, contact the New American Library, 1633 Broadway, New York, NY 10019, 212-397-8000.

Circle 584 on Reader Service card.

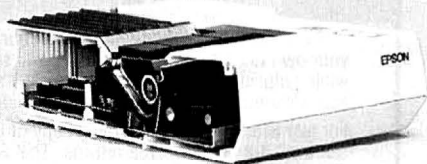
#### Publishing Guide

A guidebook for those thinking of purchasing electronic or desktop publishing systems is available for free from NBI Inc. Called *A Guide to Electronic Publishing Solutions*, the 50-page booklet includes an overview of office and in-house publishing en-

Circle 452 on Reader Service card.

Attention all FX80, FX100, JX, RX, & MX owners:  
**You already own half of  
a great printer**

Dealer  
inquiries  
welcome.



Now  
Only  
**\$79.95**

Now for \$79.95 you can own the rest. You see, today's new dot matrix printers offer a lot more.

Like an NLQ mode that makes their letters print almost as sharp as a daisy wheel. And font switching at the touch of a button in over 160 styles. But now, a Dots-Perfect

upgrade kit will make your printer work like the new models in minutes— at a fraction of their cost.

And FX, JX and MX models will print the IBM character set, too.

So, call now and use your Visa, MasterCard, or AmerEx. Don't replace your printer, upgrade it!

**1-800-368-7737**  
In California: 1-800-831-9772

g Sample of  
letter with  
Dots-Perfect

**Dots-Perfect™**  
**Dresselhaus**

Sample of  
letter without  
Dots-Perfect

837 E. Alosta Ave., Glendora, CA 91740 Tel: (818) 914-5831  
An upgrade kit for EPSON FX, JX, RX, & MX printers



EPSON is a trademark of  
EPSON America, Inc.

# Hey!

Remember to  
mention that you  
saw their ad in  
**80 Micro**

Thanks. . . .

**\$19.95 INTRODUCTORY OFFER**

**OMNISCROLL III/4**

OMNISCROLL III/4—The premier machine language screen scrolling utility that you can load and call from BASIC. Select any area of your screen and command your computer to scroll in any direction (UP, DOWN, RIGHT OR LEFT)

- \*MAKE GREAT ANIMATED GRAPHICS FROM INTERPRETER BASIC
- \*COMPLETE DOCUMENTATION
- \*MACHINE LANGUAGE SOURCE CODE LISTING
- \*BASIC DEMO PROGRAMS
- \*TUTORIAL TEXT

OMNISCROLL III/4 is for the TRS-80 Model III or 4 (in III mode) and is supplied ready to run with TRSDOS 1.3 (Instructions are included for NEWDOS 80 version 2.0)

To order send check or money order (sorry, no COD's or credit orders) for \$19.95 plus \$2.50 S&H (\$5.00 Canada or Mexico) with your name and address to:

**Lyons Products  
P.O. Box 272  
Titusville, PA 16354**

PA residents add 6% sales tax to the base price.

*Subscription Problems?*

80 Micro does not keep subscription records on the premises, therefore calling us only adds time and doesn't solve the problem.

Please send a description of the problem and your most recent address label to:

**80Micro**  
Subscription Dept.  
PO Box 981  
Farmingdale, NY 11737

Thank you and enjoy your subscription.

*Moving?  
Subscription Problems?*

Get help with your subscription by calling our new toll free number:

**1-800-645-9559\***

between 9 a.m. and 5 p.m. EST, Monday-Friday.

If possible, please have your mailing label in front of you as well as your cancelled check or credit card statement if you are having problems with payment.

If moving, please give both your old and new addresses.

\*New York State residents call 1-800-732-9119.

**FREEDOM ELECTRONICS**

FREE QUOTES  
ROCK BOTTOM PRICES



**TANDY COMPUTERS**

**SALE PRICES** Write or call for Warranty Information

**TOLL FREE 800-222-9485**

**MODEMS • PRINTERS • SOFTWARE • DISK DRIVE**

**100% RADIO SHACK® PRODUCTS AND COMPONENTS**

**TOLL FREE**

**800-222-9485**

MON-FRI  
8 AM-5 PM  
CENTRAL TIME

**TOLL FREE**

**800-222-9485**

The cost of owning a computer is coming down, but they are still out of reach for a lot of people. We offer the possibility of purchasing computers, printers, software and all the extras at well below the suggested retail prices.

If you need a better way to keep track of a home budget plan or a business inventory, why not make the investment at rock bottom prices. You get the support of the biggest name in small computers, nationwide warranty, and service work. In many cases, we will ship the same day.

During our years of business experience we have learned the meaning of money, resources, and personnel management. We offer a way to increase your effectiveness in these areas at a tremendous savings to you.

The next move is up to you. Just give us a call on our toll free hot line for the latest quotes on Tandy/Radio Shack computers, software, and equipment. It could be the best move that you will ever make.

\*\*A small handling charge for returns.



**FREEDOM ELECTRONICS**

(A Division of Four-Wa, Inc.) 513 N. Grant Lexington, NE 68850

Tandy and Radio Shack are registered trademarks of Tandy Corporation

**IN NEB CALL 308-324-7279 NEB RESIDENTS ADD 3% SALES TAX**



**Make Great Connections!**

- Transfer files directly to/from disk
- Use XMODEM for error correction
- VT100 terminal emulation
- Autodial and logon with any autodial modem

**Omniterm**<sup>TM</sup>

Professional Communications Software

“...a powerful, polished program that's a real pleasure to use.”

*NewsNet Newsletter, Aug. 1984*

“...the greatest communications software I've ever used.”

*PCM Magazine, Sept. 1985*

“...beginners can get started with a minimum of effort.”

*PC Magazine, Dec. 1984*

“...could become the package of choice in many corporate multiple-machine PC environments.”

*PC Week, Oct. 1984*

“...a contender in both the smart terminal and host software categories.”

*PC World, Sept. 1984*

**Now available in Radio Shack Stores! Ask for**

Omniterm 2

Cat.# 25-1160

\$129.95

IBM PC/XT/AT

Tandy 1000/1200/2000/3000

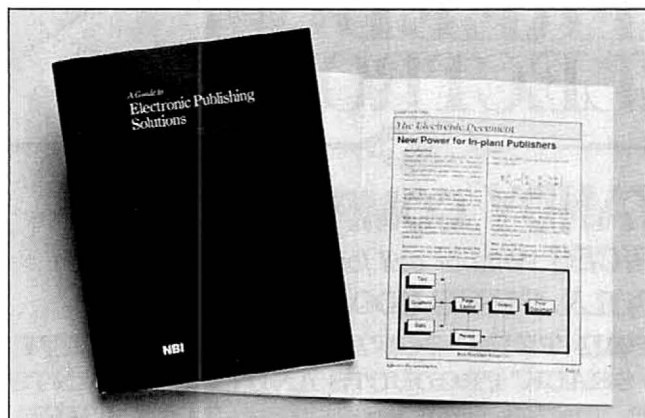
Omniterm Plus

EOS Cat.# 900-123

\$95.00

TRS-80 Model 4/4P/4D

Omniterm is a product of Lindbergh Systems, Inc. P.O. Box 3604, Ann Arbor, MI (313) 971-9733



NBI Inc.'s free 50-page booklet is a guide to purchasing electronic publishing systems.

## New Products Index

### MS-DOS

Reader Service Number	Company	Page
551	Activision Inc.	140
552	Business Tools Inc.	141
553	BV Engineering	141
554	C. Itoh Digital Products Inc.	141
555	CMI Software	144
556	Corporate Microsystems Inc.	140
557	Dac Software Inc.	140
558	Enertronics Research Inc.	144
559	Generic Software Inc.	145
560	James Halstead & Associates	141
561	Keyword Office Technologies Ltd.	145
562	Lassen Software Inc.	144
563	Lifeboat Associates	140
564	OmniTel Inc.	145
565	Palantir Software	141
566	Publishers Software Network	144
567	Sterling Software	140
568	Studio Software	140

### TRS-80

Reader Service Number	Company	Page
571	Fax Plus Computing	147
572	Poor Person Software	147
573	Portable Computer Support Group	147
574	Shenandoah Software	147

### Etc.

Reader Service Number	Company	Page
575	AVA Instrumentation Inc.	151
576	Black Box Corp.	149
577	C. Itoh Digital Products Inc.	149
570	Clay Watts Software	150
578	Computer Accessories Corp.	151
579	Educational Products Information Exchange	154
580	Electronic Specialists Inc.	150
581	Infocom Inc.	154
582	Jerome Business Forms Inc.	151
583	NBI Inc.	152
584	New American Library	152
585	Northeast Regional Agricultural Engineering Service	151

New Products listings are based on information supplied in manufacturers' press releases. 80 Micro has not tested or reviewed these products and cannot guarantee any claims.

vironments, descriptions of electronic-publishing technology, and cost-justification and guidelines.

For a copy, contact NBI Corporate Communications, P.O. Box 9001, Boulder, CO 80301, 800-922-8828, extension 604.

Circle 583 on Reader Service card.

### Courseware Guide

The Educational Products Information Exchange (EPIE) is offering a comprehensive courseware-evaluation package at 50 percent savings through December 31. For \$149.95, you can obtain the 1986-87 edition of *The Educational Software Selector*

(TESS), which contains 3,500 software reviews and over 7,800 descriptions of educational-software products; a library of over 800 in-depth courseware evaluations from EPIE's Micro-Courseware Pro/File and MicroSIFT services; and a year subscription to the TESS electronic update service via CompuServe.

EPIE is a user-supported consumer agency for education associated with Consumers Union of the U.S., which publishes *Consumer Reports*. To order or request further information, contact EPIE, P.O. Box 839-RE, Water Mill, NY 11976, 516-283-4922. Circle 579 on Reader Service card.

## DIFFERENT TRACK



The latest interactive software from Infocom.

### Fiction Fantasy

Leather Goddesses of Phobos from Infocom gives new meaning to the concept "interactive fiction." It comes with a scratch 'n sniff card and 3-D comic book, and is not named after a Greek shoe store.

The year is 1936. You're a man or woman (pick one) hanging out in Upper Sandusky, OH. You're suddenly kidnapped by aliens who take you to Phobos, a moon of Mars, where the voluptuous Leather Goddesses try to force you into sexual experiments. You learn they are planning to invade Earth to turn it into the playground of their nymphomaniacal dreams.

It's clear you are the last defender of virtue. Thus you roam the solar system with a same-sex buddy in search of parts for an anti-Leather Goddesses machine. Depending on which of the variable playing modes you've selected—tame, suggestive, or lewd—you visit lots of interesting planets, head back to the temptations of Mars, or make it with the sultan's wife/husband.

Leather Goddesses of Phobos runs on IBM PCs and MS-DOS-compatible computers. It sells for \$39.95. For more information, contact Infocom Inc., 125 CambridgePark Drive, Cambridge, MA 02140, 617-492-6000.

Circle 581 on Reader Service card.

# THE CLASSIFIED

## 80micro

### HARDWARE

**MODEMS, PRINTERS, TERMINALS.** Distributor pricing to end users and dealers—FREE SHIPPING CALL 1-800-833-2600 for catalog.

### CONVERSION SERVICES

**Media Conversion for Tandy Models** to over 500 systems including Mag-tape, Micro Computers, Mini Computers, Word Processors and Type-setters. Pivar Computing Services, Inc., 165 Arlington Hgts. Rd., Number 80, Buffalo Grove, IL 60089. 312-459-6010.

### NEWSLETTERS

**One Thousand Newsletter** specifically for your Tandy 1000. 12 monthly issues for \$15.00 or \$3.00 for sample issue. One Thousand 2153-A Muren Blvd. Belleville, IL 62221. (618)277-3526.

### HORSE RACING

**\$\$\$WIN with Thoroughbred, Harness, Greyhound Handicapping Software.** . . \$29.95, enhanced. . . \$49.95. Professional Football Handicapping System. . . \$39.95. Free information. Software Exchange, PO Box 5382M, W. Bloomfield, MI 48033. (313) 626-7208.

### ADULT SOFTWARE

**Model III/4 Owners.** 3 NEW 'ADULTS ONLY' programs. Details. DEA Data Service, RD #1 Box 1080, Maryland, NY 12116. DEALERS WELCOME!

### MS-DOS

**15 Demonstration Programs—\$6.00.** 800-642-6624.

### COMPILED BASIC

**FINALLY!** A Subroutine Library for Compiled BASIC. Load directories into arrays, WINDOWING, Graphics pie and bar charts, special string functions; 130 more routines to add power to Microsoft QuickBASIC or IBM BASIC Compiler 2.0. 30 Day Money-Back Guarantee. VISA/MC/Check/MO FINALLY! is only \$99.00 + \$4.00 S&H or FINALLY! and QuickBASIC \$148.00 + \$6.00 S&H. COMPUTERWERK, INC., Dept 80, 851 Parkview Blvd., Pittsburgh, PA 15215. ORDERS 1-800-423-3400 INFO. 412-782-0384.

### PORTABLE PRODUCTS

**Barcode Readers—Printers.** Models 100/1000/PC. 215-743-6566.

### SOFTWARE

**Profile & pfs:file Users!** PROAD III+/4+ & cws: aid provide many features for reports from single or multiple files. Model III/4's. \$49. Clay Watts Software, 68C North Loop, Cedar Hill, TX 75104. 214-291-1171.

**Joe Lynn's Payroll System** for all TRS-80 III/4 and all IBM compatibles. \$49.95 (815) 436-4477

### SIGNS AND BANNERS.

Keyboard AND lowercase characters. ALL BASOC, easy MS-DOS conversion. MENU DRIVEN. TRS-DOS 1.3 or 6.1, specify. \$27.95. R.B. SERVICES, Box 924, N. Chelmsford, MA 01863.

**BIBLE SEARCH. Study entire KJV Bible** on disks. Lots of extras. Model III/IV sample disk \$6. Write Scripture Software, Dept. 8M, Box 531131, Orlando, FL 32853.

**LeScript USERS (III/4)** customize your word processor. FREE info.: J.L., 245 Richelieu, McMasterville, Que., Canada, J3GIT7.

### THE STOCK EXCHANGE

—The ultimate simulation. 1000/1200/3000 . . . \$34.85. Call 1-800-PRAXIS-S. NY Call: 1-212-365-2170. Praxis Software, PO Box 2307, Grn. Ctl. Sta., NY NY 10163.

**DESKMERGE.** All-purpose mailmerge utility for Text/Filter. Full selection, formatting! MS-DOS. \$40. Free information (SASE). McAdams Associates, 109 Spanish Village Center, Dallas, TX 75248.

**Follow your stocks** or 'Play' the NYSE with STOCTRAC. Disk. \$15.00. Specify Model III or IV. R.J. Richardson P.O. Box 6988. Burbank, CA 91510.

### RESULTS

**We get five to ten inquiries** a day from a classified ad that costs less than fifty dollars per month, less than fifty cents per contact. Now that's effective advertising!

We are generating more qualified leads from our 80 Micro classified ad than we are from ads costing twenty times as much in other publications! The 80 Micro classified ad section is the best value in advertising that we have found. Peter A. Barnes, db Computer Products

### COCO SOFTWARE

**Casper CoGo Quick Assembler** \$20 602-268-5077.

### LOTTO

**Play Lotto!** Mods I, III, 4 requires 48K (2 drives recommended). Program stores your picks, the winning picks and displays frequency. Specify computer model, state, numbers selected, number of picks. Send 39.95 to Charles Bean POB 8263 Cedar Rapids, Iowa 52408. 319-396-3123.

### BUSINESS OPPORTUNITIES

**Personal Computer Owners** Can Earn \$1000 to \$5000 monthly selling simple services performed by their computer. Work at home in spare time. Get free list of 100 best services to offer. Write: C.I.L.C.S., PO Box 60369, San Diego, CA 92106-8369.

# Small Is Useful

There was a diversity of opinion about what utilities are, so we settled on things that perform a vital and fundamental function. David Talmage (Aurora, CO) wrote a disk cataloger that certainly does that, and merits the 80 *Micro* T-shirt we're sending him.

## Utilitarianism

In his Model III program (Program Listing 1), David first opens and fields a dummy file. Then he modifies the file's device-control block (DCB) to point to the directory on track 17—a sneaky but effective way to quickly get at the directory information. On Radio Shack's older computers, it's easy to find and modify a DCB because it's stationary. In the newer operating environments, you have to hunt down the DCB with the VARPTR function first and then make sure to do nothing that chases it to another location.

When David's program prompts you for a new disk, enter a number to identify each one. Entering -1 signals that you're out of disks, and the program goes to work. It sorts the files alphabetically by both name and extension. Then it sends the two lists to your printer with each file indexed to the disk it's on according to the numbers you supplied.

David Heath (Rockland, ME) earned his T-shirt with a routine (Program Listing 2) that date- and time-stamps a program under development. You can modify the Model 4 version shown here for other Basics by adjusting the way the program reads DATE\$ and TIME\$. Model III Basic, for instance, includes both in the TIME\$ variable, and GW-Basic returns a four-digit year. Most DOSes insert the system date in the directory record; for documentation, however, that information should be part of the code. The value of David's utility is that it keeps the documentary evidence in the program (even a compiled version) by using a Data statement in line zero that the program must read, instead of a Remark statement.

Bumper stickers go out this month to David Gangwisch of Dallas, TX, and Gordon Ludlow of Seattle, WA. Gordon found constructing a Fine Lines entry "an interesting project, being the first time I've condensed a program until it slowed down!" That's the spirit.

## A Towering Challenge

Legend has it there's a temple at the

edge of the world with an ivory altar that contains three diamond spindles. About the beginning of time, give or take, the gods stacked 64 golden disks on one of the spindles, making a tower that tapered up toward the spindle's tip. Naturally, there were temple priests to care for the tower; as you'd expect, the gods left instructions. We call it documentation:

1. Move the tower from the spindle it is on to one of the others, but under threat of consequences too horrid to contemplate.
2. Move one and only one disk at a time.
3. Never put a disk on top of a smaller one.
4. Never backtrack or repeat a move.
5. Move one and only one disk each sunrise.
6. When you've moved the tower, the world will end.
7. Have a nice day!

A prudent person might ask, "When did they start? And how long will it take, exactly?" My question is: Can you solve a scaled-down version of this classic puzzle in three lines of Basic?

Program Listing 3 is a generic demonstration that lets you play with the puzzle. (For GW-Basic, change the PRINT@ statements in line 1 to LOCATE Y+1,X\*B+N:PRINT"....") The Input statement asks for the width of your display and the number of disks you want. The limit is 10 disks; seven is enough for

a 40-character screen. Use the spacebar to move the pointer to the spindle you want. Press the slash key (/) once to pick up a disk; press slash again to drop it.

You can start with line zero of my program, or a variation of it, or invent your own way to document the solution. Your program must clearly show that it solves the puzzle for some number of disks. (The more the better.) However you do it—my line zero or your way—counts toward the three-line limit.

The rules:

1. Write your solution(s) in any TRS or Tandy Basic except Pocket Computer Basic. We'll consider degree of difficulty when comparing programs created on different machines.
2. This month's entries must reach us by November 15, 1986. Although this doesn't give everyone the same amount of time (we apologize to our overseas readers especially), postponing the deadline would add a month to our publishing your solutions.
3. This month's winners will appear in the February 1987 issue.
4. Employees of CW Communications are not eligible.
5. Send your entry to: 80 *Micro*, Fine Lines, 80 Pinc St., Peterborough, NH 03458. We will not be able to return entries.
6. Specify your T-shirt size. ■

Contact Harry Bee at P.O. Box 567, Cornish, ME 04020.

### Program Listing 1. David Talmage's Model III disk cataloger.

```
0 IFZPOKEB+86,17:POKEB+87,6:POKEB+82,18:FORR=3TO18:GET1,R:FORI=1TO193STEP48:F$(F)=
MID$(F$,I+5,11)+CHR$(D):IFASC(F$(F))<>0F=F+1ELSELSECLAR30000:DEFINTA-Z:DIMP$(100
0):D=1:OPEN "R",1,"D":FIELD1,255ASF$:Z=1:B=26112:IFPEEK(26186)<>102B=26368:GOTOELS
EGOTO
1 NEXTI,R:INPUT:IFD<>1GOTOELSEF=F-1:CMD"O",F,F$(0):FORC=1TO2:FORI=1TO4:LPRINT"FI
LENAME DISK ";NEXT:LPRINT:X=(F+3)/4:FORI=1TOX:FORJ=0TO3:IFI+J*X>FTHENLSELPRI
NTTAB(J*17):LEFT$(F$(I+J*X),8);"/";MID$(F$(I+J*X),9,3):ASC(RIGHT$(F$(I+J*X),1));
2 NEXT:LPRINT:NEXT:IFC=2THENLPRINTF:"FILES FOUND ";TIME$:CLOSE:KILL"D":ENDELSEFORI
=0TO5:LPRINT:NEXT:FORI=0TOF:F$(I)=MID$(F$(I),9,3)+MID$(F$(I),1,8)+RIGHT$(F$(I),1)
:NEXT:CMD"O",F,F$(0):FORI=1TOF:F$(I)=MID$(F$(I),4,8)+LEFT$(F$(I),3)+RIGHT$(F$(I),1)
:NEXTI,C
```

End

### Program Listing 2. David Heath's Model 4 date/time validator.

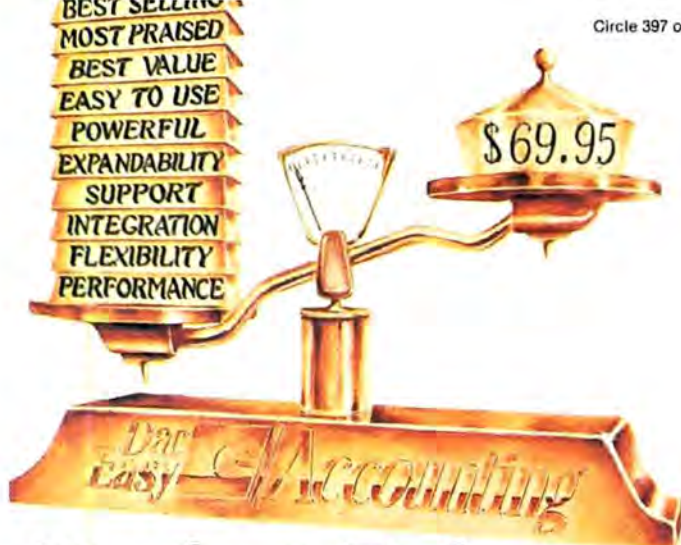
```
0 DATA*** Filename ** Version: 08/21/86 - 8:16 PM **
65000 CLS:CLEAR:READ A$:N=VAL(TIME$):B$=DATE$+" "-+STR$(1+(N+1)MOD 12)+MID$(TIM
E$,3,3)+""+CHR$(65-15*(N>11))+M ".C$:MID$(A$,4,INSTR(4,A$, " ") -4):PRINT"Save *
*"C$" ** "B$";
65010 IF INSTR("tT",INPUT$(1))THEN INPUT "Time";TS:SYSTEM"TIME "+TS+":00":GOTO 6
5000 ELSE A=CVI(CHR$(PEEK(VARPTR(A$)+1))+CHR$(PEEK(VARPTR(A$)+2)))+INSTR(A$, "
"):FOR N=1 TO 19:POKE N+A,ASC(MID$(B$,N)):NEXT:SAVE C$:PRINT"Saved"
```

End

### Program Listing 3. Bee's Tiny Tower of Brahma.

```
0 IF F THEN CLS:PRINT TAB(N)"0"TAB(B+N)"1"TAB(B*2+N)"2":FOR Y=1 TO N:FOR X=0 TO
2:PRINT TAB(X*B+1)I$(X,Y):NEXT X:NEXT Y:X=F ELSE INPUT"Width, # disks";W,N:B=IN
T(W/3):FOR F=1 TO N:I$(0,F)=STRING$(N-F,32)+STRING$(2*F-1,95):NEXT:S(1)=N:S(2)=N
:GOTO 0
1 IF S(0)=N AND S(1)*S(2)=0 THEN END ELSE PRINT @ Y*W+X*B+(N-1), " ",X=P:PRINT @
Y*W+X*B+(N-1),"1":I$=INKEY$:IF I$=" " THEN P=(P+1)*-(P<2):GOTO 1 ELSE IF I$="/
" AND (T AND 1)=0 THEN I=P:T=T+1:GOTO 1 ELSE IF I$="/" AND (T AND 1) THEN J=P:T=
T+1 ELSE 1
2 IF S(1)<N AND S(2)>0 THEN S(1)=S(1)+1:T$=I$(I,S(1)):I$(I,S(1))="" :I$(J,S(J))=T
$:S(J)=S(J)-1:GOTO 0 ELSE 0
```

End



## Perfect Balance

Now the scales are in your favor. Dac-Easy Accounting gives you the best price plus tremendous performance. That means value, and the experts agree. Dac-Easy Accounting was recognized by *InfoWorld* as 1985's overall "BEST SOFTWARE VALUE."

No other accounting package can match the explosive user base or the unanimous acclaim from industry experts. Dac is the perfect choice for your first accounting system or for upgrading from a single module system. Either way compare, and you will join over 150,000 people who have computerized with Dac-Easy.

### PERFORMANCE

Accurate information when you need it is what performance is all about. Fast, flexible reports give you what you need to know to manage cash-flow, turn inventory and increase profits. . . . Listen to the skeptics-turned-believers.

*"Dac-Easy Accounting is so inexpensive . . . we were skeptical . . . We expected to find a program that couldn't compete on a feature-by-feature basis . . . We were wrong."*  
InfoWorld, 1985

### EXPANDABILITY

You never have to worry about outgrowing the Dac-Easy Series, which offers seven software products, support, and ten different business forms. All of our products are top performers offered at amazing prices.

Dac-Easy Payroll is the best full featured payroll system on the market.

Dac-Easy Tutors are disk-based tutorials available for Accounting and Payroll.

Dac-Easy Port sends accounting and payroll files to your favorite spreadsheet.

Dac-Easy Mate is the perfect companion to Accounting and Payroll offering file look-up, macros, calculator, color, and much more.

Dac-Easy Word is our easy to use word processor that is packed with powerful features. Dac-Easy Forms and Fast Forms offer the best in continuous, multi-part forms, and checks.

### INTEGRATION

Dac-Easy's seven modules work together perfectly. Enter data once and it's posted to the other modules automatically. Also, most modules can be used stand-alone.

### FEATURES

#### General Ledger

- Unlimited multi-level accounts with screen inquiry for three years
- Pencil and pen correction option
- Automatic budgeting by department
- Unlimited journals and departments
- Excellent audit trail and flexible financial statements

#### Accounts Receivable

- Open invoice or balance forward per customer for unlimited number of customers
- Multi-sorted mailing labels
- Statements and invoices support automatic finance charges and special comments
- Detailed history for three years for number of invoices, sales, cost, and profits
- Customized aging report
- Automatic sales forecasting

#### Accounts Payable

- Checks handle multiple allocations and cash available protection
- Multi-sorted vendor labels and directories
- Customized aging report
- Automatic forecasting of purchases

#### Inventory

- Average, last purchase, and standard costing
- Physical inventory with perpetual comparisons
- Accepts fractional measure such as dozens
- Automatic forecasting of product needs
- Automatic forecast of product sales
- Detailed three-year history for every product
- Automatic pricing, alert and activity reports
- Screen inquiry for on-hand/on-order/sales/cost/profit/turns/GROI/etc.

#### Purchase Order

- Inventory and non-inventory items
- Allows up to 99 lines
- Per line discount in %
- Accepts generic deductions
- Accepts back orders and returns
- Purchase journal

#### Billing

- Service or Inventory invoicing on plain or pre-printed forms with remarks
- Prints sales journal
- Allows return credit memo

#### Forecasting

- Unique program that automatically forecasts using your three-year history:
- Revenue and expense accounts
- Vendor purchases
- Customer sales, cost and profit
- Inventory item usage
- Four different forecasting methods

### SUPPORT

Subscribe to our toll free support agreement and join the best support program in the industry. Our friendly 12 person support staff are trained to answer your accounting and technical questions. No excuses, and no delays.

Find out for yourself why Dac-Easy is the fastest selling accounting package in history. Call us today!

### FLEXIBILITY

Dac offers the rare ability to handle either service or product-oriented companies without sacrificing features.

*"Dac Easy Accounting is everything its designers say it is . . . It is also flexible enough to fulfill the accounting needs of almost any type of business."*

Journal of Financial Computing, 1985

### NOW FOR ATARI & APPLE

Dac-Easy Accounting and Payroll are now available for the Atari 520 & 1040 ST.

Dac-Easy Accounting is also available for the Apple II+, IIe & IIc.

### Minimum hardware requirements

All Dac-Easy products run on IBM or other compatibles. 256K memory, two disk drives, MS-DOS, PC-DOS 2.0 or later, 132 column printer in compressed mode, color or monochrome monitor. Selected products available on the Atari ST and Apple II series.

**Dac Easy Accounting**



## 1986 PC WORLD World Class Winner

**TO ORDER  
CALL TOLL FREE  
1-800-992-7779**  
Ask for Operator #756  
**IN TEXAS CALL  
1-214-458-0038**

or mail the  
order form below.

Mail to:  
dac software, inc.  
4801 Spring Valley Rd  
Bldg. 110-B  
Dallas, TX 75244

Yes, please rush me  
the following Dac  
products:

Product	Qty	Price	Total
Dac-Easy Accounting	—	69.95	—
Dac-Easy Payroll	—	49.95	—
Dac-Easy Word	—	49.95	—
Dac-Easy Mate	—	39.95	—
Dac-Easy Port	—	29.95	—
Dac Accounting Tutor	—	19.95	—
Dac Payroll Tutor	—	19.95	—
Add Shipping Charge			7.50

Texas Residents  
Add Sales Tax (6½%)

TOTAL

Check  Money Order

AMEX  VISA  MASTERCARD

Account # \_\_\_\_\_

Expires \_\_\_\_\_

Signature \_\_\_\_\_

Name \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

City \_\_\_\_\_

St. \_\_\_\_\_ Zip \_\_\_\_\_

Phone \_\_\_\_\_

Computer Brand \_\_\_\_\_

Type of Business \_\_\_\_\_

No. of Employees \_\_\_\_\_

**30 Day Money-Back Guarantee**  
Dac Software offers an unconditional guarantee on all Dac-Easy products (less shipping charges). There is a \$10 restocking fee if the disk seal is broken. This guarantee is available on all products bought directly from Dac Software.

MS-DOS is a trademark of MicroSoft Corp. IBM and PC-DOS 2.0 are registered trademarks of International Business Machines Corp. #756

# Introducing the Most Powerful Business Software Ever!

FOR YOUR IBM • APPLE • MAC • TRS-80 • KAYPRO • COMMODORE • MSDOS OR CP/M COMPUTER\*

**50% OFF!**



## The VERSABUSINESS™ Series

Each VERSABUSINESS module can be purchased and used independently, or can be linked in any combination to form a complete, coordinated business system.

### VERSARECEIVABLES™

\$99.95

VERSARECEIVABLES™ is a complete menu-driven accounts receivable, invoicing, and monthly statement-generating system. It keeps track of all information related to who owes you or your company money, and can provide automatic billing for past due accounts. VERSARECEIVABLES™ prints all necessary statements, invoices, and summary reports and can be linked with VERSALEDGER II™ and VERSAINVENTORY™.

### VERSAPAYABLES™

\$99.95

VERSAPAYABLES™ is designed to keep track of current and aged payables, keeping you in touch with all information regarding how much money your company owes, and to whom. VERSAPAYABLES™ maintains a complete record on each vendor, prints checks, check registers, vouchers, transaction reports, aged payables reports, vendor reports, and more. With VERSAPAYABLES™, you can even let your computer automatically select which vouchers are to be paid.

### VERSAPAYROLL™

\$99.95

VERSAPAYROLL™ is a powerful and sophisticated, but easy to use payroll system that keeps track of all government-required payroll information. Complete employee records are maintained, and all necessary payroll calculations are performed automatically, with totals displayed on screen for operator approval. A payroll can be run totally, automatically, or the operator can intervene to prevent a check from being printed, or to alter information on it. If desired, totals may be posted to the VERSALEDGER II™ system.

### VERSAINVENTORY™

\$99.95

VERSAINVENTORY™ is a complete inventory control system that gives you instant access to data on any item. VERSAINVENTORY™ keeps track of all information related to what items are in stock, out of stock, on backorder, etc., stores sales and pricing data, alerts you when an item falls below a preset reorder point, and allows you to enter and print invoices directly or to link with the VERSARECEIVABLES™ system. VERSAINVENTORY™ prints all needed inventory listings, reports of items below reorder point, inventory value reports, period and year-to-date sales reports, price lists, inventory checklists, etc.

### VERSALEDGER II™

\$149.95

VERSALEDGER II™ is a complete accounting system that grows as your business grows. VERSALEDGER II™ can be used as a simple personal checkbook register, expanded to a small business bookkeeping system or developed into a large corporate general ledger system without any additional software.

- VERSALEDGER II™ gives you almost unlimited storage capacity (300 to 10,000 entries per month, depending on the system),
- stores all check and general ledger information forever,
- prints tractor-feed checks,
- handles multiple checkbooks and general ledgers,
- prints 17 customized accounting reports including check registers, balance sheets, income statements, transaction reports, account listings, etc.

VERSALEDGER II™ comes with a professionally-written 160 page manual designed for first-time users. The VERSALEDGER II™ manual will help you become quickly familiar with VERSALEDGER II™, using complete sample data files supplied on diskette and more than 50 pages of sample printouts.

### FOR TRS-80 MODEL OWNERS ONLY!

TRS-80 owners only may now take 50% off our listed price of any module(s) from our VersaBusiness Series. All sales are final (our normal 30-day money back guarantee does not apply to sale items).

#### To Order:

Write or call Toll-free (800) 431-2818

(N.Y.S. residents call 914-425-1535)

- \* add \$3 for shipping in UPS areas
- \* add \$4 for C.O.D. or non-UPS areas

- \* add \$5 to CANADA or MEXICO
- \* add proper postage elsewhere

DEALER INQUIRIES WELCOME

All prices and specifications subject to change / Delivery subject to availability.

**COMPUTRONICS**

50 N. PASCACK ROAD, SPRING VALLEY, N.Y. 10977