

80 micro

the #1 magazine for Tandy users

OCTOBER 1986
USA \$4.00
CANADA \$4.50
A CWC/I PUBLICATION

ALSO INSIDE:

Dave's MS-DOS Column

The Art of Programming

Product Reviews

Public Works

BUGS GOT YOU BUMMED?

**Avoid Burnout
With Our 16-Page
Blockbuster Guide
To Basic Debugging
Covering
The I/III/4,
GW-Basic,
And the Model 100**

**How to Diagnose
And Cure
52 Common Bugs**

**Plus
Our Master Checklist:
177 Problems
Every Programmer
Should Avoid**



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.

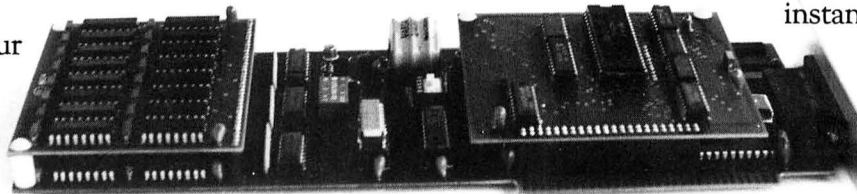
MEMORY MANAGEMENT SOFTWARE — Enhanced memory management features let you address up to 32 megabytes of memory.

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

MASTER/CARD prices begin at \$185.00.

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

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 Superscripts.
- 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.

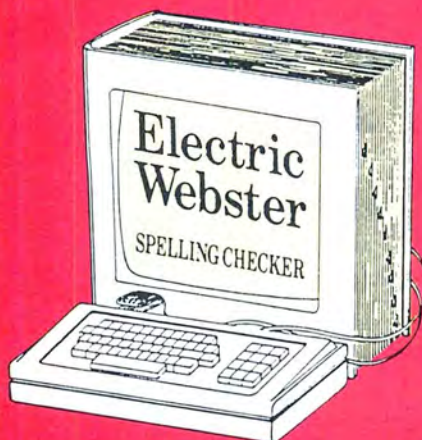
50,000 Word Dictionary: Uses only 2½ bytes per word; add as many words as you wish.

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, Newscript, Lazy Writer, Superscripts, 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:

For 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

DiskCount Data

WHERE
QUALITY PROGRAMS
MEET COMPETITIVE PRICES

2701-C W. 15th • SUITE 612 • PLANO, TX 75075 • (214) 680-8268

Test Question Data Bank

Attention Teachers and Students

Only
\$49.95

An excellent value for teachers and students, the TEST QUESTION DATA BANK allows question and answer input for 1 unit of instruction, chapter, course, semester, etc. Many different Data Bank disks may be used and the format can be multiple choice, matching, short answer or true/false. Questions may be added, changed, deleted or reviewed at any time. Up to 200 questions may be printed by choice or random selection or combination of the two. Starting question number may be specified, and the same tests and answer keys can be printed in different orders. Data input is fully error trapped making the data bank very easy to use. Stop preparing your tests manually when you can let your Mod 3/4 do it for you.

WORD PROCESSORS & PRINTER DRIVERS

Lazy Writer III/II/4	119.95
Lazy Font III/II/4	44.95
M-Script III/II/4	53.50
LeScript III/II/4/Max	109.95
LeScript MSDOS-1000-1200	179.95
PowerDriver-E Epson III/II/4	29.95
PowerDriver-P Prowriter III/II/4	29.95
PowerDriver-S Starwriter III/II/4	29.95
PowerDriver-O Okidata 92 III/II/4	29.95
PowerDriver-FX (FX/FX) III/II/4	29.95
Epson Driver Compiler	29.95
PowerScript for Scripsit III/II/4	34.95

GENERAL LEDGER

by FBN Systems

NOW
149.95

The Finest We've Found

SAVE 50%

Multiple Cash Accounts... Departmentalize any account... You select which accounts print on income statement & balance sheet... Real time transaction posting... no more batch processing... total audit trail. We have what we believe to be the finest general ledger for the Model III on the market. Call for more details or order now.

A Serious Business Program.
LIST \$300.00

OPERATING SYSTEMS

CP/M 2.2 Montezuma Mod 4	169.95
R-Shack HD Driver for CP/M 2.2	30.00
Monte's Window	49.00
Monte's Toolkit	49.00
Monte's Basic (Basic)	49.00
Dosplus 4A with M-ZAL	129.95
Dosplus 3.5 III/II	79.95
Multidos 1.71 III/II	79.99
Multidos 80/64	89.95

MOD 4 BY JACK

A complete re-write of the Mod 4 manual in English!... Only \$9.95

POWERMAIL PLUS

By PowerSoft

ONLY
89.95

Separates any category for you in any manner you wish. This new version can span drives and may use multiple floppies. The program will sort on any eight levels if you wish. Separates your flags and puts them into another file. Print options: Labels & Listing. One choice is the simple "telephone book" type listing. Two of the other modes give you not only the listing of names, but also either FLAG numbers, or the actual FLAG descriptions. The final print mode is what we call THE SALESMAN'S NOTE-BOOK™. It prints out the whole list or whatever parts you specify with all info including full flag description in each record. Then the word "Notes" is printed with several lines of blank space for making those notes in the field. MOD III/II or 4/PI/D

UTILITIES

J&M Memory Minder I	84.95
J&M Memory Minder III/4	74.95
The Toolbox for LDOS	44.95
ALCOR C Complete Svsstem	64.95
ALCOR Multi-Basic Compiler	64.95
ALCOR Pascal	64.95
AOS Superkeys Key Macros Mod III	35.00
The Toolbelt Mod 4	44.95
AOS Utilis. 1 Varkeep/Scmpkr	49.95
Pascal-80 Mod I/III	59.95
The Creator Mod I/III/MSDOS	44.95
AS Public Domain Disks (each)	9.95
Zues Editor/Assembler III/II/4	74.95
System Diagnostic I/III/4	89.99
Trashman	32.50
Faster	22.95
RPM	21.50
DSMBLR III I/III	29.95
Accel 3/4 Basic Compiler I/III	44.95
Monitor 5 I/III/4	22.95
Hyperzap Disk Utility I/III/4	49.95
Z-Basic Compiler 3.0	79.95
T/Maker Mod 4/4P/4D	275.00
DOSTAMER	49.95
PRONTO	59.95

SUPER UTILITY PLUS

By POWERSOFT

SALE

VOTED AS THE OUTSTANDING UTILITY BY 80-MICRO READERS

PROTECTED MEDIA

BUY SUPERUTILITY PLUS

3.2 FOR MOD I/III
MOD 4 VERSION FOR MOD 4/4P/4D
AT \$74.99
AND RECEIVE THE NEW BOOK USING SUPERUTILITY PLUS FREE
A \$100.00 VALUE FOR ONLY \$74.99
SUPERUTILITY/PC NOW \$84.95

SCHOOL UTILITY AND EDUCATIONAL

Power Reading	64.50
Test Question Data Bank	49.95
Test Generator/Drill	34.95
Football Scouting	49.95
Basketball Statistics	39.95
Baseball Statistics	39.95
Computer SAT III-1000-1200	79.95
Student Schedule Data Base	49.95
Teacher Evaluation	39.95

THE HOME ACCOUNTANT

By Continental Software

ONLY
62.50

An Outstanding Financial Planner

• Maintains up to 100 budget categories • Keeps track of up to 5 checkbooks • Prints checks, if desired • Prints a personal balance statement, income and expense summary • Prints net worth statement • Provides fast bank reconciliation • Allows the extension on multiple diskettes • One program handles cash checkbooks • Credit cards and other liabilities and expenses • Unlimited annual, fiscal or calendar year • Transactions may be "split" among different budget categories • Flags transactions for tax purposes • Maintains transaction history • Provides Hi-Res graphics for any category by bar graph.
The program itself does adjust about everything you'd ask of a "personal finance package"—Popular Computing, November, 1982.
MOD III

GRAPHICS AND GAMES

Powerdraw I/III	34.95
Graphit (Line Graphing)	34.95
AOS Utilis. Screenpacker Plus	49.95
PowerDot II I/III Spec. Printer	34.95
Meltdown (Nuclear Powerplant)	19.95
Gamepak-3 (Funface, Match, etc.)	29.95

SUPERDOS

Over 15 enhancements to TRSDOS 1.3... 29.95

FAST/CM/D

Run TRSDOS 1.3 at the high speed in Mod 4/4P/4D... 29.95

•FREE• FREE SPECIALS •FREE•

Order over \$100.00 and select one of the following ABSOLUTELY FREE. Order over \$200.00 and you may select any two items: **SOFTWARE:** Varkeep/Screenpacker Plus • Master Directory Mod III • Superkeys Mod III • Meltdown I/III • **BOOKS:** TRS-80 For Kids From 8 to 80 Vol. 1 or II • Electronically Speaking • Computer Communication Techniques • The Rest of 80 • Using the Z-80 in the TRS-80 • TRS-80 Data Files • Inside Your Computer • GREEN SCREEN • Mod I, III/4/4D or P

ICS PROFESSIONAL

by Freeman Software

SAVE
\$50

INVENTORY CONTROL SALES REGISTER INVOICING

ONLY
\$89.95

This complete retail inventory, invoicing and sales register system will maintain over 2,500 items on MOD III floppies with built-in accounting for sales tax, sales type and 9 different sales people. Print sales registers, invoices and many different inventory reports on 80 or 132 col. printer. Tracks backorders and will also re-order on predetermined quantities. Also maintains cost of entire inventory. A GREAT VALUE! MOD I/III or PC/1000

TRSDOS-MSDOS-CPM

HUGE SALE ON
CONVERSION UTILITIES
CONVERT BASIC TO PC... 29.95
SUPERCROSS/XT... 90.00
SUPERCROSS/XT
W/CONVBASIC... 99.95
HYPERCROSS/XT 2.0... 99.95
THESE UTILITIES ARE A MUST FOR CONVERTING TRSDOS TYPE PROGRAMS TO YOUR MSDOS OR CPM COMPUTER. ALL MENU DRIVEN, THEY DO THE COMPLETE CONVERSION ON YOUR TRS-80. MOD 1 NEEDS DOUBLE DENSITY. Specify MOD IDD, MOD III, MOD 4

ENCYCLOPEDIA FOR THE TRS-80*

WE FOUND ANOTHER CACHE!
A GREAT COLLECTOR'S ITEM
BUY THE FULL 10 VOLUME SET
NOW WHILE IT IS STILL

only 39.95 AVAILABLE only \$39.95

AN APOLOGY TO OUR CUSTOMERS... We sold thousands of books on our Christmas Sale Flyer and sold out of both versions of the ENCYCLOPEDIAS. We have since discovered another cache which we bought to pass on to you at our lowest price ever. Each volume contains from 15 to 20 articles accompanied by program listings. The books are each approx. 200 pages covering such topics as UTILITY, TUTORIAL, BUSINESS, WORD PROCESSING, HARDWARE, GRAPHICS, GAMES AND MORE. This is the FULL 10 VOLUME SOFTCOVER Edition originally sold for \$109.50. Volumes measure 6x9 inches and were authored for the Model I/III. Many of the listing will work on the Models 4. **SALE ONLY \$39.95...** Please add an additional \$2.00 to our normal shipping.

PRINTER RIBBONS

Brand New—No Reloads

PRINTER	PRICE EA.
ANADIX 9500 SERIES/9620/9625	8.00
C. ITOH 8510 PROWRITER	6.00
C. ITOH A10F/10/DWP 210 (FILM)	4.00
DMP 2100/TOSHIBA 1350	7.00
DW I/DWP-410 (MULTI STRIKE FILM)	5.00
EPSON MX 80/FX/RX	5.00
EPSON MX-100	8.00
LP I/II/III	6.00
OKIDATA 80/82A/83A/92/93	3.00
OKIDATA 84	4.00

NEW BOOK

The Programmers Handbook of Computer Printer Commands

This outstanding new issue offers you all control codes of the most popular 170 printers. Complete tables for Daisy Wheel & dot matrix printers indexed alphabetically by mfg. It also includes names & addresses of all listed mfgs. Codes are presented in written, hex and decimal equivalent. A great information source.
270 PP, Spiral Bound... 37.95

INFOSCAN

By The Small Systems Center

NOW
44.95

Retail	49.95
Special	44.95

Infoscan is an information utility that is used to organize, store and retrieve any type of useful information in any format. It combines the features of a word processor, data base manager and information retrieval and display utility. You compose information records on the screen using the word processing features in any format you like. Each record is described by 1-17 character keyphrases that you specify. Once created, the information file's keyphrases can be scanned as a list on the screen using an impressive key scan bracket. You scroll the keyphrases thru the brackets with the arrow keys on your keyboard. When the desired keyphrase is found, you press a single key and the corresponding information record is retrieved from disk and displayed on the screen. The record displays in exactly the same format as you used to create it. You can even design your own forms to "fill in".
MOD III/II MINIMUM 48K 1 Drive

DS/IDD DISKETTES

10 EACH, PACKAGED IN A PLASTIC LIBRARY BOX **9.95**

ZBASIC 3.0

by Zedcor

79.95

The Incredibly Fast BASIC Compiler

It's ZBASIC. Written for programmers by programmers. (If you know BASIC—you know ZBASIC!) Now you can write a program exactly the same way on an Apple, an IBM, a Tandy, or any other major micro and port the source code. You only write the program once... and it runs on all the major micros. The commands stay the same—regardless of the computer* (even graphic commands and disk I/O). ZBASIC. Starting now, it's the only language you'll ever have to know.
*SPECIFY VERSION WHEN ORDERING
*TRS-80 MOD. I, III • IBM and Compatible • CP/M-80 2.3w/7
*TRS-80 MOD 4, 6, 2 DOS 2.1 or greater (on Kaypro S50G)

BOOKS, WALL CHARTS & MISC

Using SuperUtility (new issue)	17.95
Super Utility Tech Manual 3.x	13.95
TRS-80 ROM routines documented Mod II	18.95
TRSDOS 8/LDOS Programmers Guide	19.95
Green Screens I/II/III/4/4P	16.95
Diskettes DSDD 10 in Plastic Bx	9.95
Colored Sentinel Disks	17.00
Profile 3+ Commands Wall Chart*	4.00
Visicalc Commands Wall Chart*	4.00
Superscript Wall Chart*	4.00
Model III Basic Wall Chart*	4.00
Model 4 Basic Wall Chart*	4.00
Mod 4 by Jack (user guide)	9.95

*Charts not shipped as separate order

High-Resolution Graphics



HI RESOLUTION GRAPHICS

THE GRAPHICS SOLUTION by Micro Labs **\$189.95**

Run the best Hi-Res board on your Mod III or 4/4P. Far superior to Radio Shack's board, this gem will open up a new world of graphics applications. Graphics basic is included along with 39 other Hi-Res demos & applications and a detailed user manual. All major operating systems are supported and the Hi-Res screen can be printed on 20 popular printers. Installation is simple with a clip-on internal board. Hi-Res, text & Low-Res graphics can all be displayed simultaneously. This board is the finest Hi-Res modification on the market and additional Hi-Res software is available. Call for further details. Specially Mod III, Mod 4, 4P or 4D when ordering. **WAS \$299.95 REDUCED TO \$199.95 SALE \$189.95**

HI-RES SOFTWARE

3D PLOT	39.95
MATHPLOT	39.95
BASIC	39.95
SLIDESHOW	19.95
PICHAR	14.55
DRAW	39.95
BIZGRAPH	was 98.00 now 75.00
ADVANCED LET'S WRITE MUSIC	49.95
XTCAD	was 449.95 now 345.00
SURFACE PLOT	39.95
G BASIC 3.0 FOR RIS BOARD	49.95
TOURNAMENT CHESS	49.95
TOURNAMENT REVERSI	now 29.95
3 D TIC TAC TOE	now 19.95
LIFE & SPIROGRAPH	24.00
FRACTALS	19.95

Back By Popular Demand

The Programmer's Guide To LDOS/TRSDOS6

Five star rated by 80 MICRO, The Programmer's Guide is a must have book to understand the internal workings of the DOS.

200 Pages—8½ x 11, by Roy Soltoff one of the authors of LDOS/TRSDOS 6.

Retail 24.95 Sale 19.95

DOSTAMER

By the Babbage Patch

Just Reduced NOW **\$49.95**

Dostamer Mod 4/4P/4D 49.95
Dostamer for 1000, PC/MS, DOS 49.95

You have heard of DOS manager type programs in the MS-DOS world. Now the Mod 4 has one too. Rated 4½ stars by 80 MICRO, it has 10 full user menu screens to customize your DOS. Help menus are included and now, for a first, you can comment all your directory entries. Tag/Untag all files for mass copy/kill etc. Over 200 user defined keys. We highly recommend this outstanding software package.

Game Pak 3

By Micro Mining

29.95

3 Excellent games for the price of what one game would normally cost.

#1 FUNNY FACE... A graphic program that lets you construct over 1,000,000 faces. Also play the police line-up.

#2 MATCH... A graphics matching game like the popular TV game "Concentration."

#3 REPEAT AFTER ME... Emulate the popular game "Simon."

OUR GREAT BOOKSALE CONTINUES

FOR BOOK DESCRIPTIONS, SEE OUR 80 MICRO AD (JUNE '86)

TITLE	RETAIL	SALE
TRS-80 FOR KIDS FROM 8 TO 80 I	\$10.95	\$ 7.95
TRS-80 FOR KIDS FROM 8 TO 80 VOL. II	\$10.95	\$ 7.95
HOW TO MAINTAIN & SERVICE YOUR SMALL COMPUTER	\$17.95	\$11.95
USING THE Z-80 IN THE TRS-80	\$13.95	\$ 3.95
COMPUTER COMMUNICATIONS TECHNIQUES	\$15.95	\$10.95
ELECTRONICALLY SPEAKING	\$14.95	\$ 9.95
PRACTICE PROBLEMS IN NUMBER SYSTEMS, LOGIC & BOOLEAN ALGEBRA	\$11.95	\$ 7.95
INSIDE YOUR COMPUTER	\$12.97	\$ 8.95
TRS-80 DATA FILES	\$12.97	\$ 3.00
THE WORLD CONNECTION	\$ 9.95	\$ 6.95
IBM PC FOR KIDS FROM 8 TO 80	\$15.95	\$10.95
ANNOTATED BASIC VOL. I	\$12.97	\$ 3.00
ANNOTATED BASIC VOL. II	\$12.97	\$ 3.00
THE REST OF 80	\$ 9.97	\$ 5.95

BOOK QUANTITY SPECIALS

This special only applies to the titles featured above. Please add an additional \$2.00 to our normal shipping.

BUY ANY FIVE BOOKS FOR \$30.00

BUY ANY TEN BOOKS FOR \$50.00

Quantities limited and subject to prior sale

TWO NEW RELEASES

POWER READING

4½ star rated by 80 MICRO

More than Speed Reading

by LSR Associates ★★★★★

A great program for teachers, students and anyone else who would like to greatly increase their reading speed and comprehension. This program automatically adjusts to individual abilities and it's better than taking outside speed reading courses. Power reading monitors your reading as you progress and will adjust speed. It prints reports to the screen or printer. Successfully tested on grades 7-Adult. This program is shipped with a general reading courseware diskette packed full of stories. An additional "Investment" courseware diskette is available. Mod III version runs in the 4/4P/4D.

Power Reading specify Mod III or MS-DOS **64.50**
Additional courseware diskette **16.50**

MASK MAKER

A Screen design and development system by Strachen Holdings LTD.

Now design your own graphic or data input screens in the native Mod 4/4P/4D mode. If you are writing programs in either BASIC or Assembler, let Mask Maker save you hours of development time. You can design any custom screen to your specifications and layout for merging into your programs. Mask Maker will automatically write to code and generate several different output formats in Assembler or BASIC to enhance your program design. Mask Maker runs under TRSDOS 6.2. It is a valuable programmers tool priced very reasonably. Mask Maker received a 4 star review in 80 MICRO, June 1986. The manual has been totally rewritten since the review.

Mask Maker Mod 4 **ONLY 39.95**

SUPERDIRECTORY

Index all of your diskettes and disk files with SUPERDIRECTORY. This unique program will read all of your disk files, generate a master library sorted by file name or extension along with the appropriate disk number. Your master index can be sent to the printer or brought to the screen. We even include an editor so you can add one line of comments to each file in the library. While SUPERDIRECTORY runs on the Model I or III (4/4P/4D in the MOD III mode), it will read and index Model 4 diskettes while in the Model III mode. When ordering, Model I or Model III must be specified. Also, please inform us if you are going to run it on the Model 4P as an additional file is needed. Retail \$49.95 SAVE 20% NOW \$39.95

AOS UTILITIES #1

Advanced Operating Systems

Comes in a padded binder

Retail 99.95 NOW **49.95**
SAVE 50%

VARKEEP

Can save variables to be passed to other basic programs, allows basic program chaining, contains a basic loader program which deletes itself to provide additional memory space, occupies 720 bytes of user ram.

Screenpacker Plus

Allows drawings to be created by moving a cursor around the screen, provides a normal typewriter mode which produces upper- and lowercase letters, produces larger letters, nine letters per line, five lines per screen.

Mod I or Mod III, specify.

The TRS-80 GRAB BAG

SALE 39.95

If you own a TRS-80 (Mod I/III/4), and you are a chance taker, or a gambler and LOVE surprises, our GRAB BAG may just be for you. Send us just 39.95, along with our standard \$3.00 shipping, and we will comb the far reaches of our warehouse. We will ship you a surprise package worth more than \$200.00. It may be computer books, disk programs, tape programs, other goodies or assortments of all. Programs will be guaranteed to run and replaced if they don't. Some items may be old, some current... that's the surprise. Refunds or exchanges are not allowed but we know that you won't be disappointed.

THE TOOLBELT MOD 4

by Powersoft

Powersoft does it again with a collection of 16 of the most popular LDOS TOOLBOX utilities republished for TRSDOS 6 running on the Model 4. Now enhance your MOD 4 TRSDOS with this powerful set of utilities. Complete with detailed manual

on how to use each utility program to do the many things the TOOLBOX for LDOS was famous for.

MODEL 4

APPLICATIONS

Macro Typing Tutor I/III/4	39.95
ST-80 III: Terminal, host and mini-BBS	69.95
Masterdirectory Mod III	29.95
Superdirectory Mod I/III	39.95
Datagraph I/III/4Max	74.95
Datagraph w/Pie Chart Option	109.95
The Basic Checkbook I/III	64.95
Mterm I/III/4	59.50
Loan Amortization III	29.95
PowerMail Plus I/III/4	89.95
Text Merge for PowerMail	49.95
Power Mail w/Text Merge	119.95
Inventory Control/ICS Pro	69.95
Ultraterm I/III	44.95
Ultraterm 2.0 w/auto-logon	59.95
Modem-80 I/III	39.95
Modem-80 4/4P	79.95
SPS Statistical Analysis Mod 1	150.00
SPS as above for Mod III inquire	

ELECTRONIC BULLETIN BOARDS ONLY 74.95

RUN YOUR OWN BULLETIN BOARD

You too can be a sysop. Run your own BBS and open up your computer to the outside world. . . . Imagine a real time electronic message center in your own home.

COMPLETE SYSTEMS

BBS-80 MOD I or III (for floppies)	\$ 74.95
INFOEX-80 or I or III (will run on hard disk)	\$ 99.95
FAST-80 for the Model 4/4P/D	\$ 74.95
BBS-PC IBM or Compatibles	\$250.00

Call for additional details

DATAGRAPH ONLY 74.95

by Micro Software

Transform your Visicalc or Multiplan files into High-Resolution Custom Graphs on Your TRS-80 Computer and Graphics Printer

- GRAPHICS PRINTERS REQUIRED
- MX-80 GRAFTRAX OR GT +
- MX-100, FX 80/100
- LP VIII, DMP-200-2100, 120
- NEC 8023 A-C, C ITOH 8510
- IDS 480/560, 480, 80/132
- OKIDATA 82/83, 92/93, 84
- GEMINI 10/15

PIE CHART OPTION

\$34.95

MOD I, III, 4 (SPECIFY)

PLEASE SPECIFY PRINTER



214-680-8268

Monday - Friday 10:00 to 8:00 CST
Saturday 10:00 to 5:00 • Closed Wednesdays

Send Cash, Check or Money Order. Please add \$3.00 for UPS Shipping or \$5.00 For US Postage & Insurance. COD's send an additional \$3.00 COD fee.

All COD's will require cash or certified upon delivery.

Foreign orders are welcome. All shipping charges assumed by purchaser.

When ordering by mail, please specify computer and model number.

Phone Your Order In Today Or Mail To:

DISKCOUNT DATA, 2701-C WEST 15th, SUITE 612, PLANO, TX 75075



Cheerfully Accepted

PowerSoft NewsFlash #12

Anniversary Column!

Thank you for reading our NewsFlash column over the past year. Your response has been favorable and we enjoy passing along news as available. We appreciate your support and will strive to continue to provide quality products at a fair price. On CompuServe™, type GO PCS56 to visit our SIG.

The response to our new TRSCROSS™ utility has been fantastic! *Thank you!* TRSCROSS is explained in depth in our ad elsewhere in this issue, but briefly for those that have a TRS-80 or used one before, and now use a PC or compatible - do not miss this program! It allows you to read and convert your double density TRS-80 disks directly over to PC/MS-DOS right in the PC! A TRS-80 is not even needed. BASIC programs and SuperSCRIPSIT files are converted "on-the-fly" in just one pass! We've checked our competition, and to do the same thing requires many steps more than this. Also, the competition doesn't tell you that his program is written in BASIC! *We couldn't believe it!!* It's much slower, and has less automatic BASIC conversion (and no SCRIPSIT or SuperSCRIPSIT conversion) - for more money! TRSCROSS is what you really want. Just pop your TRS-80 diskette in your PC and read or write to it. In both directions. It's easy & fast! Don't settle for less than the best. Only \$89.95.

We still support the TRS-80! We have written many excellent products for the TRS-80 that you should definitely know about if you use this computer. Below is a list of what we can do for you and your TRS-80.

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, removes passwords, backs up "funny" disks, allows transferring of files from all kinds of other TRS-80 operating systems and much more! Approximately 70 functions in all! *5 star review!* Only \$79.95

Model 4 ToolBelt - This is known as the "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 you use LDOS, buy the LDOS ToolBox. Only \$49.95 each.

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

BACK/REST - Our super fast mirror-image utility for backing up your TRS-80 hard drive if you use LDOS or TRSDOS 6. BACK/REST tells you how many disks you will need ahead of time, and prompts you all the way through on what to do. Handles files larger than a floppy with ease. Allows complete restoration of the entire drive or file by file. *5 star review!* \$99.95

PowerMAIL Plus - The very best mail 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. *Reviewed in June '85 80-MICRO (4 stars).* \$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 GW-BASIC). \$29.95

Buy SuperCROSS/XT at same time as CNVBASIC and get both for \$119.95!

Specify TRS-80 Model# when ordering SuperCROSS, CNVBASIC, PowerMAIL, or Super Utility.



PowerSoft Products

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

Add \$3 S/H (US) or \$12 Foreign • Texas Residents add sales tax • TRS-80 is a trademark of TANDY Corp

PUBLISHER
Peter Hutchinson

EDITOR-IN-CHIEF
Eric Maloney

EXECUTIVE EDITOR
Michael E. Nadeau

MANAGING EDITOR
Marilyn G. McMaster

REVIEW EDITOR
Ryan Davis-Wright

COPY EDITORS
David E. Essex
Anne Freed

TECHNICAL WRITERS
Bradford N. Dixon
Dave Rowell

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 Wozmak
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

MARKETING/PROMOTION DIRECTOR
Jane Butterfield



Article submissions from our readers are welcomed and encouraged. Inquires 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.

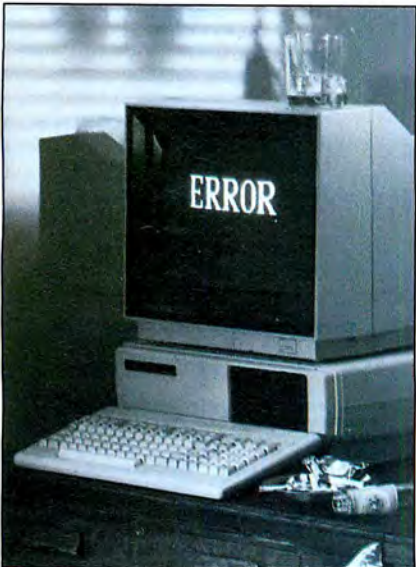
*TRS-80, Scripsit, and TRSDOS are trademarks of Radio Shack, a division of Tandy Corp.

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.

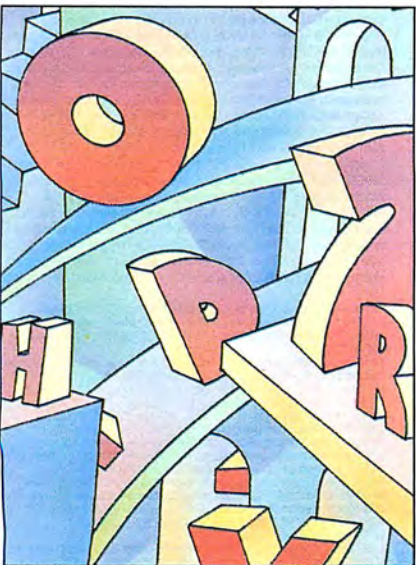
Entire contents ©copyright 1986 by CW Communications/Peterborough Inc. No part of this publication may be reprinted, or reproduced by any means, without prior written permission from the publisher. All programs are published for personal use only. All rights reserved.



page 27



page 34



page 114

Features

- 27. **Stacking Up MS-DOS Subroutines**
by Thomas L. Quindry
Four subroutine libraries compared.
- 34. **The Complete Guide to Basic Debugging**
by Lewis Rosenfelder
Save your sanity and your programs with our comprehensive debugging directory. (Models I, III, 4, and 1000)
- 36. **21 Debugging Hints**
- 40. **Master Checklist**
- 42. **A Guide to Basic Error Messages**
- 114. **The Road to Better Sorting** *by Hardin Brothers*
Seven all-occasion sorts. Choose the right one to get the job done fast. (Models 4, 1000, 1200 and 3000; Load 80)
- 124. **What's Your Function?** *by Joel M. Hoffman*
How to make the most of Basic's DEF FN command. (Models III, 4, and 1000)
- 126. **Restorative Powers** *by David Goben*
A sure cure for accidental resets within Scripsit. (Models I, III, and 4/4P/4D; Load 80)

Departments

- | | |
|--|---|
| 6. Load 80 Directory | 134. Dave's MS-DOS Column
<i>by Dave Rowell</i> |
| 8. Side Tracks
<i>by Eric Maloney</i> | 140. The Art Of Programming
<i>by Bruce Tonkin</i> |
| 10. Input | 145. Public Works
<i>by Bradford N. Dixon</i> |
| 12. Feedback Loop | 146. Debug |
| 19. Pulse Train
<i>by Bradford N. Dixon</i> | 148. The Next Step
<i>by Hardin Brothers</i> |
| 25. Reader Forum | 158. How to Read 80 Micro |
| 27. Reviews
<i>edited by Ryan Davis-Wright</i> | 162. Express Checkouts
AT4X4Plus
The Norton Editor
TRScat
Dots-Perfect |
| BasicA Scientific Subroutine Library Finally! | 170. HOT CoCo Section |
| The Inside Track | 197. New Products |
| Peeks 'n Pokes | 208. Fine Lines |
| Mr. Ed | |
| The Word Machine 4.0.b | |
| Able One | |
| GW-Convert | |

LOAD 80

Load 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

Sort Takes

Article: The Road to Better Sorting (p. 114).

System: Model 4, 64K RAM.

Six sort routines that bring order to the chaos of data lists.

Language: Basic.

Cassette filespecs: B, C, D, E, F, G, H.

Disk filespecs: SORTLST1/BAS, SORTLST2/BAS, SORTLST3/BAS, SORTLST4/BAS, SORTLST5/BAS, SORTLST6/BAS, SORTLST7/BAS.

Scriptit Recovery

Article: Restorative Powers (p. 126).

System: Model I, 16K RAM, Cassette Scriptit; Model I, 32K RAM, Disk Scriptit; Model III, 16K RAM, Cassette Scriptit; Model III, 32K RAM, Disk Scriptit; Model 4 with 64K RAM, Scriptit, EDAS editor/assembler (optional).

A complete set of recovery programs for all versions of Model I/III/4 Scriptit.

Language: Assembly.

Cassette filespecs: RECM1C, RECM1D, RECM3C, RECM3D, RECM4.

Disk filespecs: RECM1C/CMD, RECM1D/CMD, RECM3C/CMD, RECM3D/CMD, RECM4/SRC, RECM4/CMD.

Model 4 Math

Article: The Next Step (p. 148).

System: Model 4, 64K RAM;

EDAS editor/assembler (optional).

Working with extended-length integer arithmetic on the Model 4.

Language: Assembly.

Cassette filespec: MULTBY.

Disk filespecs: MULTBYTE/SRC, MULTBYTE/CMD.

Loc-Editor

Article: How to Read 80 Micro (p. 158).

System: Models I and III, 32K RAM.

A program that finds errors for you.

Language: Disk Basic.

Cassette filespec: J.

Disk filespec: LOCEDITR/BAS.

Checksum

Article: How to Read 80 Micro (p. 158).

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: I.

Disk filespec: CHECKSUM/BAS.

Bonus Program

System: Model 4, 64K RAM.

A Model 4 memory exerciser and diagnostic program.

Language: Assembly.

Cassette filespec: MEMTST.

Disk filespec: MEMTST/CMD, README/TXT. The latter is the documentation for the program.

For a printout, type LIST README/TXT (PRT) at TRSDOS Ready and press the enter key.

BAS = Basic, SRC = source code, CMD = object code, TXT = ASCII text file

ART DIRECTOR

Anne Fleming

PRODUCTION MANAGER

Lynn Lagasse

AD/GRAPHICS PRODUCTION

Deborah Brumfield

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 Destrempe

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)*, *Theorem*, 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 Mikrodatab*; 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, WC1R4EJ, England.

Dealers: Contact Kathy Boghosian, Retail Sales Manager, 80 Micro, Pine St., Peterborough, NH 03458. (603) 343-0728.

♥ 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.

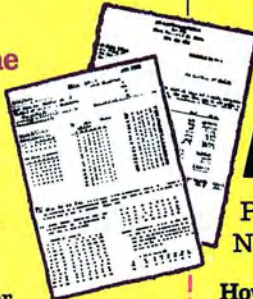


Superb State-of-the-Art File Handling

- 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.

Early last summer, while everyone else was trying to guess what new computers Tandy would be announcing this year, *80 Micro* was tracking down persistent rumors that Our Favorite Spokesman Bill Bixby would no longer be peddling Tandy products.

Word finally came down from Tandy's in-house advertising agency (which some waggish Forth Worth executive, in a moment of inspiration, named the Central Advertising Agency): Bixby's contract expired at the end of June.

And boy, did it expire. An internal memo instructed the people in charge of ads, "To insure that there are no difficulties regarding this for any parties, either for Radio Shack or any of the magazines used by us, please ask your production manager to purge any materials (film, slicks, etc.) that contain Bill Bixby."

We don't know why Tandy and Bixby didn't renew their contract. Perhaps Tandy simply decided that it was time to change its image. (If you ask, "What image?" it just shows how jaded and cynical you've become.) They've had Bixby around since the Model 2000, and while the ad campaign has been innocuous enough, it hasn't exactly made advertising history.

The real question, of course, is: What will the new image be? Will Tandy continue to press forward with its low-rent, *papier-mache* style of advertising? Will the actors in its commercials continue to look like their frontal lobes were removed with an ice pick? Or will Tandy break out with something different and exciting?

If you watch much TV, you're aware of the many different approaches ads take these days. Tandy has a variety of options, depending on what kind of personality it wishes to project to the public.

Patriotic ads seem to be most prevalent. They show red-blooded, working-class Americans rediscovering their pride through cars, beer, insurance, and hamburgers. I have yet to see a computer company take this approach. It seems like a natural for Tandy, with its Radio Shack stores in nearly every town in the country.

Here's the scenerio. Tandy President John Roach drives up to a construction site somewhere in the Heartland, where a bunch of honest American guys are working up an honest American sweat. John gets out of his honest American pickup. He's dressed in a red flannel



shirt and blue jeans, and is carrying a lunch pail in one hand and the Model 100 in the other. John speaks.

"If you're tough like these guys, you need a tough computer. That's the kind of computer Tandy makes—rugged, honest, and, most of all, cheap."

John talks a bit more about the 100's virtues. As he finishes, an honest American guy slaps him on the shoulder and shoves a beer in his hand.

"Here ya go, Big John; we couldn'ta done it without ya."

The commercial fades with John and the guys happily bonding in their masculine way as Willie Nelson sings the Tandy jingle: "We know Americans want it straight/We make computers that make America great."

Another common approach appeals to our nostalgia for the simplicity of rural life in the good old days. (My favorite features a guy eating a wholesome bowl of cereal and fruit in his garden while a fearless rabbit looks on. Whoever thought this one up was using a strong psychedelic.) I envision the Tandy ad as going something like this:

A young couple walks into a country store. They're arguing about something. A kindly, older woman approaches, and asks in a German accent:

"Zo vot zeems to be ze problem vis you two?"

Woman: "Oh, Hilda, it's our computer. Bill doesn't like it anymore."

Hilda: "Ach! Zo haf you tried ze Model 1000 from Tandy?"

Man: "Aw, come on! All computers are alike!"

Hilda: "Zat shows how much you know. Here—look at zis!"

Hilda shows them her 1000 behind the counter and explains its many advantages.

Woman: "So let's try it!"

A week later:

Bill: "Hilda, we don't know how to thank you. The 1000 is great, and our marriage is saved!"

Hilda: "Goot! Zo you vont to buy zome zoftvare?"

Merry laughter as the commercial fades.

Another common type of ad features famous retired jocks. A jock ad would do well for Tandy, given their presence on TV during sporting events.

For example, Bob Uecker and Too-Tall Jones walk into a Radio Shack Computer Center.

Uecker to clerk: "Hey, buddy! Whaddya got for a famous guy like me who's always on the go?"

Clerk: "Well, Mr. Uecker, how about this Model 200?"

Uecker: "200! That's my lifetime batting average! I'll take 10 of 'em!"

The clerk tells Uecker about the 200's great features, while Uecker fills in with repartee. The ad closes with Uecker dumping a load of 200s into the back seat of his car.

Uecker: "Now what the heck happened to Too-Tall?"

Jones comes out of the store with a Model 6000 under each arm.

Jones: "Hey, Bob, check out these easy-carrying portables!"

Life without Bill Bixby isn't the end, but rather a new beginning. Will Tandy rise to the challenge? Don't move away from your sets.

The Clothes Make the Man?

Speaking of image, Tandy got quite a bit of press for its new dress code that puts Computer Center personnel in conservative business suits and prohibits men from wearing moustaches or beards. Said Senior Vice President Ron Stegall, "A beard or a mustache has never sold a computer."

Let me check my calendar. This is 1986, isn't it?

Tandy has every right to expect its employees to be neat and professional, but you've got to wonder about this idea that shaving improves sales performance. As my grandmother used to say, "Shave a bozo and what have you got? A hairless bozo." ■

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

CAMEO

ROMAN

Nostalgia

LOMBARDIAN

Pump

celtic

Playbill



OUTLINE

Pretorian

CHAINED

SHADOW

Chancery Medium

POKER

HANOKAH

BACKLITE
 BUCKLE

Rotunda

REVBAN

Calligraphy

Old English

INCISED TRAJAN

BELLS

CITY

Mini Cubes

Small Boldface

XMAS

USA

CLIMBING

Small Bold Italics

MOON LITE

W
R
I
T
E
R
B
R
O
W
N

Circle 91 on Reader Service card.

DOTWRITER printed these on an Epson MX-80.

See What You Can Do With DOTWRITER!

DOTWRITER 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?

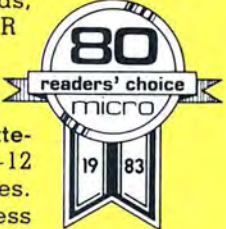
DOTWRITER uses the "bit-image" graphics of your printer to produce the kinds of stunning results shown inside the box. It is a full-function text printing program, so you can inter-mix different character sets, do centering, paragraphs, pagination, magnification, draw horizontal and vertical lines, reversals (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 costs less than \$25 each and you may purchase them at any time.



SIDWAYS SPREADSHEETS

If 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.

Send 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.

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

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.

Art Criticism

Bruce Tonkin, in his article "Learning GOTO Gracefully" (May 1986, p. 82) rails against those who dogmatically oppose the GOTO statement. I can't blame him, but I don't quite agree with him either.

Abandoning GOTOs in favor of GOSUBS makes no sense out of context. Most structured programmers make judicious use of GOTOs in Basic and in Cobol, and it is virtually unavoidable in most Assembly-language programs. Anyone who describes structured programming solely in terms of GOTO avoidance doesn't understand the goal of structured code or is unwilling to take time explaining it.

Bruce might be overreacting to the gurus of no-GOTO and has thus thrown out the baby with the bathwater. He says Basic doesn't have a Case statement, but in fact it does allow for a case structure that existed long before languages having the Case statement were created.

Bruce's solution to the convoluted keyboard-input code in Program Listing 2 is indeed an improvement, but it might be difficult to apply to other case problems. The structured solution to this problem would be:

```
100 IF A$="Y" GOSUB 200
    ELSE IF A$="N" GOSUB 300
    ELSE GOSUB 400
110 'Program continues here
200 'Handle A$="Y"
290 RETURN
300 'Handle A$="N"
390 RETURN
400 'Handle exceptions
490 RETURN
```

The keyboard-parsing logic is clear and it's easier to see the program's overall flow. The keystroke is dealt with in line 100 and the program continues at line 110 without the subroutines obscuring the overview. You can also use Bruce's technique by replacing my line 100 with the following:

```
100 ON 1+INSTR("YN",A$) GOSUB 400,
    400,200,300
```

This isn't as clear as the preceding code, but it can easily handle situations where a large number of possible responses won't fit into Basic's line limit.

Using GOSUBS instead of GOTOs encourages modularity and makes it easier to figure out what the code is trying to do.

Barry Kornfeld
President, Stony Clove Computers
New York, NY



I'm afraid Barry has misunderstood me, or I have failed to make myself clear. I don't believe that "structured programming" means "get rid of GOTOs." As I said in my article, programmers should avoid using the GOTO in certain circumstances because it is frequently abused.

I listed examples of this kind of abuse and noted that even my more complex programs use the GOTO. Like Barry, I believe the GOTO is an essential part of most programming strategy and that attempts to do away with it are misguided.

Barry's example of a structured way to handle keyboard input has minor defects: The If statement lacks a corresponding Then, and the code requires Basic to evaluate each case one at a time (the INSTR method requires just one evaluation). He is correct, though, when he says the INSTR method may not easily be generalized to arbitrary case-type constructions, in which case his method would be a good alternative.

There are nearly as many definitions of structured programming as there are programmers, but it does seem that Barry's definition isn't very different from mine.

—Bruce Tonkin

80 Micro's BBS is open 24 hours a day. It offers programs you can up and 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.

Bruce Tonkin's dreams and realizations about the American National Standards Institute (ANSI) standard for Basic are much the same as mine ("Mistaken Measures," July 1986, p. 92). For a quick applications program, I'll take a good, strong "extended" version of Microsoft Basic any day.

I first saw the proposed standard 2½ years ago and was appalled—it's an absolute nightmare of syntax rules and variety of application. ANSI has only given us a rat's nest of options.

Jerry L. Latham
Midwest City, OK

Multi-Basic Revelation

As someone who is interested in the "breath of fresh air" that is supposed to come with using compilers, I read with interest Mark Goodwin's review of Alcor Systems' Multi-Basic Compiler (November 1985, p. 33)—so much so that I went out and bought the product.

Most of my programs deal with ionospheric physics and make extensive use of sines, cosines, and the like. Imagine my dismay at finding that compiled and CODEGEN programs run about three times slower than they do in Basic. Apparently for reasons of economy, Multi-Basic leaves some mathematical functions in pseudo-code instead of converting them to machine language.

I've written the following "pirouette" benchmark—so named because it goes around the origin three times—for others who do scientific programming:

```
10 PI=3.14159: A$=TIME$
20 FOR I=0 TO 1080: TH=1*PI/180: Y=SIN
    (TH): NEXT
30 B$=TIME$: PRINT "STARTED AT "; A$:
    " AND ENDED AT "; B$
40 END
```

The Multi-Basic Compiler ran this benchmark on my Model 4 in 100 seconds, while Basic did it in 26.

If I had seen numbers like this earlier, I'd be \$69.95 richer.

Richard R. Brown
Anacortes, WA

Whack Shack Yak

My solicitation for reader comments on Radio Shack service (Side Tracks, June 1986, p. 8) got about 50 responses, with Whack the Shack letters outnumbering Don't Whack the

Shack letters by 2 to 1. This is actually a decent showing for Tandy, since unhappy customers are more likely to be vocal. (Our own surveys show that about 75 percent of our readers are satisfied with Tandy's customer support.)

About the only conclusion the letters lead to is that a customer's impression of Tandy and Radio Shack is determined by how well the local Computer Center serves him. If Tandy wants to improve its image, it has to start with the fellow behind the counter.

—Eric Maloney

Thumbs Down

I've learned to expect no help from Radio Shack Computer Center personnel because they know precious little more about computers than I do.

There is no way to establish a personal relationship with anyone because nearly every time I go there, the personnel has changed.

Radio Shack's user's manuals are ambiguous, confusing, and clumsy, and its personnel are ignorant, cold, evasive, and indifferent.

The bottom line is this: Generally speaking, Radio Shack has a good, reasonably priced product but a very poor support system.

James P. Needham
Brandon, FL

When I bought my computer, the 9 key wouldn't work. I made a call to the Radio Shack dealer in South Carolina who sold me my Model I.

Dealer: What does it do when you press it?

Me: It doesn't do anything.

Dealer: Then don't use it.

Me: But I write all my own programs. I need the parenthesis.

Dealer: You're bright. Program around it.

When I was buying software in a company store in Wichita, KS, the salesman requested I sign my name to an agreement stating that I wouldn't use the sale item commercially. I wouldn't sign and asked for my money back. The salesman opened the drawer and threw the bills and change at me! I, my sister-in-law, and nearby customers were all crawling around on the floor picking up the money.

But revenge is sweet. I dropped into another company store in Enid, OK, to find a new power supply for my Model I. They had a Model I they said they couldn't fix, so I bought it for \$25. When I powered up at home, the screen filled with trash, so I reached around the back of the monitor and turned the horizon-

tal-hold knob. The computer has worked perfectly ever since.

It's the spirit of the Model I and its initial impact in 1977 that makes it live on. It was the first gleam in thousands of peoples' eyes.

If I were Citizen Kane, my Model I would be my Rosebud; I will never give it up. I wish I had a sign in front of my house that said, "If your Model I doesn't serve its purpose anymore, leave it here, but keep the spirit with you forever." Something like that is too intangible for Radio Shack to understand.

Michael Shuck
Riverdale, MO

For the past six months I have had nothing but trouble from the Radio Shack Computer Center here in Wichita. The salespeople are much more knowledgeable about commissions than they are about Tandy products or computers in general. I actually overheard one salesperson explaining that the Model 4D is expandable to 768K RAM!

A month and a half ago, I ordered a *Model III Technical Reference Manual*. For three weeks, the Computer Center people forgot to order it. When I finally reminded them, they ordered a repair and service manual instead. I have yet to see my manual.

Finally, I received a letter announcing a patch to update TRSDOS 6.2.0 to 6.2.1. I instantly went to the Center and asked about the update. They didn't have any, and "We'll order one today" was their reply. I received the update disk four months later.

David Anderson
Wichita, KS

Thumbs Up

No more cheapshots at Tandy. They are a sound, well-managed company offering just about the best price/performance ratio on the market. And they don't sneer at Mr., Mrs., and Ms. Public the way the crowd at Big Blue are apt to do. Also unlike Big Blue, they are everywhere.

I am not into buying fancy initials or K-Mart electronics equipment. I want the best for my computer dollar and I find it at the Shack.

Janet Littler
Cleveland, OH

We chose Color Computers for our freshman introductory program and are pleased with the decision. The people at the Augusta Radio Shack have been very supportive and have gone out of their way to meet our needs. They constantly keep us up to date on new equipment and software to help us introduce

our students to the world of computers.

Convenience, low cost, fast repair service, and knowledgeable salespeople have made the Shack our most valuable computer resource. They've made meeting our new state computer proficiency requirement a lot easier.

Bob Teague
Winthrop High School
Winthrop, ME

We could probably make a list of complaints that would be pretty long. Then we would have to make a list of the times we were happy with the service from Radio Shack—that list would be much longer.

James Barkman
Dinuba, CA

The Shack gets our vote. The world has treated it unfairly. My only complaint is about Tandy's refusal to deal with superior operating systems and software such as NEWDOS, MULTIDOS, DOSPLUS, and Ttypital.

Henry C. Aldrich
University of Florida
Gainesville, FL

I am a Tandy person. I believe in them. I believe in their products. I believe in their salespeople. I believe in their service. I have been dealing with them since about 1979 and have never had bad dealings with anybody at Tandy's home office or stores.

David Bahn
Monroe, LA

Mr. Bahn reports that he owns a Model I, two Model IIIs, two Model 4Ps, a Model 1200, two 16K Model 4's, a Model 1000, a TI 99/4A, a Commodore 64, and a Timex-Sinclair.

—Eds.

Don't whack this Radio Shack. The manager's name is Bart. He has supported his customers faithfully since 1979 and goes out of his way to support old and new machines. The man knows every computer club personally because he makes it a priority to visit club meetings and answer questions.

He defends Radio Shack and Tandy as a good manager should and supports them through their failures. The leadership Bart exhibits earns him praise all over the Silicon Valley. I think he was born with a Z80 chip installed in him.

R.W. Brown
Campbell, CA

Bart's store is at 1820 Saratoga Ave. in San Jose.

—Eds.

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.

Making the Big Move

Q: We are a small company using an MAI Basic Four minicomputer and several stand-alone 48K Model IIIs and 64K Model 4's. Recently, we bought a Tandy 1200 HD and a communications program for transferring data from the MAI to the Model 1200.

We want to buy more 1200s to replace our Model IIIs and 4's but would like to save the data and programs for use on the 1200s. Is there a program to convert Model III and 4 programs and data to the 1200? We use TRSDOS 1.3 on the Model IIIs and TRSDOS 6.2 on the 4's (VisiCalc and Profile on both) and plan to use Ashton-Tate's dBase III and Lotus 1-2-3 on the 1200s. (Richard Stickney, Wabash, IN)

A: You can move the data between computers but can't convert the programs so easily. The easiest way to move data is with a disk-conversion utility such as Hypercross or SuperCross. Either will copy data from the Model III or 4 to an MS-DOS disk, where you can read the data into your program. While you can save both VisiCalc and Profile data files in ASCII, you might have problems getting the MS-DOS programs to read the data because it's in the wrong format.

Hypercross is available from Hypersoft, P.O. Box 51155, Raleigh, NC 27609, 919-847-4779 from 6 to 11 p.m. SuperCross is available from PowerSoft, 17060 Dallas Parkway, Suite 114, Dallas, TX 75248, 214-733-4475.

Disassembly Instructions

Q: Where can I get a Model III/4 disassembler, editor/assembler combination that will let me disassemble large programs into modules that I can link again later? (M.H. Briggs, Walla Walla, WA)

A: MISOSYS sells programs that could help you. For the Model III, try a combination of EDAS and DSMBLR. For the Model 4, try PRO-DUCE and either PRO-Create or PRO-MRAS, which also work with Model III programs. All are available from MISOSYS Inc., P.O. Box 239, Sterling, VA 22170-0239, 703-450-4181.

The Alternate Source's Insight is another good disassembler; you can use it in tandem with their ALE or ZEN assem-



blers. For information, contact The Alternate Source, 704 N. Pennsylvania Ave., Lansing, MI 48906, 517-482-8270.

A Real CAD

Q: Are there any CAD (computer-aided design) or CAE (computer-aided engineering) programs for my Model III with 48K and two disk drives? What additional software or hardware will I need? (R.L. Treiber, Fort Lauderdale, FL)

A: The only Model III program we know of is xT.CAD from Microdex (1212 N. Sawtelle Ave., Tucson, AZ 85716, 602-326-3502). It requires a high-resolution graphics board available from Radio Shack National Parts (900 E. Northside Drive, Fort Worth, TX 76102, 817-870-5662) or Micro-Labs Inc. (902 Pinecrest, Richardson, TX 75080, 214-235-0915).

Color Commentary

Q: Is there a graphing program for the Model 4 comparable to the Radio Shack Model III Business Graphics Analysis Program (catalog no. 26-1597)? I prefer one that uses the high-resolution graphics board. Also, is there a Model 4 program that does color graphics on the Tandy CGP 220 color printer? (Richard A. Belz, Gainesville, FL)

A: While there are graphics programs available for the Model 4, none is comparable to the Business Graphics Analysis Program (BGAP). BGAP is fine if you don't mind switching data between the Model III and 4; it will certainly do the job in regular and high-resolution mode. It drives the CGP 220 well, creating high-quality color graphics.

Squeezing the Screen

Q: I use a Tandy 1000 HD and need a high-memory, machine-language pro-

gram that will read the screen contents into the RS-232A port. (I used to have a program that did this on the Model III.) Can you refer me to an 80 Micro back issue or to a company that supplies this type of program? (John Terfehr, Yucca Valley, CA)

A: You can use memory-resident SideKick (Borland International Inc., 4113 Scotts Valley Drive, Scotts Valley, CA 95066) to grab screen text (the screen-input function) into SideKick's Notepad. Then save the text block-copied from the screen to a file with SideKick's block-write command, and send that to the RS-232 from DOS with the Copy command: COPY file name.TXT COM1. If you're in a communications program, input the text from screen; then send the text (as if typed from the keyboard) with SideKick's block-export function—carriage returns, line feeds, and all.

Divide and Conquer

Q: Can you recommend a text or commented program that lets you switch memory banks 2 or 3 into and out of the upper 32K of memory? I want to do this on my 128K Model 4 in Model III mode. Radio Shack's Model 4 Technical Reference Manual is no help. (Richard Robertson, Chautauqua, NY)

A: "The Great Divide," by E. Cameron Snyder (August 1985, p. 62), uses the banks in the Model III mode in Assembly language.

WordStar Navigator

Q: I have a CP/M question. I am trying to install MicroPro's WordStar for printer output. Does anyone know the proper hexadecimal addresses for status requests for the Model 4P as requested by the Install.COM program? I have tried everything I can think of and can only get WordStar to print what seems to be the right half of the page. (James Pitney, San Francisco, CA)

A: According to John Long of Montezuma Micro, if you have the Montezuma Micro version of CP/M, you should run WordStar's WInstall program to set up installation. Install it as an ADM-3A terminal. Montezuma Micro has a version already installed and ready to go for the Models 4 and 4P.

Functionally Illiterate

Q: I am switching from a Model 4 to a Tandy 1000 HD and have been unable to use the 1000's function keys in my pro-

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** ^{95*}

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

80 Micro review 12/84
 Easy to use? ★★★★★
 Good docs? ★★★★★
 Bug free? ★★★★★
 Does the job? ★★★★★

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 "TIMES" 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, FPO, APO add 10%



grams as a CHR\$ within an INKEY\$ routine, as I could on the Model 4. Here's part of the routine I want to use:

```
100 X$ = "" : X$ = INKEY$: IF X$ = "" THEN
    GOTO 100
110 X = VAL(X$)
120 IF X$ = CHR$( CHR$ for function key 11
    or 12) THEN GOTO 1000
130 ON X GOTO etc.
```

(Glenn E. Smith, Olathe, KS)

A: The Tandy 1000 manual doesn't explain function keys very well. Refer instead to the chart in the back of the Basic manual showing the keyboard ASCII scan codes.

Function keys produce extended codes (ASCII zero followed by another ASCII code) for creating special keys. F11 and F12 (unshifted) are listed as X-098 hexadecimal (hex) and X-099 hex. In Basic, using decimal numbers, these codes translate to CHR\$(0) + CHR\$(152) and CHR\$(0) + CHR\$(153).

Here's a sample program:

```
100 X$ = "" : X$ = INKEY$: IF X$ = "" THEN
    GOTO 100
110 X = VAL(X$)
120 IF X$ = CHR$(0) + CHR$(152) THEN
    PRINT "F11"
130 IF X$ = CHR$(0) + CHR$(153) THEN
    PRINT "F12"
140 GOTO 100
```

This program doesn't work with function keys F1 through F10, which have been assigned the functions listed at the bottom of your screen. You can use the On Key statement to get around this inconvenience, but you must use a GOSUB instead of a GOTO. For example:

```
10 KEY(1) ON:KEY(2) ON
20 ON KEY(1) GOSUB 1000
30 ON KEY(2) GOSUB 1100
40 GOTO 40
1000 PRINT "You pressed F1":RETURN
1100 PRINT "You pressed F2":RETURN
```

Running into Red Tape

Q: I program almost exclusively in Basic on a Model 4, and have a wide selection of Basic programs—many featuring graphics—on cassettes that I ran on my Level II Model I. I am unable to transfer these programs to disk under TRSDOS 6.2 and have to retain them on tape using Model III mode. I've rekeyed some nongraphics programs on the Model 4 and stored them on disk, but I can't do the same with graphics programs that use the Level II Set, Reset, Point, and CHR\$ commands.

Also, the Model 4 won't accept most of my Model I system tapes, including Adventure International's StarFighter and SubLogic's Flight Simulator—not even in Model III mode. Hayden's Sargon II runs, but with a peculiar graphics set. (E.A.J. Robjohns, Beckenham, Western Australia)

A: The Model 4 doesn't have Set, Reset, and Point commands; "Upgraded Graphics," by Alan D. Smith (August 1985, p. 76), tells you how to add them to Model 4 Basic programs. "Move It!," by John D. Wolfskill (September 1986, p. 62), expands on the same idea.

"A Happy Medium," by David M. Roberts (January 1986, p. 70), offers a program for transferring Model I/III system tapes to a Model 4 disk. Roberts' program solves some of the problems created by differences in the computers' memory layouts. Most system programs are quite specific, however, and won't transfer and operate on other systems easily.

1000 HD Mystery Keys

Q: The Model 1000 HD reference guide states that keys 13, 14, 15, and 16 control cursor movement when you're using the On Key GOSUB command. My computer, however, uses codes 11 through 14. Why is this? (Emilio Serano, Rangacua, Chile)

A: The new version of the 1000's GW-Basic 2.02 is Tandy's version 1.01. Tandy rearranged the On Key assignments to make its version more compatible with IBM Basic. F11 and F12, which were 11 and 12 in the first 1000 Basic, are now 21 and 22. The arrow keys are now 11 through 14, as you noted.

Anatomy of a Model 4

Q: As a computer-science student, I'd love to learn more about my computer. Can you recommend a book that will informally introduce me to the architecture and organization of the Model 4? (Leila M. Laaksonen, Marietta, GA)

A: We suggest *Mod-4 by Jack* from Crest Software (2132 Crestview Drive, Durango, CO 81301), which was reviewed in the August 1985 *80 Micro* (p. 115). Another good source is *The Programmer's Guide to LDOS/TRSDOS Version 6.x*, by Roy Soltoff (MISOSYS Inc.), a review of which appears on p. 119 of our November 1985 issue.

The Great Leap

Q: I've been trying to convert programs for my old Model I, 35-track, single-density system to my new Tandy 1000. Changing from PRINT@ to Locate is no problem, and neither is inserting spaces around key words—it's just time-consuming. I have yet to see a conversion program that does even these two tasks completely and properly.

The major problem concerns PEEK, POKE and some Data statements. Question: Is there a publication or list containing PEEK and POKE locations and usage for the Model I and Tandy 1000? (R.W. Russell, Albuquerque, NM)

A: The best information source we've

seen for converting Model III (or Model I) Basic to 1000 GW-Basic is the CONV3TOPC manual by Educational MicroSystems (P.O. Box 471, Chester, NJ 07930, 800-922-0786, 201-879-5982 in New Jersey).

Memory Space Lowdown

Q: I own a Tandy 1000 with 256K (including a 128K Memory Expansion Board). I have two questions:

Why does the computer say it has only 59,676 bytes of memory space when I boot up Basic?

I want to get a 20-megabyte (MB) hard disk for my Tandy 1000. Do I have to get a direct memory access (DMA) chip and/or a new BIOS ROM first? (Harold Robinson, Enumclaw, WA)

A: Basic can address a maximum of 60K, unless you have only 128K.

The DMA chip came with the Memory Expansion Board. You should have the new BIOS ROM 1.01 for third-party hard drives. For a 20MB hard drive, get Microsoft's PC-DOS 3.1.

A Sharper 1000

Q: I want to upgrade my Tandy 1000's display resolution with a transistor-transistor logic (TTL) monitor. Where can I find the display card I need? (Zinchenq Own, Bridgewater, NJ)

A: See PCA Technology's ad in the July 1986 issue (p. 95) for the Hercules-compatible Monoboard, which should drive an IBM-type TTL monochrome monitor from your 1000. You can contact them at 2512 Pegasus Drive, Bakersfield, CA 93308, 805-392-1714.

Out of Print

Q: I'm having trouble using the /P command with VP Planner on my Tandy 1000 and Okidata 92 printer with Plug and Play ROMs. I can print just fine from my other programs, but I have to come out of VP Planner every time I want to print something. Can you help? (Randolph Martin, Richardson, TX)

A: If you have an early-model 1000 (bought in 1984 or shortly after) you might need to alter the printer port. Very early 1000s don't support one of the printer status bits, which causes problems with some programs. Check with your local Tandy repair center.

No Brownouts Expected

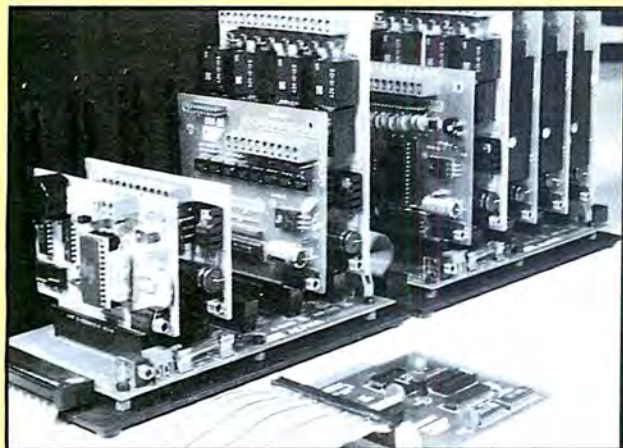
Q: I own a Tandy 1000, which I recently equipped with a Qubie PC20 20MB hard disk. I also have Tandy's Memory PLUS board (filled with 640K) and an internal 1,200-baud modem. Both the hard-disk controller and modem are 5¼-inch boards.

I also plan to add Tandy's piggyback Digi-Mouse board, but I'm concerned

The Amazing A-BUS

NEW

What will you do with it?



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.

- SHEILA wanted to set up a variety of experiments in her lab. With an A-BUS, the computer can watch the mice instead of Sheila.
- HARRY has a model railroad layout that he wished to automate. Now his home computer controls the engines, gates, signals, etc. through the A-BUS.
- BOB tests electrical fixtures as they leave the assembly line. He develops test equipment quickly with inexpensive, off-the-shelf, and easy to use A-BUS cards.

Before they chose the A-BUS, they asked:

- **What if I change computers?** Incredibly, this is as simple as replacing the inexpensive adapter card. The A-BUS cards work with hundreds of different computers.
- **What about my limited budget?** Good news! The A-BUS is the most economical system for any computer, anywhere. Also, you pay only for the functions you need.
- **I'm not an engineer. Can I use the A-BUS?** If you can wire a switch, you can use the A-BUS. Simple OUT and INP commands control everything. (Apple and CoCo use POKE and PEEK). You'll like the detailed user's manuals.
- **What would I need?** Select the A-BUS cards, and slip them into a motherboard. Plug the adapter into your computer and connect them with a cable.
- **Can I get the user's manuals?** Yes, the complete set for all the A-BUS cards is available for only \$10. Also, you are welcome to call our tech line about your application.



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) 296-5918

Technical info: (203) 656-1806

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

that the system's power supply is already being taxed to its limits. Do you know if a larger power supply for the Tandy 1000 is available? If so, how is it rated and priced? (Anthony Q. Martin, Clemson, SC)

A: We don't know of a larger one yet, but we also haven't heard of anyone overloading the 1000 power supply. We've had more hardware installed in our 1000s than what you mentioned without any problems.

Readers Respond

Clearing the 1000's Screen

Reader Emilio Serrano (Rangacua, Chile) writes that our recommendation to Joseph Malacria (March 1986, p. 16) to use CHR\$(26) on the Model 1000 as an equivalent to the Model 4's CHR\$(31) doesn't work.

We've since learned that there is no ASCII code to clear to the end of the screen in GW-Basic. In Basic, entering control-Z from the keyboard does clear to the end of the screen, but this isn't the same as the CHR\$(26) the program sends to the screen.

Richard C. Kohlheyer (Las Vegas, NV) has come up with an alternative solution, in which L stands for the line number:

```
VIEW PRINT L TO 24:CLS:VIEW PRINT 1 TO 24:LOCATE L,4:RETURN
```

En Francais

Francine LeClerc asked for a program to add French accents to the Model 4 keyboard (July 1986, p. 16). Tim Worcester of the Electronic Closet in Bainbridge Island, WA, recommends installing a custom-designed video-character ROM if the intention is to add accent marks to characters displayed on screen. Tim says he has provided several such ROMs to French-Canadian Model 4 users. The Electronic Closet's address is 8187 N.E. Blakely Court W., Bainbridge Island, WA 98110.

Name That Disk

A.D. Bingham of England asked in the July issue (p. 16) if he can alter the name of an already formatted disk. According to Patrick J. Orginc (Mountain Home, ID) you can use the ATTRIB function of Model 4 TRSDOS 6.2 to change the disk name at any time, as long as you know the master password. You can also use the ATTRIB function to change the owner and user passwords along with the protection level on the disk.

Joseph P. Dineen (Pocasset, MA) has a program that will perform the change in TRSDOS 1.3 on the Model III (see the Program Listing).

Program Listing. Dineen's program for changing TRSDOS 1.3 disk names.

```
10 'RENAME TRSDOS 1.3 DISK
20 CLS
30 POKE 16561,&HBE:POKE 16562,&HBE:POKE 16409,1:CLEAR 500
40 FOR N=-16656 TO -16644:READ A:POKE N,A:NEXT
50 IF PEEK(293)<>73 THEN POKE &HBFA,221:POKE &HBFA,0
60 DEFUSR=&HBEF0
70 N1$="":N1=VARPTR(N1$):POKE N1,8:POKE N1+1,&HD0:POKE N1+2,&HBF
80 DATA 17,1,17,1,0,0,33,0,191,205,117,70,201
90 CLS:PRINT"Rename TRSDOS Disk"
100 PRINT:PRINT"Place Diskette in Drive 0 and press <ENTER> or Q t
o Quit.":PRINT
110 Y$=INKEY$:IF Y$=""THEN 110 ELSE IF Y$="Q" THEN END
120 X=USR(0):PRINT "Current Name is "N1$:PRINT
130 N3$=N1$:INPUT "Enter New Name";N3$:N3$=N3$+" "MID$(N1$
,1,8)=MID$(N3$,1,8): '8 SPACES BETWEEN QUOTES
140 PRINT:PRINT"Entering "N3$:FOR N=1 TO 500:NEXT
150 IF PEEK(293) <> 73 GOTO 170
160 POKE &HBFA,0:X=USR(0):POKE &HBFA,117:GOTO 90
170 POKE &HBFA,239:X=USR(0):POKE &HBFA,221:GOTO 90
```

End

Calling AT&T

Also in the July Feedback Loop (p. 16), Edward Kionka and Ron Scott advised Gil Seiler on how to interface a Tandy Daisy Wheel II printer with an AT&T 6300 computer.

Michael M. Meyers (Montclair, NJ) writes that his early-vintage DW II won't recognize the 1B and 15 hex codes for eliminating the extra line feed, presumably because the printer has an older-version ROM. For users running MS-DOS 2.0 or higher, he recommends Montezuma Micro's PC-Write, which sells for \$6 as public-domain disk M382 (P.O. Box 763009, Dallas, TX 75376-3009, 800-527-0347 or 800-442-1310 for orders).

Michael says PC-Write includes a driver specifically for the DW II that lets him do word processing on an Epson QX-16 computer.

CP/M on an LNW

Barry Erick (Dallas, PA) has some suggestions for Larry Arbour, who wants to run CP/M software on his LNW computer with 40- and 80-track TEAC drives (July 1986, p. 16).

Barry recommends using the LNW.COM program to set up the drives to recognize the popular CP/M disk formats. Type in and enter LNW, and call menu B for a list of alien disk formats. You can order the proper CP/M format from there. Barry used this method with a CP/M version of Borland International's Turbo Pascal on a Kaypro disk. He called up LNW, selected Kaypro SS (single sided) for drive B, placed an LNW-formatted disk in drive A, and used the PIP a:b:*.* command to make a copy of the master.

You can also use the LNW Set.COM file to custom-program the disk driver. To find out what's on an LNW disk—including interleave factors and the number of sectors and disk sides—go to Set and answer the prompts. You can also customize the drive to accept foreign disks not listed in the LNW.COM program.

Finally, 80 Micro advertiser Monte-

zuma Micro sells software in the LNW format.

Seeking Help

► R.E. Gustafson (Habichts Inc., 274 Dakota Square, Huron, SD 57350) is looking for a Model 4 version of Postman, a mailing-list program. He already owns the Model I/III version but wants to use it on a Model 4P.

► Goetz Gemper (Kaiserstrasse 151, D-5300 Bonn 1, West Germany) asks if anyone still sells the Interactive Control Language from XYZT Computer Dimensions of New York, and whether the language supports NEWDOS/80 Version 2.0 on the Model I.

► Manuel T. Guillan Jr. (Box 1576, Quebradillas, PR 00742) is seeking a Trivia Fever program for the Model 4.

► Robert L. Brickhouse (724 N.W. 61st Terrace, Fort Lauderdale, FL 33317) is looking for a program for managing a defined-benefit system pension plan on a 48K Model III with two drives.

► Maurice Abbott (66 Airlie Road, Montmorency, Victoria 3094, Australia) wants to buy the updated, machine-language version of AIDS III Version 1.5, a Model I data-management program marketed by SofTrends Inc. of Euclid, OH. The update may be called AIDS III Version 2, AIDSPLUS, or Promise! (the latter was reviewed in the November 1983 80 Micro, p. 176).

► Jeffrey McLean (5230 Kebbe Drive, Sterling Heights, MI 48077) seeks a memory upgrade for the Micro Merlin, a 16-bit expansion computer he runs with his LNW80 Model II. The Micro Merlin was sold by Micro Projects Engineering.

► John R. Spalding (RD #1, Coudersport, PA 16915) writes that he has a deteriorating eye condition and needs a large, monochrome monitor to use with his Model 4. He now uses the large-character code CHR\$(23) and magnifiers but finds that the magnifiers aren't completely compatible with a 12-inch screen. ■

"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.

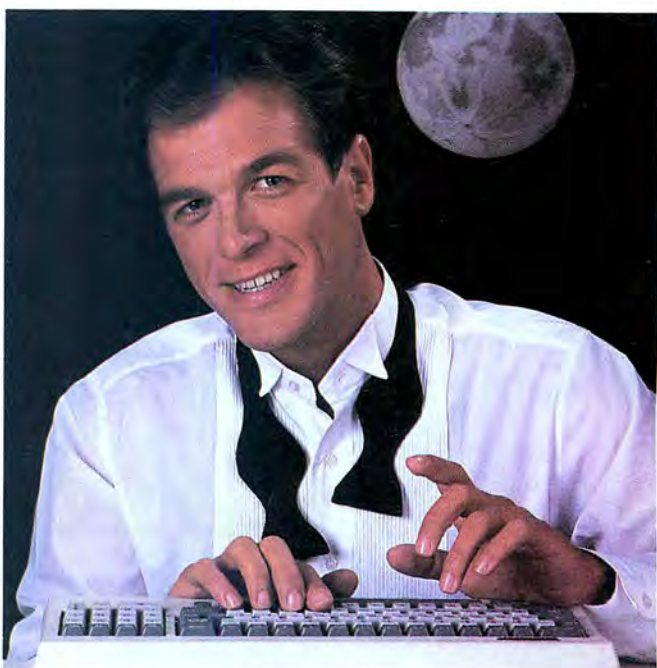
And you get a lot more for your money.

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

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!

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.

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
GENie*	X	X	X	X	X	X	\$18.00	none	\$5.00	\$5.00

*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.

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

Conv3toPC V2.0 (Complete)	\$139.95	MACH2 NEW!!	\$69.95	TWIN Spreadsheet	\$109.95
Conv3toPC.BAS (No Hypercross)	\$99.95	A tool chest of routines that does for PC BASIC		Lotus 1-2-3 (TM) features & better graphics for	
Conv4toPC V1.0 (Complete)	\$139.95	what Rosenfelder's fantastic BASIC FASTER		a fraction of the cost.	
Conv4toPC.BAS (No Hypercross)	\$99.95	AND BETTER did for Mod III BASIC.		ABLE-1	\$84.95
Hypercross Mod I/III	\$49.95	QuickBASIC	\$79.95	Integrated PC package featuring Wordprocessor,	
Hypercross Mod 4	\$49.95	Compile PC BASIC programs for speed and en-		Spell Checker, Communications, Spreadsheet,	
CROSS REFERENCE	\$24.95	hanced functions.		Database and Graphics modules.	
For PC BASIC programs. Referenced variables,		RAMDISK	\$44.95	TAS-Plus	\$68.95
line #s, keywords.		Create superfast pseudo disk drive (eg. 90K		Relational PC Data Base plus 4th Generation	
FASTSORT	\$24.95	RAM drive C: and still have 60K for BASIC on		Language, Screen Painter, Program Generator,	
Machine language SORT callable from PC BA-		a 256K PC).		Report Writer, Source Code Editor, AND Run-	
SIC. Excellent replacement for Mod III CMD		Norton Utilities V3.1	\$69.95	time Compiler. A real bargain!!	
"O" command.		Industry standard for directory & file recovery.		PROGRAMMING LANGUAGES	\$39.95
ISAM ROUTINES	\$69.95	Also, modify file attributes, search/sort direc-		Become proficient in other popular PC lan-	
Use these routines in PC BASIC programs. Pro-		tories etc, etc.		guages: Utah COBOL, FORTRAN, PASCAL	
vides keyed access to random files & all file maint.		FASTBACK	\$149.95	or PILOT. Also Utah EDIT (a full screen editor).	
PEEKs 'n POKES	\$39.95	Performs 10 Meg hard disk backup on floppies		\$39.95 each.	
Utilities for PC BASIC programmers. Call for		in 8 minutes!		FRACTION CALCULATOR	\$29.95
details.		DoubleDOS	\$44.95	Solve mixed number arithmetic problems on your	
INSIDE TRACK	\$59.95	Load, run, toggle between two programs		PC. Exact common fraction answers without dec-	
More utilities for PC BASIC programmers. Call		concurrently.		imals. Instruction mode great for children.	
for details.		DISK OPTIMIZER	\$44.95		
BASIC SCREEN TOOLS & BTREE	\$89.95	Improves hard disk performance by consolidat-		Prices subject to change without notice.	
Add the professional touch to your PC BASIC		ing files.			
progs: Windows, on-line help screens, sophis-					
ticated file management.					

800-922-0786

(NJ residents 201-879-5982)

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 1/4 lbs.). NJ residents add 6% sales tax.

Tandy Makes Connections In the Education Market

Tandyland

Educational Systems Technology Corp. (ESTC), a small educational-software developer in San Diego, CA, has entered a joint-marketing venture with Tandy Corp. involving an integrated learning system for elementary schools. The networked system employs Tandy 1000s as student workstations and the Tandy 3000 as file server (see the Photo).

The unique ESTC educational system includes a variety of features intended to optimize the computer-aided learning process. Major components of the system include a comprehensive 1,500-lesson reading and mathematics curriculum for grades 1-6; a computer laboratory comprising a Tandy 3000 host machine and up to 40 Tandy 1000 workstations (allowing an entire class to work on the same lesson); and an on-site facility-management service, which includes an ESTC lab attendant and a complete computer-controlled student-management and performance-rating system.

For more information, call or write Educational Systems Technology Corp., 5230 Carroll Canyon Road, San Diego, CA 92121, 619-587-0087, or contact Tandy's Education Division by calling 800-433-5682.

For Tandy computer users, new and old, I have some good news and some bad news pertaining to product support. The good news is that Tandy's Business Products Division is expanding telephone support at its 60 Customer Training and Support Centers across the country. The bad news is that the improved support will cost a pretty penny to obtain.

Effective as of July 1, new computer owners can purchase three months of telephone support for \$75 and renew it at a rate of \$60 per three-month period for up to a year at a time. Effective July 31, established customers can purchase three months of telephone service for



Photo. The Tandy/ESTC integrated learning system.

\$60 and renew at the same rate.

While service charges of this type are common in other industries, they are likely to arouse the ire of some Radio Shack customers. The mainly home-hobbyist Radio Shack consumer will now have to weigh the financial consequences every time a problem arises that might warrant a service call—a rude transition after many years of enjoying free support from Tandy. Like it or not, however, the rules have changed. In the company's words, "After July 31, telephone support will not be available without charge."

Update

Too bad, Bill Bixby fans. The rumor circulated last spring regarding the actor's demise as Tandy's advertising spokesman (see July 1986, p. 20) is now a fact. A memo from Tandy's Central Advertising Agency instructs parties running Radio Shack ads not to use any material with Bixby's picture on it after June 30. His contract expired as of that date.

So far, the Fort Worth company has not announced a replacement. In fact, the word from marketing personnel at Tandy is that the company might leave the job vacant for a while and let the sales statistics and features of its com-

puter line speak for themselves. The company leaves open the possibility of finding a new spokesman in the future, however.

Tandy introduced three new computers and an expanded version of its Model 3000 at a July 30 press conference in New York City.

Announced were two Model 1000s (the EX and SX); the Model 3000 HL, which replaces the Model 1200; a 40-megabyte (MB) 3000 HD; and finally, after years of rumors, the Color Computer 3.

Both of the new 1000s feature an 8088-2 CPU, which can be switched between operating at 4.77 and 7.16 MHz. The IBM PC runs at

the standard rate of 4.77 MHz.

The 1000 EX costs \$799 and comes standard with 256K, one disk drive, MS-DOS 2.11 and Personal DeskMate. The EX can be upgraded to 640K with Tandy's PLUS modules. The EX, like the Apple IIc, comes with the keyboard, CPU, and disk drive assembled as one unit.

The 1000 SX costs \$1,199 and comes standard with 384K, two disk drives, MS-DOS 3.2, and DeskMate II. The SX is upgradable to 640K on the motherboard and features five slots, two more than on the old Model 1000.

The CoCo 3 costs \$219 and features 128K (upgradable to 512K), OS-9 Level 2.0, and a high-resolution graphics mode.

The 3000 HL (\$1,699) uses an 80286 CPU (like the Model 3000), and its operating speed can be switched between 4 and 8MHz. It comes with 512K, one 360K disk drive, and seven slots (four 8-bit slots and three 16-bit [AT] slots).

The 3000 HD is now available with a fast-access 40MB hard disk and costs \$4,299. The 20MB version costs \$3,599 and the standard Model 3000's price has been reduced to \$2,199.

MicroTrends

The Network Nation envisioned by many during the height of the micro-

computer revolution (way back in the early 1980s) will take longer than most people expected to become a reality. That's the conclusion drawn by the New York market-research firm Link Resources, which has released a study of the revenues of firms involved with electronic-mail (e-mail) development. By 1990, the annual revenue of the struggling industry will be about \$1.5 billion, Link says—not \$8 billion, as once expected. In 1985, combined revenues for the e-mail industry were \$300 million.

"One of the main factors behind the slowing of growth is the slowdown in sales and use of personal computers," said Mark Winther, Link's director of new communications services. "The use of PCs is crucial to activity levels and growth of the e-mail services," he added.

Another reason why e-mail has not caught on as quickly as expected, Winther suggested, is that it's too complicated to use. "Electronic mail will not achieve its full potential until it becomes easier to send and receive messages, eliminating the complicated computer routines now required to get on and off the public systems," he concluded.

In a previous study of e-mail popularity, Link found that most users of such services appreciate having e-mail capability once they learn how to access it. The most common applications are for informal messages, sending intraoffice reports, and accessing telex networks.

Fortunately, at least two producers of popular e-mail systems appear to be taking user complaints to heart. MCI (the producer of MCI Mail) and GTE (producer of Telemail) have made their systems more easily accessible to thousands of users by connecting with popular on-line data bases. MCI Mail can now be accessed through CompuServe, which has 270,000 subscribers; GTE's Telemail can be accessed through Telecom Canada's Envoy 100 messaging service. If other e-mail developers take steps to make their systems easier to use, the Network Nation might still have a bright future.

Though the future of electronic mail appears tentative, the market for micro-computer printers—especially laser printers—is anything but. By 1990, the nonimpact (laser, thermal, and ink-jet) printer market could reach \$8.5 billion, according to Frost and Sullivan, another New York market-research firm.

The firm expects a dramatic rise in the popularity of nonimpact printers over the next four years. Advantages in terms of speed and noise level, it predicts, will propel sales of nonimpact printers past

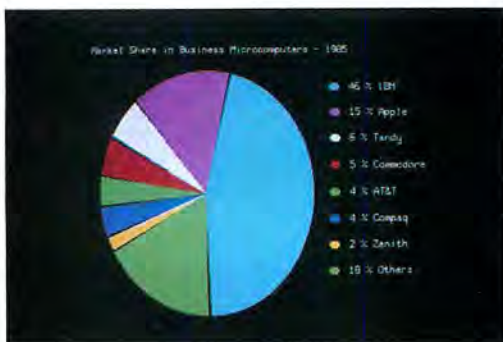


Figure. Market shares of leading contenders in the business micro market (1985).

those of daisy wheels and make them the preferred choice of most users. Some lasers and other nonimpact printers offer near-letter quality output at speeds as much as 20-30 times faster than those of daisy wheels, with a 40-percent lower noise level.

Though nonimpact printers captured less than one-tenth of the printer market in 1985, their share is expected to increase to nearly two-thirds by 1990. Oddly enough, the factor that once kept nonimpact printers out of corporate offices—their inability to produce true letter quality—seems not to matter anymore. Quiet operation has become more important for many businesses, a trend that enhances the outlook for nonimpact printers in the office environment.

Frost and Sullivan's survey also indicates that laser technology will lead the charge of nonimpact printers, as pricing becomes more favorable to small businesses. Currently, the prices of some laser printers approach the high-end price range of some daisy-wheel printers. Thermal and ink-jet printers will be slower to gain widespread acceptance because of poor print quality, special paper requirements, odors, and other problems associated with them.

Tandy, meanwhile, is scanning the nonimpact printer market for a suitable niche. Hewlett-Packard and Apple Computer currently control two-thirds of the laser-printer market, while Okidata leads in sales of thermal printers. Hewlett-Packard is the overwhelming leader in ink-jet printer sales.

The July 14, 1986, issue of InfoWorld reports that IBM Corp.'s share of the business micro market increased from 35 percent to 46 percent in 1985. AT&T Information Systems and Compaq Computer Corp. both increased their shares to 4 percent for the second- and third-largest percentage gains last year. In 1984, Compaq captured 2 percent of the business micro market, while AT&T had no appreciable share.

In terms of overall share, Apple Com-

puter Inc. came in second to IBM with 15 percent of the business market—down a percentage point from the 16-percent share it had in 1984. Tandy captured the third-largest share in 1985 with 6 percent. Trailing the pack were Commodore Electronics Ltd. with 5 percent, AT&T and Compaq, each with 4 percent, and Zenith Data Systems with 2 percent (see the Figure). The percentages are based on responses to a "state of the market" survey conducted by Infocorp, a Cupertino, CA, market-research firm.

While small businesses remain the stronghold of microcomputer sales, large corporations are increasing purchases of micros, the survey indicated. "This means personal computers are becoming more important to large corporations," Infocorp's vice president of primary research, Howard Furer, concluded.

The survey also found that the number of people who use microcomputers at work has increased 4.3 percent since 1984. Of 61,427 households polled in the survey, 12.2 percent reported that at least one family member was using a computer at work as of January 1986. Only 7.9 percent reported a family member using a computer at work as of January 1985.

New Threads

Telecommunications enthusiasts who are bored with CompuServe and The Source might want to investigate ProtoCall, an on-line service with an unusual twist. In addition to providing traditional on-line services (special-interest groups, discussion forums, discount shopping, and more), ProtoCall creates a backdrop against which members can play interactive, on-line fantasy games. The service is laid out like a city, complete with streets, parks, beaches, a nightclub, movie theater, hotel, airport, and spa.

Users of ProtoCall type commands to stroll along the system's streets and wander in and out of SIGs, forums, and stores. Private messages can be sent to anyone anywhere on the system, and users can interact with automatons, beings that are generated through artificial intelligence and randomly roam ProtoCall's streets.

Interplay Inc., a telecommunications firm based in Fairfax, VA, is the originator of ProtoCall. On-line junkies who want to explore ProtoCall, or obtain a road map to find their way around on paper, can call or write to Interplay Inc., 10875 Main St., Suite 210, Fairfax, VA 22030, 800-826-3286. ■

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.

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

New for
Profile users

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 III/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 III/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.



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 #8 * 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**

**ONLY
\$49.95**

Name _____ Address _____ City _____ Telephone# _____
My Computer is: _____
VISA/MasterCard# _____ Exp. Date _____
State _____ Zip _____
Amount enclosed: \$ _____
\$49.95 + \$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.

MISOSYS, Inc.

We have professional software products for your Tandy Computer

Now toll-free telephone ordering available. 800-MISOSYS

ON SALE

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
- 65534 records, 1024 characters per record
- 64 fields/record, 1-254 chars/field
- Definable input screens
- Definable print formats
- TRSDOS™ 6 or MS-DOS™ (T1000, T1200)

Complete LB **7495**
(Regular \$99) + \$3 S&H

NEW LOW PRICE

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 \$19.95 + \$2 S&H
- LDOS™ 5.1.4 disk + QRC plus small LDOS user handbook \$29.95 + \$3 S&H
- The complete LDOS™ system: 5.1.4 disk plus 400 page manual . . . binder e/w tabs \$5.00 extra \$49.95 + \$5 S&H (Previously \$69)

Note: Model I systems available on request

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 **2995**
+ \$2 S&H

NEW

Mister ED Application Pac

- DED—full screen edit a disk
- FED—full screen edit a file sector
- MED—full screen edit a RAM page
- TED—full screen edit a text file
- VED—edit the video screen
- CARDFORM—populate CARD with a form
- DOLOAD—loads DOSAVEd files
- REGENBU—shrinks BRINGUP/DAT file

Mister ED **5995**
(Requires PRO-WAM) + \$3 S&H

NEW

Enhanced BASIC Compiler

- Includes CED: a full featured line editor
- Supports LOGO-like turtle graphics: DRAW, ROT, & SCALE
- Supports an "X" file mode which extends random access record lengths to 32767 bytes!
- Supports in-line assembler code via: Z80-MODE/HIGH-MODE
- Multi-line functions; fast keyed/tagged sort; REPEAT-UNTIL; IF-THEN-ELSE; labeled statements; much more!

ENHCOMP (For Model III)—PRO-ENHCOMP (For Model 4) either version **12495**
+ \$3 S&H

NEW

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

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: **9995**
(Regular \$249) + \$5 S&H

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! Circle 107 on Reader Service card.

Reader Forum is looking for your words of wisdom. Send your patches, solutions, or advice in regard to Tandy microcomputing to Reader Forum, c/o 80 Micro, 80 Pine St., Peterborough, NH 03458. We pay \$10 for each item that we use. All Reader Forum submissions should be no more than one typed, double-spaced page in length.

Custom Cursors

You can change the TRS-DOS cursor on your Model 4 to any ASCII character with just three commands. First, type BUILD (filespec) from the TRSDOS Ready prompt, where you choose the filespec arbitrarily. The computer replies with "Building (filespec)/JCL." Next, type SYSTEM (BLINK=n), where n is an ASCII character code, and press the enter key. You could type SYSTEM (BLINK=NO) to get a nonblinking cursor, as well. Press the break key to return to TRSDOS Ready.

Finally, type DO (filespec). Your new cursor will appear. If you want no cursor, enter 128 for the ASCII code.

Bob Moran
Jackson, MS

All Caps for Me

The Model 4 insists on starting the keyboard in lowercase when you turn it on or reboot it. I prefer to enter commands in uppercase. There are three ways to force the computer to start up in uppercase. You can press the caps key before entering the commands. You could reboot the computer, press the caps key, and enter SYSGEN to store the caps key in the CONFIG/SYS file. Or you could use my patch to TRSDOS 6.2.x:

```
PATCH SYS0/SYS.LSIDOS:0
(D00,80 = 20:F00,80 = 00)
```

ASCII Split (see the Program Listing) splits any TRS-DOS or MS-DOS ASCII file into two segments. The second file will contain some overlap from the first file. You can use this program to split files too large for your word processor to handle at once. You will have to remove the extra line feeds that the program inserts at the end of each data-file record.

The program requests the name of the file to be split and the names of the two files to be written. Make sure that there is enough room on your

disk to contain the additional two files. Indicate the drive number with the file name if you want to write to other than drive zero.

The program will also request a number for the split. This number should be at least half the number of records in the file. If there are many line returns, the number should be substantially higher than half the number of records. ASCII Split counts every record and line return to find where to split.

Beve Woodbury
80 Micro staff

Program Listing. Basic program to split any TRSDOS or MS-DOS ASCII file.

```
10 'split long ascii file into two files.
20 CLS:INPUT "Enter name of file to be split: ",I$
30 PRINT:PRINT
40 INPUT "Enter name of first half file: ",H1$:PRINT
50 INPUT "Enter name of second half file: ",H2$
60 OPEN "I",I,IS:OPEN "O",2,H1$:OPEN "O",3,H2$
70 PRINT:INPUT "Enter number for split location: ";S
80 PRINT:PRINT:PRINT"Writing ";H1$
90 FOR K=1 TO S:LINE INPUT#1,A$:PRINT#2,A$:NEXT K
100 PRINT "Writing "H2$
110 FOR K=1 TO 2:LINE INPUT#1,A$
120 PRINT#2,A$:PRINT#3,A$:NEXT K
130 IF EOF(1) THEN CLOSE:END
140 LINE INPUT#1,A$:PRINT#3, A$:GOTO 130
```

End

have three backup floppies for logical hard-drive zero: HD0A, HD0B, and HD0C. I use HD0B to back up files with extensions CMD, DCT, DVR, FLT, HLP, JCL, TXT, and UTL.

At the end of each day, I scroll my hard-drive directories with DIR (M) and make a note of the logical drive number and extension of any file that I've modified. Then I find the backup floppies that correspond to those drive numbers and extensions and back up only the modified files, using JCL files to call all the files on a particular backup disk. For example, here's the JCL file for backup disk HD0B:

- HD0B/JCL
- Program to back up modified files (M).
- Backs up suffixes CMD, DCT, DVR, FLT, HLP, JCL, TXT, UTL.

```
BACKUP /CMD:0 :5 (M)
BACKUP /DCT:0 :5 (M)
BACKUP /DVR:0 :5 (M)
BACKUP /FLT:0 :5 (M)
BACKUP /HLP:0 :5 (M)
BACKUP /JCL:0 :5 (M)
BACKUP /TXT:0 :5 (M)
BACKUP /UTL:0 :5 (M)
```

Since the file is named after the backup floppy, it's easy to remember how to activate it. In TRSDOS I use the command DO HD0B and in Basic I use SYSTEM "DO HD0B".

You do lose some time when the JCL file activates the backup utility to search for extensions that do not belong to modified files. The method is still faster, though, and requires fewer keystrokes than either backing up the entire hard disk or inputting backup commands for each extension. Best of all, the people who work for me don't have to learn backup commands; DO (backup-disk name) is much simpler, and the comments at the top of each JCL file remind the operator of what is happening.

Jerry Engelbach
New York, NY



Not-So-Hard Times

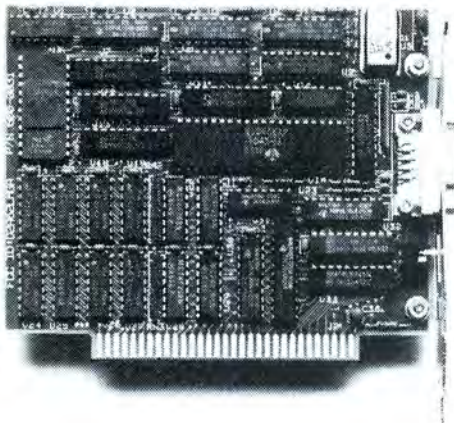
JCL files can help save time when backing up Model 4 hard-disk files to floppies.

My hard disk is partitioned into four logical drives, zero to 3, and all my files have three-letter extensions. I allocate floppies to back up particular extensions on each logical drive. For example, I

Robert C. Pettit
NAS Lemoore, CA

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

Stacking Up MS-DOS Subroutines

by Thomas L. Quindry

★★★★

BasicA Scientific Subroutine Library runs on the Tandy 1000/1200/3000 (256K) and requires BasicA or QuickBasic. Wiley Professional Software, John Wiley & Sons Inc., 605 Third Ave., New York, NY 10158, 212-850-6788. \$125.

★★★★☆

Finally! A Subroutine Library for Compiled Basic runs on the Tandy 1000/1200/3000 (256K) and requires QuickBasic. Komputerwerk, 851 Parkview Blvd., Pittsburgh, PA, 412-782-0384. \$99.

★★★

The Inside Track runs on the Tandy 1000/1200/3000 (256K) and requires QuickBasic. MicroHelp Inc., 2220 Carlyle Drive, Marietta, GA 30062, 404-973-9272. \$44.95.

★★★

Peeks 'n Pokes runs on the Tandy 1000/1200/3000 (256K) and requires Basic, the IBM or Microsoft Basic compiler, or Microsoft's QuickBasic. MicroHelp Inc. \$29.95.

Today's subroutine libraries specialize in computer and DOS control from within your program. They access your computer's internal memory and registers to determine your hardware configuration, provide screen formats and windowing, and do much more. They help you get more out of your computer. Some libraries work only with compiled Basic; you can use others with Basic, BasicA, Pascal, C, and Fortran.

The four subroutine libraries reviewed here collectively provide subroutines and techniques for all the above. For this review, I used a Tandy 1000 with Basic, BasicA, and the Microsoft QuickBasic Compiler where applicable. All the packages have a liberal return policy for reviewing the documentation, provided you don't break the seal enclosing the software package. Once you have inte-



containing functions that deal with matrices with real or complex elements, polynomials, integration and differentiation, equation solution, simultaneous equations, numerical analysis, function evaluation, statistics, and so on. Other utilities include sorting and graphics.

Each software module is as transparent as possible to your other programming and is self-supporting. If you need other routines from the library, you can include them in the code of the subroutine used. All subroutines are allocated to specific line numbers (from 40000 to 50000) that are unique for that subroutine

within the library. Thus, you can merge more than one subroutine with your program without conflicting with others from the library. Set rules avoid conflicts between internal variables to the subroutines with user variables.

The library includes three disks. Disks 1 and 2 each contain all 114 subroutines. Two sets of similar subroutines are doubled up, since only 112 files can exist in a single directory. Disk 1 contains a fully structured and commented subroutine in each file. The subroutines on this disk are primarily for use with a Basic compiler.

Disk 2 is primarily for use with interpretive Basic. The subroutines on this disk are the same as those on disk 1 but are compressed to save space and have no comments. Although you can use either set with BasicA or compiled Basic, this set will run faster with BasicA due to its compression. Disk 3 contains test files for each of the 114 subroutines.

The package's documentation is excellent. Descriptions of each subroutine give the purpose, other subroutines used, calling sequence, arguments used, and other special considerations, such as advantages and disadvantages when using the subroutine. The manual gives the mathematical method used to derive the equations, as well as a listing of the subroutine and the form of the re-

BasicA Scientific Subroutine Library

BasicA consists of 114 scientific subroutines that have been tested using an IBM PC with BasicA 2.0 under PC-DOS 2.0 and on an IBM PC/AT under DOS 3.0 and Basic 3.0. Each subroutine has been written so that you can compile it with the IBM Basic Compiler, the Microsoft QuickBasic Compiler, or a similar compiler.

You can include these modular subroutines with your enhanced Basic (BasicA) or compiled Basic programs. They calculate solutions to mathematical problems

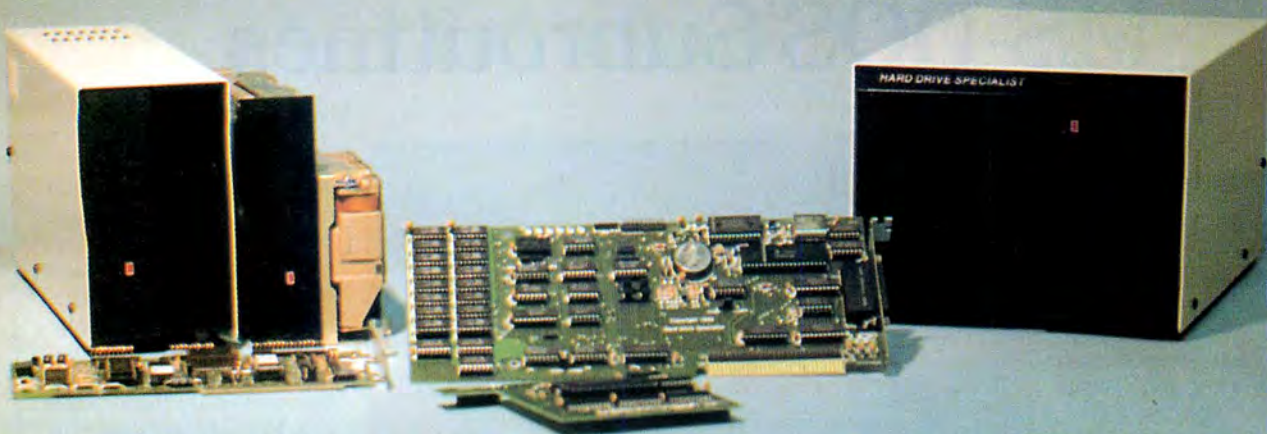
The Star Ratings

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

The stars mean:

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

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 \$329.

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 \$249.

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 \$549. External \$699.
 20 Meg Internal \$749. External \$899.
 42 Meg Internal \$1349. External \$1495.
 20 Meg Internal for use with 2 disk drives \$769.

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	Secondary
5 Meg	\$795.	\$595.
10 Meg	\$1095.	\$895.
20 Meg	\$1295.	\$1095.
30 Meg	\$1895.	\$1695.

(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.

sults obtained with the test program supplied on disk 3 for that subroutine. Wiley & Sons has done a great job with this manual.

I have not attempted to verify the accuracy of these subroutines nor have I tried every subroutine. Since each subroutine is fully documented, a mathematician should be able to satisfy himself as to the library's accuracy.

Finally! A Subroutine Library for Compiled Basic

The Finally! subroutine library contains over 100 subroutine utilities that you can include with your compiled Basic programs. These utilities are compatible with current versions of the IBM and Microsoft compilers. Unlike the BasicA Scientific Subroutines, this library is designed to provide general programming support.

These subroutines run the gamut from hardware-configuration control and screen formatting to less rigorous mathematical calculations. The library is divided into several categories, such as date and time conversion, file and directory control, medium- and high-resolution graphics, text-screen graphics, hardware interfacing, keyboard control, general math, geometry and trigonometry, number conversion, printer control, program control, screen control, sorting, and string handling.

Date and time conversion includes determination of the day of the week and other string and integer conversions based on dates and time. Graphics subroutines encompass various methods for screen display, including big letters, charts, graphs, and drawing boxes around selected prompts and messages. Hardware-interfacing routines can determine your computer configuration, including video mode, number of printer or RS-232 ports, and type of monitor.

Keyboard-control routines can set your caps-lock key, insert mode, and the like. Math routines are limited to common math functions such as average, minimum, and maximum values. They include hexadecimal conversion and other base conversions, as does the number-conversion group. The printer group includes graphics screen-dump routines for a limited number of printers. The string-handling routines have search-and-replace functions as well as comparison routines.

You can add subroutines to your programs in one of three ways. You can merge them into your source code, call them from your source code, or link them to your object code at compilation time. The code is in three forms. A library file includes compiled code that you can call from your program and link

The Finally! subroutines can relieve the programmer of a lot of duplicated effort for small tasks.

at compilation time. You can merge straight ASCII text (no line numbers) of the subroutines with your source code while editing. Or you can use the \$INCLUDE command from within your source code to pull in subroutine functions as you need them when linking the compiled program.

Like BasicA, Finally! has set rules to avoid conflicts between internal variables to the subroutines with user variables. There should be no conflict between Finally! variable names and BasicA variable names. When you use the Finally.LIB file or the .OBJ (function) library, all supporting subroutines are included. If you merge ASCII text containing a subroutine into your program, you must also take care to merge all supporting subroutines yourself.

Although Finally! has good documentation that describes what each software module does and what the specific input/output conditions are, it does not follow through with the level of detail in BasicA. It does not provide listings or test files. And Finally! gives no examples, with the exception of a demo and another utility program written using the subroutines.

The demo and utility files are much too complicated for use as programming examples. A sophisticated compiler user would have no problem with Finally! programming.

The manual's introduction does not do a good job of describing what you have to do to use these subroutines. Merging ASCII files is simple enough, but you are left to your own devices to determine how to link the Finally.LIB file to your program or how to adequately use the function-library form of entry. To compound the problem, the manual uses illegal variable names (at least in Microsoft's QuickBasic compiler) for syntax examples when describing input and output format for certain subroutines. Some examples even give incorrect forms.

Some of the hardware-interfacing routines give incorrect results. They described my Tandy 1000 with color mon-

itor as a PC with monochrome monitor. The author even notes that his Tandy 1200 is identified as a PCjr. The purpose of these routines is to adjust a program regardless of hardware. The type of computer might be important if certain keys vary from one computer to another. Color versus monochrome might be important if you use graphics routines. Subroutines that give the number of disk drives, printer ports, and RS-232 ports, as well as the amount of memory, worked fine.

The subroutine to convert the date from digits into a string containing the month, day, and year, does not work with Microsoft QuickBasic when called from the Finally! library. I got a message stating that the library from the IBM Compiler 2.0 could not be found. A typographical error in the ASCII version of one of the subroutines might have been carried over into the Finally! library. Also, one of the other subroutines gives the same message.

For the most part, the Finally! subroutines are convenient and easy to use. Once you get accustomed to them, linking the Finally .LIB to your code is the most convenient way to accomplish your programming goal. The \$INCLUDE command and calling functions are also convenient once you master them, except that all files for functions used must be available in the directory at compilation and linking time. This method works best when you are using a hard disk. The easiest way for a beginner is to merge all the ASCII-formatted subroutines into a file and then compile and link them. This gets cumbersome, since supporting subroutines are not automatically called into your program as in the other methods. All the ASCII and function-library subroutines are fully commented within the software and are easy to read.

The Finally! subroutines can relieve the programmer of a lot of duplicated effort for small tasks. They should be compatible with most of the BasicA subroutine library.

The Inside Track And Peeks 'n Pokes

The Inside Track subroutines are small utility programs intended mostly for use in other programs. They range from identifying hardware configuration to manipulating disk parameters, screen formatting, file access, and memory control. The Peeks 'n Pokes subroutines are much the same flavor but emphasize looking into your MS-DOS computer's memory. They also provide routines for identifying hardware configurations and a Basic routine for changing key-state configurations such as caps lock, insert mode, and shift

key; The Inside Track has a machine-language program to do this. It is hard to describe the differences between these sets of programs, but they have slightly different methods of application.

Programs from either set can hardly be called subroutines, since most of them are stand-alone demonstrations of techniques the authors wish to describe. The various programs are not universal in application. Some demonstrate techniques for interpretive Basic, some for compiled Basic, and some are utilities that you run to perform a specific function.

With The Inside Track, you must run some of the utility programs before you can use the techniques in the demonstration programs. Peeks 'n Pokes includes at least one routine each for Pascal, C, and Fortran.

The Inside Track library is divided into categories, such as controlling memory, executing programs, screen displays, modifying keyboard characters, manipulating disks, and DOS/BIOS functions. It gives additional information about programming techniques and patches for the various Basic compilers or the programs resulting from them.

The Inside Track's stand-alone utilities perform tasks like reserving blocks of memory to protect programs you might not want to disturb or to store information you might later wish to use in your programs. Inside Track includes a program to force the state of keyboard attributes like caps lock, control-break, and the shift keys. Two of these programs read the clock and either sound an alarm or suspend operation of a task until a certain time.

Unfortunately, these programs do not read the clock correctly on my Model 1000. I have a real-time clock, but these programs read the computer time, which is not set by my clock utility. Most public-domain clock-reading programs work the same way as the programs in The Inside Track.

The Peeks 'n Pokes library is less extensive and is divided into categories such as keyboard control, video, disks, parallel printer, communications, DOS/BIOS functions (nearly the same as in The Inside Track), and sound. It includes a program to unprotect Basic programs saved with the "file name".p option.

The routine for reading time and date performs differently from The Inside Track routine and returns the correct time. The manual for this library contains many of the Basic and Assembly-language listings.

The structure of these programs does not allow for their use as subroutines. They have no stated rules for variable

names and don't use Basic line numbers. Documentation from within the programs is not that good. Programs are designated for use only in interpretive Basic or only for compiled Basic. Many of the interpretive Basic programs from The Inside Track require that you run a utility program before you can use them. In addition, many of the interpretive Basic programs require that you POKE machine-language subroutines into memory from Data statements within the Basic program.

The Inside Track gives OBJ files for some of the compiled programs, as well as a compiler library. As a point of comparison, the compiler library included with Finally! is 174,000 bytes long. The compiler library included with The Inside Track is around 4,100 bytes. The Inside Track also includes OBJ files for interpretive Basic. It has no instructions for using the OBJ files for interpretive Basic.

As tutorials on the inner workings of MS-DOS computers, these programs have much to recommend them. The authors are very knowledgeable about computer hardware, and I can incorporate many of the techniques they employ into my programs. Overall, Peeks 'n Pokes would suit my intellectual needs better than The Inside Track.

However, as subroutines to add to my programs, neither Peeks 'n Pokes nor The Inside Track is of much value. To use these examples, you will need to do a lot of debugging and analysis. The information in the routines from these two libraries is much more like reference material for a book on the inner workings of MS-DOS computers than application-oriented software.

Summary

The BasicA Scientific Subroutine Library and the Finally! subroutine library are a cut above The Inside Track and Peeks 'n Pokes from MicroHelp Inc. because you can more easily use them within your own programs.

If you want higher math capability, you'll find the BasicA library very helpful, whether you are programming in interpreted or compiled Basic. These routines would be invaluable for anyone programming math functions.

Finally! is useful for programmers who are experienced with a Basic compiler and know how to incorporate the routines into their programs. You can use the package's routines without making changes.

The Inside Track and Peeks 'n Pokes are more valuable as tutorials on how your MS-DOS computer works than as programming routines. While they show a lot of tricks, they aren't as directly useful as the other programs. ■

Straight Talk On Mr. Ed

by John B. Harrell

★ ★ ★ ★

Mr. Ed runs on the Model 4 (128K) and requires TRSDOS 6.2, Pronto (from MISOSYS) and one disk drive. MISOSYS Inc., P.O. Box 239, Sterling, VA 22170-0239, 703-450-4181. \$59.95.

When I reviewed Pronto, I thought I had seen the best applications yet for the Model 4 computers. Pronto is a window application manager for TRSDOS that provides a single-key pop-up window menu for invoking several functions. This package has all the basic utility of Borland International's SideKick with applications for a card filer, two different calculators, a calendar, a character-set display, and others.

MISOSYS has done it again with Mr. Ed—A Pronto Applications Pack. This package consists of nine applications for Pronto, each one a powerful tool in itself.

Cardform

You use Cardform with the Pronto Card Filer, which provides a limited notepad (12 lines of 40 characters) using free-format input. While this is suitable for most uses, having a predefined format for several other applications speeds data entry and makes the data uniform (where it can be accessed with another program).

Cardform provides a mechanism for adding the required format to the data base. When you invoke it, Cardform searches for a record specifying the format (a record with the Cardform ID). If it finds one, you can add records to the data base using this format. You create the format record by using the Card Filer—simply create a new data record with the proper format and set the ID to Cardform.

Disk Editor

The Disk Editor (DED) is one of five editors included in Mr. Ed. They are extremely useful considering the limited program space available for the Pronto applications. Any utility used with Pronto is restricted to the TRSDOS command-overlay area, which places a significant limitation on size. Considering the versatility of these utilities, MISOSYS has done an outstanding job of cramming functions into the allocated area.

DED is a full-sector editor that displays the entire 256 bytes in a sector as well as the ASCII-character display for each sector (see the Figure). The display is organized as 16 rows of 16 bytes with the ASCII-character representation to the left of each line. You address sectors by

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

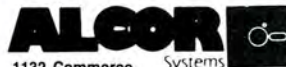
- MC Visa Money Order Check
- Card # _____ Exp. _____

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

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

TRSDOS version also works with LDOS, NEWDOS, DOSPLUS and MULTIDOS



1132 Commerce Systems
 Richardson, TX 75081
 (214) 238-8554

specifying the disk, the cylinder in hexadecimal (hex), and the sector in hex.

You invoke DED as you would any other Pronto application. It requests the drive for display. If the drive number is valid, a full-screen window opens and the sector display replaces your current text. A single-line command prompt shows all the available command-key letters.

DED accepts an astounding 17 single-key commands; you use the arrow keys to move around the record. You shift the arrow keys to move rapidly to the farthest extent of the display in the direction pressed. DED supports Pronto's import feature, letting you use text or data from a previous screen in the editor.

DED also supports all the standard editor functions that let you move back and forth among the sectors. You can enter text in ASCII or data directly in hex. DED contains some interesting commands not usually found in this type of tool: insert a null and push all other characters down, quash the current byte and move all other bytes up, and zap bytes to the end of the sector.

This editor has search commands for locating hex data or ASCII-character text strings. You can search for data strings up to either eight characters or 16 bytes. Unfortunately, DED does not provide a way to mix hex bytes with characters as the search argument. However, when you consider the size of the overall application, it is surprising that MISOSYS could include a search feature at all.

When you have completed changes to the disk sectors and are ready to exit DED, press the X key.

File Editor

The File Editor (FED) provides almost the same features as DED but is organized around the TRSDOS file structure. Instead of specifying the drive number, you specify the file name. You can then access any sector within the file no matter where it resides in the disk structure. While you use FED, all sector accesses are relative to the beginning of the file.

DED has functions for moving rapidly between sectors and cylinders. In file-edit mode, cylinders lose their meaning, so FED does not contain these features. Instead, FED provides commands for moving rapidly to the beginning or end of the file.

Memory Editor

The Memory Editor (MED) lets you edit the computer's memory, again using full-screen editor capabilities similar to those included with DED and FED. Unlike most other memory editors, MED lets you display or modify any 256-byte page of any memory bank.

MED is oriented to the Model 4's mem-

```

0123456789ABCDEF      00 01 02 03 04 05 06 07 08 09 0A 0B 0C 0D 0E 0F
-----
| DESTINATION disk | <00> | 44 45 53 54 49 4E 41 54 49 4F 4E 20 64 69 73 6B |
| already used! I  | <10> | 20 61 6C 72 65 61 64 79 20 75 73 65 64 21 20 49 |
| nsert next desti | <20> | 6E 73 65 72 74 20 6E 65 78 74 20 64 65 73 74 69 |
| nation disk!";   | <30> | 6E 61 74 69 6F 6E 20 64 69 73 6B 21 22 3B 3A 20 |
| ..... (. :     | <40> | 89 20 0E 9C 13 00 E1 95 B5 13 8D 20 0E 28 00 3A |
| . . . : LC . . . | <50> | 20 C2 20 13 2C 12 3A 4C 43 20 F1 20 13 3A 20 8D |
| . . . . @ . & . VS; | <60> | 20 0E 1E 00 3A 20 91 20 40 1C 26 02 2C 56 53 3B |
| : . . . . : : : : : | <70> | 3A 20 95 20 A8 20 89 20 0E 88 13 3A 46 50 20 F1 |
| L:EC . . : EL . E | <80> | 20 4C 3A 45 43 20 F1 20 11 3A 45 4C 20 F1 20 45 |
| R: . . d . . . . . | <90> | 52 3A 20 89 20 0E 64 05 00 EB 95 BA 13 A9 20 0E |
| . . . P . . . : @ . | <A0> | BF 13 00 50 96 BF 13 C3 20 13 3A 20 91 20 40 1C |
| . . . VS; . "Unuse | <B0> | 10 04 2C 56 53 3B 3A 20 91 20 22 55 6E 75 73 65 |
| able destination | <C0> | 61 62 6C 65 20 64 65 73 74 69 6E 61 74 69 6F 6E |
| disk, Insert ne   | <D0> | 20 64 69 73 6B 2E 20 49 6E 73 65 72 74 20 6E 65 |
| w disk, hit <ENT  | <E0> | 77 20 64 69 73 6B 2C 20 68 69 74 20 3C 45 4E 54 |
| ER"; . . . . .    | <F0> | 45 52 3E 22 3B 3A 20 95 20 A8 20 09 . . 0E 88 13 |
-----
Drive: 0 Cylinder: X'21' Sector: X'0F' Byte: X'FC' => X'20' = 32
    
```

Disk Editor 1.1 - Copyright 1986 MISOSYS, Inc.
 Command [; - @ A C D F G H I N P Q R S X Z]: _

Figure. Screen dump of Mr. Ed Disk Editor.

ory-bank structure so the disk commands are replaced with commands to move rapidly between the banks. In fact, MED is similar to DED in this respect—little difference exists between handling cylinders and data banks.

Text Editor

The Text Editor (TED) is a full-screen editor with many word-processing features. TED has cursor-movement controls; scrolling; block operations for deleting, copying, and moving data; text insertion; and overstrike modes.

TED provides a 30K text buffer, but, unfortunately, this has some drawbacks. You must have one RAM bank free to dedicate to TED. When you have Pronto already loaded, using TED will exhaust all the additional memory in your 128K computer.

TED provides a surprising number of features for a small application. Cursor movement using the arrow keys is standard, as is rapid movement to the top and bottom of the buffer and to the beginning and end of the file. You can also scroll and page up and down in the text buffer.

Also on the distribution disk is the OOPS application. OOPS is for those occasions when you have exited TED inadvertently or were forced to reset the system prior to saving your file. OOPS reenters TED without clearing the text buffer and preserves your last text file. You can then save the file to disk.

The documentation lists the appropriate locations in TED where you can customize many of the features using FED. You can change the default cursor types, the command keys, and the initial editor mode by making simple 1-byte changes with FED.

Video Editor

The last editor on the distribution disk, Video Display Editor (VED), is a

full-screen text editor similar to TED for editing the screen image that exists at the time you invoke it. You can also save the current screen image to a disk file or load the video screen from a disk file using VED.

Two other applications are on the distribution disk. The Video Load Application (DOLOAD) lets you load a saved video screen. You might want to export a portion of this screen back to your program source code and this is the easiest way to access the data.

REGENBU/BAS is a Basic program that reads the file created by the Bringup application, removes unneeded records, and shrinks the file. Bringup removes records, but the file remains the same size.

Conclusion

While Mr. Ed is a classy software package that adds exceptional value to Pronto, I do not think it's for everybody. You will require far more documentation (read the TRSDOS reference manual in detail) before you should attempt anything more than looking at disks with the editors. The documentation provided explains the application software's features and does not provide any details about the TRSDOS disk format. It's possible to overwrite parts of the DOS resident in memory while using MED.

Even if you are not a programmer, Mr. Ed can be a handy tool to have around. I especially like the text editor for making simple changes to JCL files or creating messages that I will later upload on CompuServe. I can do either from within any application by invoking Pronto.

If you need file, disk, or memory access, Mr. Ed is a programmer's delight. Couple Mr. Ed's capabilities with the Pronto calculator in hex or binary and you have an outstanding development tool. If you fit into this category, I recommend that you get Mr. Ed right away. ■

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 OVER-NIGHT, 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

Microprocessor: Intel 8088 @ 4.77MHz

Power Supply Rating:

IBM Standard Bus:

Operating System:

Disk BASIC:

MS-DOS and BASIC Ref. manuals:

Standard System RAM:

COST to EXPAND RAM:

Keyboard:

Video Monitor:

Video Outputs:

Disk Drive Capacity:

Max Number of Internal Drives:

Internal Expansion Slots:

Accepts Standard IBM Cards:

8087 Math Co-Processor Option:

Sturdy Steel Case:

Standard Parallel Ports:

Standard Joystick and Light Pen Ports:

Standard Serial Ports:

Cost Ready-to Run:

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

CLONE

YES

Optional 8.0MHz

135 WATT

YES

MS-DOS 3.2

YES

YES

640K

-0-

'AT' STYLE

INCLUDED

B/W, NTSC, RGB

1-360K

4

8

YES

YES

YES

1

YES

2 (1 Optional)

\$ 699

IBM PC

YES

NO

63.5 WATT

YES

EXTRA

IN ROM

EXTRA

256K

\$\$

STD

EXTRA

EXTRA

1-360K

4

5

YES

YES

YES

0

NO

0

\$ 3,063

TANDY 1000 EX

YES

YES (7.16 MHz)

54 WATT

NO

MS-DOS 2.11

YES

EXTRA

256K

\$\$\$

NON-STD

EXTRA

NTSC, RGB

1-360K

2

1

NO (10" Only)

YES

NO (Plastic)

1

YES

0

\$ 1,307

CLONE OPTIONAL EQUIPMENT AND FEATURES

2nd 360K Half-height Floppy Drive \$ 99

20mb 65ms Seagate Internal HD 399

30mb 40ms Seagate Internal HD 699

80286 SpeedKit. Makes XT faster than AT 399

300-1200 Baud Internal Modem & Software 149

HiRes RGB Color Monitor 640 x 200 \$ 299

HiRes Mono Graphics Card 720 x 348 129

HiRes Mono Monitor 720 x 348 110

5151 Accounting Keyboard 79

300 Watt Uninterruptable Power Supply 299

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.

Tandy 1000 EX cost figures*: DOS 2.11 and BASIC reference manuals \$70; Memory Plus Expansion Board (to 384K) \$130; One serial Port \$79; Battery Back-up Clock Calendar \$99;

Composite Monochrome Monitor \$130; Model 1000 EX Computer \$799; Total \$1,307. We were not able to equip the Tandy 1000 to compare directly with the Clone because of the 1000's inherent design limitations.

*The above prices are list prices as best we could determine. Both the IBM and Tandy are available at a discount. Check it out! Just like at the car dealer you can usually buy them at less than the list price.

OUR GUARANTEE

Simply, if anything is wrong with your Clone or any of it's 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 available on request.

NO ORPHANED CUSTOMERS.

We have been supplying serious computer users with high quality hardware 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

©1986 by Clone Computers. IBM is a registered trademark of International Business Machines. MS-DOS, Flight Simulator are trademarks of Microsoft Corp. PC-Dos/Matrix is a trademark of Alternative Decision Software. Qmodem is a trademark of the Forbin Project. PC-Write is a trademark of Quicksort. 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

The (Latest) Word Machine

by Gary Ludwick

★★★

The **Word Machine 4.0.b** runs on the Model 4 (64K) and requires two disk drives. Pel-Tek, Box 1026, Southampton, PA 18966, 800-523-2445 extension 19. \$39.95.

Pel-Tek has upgraded its venerable Word Machine word processor for the Model 4. Using most of the Model 4's increased capabilities, such as the 80-column screen, sound, and highlighting, Pel-Tek has created an affordable, flexible, and easy-to-learn word processor. The program isn't perfect, but for medium-duty nonprofessional use, it packs a lot of power for the money.

Word Power

The Word Machine has most of the features you've come to expect in a word processor and most of the ones you'll find in more expensive programs. The difference lies in how it performs its tasks.

The Word Machine uses a 25-line display, reserving the top four lines for program control and command prompts. It uses the remaining 21 lines for text. One of the program's nice features is a menu of commands and prompts that remains on the screen at all times. If you are not sure which command to use, a help file is only a keystroke away. Essentially, The Word Machine has two command modes: text entry and text edit. All other functions and controls fall under these two.

Again, in text entry and text edit, The Word Machine does everything you'd expect—deletion, insertion, full-screen edits, formatting, overwriting, tabulation, and the like. It also has some bells and whistles. For instance, it offers a macro-key file that lets you insert a prewritten text line or have all your printer control codes available for insertion with a single keystroke. You also have on-screen reformatting and printout previewing capabilities. The Word Machine remembers the last action you took and uses the F3 function key as an undo command. You can also enter ASCII and escape codes from the keyboard.

The Word Machine has other features I haven't mentioned—such as a pause command that allows personalized form letters—but you can see that it has a lot of power and potential for the money.

The Downside

In terms of functions, The Word Machine does indeed have power. But, it has some problems in execution.

Able One does a fair job of linking its applications, but its overall performance is slow, awkward, and even silly.

The Word Machine is written in compiled ZBasic. That's like putting a four-cylinder engine in a Cadillac. Even compiled Basic is slow compared to today's machine-language programs, particularly in file manipulation and memory usage.

The Word Machine spends a lot of time on disk access. Even the simple act of saving a file causes it to dump its main program, go to disk for its file-manipulation routine, come back and ask you some questions, and then, finally, write the file to disk. It then reverses the whole operation to get back to your text and the Word Machine program. For most top-line word processors, file saving or loading is a one-keystroke, no-wait operation. The compactness of machine code would let The Word Machine stuff much more program into memory and cut down on so much disk work.

Memory Stuffed

As for memory use, The Word Machine is designed for a standard 64K Model 4. It reserves about 1K of top memory for hard-disk drivers or spooling routines and uses everything else. High-memory programs such as Pronto or Dostamer will not work with The Word Machine. If you load Pronto and then try to load The Word Machine, you get a "not enough memory" message.

One possible improvement for The Word Machine would be a built-in software option to let owners of 128K machines install The Word Machine as a RAM disk. That could eliminate many of the slow disk-access periods.

Conclusion

Although I have problems with a compiled Basic word processor, The Word Machine is probably a good choice if you are an occasional user who values money over execution speed. It is easy to learn and operate, comes with a clear and concise manual, and has almost every feature you'll find on high-priced programs. But the package is somewhat slow and awkward in its execution. ■

Able One Lacks The Right Abilities

by Eric Grevstad

★

Able One runs on the Tandy 1000/1200/3000 and requires 512K and two disk drives. Able International Inc., 301 North Main St., Pueblo, CO 81003, 303-544-9600. \$84.95.

It's hard not to applaud Able International's goal—to offer a five-function integrated package for \$84.95 without copy protection, advertised as "everything Symphony was supposed to be." Unfortunately, when you use Able One, you're more likely to think of Haydn's *Toy Symphony*. The program does a fair job of linking its applications, but its overall performance is slow, awkward, and even silly.

Un-Able

For instance, Able One has pretensions to artificial intelligence or an English-language interface; it's nothing like the data-base query syntax of Symantec's Q&A, but an opening menu cheerily asks, "How may I help you, Customer?" The program understands 30-odd words (including "name," so you can teach it not to call you "customer"), so novices can type "I need help" or "Please open the data base."

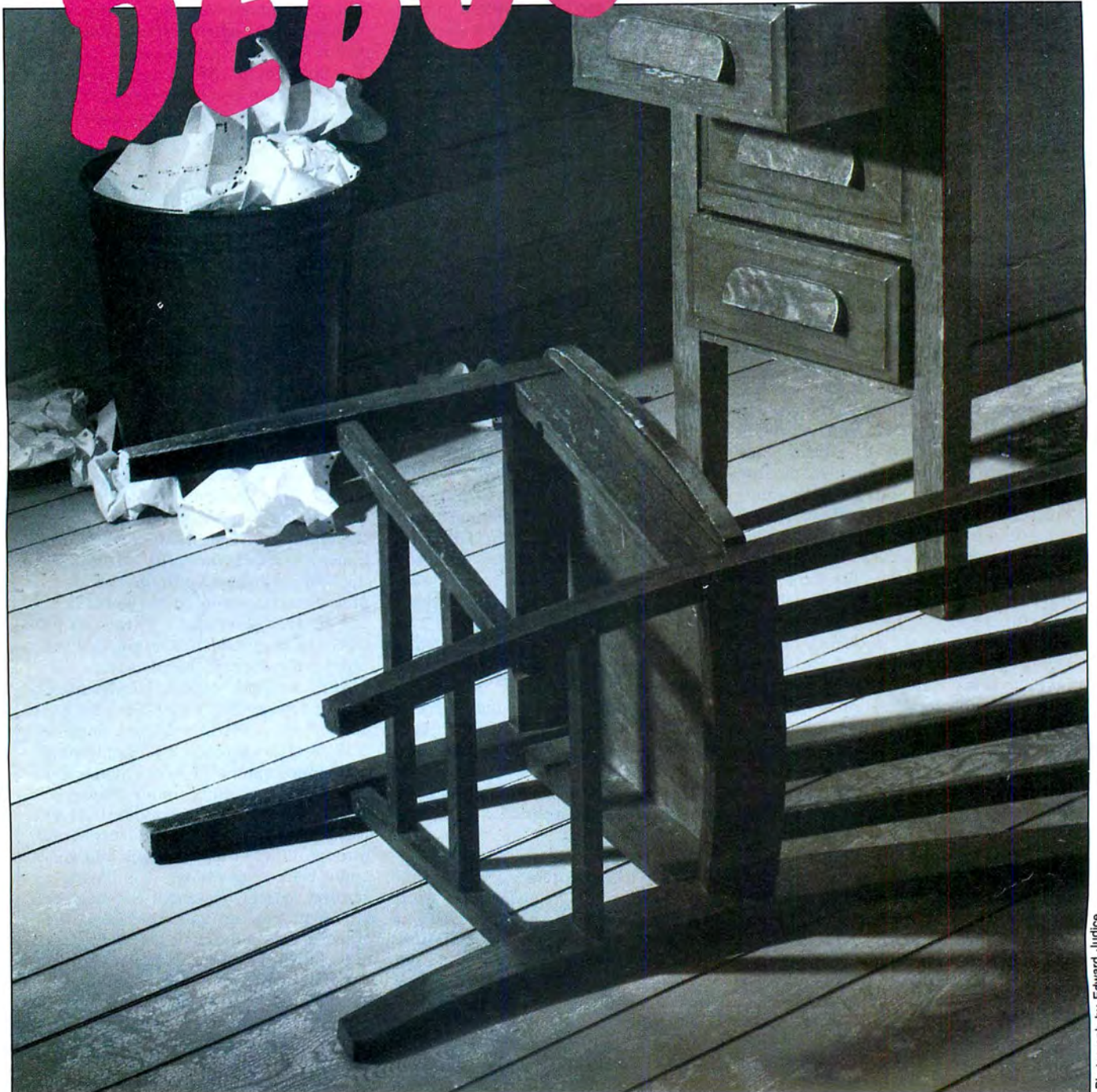
It takes seconds to learn that typing just "spreadsheet" or the letter S has the same effect as "I want to create a spreadsheet." Able One doesn't support real file-handling sentences, such as "Open the client data base." Meanwhile, the moving-bar task menu (Word Processing, Spreadsheet, and so on) has a surprise: Selecting Quit returns you to DOS, but so does selecting Utilities. From DOS, the manual explains, you can run utilities like Format or Diskcopy.

The function keys serve consistent generic purposes (such as F3 to save the current file or F4 to print one or more disk files), so you reach all application commands via the F9 key, which opens a vertically scrolling menu. However, 1000 owners beware: Pressing F11 or F12 causes Able One to suddenly scroll through different applications and generally behave as though it is having a seizure. Patient beginners can use the cursor-movement and enter keys (the spreadsheet menu has over 50 entries); experts will press F9 and type the desired command. Either way, Able One is keystroke-intensive with a vengeance. Fortunately, a macro function lets you assign typed sequences to "remember keys" such as alternate-A, albeit replac-

Continued on p. 161

The Complete Guide to

BASIC DEBUGGING



Photograph by Edward Judice



You *can* overcome program bugs.

Our detailed guide tells you how.

by Lewis Rosenfelder

Back in 1982 it was intended to be the ideal novelty gift for anyone with a computer. Some enterprising soul had taken integrated circuit chips, painted eyes on them, and mounted them as paperweights—\$9.95 each. The Computer Bug never caught on like the Pet Rock. Perhaps it's because we already have all the little critters we can handle.

Bugs and debugging are a fact of life, a part of the process of programming. A baby's first words are "Momma and Dada." A newborn Basic program's first two words are "Syntax Error." Count on it.

If you regress to baby babble at the sight of an illegal function call, Return without GOSUR, input past end, or While without Wend, this debugging guide to Basic will help. If you break out in a rash when your program crashes, take a deep breath, count to 10, and consult this guide. The problem might not be so serious after all.

Bugs in Perspective

Look at it this way. If it weren't for bugs, we wouldn't have programs. Bugs are nature's way of keeping us programmers from taking over the world. Without bugs, who would need us anyway? Without the ever-present knowledge that there's always one more bug, who would bother testing a program?

I've learned the hard way. Experience has taught me to test thoroughly, but even so, I check my rear-view mirror when driving away from a business after delivering a new program. The operator, having already discovered the first bug, might be running down the street after me. It's happened more than once!

The bad thing about debugging is that after spending a whole night agonizing at the keyboard, next morning someone accuses you of falling in love with the computer. Don't even try to explain it. Who's going to empathize with a subscript out of range? Just say, "The computer doesn't fully understand what I want it to do and I'm trying to figure out why," and leave it at that.

There's only one way to survive, and perhaps even enjoy debugging. Imagine you are Sherlock Holmes. Now, with magnifying glass in hand (and a can of Raid), let's begin.

Bug Personalities

Some bugs cause Basic to stop the program and display an error message for you. Be thankful because at least you have

a clue about what's wrong. These bugs are the complainers, so they get the most attention. They indicate a failure to go by the rules of the language. Type mismatch, missing operand, Next without For, undefined line number, and syntax error are examples. These bugs make you wonder, "If Basic is smart enough to know I made an error, why isn't it smart enough to fix it?"

A syntax error is like getting stopped for a burned-out tail light and the cop never realizes you are actually driving the getaway car from a bank robbery. Logical bugs are ours to outwit. They include such things as forgetting to clear a total before starting a new calculation, telling the computer you want it to process all items greater than 100 when you actually need all items less than 100, and the programming equivalent of a broken record: the continuous loop.

Other bugs have to do with quirks of the Basic language and the computer itself. These include such things as rounding errors when converting a number from single precision to double, failure to respect "My Dear Aunt Sally" (a mnemonic device to indicate the order of operations: multiplication, division, addition, subtraction), troublesome character codes that clear the screen or cause printer paper to spew out when printed, and Basic's absolute refusal to divide by zero.

You'll also encounter bugs with impul-

System Requirements

All systems

21

Debugging Hints

1. Find it before fixing it. Use direct commands to test statements one by one.
2. Use a scratchpad and make a bug list. Save time by fixing a swarm of them at once.
3. Examine the inputs. Use Print statements to view variable contents.
4. Backtrack to the source of the error.
5. Think like a computer. Follow each questionable condition.
6. Insert TRON and TROFF statements to see line numbers as they are executed.
7. Make a program listing. Mark it up. Sometimes it's easier to see errors on paper.
8. Insert temporary Stop, Print, or Beep statements.
9. Try a new approach. There's always another way to do it.
10. Anticipate hardware and operator errors.
11. Test the extremes: negatives, zero, null inputs, small inputs, and big inputs.
12. Isolate the problem and run an experiment. Use RND to generate test data.
13. Be a careful observer. Look for the unusual.
14. Beware of enhancements. Make it do the primary job first.
15. Validate input so computational routines can rely on good data.
16. Think modularly. Package proven routines and reuse them.
17. Adopt your own standard line numbers and variable names so you'll know where and what things are.
18. Document your work. Use remarks. Draw a flowchart for difficult routines.
19. Date the program and note all revisions.
20. Let someone else test the program.
21. Take a break. Sleep on it. Read the Basic manual.

sive personalities. They don't make themselves known until they feel like it. Technically, they are not bugs, but failures to anticipate and handle everything that can go wrong at run time. Disks inserted upside down, operator entries in lowercase letters when you were counting on uppercase, printer out of paper, and file not found are members of this family.

Finally, vanity bugs tend to waste our time. They affect the cosmetics of the program. Some are harmless, such as a paycheck that says "Exactly 1 dollars." Others, like numbers printed under misaligned headings, can be costly. Still others make a program difficult or impossible to use, such as messages that scroll off the top of the screen before you can read them.

They are all related, and one bug can hide several others. An illegal function, for example, might indicate bad disk data generated by two or three bugs in another program. It can work the other way, too. Just as you might get rid of a whole swarm of bees by killing the queen bee, sometimes fixing one little program bug can make dozens of problems disappear.

What to Do When Bitten

Before touching anything, ask yourself what happened. Look at the screen. Did you enter any unusual data? What was the computer trying to do? What was the last thing it did successfully? If you got an error message, note it and list the line.

If custom error handling is in effect (the programmer used an On Error GOTO statement) and you want to investigate further, press the break or control-C keys. At the Ready or OK prompt, type ON ERROR GOTO 0 and press enter. Basic should display its built-in error message.

If in doubt about the error's line number, type PRINT ERL and press enter. To get the error code to look up in your manual, use PRINT ERR. To list the line, type LIST followed by a blank and the line number, and then press enter.

Now the hard part: Sometimes it's not immediately obvious what's wrong, especially in a long line. One way to find out is to retype each statement in direct mode. For example, if the line says:

```
1230 A1 = B1/2:PRINT B1:GOSUB 2000:RETURN
```

You enter:

```
A1 = B1/2
```

No problem here, so enter:

```
PRINT B1
```

No problem again. Now enter:

```
GOSUB 2000
```

There's your error. Basic reports, "Syntax error." A little head-scratching tells you GOSUB is misspelled. Edit the line and re-run the program.

Checking Variables

It's not always that easy. Suppose you

Program Listing. Program to create a file of Stop statements.

```
10 LINE INPUT "Name of merge file to
create: ";F$
20 INPUT "Starting line number: ";S
30 INPUT "Ending line number: ";E
40 OPEN "O",1,F$
50 FOR I=S TO E STEP 10:PRINT #1,I+
5;"STOP":NEXT I:CLOSE:END
```

End

see the following statement after an illegal function has been reported:

```
1340 PRINT MID$(A$,A%,P%)
```

First, you should check the values contained in the variables. Enter:

```
PRINT A$
```

Perhaps it displays the string "JACK JONES." Now type:

```
PRINT A%
```

and:

```
PRINT P%
```

Suppose A% is 5 and P% is -1. Now what? Look up MID\$ in your manual to see that the third parameter must be between 1 and 255. Now backtrack to find where P% got the incorrect value. A printed listing of the whole program is helpful here. (Turn on the printer and enter the LLIST command.) Look for statements that have P% =, INPUT P%, READ P%, and so forth.

It's very important to find out all you can before editing the program. As soon as you make a change, Basic clears the variables, and your clues are gone. If Basic automatically listed the line for you to edit, as it sometimes does, don't press enter. Press break, control-C, or Q (which ever command exits the system's edit mode). Now you can look around and examine variables to determine the necessary correction.

Traps and Tracers

Other techniques can help you find more difficult errors. Use Basic's trace feature to list the line numbers as it executes them. Type TRON before running the program. Now you can see where the program has been just before the error occurs. TROFF turns off the trace.

If you have an idea where the problem occurs, temporarily insert TRON and TROFF in the program just before and after the questionable routine. This way, lines you're not worried about aren't listed.

Suppose you know the problem occurs when P% is negative, but you don't know where P% picks up the wrong value. After every statement that assigns a value to P%, insert two temporary statements:

```
PRINT P%:STOP
```

Now run the program. The program will soon stop, just as if you had pressed break. Since you included PRINT P%, that variable's current value appears on the line

above the cursor. If the value at this point looks good, enter:

```
CONT
```

The program continues to your next Stop. You are free to list lines and look at other variables at any Stop statement. As long as you don't make a correction you can continue.

To be more efficient, include If statements in your traps. For example:

```
IF P% < 0 THEN PRINT P%:STOP
```

The short Program Listing creates a file of Stop statements that you can merge with any Basic listing that has been renumbered in intervals of 10. The merged file will contain Stops between each line of your original code. Enter and run the code in the Listing, making sure that the merge-file name is different from the file you want to test. Then load the program and merge the Stop-statement file.

The resulting program will stop after each line in the range you specify when you run it. If you want to get fancier, change the Stop to:

```
LOCATE 24,1:PRINT A,B,C:STOP
```

or something similar to test the values of any variable.

You might also consider temporary Beep or Sound statements to identify what's going on. The advantage is a clean video display. When you find and fix the problem, remove the temporary traps and tracers.

When You Are Stumped

It's not unusual to panic when faced with a bug. Sometimes the frustration causes you to overlook the obvious and forget about similar problems that you've solved in the past. To help, I've included three charts in this issue. The charts apply to both TRSDOS and MS-DOS Tandy computers, and areas specific to one or the other are noted as such.

The first chart (at left) lists 21 debugging hints: things to do, approaches to take, and practices to follow.

The second (p. 40) is a checklist of 177 common logical errors, with symptoms, causes, and possible solutions. It is organized by type of problem: video display, printouts, calculations, disk-file data, branching errors, and so forth.

The final chart (p. 42) is a detailed directory of Basic error messages, possible causes, what to do about them, and ways to prevent them. Prevention, of course, is the best medicine. I'm confident that you'll find these tips helpful. ■

Lewis Rosenfelder is a software developer, author, and vice president of Tradewind Software, Honolulu, HI. His published books include Advanced BASIC Faster & Better (Blue Cat Inc., Walnut, CA, 1985). You can reach him at 3026 Edwards Place, Riverside, CA 92503.

TANDY[®]...



The
New
Tandy
1000 EX



The
New
Tandy
1000 SX

Welcome to the next generation

Introducing four
Tandy PC compatibles
that redefine the IBM[®]
“industry standard”

Meet our new line of MS-DOS[®] based personal computers. Each one was carefully designed for a particular type of use. Each with a different customer in mind. And yet each of these computers has one thing in common: the Tandy commitment to excellence.

We could have simply introduced computers that copy our competition at a lower price. No better, no worse—just a better deal. But that’s just not the way we think. When you buy a Tandy computer, we want you to know

you’re getting more. More power, more speed, more options, more support. All at a lower price than the so-called “industry standard.”

The Tandy 1000 EX

Only \$799 for a true MS-DOS based computer? It’s true. Here’s your ideal home computer—and you don’t have to settle for a “game machine.” The Tandy 1000 EX has 256K of memory, a built-in disk drive and runs the same software as an IBM[®] PC—at speeds up to 50% faster! And every Tandy 1000 EX comes with our new graphics-oriented Personal DeskMate[™] software. The 1000 EX is also the perfect classroom computer.

The Tandy 1000 SX

Here’s a high-performance version of America’s #1 PC compatible—the Tandy 1000. The new Tandy 1000 SX is still compatible with industry-standard MS-DOS software. *But it can now run many of these programs 50% faster.*

To complement this new level of high performance, the Tandy 1000 SX comes with 384K of memory (expandable to 640K on the main board) and two built-in disk drives—all standard.

And when you purchase a 1000 SX, you even get our enhanced DeskMate[®] II six-in-one applications software at no extra charge. All this for just \$1199.

Better Again TM



The
New
Tandy
3000 HL



The
New
Tandy
3000 HD

of personal computing.

The Tandy 3000 HL

If you've already invested in IBM PC/XT software and hardware, and would like to expand, take a good look at the Tandy 3000 HL. *You get four times the power of the XT... for less.*

The 3000 HL can process twice the data, thanks to its advanced, 16-bit 80286 microprocessor. Plus, the 3000 HL operates at twice the speed of the XT.

With a Tandy 3000 HL, you're getting much more than an XT compatible—and for only \$1699.

The Tandy 3000 HD

Unmatched in performance, the 640K Tandy 3000

HD is a powerful workstation with both networking and multiuser capabilities.

It's compatible with the IBM PC/AT®, offers greater disk storage (40 megabytes), yet is priced at only \$4299. *The new Tandy 3000 HD is the most powerful computer we've ever made.*

American-made quality

These four new computers are built in our own manufacturing plants right here in the U.S.A. They're designed to meet our rigid quality standards, and backed with the best support in the industry.

We're proud of our new line, and we want you to see why. Come in today.

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.**

Radio Shack, Dept. 87-A-298
300 One Tandy Center
Fort Worth, TX 76102

Name _____
Company _____
Address _____
City _____
State _____ ZIP _____
Phone _____

Prices apply at Radio Shack Computer Centers and participating stores and dealers. Monitors not included. Tandy 1000 EX shown with optional second disk drive and platform. IBM and IBM PC/AT/Registered TM International Business Machines Corp. MS-DOS/Registered TM Microsoft Corp.

Master Checklist

Video Display Problems

1. Were incorrect Locate or PRINT@ parameters used?
2. Did you forget to use CLS at the start of the program?
3. Were row and columns confused in a Locate? (First position is 1,1.)
4. Did an attempt to print in the last column force a line feed? (Avoid it.)
5. Did an attempt to input or print on the last row force scrolling? (Avoid it or use a semicolon. Note: On MS-DOS machines, printing to either of the last two rows can cause scrolling.)
6. Is a Screen, Width, or Color statement needed?
7. Are Screen, Width, Color, and CLS statements in the right order?
8. Did a long string drop to the next row on an MS-DOS system? (Try Print Using's & option.)
9. Is a line erased after data is printed on the row above it? (Use a semicolon to end the Print statement.)
10. Is a line erased below a keyboard input? (Use Input or Line Input's semicolon option, if allowed. Otherwise write an INKEY input routine or locate it elsewhere.)
11. Is the data invisible? (Perhaps foreground and background colors are equal.)
12. Does the screen clear before you can read what it says? (Insert an Input statement with a "Press any key to continue" message.)
13. Are unusual screen clearings, line feeds, or character-size changes occurring when a string is printed? (Bad data or control characters in the string.)
14. Are positions incorrect with back arrows, brackets, and numbers displaying? (MS-DOS—You might need ANSI.SYS for this program.)
15. Did the screen or current line clear after you typed it in? (Perhaps you accidentally pressed clear, control-home, or escape. Avoid this by writing an INKEY input routine.)
16. Did you erase data that you were attempting to tab over? (Use Locate or PRINT@.)
17. Also see Bad Printouts and Misaligned Columns.

Bad Printouts and Misaligned Columns

18. Is a semicolon missing? Are extra commas included in the Print or LPRINT statement?
19. Did you attempt to tab to a position left of the current column? (You can't do it.)
20. Did you attempt to tab past the last column?
21. Was the tab syntax confused or an extra comma included? (TAB(0) is the leftmost position.)
22. Were columns misaligned due to inconsistent data lengths? (Try Print Using or tab.)
23. Was a number too big for its Print Using string? (Percentage symbols indicate an overflow. Add more digit positions or check the calculation.)
24. Were variables misaligned in a Print Using string? (Look for invalid or extra characters in the format string: %, #, ., and so on.)
25. Was Print accidentally used instead of LPRINT? (Watch your screen.)
26. Is bad disk data giving unusual line feeds or form feeds?
27. Is an opening quotation mark missing on a string constant? (Zeros are printed.)
28. Is a closing quotation mark missing on a string constant? (The rest of the program line is printed.)
29. Is a line wraparound taking effect on the printer because of too much data? (Use a Width statement and, if necessary, printer-setup codes.)
30. Is data not being printed because of a failure to handle all If. . . Then conditions? Bad program flow? Bad nesting of For. . . Next loops?
31. Does SPACE\$ or STRING\$ have an incorrect parameter?
32. Was the printer turned off during the run, causing setup codes to be lost?
33. Is scientific notation causing trouble? (Try Print Using.)
34. Was the printer initialized to top of form?
35. Is the line count and form size right?
36. Is automatic wraparound invalidating a line count your program might be keeping?
37. Are you checking for end of page frequently enough to print your heading?
38. Is a missing semicolon after LPRINT CHR\$(12) causing an extra line feed with each form feed?
39. Are you having overprinting or double-spacing problems? (Check the printer's auto-line-feed switch or send setup codes. Turn the printer off then on after setting switches.)

A Numeric Expression Is Giving an Incorrect Result

40. Bad input? Corrupted disk-file data?

41. Bad order of operations? (Change the order or use parentheses.)
42. Are missing type codes (%., #) or incorrect DEFINT, DEFNG, or DEFDBL statements causing the wrong variables to be used?
43. Is there a misspelled or wrong variable name? (You can use a cross-reference program to find misspelled names.)
44. Is another routine changing variable contents? (Variable conflict?)
45. Is single- to double-precision conversion causing inaccuracies? (Use STR\$ then VAL to convert.)
46. Are extra digits being added to the right of the decimal in double-precision variables? (Use # after all constants that enter the calculation.)
47. Are nonnumeric characters in a string causing VAL to return zero?
48. Are rounding problems being caused by integer versus noninteger division? (MS-DOS systems.)
49. Are there errors in rounding? (Watch negative numbers. Consider Fix versus INT.)
50. Is Print Using rounding the output? (Consider rounding internally to make the numbers agree.)
51. Are you forgetting to multiply or divide by 100? (Percentages.)
52. Has a Clear statement zeroed all variables?
53. Is there row versus column confusion in array data?
54. Have two functions been defined with the same name?

A String Expression Is Giving an Incorrect Result

55. Bad input? Corrupted disk-file data?
56. Suppressed leading blanks, incomplete data? (Substitute Line Input for Input. Note: MS-DOS systems drop trailing blanks from keyboard input.)
57. Are variable names misspelled or incorrect?
58. Are you LSETting or RSETting to a field that is too small or null?
59. Are arguments in the wrong order for MID\$, INSTR, and so on?
60. Is the string an unexpected length in a MID\$ function?
61. Have LEFT\$ and RIGHT\$ been confused?
62. Have you forgotten to loop an INKEY\$ statement. (The string is null.)
63. Is a null argument causing a problem with INSTR?
64. Did you fail to consider the sign position at the left of a STR\$ string? (Positive numbers converted to strings have a leading blank.)
65. Have two functions been defined with the same name?

Keyboard Input Problems

66. Are leading blanks suppressed? Is input data incomplete? (Use Line Input instead of Input.)
67. Is a control key intercepted before the program can handle it. (Use INKEY\$.)
68. Are function keys sending multiple characters?
69. Are function keys not working? (Check On Key GOTO statements.)
70. Are incompatible scan codes the problem? (Tandy 2000 versus Tandy 1000, 1200, 3000.)
71. Are the caps-lock, number-lock, and scroll-lock states correct?
72. Have you forgotten to loop an INKEY\$ statement? (The string is null.)
73. Is unwanted old data remaining when you press enter? (Use Line Input or zero the data before Input.)
74. Also see Video Display Problems.

A Search, Sort, or If. . . Then Test Fails

75. Misspelled variable names? Variable conflict? Wrong array elements?
76. Capitalization problems? (Convert to uppercase before comparing or sorting.)
77. Is numeric imprecision causing a comparison to fail? Is a zero not really a zero? (Use INT or use an ABS [number minus value] test to see if the number is sufficiently close to the desired amount.)
78. Is the comparison failing because signs are not equal? (Use ABS.)
79. Is the comparison failing due to leading or trailing blanks? (Pad or truncate to make lengths equal.)
80. Is the search or sort missing the first or last item? (Are you starting at zero or 1? Is the item count correct?)
81. Are items out of order for a search routine that expects them in order? (Sort them.)
82. Is array or disk-file data missing? (Bad fielding, Data-statement errors, and so on.)
83. Is a null string improperly handled in a comparison?
84. Are there tab characters in the string? (Expand CHR\$(9) tabs before comparing.)
85. Are there problems with And, Or, and Not? (Use parentheses.)
86. Are And, Or, and Not tests failing? (Force expressions to zero or -1.)
87. Have you confused And with Or?
88. Are you attempting to compare MKI\$, MKS\$, or MKD\$ strings? (You must convert them to numeric or special format for proper sorting. Watch imprecisions in MKS\$ and MKD\$ strings.)
89. Is searching or sorting failing for numbers in strings? (Right-justify and align decimals. Handle the sign separately.)

- 90. Have you confused greater than with greater than or equal to, equal with not equal, and so on?
- 91. Bad If. . .Then. . .Else flow? Bad nesting of For. . .Next and While. . .Wend loops?
- 92. Are unwanted zero or blank items appearing at the start of a sorted list? (Eliminate them before the sort or skip them when printing. Eliminate leading blanks before sorting.)
- 93. Are invisible characters such as backspace codes causing problems? (Use MID\$ and ASC to check the value of each character in the string.)

Branching, Looping, and Program Flow Problems

- 94. A wrong line number was entered. (Is it somewhere else in the program?)
- 95. A line is missing. (Did you overtype an existing line?)
- 96. Did you forget to use New or Delete before adding new lines?
- 97. Did a merged file have unexpected extra lines in it?
- 98. Did you start a new line before ending the old one. (If a line ends on the final column of the screen, it is easy to forget to press enter.)
- 99. Are missing or extra line numbers in an On. . .GOTO list?
- 100. Is the On. . .GOTO value correct? (Bad computations, unexpected roundings.)
- 101. Was there an unexpected fall-through to the next instruction with a too-large On. . .GOTO value?
- 102. Is a missing Return causing a subroutine to fall into the next subroutine?
- 103. Has an On Error GOTO taken effect? An incorrect Resume line?
- 104. Did you forget to reset the On Error GOTO from an earlier routine? (Use ON ERROR GOTO 0.)
- 105. Is the counter being cleared or changed within a For. . .Next loop? (Variable conflicts?)
- 106. Is the "to" value being cleared or changed within a For. . .Next loop? (Variable conflicts?)
- 107. Is there row versus column confusion in array data read by a For. . .Next loop?
- 108. Is the wrong step being used in a For. . .Next loop? (Are the "from" and "to" values outside the range?)
- 109. If using a negative step in a For. . .Next loop, is the "to" less than the starting value? (It should be.)
- 110. Is a GOTO or Return exiting a For. . .Next loop? Are you using a GOTO to get back to the start of the loop? (Don't.)
- 111. Do you have bad If. . .Then. . .Else flow? (Simplify. Use one Then and one Else clause for each If. Use GOTOs to eliminate the simplest conditions first.)
- 112. Did you omit the Then in an If statement? (Don't.)
- 113. Do you have a continuous loop caused by an incorrect GOTO, a faulty comparison, a counter being cleared, or an omitted Return?
- 114. Does your loop fail to repeat because of a missing GOTO, a missing or mismatched Next, a missing Wend, a faulty comparison, a counter being changed or not initialized, or an omitted Return?
- 115. Are For. . .Next loops executed even when the starting value of the counter is out of range? (Model I/III Basic always executes a For. . .Next loop at least once.)

Missing or Corrupted Random Disk-File Data

- 116. Are fields misaligned? Overlapping? (Check Field statements.)
- 117. Are there missing or extra Field items? (Check Field statements.)
- 118. Are you trying to field more than 255 bytes? (Use dummy strings as spacers.)
- 119. Was a dummy field size miscomputed, causing misalignment?
- 120. Was fielding modified since the file was last written?
- 121. Is the correct record size given in the Open statement?
- 122. Did you fail to use LSET or RSET to fielded strings anywhere? (This invalidates the fielding.)
- 123. Were MKI\$/CVI, MKS\$/CVS, MKD\$/CVD, CHR\$/ASC used consistently when LSETting and retrieving data?
- 124. Wrong disk? Wrong backup copy? Wrong file name?
- 125. Were disks swapped before files were closed last session? (Scrambled data, disk I/O errors.)
- 126. Was the file closed last run? (Data missing or zeros past the prior end of file.)
- 127. Did you forget a Get or Put statement or miscalculate the record number? (Watch Get and Put statements without record numbers. The record number is incremented automatically.)
- 128. Was a wrong file number used on a Get or Put statement?
- 129. Did you forget to get and field the old record before updating and putting it? (If so, data is lost from the fields not updated.)
- 130. Does another program use the same file name?
- 131. Was a CHR\$(26) encountered in an file INPUT\$ statement, causing subsequent data to be missed?

Missing or Corrupted Sequential Disk-File Data

- 132. Are the output and input routines compatible?
- 133. Are extra or missing delimiters causing problems? (Commas,

- quotes, carriage returns, and so on.)
- 134. Have PRINT# versus WRITE#, and INPUT# versus LINE INPUT# been confused? (See your manual.)
- 135. Is an input line too long? (Multiple INPUT# or LINE INPUT# statements are required, possibly causing data to get out of sync.)
- 136. Was non-ASCII data printed to the file, causing problems when entering data? (Avoid compressed strings such as MKI\$, MKS\$, and MKD\$ in sequential files.)
- 137. Did an OPEN "O" statement reset the end of file to zero?
- 138. Was the file closed last run? (If not, the end of file is the prior end of file.)
- 139. Did the disk become full last run? (If so, the last record wasn't written. Possibly, the file wasn't closed.)
- 140. Were disks swapped before closing? (Scrambled data, disk I/O errors.)
- 141. Was an overflow encountered on an integer being input? (Missing delimiters, possible out-of-sync data.)
- 142. Are zeros being input because of nonnumeric characters in the input file? Is the sign position correct?
- 143. Was an extra end-of-file character inserted? (Data past it cannot be put in.)
- 144. Is an end-of-file character missing? (Garbage data is at the end of the file.)
- 145. Was a wrong file number used on PRINT# or INPUT# statements?
- 146. Was # forgotten in PRINT# or INPUT# statements? (Watch the screen.)
- 147. Does another program use the same file name?

A Call, USR, PEEK, or POKE Routine Doesn't Work

- 148. Was it loaded? At the right address?
- 149. Is the DEF SEG missing or incorrect? (MS-DOS systems.)
- 150. Was DEFSEG = accidentally used instead of DEF SEG = ? (MS-DOS systems.)
- 151. Has a missing or incorrect Clear statement failed to protect memory?
- 152. Are Call arguments missing or in the wrong order?
- 153. Are arguments the right types? (Where constants are permitted, use CINT, CSNG, or CDBL.)
- 154. Is the variable argument specified correctly? (VARPTR versus just the variable name.)
- 155. Have array VARPTRs shifted? (They change whenever a new simple variable is added.)
- 156. Are integer addresses specified correctly? (Subtract 65536 from addresses over 32767.)
- 157. Have differences between compiler and interpreted Basic been noted?
- 158. Computer incompatibilities?

The System Freezes

- 159. Is it waiting for input? Waiting for a disk?
- 160. Is the printer off, not on line, or out of paper?
- 161. Was the print-screen key accidentally pressed with printer not ready? (Turn on the printer.)
- 162. Was the hold key pressed? (Press it again.)
- 163. Is much data being read in or sorted? (You might need to wait a few minutes for garbage collection while Basic reorganizes the strings in memory. On TRSDOS machines, giving more string space with the Clear command can reduce the delay.)
- 164. Are an On Error GOTO routine and Resume looping? (Try break or control-C. Then type ON ERROR GOTO 0.)
- 165. Is it a program error? (Continuous loop, bad POKE, Call or USR routines. Try pressing break or control-C. If the break is successful, type TRON and then CONT to display the line numbers. TROFF stops line-number display.)
- 166. Has hardware malfunctioned due to a sudden power drop or static electricity?
- 167. Are all cables connected tightly? Are the contacts clean?

It Worked Before, But Not Now

- 168. Is this the latest version of the program? (Date all files!)
- 169. Did modifications cause bugs in parts of the program that worked before? (Log your revisions. Keep backup copies until the new version is well tested.)
- 170. Were the latest modifications saved?
- 171. Were wrong or different startup parameters given upon entry to Basic?
- 172. Was the system or screen mode initialized differently?
- 173. Has a program changed memory allocations earlier in the session? (Try starting from scratch.)
- 174. Are files missing or incorrect?
- 175. Has a new bug been discovered due to different input?
- 176. Has Basic become corrupted in memory? (Restart it.)
- 177. Are there hardware malfunctions? (Run diagnostics or try another computer.)

A GUIDE

To Basic Error Messages

This guide lists the error messages you are most likely to encounter while writing or running Basic programs on Tandy computers. Use it as a reference to explain baffling errors and as a source of helpful hints about program design, debugging, and data recovery.

Since error messages vary slightly from one version of Basic to another, you might need to browse through the guide to find the error that corresponds to your system. I've listed error messages in alphabetical order as they appear on the Model 4 and Tandy 1000 screens. Error messages unique to one machine or the other are noted as such. Cross-references are provided to help you locate appropriate messages.

In most cases, I've also included the two-letter error code listed in the manuals of portable computers and limited-memory versions of Basic. The Table on p. 56 lists the error numbers used with most systems.

Not all error descriptions and remedies apply to both MS-DOS and TRSDOS versions of Basic. Where differences occur, I've noted them and given alternate descriptions or solutions parenthetically. References to MS-DOS machines include the Tandy 1000, 1200, 2000, and 3000. References to TRSDOS machines include most other Tandy computers. If you have a Model 4 or Tandy portable, you should be sure to read the MS-DOS notes, since many similarities exist.

Advanced Feature, Level 3 Error (L3)

Explanation

The program attempted a command, statement, or function that isn't valid in the Basic version being used.

Causes

- Attempting a disk statement with cassette Basic.
- Using a graphics, music, or event-trapping statement with a limited version of Basic.

What to Do

- Change or delete the statement.
- If necessary, use the version of Basic that supports the statement (for example, BASICA.COM instead of Basic.COM on the IBM PC).

Prevention

- If memory permits, always use the most advanced version of Basic.

Bad File Mode

Explanation

An Open statement was attempted with an invalid mode, or a subsequent file-accessing command was inappropriate for the mode

selected. Files can be opened in one of four modes: Input, Output, Append, or Random. (Some systems use Extend instead of Append, or Direct instead of Random.)

Causes

- Attempting input from a sequential file already opened for output, or vice versa.
- Attempting to use Put or Get statements with a file opened in a nonrandom mode.
- Specifying an incorrect file number in an input or output statement.
- Attempting to merge a file that wasn't saved in ASCII (using the .A option).

What to Do

- List the line. If it contains an Open statement, check for a valid mode: I, O, A, or R. (Some systems give alternative ways to write the Open statement. Check your manual.)
- Look for a Get, Put, LOF, EOF, PRINT#, INPUT#, or WRITE# statement. Check the specified file number and the related Open statement.

Prevention

- Experience, thorough testing, and checking the manual when in doubt.
- Use .A when saving files to be merged. Create a merge library.

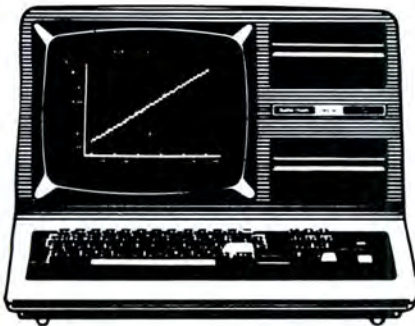
Wrong:

```
10 OPEN"D",1,"TESTFILE",15
20 FIELD 1, 15 AS N$
30 INPUT "RECORD #";REC%
```


NOCONA

ELECTRONICS

MODEL 4D



MODEL 6000



MODEL 1000



512K MOD 3000 W/20 MEG HD	2499.00	512K MOD 3000	1819.00
640K MOD 3000 W/35 MEG HD	3549.00	DMP 105 PRINTER	145.00
256K MOD 1200 HD 1 DR.	1499.00	DMP 130 PRINTER	249.00
128K MOD 1000 W/MONO 1 DR.	759.00	DMP 430 PRINTER	499.00
128K MOD 1000 W/COLOR 2 DR.	1099.00	DMP 2100P PRINTER	1019.00
24K MOD 102 PORT	369.00	DWP 220 PRINTER	329.00
24K MOD 100 PORT	179.00	DWP 510 PRINTER	999.00
24K MOD 200 PORT	679.00	TRACTOR DWP 220	99.00
32K MOD 600 PORT	1149.00	TRACTOR DWP II/510	159.00
64K MOD 4D 2 DR.	839.00	TRACTOR FEED DMP2100P	99.00
512K MOD 6000 W/15 MEG HD	2579.00	384K MOD 1000 W/10 MEG HD	1412.00
64K COLOR COMPUTER	139.00	PARALLEL PRINTER CONTROLLER	179.00
35 MEG HARD DISK	2059.00	70 MEG HARD DISK	2679.00
		NEW DMP 2200 PRINTER	1149.00

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


```

40 IF REC%=0 THEN 90
50 INPUT "NAME"; A$
60 LSET N$=A$
70 PUT 2,REC%
80 GOTO 30
90 CLOSE 1

```

Right:

```

10 OPEN"D",1,"TESTFILE",15
20 FIELD 1, 15 AS N$
30 INPUT "RECORD #";REC%
40 IF REC%=0 THEN 90
50 INPUT "NAME"; A$
60 LSET N$=A$
70 PUT 1,REC%
80 GOTO 30
90 CLOSE 1

```

Bad File Name (NM)

Explanation

An unacceptable file name was given with an Open, Load, Run, Merge, or Kill statement.

Causes

- Invalid characters in the file name, a blank name, or a name that is too long.

What to Do

- See your manual for valid file names and try again.
- List the line having the Open statement and examine the logic that provided the name.

Prevention

- Validate file names supplied by the user or provide an On Error GOTO routine.

Bad File Number

Explanation

Basic encountered an invalid file number or, possibly, a bad file or device name. (Files are referenced by the numbers 1-15 on most systems.)

Causes

- Failing to specify the number of files upon entering Basic. (The default took effect.)
- The current program opens more files than were specified.
- The number specified was zero, negative or too high. (Some systems use negative file numbers to reference cassette drives or printers.)
- You attempted to execute a Get, Put, INPUT#, PRINT#, or WRITE# statement before opening the indicated file or after you had closed it.
- Using incorrect parameters for an Open statement.
- Under MS-DOS, you didn't declare enough buffers under the DOS CONFIG.SYS file when booting up. If only five buffers are available, remember that DOS uses one for the printer and one for the keyboard; only three will be available to a Basic program.

What to Do

- List the line. Check the file number requested. If necessary, print variable contents.
- Check the Open statement and the file number it specifies.
- Check program flow. Did the Open statement execute? Is a Close statement closing all files when it should be limited to specific files? Has a Clear statement closed the files?
- If the program is chained to, check the Chain, Run, or Load statements in the chained-from program.
- If necessary, restart Basic from DOS with the correct specification for files.

Prevention

- Write a batch or Do file (or an Auto command) that enters Basic with all parameters set correctly for the application.
- If memory is plentiful, enter Basic with files set to the maximum.
- Specify file numbers explicitly in your Close statement.
- Make sure you've declared enough buffers under the DOS CONFIG.SYS file (MS-DOS only).

Wrong:

```

Basic <Enter>
10 OPEN "O", 8, "TESTFILE"
20 LINE INPUT "NAME? ";N$
30 IF N$ = "END" THEN 50
40 WRITE# 8, N$: GOTO 20
50 CLOSE 8

```

Right:

```

Basic (F=8) <Enter>
      (Model 4 syntax)
10 OPEN "O", 8, "TESTFILE"
20 LINE INPUT "NAME? ";N$
30 IF N$ = "END" THEN 50
40 WRITE# 8, N$: GOTO 20
50 CLOSE 8

```

Bad Record Number

Explanation

A Put or Get statement attempted to access an invalid record number in a random file.

Causes

- Exceeding the system's record number limit.
- The record number is negative or zero.

What to Do

- List the line. Look at the Get and Put statements to determine the record number being specified. If it is a computed number, check the calculating routines.
- Where a field provides a pointer to another disk record, the file might be corrupted or improperly fielded, or it wasn't closed during the last session and is incomplete. Check the Field statements. To recover an incomplete file, see Input Past End.

Prevention

- Validate operator inputs.

- Write On Error GOTO routines and recovery programs for files that use pointers from one record to another.

Can't Continue (CN)

Explanation

Basic encountered an illegal attempt to use the CONT instruction after a break in execution or after the program has halted because of an error.

Causes

- Basic's line pointer and variable list have been cleared.
- No program is in memory, or the program has been edited since breaking.

What to Do

- Restart the program by typing RUN.
- If you must continue, first use Print statements to verify that variables are intact. Then type LIST . (substituting the period for the line number) to list the current line. Try to determine which statements have not executed yet. Enter them one at a time as direct commands. Finally, use GOTO to jump to the next line.

Prevention

- Avoid editing programs you want to continue.
- If Basic displays a program line for editing after an error has occurred, avoid pressing the enter key. Use Basic's command to exit Edit mode (Q, control-C, or break, depending on the system).

Communications Buffer Overflow

Explanation

The remote computer is transmitting information faster than your computer can process it.

Causes

- Processing the data consumes too much time on the receiving end.

What to Do

- Use a slower baud rate.
- Exit, then restart Basic using the /C switch to indicate a larger receive buffer (in MS-DOS systems only).

Prevention

- Compile the receiving program for faster execution.
- Hold received data in memory rather than immediately writing it to disk.
- Put delay loops in the sending program.
- Implement a handshaking protocol. Transmit a go-ahead code after each byte (or more) is received and processed, or use

On Error GOTO handlers to send the standard XOFF and XON characters: CHR\$(19) to halt transmission, CHR\$(17) to resume transmission.

Device Fault

Explanation

Basic encountered a problem with an input/output (I/O) device, such as a printer, disk drive, or modem.

Causes

- A malfunctioning or improperly connected device.
- The device is turned off, or (if a printer) the on-line switch is off.
- See Device Time Out and Out of Paper.

What to Do

- List the line to see which device is being accessed.
- Correct the problem with the device.
- Type CONT or GOTO to continue, or RUN to restart.

Prevention

- Include messages to remind the operator to turn on all devices.
- Use On Error GOTO statements for automatic retries.

Device I/O Error Or Disk I/O Error (IO)

Explanation

An error occurred when reading data from or sending data to a device, such as a disk drive, printer, or modem.

Causes

- The device is not ready or it is improperly connected or malfunctioning.
- See also Device Unavailable, Disk Write Protect, Disk Not Ready, and Disk Media Error.

What to Do

- List the line to see what file number is being used. Refer to the Open statement to see what device is involved.
- Correct the device problem and retry.

Prevention

- Use an On Error GOTO statement before the Open statement, preferably before each command accessing the device. In the error handler, let the user correct the situation and retry or abort.

Device Time Out

Explanation

An I/O device, such as a printer, disk drive,

SEE WHAT WE OFFER



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



TANDY 1200
From \$1098⁰⁰
256K/2D.D.
(monitor, etc. not included)

Someday, our competition will give as much

In addition to a price you can afford more easily:

¹A buy-back policy*, to insure you against a good idea that turned out to be a mistake or even if you simply "changed your mind". ²An exchange, for a new one, in the rare event that yours should prove to be a "lemon". ³Credit card purchasing convenience for speed and safety plus ⁴an additional discount for cash-with-order buyers and ⁵a CALL-FREE number so you can get our prices free (except Texas). ⁶A price quote which has **NO ROAD-FREIGHT charges added later**, we pay the freight and ⁷fast shipping, usually next business day. ⁸A same-day "rush service" for late satisfaction and ⁹the assurance that repeat-customers exceed new ones means great satisfaction. ¹⁰References given upon request, to prove our bona-fides. * For a small restocking fee.

Tandy® computers are created equal. . .all retailers are not.

Did you get "the rest of the story" before you placed your order? (. . .good thinking.)



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

Circle 214 on Reader Service card
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

or modem, has not responded.

Causes

- A malfunctioning or improperly connected device.
- The device is turned off.
- Incorrect communications parameters.

What to Do

- List the current line to determine which device is being accessed.
- Examine the device for problems. Check power, cable connections, on/off status, paper insertion, and so on.
- Are you accessing the correct device? Is it connected to the correct I/O port? Are you using correct communication parameters?
- If applicable, check the related Open statement.

Prevention

- If you're attempting RS-232 communications (to a serial printer or modem), check the manual for options to the Open "COM" statement. You can extend the time that Basic waits before reporting an error.
- Use On Error GOTO statements for automatic retries.

Device Unavailable

Explanation

A requested device, such as a disk drive, printer, or communications port is unavailable.

Causes

- A disk drive is off or is disconnected. A printer is disconnected, off, or not on line.
- Attempting to use a device that doesn't exist, such as an invalid disk drive or a line printer.
- Attempting to use a properly connected device that Basic is unaware of because of a missing or uninstalled device driver program.
- See also Disk Write Protect.

What to Do

- List the program line to see what device is being requested.
- Turn on and check the device. Push its reset button, clear button, or on-line switch.
- Consider programs, commands, or parameters that you might have forgotten or incorrectly specified before entering Basic. (In MS-DOS, for example, this includes device entries in a CONFIG.SYS file and the /C switch upon starting Basic.)

Prevention

- Validate operator entries when letting the user select devices or give a menu of hard-coded choices.
- Display a message such as "Press enter when printer is ready."

- Use On Error GOTO statements to trap unexpected conditions. Let the user retry or abort.
- Write a batch file, Do file, or Auto command that does all the preliminaries automatically before entering Basic.

Direct Statement In File (DS)

Explanation

Basic encountered a line without a number while executing a Run, Load, Merge, or Chain statement.

Causes

- Omitting a line number, writing a line that is too long, or inserting an extra carriage return in a program created or modified with a word processor. (Programs downloaded via telephone sometimes have extra carriage returns, as well.)
- Omitting carriage returns in a program edited with a word processor. (Basic tries to load two or more lines as one.)
- A program saved in ASCII contains a line that is too long. This can happen after editing a program line to make it longer than what Basic allows upon original entry.
- Attempting to run, load, or merge a file that isn't a Basic program.

What to Do

- Use the List command to see how much Basic was able to load and where the problem occurred. (Sometimes you won't be able to list any lines.)
- Use a word processor, editor, or debugging utility to insert line numbers.

Prevention

- Save the file without the .A option, except when required.
- Use the BAS extension to identify Basic program files in the directory.

Disk Full

Explanation

No space is left on the disk or the limit for file names in the directory has been reached.

Causes

- The disk is full.
- Using an erroneously large record number in a Put statement.
- Inserting the wrong disk or using the wrong file name.
- Routines intended to kill obsolete files failed in earlier sessions.
- A file with a misspelled name or otherwise unnecessary files are on the disk. Perhaps the disk was inserted while another program was running.

What to Do

- List the line to determine what file was being written, and refer to the Open statement to determine the file name.
- Check the record number if the line contains a Put statement.
- Display a directory and kill unnecessary files.
- If appropriate, close and kill the file that was partially written to disk.

Prevention

- Write a "creation" routine that asks the user how many records of each type will be required. Then preallocate disk space by opening the files, writing an appropriate number of zero or blank records, and closing them.
- Employ data-compression techniques (see Out of Memory). With random files, consider using smaller record sizes or fielding multiple logical records for each physical record.
- Split the file into multiple files on different disks or drives.
- Consider the application. Random files are more efficient in some cases, sequential files more efficient in others.
- When formatting, make sure the correct parameters are given. Discard disks that have tracks locked out.
- Have blank formatted disks on hand for emergencies.
- Write routines to ensure that the correct disk is inserted.

Disk Media Error, Disk I/O Error

Explanation

The system sensed a problem when reading from or writing to a disk file.

Causes

- The disk hasn't been formatted or has been formatted on an incompatible system.
- Improperly inserting the disk.
- Damage to the disk's surface.
- Swapping disks while files were open in an earlier session.
- A hardware malfunction occurred when the file was last written.
- The drive's read-write heads are dirty or out of alignment.

What to Do

- If the disk is new, exit Basic and format the disk.
- Remove the disk, reinsert it, and try again (several times if necessary).
- Use another disk drive to copy the file to a new disk.
- Use the latest backup copy.
- For advanced programmers only: If the error occurred during a Get in a random file,

try issuing a Put command to the same record number (after a Get attempt). You might recover some of the data this way.

- For advanced programmers only: Write a temporary program that combines good records from the damaged file with data from the latest backup replacing the bad records.

Prevention

- Back up disks regularly and rotate your backups.
- Discard disks with visible scratches. Have the drives serviced.
- Avoid getting dirt and fingerprints on disks and keep them away from high temperatures and magnetic fields. Avoid drive overheating. Always put disks in envelopes when they're not in use.
- Clean the drive periodically with a head-cleaning disk.
- Avoid turning the system on or off when disks are inserted.
- Don't remove or swap disks until all files are closed.
- Use an uninterruptible power supply or surge protector. Avoid operating the computer during lightning storms.
- Use the TRSDOS or MS-DOS verify option, which senses disk-write errors when they happen.
- Write an On Error GOTO handler that allows retries.

Disk Not Ready

Explanation

Basic attempted to access a disk drive that wasn't ready.

Causes

- The disk wasn't inserted, was incorrectly inserted, or the drive's latch wasn't closed.
- The drive is off, improperly connected, malfunctioning, or not receiving power.

What to Do

- Correct the problem and retry.

Prevention

- Write an On Error GOTO handler that senses the problem and lets the user retry.

Disk Write Protect

Explanation

The write-protect notch is covered (on 5 $\frac{1}{4}$ -inch disks) or uncovered (on 8-inch disks), preventing the system from writing data to a disk.

Causes

- Wrong disk. You've intentionally write-protected the disk to avoid accidental changes or erasures.
- Inserting the disk incorrectly.

- There is a malfunctioning sensor inside the disk drive.

- A "software protect" has been issued (available with some TRSDOS systems).

What to Do

- Watch the disk-drive light to see which disk is being accessed. Remove the disk, correct the problem, and try again.
- Return to TRSDOS and use the WP command if a software protect is in effect.

Prevention

- Write an On Error GOTO handler that senses the problem and lets the user retry.

Division by Zero (/0)

Explanation

The rules of math prohibit division by zero, so Basic refuses.

Causes

- Attempting to divide by zero, a variable containing zero, or an expression that equals zero.
- Attempting to use zero with a negative exponent.
- Attempting to use the MOD expression with zero as the second operand.
- Dividing by numbers obtained from an empty, misnamed, or corrupted disk file, or one that was extended but not closed in the last session.

What to Do

- List the line and check the division and MOD expressions.
- Check the inputs and expressions that provided the divisor. Watch for multiplications by zero within the expressions. If appropriate, check Field statements and disk files that might be involved.
- Check small divisors that might round off to zero.
- Check the spelling of the variable used as a divisor and its type (i.e., integer, single, or double precision). Make sure you defined the variable earlier in the program.
- Check defined functions called by the offending line.

Prevention

- Write statements that validate operator inputs.
- Use an If statement before a division to check for a zero value in the variable used as a divisor. If zero, load the quotient variable with zero (or a code for "not applicable") and jump past the division.
- Use an On Error GOTO statement.

```
Wrong:
10 A=10:B=5:L=15
20 FOR K=1 TO 10
30 X=(A+B-K)/L
40 PRINT X
50 A=A+10:B=B+2:L=L-K
60 NEXT K
```

Right:

```
10 A=10:B=5:L=15
20 FOR K=1 TO 10
25 IF L=0 THEN PRINT "****":GOTO 50
30 X=(A+B-K)/L
40 PRINT X
50 A=A+10:B=B+2:L=L-K
60 NEXT K
```

Duplicate Definition, Redimensioned Array (DD)

Explanation

The program attempted to dimension an array that was already dimensioned.

Causes

- More than one dimension (DIM) statement for the same array. GOTOs or GOSUBs that cause a DIM statement to execute twice.
- Some versions of Basic require redimensioning in chained-to programs. Others prohibit it.
- Using subscripts zero to 10 and attempting later to dimension the array.
- Using an Option Base statement after dimensioning an array.

What to Do

- Check for duplicate DIM statements.
- Check GOTOs and program flow.

Prevention

- Put all DIM statements together near the start of the program.
- Use the Erase statement in versions of Basic that permit it.
- Use a separate variable as a flag to indicate dimensioned arrays in parts of the program that might execute more than once. If the array has already been dimensioned, skip over the DIM statement.

Wrong:

```
10 DIM A(15):T=125:G=0
20 PRINT "TEST";J
30 J=J+1:G=J*T:A(J)=T+J*2
40 IF J=15 THEN END
50 PRINT G,J
60 IF J=10 THEN 10
70 GOTO 20
```

Right:

```
5 DIM A(15)
10 T=125:G=0
20 PRINT "TEST";J
30 J=J+1:G=J*T:A(J)=T+J*2
40 IF J=15 THEN END
50 PRINT G,T
60 IF J=10 THEN 10
70 GOTO 20
```

Field Overflow

Explanation

Field statements assign lengths to string variables and align them so that data transferred to and from random disk-file records is organized correctly.

TANDY IS DANDY...

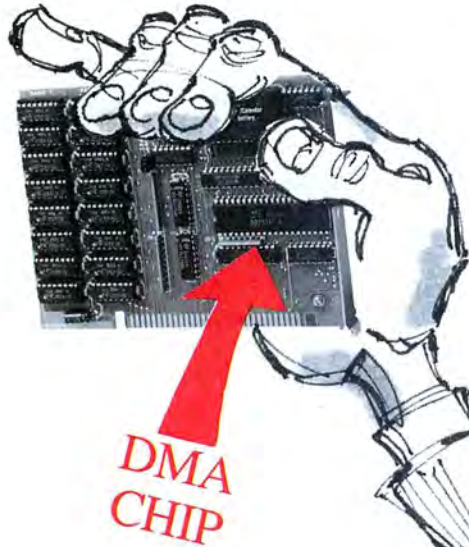
...until you want more

"...the Zuckerboard is a high-quality, reliable alternative to the high prices of Tandy's expansion memory boards."

June 1986 Issue

PCM

Magazine



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

Dr. Dr. Zucker



It's another ZUCKERBOARD

atb

235 Santa Ana Court • Sunnyvale, CA 94089
(800) 233-6874 (CA) • (800) 222-4920

FOR TANDY 1000

116-100	\$109	Memory Board with 256K
116-200	149	Memory Board with 512K
116-300	49	20 Year Clock/Calendar
130-100	49	256K Chip Upgrade
115-256	109	Secondary Memory Board with 256K
115-384	125	Secondary Memory Board with 384K
116-400	249	Multifunction Board with 512K + Serial + Ramdisk + Print Spool Software
116-400C	279	Multifunction Board with 512K + Serial + Ramdisk + Print Spool Software + 20 Year Clock Calendar
125-100	549	Internal Half Height 20MBYTE Hard Disk includes Controller and Cables

FOR TANDY 1200

115-200	\$149	Memory Board with 512K
119-200C	198	Memory Board with 512K + 20 Year Clock/Calendar
115-300	125	Memory Board with 384K
119-300	174	Memory Board with 384K + 20 Year Clock/Calendar

FOR TANDY 1000 & 1200

124-000	\$129	Mouse
124-100	159	Mouse with PC Paint Software
129-000	49	Ramdisk + Print Spooler Software
130-000	109	Keyboard Upgrade

Model	Qty.	Unit Price	Ext. Price
FOR TANDY 1000			
116-100	_____	\$109	_____
116-200	_____	\$149	_____
116-300	_____	\$ 49	_____
130-100	_____	\$ 49	_____
115-256	_____	\$109	_____
115-384	_____	\$125	_____
116-400	_____	\$249	_____
116-400C	_____	\$279	_____
125-100	_____	\$549	_____

FOR TANDY 1200			
115-200	_____	\$149	_____
119-200C	_____	\$198	_____
115-300	_____	\$125	_____

FOR TANDY 1000 & 1200			
124-000	_____	\$129	_____
124-100	_____	\$159	_____
129-000	_____	\$ 49	_____
130-000	_____	\$109	_____

Subtotal	_____
CA Residents add applicable tax	_____
Shipping \$6.00 per product in the USA	_____
Total	_____

Name _____
 Address _____
 City, State _____ Zip _____
 Phone _____

Visa MasterCard
 Number _____ Expires _____
 Check or money order
 Please allow 2-4 weeks for delivery

Model	Qty.	Unit Price	Ext. Price
FOR TANDY 1000			
116-100	_____	\$109	_____
116-200	_____	\$149	_____
116-300	_____	\$ 49	_____
130-100	_____	\$ 49	_____
115-256	_____	\$109	_____
115-384	_____	\$125	_____
116-400	_____	\$249	_____
116-400C	_____	\$279	_____
125-100	_____	\$549	_____

FOR TANDY 1200			
115-200	_____	\$149	_____
119-200C	_____	\$198	_____
115-300	_____	\$125	_____

FOR TANDY 1000 & 1200			
124-000	_____	\$129	_____
124-100	_____	\$159	_____
129-000	_____	\$ 49	_____
130-000	_____	\$109	_____

Subtotal	_____
CA Residents add applicable tax	_____
Shipping \$6.00 per product in the USA	_____
Total	_____

Name _____
 Address _____
 City, State _____ Zip _____
 Phone _____

Visa MasterCard
 Number _____ Expires _____
 Check or money order
 Please allow 2-4 weeks for delivery

TEAR HERE AND SAVE TO BUY LATER

NO POSTAGE
NECESSARY
IF
MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 1625 SUNNYVALE, CA

POSTAGE WILL BE PAID BY ADDRESSEE

ADVANCED TRANSDUCER DEVICES, INC.

235 Santa Ana Court
Sunnyvale, CA 94089

ATTENTION: DR. DR. ZUCKER

NO POSTAGE
NECESSARY
IF
MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 1625 SUNNYVALE, CA

POSTAGE WILL BE PAID BY ADDRESSEE

ADVANCED TRANSDUCER DEVICES, INC.

235 Santa Ana Court
Sunnyvale, CA 94089

ATTENTION: DR. DR. ZUCKER

Dr. Dr. Zucker



It's another ZUCKERBOARD



235 Santa Ana Court • Sunnyvale, CA 94089
(800) 233-6874 (CA) • (800) 222-4920

FOR TANDY 1000

116-100	\$109	Memory Board with 256K
116-200	149	Memory Board with 512K
116-300	49	20 Year Clock/Calendar
130-100	49	256K Chip Upgrade
115-256	109	Secondary Memory Board with 256K
115-384	125	Secondary Memory Board with 384K
116-400	249	Multifunction Board with 512K + Serial + Ramdisk + Print Spool Software
116-400C	279	Multifunction Board with 512K + Serial + Ramdisk + Print Spool Software + 20 Year Clock Calendar
125-100	549	Internal Half Height 20MBYTE Hard Disk includes Controller and Cables

FOR TANDY 1200

115-200	\$149	Memory Board with 512K
119-200C	198	Memory Board with 512K + 20 Year Clock/Calendar
115-300	125	Memory Board with 384K
119-300	174	Memory Board with 384K + 20 Year Clock/Calendar

FOR TANDY 1000 & 1200

124-000	\$129	Mouse
124-100	159	Mouse with PC Paint Software
129-000	49	Ramdisk + Print Spooler Software
130-000	109	Keyboard Upgrade

Causes

- The strings in the Field statement have a total length exceeding the record length assigned when the random file was opened.
- If you were attempting sequential I/O to a random file with the PRINT#, WRITE#, or INPUT# commands, the bytes printed or input exceed the record length.

What to Do

- List the line. Check the Field statements. Add the constants, variables, or expressions to the left of each AS. The total should not exceed the record length specified when the random file was opened, or the default record length if one wasn't specified.
- Check the Open statement for the random file. The optional last parameter (on systems that allow it) specifies the record length (the maximum number of bytes that may be fielded). If you omitted the record length, the default applies (256 bytes on most TRSDOS systems, 128 bytes on most MS-DOS systems).
- Correct the Field or Open statement.

Prevention

- Write a routine that gets field lengths from Data statements. A For . . Next loop can add the field lengths for the Open statement. A second loop can do the fielding, using array strings for fields. With each loop, a dummy string and an array string are fielded. The length of each new field is added to a variable, which indicates the dummy field's length on the next repetition. This method allows better documentation and easier modification.
- When you attempt sequential I/O to a random-file record, use a variable to keep count of the bytes. When appropriate, use the Get statement to read the next record. You can also use PEEK statements to monitor the position.

File Already Exists

Explanation

The user tried to rename a file as a name that already exists. (No two files in the same disk directory can have the same name.)

Causes

- Specifying an incorrect file name with a Name command.

What to Do

- Display a directory to see what file names are in use.
- Select a different file name or kill or rename the file you want to use.

Prevention

- Use an On Error GOTO statement to trap the error. In the error handler, let the user select the remedy.

File Already Open (AO)

Explanation

The program tried to open a file that is already open.

Causes

- Wrong file number in the Open statement.
- Failing to close a file that's already open, or closing the wrong file (with the Close and Open statements).
- Accidentally using two Open statements or calling an Open subroutine more than once.
- Attempting to kill a file that is open.

What to Do

- List the line and check the file number.
- Insert a Close statement or delete the unnecessary Open statement.

Prevention

- Put a Close statement just before the Open statement.
- Never kill an open file.

File Not Found

Explanation

Basic attempted a Load, Run, Open, Merge, Name, or Kill statement with a file name that cannot be found on the specified disk, drive, or subdirectory.

Causes

- Specifying an incorrect file name or drive.
- Inserting the wrong disk.
- The file has been killed or wasn't created.
- Setting the default drive or subdirectory incorrectly before entering Basic (with systems allowing a default drive and directory).
- Specifying the file name without an extension. Basic has added a default extension.

What to Do

- Try again with the correct file name and drive specification.
- List the line and print applicable variables (using the Print command) to see what file name was attempted.
- Display a directory to see if the file is present with a misspelled name. If so, rename it.

Prevention

- Write an On Error GOTO routine that checks for the required files when the program is started. If a file is not present, have the program go to a file-creation routine or prompt the user to respecify the file and drive or insert a different disk.
- Random-file Open statements do not generate "File not found" errors. To verify that they're present, use a Name or Open "I" statement to trap the error. Then close the file (CLOSE) and reopen it in random mode. Under MS-DOS, the LOF function returns the file size in bytes; this can serve

as a test of existence, too. There's no need for error handling with this technique.

- Validate user-entered file names, or write a routine that builds file names from operator inputs.

For Without Next

Explanation

Basic encountered a For statement without a corresponding Next statement.

Causes

- A Return, Stop, or End statement within the For . . Next loop.
- A missing Next statement.

What to Do

- Examine the logic. Simplify or reorganize the program.
- Delete the unnecessary For statement.

Prevention

- See Next Without For.

Illegal Direct (ID)

Explanation

While in Basic's Ready mode, you entered a statement that is permitted only within a program.

Causes

- Forgetting to use a line number.
- Typing INPUT, LINE INPUT, or DEF FN as direct commands.

What to Do

- Write a short program to do what you intended and run it.
- If you were attempting to debug a program by manually inputting data items from a sequential file, put your Input command in a temporary subroutine and use GOSUB as your direct command.

Prevention

- Avoid Input and DEF FN commands in direct mode.

Illegal Function Call (FC)

Explanation

A request was made outside valid limits, or Basic didn't understand a statement and attempted to interpret it as a function.

Causes

- A function's numeric argument is too large or too small because of invalid operator input, corrupted disk data, improper disk-record fielding, erroneous math, inadvertent clearing, or conflicting use or misspelling of variable names.

- A string argument for a function is too long, too short, or null.
- The subscript for an array variable is negative.
- Issuing a USR call without first specifying the starting address with the DEF USR command.
- Trying to list or edit a protected program.
- Mistyped or misaligned commas and parentheses.
- Specifying an invalid screen position when using a PRINT@ or Locate command. Attempting to print on the 25th line of the screen without first using the Key Off statement. (MS-DOS systems.)
- Specifying an invalid screen mode with graphics or color functions.

What to Do

- Use Print statements to check the contents of variables used by the function.
- Check the length of string variables by printing the LEN function.
- Examine the statements that assigned values to the variables.
- Check your manual for valid arguments and ranges.

Prevention

- Use statements that will validate operator inputs.
- If appropriate, insert dummy characters at the beginning or end of a string to force it to a valid length.
- Think through all possible values that variables might contain. During testing, try inputting all extremes: large numbers, zero, negative numbers, long entries, omitted entries.
- Use On Error GOTO statements to trap bad values from disk files.
- Never assume startup modes. Use Screen, Width, and Key statements when appropriate.
- Consider MID\$ as a substitute for LEFT\$.
- Write a separate program that checks and repairs disk-file data.

Input Past End (EF)

Explanation

The program is attempting to input data from a sequential file after the end has been reached.

Causes

- The inputting program failed to pretest for the end of the file.
- The file is incomplete. You might have removed the disk prematurely, or a power failure prevented the program that created the file from closing it.
- The program that created the file wrote it in an incompatible format, or commas (and other delimiters in the file) have been ignored by the inputting program.

- Encountering a CHR\$(26) in a file when using the INPUT\$ function (in MS-DOS systems only).
- Attempting to read from a sequential file opened for output or appending.

What to Do

- Check the INPUT# instruction to see that its variable types agree with those having PRINT# statements.
- Check to see if a LINE INPUT# statement was used in place of an INPUT# statement, causing Basic to ignore commas and other delimiters.
- Check the routine that wrote the file. You might need commas within quotation marks to separate items in the PRINT# statement. (See your manual.)
- Display a directory to check the file's length. Sometimes an incomplete file can be recovered: Open it in random mode, execute a Put statement to a record past the estimated end-of-file (EOF), then close the file.
- Insert a temporary Print statement after each INPUT# statement so you can view the data as it's inputted.
- If necessary, use a debugging utility or word processor to view and edit the file.

Prevention

- Use an If statement with the EOF function before each INPUT# statement.
- To prevent problems with commas, quotation marks, and other delimiters, try limiting each PRINT# statement to only one item, and use LINE INPUT# for all input. (Where appropriate, use the VAL function to change string variables to numeric.)
- Don't write compressed data (MKI\$, MKS\$, and MKD\$ strings) to sequential files. Be careful with CHR\$ values under 32.

Internal Error

Explanation

A problem has occurred within the Basic interpreter or the tables it maintains. Possibly, a bug exists within Basic itself. See Unprintable Error.

Line Buffer Overflow

Explanation

You entered a line with too many characters.

Causes

- This error rarely, if ever, occurs.

What to Do

- Break the line into smaller parts and try again.

Missing Operand (MO)

Explanation

An incomplete request for a numeric com-

putation or string concatenation.

Causes

- A plus, minus, multiplication, division, MOD, or exponentiation symbol is missing a variable name, constant, or expression to the right.
- An equals sign, greater-than sign, less-than sign, or logical operator such as And, Or, Not, XOR, or INP, has a missing operand to the right.
- Misplaced parentheses, quotation marks, or commas.
- The program line might have been truncated because it was too long.

What to Do

- List the line. Insert the missing operand or delete the extra operator.

Prevention

- Be especially careful when modifying a line. Make sure you delete the old expression.

```
Wrong:
10 A=((B+J)/20)+10)-((L+J)/10)+
Right:
10 A=((B+J)/20)+10)-((L+J)/10)+B
```

Next Without For (NF)

Explanation

Basic encountered a Next statement without a corresponding For statement.

Causes

- GOTO statements that enter or exit a For. . .Next loop.
- A Next statement is located within a subroutine, but the For statement appears outside the subroutine.
- Improper nesting. The program might have more Next statements than For statements, or the optional variable names used with Next might not match the names with the corresponding For statements.
- With some systems, use of the CONT command to continue a program halted by an error or break while a For. . .Next loop is active.

What to Do

- Examine the logic. Simplify or reorganize the program.
- Delete the unnecessary Next statement.

Prevention

- Indent nested For. . .Next loops. Remember, the first For statement corresponds to the last Next statement, the second For statement corresponds to the second-to-the-last Next statement, and so on.
- Use only one Next for each For. Watch GOTOS, GOSUBS, Returns, and If. . .

Then. . . Else statements.

•Write For and Next statements first. Then fill in the logic between.

•To continue a halted program in a For. . . Next loop, try entering the For statement with a colon and GOTO as a direct command. (The Models I and III don't permit this.)

No Resume (NR)

Explanation

An error occurred while On Error GOTO trapping was in effect. The error-handling routine took effect, but no Resume statement was found.

Causes

•Failing to include a Resume statement.
•You've used an End, Stop, or Return statement by mistake within the error-handling routine.

What to Do

•Examine and modify the error-trapping routine.

Prevention

•If you want to return from the subroutine

where the error occurred, resume to the line that contains the subroutine's return. Optionally, create a variable to indicate error conditions and resume to the next instruction.

Out of Data (OD)

Explanation

Basic attempted a Read statement after all Data-statement items had been read.

Causes

•Too few Data statements or too many Read statements.
•Improper use of quotation marks, commas, or colons in lines with multiple data items. One or more missing commas.
•Failing to use the Restore command to reread a data list.
•Specifying the wrong line number in the Restore command.

What to Do

•If the Read statement is in a For. . . Next loop, print the variable being used as a counter to see how many times it repeated. Count Data-statement items. Adjust the To portion of the For statement or

add the missing Data statements.

•If data items were being read into an array, determine where it got out of sync by using the Print command to spot-check the array elements.

•Check commas, quotation marks, and colons in Data-statement lines. Data strings with commas or colons must be enclosed in quotation marks.

•If warranted, add a Restore statement before the read routine to make sure it begins with the correct data line.

•Insert a temporary Print statement after the Read statement and rerun the program to view the data items as Basic reads them.

Prevention

•Instead of using a For. . . Next loop to read the data, use a special data item (such as "END" or "999") at the end of the list and check for it after each read.

•Use Restore statements where they are appropriate.

Wrong:

```
10 FOR K=1 TO 10:READ A(K):NEXT
20 DATA 2534,543,55,230,25
30 DATA 290,38,45,16
```

Right:

```
10 FOR K=1 TO 10:READ A(K):NEXT
20 DATA 2534,543,55,230,25
30 DATA 290,38,45,16,0
```

Circle 152 on Reader Service card.

NEW PRINTERS ADDED! FIND YOURS BELOW. Good This Month		RIBBON SALE			EXACT REPLACEMENTS					
PRINTER MAKE, MODEL NUMBER Contact us if your printer is not listed. We have many more in stock. We can probably RELOAD your old cartridges.	RIBBON SIZE Inches by Yards	NEW CARTRIDGES From the various manufacturers or made in our own shop. Ready to use.			RELOADS You SEND your used CARTRIDGES to us. WE put OUR NEW INSERTS in them.			INSERTS EZ-LOAD™ DROP IN. NO WINDING! EXACT REPLACEMENTS made in our own shop. Cartridges NOT included.		
C ITOH Prowriter 1550-8510, NEC 8023-8025, APPLE DMP-IMAGEW	1/2 x 18	\$18/2	\$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 DIABLO HYTYPE II } Fabric Black	5/16 x 130 NOT RELOAD 5/16 x 17	\$18/3	\$60/12	\$342/72	\$5 ea 3-11	\$4 ea	12 or more	\$24/6	\$42/12	\$234/72
RADIO SHACK-TOSHIBA-COMMODORE-PANASONIC-RICOH Carbon Film - DWP 210 (Hytype II) Black (1445) DW II, DWP 410-510, RICOH 1200-1300-1600 Black (1419) Red, Green, Blue, Brown Colors (1419) Fabric (Long Life), DWP 210 (Hytype II) Black (1458) DW II, DWP 410-510, RICOH 1200-1300-1600 Black (1449)	1/2 x 52 5/16 x 145 1/4 x 145 1/4 x 130 5/16 x 17 NOT RELOAD 1/4 x 25	RS DMP-2200	\$18/1	\$16 ea	2 or more	\$30/3	\$57/6	\$108/12		
DMP-100, LP VII, COMMODORE 1525, GORILLA BANANA (1424) DMP-200, 120, (430 Inserts & Reloads Only) (1296) (1483) DMP-400-420, LP VI-VIII, PANASONIC KXP-130-1093 (1418) DMP-500 (130 Inserts & Reloads Only) (1236) (1482) DMP-2100, TOSHIBA P1340-1350-1351-351 (1442) LP-I-II-IV, CENTRONICS 730-737-739-779 (Zip Pack) (1413) LP III-V, CANON A1200 (New Only) (1/2 x 5) (1414)	Inker Loop 1/2 x 20 5/16 x 14 1/2 x 20 1/2 x 20 9/16 x 16 1/2 x 15	\$18/2	\$51/6	\$ 96/12	\$7/1	\$6 ea	2 or more	\$15/3	\$54/12	\$288/72
EPSON LQ 1500, (LQ 800, LQ 1000 Inserts and Reloads Only) MX-FX-RX 70-80-85, LX 80-90 (5/16 x 7), IBM PC (5152) MX-FX-RX 100-185-286, IBM PROPRINTER (7/16 x 20) (4201) DX 20-35 Carbon Film (Multistrike), OLIVETTI ET-121-221	1/2 x 14 1/2 x 20 1/2 x 30 5/16 x 290	\$18/2	\$51/6	\$ 96/12	\$7/1	\$6 ea	2 or more	\$15/3	\$54/12	\$288/72
NEC Spinwriter-Carbon Film - 2000-3500 (Reloads BCCOMPCO Only) -Fabric - 2000-3500 (Can Reload Most Types) -Fabric - 2000-3500 (Can Reload All) -Fabric - 2000-3500 (Can Reload All) Pinwriter P1-P2-P6 P3-P7	5/16 x 145 NOT RELOAD 1/4 x 145 1/2 x 14 1/2 x 13 1/2 x 20 1/2 x 27	\$18/3	\$60/12	\$342/72	\$5 ea 3-11	\$4 ea	12 or more	\$24/6	\$42/12	\$234/72
OKIDATA Pacemark 2350-2410 Black Microline 182-183-192-193 ML-80-82-83-92-93 (Call for ML-84 Prices)	1/2 x 100 Inker Loop 1/2 x 16	\$25 each \$20/2	\$57/6	\$108/12	\$20/1	\$18 ea	2 or more	\$36/3	\$132/12	\$720/72
MANNESMAN-TALLY MT-160, RITEMAN INFORUNNER (Inker Loop) MT-180-290 -SPIRIT 80 (SP80) COMMODORE 1526 (Multistrike)	9mm x 11 9mm x 13 1/2 x 35	\$19/2	\$54/6	\$102/12						
PANASONIC KXP-1080-1090-1091-1092-1592-1595	Inker Loop	\$20/2	\$57/6	\$108/12						
BROTHER HR-15-25-35 COMREX DX-15, II	Carbon Film (Multistrike) Fabric (Call for Comrex 420 Prices)	5/16 x 82 5/16 x 17	\$18/3	\$60/12	\$342/72					

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

Out of Memory (OM)

Explanation

The program is too big, available memory is insufficient, or memory has been allocated incorrectly.

Causes

- Attempting to run a program written for a computer with more memory.
- A subroutine or function that calls itself.
- An incorrect or missing Clear statement. A Clear statement earlier in the session (or perhaps in a different program) might have limited variable-storage space.
- Too much For. . . Next, While. . . Wend, GOSUB, or function nesting.
- Too many variables.
- A malfunctioning computer or corrupted program file.

What to Do

- Execute a Clear command, then run the program again.
- List the line for a clue to the cause.
- On TRSDOS systems, which allocate string and variable space separately, type PRINT FRE(A\$) to see how much memory is free for strings. If space is available, adjust the Clear statement to reduce string space and increase variable-storage space. (Consult your manual.)
- On MS-DOS systems, type PRINT FRE(" "). If space appears sufficient, adjust the Clear statement to allow more stack space. Clear does not allocate string space under MS-DOS.
- If the program is saved on disk, type NEW, CLEAR, and PRINT MEM to see how much memory is available. (On MS-DOS systems, type PRINT FRE(0) instead of PRINT MEM.)
- Return to TRSDOS or DOS and restart Basic with a smaller Files specification. (Consult your manual.) Also, try entering Basic with a smaller file.
- Turn the computer off, back on, and try again.

Prevention

- Watch out for missing or incorrect Clear statements.
- Break large programs into smaller ones and link them with Run, Load, or Chain statements.
- Store data in disk files rather than in memory and in Data statements.
- Use integer variables instead of single- and double-precision variables.
- Remove unnecessary remarks. Use multiple statements per line.
- Make variables serve multiple purposes. Look for common phrases within strings within quotation marks and "build" them at run time. Change strings to null, or empty, quotation marks (" ") once each has served its purpose.

• Structure programs more efficiently. Convert repeated routines to subroutines. Write more powerful statements using INSTR and On GOTO instead of If. . . Then and GOTO.

- Dimension all arrays. Don't waste the zero subscripts.
- Use compression techniques such as bit mapping and stripping of leading and trailing blanks. Use codes to indicate repeating characters and CHR\$, MKI\$, MKS\$, and MKD\$ to pack numbers into strings.
- Write a batch or Do file (or an Auto command) that enters Basic with the Files and other parameters set most efficiently for the application.
- Watch Data statements. Data read into numeric arrays takes space in memory twice.
- Buy more memory.

```
Wrong:
10 GOSUB 100
100 PRINT "entering subroutine"
110 GOSUB 100
120 PRINT
130 RETURN
```

```
Right:
10 GOSUB 100
100 PRINT "entering subroutine"
105 RETURN
110 GOSUB 100
120 PRINT
```

Out of Paper

Explanation

The printer is out of paper.

Causes

- The printer is out of paper.
- The printer has paper, but it's not activating the sensor because of a rip, a paper jam, or improper loading.

What to Do

- Reload the paper. (Press the printer's on-line or reset switch if necessary.)
- Type CONT to continue.

Prevention

- Sufficient paper. Careful loading. A printer stand for smooth feeding.

Out of String Space (OS)

Explanation

Too much data was loaded into memory from disk or operator input. The program might be too big, available memory might be insufficient, or adequate space might not have been allocated for data manipulation during a session.

Causes

- Attempting to run a program written for

a computer with more memory.

- An incorrect or missing Clear statement. A Clear statement earlier in the session (or perhaps in a different program) might have limited string-storage space.

What to Do

- Change the Clear statement to give more space to string data and less space to program text and numeric variables. (Clear does not allocate string space on MS-DOS systems.)
- See Out of Memory.

Prevention

- If loading data to be sorted, use only the first few characters of each string.
- See Out of Memory.

Overflow (OV)

Explanation

Basic encountered an attempt to assign a value greater than 32,767 or less than -32,768 to an integer variable. Single- and double-precision overflow possible, too.

Causes

- Invalid operator input.
- Arithmetic computations giving larger or smaller results than intended.
- Corrupted disk-file data. If inputting from a sequential file or Data statements, the data might be bad or out of sync, or separators between data items might be missing.
- Unintended use of an integer symbol (%) or a DEFINT statement is in effect for the variable.
- Attempt to calculate a very large number, such as 50 factorial.

What to Do

- Check variable-type codes and DEFINT statements.
- Check mathematical expressions and all inputs that led to the overflow.
- Check to make sure keyboard input is valid.
- Check Data statements, file contents, and random-file Field statements that might have generated bad data.

Prevention

- Consider using single- or double-precision variable types.
- Write statements that validate operator inputs before assigning them to integer variables. (Input to a single-precision, double-precision, or string variable; compare to -32,768 and 32,767; then, if within the range, assign the value to the integer.)

```
Wrong:
10 DEFINT A-D
20 A=3465:B=2938
30 C=A*B:PRINT C
```

```
Right:
10 DEFSNG A-D
```


Path/File Access Error, Access Denied

Explanation

Basic was unable to use the file due to password protection or locking.

Causes

- The file's attribute codes prohibit access.
- The file has a password.
- Another user is accessing the file (with multiuser systems only).

What to Do

- Retry with a correct password.
- Change the file's attributes. (Exit Basic and use the ATTRIB or PROT commands, if available.)
- In a multiuser system, wait, then retry.

Prevention

- Avoid accidental use of passwords by having the program validate the user's file-name entries.

Path Not Found

Explanation

Basic was unable to find a file because an invalid subdirectory or drive was specified (in MS-DOS systems only). See File Not Found.

Rename Across Disks

Explanation

When you rename a file, the drive specification given with the new name must be the same as the drive for the old name.

Causes

- Incorrect use of the Name command.

What to Do

- Remove the drive specification from the new name and retry.

Prevention

- Avoid giving a drive specification with the new name.
- Validate operator inputs.

Resume Without Error (RW)

Explanation

Basic encountered a Resume statement without an error.

Causes

- An incorrect GOTO or GOSUB, or a forgotten Return or End statement, that lets the program fall through to an error-handling routine.
- Using two Resume statements to recover from the same error.
- Using the CONT command after breaking execution of an error routine.

What to Do

- Examine the program flow. Look for GOTOs, GOSUBs, and missing Return or End statements that allow invalid entry to your error handler.

Prevention

- Use GOTOs to jump over error-handling routines. Alternatively, put all the routines at the end of the program and insert an End statement before the first.

Return Without GOSUB (RG)

Explanation

Basic encountered a Return statement without a GOSUB preceding it.

Causes

- Falling through. This happens when you put the main part of your program before the subroutines. Where the main program should end, it continues into the first subroutine.
- Using a GOTO instead of a GOSUB to enter a subroutine.
- Using a Clear statement in a subroutine.

What to Do

- Examine the logic. Simplify or reorganize.
- Delete unnecessary Return statements.

Prevention

- Use only one Return statement for each subroutine.
- Use a GOTO to jump past subroutines near the start of the program. Insert an End statement before the first subroutine at the end of your program.
- Use remark lines with blanks or strings of dashes to make clear where subroutines start and end.
- Watch GOTOs, For. . .Next loops, and If. . .Then. . .Else statements.

String Formula Too Complex (ST)

Explanation

Basic lacks sufficient string or stack space to evaluate a string expression.

Causes

- Insufficient memory or string space.

What to Do

- Simplify the string expression.
- See Insufficient Memory and Out of String Space.

Prevention

- This error usually occurs only with large programs to be compiled. Try the compiler's /S option (or equivalent, if available), which conserves memory by storing strings on disk during compilation.

String Too Long (LS)

Explanation

The program attempted to create a string longer than 255 characters.

Causes

- Using a plus sign (+) to combine strings with a total length of over 255 bytes.
- An intermediate result within a string expression is too long, even though the final result might be less than 256 bytes.

What to Do

- List the line. Examine string expressions. Print the length of questionable strings.
- Redesign string expressions that have oversized intermediate results.
- Look for string-lengthening expressions within loops. Check for omitted or mistyped statements intended to nullify the string before the loop or with each repetition.
- Check for invalid lengths in Field statements.

Prevention

- Validate input. Use the LEFT\$ function to truncate strings that are too long.
- Use the LEN function to check a string's length before appending data to it.
- Where lengths of over 255 bytes are required, use multiple string variables or array elements. When over 255 bytes are needed, use the INKEY\$ or INPUT\$ function to accept keyboard input one character at a time.
- Some Basic compilers allow strings of up to 32,767 bytes.

```
Wrong:
10 A$="*****":B$="//"
20 D$=A$
30 FOR K=1 TO 25
40 C$=STR$(K*100)
50 D$=D$+C$+B$+STR$(K)+A$
60 NEXT K
```

```
Right:
10 A$="*****":B$="//"
20 D$=A$
30 FOR K=1 TO 25
40 C$=STR$(K*100)
50 D$=D$+C$+B$+STR$(K)+A$
55 IF LEN(D$)>240 THEN D$
=D$:D$=""
60 NEXT K
```


Subscript Out of Range (BS)

Explanation

A subscript for an array variable is too large or the wrong number of subscripts has been given.

Causes

- A missing or inadequate dimension (DIM) statement, or one that doesn't logically precede the array variable's reference. (Subscripts over 10 and double- or triple-dimensioned arrays require DIM statements.)
- A mistyped line that causes Basic to think you are referencing an array variable when you intend to use a function.
- An incorrect or omitted type-declaration character (\$, %, !, or #.)
- Misspelling a function or attempting to use one that doesn't exist.
- Executing a Clear statement after DIM or DEF statements.
- With double- and triple-dimensioned arrays, confusion as to which dimension is which.
- Erroneous math expressions or invalid inputs to a variable that serves as a subscript.

What to Do

- List the line. Look for misplaced parentheses and commas.
- Use Print statements to check the variables used as subscripts. If invalid, check the expressions that computed them.
- Check DIM statements, Clear statements, and program flow. Add or change DIM statements as required. Use a For . . . Next loop with a counter to see how many elements have been dimensioned for the array.

Prevention

- Use a variable in your DIM statement and use it again in For . . . Next loops and validation routines that reference the array. (Do not use this technique if you intend to compile Basic programs. Instead, use a constant in the DIM statement and assign the same value to a variable in the following statement.)
- Use remark (REM) statements to document how the program uses dimensions and which ones to change if the program is modified to handle more data. Use descriptive variable names when referencing array elements.

```
Wrong:
10 DIM A(5,10)
20 FOR K=1 TO 10
30   FOR J=1 TO 5
40     A(K,J)=J
50   NEXT J
60 NEXT K
```

```
Right:
10 DIM A(5,10)
20 FOR K=1 TO 10
```

```
30   FOR J=1 TO 5
40     A(J,K)=J
50   NEXT J
60 NEXT K
```

Syntax Error (SN)

Explanation

Basic doesn't understand your request.

Causes

- Typing errors: Failing to put spaces where required. Omitting colons between statements. Forgetting the opening double-quotation mark after typing RUN, LOAD, SAVE, or PRINT (when printing a quoted string).
- Using a reserved word as a variable name. (Some systems prohibit reserved words within variable names.) Using FN as a variable name.
- Improper nesting of parentheses. Omitting an argument to a defined function.
- Improper use of a Basic statement, command, or function. A comma where a space should be (or vice versa), omitted parentheses in a function, and so on.
- Use of a program or command with an incompatible version of Basic.
- Wrong operating mode. Using a TRS-DOS, MS-DOS, or application-program command in Basic's Ready mode.
- A corrupted program file in memory or on disk.

What to Do

- List the offending line. It might be incomplete, or extraneous characters might be present. If the error is obvious, retype or edit it.
- Retype the line. "Invisible characters" might have caused the problem. Often the error becomes obvious as you retype.
- If a statement includes parentheses, count them. The total should be even (one open parenthesis for each closed one).
- Restart the computer and try again.
- Save the program in ASCII and reload it.
- Look up questionable statements in your Basic manual.
- If the line contains a defined function, check the DEF FN statement.
- Check POKE statements that might be altering program text or variable storage.

Prevention

- Careful typing. Thorough testing. Experience.
- Compiling your programs locates syntax errors that might be overlooked in testing.

```
Wrong:
10 FOR K=1 TO 5 PRINT "HELLO":NEXT
20 A$=MID$(B$,1;2)
```

```
Right:
10 FOR K=1 TO 5:PRINT "HELLO":NEXT
20 A$=MID$(B$,1,2)
```

```
Wrong:
10 DEF FNA X=INT((X*100)+.5)/100
20 X=123.347
30 X=FNA(X)
40 PRINT X
```

```
Right:
10 DEF FNA (X)=INT((X*100)+.5)/100
20 X=123.347
30 X=FNA(X)
40 PRINT X
```

Too Many Files (FL)

Explanation

You've reached the directory-entry limit while attempting to create a new file, too many files are open at once, or you've given a bad file specification.

Causes

- The disk directory is full.
- A bad file specification has been given or some other error has occurred in an Open statement.
- A CONFIG.SYS file is missing, or its Files specification is missing or inadequate (in MS-DOS systems only).

What to Do

- List the line and check the Open statement.
- Display a directory to get a file count. Kill unnecessary files, use a different disk, or if your system allows it, create a new subdirectory.
- If the Open statement and directory count are okay on an MS-DOS system, exit Basic and modify the CONFIG.SYS file to contain a FILES = entry with a higher number such as 20. (If CONFIG.SYS is not present, create it. See your MS-DOS manual.) Reboot the system and restart Basic.

Prevention

- Keep the directory clean.
- Use a CONFIG.SYS file (in MS-DOS systems only).
- Make a file serve multiple purposes.

Type Mismatch (TM)

Explanation

Basic encountered a string variable or constant when numeric was expected, or vice versa.

Causes

- Omitting an argument to a function, or supplying arguments in the wrong order.
- Using a Swap statement with variables of differing types.

What to Do

- List the line and look for misplaced commas or parentheses, as well as omitted or incorrect type declarations (% , ! , # , and \$).
- Examine DEFINT, DEFSTR, DEFDBL,

and DEFSTR statements elsewhere in the program.

- Consult your manual to see what arguments Basic expects.

Prevention

- Use VAL to convert strings to numeric.
- Use STR\$ to convert numerics to strings.

```
Wrong:
10 DEFINT A-J:DEFSTR K-Q
20 FOR K=1 TO 10
30 PRINT"TESTING",K
40 NEXT K
```

```
Right:
10 DEFINT A-K:DEFSTR L-Q
20 FOR K=1 TO 10
30 PRINT"TESTING",K
40 NEXT K
```

Undefined Line Number (UL)

Explanation

A GOTO, GOSUB, On GOTO, On Error GOTO, On Key, or Restore statement referenced a nonexistent line.

Causes

- You accidentally deleted a line or lines.
- You renumbered or combined lines without changing all statements that reference them.
- You mistyped a line number or forgot to press the enter key before starting a new line.
- You entered a number or calculation in Ready mode without typing PRINT, LIST, EDIT, or DELETE.
- Part of the program failed to load.
- The program isn't finished.

What to Do

- List the line containing the reference to see if you mistyped it.
- If multiple lines are referenced, list each one.
- List the line that precedes the one in question. Perhaps you forgot to press the enter key or it got connected in some other way.
- If the program file is in ASCII format, use a word processor or a debugging utility to list it. Check to see if end-of-file codes have been inserted before the missing code.
- If the program should have been merged with additional lines from another file, check to see if the file exists and is stored in ASCII (text) format.

Prevention

- Use GOTOS only when necessary. If...Then...Else, For...Next, and While...WEND are easier to modify.
- Where possible, use defined functions instead of subroutines.
- Adopt standard line numbers for common program routines.
- Block out your program with pre-assigned line numbers. Use a Stop statement and a remark at each GOTO or GO-

SUB destination until you're ready to write the routine.

- Use renumbering utilities to automatically change line numbers and their references.
- Use cross-referencing utilities or a Basic compiler to check line-number references.

Undefined User Function

Explanation

A user function must be defined with a DEF FN statement.

Causes

- You forgot to include a DEF FN statement to define the function.
- You defined the function, but Basic hasn't executed the line yet.
- You used FN as an array variable.

What to Do

- List the line. Did you intend to use a function? Is it spelled correctly?
- Does the program include the function definition? Check the program flow.
- Add the DEF FN statement, if missing.

Prevention

- Define functions early in the program.
- For programs to be compiled, a function definition must be at a lower line number than the statement that first calls it.

```
Wrong:
10 DEF FNA (X)=INT((X*100)+.5)/100
20 CLEAR
30 X=123.347:X=FNA(X)
40 PRINT X
```

```
Right:
10 DEF FNA=INT((X*100)+.5)/100
30 X=123.347:X=FNA(X)
40 PRINT X
```

Unprintable Error (UE)

Explanation

Basic has no message for the error that occurred.

Causes

- An Error statement that has an invalid error code.
- A corrupt program file, bad memory, or incorrect POKE-statement addresses.
- A problem in a USR or Call routine.

What to Do

- Restart Basic and reload your program.
- Check all USR, Call, and POKE statements. (On MS-DOS systems, also check DEF SEG statements and BLOAD addresses.)
- If the problem persists, try using backup copies of your program and Basic.

Prevention

- Be careful with USR, Call, POKE, and

BLOAD statements.

- Remember to use the DEF SEG statement on MS-DOS systems. DEF SEG statements from other programs earlier in the session remain in effect.
- Make sure to save your program before testing it.

Wend Without While

Explanation

A While loop must be active when Basic encounters a Wend statement.

Causes

- A missing While statement.
- An unnecessary Wend statement. Improper nesting of While...Wend and For...Next loops.
- GOTOS and GOSUBS that jump into the While...Wend loop without executing the While statement.

What to Do

- Examine the logic. Simplify or reorganize the program.
- Add the While statement or delete the unnecessary Wend.

Prevention

- While...Wend loops are similar to For...Next loops. See Next Without For preventions.

While Without Wend

Explanation

For each While statement, a corresponding Wend statement must be executed before the program terminates.

Causes

- A missing Wend statement.
- Improper nesting. More While statements than Wend statements.
- Basic encountered an End, Stop, Return, or the program terminated before the Wend.

What to Do

- Examine the logic. Simplify or reorganize the program.
- Add the Wend statement or delete the unnecessary While statement.

Prevention

- While...Wend loops are similar to For...Next loops. See Next Without For preventions.

```
Wrong:
10 WHILE INKEY$=""
20 PRINT "TESTING":END
```

```
Right:
10 WHILE INKEY$="" :WEND
20 PRINT "TESTING":END
```


3.5" DRIVE FOR YOUR TANDY 1000

Compatible with many computers using 3.5" drive including: IBM Convertible, DG/One, Kaypro 2000, Toshiba T1100, HP110 & 150, Atari 520ST, and Tandy 600.

Manzana's line of 3.5" external and internal disk drive systems come with 3FIVE™. This sophisticated but easy to use software package allows your Tandy 1000 to read & write to a full 720K in many 3.5" formats and is compatible with all MS-DOS 2.X, 3.X.

Upgrade your Tandy to 3.5" technology—the new standard in disk storage.



MANZANA. . .the industry pioneer in 3.5" peripherals. For more information, contact your dealer or call direct. In Canada, please contact Quay Computer Corporation at 416-629-1570.



MANZANA

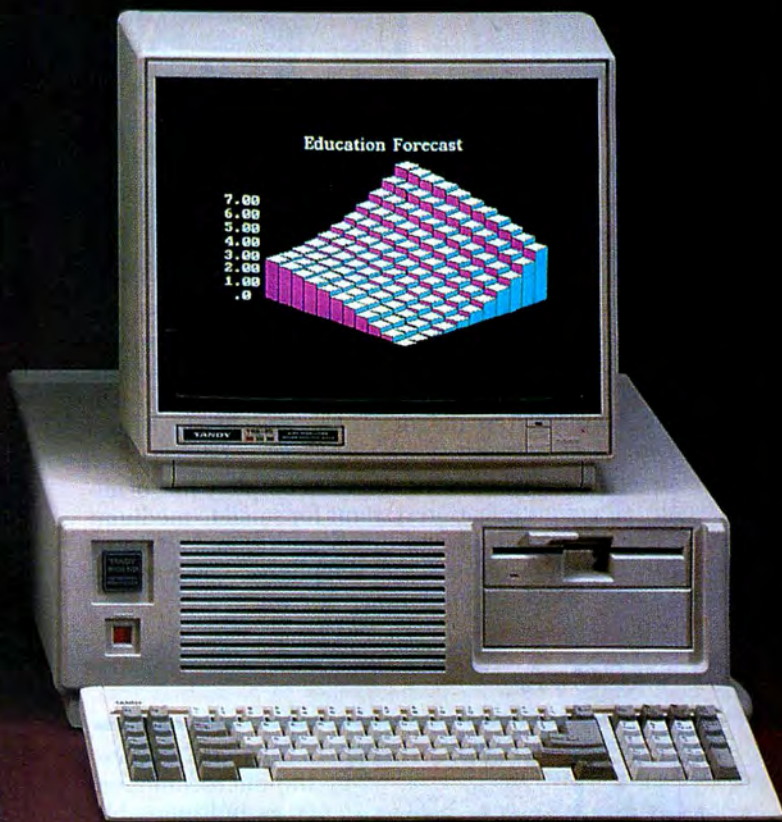
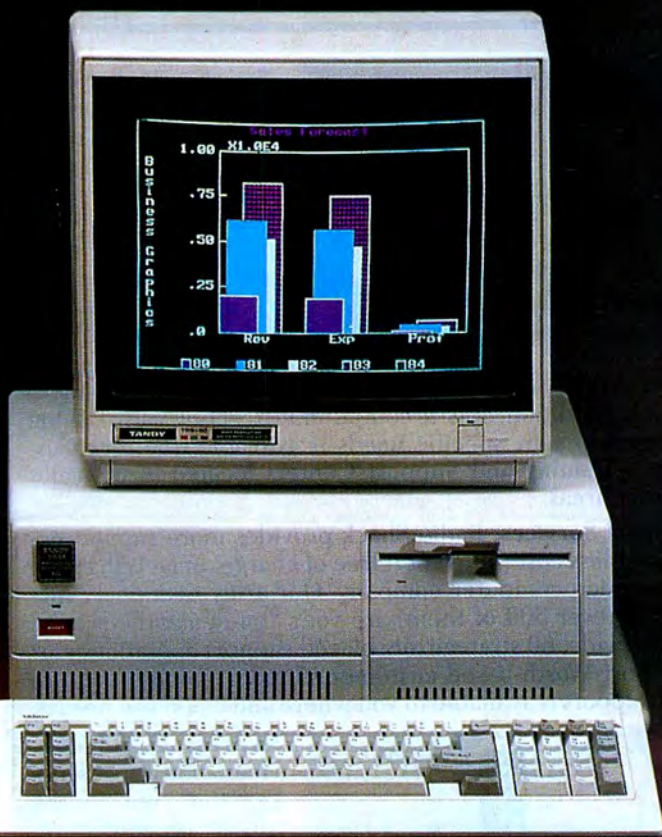
Microsystems, Inc.

P.O. BOX 2117
GOLETA, CA 93118
(805) 968-1387

Error message	Error code and abbreviation (where appropriate):			
	Tandy 1000	Model 4	Model I/III	Model Portables
Advanced Feature	73	—	—	—
Bad File Data	—	—	22, FD	—
Bad File Mode	54	54	—	—
Bad File Name	64	64	—	55, NM
Bad File Number	52	52	—	51, BN
Bad Record Number	63	63	—	—
Can't Continue	17	17, CN	17, CN	17, CN
Communications Buffer Overflow	69	—	—	—
Device Fault	25	—	—	—
Device I/O Error	57	57	—	—
Device Time Out	24	—	—	—
Device Unavailable	68	—	—	—
Direct Statement in File	66	66	—	56, DS
Disk Full	61	61	—	—
Disk Media Error	72	—	—	—
Disk I/O Error	—	—	—	18, IO
Disk Not Ready	71	—	—	—
Disk Write Protected	70	—	—	—
Division by Zero	11	11, /0	11, /0	11, /0
Duplicate Definition	10	—	—	10, DD
Field Overflow	50	50	—	—
File Already Exists	58	58	—	—
File Already Open	55	55	—	53, AO
File Not Found	53	53	—	52, FF
For Without Next	26	26	—	—
Illegal Direct	12	12, ID	12, ID	12, ID
Illegal Function Call	5	5, FC	5, FC	5, FC
Input Past End	62	62	—	54, EF
Internal Error	51	51	—	—
Line Buffer Overflow	23	23	—	—
Missing Operand	22	22	21, MO	22, MO
Next Without For	1	1, NF	1, NF	1, NF
No Resume	19	19	18, NR	19, NR
Out of Data	4	4, OD	4, OD	4, OD
Out of Memory	7	7, OM	7, OM	7, OM
Out of Paper	27	—	—	—
Out of String Space	14	14, OS	14, OS	14, OS
Overflow	6	6, OV	6, OV	6, OV
Path/File Access Error	75	—	—	—
Path Not Found	76	—	—	—
Redimensioned Array	10	10, DD	10, DD	—
Rename Across Disks	74	—	—	—
Resume Without Error	20	20	19, RW	20, RW
Return Without GOSUB	3	3, RG	3, RG	3, RG
String Formula Too Complex	16	16, ST	16, ST	16, ST
String Too Long	15	14, LS	14, LS	14, LS
Subscript Out of Range	9	9, BS	9, BS	9, BS
Syntax Error	2	2, SN	2, SN	2, SN
Too Many Files	67	67	—	—
Type Mismatch	13	13, TM	13, TM	13, TM
Undefined Line Number	8	8, UL	8, UL	8, UL
Undefined User Function	18	18, UF	18, UF	—
Unprintable Error	21	21	20, UE	20, UE
Wend Without While	30	30	—	—
While Without Wend	29	29	—	—

Table. Error messages and codes cross-referenced according to computer.

1987 Tandy® Computer Catalog



The #1 line of PC-compatible computers, along with today's most popular software and accessories. All backed with the best support and service available anywhere.

Radio Shack®
COMPUTER CENTERS
A DIVISION OF TANDY CORPORATION

TANDY®... In Business

Over 1200 of our Computer Centers nationwide are ready to help you and your business in choosing the very latest in computer technology, backed by the service and support you need. We have what it takes to sit down and talk business whether you need one or one hundred computers!

Technology...



When you buy a Tandy computer from Radio Shack, you're not just buying a computer, you're buying a computer company. Radio Shack invests heavily in product development so that our line is constantly updated with new technology. By staying a step ahead, we keep quality high, and costs down.

Of course, the same holds true for our complete line of all-electronic telecommunication systems for small to medium-sized businesses. Whether you buy a multi-line system or our mobile/transportable cellular telephone, you can depend on Radio Shack technology.

Service...



In today's office, the microcomputer is as indispensable as the telephone. Radio Shack understands this and offers service responsiveness previously available only on mainframe computers, yet at a fraction of the cost.

Nationwide Service. There are 166 strategically located, company-

owned Radio Shack Computer Service Centers to assure convenient service nationwide. Service that's performed by employees of the same company that manufactured and sold you your computer. We understand that downtime can cost you money. That's why we strive to get your system "up and running" as quickly as possible.

On-Site and Carry-In Service. In most market areas, service is available at your place of business, as well as ours. At our Business Products Service Centers, you can bring in your computer for routine service performed while you wait.

Affordable Service Contracts. For protection against unexpected repair costs, add one of our service contracts to your computer. Carry-in and on-site service contracts let you create a truly versatile service program to suit your specific needs. In effect, these plans extend the limited warranty of your computer on parts and labor.

Support...



Training. Radio Shack offers training and support that is unequalled in the industry. Letting us teach you about your computer system shortens and smooths that period of "becoming compatible with each other". You can select

from a wide variety of courses taught at 60 locations nationwide. In addition, on-site computer instruction with training tailored to your specific needs is available from our Customer Training and Support Centers located in 60 major market areas.

Support Services. Radio Shack provides more support options at less cost (much of it free of charge, in fact) than any other microcomputer company. Our army of support specialists (over 500 of them) are your "on-demand" experts. Nationwide, 60 strategically placed support operations plus our Fort Worth-based customer support operation ensure that support is available to you where and when you need it.



Express Order Services. Software is the key that unlocks the power of your computer. We support you with "off the shelf" software, plus many other top name packages. Our exclusive Express Order Software service brings you software that's

performance proven, and professionally supported by each software manufacturer. Special expansion boards and other hardware enhancements are also available through our Express Order Hardware Service. Express Order items can be ordered at any Radio Shack Computer Center, store or participating dealer. Orders are transmitted electronically and shipped the next business day for super-fast service.

Tandy Computer Leasing. Leasing is an alternative method of installment financing which allows a company to obtain assets vital to daily business operations without a heavy capital investment. We offer a 37-month true lease with Fair

for Business

Market Value Purchase Option upon lease expiration on computer systems, plus there is a 30-day trial period in which to evaluate your computer system on the job. And because a Tandy computer lease is a true lease, your entire monthly rental payment may be fully tax deductible as a business



expense. Software, installation, taxes and some other normally "non-financeable" costs can be included in the lease, too. Tandy Computer Leasing will bill monthly for Radio Shack's Extended Service Plans. And, at lease expiration, you have the option to acquire the equipment at Fair Market Value, or to return the equipment without additional cost. It's simple to initiate a leasing arrangement with Tandy Computer Leasing. Just fill out a Lease/Credit Application at any Radio Shack store, Computer Center or participating authorized Radio Shack dealer. This information will be submitted to our home office using our national WATS line service. In most cases, a decision will be available before the end of the next business day.

Classroom Computing. We offer one of the most comprehensive libraries of educational software available anywhere (see below). And we're helping introduce teachers to the benefits of computers in schools by providing training at no charge. Direct inquiries to: Education Division, 1400 One Tandy Center, Fort Worth, Texas 76102.

Corporate Sales. Radio Shack provides for the needs of corporations and quantity buyers. We'll help solve your company's computer application and communications needs. Direct inquiries to: National Account Division, 1400 One Tandy Center, Fort Worth, Texas 76102.

Value Added Resale. OEMs and System Houses become part of our success story by designing and selling vertical market application packages configured with our computers. Direct inquiries to: Tandy Value Added Resale, 1400 One Tandy Center, Fort Worth, Texas 76102.

Credit Cards Welcomed. Radio Shack honors American Express, Carte Blanche, Diner's Club, MasterCard, Visa and Radio Shack/CitiLine. With Citibank's "On-Line Credit" process, you may be approved from \$100 to \$2,500 in just minutes if you already have a valid VISA or MasterCard. Or you may qualify for Citibank's Regular phone-in process for purchases from \$100 to \$25,000, usually in an hour or less. CitiLine may also be used for additional purchases of \$25 or more. Payments may be evenly spread over 33 months or more, or paid in full anytime with no prepayment penalty. CitiLine is a revolving, open-ended credit plan from Citibank (Maryland), N.A. Actual payments may vary depending on any existing balance. Come in today, and apply for your own personal line of credit from Citibank. No fee required.



Get Our Two Other Computer Specialty Catalogs FREE at Radio Shack Today

Radio Shack has two other catalogs to help make your selection of computer software easier. Our RSC-18 Software Reference Guide contains over 600 programs listed by category and available "off-the-shelf" from Radio Shack or through our exclusive Express Order™ service. You can pick up your free copy of the RSC-18 at any Radio Shack Computer Center or participating store or dealer. Educators: be sure to ask for RSC-18E, our Educational Software Catalog. This special edition is filled with software for educational applications.

HANDY INDEX

Anti-Glare Screens	48
Anti-Static Products	50
Books	45
Cables	46
Cassette Recorders	47
Cassette Tapes	47
Classroom Networks	35
Color Computers	36, 37
Accessories	36, 38
Software	39, 40
Disk Cartridge System	11
Diskettes	51
Education Division Products	31-33
Express Order Hardware	13-15
Forms and Fanfold Paper	50
Furniture	49
Hard Disks	23
Local Area Network	34
Tandy 3000 Computers	4, 5
Expansion Options	11
Software	16-21
Tandy 2000 Computers	6
Expansion Options	7
Software	20, 21
Tandy 1000 Computers	8, 9
Expansion Options	12
Software	16-21
Tandy 6000 Computers	22
Expansion Options	23
Software	24-26
Model 4D Computer	27
Expansion Options	27
Software	28-30
Tandy 600 Computer	43
Expansion Options	42
Software	43
Tandy 200 Computer	42
Accessories	42
Software	43
Tandy 102 Computer	42
Accessories	42
Software	43
Modems/Acoustic Coupler	41
Monitors	10
Pocket Computers	44
Printers	52-54
Supplies	50, 55
Switch Boxes	47
Tape Cartridge System	11
DT-100 Terminal	23
Videotex Software	41
Office Information System (VIS)	35

Quantity Discounts

Product	6-11 of 1 item	12-49 of 1 item	50-499 of 1 item	500-Up of 1 item
Software, Books, Accessories, Ribbons, Paper	10%	15%	17%	20%
Tandy 102, 200, 600, Pocket & Color Computers, Printers, Peripherals	5%	10%	15%	20%
Model 4D, Tandy 6000, 3000, 2000, 1200, & 1000	5%	10%	(See store manager for quantities over 20.)	

For discounts on diskettes and cassettes, see page 47 and 51. All prices and terms optional in Dealer/Franchise stores. Prices are subject to change without notice.

TANDY 3000 PC/AT-COMPATIBLE



Tandy 3000 with
1.2-Meg Floppy Drive

NEW LOW
PRICE

Was \$2599.00
in Cat. RSC-16

2199⁰⁰

Only \$80 Per Month on
Our Commercial Lease
(Plus Applicable Use/Sales Tax)

Tandy 3000 HD with
40-Meg Hard Disk

NEW
FOR 87

4299⁰⁰

Only \$155 Per Month on
Our Commercial Lease
(Plus Applicable Use/Sales Tax)

Monitor and adapter not included

The Tandy 3000 is the affordable alternative to the IBM® PC/AT. Here's the power you need to manage your business or to create a multiuser system for your office.

Our Tandy 3000 is compatible with software designed for the IBM PC/AT and the PC/XT. Choose from advanced word-processing packages to heavy-duty database management to accounting software.

Multitasking, Multiuser Capacity

The Tandy 3000 is designed to use the XENIX 5.0 multiuser operating system. In such a configuration, multiple display terminals will be able to tap the high performance 80286 microprocessor. Thanks to its high processing speed, two to six users throughout an office will be able to use the Tandy 3000 simultaneously. Each user can work independently on such products as accounting, word processing and electronic filing. All of the users can share the Tandy 3000's accessories, eliminating the need for a printer or modem at each worksta-

tion. Thus, each remote user has the power of a fully configured computer system for the price of a terminal.

Designed for High Performance

The Tandy 3000's 16-bit architecture operates at 8 megahertz. It features 512K main memory and a high-capacity 5¹/₄" slim-line floppy disk drive. For compatibility, this drive can read 1.2-megabyte and 360K formats for use with IBM PC diskettes.

Or for maximum storage capacity, choose the Tandy 3000 HD. In addition to the floppy drive, the 3000 HD comes with a built-in 20-megabyte or 40-megabyte hard disk drive for fast access to volumes of important data.

A serial/parallel adapter is standard, making Tandy 3000 ready to interface with peripheral devices like telephone modems, printers and plotters.

The Tandy 3000 is equipped with ten expansion slots, including seven PC/AT-compatible slots, two PC/XT-compatible slots and a PC/XT-compatible half-slot for the serial/parallel adapter.

Tandy 3000. 512K RAM. 25-4001 2199.00

Tandy 3000 HD 20-Meg. 512K RAM. 25-4010 3599.00

Tandy 3000 HD 40-Meg. 640K RAM. 25-4011 4299.00

MS-DOS™ (3.2)/BASIC. Comes with our exclusive **DeskMate® II** 6-in-1 software. 25-4103 99.95

XENIX Sys. V Operating System. 25-4201 595.00

XENIX Sys. V Development System. 25-4202 595.00

XENIX Sys. V Text Processing System. 25-4203 175.00

SPECIFICATIONS. Microprocessor: Intel 80286 processor with 16-bit data path. Clock speed, 8 MHz. Object code compatible with 8086/8088. Real-time clock with battery backup. **Operating System:** Optional Microsoft MS-DOS 3.2 with BASIC. **Memory:** 512K RAM with parity. 25-4011 standard with 640K RAM. By using the expansion slots, memory is expandable to 12 megabytes under XENIX. Includes power-up diagnostics. Sound included. **Keyboard:** 84-key sculptured, including numeric entry keypad. Special keys include ESCape, Num Lock, Alt, Ctrl, Caps Lock, Prt Sc, Sys Reg, Scroll Lock, Up, Down, Right and Left arrows. Ten programmable Special-Function keys. Retractable legs, 6-ft. coiled cable. **Video Display:** Optional high-resolution, non-glare, non-interlaced 12" monochrome (green) or 14" color monitor. 80 or 40 characters per line by 25 or 50 lines. Optional high-resolution 640 x 200 monochrome graphics and 320 x 200 graphics in 16 colors, or 640 x 200 graphics in 4 colors. **Disk Drives:** Built-in high-density, thin-line 5¹/₄" floppy can read 1.2Mb and 360K formats. Tandy 3000 HD also has built-in 20 or 40-megabyte hard disk drive. Disk storage is expandable to include two floppy disk drives and one hard disk drive, or one floppy disk and two internal hard disk drives. Total internal storage capacity can exceed 80 megabytes. **Internal Expansion:** 10 plug-in card slots, including 7 PC/AT-compatible slots, 2 PC/XT-compatible slots and 1 PC/XT-compatible half-slot for the serial/parallel adapter. Optional 80287 math co-processor can be added. **External Connections:** Standard parallel printer port, RS-232C serial communications port, AC outlet. **Dimensions:** 6¹/₂ x 19 x 18". **Weight:** 47 lbs. **Power Requirements:** 120VAC, 60 Hz. U.L. listed.

3000 HL: 4 TIMES AN XT's POWER



1-Disk Tandy 3000 HL

NEW FOR 87

1699⁰⁰

Monitor and adapter not included

Commercial Lease Available
For Only \$65 Per Month
(Plus Applicable Use/Sales Tax)

If you've already invested in IBM® XT software and hardware, yet are shopping for a lower-priced compatible, then take a look at our newest computer to join the Tandy line of IBM compatibles, the Tandy 3000 HL.

The Tandy 3000 HL is the basic building block of business systems. It was created to be fully compatible with IBM XT's, and then we made it even better.

First, we made it faster. With an 80286 processor, it's over four times faster than the XT. And that's good news for busy people. Then we made sure the Tandy 3000 HL has plenty of memory to run the software you and your staff have grown accustomed to. The Tandy 3000 HL comes with 512KB standard memory and can be expanded to 4 megabytes using the expansion slots. You can choose from advanced word-processing packages and heavy-duty database management to accounting software. And because the Tandy 3000 HL uses most popular MS-DOS packages that are available off-the-shelf, you can get all the software you need, when you need it.

A Computer That Can Expand—Inexpensively

Because we know how quickly your business can grow, we made sure the Tandy 3000 HL has room for fast, low-cost

expansion. It comes standard with seven expansion slots; four 8-bit/XT compatible slots and three 16-bit data bus slots. And for better office efficiency, the Tandy 3000 HL features a built-in real-time clock with battery backup for automatic date and time-stamping of all jobs, process control and other time-sensitive applications.

We also remember how much time is spent composing memos, calling meetings and writing reports. And because networking is quickly becoming one of the biggest concerns for current computer owners, we made the Tandy 3000 HL network compatible with all MS-DOS computers. Now with the Tandy Vianet local area network, you can connect your existing MS-DOS based computers to the Tandy 3000 HL and continue to communicate with your staff, while spending much less. It will be easier than ever before to pass a document around your company for comments and refinements, producing a finished version that not only costs less but contains better information. You can send memos, figures and other important messages via computers, eliminating lost memos, forgotten meetings or incomplete reports.

For XT compatibility with more power and versatility, at a much lower cost, this is the computer to step up to.

Tandy 3000 HL. 25-4070	1699.00
20 Megabyte Hard Drive. 25-4062	799.00
40 Megabyte Hard Disk. 25-4061	1799.00
Hard Drive Controller. 25-4060	399.95
MS-DOS 3.2/BASIC/DeskMate II. 25-4103	99.95

SPECIFICATIONS. Microprocessor: Intel 80286 processor with 16-bit data path. Switchable clock speed, 4/8 MHz. Object code compatible with 8086/8088. Real-time clock with battery backup. **Operating System:** Optional Microsoft MS-DOS 3.2 with BASIC. Memory: 512K RAM with parity. By using the expansion slots, memory is expandable to 4 megabytes. Includes power-up diagnostics. Sound included. **Keyboard:** 84-key sculptured, including numeric entry keypad. Special keys include ESCape, Num Lock, Alt, Ctrl, Caps Lock, Prt Sc, Sys Reg, Scroll Lock, Up, Down, Right and Left arrows. Ten programmable Special-Function Keys. Retractable legs, 6-ft. coiled cable. **Video Display:** Optional high-resolution, non-glare, non-interlaced 12" monochrome (green) or 14" color monitor. 80 or 40 characters per line by 25 lines. Optional high-resolution 80 characters by 50 lines, 640 x 200 graphics and 320 x 200 graphics in 16 colors, or 640 x 200 graphics in 4 colors. **Disk Drives:** Built-in thin line 5 1/4" floppy can read 360K formats. Disk storage is expandable to include two floppy disk drives and one hard disk drive, or one floppy disk and two internal hard disk drives. Total internal storage capacity can exceed 80 megabytes. **Internal Expansion:** Seven plug-in card slots, including three 16-bit slots, four PC/XT-compatible slots. Optional 80287 math co-processor can be added. **External Connections:** Standard parallel printer port. **Dimensions:** 6 1/8 x 17 x 15 1/2". **Weight:** 32lbs. **Power Requirements:** 120VAC, 60 HZ. U.L. listed.

THE TANDY 2000 COMPUTER



2-Disk Tandy 2000

1599⁰⁰

Commercial Lease Available
For Only \$60 Per Month
(Plus Applicable Use/Sales Tax)

10-Meg Tandy 2000 HD

2499⁰⁰

Commercial Lease Available
For Only \$90 Per Month
(Plus Applicable Use/Sales Tax)

Monitor and graphics options not included.

High Technology . . . for Less

Like the IBM PC/AT, the 256K Tandy 2000 performs two to three times faster than the IBM PC. Each Tandy 2000 disk drive offers twice the storage of an IBM PC drive, but still reads and writes their format. Our color graphics are twice the resolution of COMPAQ or IBM, and offer twice as many colors. And all four of our user-accessible card slots are available for future growth. Check out the Tandy 2000 . . . we invite comparison!

Advanced Color Graphics

The Tandy 2000's high-resolution graphics let you create razor-sharp charts, graphs and diagrams in a brilliant array of colors. And by adding our computer-aided design (CAD) software and graphics peripherals, the Tandy 2000 offers minicomputer performance at an exceptional low price.

Extremely High Speed

An 80186, true 16-bit CPU makes the Tandy 2000 dramatically faster than other MS-DOS computers. That means Tandy 2000 software runs faster, so you get the job done quicker.

Vast Storage Capacity

The Tandy 2000's two floppy disk drives let you store more documents and crunch through bigger tasks with ease. For even greater storage, the Tandy 2000 HD features a built-in 10-million-character hard disk drive.

Large Library of Proven Software

The industry standard MS-DOS operating system lets us bring you the most popular and sophisticated programs on today's market. Programs like Lotus 1-2-3, dBASE II, Multiplan, pfs:file, MultiMate, SuperCalc³ and many more. You can even exchange data between the Tandy 2000 and an IBM PC, using PC Maker™ (included at no charge). With PC Maker, you can create a disk that you can load and read on an IBM PC. You can also read PC disks on the Tandy 2000.

Compare the Tandy 2000 to the IBM PC and PC/AT

Feature	Tandy® 2000	IBM® PC	IBM® PC/AT
Microprocessor	80186	8088	80286
Clock Speed	8 Mhz	4.7 Mhz	6 Mhz
RAM Standard/Maximum	256/768K	256/640K	256/3 MEG
# Drives/Capacity	2/720K	1/360K	1/1.2 MEG
Monitor Support	Mono	Option	Option
Printer Adapter	Included	Option	Option
Optional Graphics	640 x 400	320 x 200	640 x 350
RS-232 Adapter	Included	Option	Option
Price—CPU only (Mfr.'s list as of 4/2/86)	\$1599	\$1995	\$3995

Tandy . . . Clearly Superior™

At \$3995¹, a similar PC/AT configuration is \$2400 more than a 2-disk 256K Tandy 2000. In fact, you can get a complete Tandy 2000 system with color monitor and graphics for just \$2553.85—over \$1400 less than an AT without a monitor! Add expansion memory, stunning high-resolution monochrome and color graphics, our Digi-Mouse™ and more. And you can install most of these options yourself. Putting it simply, the Tandy 2000 delivers extraordinary quality performance at a remarkably low price.

256K 2-Disk Tandy 2000. 26-5103 1599.00

10-Meg Tandy 2000 HD. 26-5104 2499.00

TANDY 2000 EXPANSION OPTIONS



10-Megabyte Disk Cartridge System Now for the Tandy 2000 Computer

2195⁰⁰

Ideal As Primary Disk
Storage or for Backup

10-Megabyte Disk Cartridge System. Use the Disk Cartridge System as your primary data storage device instead of a hard disk drive. You get speed, reliability, expandability, security and transportability without compromise. Each cartridge holds 10 megabytes of data—and because the cartridges are removable, you can run an unlimited amount of data without adding drives. The Disk Cartridge System also gives you fast, convenient backup. Includes cartridge. U.L. listed.

26-1245 2195.00

Interface Kit for Tandy 2000. User installable.

26-5147 199.95

New Low Price! 10-Megabyte Cartridge. Was \$89.95 in Cat. RSC-16. 26-1372 79.95

Digi-Mouse Two-Button Mouse

Plugs in for easy cursor movement in programs like Microsoft Word, DR Graph, DR Draw, and others. Requires #26-5144 (below). 26-1197 99.95

Digi-Mouse/Clock Controller

Dual-purpose board includes controller for Digi-Mouse and perpetual time/date clock so that you don't have to re-input time and date into your applications programs. Battery back-up. User installable.

26-5144 99.95

8087 Math Co-Processor Option

Upgrades your Tandy 2000 with additional circuitry to perform graphics-intensive tasks. Increases speed as much as 50%. Programs must be specifically written (such as VersaCAD and C Compiler) to take advantage of this option. Installation required (not included). 26-5143 499.95

New Low Price! 128K RAM Module

Expands your 128K Tandy 2000 to 256K of memory, but does not use a card slot. Installation required (not included). Was \$179.95 in RSC-16. 26-5160 129.95

Choose Your Display Monitor

Both the VM-1 High-Resolution Monochrome Monitor and the CM-1 High-Resolution Color Monitor tilt 5 or 10 degrees so you can find your best viewing angle, and each features an 80 × 25 display for easy viewing. The VM-1 has a 12" green phosphor, non-glare screen and can display optional graphics. The 14" CM-1 gives you vivid 8-color graphics with the Monochrome/Color Graphics options.

VM-1 Monochrome Monitor. Pedestal extra.

26-5111 199.95

New Low Price! CM-1 Color Monitor. Requires #26-5140 and #26-5141 graphics options. Was \$599.00 in Cat. RSC-16. 26-5112 529.95

High-Resolution Monochrome Graphics

Produce detailed business graphs, tables, charts and more on either the VM-1 Monochrome or CM-1 Color Monitor. 256,000 picture elements (640 × 400) produce amazing detail. User installable. 26-5140 299.95

High-Resolution Color Graphics Chip Kit

Create spectacular 640 × 400 color graphics on the CM-1 monitor. Displays 8 of 16 colors. Requires Monochrome Graphics Option. Does not use a card slot. User installable; however, installation by our technicians is recommended.

26-5141 124.95

Space-Saving Options

Tandy 2000 is more than just attractive, it's a milestone in ergonomic design. Choose the Floor Stand to position the CPU beside or under your desk to increase usable space. The compact Monitor Pedestal for your VM-1 monitor tilts and swivels for optimum viewing angle. The monitor and keyboard can be used up to 8 feet away from the computer. Using both the pedestal and floor stand, with the keyboard in your lap, you have the smallest possible "footprint"—just 8½ × 12¼". And in the standard desktop configuration, the keyboard slides under the computer to minimize storage space.

Monitor Pedestal. 26-5115 89.95

Floor Stand. 26-5116 145.00

New Low Price! Memory Expansion Board

Contains 128K of memory. Our 128K RAM Upgrade expands this board to 256K. Two boards can be added. User installable. Was \$219.95 in RSC-16. 26-5161 149.95

New Low Price! 128K RAM Upgrade

Installs on Memory Expansion Board. User installable. Was \$129.95 in RSC-16. 26-5162 99.95

10-Megabyte Hard Disk Kit

Requires installation (not included). 26-5125 1000.00

External Hard Disk Controller

Connect one external secondary hard disk drive (10, 15 or 35-megabyte) to a floppy disk-based Tandy 2000. Installation recommended (not included). 26-5127 350.00

Tandy 2000 Serial Expansion Board

Connect your Tandy 2000 to a mainframe computer, or hook terminals or additional serial devices to the Tandy 2000. Includes four serial channels with connectors. Requires special software. 26-5164 325.00

SPECIFICATIONS. Microprocessor: Intel 80186 processor with 16-bit data path. Clock speed, 8 MHz. Object code compatible with 8086/8088. Two direct memory access channels. Three programmable timers. **Operating System:** Includes Microsoft's advanced MS-DOS 2.11 with BASIC. **Memory:** 256K RAM with parity, expandable to 768K. Includes power-up diagnostics. Sound included. **Keyboard:** 90-key sculptured, including numeric entry keypad. Special keys include HOLD, ESCape, BREAK, CTRL, CAPS, INSERT, DELETE, HOME, Up, Down, Right and Left arrows. Twelve programmable Special Function keys. Retractable legs, 6 ft. coil cable and tactile keyclick. **Video Display:** Optional high-resolution, non-glare, non-interlaced 12" monochrome (green) or 14" color monitor. 80 or 40 characters per line by 25 lines. User-definable character set. Reverse video, underline, blank, blink, double-wide/double-high. Smooth scrolling and split screen. Optional high-resolution monochrome and color graphics (displaying 8 colors selected from 16—white, yellow, cyan, green, magenta, red, blue, black. Full and half-intensity). **Disk Drives:** Two built-in double-sided, double-density, thin-line 5¼" mini-floppies, with 720K per drive (formatted). 96 tracks per inch. Tandy 2000 HD has one 720K mini-floppy and one 10-megabyte hard disk drive. **Internal Expansion:** Four available user-accessible plug-in card slots. **External Connections:** Standard parallel port, RS-232C serial communications port, monochrome monitor, AC outlet. **Dimensions:** 8½ × 12¼" footprint (pedestal base) when using floor stand and pedestal, keyboard in lap. 18¾ × 21¼" with monitor on CPU and keyboard under CPU. Keyboard 6¼ × 7¾". **Weight:** 41 lbs. **Power Requirement:** 120VAC, 60 Hz. U.L. listed.

HI-PERFORMANCE TANDY 1000 SX



NEW FOR 87

1199⁰⁰

Less monitor and software

Get Down to Business with DeskMate II

We've improved our popular DeskMate 6-in-1 applications software to take advantage of the Tandy 1000 SX's power. DeskMate II* for the Tandy 1000 SX features six applications on one disk. And with the special task-switching feature, you can exit DeskMate II, enter an applications program, then return to DeskMate II—all with just a few keystrokes. Start computing the first day with Text Processing, Spreadsheet Analysis, Electronic Filing, Calendar/Alarm, Telecommunications and Electronic Mail. Every day you'll be greeted by a menu that displays a calendar, appointment schedule and a list of files stored for every function. Plus, when you use your Tandy 1000 in a local area network, DeskMate II is ready, because it's compatible with ViaNet.

And since the Tandy 1000 SX is PC compatible, you can choose from an astounding collection of MS-DOS programs. Select from popular spreadsheet, word processing, integrated applications, business graphics, education or entertainment programs.

Packed with Deluxe Features

With the Tandy 1000 SX, most of the "options" you expect to pay more for are included. Adapters are built in for easy hookup to a monochrome or color monitor. You can even display high-resolution graphics on our lowest-priced monitor. Or use your color TV with an optional RF modulator for 40 column text and color graphics. Adapters for a printer, joysticks, or light pen are all standard, as are MS-DOS 3.20 and GW-BASIC. Whatever your needs, the Tandy 1000 SX is the most powerful computer for the money. 25-1051 1199.00

- Fifty-Percent Faster Than the IBM® PC
- Ready-to-Run—Includes DeskMate II Six-Function Software
- Software Compatible with the IBM PC—
Choose From the Most Popular Programs on the Market
- Two Built-In 5 1/4" 360,000-Character Disk Drives
- Five PC Compatible Card Slots for Easy Expansion

Tandy 1000 SX. Our MS-DOS family of computers is growing to meet your needs. Since its introduction, the Tandy 1000 went on to become the hottest IBM PC compatible to hit the market. Now we've made it even better.

High Speed Performance

The 1000 SX is centered around the 8088 microprocessor, ensuring compatibility with industry-standard MS-DOS software. But unlike other "industry-standard" computers, you can run virtually all of your programs one and one-half times as fast with a 1000 SX. This software-switchable speed control lets you finish spreadsheets, sort data bases and display intricate charts and graphs faster than ever.

To complement this new level of sophisticated performance, the 1000 SX comes with 384K RAM, expandable to 640K on the main board, and two built-in disk drives. And with five card slots, it's easy to expand your system. Expansion boards are user-installable, and you can choose from memory expansions, internal modems—even a 20-megabyte hard disk card!

SPECIFICATIONS: Microprocessor: Intel 8088, Clock Speed: 7.16/4.77 Mhz, software selectable. **Operating System:** Includes Microsoft's MS-DOS 3.2 with GW-BASIC. (Reference Manuals extra). **Memory:** 384K RAM, expandable on main board to 640K. Includes power-up diagnostics. **Keyboard:** 90-key sculptured, including numeric-entry keypad. Special keys include HOLD, ESCape, BREAK, CTRL, CAPS, INSERT, DELETE, and HOME. Twelve programmable Function keys. Retractable legs. 6-ft. coil cable. **Video Display:** Optional high-resolution, non-glare 12" monochrome (green) or 13" RGBI Color Monitor. 80 or 40 characters per line by 25 lines. 256 characters. Reverse video, blank, blink. 16 foreground and 8 background colors. High-resolution monochrome and color graphics (640 x 200 pixels). Displays 8 of 16 colors—black, blue, green, cyan, red, magenta, brown, white, gray, light blue, light green, light cyan, light red, light magenta, yellow, high-intensity white. Higher resolution video support available with optional expansion boards. **Disk Drives:** Two double-sided, double-density, 360K (formatted) thin-line 5 1/4" mini-floppies. 48 tracks per inch. **Internal Expansion:** Five user-accessible IBM PC-compatible card slots (10" maximum length), 8087 Math-Coprocessor. **External Connections:** Standard parallel port, composite video out, line level audio out, light pen port, two joysticks, RGBI Color Monitor, AC outlet. Power: 120 VAC, 50/60 Hz.

TC8

*DeskMate II requires 80 column monitor. Telecommunications and E-Mail require optional modem.

ENTRY-LEVEL TANDY 1000 EX



NEW FOR 87

799⁰⁰

Less monitor, platform,
external disk drive and software.

- The Lowest-Priced MS-DOS Based Personal Computer
- Get PC Compatibility at a Fraction of the Price
- Fifty-Percent Faster Than the IBM® PC
- Incredibly Easy-to-Use Personal DeskMate Software
- Choose from Thousands of Popular Programs
- Built-In 360,000-Character Floppy Disk Drive
- Ideal for the Home, A Natural for Schools

Tandy 1000 EX. Now there's no reason to settle for a "game" computer. The new Tandy 1000 EX is a true PC-compatible computer, ready to use the MS-DOS software you bring home from the office, as well as software designed for the home or classroom. Inside the sleek one-piece design resides a 5¹/₄" disk drive and 256,000-character RAM. The integral 90-key keyboard has the same layout as the Tandy 1000 SX, ideal for business programs. You'll find an advanced three-voice sound circuit for sophisticated sound and music generation through the built-in speaker. There's also a headphone jack with volume control for quiet listening—perfect for the classroom.

The Advantages of Personal DeskMate

Every Tandy 1000 EX comes with a new graphics-oriented version of our DeskMate productivity software. Personal DeskMate* is amazingly easy to use, with handy pull-down menus and pop-up boxes for selecting functions. Add an optional Digi-Mouse® or joystick and you'll have the ultimate in convenience.

SPECIFICATIONS: Microprocessor: Intel 8088, Clock Speed: 7.16/4.77 Mhz, software selectable. Operating System: Includes Microsoft's MS-DOS 2.11 with GW-BASIC. (Reference Manuals extra.) Memory: 256K RAM, expandable to 640K. Includes power-up diagnostics. Keyboard: Integral 90-key sculptured, including numeric-entry keypad. Special keys include HOLD, ESCape, BREAK, CTRL, CAPS, INSERT, DELETE and HOME. Twelve programmable Function keys. Video Display: Optional high-resolution, non-glare 12" monochrome (green) or 13" RGBI Color Monitor. 80 or 40 characters per line by 25 lines. 256 characters. Reverse video, blank, blink. 16 foreground and 8 background colors. High-resolution monochrome and color graphics (640 x 200 pixels). Displays 8 of 16 colors—black, blue, green, cyan, red, magenta, brown, white, gray, light blue, light green, light cyan, light red, light magenta, yellow, high-intensity white. Disk Drives: One double-sided, double-density, 360K (formatted) thin-line 5¹/₄" mini-floppy, 48 tracks per inch. Internal Expansion: One "PLUS" style expansion board or two "PLUS" style expansion boards when used with Memory PLUS Expansion Adapter (25-1062). External Connections: 5¹/₄" 360K or 3¹/₂" 720K External Disk Drive, standard parallel port, composite video out, 1/8" headphone jack with volume control, two joysticks, RGBI Color Monitor. AC outlet. Power: 120 VAC, 50/60 Hz.

With TEXT you'll see a simple text entry and editing system that includes cut/copy/paste functions, search and replace, and underlining and boldface. WORKSHEET gives you a simple in-memory spreadsheet application with 99 rows and 99 columns of numeric, text, or calculated cells. It will support selectable column widths, as well as numeric and text cell format options. DESKTOP helps you visually organize and manage program and data files. You can install any combination of applications onto the screen, including CALCULATOR, NOTEPAD, CALENDAR and PHONE DIRECTORY. You can use FILER to keep track of your recipes. With PAINT you'll have a simple graphic picture editor that includes functions for drawing basic shapes (solid or outline), lines, points, fonts, and pattern fills. And of course we've included TELECOM, our basic telecommunications package for communicating with information services as well as for uploading and downloading files.

Ready to Use, Ready to Expand

The one-piece Tandy 1000 EX offers convenient portability—just plug in a monochrome or color monitor, or a TV set with an optional RF modulator. Plug in joysticks, printer or a second disk drive without buying extra-cost adapters. Add the Memory PLUS Expansion Adapter for two additional connectors for more memory, modem telecommunications, Digi-Mouse and classroom networking options. If you've been searching for a computer that's "just right" for your family or classroom, the Tandy 1000 EX is for you.

Tandy 1000 EX. With MS-DOS/GW-Basic 2.11

25-1050 799.00

Tandy 1000 EX Monitor Platform. 26-210 29.95

MS-DOS 3.20 Upgrade. 25-1170 29.95

*Personal DeskMate requires 80 column monitor. Telecom requires optional modem.

MONITORS, ADD-ONS AND BOOKS

Complete Your System with the Tandy Display Monitor That's Right for You

Monitor Pedestal
sold separately



We offer monitors for every need and budget. Our monochrome monitors have non-glare, green phosphor screens. Or pick a color monitor for brilliant graphics.

- VM-1 Monochrome Monitor.** 12" screen displays 80 x 25 text, 640 x 400 graphics. Tilts 5 or 10 degrees for best viewing angle. 26-5111 199.95
- VM-3 Monochrome Monitor.** 12" screen displays 80 x 25 text, 720 x 348 graphics. 25-3010 219.00
- New! VM-4 Monochrome Monitor.** 12" screen displays 80 x 25 text, 640 x 200 graphics. 25-1020 129.95
- New Low Price! CM-1 Color Monitor.** 14" screen displays 80 x 25 text, 640 x 400 graphics. Tilts 5 or 10 degrees for best viewing. Was \$599.00 in Cat. RSC-16. 26-5112 529.95
- New! CM-5 RGBI Color Monitor.** 13" screen displays 80 x 25 text, 320 x 200 graphics. 25-1023 299.95
- New! CM-10 RGBI Color Monitor.** 13" screen displays 80 x 25 text, 640 x 200 graphics. 25-1022 459.95

Quick-Reference Chart for Tandy Display Monitors

	Video Adapters for Tandy 1200/3000			Tandy 1000	CoCo	100/102/200 Disk Video	Tandy 2000	CoCo 3
	25-3045	25-3046	25-3047					
VM-1		640 x 400 Text Only	640 x 400 Text and Graphics(3)				640 x 400 Text and Graphics(4)	
VM-3	720 x 348 Text and Graphics(1)							
VM-4	640 x 200 Text and Graphics			640 x 200 Text and Graphics		640 x 200 Text Only		
CM-1		640 x 400 Text Only	640 x 400 Text and Graphics(3)				640 x 400 Text and Graphics(5)	
CM-5	320 x 200 Text and Graphics			320 x 200 Text and Graphics				
CM-8								640 x 192 80-Column Text and Graphics
CM-10	640 x 200 Text and Graphics			640 x 200 Text and Graphics				
Composite Color	320 x 200 40-Column Text			320 x 192 40-Column Text		320 x 200 40-Column Text		320 x 192 32/40-Column Text and Graphics
TV	320 x 200 40-Column Text(2)			320 x 200 40-Column Text(2)	256 x 192 32-Column Text	320 x 200 40-Column Text(2)		320 x 192 32/40-Column Text and Graphics

Two-Button Digi-Mouse



99⁹⁵

Ideal for Use with
Graphics Programs

Plugs in for easy cursor movement in graphics programs, as well as other applications. Requires Digi-Mouse/Clock Controller Board (26-5144, 25-1010 or 25-1015). 26-1197 99.95

Deluxe Joystick



29⁹⁵

Get Quicker and
Easier Cursor Control

You can feel the difference. Patented stick mechanism for more accurate cursor control and quicker response. Select "spring-centering" or "free-floating" operation. 26-3012 29.95

Instructional and Reference Books

New! MS-DOS/GW-BASIC Reference Guides. Includes reference materials for MS-DOS and GW-BASIC 2.11 and 3.20. 25-1508 29.95

MS-DOS: The Basics. Explains the basics of the MS-DOS system, its functions and possibilities. 25-1506 7.95

MS-DOS: Advanced Applications. Discusses working with files and devices, organizing your files, simplifying your work, controlling the flow of data, personalizing your system, keeping your system healthy and "looking behind the scenes". 25-1507 14.95

Learning BASIC for Tandy Computers. An excellent tutorial

for BASIC programming by Dr. David Lien, author of our famous Model I Owner's Manual. 25-1500 19.95

The Complete Guide to the Tandy 1000. An extremely thorough examination of the power of our most popular computer. Covers basic operations, software options, compatibility issues, mastering MS-DOS, hardware, expansions and more. 25-1505 14.95

Tandy 1000 Programmer's Reference Manual. Documents all BIOS subroutines and entry points for use in low-level languages. 25-1503 14.95

Tandy 1000 Technical Reference Manual. Includes schematic diagrams and theory of operation on the Tandy 1000 and option boards. 25-1504 29.95

TC10 (1) Requires special software. (2) Requires RF modulator. (3) 640 x 200 with standard software. Hi-res modes require special software. (4) Graphics require 26-5140. (5) Requires 26-5140/5141.

POWERFUL EXPANSION OPTIONS

TCS-100 Tape Cartridge System

Backup Your Data on Tape

1999⁰⁰



Now you can get reliable hard-disk backup on tape (backup 10 megabytes in as little as 6 minutes). Uses standard 1/4" cartridges (one included) for over 48 megabytes of archival storage. Powerful file-by-file backup/restore function. Select single files, groups of files or all files. Select files based on globals, wild cards, files modified since last backup, file creation data, directory structure and more. Features three heads—read, write and erase—for one-pass backup with immediate read-after-write verification. Requires Interface Kit (below) U.L. listed AC.

25-3020 1999.00

Tandy 1000/1200/3000 Interface Kit. Includes software and cables for file-by-file or mirror-image backup. Kit also supports IBM PC and PC-compatible computers. 25-3021 ... 149.95

1/4" Data Tape Cartridge. 26-1391 34.95

20 + 20-Megabyte Disk Cartridge System

3499⁰⁰



Depend on a Disk Cartridge System instead of a hard disk for speed, reliability, expandability, security and transportability. The DCS consists of one or two drives and high-performance cartridges. Because cartridges are removable, you can store an unlimited amount of data. You can easily back up your conventional hard-disk system. Requires Interface Kit (below).

New! 20 + 20-Megabyte DCS. 25-4066 3499.00

New! 20-Megabyte 5 1/4" Internal DCS. (Available 9/30/86.) 25-4064 1799.00

10-Megabyte DCS. 26-1245 2195.00

Secondary DCS. Add a 10-megabyte disk kit* to create a 10 + 10-megabyte system. 26-1246 999.00*

New! 8" 20-Megabyte Cartridge. 26-220 119.95

New! 5 1/4" 20-Megabyte Cartridge. 26-221 84.95

New Low Price! 10-Megabyte Cartridge. Was \$89.95 in Cat. RSC-16. 26-1372 79.95

20-Megabyte Hard Disk Card

NEW FOR 87

799⁰⁰

- An Efficient New Way to Get Hard-Disk Storage
- User-Installable Card Saves on Desk Space

Get 20 megabytes of hard-disk storage on a user-installable card. Mounts in a 10" card slot on the Tandy 1000 or a 13" slot on the Tandy 1200, Tandy 3000 HL, IBM PC or PC compatible. Operates as either first or second hard disk and can run a second hard disk drive. Comes with a thorough installation manual and a diskette with special installation software. It's the easiest way yet to get hard-disk storage power! 25-1029 799.00

External 10-Megabyte Hard Disk Drive

Get 10 Million Characters of Data and Program Storage

699⁰⁰



Expand your Tandy 1000's storage affordably. Add two to the Tandy 1000 or one to the Tandy 1000 HD for 20 megabytes of total system storage (Cable Kit and installation required for secondary unit). Requires Hard Disk Controller Board. 25-1025 699.00

User-Installable Tandy 3000 Expansion Boards and Options

1.2-Meg. Floppy Disk Kit. High-performance, high-capacity floppy disk drive. Store 1.2 megabytes of data. Can also read and write 360K disks. 25-4050 299.95

360K Floppy Disk Kit. 25-4051 199.95

New Low Price! Hard Disk Controller. Lets you add an internal 20-megabyte hard disk. Was \$499 in Cat. RSC-16. 25-4060 399.95*

20-Megabyte Hard Disk Kit. Use with Tandy 3000 HD to increase internal storage by 20 meg. Or combine with Controller above to convert a 3000 to a 3000 HD. 25-4062 799.00*

External Hard Disk Cable Kit. 25-4063 59.95*

New! Memory Expansion Board. Add up to 2 megabytes of memory to your Tandy 3000. Comes with 1MB of memory. In MS-DOS, use VDISK to set aside portions of your computer's RAM memory that simulate disk storage. Use board for more efficient operations using XENIX System V operating system. 25-4030 499.95

New! 4-User Board. Adding this multiuser board to your Tandy 3000 computer enables it to support up to four serial devices

operating at 9600 baud. For use with the XENIX System V operating system. The board uses a Z80 controller for greater speed. 25-4031 299.95

80287 Math Co-Processor. Add to your Tandy 3000 to perform one set of functions while the co-processor simultaneously performs highly accurate mathematical calculations (arithmetic, trigonometric operations and logarithmic functions) at high speed. Programs must be specifically written for this option. 25-4033 399.95

Tandy 1000/1200/3000 Serial Parallel Adapter. Add a second serial/parallel adapter to connect a second printer or increase your communications capability with an additional modem. 25-4034 169.95

10-Megabyte Disk Cartridge System Interface Kit. For Tandy 1000/1200/3000. 25-3022 199.95*

New! 20-Megabyte Disk Cartridge Interface Kit. For Tandy 1000/1200/3000. 25-4081 149.95*

New! Universal Disk Cartridge System Interface Kit for Tandy 2000. 26-5147 199.95*

*Installation Recommended. Not Included.

Tcii

UPGRADE & EXPANSION OPTIONS



Add a Disk Drive to Your System

NEW FOR 87

279⁹⁵

Low As
\$20 Per Month*

3 1/2" 720K External Disk Drive. Gives twice the storage of a 5 1/4" disk drive and uses smaller, more durable diskettes. Special features in the Tandy 1000 EX allow you to store programs on this disk drive and load them directly. 25-1061 .. 279.95

5 1/4" 360K External Disk Drive. Makes backing up diskettes much easier! Also very useful for personal productivity applications. 25-1060 249.95

Tandy 1000 Disk Drive Kit. Provides an additional 360K of disk storage. Mounts internally. Installation recommended (not included). 25-1005 199.95

Tandy 1000/1200/3000 Expansion

Digi-Mouse

Plugs in for easy cursor movement in graphics programs, as well as other applications. 26-1197 99.95

New! Memory PLUS Expansion Adapter

Expands your Tandy 1000 EX to 384K and adds DMA circuit to speed up computer operations. Sockets allow you to expand another 256K. Also provides connectors for addition of two PLUS Upgrade Boards. 25-1062 129.95

New Low Price! Memory PLUS Expansion Board

Provides DMA and an additional 256K of memory—bringing your 128K Tandy 1000 to 384K. Add the 256K RAM Kit for a full 640K. PLUS Expansion Board (RS-232 or Mouse) can be plugged into a special connector, saving a slot for other applications. Was \$319.95 in RSC-16. 25-1011 179.95

New Low Price! 256K Parity Memory Kit

Add 256K of memory to your Tandy 1000, 1200 or 3000. Was \$219.95 in RSC-16. 25-3062 129.95

New Low Price! Memory Expansion Board

Uses an expansion slot to upgrade a 256K Tandy 1200 to 384K or a 384K Tandy 1000 to 512K. Also provides sockets for an additional 128K. For Tandy 1000/1200/PC/Compatibles. Was \$199.95 in RSC-16. 25-1009 129.95

New Low Price! 128K RAM Upgrade Kit

Use to upgrade your Tandy 1000 from 256K to 384K or from 512K to 640K. Was \$129.95 in RSC-16. 26-5162 99.95

New! 8087 Math Co-Processor

For Tandy 1000 (25-1000A or 25-1001A only), and 1200. Increase throughput up to 10 times with software that supports a co-processor. Supported by many CAD and spreadsheet programs and many more. 25-1012 229.95

TC12

Digi-Mouse Controller/Calendar Board

Dual-purpose board includes controller for Digi-Mouse™ and perpetual time/date. Never have to enter time and date again. For Tandy 1000/1200 only. 25-1010 99.95

New Low Price! 1200-Baud PC Modem

An auto-dial/auto-answer modem for the Tandy 1000/1200/3000, the IBM PC and PC compatibles. Features powerful automatic dialer commands that are compatible with virtually all communications software. Hayes® compatible. Switchable 1200/300-baud operation. FCC registered. Was \$299.95 in RSC-16. 25-1013 199.95

New! Dual Display Graphics Adapter

Combines the function of 3 boards in one. Uses VM-3 and CM-10 monitors. Displays up to 640 x 200 in 16 colors with special software. Features Hercules-compatible graphics mode for use with VM-3 monitor. 25-3045 249.95

Deluxe Text Display Adapter

Allows your Tandy 1000, 1200 or 3000 to display text on the VM-1 Monochrome Monitor or CM-1 Color Monitor. 25-3046 249.95

New Low Price! Deluxe Graphics Display Adapter

Allows your Tandy 1200 or 3000 to display high-resolution graphics (640 x 400) on the CM-1 or VM-1. Was \$499.95 in RSC-16. 25-3047 399.95

Hard Disk Controller Board

Allows you to add hard disk drives for up to 70 million characters of storage for data and programs. Compatible with most Tandy 1000 software—most programs transfer directly to hard disk. Includes cable for use with our 10, 15 or 35-Megabyte Hard Disks. 25-1007 299.95

PLUS Upgrade Boards

These boards are specially designed for use with the Tandy 1000 EX or our Memory PLUS Expansion Board. You can also use them with the Tandy 1000 SX or any other PC compatible with the PLUS Upgrade Adapter Board. All PLUS Upgrade Boards are user installable with just a few simple tools.

New Low Price! PLUS RS-232C Option Card

Lets your computer talk with other computers and access national information services, when combined with communications software and external modem. Use with high-speed modems or serial plotters and printers. Was \$99.95 in RSC-16. 25-1014 79.95

PLUS Digi-Mouse Controller/Calendar Board

Dual purpose—includes controller for Digi-Mouse™ and a perpetual time/date clock. You'll never have to enter time and date again! 25-1015 99.95

New! PLUS 300 Baud PC Modem

Great for use with the DeskMate and on-line services such as Compuserve, Dow-Jones and more! Switchable Tandy/Hayes® compatible modes. Connects directly to modular phone jack. FCC registered. Cable included. 25-1017 (Avail. 12/30/86) 99.95

New! PLUS 1200 Baud PC Modem

Hayes™ compatibility lets you run the most popular communications software at higher speeds—reducing the cost of on-line time. FCC registered. 25-1018 199.95

New! PLUS Network 4 Interface

Use the Tandy 1000 EX as a low cost system in an educational network. See network section on page 35 for more information. 25-1019 299.95

PLUS Upgrade Adapter Board

Allows you to use PLUS Upgrade Boards in a standard PC card slot. 25-1016 14.95

NEW EXPRESS ORDER HARDWARE

Choose From a Variety of Options

Expand your computer system with the latest technology! Pages 13, 14 and 15 feature special expansion boards and other hardware enhancements that are available through our exclusive Express Order Hardware service. These expansion options are performance proven, and professionally supported by the independent manufacturers (see page 15). Express Order items can be ordered at any Radio Shack Computer Center, store or participating dealer. Orders are transmitted electronically and shipped the next business day for super-fast service.

AST Research

5251/11™. Attach PC's and compatibles directly to an IBM System 3X. Allows your PC to emulate IBM 5151 Model 11 terminals without change. 90-2050 895.00

5251/12. For remote IBM System 3X communications. Package allows your PC to emulate an IBM 5251 Model 12 Terminal. 90-2044 790.00

3270 Coax™. Allows your PC to function as 3278/79 terminal via standard coaxial cable connections. 90-2029 1145.00

3780™. Allows your PC to emulate IBM's 2770, 2780, 3741 and 3780 terminals. 90-2049 895.00

SNA and BSC. Complete hardware/software solutions providing full IBM 3270 terminal emulation.

SNA. 90-2038 895.00

BSC. 90-2030 695.00

PCOX™. Low cost, direct coaxial solution, integrates your PC into an existing mainframe/controller environment for reliable 3270 communications.

90-2039 995.00

SIX PAK PREMIUM™. With 512K memory. Expanded memory with multifunction capabilities. Includes DESQview.

90-2054 595.00

RAMpage™. Enhanced Memory Specification combined with DESQview. Up to 2 megabytes of memory.

For PC and XT (with 256K). 90-2052 395.00

For AT (with 512K). 90-2053 795.00

Advantage™. For the PC-AT and compatibles. Offers up to 3 megabytes of memory, 2 serial ports, parallel port and game adapter port. 90-2051 595.00

STB

Memory Companion/PC™. STB's Memory Companion/PC offers bank switching capability for the Tandy 1200/3000 and the IBM PC, XT, AT and compatible systems. The board provides up to 2 megabytes of memory for software programs using the Lotus/Intel/Microsoft Expanded Memory Specification.

90-2027 520.00

EGA Plus™. Tandy 1200/3000 and IBM compatible. Incorporates an Enhanced Graphics Adapter, Graphics Memory Expansion Card, Graphics Memory Module Kit and Parallel Print Adapter on a single video board. 90-2025 499.95

Chauffeur™. Tandy 1200/3000 compatible. Displays IBM color/graphics software in a full-screen format, without any software modifications. Colors are converted to a 16-level grey scale.

90-2026 395.00

Grande Byte™. Offers a variety of memory expansion sizes for the Tandy 1200/3000 and the IBM AT. Provides up to 2.5 megabytes of extra memory for RAM disks, multitasking programs or multiuser operating systems. 90-2028 495.00

Rio PLUS II™. A multifunction board with an array of functions for the Tandy 1200 and 3000. Access up to 576K of additional memory by using all of the memory expansions. Other features include a Parallel Printer Port, one Standard and one Optional Serial Port, Clock/Calendar and Optional Game Port.

90-2072 395.00

SUPER I/O II. Provides four I/O functions for the Tandy 1200 and IBM XT and IBM Portable. The SUPER I/O II offers a parallel port, serial port, game port and clock/calendar. Comes with user's manual. 90-2071 195.00

Quadram

QuadEGA +™. Four PC display standards in one high resolution color graphics board. Perfect for the Tandy 1200/3000, IBM® PC, PC/XT and AT. Get 640×350-resolution graphics in 16 colors (choice of 64), 720×348 in color and monochrome software, 320×200 medium-resolution or 640×200 high-resolution graphics (16 out of 16 colors). 90-2045 ... 595.00

Quadport-AT™ Expansion Kit. Dramatically increases the power of your Tandy 3000 or IBM PC/AT by adding four serial communications ports to the Quadport-AT. These ports let you add stations in a multiuser environment or peripherals.

90-2046 595.00

Liberty™ AT. Frees your Tandy 3000 from the drawbacks of the 640K PC-DOS limit. Liberty AT is built around the Lotus/Intel/Microsoft Expanded Memory Specification.

90-2047 595.00

AT Memory Expansion. Expansion kit delivers two add-on daughter cards for the Quadboard-AT and the Liberty-AT.

90-2048 285.00

Tecmar

Phonagate 2400. Tandy 1200/3000-compatible 2400 baud modem that can be installed in a single slot. With simple commands you may communicate with other computers and send files and messages reliably. 90-2031 695.00

5251/11 Emulator™. Allows you to use your Tandy 1200/3000, IBM PC, XT or AT as an IBM 5251/11, 5291 or 5292 Model 1. Your computer can communicate with an IBM System 34/36/38 computer. In addition to two host sessions, you can use your PC as a regular computer. 90-2034 795.00

Maestro AT™. Maestro is a powerful multifunction board for your Tandy 3000 or IBM Personal Computer AT, containing a parallel port, serial port and up to 2.5 megabytes of memory. Comes with 640K of memory. Adds up to 2.5 megabytes of memory. Easy to install. 90-2032 795.00

640 Plus™. Give your Tandy 1200/3000 or IBM PC, XT or AT new power, the ability to create spreadsheets, data bases and files of unprecedented size. Install up to four 640 Plus boards for a total of 8 megabytes of memory! 90-2033 475.00

MegaFunction™. For the Tandy 1200/3000. MegaFunction combines the standard multifunction capabilities with a 1.25 megabyte RAM disk, an auxiliary power supply, parallel printer port, serial port and a clock/calendar. 90-2036 895.00

MORE EXPRESS ORDER HARDWARE

Captain™. A complete multifunction board that adds up to 384KB system memory, parallel printer port, serial port and clock/calendar. The basic add-on for your Tandy 1200/3000, IBM PC or compatible computer. Comes with bonus software package from Tecmar. 90-2037 589.00

Q60AT™. A half-height internally mounted tape backup unit for your Tandy 1200/3000 or IBM PC. Protects you from data loss should your hard disk fail. User-friendly menus guide you through the program. 90-2035 1695.00

Key Tronic

Key Tronic Keyboard 5151. Improves the use of your IBM PC, XT or AT Personal Computer. Incorporates keytop and layout changes, as well as other features, for greater flexibility and user convenience.

Tandy 1200. 90-2041 248.00

Tandy 3000. 90-2040 248.00

Key Tronic Touchpad. A real technological breakthrough in keyboard design. You get a Mouse, Digitizing Tablet, programmable function keys and Cursor Pad—all encompassed in an AT-style keyboard. 90-2042 418.00

Key Tronic Keyboard 5150. Replacement keyboard for the Tandy 1200. 90-2043 149.00

Kurta

Series ONE Tablet™. Tandy 1200/3000 compatible. The microprocessor-based tablet offers switch selectable output formats, multiple operating modes, downloading from the host and a programmable menu for ease of use. 90-2000 795.00

Series TWO Tablet. Tandy 1200/3000 compatible. High-resolution tablet digitizer provides origin set capability, as well as automatic skew correction. Resolution is up to 1000 PPI with an accuracy of approximately .025". 90-2001 1085.00

Three-Button Cursor. 90-2002 125.00

Irwin

Model 110 Tape Backup™. 10-megabyte tape backup system provides unparalleled flexibility. 90-2062 699.00

Model 125AT Tape Backup. 20-megabyte high-speed tape backup system. 5 1/4", 500K bit data transfer rate. 90-2061 850.00

Tallgrass

Tallgrass TG-1020i Tape Backup™. 20-megabyte half-height 5 1/4" automatic tape backup system. Internal. 90-2063 995.00

Tallgrass TG-2010e Tape Backup. External tape backup system. 90-2064 1295.00

Archive

Fastape™ Streaming Tape Drive. 1/4" streaming tape drive, 20 MB capacity. Housed in rugged cabinet. 90-2059 1195.00

Scorpion 5 1/4" Tape Drive. High performance drive, yet takes up no more space than a floppy disk. Ideal solution for tape backup. 90-2060 1195.00

Sigma

Color 400™. Allows your Tandy 1200/3000 to display high-resolution graphics (640 x 400) non-interlaced in 16 colors using the CM-1 monitor. CGA/AutoCAD compatible. Comes with PC Paintbrush. 90-2073 695.00

PC Technologies

286 Express™ Accelerator Card. Full featured, half-slot accelerator card. Compatible with the Tandy 1200 and the IBM PC and PC/XT. Replaces the CPU with an 80286 microprocessor, faster than the one in the AT. Your software will run two to six times faster. 90-2065 599.00

Orchid Technology

CramRAM™. Get 1 megabyte (expandable to 2) of RAM packaged in a half-length card. Bring your Tandy 1200 up to 640K and get Lotus/Intel Expanded Memory Specification—all with the same board!

90-2066 645.00

Conquest™ Multifunction Board. Supports the Tandy 1200, IBM PC and compatibles. Effectively replaces three ordinary expansion boards with a multifunction board, an expanded Memory board and a PCnet board—all in one! Multiple boards expand your memory to 8 megabytes. 90-2075 395.00

Western Digital

Filecard 20™. An easy-to-install 20 megabyte hard disk mounted on a single controller card. Allows your computer to remain configured with two floppy drives for greater flexibility. 90-2080 895.00

Ven-Tel

2400-Baud Half-Card PC Modem. An ultra-high performance internal modem for the Tandy 1000/1200/3000 and IBM PC/XT/Compatibles. Features auto-dial/auto-answer, 2 telephone jacks, call progress reporting (BUSY, NO ANSWER, ETC) and test modes. FCC registered.

90-2067 695.00

Natural Micro Systems

Watson Voice Management System™. An integrated modem that puts the "voice" in voice/data communications. Includes voice mail system, electronic telephone database, auto/dial, calendar, remote editing and more.

90-2082 498.00

Watson-VIS Software. An upgrade software that turns Watson into a voice information system. Perfect for customer messages, orders after business hours, polling, telemarketing and more. 90-2083 298.00

Telebyte

Shorthaul Modem™. Modem/line driver for linking any RS-232-based devices. Up to 19.2K baud, full duplex.

90-2004 125.00

RS-232 to Phone Plug Converter. Convert RS-232 to modular phone connector.

HOST. 90-2005 29.95

TERMINAL. 90-2006 29.95

Captain and Q60AT/TM Tecmar. Key Tronic Keyboard 5151, Key Tronic Touchpad and Key Tronic Keyboard/TM Key Tronic. Series ONE Tablet, Series TWO Tablet and Three Button Cursor/TM Kurta. Model 110 Tape Backup and Model 125-AT Tape Backup/TM Irwin. Tallgrass 1020i and 2010e Tape Backup/TM Tallgrass. Fastape and Scorpion/TM Archive. Color 400/TM Sigma Designs. 286 Express/TM PC Technologies. CramRAM and Conquest/TM Orchid Technology. Filecard 20/TM Western Digital. 2400-Baud Half-Card PC Modem/TM Ven-Tel. Watson Voice Management and Watson-VIS Software/TM Natural Micro Systems. Shorthaul Modem, RS-232 Converter/TM Telebyte.

MORE EXPRESS ORDER HARDWARE

Information Technologies, Inc.

Linkup System XT™. Linkup XT is a full performance, communications plug-in board (short board) allowing high-speed (up to 19.2K bps) communications with a wide variety of host systems or other personal computers. Includes SDLC, HDLC, BSC and asynchronous protocol support, programmable software timer, installation manual and hardware diagnostic utility software. For the Tandy 1000/1200/3000. 90-2010 395.00

Linkup System XT SNA 3270. Emulates REMOTE 3270 display station using SNA/SDLC protocol. Supports switched or leased line, on-line trace and error logging, RS-232C modem interface, full or half duplex. For the Tandy 1000/1200/3000. 90-2011 390.00

Linkup System XT BSC 3270. Emulates REMOTE 3270 display station using BSC protocol. Supports switched or leased line, on-line trace and error logging, RS-232C modem interface, full or half duplex. For the Tandy 1000/1200/3000. 90-2012 390.00

Linkup System XT BSC 3780. Emulates REMOTE 3780 or 2780 RJE Display Station. For the Tandy 1000/1200/3000. 90-2014 390.00

Linkup System One. Linkup is a high-performance, cost-effective data communications product for the Tandy 1200/3000 that allows high-speed (up to 64K bps) communications with a wide variety of host systems or other personal computers. Includes communications co-processor, efficient shared RAM memory interface to bus, SDLC, HDLC, BSC and asynchronous protocol support, programmable real-time clock, calendar, software timer, installation manual and hardware diagnostic utility software. 90-2015 605.00

Linkup System One SNA 3270. Emulates REMOTE 3270 display station using BSC protocol. Supports switched or leased line, on-line trace and error logging, RS-232C modem interface, full or half duplex. Includes Linkup ATERM, ABLOCK, VT 52/100. For the Tandy 1200/3000. 90-2016 390.00

Linkup System One BSC 3270. Emulates REMOTE 3270 display station using BSC protocol. Supports switched or leased line, on-line trace and error logging, RS-232C modem interface, full or half duplex. Includes Linkup ATERM, ABLOCK, VT 52/100. For the Tandy 1200/3000. 90-2017 390.00

Linkup System One BSC 3780. Emulates REMOTE 3780 or 3270 RJE display station. 90-2019 390.00

Linkup System Coax. Emulates LOCAL IBM 3278/9 Display Station cabled via RG-62-A/U coax to an IBM 3274/6 Terminal Controller or System 360/370/30xx/43xx Host Communications Controller. IRMA-compatible. Various file transfer support including TSO, CMS and CICS support. BASIC language interface (and requisite subroutines) for File Transfer via BASIC programs. Utility programs for redefining default keyboard and display attributes. Installation manual. Diagnostic software. For the Tandy 1200/3000. 90-2020 700.00

National Instruments

GPIB-PC 2000 CARD™. IEEE-488 interface transforms a Tandy 2000 into an instrumentation workstation with capability of controlling over 4000 different instruments. 90-2021 795.00

GPIB-PC DOS Software. Transform GPIB controller with complete communications and bus management capability. 90-2022 430.00

Linkup System XT, XT 3270 SNA, XT 3270 BSC, XT 3780 BSC, Linkup System One, System One 3270 SNA, System One 3270 BSC and System One 3780 BSC/TM Information Technologies, Inc. GPIB-PC 2000 CARD and GPIB-PC DOS Software/TM National Instruments. PC Slave/TM Advanced Digital. Warp Speed/TM Warp Speed Computer Products. MFB-1000/TM PBJ Computer Products. Colorblind/TM Upstart Corp. Color Commander/ TM Perma Power Electronics. 8087 Adapter/TM Trionix. OmniPak/TM Omnitel.

Advanced Digital

PC Slave™. Actually a PC-compatible computer on a full-size card. Lets you run MS-DOS on a terminal sharing disk drives and printer only. Comes with 256K memory and operating system software. 90-2081 1090.00

Warp Speed Computer Products

Warp Speed™ Light Pen. Operates on either monochrome or color monitor. Includes free driver software for Tandy DeskMate®, Microsoft® Windows and a File Controller.

For Tandy 1000. 90-2069 199.99

For Tandy 1200. 90-2074 199.99

Lite Pen Company

Light Pen. Stainless steel pen includes software, featuring sketch/draw/paint color graphics, backgammon, solitaire, world national maps, computer tutorials. Two-year warranty.

For Tandy 1000. 90-2085 179.95

For Tandy 1200. 90-2086 179.95

PBJ Computer Products

MFB-1000 MultiFunction Board. Contains the three most needed functions on a single expansion card. The MFB-1000 contains up to 128K (expandable to 512K) of RAM for the Tandy 1000, a serial port, and a battery-backed real time clock/calendar. 90-2078 329.95

X RAM™ Memory Expansion Board. Breaks the 640K barrier imposed by DOS and adds up to two megabytes of memory to your system. Includes 256K and a versatile RAMdisk program. Intel/Lotus/Microsoft compatible. For Tandy 1000/1200. 90-2079 299.95

Upstart Corp.

Colorblind™. Combats many of the symptoms suffered by CRT users: eye strain, headaches, blurred vision, etc. Makes it easy to switch video attributes (high intensity and color) without reconfiguring the software. Run color software on a VM-4 monitor. Use with the Tandy 1200/3000 or the IBM PC. 90-2076 49.95

Perma Power Electronics

Color Commander™. Get more variety in your color graphics. Pushbutton color changes for business graphics, illustrations and word processing. Compatible with RGB monitors: CM-2, CM-4 and CM-10. 90-2077 359.00

Trionix

Trionix 8087 Adapter. Allows you to add a Math Co-Processor to your Tandy 1000 or Tandy 1000 HD., which speeds up CAD and other applications by as much as 10 times. Requires special software. For 25-1000 and 25-1001 only. 8087 Math Co-Processor sold separately. 90-2070 240.00

Omnitel

OmniPak™. Integrates all the communications needs of a Tandy 1200/3000 or IBM PC into one versatile card. By combining a 1200-baud modem with memory and expansion, OmniPak puts any suitably-equipped PC in the nation no further away than your keyboard! 90-2068 549.00

Important Express Order Hardware Notice

Products offered in the Express Order Hardware program are supported directly by the hardware manufacturer. This includes questions related to the use of the products, as well as repairs or maintenance. The manufacturer, not Radio Shack, is completely responsible for the warranty of the product.

1000/1200/2000/3000 SOFTWARE

The *pfs* Series

Choose from this family of software for extremely user-friendly programs. Programs interact with each other so you only need to enter data once.

pfs:file

A very simple way to create and organize your own business or personal filing system. Store, retrieve and review information in a fraction of the time conventional filing takes.

Tandy 1000/1200. 25-1140 140.00

pfs:report

A powerful analysis tool that creates presentation-quality tabular reports from sales, inventory and other data stored in *pfs:file*. Sort from any data category and calculate averages, totals, subtotals and more.

Tandy 1000 25-1141 125.00

Tandy 1200 25-3162 125.00

pfs:write

Easily create reports, letters and memos with advanced editing features and page headings and footers, centered text, right or left justification and more.

Tandy 1000/1200. 25-1142 140.00

pfs:graph

Turn complex numerical data into easy-to-read graphs. Accepts data from *pfs:file* or from the keyboard. Displays and prints data in bar, line or pie charts. Each chart can contain one to four graphs. Requires monochrome or color graphics.

Tandy 1000/1200. 25-1143 140.00

pfs:plan

Lets you organize a spreadsheet for planning, tracking, analyzing and reporting numerical data. You can even print a copy of your worksheet in a document produced with *pfs:write*.

Tandy 1000/1200. 25-1144 140.00

Database Management

Cornerstone

A full-featured relational database system designed specifically for non-programmers. Simply select menu options or complete forms to build complex databases, enter data and produce reports. The flexibility lets you change virtually any aspect of your database at any time. Add, delete or change files, fields, indexes, relationships or reports in seconds. Fields are variable-length, so you never need to determine field lengths in advance. Requires 256K and two disk drives.

Tandy 1000/1200/2000/3000. 26-5354 99.95

dBASE II

Powerful relational database management for easy manipulation of data using English-like commands. You can add, delete, edit, display and print your information. And you can change the file format at any time without re-entering data. Provides a maximum of 65,535 records per database file and 1000 characters per record. Requires 256K.

Tandy 1000/1200/2000/3000. 26-5352 495.00

dBASE III Plus

An ideal data management system for people who don't want to program, or a programming tool for those who prefer to create their own system. With our built-in Assistant, you'll be provided with new easy-to-use pull-down menus for creating, using and modifying databases. Our new Screen Painter lets you create custom screens as your business dictates. The Advanced Query System lets you build complex query requests just by selecting from pull-down menus. Finally, there's a new Applications Generator that creates entire applications programs without programming! A new Data Catalog and more than 50 new commands and functions help streamline applications development. Requires 384K, 2 floppy drives or one floppy and one hard drive. LAN mode requires 384K and 3.1 DOS.

Tandy 1200/3000. 25-3191 695.00

OFFIX

Create "file folders" that can be stored and retrieved from "file cabinet drawers", create documents and forms for folders, and produce reports and form letters based on the contents of the folder. Requires 256K.

Tandy 1000/1200 HD/2000. 26-5325 99.95

Spreadsheet Analysis

Microsoft Multiplan

This popular "second-generation" spreadsheet lets you transfer information between worksheets automatically. You can assign plain English names to any column, cell or area, vary individual column widths, center numbers and text within a column or align decimals. Sorting can be performed in alphabetical or numerical order. Cells can be set up individually, by row, column, block—or globally. Displays up to eight windows on the screen. Includes on-line help.

Tandy 1000/1200/2000/3000. 25-1163 195.00

Integrated Software

DeskMate

DeskMate is an easy-to-use, multifunctional software program that uses the same commands throughout. The system uses the computer's control keys, so there are no complicated commands to memorize. Each day you'll be greeted by a menu that displays a calendar, appointment schedule and a list of files stored for every function. Choose from word processing, spreadsheet analysis, electronic filing, telecommunications, electronic mail and calendar/alarm. Telecom and Mail require modem.

Tandy 1200 HD/IBM PC Compatibles. 25-3166 199.95

DeskMate II

Includes all the features of DeskMate with the addition of a task-switching feature that allows the user to alternate between DeskMate II and another program with a few keystrokes.

Tandy 1000 SX. Included with CPU

Tandy 1000/2000. 25-1164 (Avail. 10/15/86) 199.95

Tandy 1200/PC Compatibles. 25-3167 (Avail. 10/15/86) 199.95

Tandy 3000. ... Included with MS-DOS (25-4103, \$99.95)

Personal DeskMate

An easy-to-use, graphics-oriented program with pull-down menus and "dialogue boxes" for selecting functions. Includes Text, Worksheet, Filer, Calendar, Telecom and Paint, a graphic picture editor. A Phone Directory, Calculator and Notepad may be accessed any time. TELCOM requires a modem.

Tandy 1000 EX. Included with CPU

Tandy 1000/1000 SX. 25-1165 (Avail. 10/15/86) 199.95

Lotus 1-2-3

An easy way to go from spreadsheet to graphics to information management—instantly! Change your spreadsheet data; then graph it in seconds. Search and sort data in your spreadsheet. "Macro" keys let you substitute a single keystroke for a long sequence. One keystroke brings you on-screen help. Features 256 columns and 2048 rows in spreadsheet and 2000 records in database. Requires 256K.

Tandy 1000/1200/3000. 25-1145 495.00

Tandy 2000. 26-5300 495.00

Framework II

This program doesn't just process numbers—it processes ideas. Each operation is placed in a "frame" that separates it from the rest of the program. Each frame is in an outline form, which you can rearrange or modify at any time. Just jot down notes or ideas in one frame, then create sub-frames for databases, spreadsheets, graphics and reports which relate to these ideas. Framework also utilizes a "desktop" format to view several operations at once on the screen. A special "zoom" function lets you instantly expand any frame to fill the entire screen. Requires 384K.

Tandy 1200/3000. 25-3192 695.00

1000/1200/2000/3000 SOFTWARE

Accounting

Quartet

A Tandy exclusive! Quartet includes four integrated accounting programs to give you the most up-to-date information on your company's financial health. Track your business records with programs for General Ledger, Accounts Receivable, Accounts Payable and Payroll. Quartet was designed for ease of use, fast data entry and on-line updating of ledger accounts. Features a convenient search function and automatic look-up of records. Quartet provides easy access to invoices, bills, paychecks, expense checks and ledger transactions and can create user-defined reports for customers, vendors, employees and items. Entries are made only once. Any related data is automatically updated to the General Ledger. Since all Quartet functions are integrated, there is no constant disk swapping as on many systems. Best of all, easy-to-read formatted screens look much like the invoices, check registers and payroll registers you're already using. Quartet can be used to print user-formatted financial statements with or without comparisons to previous years. Also prints invoices, monthly statements, payroll checks and expense checks. Includes well-defined audit trail. Uniformity of functions throughout the program makes Quartet especially easy to learn. Comes with sample data. Requires 256K and two disk drives or hard disk.

Tandy 1000/1200/2000/3000. 25-1146 399.95

Tandy 3000 XENIX Multiuser Software

Powerful, fully integrated multiuser software. See page 25 for full descriptions.

General Ledger. 25-4301 599.00

Payroll. 25-4303 (Avail. 12/30/86) 699.00

Accounts Receivable. 25-4304 599.00

Accounts Payable. 25-4305 599.00

Order Entry. 25-4307 599.00

Sales Analysis. 25-4308 399.00

Personal Accounting Software

Finance Manager

Helps you gain a better understanding and control over your personal and business financial needs. Create net worth statement and budgets, determine net profit, print checks, account for taxes, monitor your income and expenses and analyze investment opportunities. Automatic check printing and checkbook reconciliation are both included. A search capability can be used to recall any recorded transaction. All income and expense activities can be entered into a budget that is automatically updated and represented graphically. All taxable transactions can be recorded and retrieved later for tax preparation. Includes a program that will turn your personal computer into a sophisticated financial calculator. Calculates net present value, future values and loan amortization schedules.

Tandy 1000/1200/3000. 25-1148 99.95

Managing Your Money

Andrew Tobias' Managing Your Money is seven programs in one integrated, personal financial management package. Managing Your Money serves as a reminder pad and a complete budget and checkbook program. It helps with tax estimation and can even print out your schedule D. The program evaluates your family's present life insurance needs and suggests how you can improve your coverage. It is a financial calculator which can perform rental property analysis and financial planning. The sophisticated portfolio manager handles as many real or hypothetical stocks, bonds and options as you like, and can also manage collections such as wines, coins or paintings. And it's easy to use. Wherever you are in the program, just press the ESCape key for a HELP message. The HELP messages tell you how to work with the program and, where appropriate, also provide financial guidance.

Tandy 1000/1200/3000. 25-1159 199.95

Word Processing

SCRIPSIT®

Includes features of a dedicated word processor. Control-key functions can be displayed on the screen for quick and easy reference. And the built-in spelling corrector and verifier from Houghton-Mifflin not only finds misspellings, but corrects them automatically. Allows merging with dBASE files. And of course you get the features you've come to expect with the name SCRIPSIT: global search function, easy editing features, on-screen format reference and more. Extremely easy to learn and use. Requires 256K and two disk drives.

Tandy 1200/3000. 25-3171 299.95

Tandy 1000/2000. 25-1155 299.95

Tandy 3000 XENIX. Requires 640K.

25-4213 (Avail. 9/30/86) 499.00

Microsoft Word 3.0

Add our optional Digi-Mouse and move text and select commands without even using the keyboard! Word displays up to eight windows at once, so you can move text from one document to the other with ease. Text is displayed in boldface, italics, underlines, super and subscripts, small caps—all without any confusing symbols. More information on the various commands are displayed by pressing a single "help" key. Use with our color monitor and enjoy color-coded text. Requires 256K.

Tandy 1000/1200/3000. 25-1162 450.00

Microsoft Word

Tandy 2000. Ver. 1.0. Requires graphics. 26-5314 ... 375.00

HomeWord Plus

No complicated commands to memorize, no hefty manuals to flip through! HomeWord is so easy to use, adults or children can start word processing almost immediately! Instructions on cassette tape and an easy-to-follow instruction manual take you through basic word processing functions. And the program's identifiable icons make it a snap to print, edit, delete or move copy. Using the built-in spelling dictionary, HomeWord Plus automatically searches for misspelled or unknown words. Correct a misspelled word once and HomeWord Plus corrects it throughout the remainder of your text. HomeWord Plus includes 45,000 words, and you can add up to 5000 more.

Tandy 1000. 25-1161 69.95

Graphics

Micro Illustrator

Draw beautiful pictures and designs on your computer. No programming experience needed—all commands are on the icon-driven menu. Just point to choose shapes, colors, patterns, special effects and brushes. Save your pictures on disk and create your own picture show.

Tandy 1000. 25-1120 29.95

VersaCAD Entry-Level

A general-purpose design and drafting program that contains much of the power found in software five times the cost. Menu-driven operation and plain-English prompts guide you through the program as you work. Productivity features include 10 built-in primitive objects; ability to quickly group objects for collective manipulation; interactive editing (the object being worked on blinks on the screen and visually changes); total flexibility of object attributes (color, linestyle, etc.) on any drawing level (attributes may be changed at any time with a function key); unlimited zoom; auto-dimensioning; inquiry about object locations, area, perimeter totals, etc.; drawing aids, such as center marker and template lines; snap at any time to an object; grid intersection or user-defined spacing increments; output to pen plotter or graphics printer with user-defined plot specifications; and automatic drawing recovery from error or power failure. Includes written tutorial and introductory audio tape. Requires 256K, two disk drives, graphics monitor and Tandy GT-2000 digitizer.

Tandy 1000/1200/2000. 26-5282 399.95

TANDY 1000/1200/2000 SOFTWARE

MS-DOS Languages and Communication

Macro Assembler

Assembles symbolic instructions into machine code. Supports an expanded set of conditional directives. 26-5252 . . . 99.95

Lattice "C"

Lattice C compiler is a fast, two-phase compiler. 26-5254 . . . 499.00

FORTRAN Compiler

From Microsoft. A subset of FORTRAN-77 for scientific and engineering applications. 26-5255 . . . 349.95

PASCAL Compiler

From Microsoft. Compatible with the ISO proposed standard. Generates machine code. 26-5256 . . . 299.95

COBOL Compiler

Includes an editor, interactive debugger, CRT control and a single-pass compiler. 26-5257 . . . 595.00

OmniTerm 2

Communicate with a mainframe or Tandy XENIX host as a VT100 terminal, access information services, communicate with other micros or auto-answer and file transfer in the unattended mode. 25-1160 . . . 129.95

Softerm 2000

A communications and terminal-emulation program to access bulletin boards, information services and mainframes. Emulates over 20 character and block-mode terminals. Requires 256K. 26-5261 . . . 149.00

T-1000 Protocol Converter

Lets your computer or terminal access IBM host computers using BSC, SNA/SDLC or Channel Attachment Operations. Emulates an IBM 3278-2 via direct type A coax connection. Requires terminal emulation software, such as Softerm 2000 (26-5261). UL listed. 26-1169 . . . 995.00

Tandy 2000 Communications

BIS 3780

Allows a Tandy 2000 to communicate with an IBM bisynchronous protocol host with any IBM S/360, S/370, 30XX and 43XX host or non-IBM hosts using standard IBM SNA/SDLC or IBM bisynchronous protocol. Your computer functions as a remote terminal on a Remote Job Entry (RJE) terminal. MS-Assembler (26-5252) may be required if mode reconfiguration is needed. 26-5258 . . . 695.00

BIS 3270

Allows a Tandy 2000 to communicate with a mainframe over point-to-point or multi-point telephone lines (via a synchronous modem or modem eliminator) with any IBM S/360, S/370, 30XX and 43XX host or non-IBM hosts using standard IBM SNA/SDLC or IBM bisynchronous protocol. Emulate an IBM 3271/3274/3275/3276 display station and a 3284/3286 printer. 26-5259 . . . 695.00

CLEO-3270 Cluster Controller

Emulate a remote IBM 3276-2 cluster controller with an IBM 3287 printer attached (via a synchronous modem or modem eliminator). Your cluster can consist of up to four other computers emulating IBM 3278 display stations. Requires 256K system and serial Expansion Board (26-5164). 26-5262 . . . 980.00

Tandy 2000 Serial Expansion Board

Connect your Tandy 2000 to a mainframe computer, or hook terminals or additional serial devices to the Tandy 2000. Includes four serial channels with connectors. 26-5164 . . . 325.00

Tandy 2000 Programmer's Reference Manual

Contains information for assembly language programmers, including entry conditions for MS-DOS. 26-5403 . . . 19.95

Tandy 2000 Hardware Reference Manual

Introduces schematics and theory of operation for troubleshooting, designing interfaces and more. 26-5404 . . . 24.95

Tandy 1000 Learning Programs

Educational

New! Robot Odyssey

A science adventure for sharp teens and adults. Robotropolis is an underground city populated by robots that you must escape from. To unlock the secret exit you must design friendly robots, navigate invisible mazes, solve puzzles and sneak past sentries. 25-1135 . . . 34.95

New! Rocky's Boots

Hailed as a software classic by the New York Times, the award winning Rocky's Boots helps develop skills in logical problem solving, abstract reasoning, and creative thinking. The concepts of electronic circuitry, circuit design and logic are explored in a motivating environment where players invent machines to solve puzzles and win over 30 different games, including games they design themselves. By experimenting with simulated real-world electronic parts and "electricity," players as young as 9 years old can learn basic computer logic. 25-1139 . . . 34.95

New! Below The Root

Based on Zilph Snyder's recently published Green-Sky Trilogy, Below The Root combines the story-building aspects of a text adventure with hundreds of colorful graphics. It also combines fast-paced excitement with a unique text menu—a first in the field of adventure games. 25-1136 . . . 29.95

Wiz Type

Your children learn to type words, sentences and paragraphs in

a game with the characters from the comic strip "The Wizard of Id". Twenty typing levels to choose from. 25-1114 . . . 34.95

Typing Tutor III

The fastest, most effective way to learn how to type on your computer. Features Letter Invaders™, the arcade game that sharpens your typing skills. Also runs on the Tandy 1200 HD, the IBM PC and PC compatible computers. 25-1126 . . . 49.95

Mastering the SAT

Comprehensive and self-paced, the program places emphasis on the principles involved in each question and its solution, as well as test-taking strategies. 25-1127 . . . 99.95

The FUNdamentals

A self-paced teaching program and manual designed to teach the new user the basics of operating computers in general, and the Tandy 1000.

Tandy 1000. 25-1124 . . . 29.95

Tandy 1000 SX. 25-1166 . . . 29.95

Tandy 1000 EX. 25-1167 . . . 29.95

Millionaire

A remarkable simulation of the real world of stock market investing. 26-5384 . . . 49.95

TANDY 1000 HOME SOFTWARE

Games

New! Star Flight

Explore strange new worlds and new civilizations. Boldly go where no man has gone before—then figure out how to communicate with the aliens you find there. A state-of-the-art role-playing adventure set in outer space. Develop and play six characters: Captain, Science Officer, Navigator, Medical Officer, Communications Officer, and Chief Engineer. Explore over 20 unique star systems, each displayed in stunning graphic detail. 25-1137 (Avail. 10/30/86) 49.95

New! Rogue

A college classic, Rogue is so full of unpredictable monsters, ever-changing magic and hidden dangers that it's never the same game twice. 25-1134 29.95

New! Black Cauldron

A Walt Disney 3-D animated adventure game. You must find the Black Cauldron and defeat the forces of the wicked Horned King by destroying the cauldron's magical powers. 25-1133 (Avail. 9/30/86) 34.95

New! Winnie The Pooh

Walt Disney's Winnie The Pooh and his friends will capture your child's imagination while developing necessary skills and building knowledge. 25-1132 (Avail. 10/30/86) 34.95

Demon Attack

Waves of winged demons are invading. Armed with laser cannons and missiles, you must defend your home from the interplanetary warriors. 25-1110 29.95

One-on-One

Basketball superstars Larry Bird and Julius "Dr. J." Erving helped design this exciting simulation game. Try 360-degree slam dunks, turn-around jump shots, rebounding for tip-ins and more. For one or two players. 25-1111 34.95

Pinball Construction Set

Comes with five built-in pinball machines, or choose from 32 game parts to build your own. 25-1112 34.95

Lode Runner

To find the stolen treasure, you, the Galactic Commando, must run, jump, drill special passages and outsmart the Bungeling guards if you're to succeed. More than 150 game screens! 25-1113 29.95

BC's Quest for Tires

An exciting action game featuring characters from the comic strip "BC". Follow Thor as he zips around aboard his prehistoric unicycle trying to rescue the Cute Chick from the hungry dinosaur. 25-1115 34.95

King's Quest

Enter an adventurous world of three-dimensional graphics, sound and animated characters. Guide brave Sir Graham on his quest and return the king's treasures! Different mysteries and obstacles await you each time. 25-1117 39.95

Cutthroats

By Infocom, the makers of Zork I. You're the chief diver at a backwater island, working for some shady characters. Can you recover the treasure? Also runs on the Tandy 2000, Tandy 1200 HD, the IBM PC and PC compatibles. 25-1121 39.95

Touchdown Football

This is grid-iron action at its toughest and most exciting. Challenge the computer opponent with your own run, pass, punt and kick strategies. Program your offense and defense as you like. 25-1123 29.95

Flight Simulator

A real-time flight simulation program. The simulation considers 35 important aircraft characteristics and includes an out-the-window three-dimensional dynamic flight display and extensive flight controls. 26-5379 49.95

New! F-15 Strike Eagle

A challenging and exciting air combat from the modern electronic cockpit! You'll fly combat missions, engage enemy aircraft, and destroy enemy ground targets in the skies of Southeast Asia, Europe, and the Middle East. 25-1125 34.95

New! Ghostbusters

Based on the hit movie. Program features the bouncy theme song from the hit movie, voice synthesis and the ever-present danger of The Marshmallow Man. 25-1138 34.95

Infocom Sampler

The Sampler is the perfect way to introduce yourself to the addictive pleasures of Infocom. It contains portions of four different types of stories: Zork I, The Witness, Planetfall and Infidel. 25-1129 7.95

King's Quest II—Romancing the Throne

Enter a strange and wonderful adventure world as you guide King Graham on his quest to free his queen-to-be from a jealous enchantress. Different mysteries and obstacles await you each time you play. Also runs on the Tandy 1200 HD, the IBM PC and PC compatibles. 25-1128 39.95

Pipes

Arlo the Plumber needs your help to bring water to the people of Gilroy. Help him choose pipe from the factory, connect them to the houses and tie your new system to the water supply. Be frugal and plan your systems well, or you'll both end up all wet. Levels of difficulty increase with the number of houses in Gilroy. 25-1108 29.95

Learning with Leeper

Leeper will lead your children through four award-winning preschool games and help prepare them for reading, writing and math. Features shape matching, counting, eye-hand coordination and creativity skills. 25-1118 34.95

Spinnaker Software

Facemaker

Helps children become comfortable with computer fundamentals by playing fun, simple games. Build an animated face by choosing eyes, noses, ears and more. Helps improve concentration. 25-1100 29.95

Kids on Keys

Children learn with the computer keyboard as they identify numbers, letters and words. A "picture editor" lets kids change or create new pictures. 25-1101 29.95

Kindercomp

A series of games for pre-schoolers. Kids create colorful drawings, identify number sequences, create repeating word patterns, match letters and numbers and more. 25-1102 29.95

Fraction Fever

Helps children develop an understanding of fractions. Kids hop an animated "pogo stick" to match the correct picture with the fraction shown on the screen. 25-1103 29.95

Alphabet Zoo

Children learn to associate letters of the alphabet with the sounds they represent in two exciting maze games. Colorful pictures and music accompany the program. 25-1104 34.95

Kidwriter

Your children create their very own storybook with colorful scenes, text and music. The picture-stories can be saved on disk and loaded again at a later time. 25-1105 29.95

Trains

An economic simulation program. You're in charge of a railroad empire. It's up to you whether your business succeeds or fails. Make deliveries, stay on schedule and clear enough money to keep rolling. 25-1107 29.95

Alphabet Zoo, Facemaker, Fraction Fever, Kids on Keys, Kindercomp, Kidwriter and Trains/TM Spinnaker. B.C.'s Quest for Tires, King's Quest I and II and Learning With Leeper/TM Sierra On-Line. Cutthroats and Infocom Sampler/TM Infocom. Demon Attack and Touchdown Football/TM Imagic. Flight Simulator/TM Microsoft Corp. Lode Runner/TM Broderbund. Star Flight, One-on-One and Pinball Construction Set/TM Electronic Arts. Pipes/TM Activision. Rogue/TM Epyx. Ghostbusters/TM Columbia Pictures. F-15 Strike Eagle/TM Microprose.

POPULAR TANDY 2000 SOFTWARE

Word Processing

MultiMate

Actually duplicates the features of dedicated word processors. It's packed with over 100 features and functions, most of which can be accessed with just one or two keystrokes. You can edit one document while printing others and create form letters and mailing lists. You can even create documents from the ASCII files of another program. Includes a spelling verifier/corrector from Houghton-Mifflin containing over 77,000 words. Performs addition and subtraction on numerical data contained within your text. Includes a superb manual with training lessons to get you started in a hurry.

Tandy 2000. 26-5330 249.95

pfs:write

Easily create reports, letters and memos with advanced editing features and page headings and footers, centered text, right or left justification and more. The monitor displays boldface and underlined text. Best of all, pfs:write can use information stored in pfs:file to personalize form letters and even address the envelopes. Documents can be illustrated with charts created by pfs:graph or tables from pfs:report.

Tandy 2000. 26-5309 140.00

Database Management

pfs:file

A very simple way to create and organize your own business or personal filing system. You decide how your records are to appear by simply organizing information in "forms" that you design right on the display screen. Store, retrieve and review information in a fraction of the time it would take with a conventional filing system.

Tandy 2000. 26-5305 140.00

pfs:report

A powerful analysis tool that creates presentation-quality tabular reports from sales, inventory and other data stored in pfs:file. Sort from any data category and calculate averages, totals, subtotals and more. Prints in alphabetical or numerical order with automatic centering and justification.

Tandy 2000. 26-5306 125.00

dBASE III

An improved version of dBASE II makes dBASE III one of the most powerful and versatile data base management programs ever! "Assist" feature gives you a menu-driven "shell" that helps you learn the command functions—it practically teaches you the system as you go along. You can quickly create a full business information system that will grow as you grow. Files are easy to create, sort, retrieve and edit. And you can even perform complex mathematical calculations within a file. Maximum 4000 characters per field permits large text files. Other improvements over dBASE II include: maximum record capacity has been increased from 65,000 to 1 billion, 128 fields are allowed in a record as opposed to 32, up to 10 databases can be open at one time, numerical precision has been increased to 15.9 digits, (conforming to IEEE floating point standards), 256 memory variables are now allowed—an increase from 64, databases can contain as many as 2 billion bytes, and up to 16 files can be open at once (including index files).

Tandy 2000. 26-5353 695.00

Integrated Software

Framework

This program doesn't just process numbers—it processes ideas. Combines word processing, spreadsheet analysis, data management, graphics and telecommunications. Each operation is placed in a "frame" that separates it from the rest of the program. Each frame is automatically placed in an outline form, which you can modify or rearrange at any time. In other words, you can jot down notes or ideas in one frame, then create subframes which contain databases, spreadsheets, graphics and

reports which relate to these basic ideas. Framework also utilizes a "desktop" format that lets you view several operations at once on the screen. A special "zoom" function lets you instantly expand any frame to fill the entire screen. A built-in language lets you perform specialized operations automatically. Includes the five most needed applications in business. Requires 384K.

Tandy 2000. 26-5320 695.00

Symphony

Combines word processing, spreadsheet, communications, data base management, graphics and more. Symphony lets you call up information from your files, a subscription data base service, other personal computers or a mainframe, directly onto your worksheet. Then use the data to perform "what if...?" calculations. You may then draw a graph of the results. On-screen "Help" and tutorial guide. Requires 512K and graphics.

Tandy 2000. 26-5304 695.00

SuperCalc 3

Combines an advanced electronic spreadsheet with high-resolution integrated graphics and data management. Create line, bar and stacked bar graphs, pie and exploded pie charts, and even X-Y Hi-Lo and area graphs using single-keystroke commands. Spreadsheet gives you 63 columns and 254 rows, along with calendar and date calculation, and multiple storing options. Command sequences called "macros" simplify often-used operations. SuperCalc 3's powerful data base management module is based on the spreadsheet model. Requires graphics.

Tandy 2000. 26-5302 395.00

Advanced Graphics

Lumena

An amazingly versatile tool for artists, designers and illustrators to produce complex images with ease. Free-hand drawing with our GT-2000 Graphics Tablet is as easy as using a pencil on paper. Just touch the correct portion of the digitizer to select colors, shapes, letters, fonts, or to draw free-hand. Your images can be duplicated, moved, changed in size, rotated and more at the touch of the pen. And what colors! Lumena combines the two intensities of Tandy 2000's eight basic colors into 28 additional "dithers", or blends. Lumena also provides cycling and animation functions for really impressive graphics. Requires 256K (384K for cycling and animation) and GT-2000 or Digi-Mouse.

Tandy 2000. 26-5281 299.95

DR Draw

This interactive picture editor produces presentation-quality charts and diagrams. To build a picture, select geometric or text elements from the available options, using the optional DIGI-Mouse to place elements in the desired location.

Tandy 2000. 25-5279 295.00

Graphwriter

Create sophisticated presentation-quality graphics that look the way you want them to. Graphwriter combination set includes 23 different chart types. Multiple line headings, footnotes and comments are easy to insert. By using a "fill-in-the-blank" input form, charts can even be prepared by the support staff. Plot options include vertical, horizontal, half page and custom sized.

Tandy 2000. 26-5276 595.00

DR Graph

Displays line, bar, step, stick, scatter, pie and text-only charts on the screen. Print your graphs on paper or transparencies using a wide variety of printers. Simple screen instructions guide you through every stage of graph design, providing outstanding graphics without extensive training. You choose labels, titles, legends, colors, type styles and borders to add the final touch to your work. Add, move and modify the size of your text at will with the aid of the optional Digi-Mouse.

Tandy 2000. 26-5278 195.00

MultiMate/TM MultiMate International. pfs:/TM Software Publishing Corp. dBASE III and Framework/TM Ashton-Tate. Symphony/TM Lotus Development Corp. SuperCalc3/TM Computer Associates. Lumena/TM Time Arts, Inc. Graphwriter/TM Graphics Communications, Inc. DR Draw and DR Graph/TM Digital Research.

ACCOUNTING AND DESKMATE

MAI Basic Four® Interactive Accounting

MAI BASIC Four software modules are fully integrated, so that data is entered only once. The system can be tailored to meet your needs simply by answering specific parameter questions at the keyboard.

General Ledger

Provides the information you need to understand your company's financial health. Conforms to established accounting principles and maintains a complete audit trail to ensure data integrity. Provides for income tax liability posting, automatically posts recurring journal entries and more. You can distribute expenses to different departments in the company automatically. Prints trial balance, income statements and balance sheets complete with comparisons with prior year activity and budgets. Special transaction codes let you link it to other MAI/Basic Four accounting modules.

Tandy 2000. 26-5210 495.00

Accounts Receivable

Helps measure sales performance, increase collections and lower total accounts receivable. Alerts you to how much and when your customers owe you. Provides for cash or accrual basis, ages accounts to 120 days, maintains balance forward or detailed invoice accounts. Automatically pays the oldest invoice for a customer, or lets you identify the specific invoice paid. Records cash received with multiple deposits on the same day and automatically calculates late charges and sales tax. Statements are printed at the end of a period or on demand. You may enter after-the-fact sales transactions or print invoices. Reports include detailed sales journal, mailing labels, aged open invoice and more.

Tandy 2000. 26-5213 495.00

Accounts Payable

Tracks payment dates to take advantage of discounts, allows posting to one-time vendors and forecasts cash requirements. Provides cash requirements analysis, aged invoice reports and full audit trails. Works on cash or accrual basis. Prints bank reconciliation, checks, disbursement register, mailing labels and more.

Tandy 2000. 26-5212 495.00

Inventory Control

Tracks inventory by item number. Information on each item includes quantity on hand, reorder point, issue and receipt dates, unit price and cost. Choose LIFO, FIFO or average cost as costing method.

Tandy 2000. 26-5214 495.00

Add-On Modules

Additional interactive MAI Basic Four software packages are available through our exclusive Express Order Software service. Orders are transmitted electronically for fastest service.

The Home Accountant Plus

The Home Accountant also lets you label every transaction you make. When tax time comes around, you'll have every penny you've spent and earned neatly listed by category, and available at the touch of a button. You can display a bar graph and trend analysis for any selected budget category.

Tandy 2000. 26-5340 124.95

DeskMate

The system utilizes the Tandy 2000's control keys, so there are no complicated commands to memorize. Each day you'll be greeted by a menu that displays a calendar, appointment schedule and a list of each file stored for every function.

TEXT. Text processing made simple. Control-key editing features make it easy to compose and edit text right on the screen. Then print correction-free originals with an optional printer.

WORKSHEET. This electronic spreadsheet uses simple "plain English" entries to make complex calculations instantly! View countless "What if . . . ?" situations in seconds. You can print all or a portion of your spreadsheet. A valuable planning tool for everything from personal finance to marketing.

FILER. Create a name and address file, a small inventory list and more. Simple commands let you create and find files easily. You can sort files by one or more fields and also print your files in any order.

TELECOM. By adding an optional modem, DeskMate lets you communicate with a host computer, information service or another terminal. Information you receive can be saved, printed or stored on diskette for later reference. You can also send your files to other computers. TELECOM will even dial the phone number of anyone listed in FILER at the touch of a key!

CALENDAR. This part of DeskMate lets you set up an agenda for a month, as well as set your daily appointment calendar. Finding, adding and deleting events is easy. And you can also place events in an alarm file that will trigger an alarm through the Tandy 2000's built-in speaker.

MAIL. This special program lets you send and receive messages to and from other DeskMate users over the phone.

DeskMate software comes with a thorough, easy-to-understand tutorial manual, a reference manual and quick-reference card. Telecom and Mail require modem.

Tandy 2000. 26-5316 199.95

Important Software Notice

All Radio Shack computer programs are licensed on an "as is" basis, without warranty. Radio Shack shall have no liability or responsibility for any loss or damage caused or alleged to be caused directly or indirectly by computer equipment or programs sold by Radio Shack, including but not limited to any interruption of service, loss of business or anticipatory profits or consequential damages resulting from the use or operation of such computer or computer systems.



Find the Powerful Applications You Need with Tandy's Express Order Software Service

Your local Radio Shack Computer Center has the most complete selection of software available.

Our exclusive Express Order Software service brings you the hottest-selling packages—each one performance-proven and professionally supported by the software manufacturer. Your order is transmitted electronically and shipped the next business day for the fastest service.

Come in today to your local Radio Shack Computer Center or participating Radio Shack store or dealer and pick up your free copy of the new Radio Shack Software Reference Guide. In it, you'll find hundreds of popular programs. Choose from powerful accounting, word processing, spreadsheet analysis, database management, integrated software and multiuser packages. You'll also find the best in personal and educational software, plus exciting games. Radio Shack Computer Centers are your one-stop software headquarters. Come in today!

NEW LOW PRICE! TANDY 6000 HD



512K with 15-Meg. Hard Disk

NEW LOW PRICE!

3499⁰⁰

Was \$5499.00 in
Cat. RSC 16

Commercial Lease Available For Only \$125 Per Month
(Plus Applicable Use/Sales Tax)

- Features 512,000 Characters of Internal Memory—Expandable to 1 Megabyte
- Includes XENIX Multiuser Operating System to Support Up to 2 Terminals—Expandable to 6 Users
- One Floppy Drive and 15-Megabyte Hard Disk Built In
- Unique Dual-Processor Design (8-Bit and 16-Bit)
- Four Internal Slots for Easy User Expansion
- Multiuser Software Available for Accounting, Word Processing, Spreadsheet Analysis and Database Management

Multiuser Tandy 6000. For many companies, it's hard to justify the cost of a separate computer for each individual who could benefit by using one. That's why we designed the Tandy 6000. It's ideally suited for today's offices, providing simultaneous job-handling *without* the expense of multiple computers. It offers the high operating speeds and large memory capacity that many business users require. And it can handle complex, computation-intensive jobs and highly sophisticated programs that only a 16-bit computer can.

What the Tandy 6000 Can Do for You. Now you can accomplish complex tasks with ease—the Tandy 6000 microcomputer puts superior performance in a compact desktop system! Advanced 16/32-bit technology permits the Tandy 6000 to utilize much

more memory and process data at much higher speeds than 8-bit micros. The Tandy 6000 features 512K memory, easy user expansion and the XENIX multiuser operating system that lets you turn the Tandy 6000 into a three to six-workstation office system for accounting, spreadsheets, word processing, database needs and more.

Advanced 16/32-Bit Technology. The Tandy 6000 is designed around the Motorola 68000 microprocessor that accepts 16-bit data and processes it internally as 32-bit "words". A second microprocessor—the Z-80A—handles input/output and a variety of other "housekeeping" chores.

Software Compatible With Model 12. The Tandy 6000 can use the software designed for the Model 12 business computer (in the single-user mode only), plus multiuser software and other programs that are designed to take advantage of the Tandy 6000's advanced 16/32-bit technology.

Expandable. Two RS-232C serial communication interfaces and a parallel printer interface allow expansion with a variety of peripherals. Add additional memory and other options via the user-accessible card cage.

Deluxe Features. The Tandy 6000 includes a high-resolution 12" green video display with 24 lines of 80 characters, and a detachable typewriter-style keyboard with numeric keypad and 8 function keys.

512K Tandy 6000 With Built-In Hard Disk. Includes a self-contained 1.25-megabyte 8" floppy disk drive *and* a 15-megabyte hard disk drive. Add one external hard disk for a total of up to 85 megabytes of hard disk storage!

26-6022 3499.00

SPECIFICATIONS. Microprocessors: 8 MHz MC68000 16/32-bit CPU and 4MHz Z-80A 8-bit CPU. Direct memory access and vectored interrupts. Memory management includes protected system mode and user spaces. **Memory:** 512K RAM bytes, expandable to 1 million bytes. 2K video memory. **Keyboard:** 82-key professional-type, including Numeric Entry Keypad. Special keys include HOLD, ESCape, BREAK, CTRL, CAPS and REPEAT, plus Up, Down, Right and Left arrow keys and eight programmable Special Function Keys (F1 thru F8). **Video Display:** High-resolution 12" green display monitor with 80 or 40 characters per line by 24 lines. Displays upper and lower case characters with descenders, plus 32 "business graphics" characters. Automatic scrolling. Partial screen scroll protect available. **Disk Drive:** One floppy and one 15-megabyte hard disk. **External Expansion:** One secondary hard disk for up to 85 megabytes of storage. **Internal Expansion:** User-accessible Card Cage provides additional plug-in card slots. **External Connections:** One standard parallel port and two RS-232C serial ports. **Dimensions:** 13 1/2 x 21 1/2 x 28 1/8". **Power Requirements:** Built-in filtered power supply for 120VAC, 60 Hz. U.L. listed.

DELUXE DATA DISPLAY TERMINAL



795⁰⁰

- 14" High-Resolution Screen
- 80 or 132 Columns by 26 Lines
- Sculptured Keyboard

DT-100. Fully compatible with most DEC and UNIX-based software systems. Features green display screen, a high-resolution character set (128 ASCII), 16 programmable keys, cursor control keys and numeric pad. Terminal configuration is set from the keyboard. U.L. listed. 26-6052 795.00

Serial-to-Parallel Converter. Attach a parallel printer to the DT-100 when running under XENIX. 26-1198 99.95

DT-100 SPECIFICATIONS. Data Transfer Rate: Up to 38,400 bps. Video Size/Format: 24 lines (plus 2 status lines) of 80 or 132 characters. Upper and lower case. Video Attributes: Normal, underline, reverse and dim. Input/Output: One RS-232C communications port and one RS-232 printer port. Power: 120VAC, 60 Hz.

10-Megabyte Disk Cartridge System

Removable disk cartridge makes it easy to backup and store data. Get the flexibility of floppy disk storage combined with the high storage capacity and rapid access time of hard disks. Includes one 10-megabyte disk cartridge. U.L. listed.

26-1245 2195.00

Interface Kit for Tandy 6000/16. 26-6018 119.95

Hard Disk Systems

70-Megabyte System. Compatible with our XENIX system only. Use with our 12, 15 and 35-megabyte drives. Not compatible with 8-megabyte hard disk. Expand with three secondary drives.

New Low Price! Primary Drive. Requires cable kit and installation (not included). Was \$4295.00 in RSC-16.

26-4173 3999.00

New Low Price! Secondary Drive. Requires installation (not included). Was \$3895.00 in RSC-16.

26-4174 3299.00

35-Megabyte Primary Drive. Requires cable kit and installation (not included). 26-4171 2995.00

35-Megabyte Secondary Drive. Requires installation (not included). 26-4172 2695.00

Model III Cable Kit. Includes Model III LDOS. For use with 10-megabyte drive only. 26-1133 99.95

Model 4 Cable Kit. Includes TRSDOS 6.2. For use with 26-4155 and 26-1138 only. 26-1134 79.95

Model 4 Hard Disk Controller. Requires 26-1134 Kit (above). 26-1138 449.95

Model 12/16B Internal Hard Disk Kit. 26-4154 . . 2495.00*

Hard Disk Fan Air Filters. 26-1363 Pack of 3/99¢

Other Expansion Options

New Low Price! 256K Parity Memory Kit. For Tandy 1000/1200/3000/6000. Tandy 6000 requires two kits to upgrade. Was \$219.95 in RSC-16. 25-3062 129.95

New Low Price! 512K RAM Board. Card contains 512K RAM with sockets for adding another 512K. 1 megabyte total! Was \$1095.00 in RSC-16.

26-6015 979.00

Model 12 to Tandy 6000 Upgrade. Includes 68000 processor board and 512K RAM board. 26-6014 1595.00

RS-232 Card. Allows six people (instead of three) to use the power of the Tandy 6000. Requires a minimum of 512K memory (768K recommended) and RS-232 cables.

26-6013 199.00

Model 12 Card Cage. Provides six plug-in slots for optional expansion boards. Requires installation, not included.

26-6017 199.00

High-Resolution Graphics Upgrade. For Model 12/II. Create sophisticated on-screen charts, graphs, geometric patterns, even animation. 153,600 pixels (640 x 240).

26-4104 499.00**

*Installation Required (not incl.) for Model II. Model 12 Requires Card Cage. **Installation Required (not incl.) for Model II or 16. Installation Recommended for Model 12 or 16B. Model 12 Requires Card Cage. **TC23**

MODEL 12/16/6000 LANGUAGES

Model 12 Languages

FORTRAN

Complete error documentation in compiler, and hex and octal addresses for compiler listing. Includes Editor, Compiler, Linking Loader, Subroutine Library, and a Source and Listing File Print Utility. ANSI-66 standard. 26-4701 299.00

Editor/Assembler

Quickly write, edit, test, assemble and execute programs in Assembly Language. Use with either 8080 or Z-80 mnemonics. Constants can be specified in octal, hexadecimal or binary. Line and character-oriented text editor. 26-4702 199.00

Series I Editor/Assembler

Program in machine language for faster execution and more efficient memory use. Editor features line numbering and re-numbering, single-letter commands and global search. Source text may be saved in disk files. Source files may be loaded together in memory. 26-4713 49.95

Assembly Language Development

Five-module package includes Editor, Assembler, Linker, Debugger and File Transfer. 26-4712 249.00

COBOL Development System

A high-level implementation of ANSI-74 COBOL. Features multi-keyed ISAM for quick access of data, interactive DEBUG, address stop, single and variable step display, extended ACCEPT/DISPLAY commands, full level-2 I/O commands, Editor and single-pass Compiler. 26-4703 299.00

COBOL Run-Time Diskette*

26-4704 40.00

COBOL Generator

Define a complete software package and generate a COBOL source program automatically. Requires two disk drives and COBOL Development System (26-4703). 26-4707 .. 995.00

Compiler BASIC

Features single-key ISAM to help organize and retrieve data, cross reference and interactive DEBUG to speed program development, easy calls to assembly language or other object programs, 14-digit floating point decimal format, full error control, complete CRT control, and single-pass compiler. (Note: For program development and not for conversion of existing software.) 26-4705 199.00

Compiler BASIC Run-Time Diskette*

26-4706 30.00

BASCOM BASIC Compiler

Designed to complement the Model 12 Microsoft BASIC Interpreter. Allows you to create programs that execute faster and require less memory than the same interpreted programs, in addition to providing source code security. BASRUN allows you to develop a system of related programs that can all be run using the same runtime environment. 26-4725 199.00

Tandy 6000 XENIX Languages

XENIX 3.0 Development System

Includes the powerful C language and many standard UNIX utilities for developing multiuser software. With assembler, text editor, a spelling dictionary, electronic mail, sort utility and compiler generators. Requires a minimum of 256K (512K recommended) and hard disk drive. 26-6402 750.00

XENIX COBOL Development System

A high-level implementation of the ANSI-74 COBOL standard for minicomputers. Includes an editor, interactive debugger, a single-pass compiler, and more. 26-6455 699.00

XVIEW

A versatile, full-screen text editor for creating and editing program source text (operating under XENIX).

26-6404 149.00

FORTRAN 77

Write and execute main-frame-level Fortran applications. Features Hollerith and hexadecimal constants, symbols of up to 31 characters and an "include" statement. Requires XENIX Development System (26-6401 or 26-6402).

26-6451 699.00

PASCAL-2

A transportable multi-pass compiler that adheres to the Pascal ISO standard while performing optimizations to generate compact, fast code. Requires XENIX Dev. System (26-6401 or 26-6402). 26-6452 699.00

XENIX BASIC Interpreter

Chain other MBASIC programs and pass common variables. Supports 40 significant characters for variable names, logical record lengths of up to 32K, and record locking for multiuser support. 26-6457 299.00

XENIX V7 to 3.0 Upgrade

Upgrade a Model 16 running XENIX 1.3X to XENIX 3.0 without upgrading hardware to a Tandy 6000. With PAL chip (requires installation, not included). 700-3031 199.00

XENIX 3.0 to 3.1 Upgrade

700-3035 99.95

XENIX BASIC Compiler

Based on Philon Fast/Basic-M language. Closely compatible with Microsoft's MBASIC. Features separate compilation facility and extremely fast execution of compiled code.

26-6458 349.00

Mainframe Protocol Packages

Allows your Model 12 to communicate over point-to-point or multi-point telephone lines (via a synchronous modem or modem eliminator).

BIS-3270

Communicate via standard IBM bisynchronous protocol and emulate an IBM 3271/3274/3275/3276 display station and 3284/3286 printer. BIS-3270 appears to the system as a control unit with one keyboard display and one separately addressable printer. All functions of the IBM 3270 display station are supported. Requires modification of the "A" serial port (extra charge). 26-4730 1495.00

BIS-3780

Communicate via standard IBM bisynchronous protocol with any IBM S/360, S/370, 30XX and 43XX host or non-IBM host that provides support for IBM 2780/3780/2770/3741 devices. Your Model 12 can function as a remote terminal or a Remote Job Entry (RJE) terminal. Editor/Assembler (26-4702) may be required for mode configuration. Requires modification of "A" serial port (extra charge).

26-4716 995.00

Micro-SNA/3270

Communicate via standard SNA/SDLC protocol with any IBM S/360, S/370, 30XX and 43XX IBM host or non-IBM hosts that provide support for IBM 3270 devices. Your Model 12 can emulate an IBM 3274/3276 display station. Requires modification of the "A" serial port (extra charge).

26-4717 699.00

*NOTE: Run-Time Diskettes are available separately for those who intend to sell software developed on our compilers. You don't need to purchase a separate Run-Time Diskette for your own use.

Model 12 Software Will Run on a Model 12 and on a Model 16 or Tandy 6000 in the Model 12 (Single-User) Mode. Bascom BASIC Compiler, FORTRAN, Editor/Assembler, Series I Editor/Assembler, XENIX and XENIX BASIC Interpreter and Compiler/TM Microsoft Corp. BIS 3270, BIS 3780 and Micro-SNA/3270/TM Micro Integration. XENIX COBOL Development System, Compiler BASIC and FORTRAN 77/TM Ryan-McFarland. COBOL Generator/TM Phoenix Systems. XENIX PASCAL-2/TM Oregon Software.

SINGLE/MULTIUSER ACCOUNTING

Multiuser Software

Increase office productivity with our multiuser Tandy 6000/Tandy 3000 programs. They allow several people to perform different tasks simultaneously. The Model 12 software offers the same features, but is single user software.

General Ledger

Interacts with Payroll, Accounts Payable and Accounts Receivable. Reports include Income Statement, Balance Sheet and GL Worksheet.

Model 12. 26-4601 399.00

Tandy 6000/Model 16. 26-6201 599.00

Tandy 3000. 25-4301 599.00

Accounts Receivable

Open item and/or balance forward system to interface with General Ledger, Order Entry/ICS and Sales Analysis.

Model 12. 26-4604 399.00

Tandy 6000/Model 16. 26-6204 599.00

Tandy 3000. 25-4304 599.00

Accounts Payable

An accrual system that will interface with General Ledger.

Model 12. 26-4605 399.00

Tandy 6000/Model 16. 26-6205 599.00

Tandy 3000. 25-4305 599.00

Payroll

Calculates and prints checks and provides distribution to General Ledger accounts.

Model 12. 26-4603 499.00

Tandy 6000/Model 16. 26-6203 699.00

Tandy 3000. 25-4303 (Avail. 9/30/86) 699.00

Order Entry/Inventory Control System

Allows both single-pass invoicing and two-pass open order entry with separate billing. Requires and interacts with Accounts Receivable.

Model 12. Requires three disk drives or hard disk.

26-4607 399.00

Tandy 6000/Model 16. 26-6207 599.00

Tandy 3000. 25-4307 599.00

Sales Analysis

Data is obtained from customer file of Accounts Receivable or item file of Order Entry/Inventory Control System. Shows sales activity by customer, volume, salesmaker, item and more.

Model 12. Requires three disk drives or hard disk.

26-4608 249.00

Tandy 6000/Model 16. 26-6208 399.00

Tandy 3000. 25-4308 399.00

Query 16

Retrieve desired information from COBOL data files. Use Query with General Ledger (26-6201), Payroll (26-6203), Accounts Receivable (26-6204), Accounts Payable (26-6205), Order Entry/ICS (26-6207) and Sales Analysis (26-6208). Also interfaces with Multiplan (26-6480) and SCRIPSIT (26-6431). Requires hard disk.

Tandy 6000/Model 16. 26-6212 249.00

Single-User Software

These deluxe programs can form the heart of a superb dedicated accounting system—ideal for the small business which has one person that handles all the bookkeeping. The interactive capability of these packages allows easy, automatic update of each aspect of your firm's operation.

Accounts Payable

Prints cash requirements, aging reports and checks. Up to 500 vendors and 3000 invoices. Multi-drive update to General Ledger (26-4501). 26-4505 299.00

Accounts Receivable

Generates monthly statements and prints invoices. Multi-drive update of General Ledger. 26-4504 299.00

Payroll

Earning, deduction and workers' compensation categories for 200 employees. Multi-drive update to General Ledger (26-4501). 26-4503 399.00

Order Entry with Inventory Control

Maintains 650 accounts and 2000 inventory items. Interfaces with Accounts Receivable (26-4504). Requires four disks. 26-4514 199.00

Manufacturing Inventory System

Holds 2100 inventory items, 600 bills with 99 components each, and 200 manufacturing orders. Models 12 and 16 require two drives.

Model 12. 26-4509 750.00

Tandy 6000/Model 16. 26-6309 850.00

Job Costing

Aids small construction companies in the preparation of job estimates. Track the progress and cost of each job.

Model 12. 26-4513 149.00

Tandy 6000/Model 16. 26-6209 199.00

Inventory Management System

Handles 3000 inventory line items, 200 vendors, quantities to 999,999 and prices to \$9999.99. For single-sided floppy operation only. 26-4502 199.00

Inventory Control System

Assists in cycle counting, ordering from vendors, handling partial receipts and designing reports.

Model 12. Requires two disk drives. Model 12 handles approximately 6000 inventory items per diskette. 26-4602 .. 299.00

Model 12 Hard Disk or Thin-Line Floppy. Up to 30,000 items. 26-4802 399.00

Tandy 6000/Model 16 Hard Disk. Supports three users. Handles 30,000 items. 26-6302 399.00

Model 12 Software for Law Offices

The Precedent™ Legal Accounting System

An office management program designed specifically for attorneys. It allows total integration of Time and Billing, General Ledger, and Cash Disbursements.

26-4620 795.00

Docket Control

Avoid missed deadlines and appointments. May be used alone or with The Precedent (above).

26-4622 249.00

Time Accounting

A "must" for any business that requires a detailed time analysis. Prepare billing worksheets and print statements. Model II requires four disk drives.

26-4520 499.00

Litigation Support

A versatile computerized information storage and retrieval system designed for the attorney.

26-4545 299.00

Model 12 Software for Medical Offices

Medical Office System

Accommodates a large individual practice or a medical clinic with up to ten physicians. A powerful forms generator can produce any type of invoice or insurance form. Requires two disk drives.

26-4508 750.00

II/12/16/6000 BUSINESS SOFTWARE

Word Processing

SCRIPSIT Word Processing

Prepare correction-free letters, memos and reports! Plain English prompts and menus put advanced editing capabilities at your fingertips and are accessed with just two keystrokes. A Global Search feature will locate a specified word wherever it occurs in text for selective editing. Other features include ASCII convert, programmable user keys, background printing and embedded print codes. Includes manual and self-paced training course on audio cassettes.

Model 12 Thin-Line Floppy, Hard Disk. 26-4835 ... 399.00

SCRIPSIT Dictionary

Checks and displays your text on the screen, highlighting misspelled words for correction. Contains over 100,000 words. You can add up to 2000 more. Requires SCRIPSIT and one additional disk drive.

Model 12 Thin-Line Floppy, Hard Disk. 26-4834 ... 199.00

Model II. 26-4534 ... 199.00

SCRIPSIT Utilities

Allows you to move columns of text and numbers, as well as provide totals, subtotals and averages of numerical columns. You can also copy often-used text stored in a special "boilerplate" utility. Communications utility lets you transmit and receive documents (requires modem). 26-4532 ... 129.00

SCRIPSIT Plotter Driver

Add clarity to reports and transparencies. Print nine character sizes in six colors. Draw boxes around your text, straight lines, underlines, superscripts and subscripts. Requires SCRIPSIT and Multi-Pen Plotter. 26-4536 ... 49.00

SCRIPSIT 16

Allows several people to prepare correction-free letters, memos, forms and reports at the same time using a Tandy 6000 multiuser system. Multiuser SCRIPSIT includes several enhancements for customizing your text. A powerful "Global Find, Delete and Replace" routine can search not only for a character or string of characters, but also for control characters, such as carriage returns or printer codes. SCRIPSIT supports a full complement of printing features, including proportional spacing and mixed font styles within documents. Includes manual and self-paced training course on audio cassettes.

26-6431 ... 499.00

SCRIPSIT Speller

A spelling system based upon *The American Heritage Dictionary* published by Houghton Mifflin Company. Contains over 74,000 words. Requires SCRIPSIT 16 word processing software. 26-6434 ... 249.00

Database Management

Profile II Electronic Filing

A powerful program that lets you design your own data base and search through your records to find just the information you want in seconds. Store up to 99 data fields in a single record, and print up to five different reports for each file. Search your files by up to 36 user-defined criteria. Stores up to 3000 records with a one-disk Model 12, up to 20,000 with additional disk drives. 26-4512 ... 179.00

Profile Training

Learn how to put Profile II to work for you. Includes four audio cassettes, 96-page manual and diskette. Requires Profile II. 26-4516 ... 69.00

Profile Plus

An expanded version of Profile II. Built-in math functions, "associated" fields, an indexing system and selectable record lengths. 26-4515 ... 299.00

Profile Plus Upgrade

Gives Profile II users the added features of Profile Plus. 26-4517 ... 120.00

Profile Forms

Prints a detailed, single-page record on each item in your file

instead of a one or two line listing. Requires Profile Plus. 26-4556 ... 125.00

Profile Archive

Purge inactive records and list them on a line printer and/or merge them into a history file. Requires Profile Plus.

26-4557 ... 49.00

Profile Prosort

Create a high-speed index to pinpoint precise information. Requires Profile Plus. 26-4558 ... 149.00

Profile Lookup

Cross reference information from up to five different data bases. Requires Profile Plus. 26-4559 ... 199.00

Menu Generator

Create menus in machine code for BASIC or COBOL programs. 26-4555 ... 39.00

Profile 16

Allows several operators to access, update and use the same file at the same time. Design your Tandy 6000 Profile system to match your present manual methods—no need to learn new procedures. All screen prompts and menus are in plain English. And you can change or expand your system at any time without having to re-enter data. 26-6412 ... 499.00

UNIFY 3.2

A fully relational database manager designed to run and develop sophisticated business applications which handle large amounts of data. Included features are single-step database creation, interactive data entry and manipulation, a visual screen design utility (PAINT), interactive report generation (RPT), detailed menu handling, a multi-level security system, default field value assignments, domain checking during data entry, transaction logging, multi-key indexing, international date formats, and error logging. A tutorial and an on-line HELP facility are also included. Requires 512K and hard disk drive. 26-6416 ... 999.00

Spreadsheet Analysis

VisiCalc Business Forecasting Model

Allows you to generate financial reports based on your VisiCalc spreadsheets. Features preformatted templates for income statement, balance sheet, cash flow and financial ratios. Three supporting templates—sales and cost of goods sold, salaries, and assets and depreciation—are provided. 26-4526 ... 99.00

Multiplan

Consolidate related worksheets so that information is transferred between them automatically. All prompts are full length words or phrases. Plain English names can be assigned to any column, cell or area. If you have any questions, an On-Line Reference Guide gives you instant help. Up to eight display windows can be created on the screen simultaneously. Multiplan can directly utilize your current VisiCalc files, too. Includes tutorial manual. 26-4580 ... 249.00

Multiplan Multiuser

A truly sophisticated, yet incredibly easy-to-use decision support tool that allows several people to do spreadsheet analysis at once. 26-6480 ... 349.00

Integrated

DeskMate

DeskMate, a dual-purpose program, not only provides five popular applications: Text, Worksheet, Filer, Calendar/Alarm and Mail, but also provides a user friendly approach to XENIX. DeskMate has the ability to add existing applications such as SCRIPSIT 16, Profile 16 and Multiplan to an application window. These applications can be executed from this window. DeskMate is one of the easiest ways to become familiar with different computer applications, as well as XENIX.

26-6405 ... 299.00

MODEL 4D WITH DESKMATE®



1199⁰⁰

Low As \$55 Per Month*

- Includes DeskMate 6-in-1 Software for Word Processing, Electronic Filing, Spreadsheet Analysis, Telecommunications, Calendar/Alarm and Electronic Mail
- Two Built-In Double-Sided Drives for 736K of Disk Storage
- 64K Internal Memory—Expandable to 128,000 Characters
- Large Selection of Ready-to-Run Programs Available
- Expands Easily as Skills or Needs Grow

SPECIFICATIONS. Microprocessor: 4MHz Z-80A (2 MHz in Model III mode). Memory: 14K ROM, 64K RAM expandable to 128K (provides for disk drive emulation in RAM). Keyboard: 71-key typewriter-style with datapad, plus control, caps and 3 programmable function keys (F1, F2, F3). Video Display: 80 x 24 (Model 4 mode), 64 x 16 (Model III mode), or double-width 40 or 32 characters per line. Upper and lower case and reverse video (Model 4 mode). 96 text, 64 graphics and 96 "special" characters. Language: Microsoft 5.0 BASIC. Sound: Obtainable from BASIC. Toggled "keyclick". Disk Drives: Two built-in double-sided 368K 5 1/4" drives. External Connections: Cassette operation at 500/1500 baud Parallel printer port. RS-232C serial port. Buffered input/output bus. Dimensions: 12 1/2 x 18 7/8 x 21 1/2". Power: 120VAC, 60Hz.

Model 4D with DeskMate. The perfect desktop computer for busy managers, professionals, educators and home users. The Model 4D is a stylish, self-contained desktop unit with a 12" built-in 80 x 24 display. A parallel printer interface is included, as well as an RS-232C serial interface. The Model 4D runs most TRSDOS® and LDOS software designed for the Model 4 and 4P, as well as for Model III/I (in the Model III mode). U.L. listed. 26-1070 1199.00
TRSDOS 6.2 Utility.
 26-0315 39.95
TRSDOS 6.2. 26-0316 39.95

Increase the Versatility of Your Model 4/III/I Computer

Model 4 Internal Disk Drive 0. Includes a 184K, 5 1/4" double-density disk drive with TRSDOS 6 operating system, Disk BASIC and manual. 26-1127 399.95*

Model III Internal Disk Drive 0. Includes TRSDOS, Disk BASIC and manual. 26-1162 399.95*

Model III/4 Internal Disk Drive 1. 26-1163 149.95*

New Low Price! External Disk Drive. Adds 184K of data storage to your Model III or 4. Internal Drive #0 required. U.L. listed. Was \$319.95 in Cat. RSC-16. 26-1164 199.95

New Low Price! Model 4 64K RAM Kit. Expands 64K Model 4 to 128K. Required for Model 4 cassette-to-disk upgrade. Extra memory not accessible by BASIC. Was \$69.95 in Cat. RSC-16. 26-1122 59.95*

Model 4 Upgrade Kit. Converts Model III disk computer to a Model 4 disk system (except for cabinet). Includes new keyboard, 64K RAM, TRSDOS 6 diskette with Disk BASIC. 26-1123 399.95*

Model III/I 16K RAM Expansion Kit. 26-1102 29.95*

Model III BASIC and 16K RAM Kit. Upgrades 4K Level I to Model III BASIC. For Model III only. 26-1121 129.95*

Model 4 High-Resolution Graphics. 640 x 240 resolution. Requires a minimum 64K 1-Disk Model 4. Installation required (not included). 26-1126 219.95

Model III High-Resolution Graphics. Requires 48K 1-Disk Model III. 26-1125 99.95

Model III/4 RS-232C Serial Communications Board and Cable. Requires modem and software. Installation required (not included). 26-1148 79.00

Model III/4 Hard Disk Kits. Allows you to add our 15 or 10-Megabyte Hard Disk. Requires 48K 1-Disk Model III or 64K 1-Disk Model 4.

15-Megabyte Model III Kit. 26-1133 99.95

15-Megabyte Model 4 Kit. 26-1134 79.95

Model 4 Hard Disk Controller. 26-1138 449.95

Model I DOS. 26-310 14.95

Model III DOS. 26-312 14.95

*Installation required (not included). *REVOLVING CREDIT AVAILABLE—See Page 2.

TC27

MODEL 4/III BUSINESS SOFTWARE

Accounting

General Ledger

III/4 (D) Makes small business accounting procedures faster and easier. Maintains accurate records of all bookkeeping transactions and provides a balanced ledger. Use General Ledger alone or interface with the Accounts Receivable, Accounts Payable and Payroll programs for a complete, interactive accounting system. Handles up to 100 accounts and 1150 monthly transactions. Generates easy-to-read financial reports, including Trial Balance (with or without a worksheet), Income Statement, Balance Sheet, General Ledger, Account List with all accounts (or a specified range of accounts) and their current-period and year-to-date balances, Posted Transactions Report and Unposted Transactions Report for the current period.
26-1540 199.95

Accounts Receivable

III/4 (D) A balance forward system which provides rapid and accurate monitoring of sales and incoming funds. Interfaces with General Ledger above—all transactions are summarized and the totals are automatically posted to General Ledger. Offers seven standard General Ledger accounts, plus 10 user-definable accounts. Handles up to 2000 transactions per month with up to 150 customers on file. Reports include Unposted Transactions, Posted Transactions, Customer List, General Ledger Account List and Aging Report on selected customer accounts. Offers optional use of minimum payment amount on statements, and optional late charge processing (compounding option also available). 26-1541 199.95

Accounts Payable

III/4 (D) Automatically posts transactions and payments to General Ledger program. Handles up to 1100 transactions, 75 vendors, five General Ledger expense distributions per invoice and 14 invoices per check. Includes four General Ledger accounts, plus 10 user-definable accounts. Calculates due dates, discount dates and discount amounts by vendor payment terms. Prints Unposted Transactions List, Transaction Posting Report, Vendor List, Open Items List, Cash Requirements Report, Vendor Mailing Labels, G/L Account List, G/L Distribution Report, Check Review Report (for verification before check printing), Checks, Check Register and Payment Posting Report.
26-1542 199.95

Invoice Writer

III/4 (D) Provides a rapid and accurate method of creating invoices using the up-to-date information contained in the Accounts Receivable system. Automatically computes taxes and discount rates that are defined by you. Requires Accounts Receivable (26-1541). Interfaces with ICS (26-1545).
26-1544 49.95

Payroll

III/4 (D) Tracks earnings, deductions and taxes for each employee, as well as employer contributions such as FICA, FUI, SUI and more. Interfaces with the General Ledger program. You can customize your system in accordance with local, state and federal tax laws. Processes up to 80 employees, each with up to nine earnings and nine deductions categories. Handles payroll tasks for up to three states simultaneously. Earning/Deduction types allow changing amounts for employees, taxed or exempt. Also define categories for FLSA and EEOC reporting, keep historical records by period, quarter and year, and more. Print payroll checks. 26-1543 199.95

W-2 Writer

III/4 (D) For use with the Payroll system above. Using the information already collected on the Payroll data diskette, W-2 Writer saves you time by printing W-2 forms customized to fit your needs. 26-1539 49.95

Inventory Control

4 Designed to make inventory control easier and more accurate. Produces a reorder report showing items below designated

reorder level, plus an on-hand listing of items. Prints ten major reports, plus nine custom reports designed by you. Prints purchase orders and labels. Allows physical inventory count to be taken by cycle and lets you automatically reorder stock. Requires 3 floppy drives. Model 4P requires hard disk.
26-1545 199.95

New! Remote Inventory Control

4 (E) Scan bar codes representing inventory item numbers using a bar code wand and a Model 100 or 200 portable computer. Record physical count, sales, shipping and receiving, then transfer this data to Inventory Control (above) on the Model 4. 26-1535 49.95

COBOL Query

4 (F) Retrieve desired information from COBOL data files. Enter a query by specifying the file and fields from which you want to retrieve data and the selection criteria (if any). Use Query with General Ledger, Payroll, Accounts Receivable, Accounts Payable, Inventory Control, Multiplan and SCRIPSIT. 26-2026 149.95

NOTE: Three disk drives required to interface programs. All programs require a printer capable of printing 132 columns or an 80-column printer capable of printing 132 columns in condensed format.

Industry Specific

Apartment Management System

4 An efficient and easy-to-use system designed to provide property owners and managers with rapid and accurate monitoring of apartment complexes. Provides a printout of all transactions. Maintains a history of repair orders. Stores up to 450 apartment units on each diskette. Prints mailing labels. Requires Model 4 with three floppy drives or Hard Disk.
26-1538 299.95

Real Estate Finance

III (D) Ideal for the agent, investor, broker, lender or appraiser. Features Complete Mortgage, Equity, Present Worth and Building Developmental Analyses, as well as Rate of Return, Income and Expense Projections and more.
26-1579 99.95

Agricultural

AgriData

III (C) Access the latest agricultural marketing, finance, news, weather, general business and production information from the AgriData Network (formerly the AgriStar service). All you need is a Model 4 or Model III and a telephone interface. Includes a user's manual with quarterly updates, a reference flip chart, a subscription to Farm Futures Magazine, a newsletter and a toll-free 24-hour support service from AgriData Resources. Requires modem. 26-2227 399.00

Time-Saving AgDisk VisiCalc Template

AgDisk makes the popular VisiCalc "electronic worksheet" program easy to use for agricultural applications. The template below automatically loads your headings and formulas.

Feedlot Cattle Management

III (D) Templates for cattle feeder, higher grade, steer marketing, carcass evaluation, cattle net energy, metabolizable protein and urea fermentation potential, protein supplement and ration formulation. 26-1613 69.95

AgDisk software packages require an 80-column printer.

Minimum Hardware Requirements

III = Model III	4 = Model 4 Only	
I/III = Model I or III	III/4 = Model III or 4	
(A) 32K 1-Disk	(D) 48K 2-Disk	(G) 128K 2-Disk
(B) 32K 2-Disk	(E) 64K 1-Disk	(H) 16K Level II or
(C) 48K 1-Disk	(F) 64K 2-Disk	Model III BASIC

DISK SOFTWARE FOR MODEL 4/III/I

Productivity

DeskMate for the Model 4/4P

4 (E) DeskMate puts your Model 4D to work right from day one. Each day you'll be greeted by a menu that displays a calendar, appointment schedule and a list of each file you have stored. **TEXT.** Control-key editing features make it easy to compose and edit text right on the screen. **WORKSHEET.** This electronic spreadsheet uses simple "plain English" entries to make complex calculations instantly. View countless "What if . . . ?" situations in seconds. You can print all or a portion of your spreadsheet. **FILER.** Create a name-and-address file, small inventory list and more. Simple commands let you create and find files easily. You can sort files by one or more fields and print your files in any order you wish. **TELECOM.** By adding a telephone modem, DeskMate lets you communicate with a host computer, information service or another terminal. Information you receive can be printed or stored on your diskette. You can also send files to other computers. **TELECOM** will even dial the phone number of anyone listed in the **FILER** program—at the touch of a key. **CALENDAR.** Set up an agenda for a month, as well as your daily appointment calendar. **MAIL.** This special program lets you send and receive messages to and from other DeskMate users over the phone. (Note: Telecom and Mail require modem.) 26-1608 199.95

Spreadsheet Analysis

Enhanced VisiCalc

4 (E) This versatile management and engineering planning tool takes advantage of Model 4's 128K memory capacity and 80x24 display. You simply define the formulas, enter the figures and VisiCalc performs all calculations automatically. Change any value or formula, and VisiCalc instantly updates every related number! You can view countless "what if . . . ?" situations in seconds. 26-1520 99.95

Multiplan

4 (E) An incredibly easy-to-use decision-making tool that supports 128K memory for larger spreadsheets. Multiplan lets you consolidate related worksheets so that information is transferred between them automatically. All prompts are full length words or phrases. Plain English names can be assigned to any column, cell or area. If you have any questions, an On-Line Reference Guide knows where you are in Multiplan and offers information related to your problem. With Multiplan, up to eight display windows can be created on the screen simultaneously. Multiplan can also directly utilize your current VisiCalc files. Includes tutorial manual. 26-1530 199.00

Target PlannerCalc

4 (E) Create your own financial models by entering and processing data by column, row or individual location. Features a variety of mathematical operations, including conditional commands. Prompts are in plain English and a handy "Help" screen is available at the touch of a key. 26-1512 99.95

Word Processing

Disk SCRIPSIT®

4 (E) Prepare correction-free memos, letters, reports and manuscripts on the screen in an 80-character by 24-line format. Editing features let you delete, insert and move blocks of text easily. Then print as many correction-free copies as you need with an optional printer. Includes a "global search" function, reformatting, hyphenation, centering, automatic headers and footers, justification, margin and tab settings, automatic page numbering and more. 26-1596 99.95

SCRIPSIT

I/III (A) 26-1563 99.95

SuperSCRIPSIT®

4 (E) All the features of Model 4 SCRIPSIT and more. Includes true proportional-spaced printing, multiple line spacing (including half-space), and "save and recall" multiple paragraph

formats. Displays full 80x24 format with reverse video to help in editing. Features align tabs, automatic pagination and user-definable print codes. Supports underline, double underline, boldface, super and subscripts, and multiple column printing (depending on the printer). Includes self-paced training course on audio cassettes, training manual, reference manual and reference card. Requires printer. 26-1595 199.00

SuperSCRIPSIT

I/III (C) Includes all of the features of Model 4 SuperSCRIPSIT, but in a 64x16 display format and no reverse video. 26-1590 199.00

SCRIPSIT PRO

4 (G) Our most powerful word processing program. Similar to SuperSCRIPSIT (above), but with these additional features: windows for viewing two documents simultaneously, chaining of document modules, boilerplating, footnoting, manipulation of columns of text, and access to DOS commands from within the program. 26-1601 249.95

Tape SCRIPSIT®

I/III (H) Compose and edit text on the video display, then use an optional printer to produce correction-free letters and reports. Features centering, headers, footers, global search and more. Save text on cassettes for later revision (requires recorder). 26-1505 39.95

SCRIPSIT Spelling Dictionary

4 (E) Automatically checks text prepared with SuperSCRIPSIT for misspellings. Contains 73,000 words. Add your own user list, too. 26-1600 99.95

I/III (D) For text material prepared with SCRIPSIT, SuperSCRIPSIT or ASCII files. (Requires 3-disk system on Model I with SuperSCRIPSIT.) 26-1591 99.95

Database Management

Profile® 4 Plus

4 (F) Create your own personalized electronic filing system! A full-screen Define Files program makes it easy to create and change fields, even after the file is expanded. Sort and select records by any field in any segment of the file. And sorting is extended over all available disk space—not just RAM. Features indexing for faster sorting and selection. Sort by up to five fields—in ascending or descending order—to a maximum of 85 characters. And you can select records using up to 16 different search criteria. Mass operations are accessed via indexes, as well as the regular scan operation. Indexes for report and label printing, and SuperSCRIPSIT and VisiCalc selections. A built-in math package can perform arithmetic operations—such as calculating taxes, extensions and totals—among several fields and then update another field automatically. Stores up to 700 records of 255 characters in length on a 2-disk data base, 2900 with 4 disks. Create up to 36 different reports and 36 different sets of mailing labels for each file. Design reports and labels up to 200 characters across and 99 print lines down. Up to ten different screen formats for each file. Up to 36 SuperSCRIPSIT and VisiCalc spin-off file formats per file for reports and form letters. Comes with easy-to-understand tutorial manual. 26-1635 249.95

Profile III Plus

III (D) Store almost any type of information, then retrieve it at the touch of a key. User-designed file layout, input screens and reports. Supports multiple screen designs for different views of the data. Stores up to 700 records of 255 characters in length on a 2-disk system, 2100 records with 4 disks. Allows up to 99 fields per record. Comes with easy-to-understand tutorial manual. 26-1592 199.00

Hard Disk Profile III Plus

III (C) Includes all the features of Profile III Plus and allows much larger files (up to 65,535 records). Faster searches due to increased access speed of hard disk. 26-1593 299.00

MODEL 4/III/I SOFTWARE

Financial

The Home Accountant

III (D) A comprehensive personal finance system for you and your family. Lets you define up to 99 budget categories, monitor transactions, keep track of up to five checkbooks and print checks. Produces eight financial reports and bar graphs for any budget category with optional printer. Shows a historical trend analysis for any budget category. 26-1511 99.95

Money Decisions Series

III (D) Each program puts the most frequently used business and financial problem-solvers at your fingertips! Takes your information from prompts and performs sophisticated calculations. Lets you create a set of problem-solving assumptions and then calculates "before and after" effects of multiple alternatives. Each can be used alone or in conjunction with the other Money Decisions programs. Produce formatted reports with optional printer. Each program in the series comes with an extensive tutorial manual.

Money Decisions I: Investment Analysis. Includes Future Investment Value, Initial Investment, Annual Interest Rate, Internal Rate of Return and more. 26-1620 49.95

Money Decisions II: Real Estate and Loan Analysis. Includes Principal on a Loan, Regular Payment on a Loan, Last Payment on a Loan, Term of a Loan, Annual Interest Rate on a Loan, Mortgage Amortization Table and more. 26-1621 49.95

Money Decisions III: Business Statistics and Forecasting. Includes Risk Adjusted Net Present Value, Payoff Matrix Analysis, Regression Analysis/Forecasting, Bayesian Decision Analysis and more. 26-1622 49.95

Money Decisions IV: Business Management. Includes Lease Purchase Analysis, Depreciation Switch, Salvage Value, Bar Graph and more. 26-1623 49.95

Money Decisions V: Advanced Investment Analysis. Includes Future Investment Value (Uneven Cash), Present Value of Tax Deduction, Discount Commercial Paper, Accrued Interest on Bonds and more. 26-1624 49.95

Graphics

Business Graphics Analysis

III (D) Perfect for corporate planners, analysts and managers. Turns complicated numeric data into easy-to-understand charts and graphs. Select pie, bar, line or scatter charts, supply the data and the program quickly displays your graph on the screen. Allows editing of titles and labels before printing. Enter data from keyboard or disk files using VisiCalc. 26-1597 .. 174.95

Communications

Micro/Courier®

III (D) Send and receive electronic mail quickly, inexpensively and reliably! MICRO/Courier lets you send any TRSDOS file you can store and access with your computer to any other personal computer with the same communications protocol. Or access information services like Dow Jones News/Retrieval or CompuServe. Includes "unattended" mode that allows automatic dialing after business hours for reduced rate. Requires Modem II and RS-232C interface. 26-1589 149.95

Programming Languages

Assembly Language Development System

III/4 (D) Powerful package that's a necessity for the assembly language programmer. With full screen Editor, Assembler with sorted cross-reference listing, Linker for creating an absolute file, automatic File Transfer, and Debug modules. Offers numerous important and helpful features and includes TRSDOS 6 and Model III TRSDOS 1.3 support. 26-2012 149.00

Editor/Assembler, Series I

I/III (A) Allows advanced programmers to program in Z-80 assembly language. Includes an editor/assembler, sample programs and extensive 255-page manual—including detailed descriptions of the Z-80 mnemonics. 26-2013 34.95

TC30

Model III Software Packages on This Page Will Run on a Model 4 in the Model III Mode

BASCOM-4

4 (F) Feature-packed for fast compilation of Model 4 BASIC programs. BASIC compiler lets you execute faster than the same interpreted programs, and require less memory. Includes compiler, linker routine library and run-time package. Source-code security is provided. 26-2218 195.00

FORTRAN

4 (F) Write programs in FORTRAN using EDIT-80, a powerful editor with commands for interline and intraline editing. Compiler reads your FORTRAN source program from diskette, translates it into relocatable object code and saves it on diskette. Linker lets you input the relocatable object program, execute it and save it on diskette as a TRSDOS command file. Assembler lets you create relocation assembly language subroutines that you can link to your FORTRAN programs. Includes 250-page manual. 26-2219 99.95

FORTRAN. III (D) 26-2200 99.95

COBOL

4 (F) Based on the ANSI '74 standard. Features single-step compiler multi-key ISAM, COBOL editor and DEBUG. A listing of the program is generated showing the original source statements, error information, data allocation, interactive DEBUG information and optional cross-reference of all program labels and data items. 26-2190 199.00

COBOL. I/III (D) 26-2203 199.00

BFBLIB BASIC Routines Diskette

I/III (B) Supercharge your programs with these 121 subroutines, functions and utilities described in BASIC Faster and Better & Other Mysteries (62-1002, not included). Modify routines or use "as is". 26-2021 19.95

XENIX Console Emulator

Lets you use a Model 4 computer as an ADDS-25 terminal to a XENIX computer system. Requires RS-232 port. 26-1599 99.95

Cassette Software

DOTPLOT-80

(G) Create beautiful graphics with easy-to-use BASIC commands. Requires graphics-mode printer. 26-2023 19.95

Tiny Pascal

(G) Great introduction to this structured programming language (fixed-point, non-array version). Includes sample programs to get you started. 26-2020 19.95

Basic Instruction

A primary aid in learning BASIC. Write simple programs within minutes. 26-2015 24.95

Disk Games

13 Ghosts

(C) Armed only with your "Ghosts Blaster", you're out to despoil a Ghost Town. You'll encounter a skeleton that's immune to your blast and a "Laughing ghost" with an annoying knack for waking up dangerous ghoulish friends. 26-1927 19.95

Zaxxon

Enter the floating fortress, destroy enemy defenses, and finally defeat the mighty robot, Zaxxon. Add an optional amplifier for great sound effects. 26-1956 29.95

Minimum Hardware Requirements

III = Model III

I/III = Model I or III

4 = Model 4 Only

Cassette software requires a Model 4/III/I computer and a cassette recorder.

(A) 32K 1-Disk

(B) 32K 2-Disk

(C) 48K 1-Disk

(D) 48K 2-Disk

(E) 64K 1-Disk

(F) 64K 2-Disk

(G) 16K Level II or Model III BASIC

COMMITMENT TO EDUCATION

When it's time to select computer hardware and software, educators can look with confidence to the Radio Shack Education Division. Since 1979, the Education Division has devoted its full-time efforts to supporting Tandy computers and the teachers who use them. Education Division staff in Fort Worth, Texas, develop and market high-quality software programs, provide customer support, and coordinate the activities of 20 Regional Educational Coordinators and more than 100 Radio Shack Education Specialists nationwide who work to make sure that schools get the computer capabilities they need at the best possible price. More than 175 professionals in the Radio Shack Education Division are working to provide schools with the best in computer hardware, educational software, service, and support.

Education Software Packages for Varied Needs

From kindergarten to college, from alphabets to zoology, educational software programs for almost any area of teaching are available for Radio Shack computers. The software packages described on the next three pages are only a few of the more than 125 titles published by the Radio Shack Education Division. And Radio Shack's Express Order system gives you direct access to more than 500 educational titles from a variety of



noted curriculum publishers—all available through your nearby Radio Shack store. For detailed descriptions of all of these programs, stop by your local Radio Shack for a free copy of the 1986 Educational Software Reference Guide (Catalog RSC-18E—see page 3). In addition, our Tandy Educational Software Sourcebook lists over 3000 software packages available for Radio Shack computers.

Tandy Teacher Support System

Teachers can count on Radio Shack for classroom support materials that help make teaching about computers easy! Our structured courses help teachers teach and help students learn.

These computer-skills courses cover the topics most widely taught in the schools: the BASIC, Pascal, and LOGO computer languages; the computer disk operating system; and applications such as word processing, database management, and spreadsheet analysis.

Each course includes overhead transparencies that provide the framework for a structured presentation of the material. A detailed teaching guide gives notes keyed to each transparency. Student workbooks come with the package to provide a detailed note-taking guide plus quizzes and hands-on computer activities. Twenty-five student workbooks are included; additional copies are available separately.

As the teacher presents each transparency, he or she works with the students to fill in missing pieces of information on the overhead. At the same time, students add the missing information to their workbooks. Hands-on computer demonstration is



an important part of each lesson, and the activity at the end of each lesson allows students to crystallize their understanding of the material.

Our Personal Computer Applications courses for the Tandy 1000 are the latest additions to this series. They help meet the current need for quality instructional materials to teach computer applications.

Personal Computer Applications Part One introduces general computer use, word processing, and database management. A second volume, Personal Computer Applications Part Two, covers spreadsheet applications, scheduling, telecommunications, and introductory programming. Both courses are based on Tandy's DeskMate: an integrated, six-function software program provided free with each Tandy 1000 system.

Some of the products available in this series are:

Personal Computer Applications, Part One. For the Tandy 1000. 26-2590	500.00
Additional Student Workbook. 26-2591	4.95
Personal Computer Applications, Part Two. For the Tandy 1000. 26-2592	500.00
Additional Student Workbook. 26-2593	5.95
Part One: Introduction to BASIC. I/III (G)	
26-2150	220.00
Part One Additional Student Workbook. 26-2151	3.50
Introduction to Color BASIC. CC 26-2680	350.00
Additional Student Workbook. 26-2681	5.95
Part Two: BASIC Programming. I/III (G) 26-2152	260.00
Part Two Additional Student Workbook. 26-2153	4.50
Part Three: Advanced BASIC. I/III (G) 26-2154	260.00
Part Three Additional Student Workbook. 26-2155	4.50
Part Four: TRSDOS. I/III (A) 26-2156	299.00
Part Four Additional Student Workbook. 26-2157	4.50
Introduction to Pascal. I/III (C)* 26-2674	350.00
Additional Student Workbook. 26-2675	7.95
Courseware Development with AUTHOR I. I/III (C)	
26-2697	350.00
Additional Student Workbook. 26-2698	4.95

Minimum System Requirements

I — Model I	* Compatible with Network 3.
III — Model III	+ Compatible with Network 2.
CC — Color Computer	
(A) 32K 1-Disk	(G) 16K with Cassette
(C) 48K 1-Disk	(H) 16K Extended Basic
(E) 64K 1-Disk	(I) 32K Extended Basic

MATH, LOGO, EARLY LEARNING



Basic Skills Math

With the right software program, the computer can be a patient tutor that provides hours of non-threatening, individualized practice in basic skills. Children can receive an unlimited number of practice exercises at skill level, and the computer can give appropriate feedback messages for each response.

Radio Shack's basic skills math programs take advantage of this computer capability. Each program randomly generates exercises at any of a wide range of skill levels. The K-8 Math and Color Math programs cover arithmetic topics at grades K through 8, while Essential Math programs cover junior high and high school math topics. Standard features include automatic placement and automatic promotion/demotion options. K-8 Math with Student Management combines the K-8 Math program with automatic, disk-based student record-keeping. The K-8 Math Worksheet Generator generates worksheets and answer sheets keyed to grade K through 8 math skills.

Programs in this math series are:

- K-8 Math Program, Volume One.**
I/III *† (A/G) 26-1715 199.00
- K-8 Math with Student Management, Volume One.**
I/III * (A) 26-1725 199.00
- K-8 Math Worksheet Generator.**
I/III (A) 26-2162 99.95
- Color Math.** CC † (A/G) 26-3202 39.95
- Essential Math, Volume One.**
I/III *† (A/G) Addition, subtraction, multiplication, division, number concepts. 26-1716 199.00
- Color Essential Math, Volume One.**
CC *† (A/I) 26-2643 120.00
- Essential Math, Volume Two.**
I/III *† (A/G) Fractions, decimals and percent, and pre-algebra concepts. 26-1719 199.00

Programming With Super LOGO



Children and adults can create colorful graphics programs with Radio Shack's powerful Super LOGO programming language. Super LOGO is based on the Logo language developed at Massachusetts Institute of Technology. With Super LOGO, students can develop their problem-solving skills, learn programming concepts, and have fun. Using Super LOGO is

easy for children, yet also fun for adults. With Super LOGO, children apply math and logic concepts to make a cursor character called the "turtle" draw pictures on the screen. The program features advanced editing, simple list-processing capabilities, decimal arithmetic, multiple turtles running simultaneously, and animation.

- Super LOGO Disk Version.** CC (A) 26-2716 99.00
- Super LOGO Program Pak.** CC (G) 26-2717 49.95
- Super LOGO Network 2.** CC 26-2738 299.00
- Color LOGO Lab.** Requires Super LOGO. CC 26-2770 199.00
- Color LOGO Lab Additional Student Workbook.**
CC 26-2771 2.00
- Color LOGO Teacher's Book.** CC 26-2761 3.95
- Color LOGO Parent's Book.** CC 26-2763 3.95



Early Learning

First and second graders will enjoy learning with these creative Color Computer programs from the Children's Television Workshop software group. Play-With-Language™ consists of three word and reading activities to teach sight and

vocabulary words, decoding, and comprehension skills. Hands On!™ lets students write with beginning word processing aids and create pictures in ways unique to computer art.

For younger children, the Model III/4 program Introduction to the Alphabet provides practice in letter recognition, alphabetical order, and keyboard use. Immediate feedback is given for each correct response.

- Play-With-Language.** CC (A) 26-2538 99.00
- Hands On!** CC (A) 26-2539 99.00
- Introduction to the Alphabet.**
III/4 *† (A/G) 26-1718 39.95

Unique Electronic Book and Software



The touch-sensitive Electronic Book allows students to interact with the Color Computer without using a keyboard. Programs sold for use with the Electronic Book come with paper pages that have pictures keyed to the computer program. The teacher or learner inserts these pages into the Electronic Book and then runs the program.

While the program is running, the learner presses different areas of the book's surface to make activity choices or to answer questions.

Two Electronic Book programs are the Solar Explorer program and Professor Pressnote's Music Machine. Solar Explorer for grades five through nine uses the theme of space travel to give information about our solar system's planets and Earth's moon. Professor Pressnote's Music Machine for grades four and up introduces children to the fundamentals of music. Additional programs are available.

- Electronic Book.**
CC Plugs into joystick port. 26-3141 24.95
- Professor Pressnote's Music Machine.**
CC (A/G) 26-2573 24.95
- Solar Explorer.** CC (A/G) 26-2546 19.95

MORE CLASSROOM COURSEWARE

Courseware from MECC



Programs from MECC—the Minnesota Educational Computing Corporation—have become recognized nationally as sound educational software. These proven MECC programs are sold by Radio Shack for use on the Color Computer or Model III/4.

Graphing

CC (I) Five programs designed for use in a variety of mathematics classes at grade levels seven through twelve. Slope, Polygraph, and Polar are programs which graph functions and equations on a coordinate system. Snark and Radar are computer games based on graphing concepts. 26-2794 ... 34.95

Music

CC (I) Provides beginning and intermediate music theory practice for all age levels. Five programs are included. 26-2795 ... 34.95

Pre-Reading

CC (I) Contains six programs for preschool through grade two: Caterpillar, Train, First Letter, Pictures, Words, and Shapes. Using game formats, these programs help children practice alphabetization and matching letters and shapes. 26-2796 ... 34.95

Earth Science

CC (I) A package of four natural science study programs for grades five through nine. Included are: Earthquake, Minerals, Solar Distance, and Ursa (a program which simulates the apparent rotation of star patterns). 26-2797 ... 34.95

Marketplace

CC (I) Includes four simulations that give students in grades three through eight experience in making marketing decisions. 26-2798 ... 34.95

Outdoor Biology

CC (I) Presents two interactive simulations to help students in grades one through nine understand ecological concepts related to the food chain. 26-2799 ... 34.95

Basic Arithmetic

III (C) Provides games and drills designed to help students in grades two through six strengthen their arithmetic skills. 26-2790 ... 44.95

Word Games

III/4 (C) Designed to add interest and motivation to language study for grades one through six. A teacher option program allows the instructor to develop custom word lists for use with the three word games. 26-2791 ... 44.95

Expeditions

III/4 (C) Presents three interactive simulations that allow students in grades five through nine to "participate" in the events of three American historical periods. 26-2792 ... 44.95

Puzzles and Posters

III/4 (C) A teacher utility program that allows teachers to produce word puzzles and banners for classroom use. 26-2793 ... 44.95

Business Education

Teach your students the computer accounting applications used by small businesses. Business Education: Computer Applications in a Small Business covers General Ledger, Accounts Receivable, Accounts Payable, and Payroll. Introduce your students to computers and accounting principles while helping them to prepare for the business world.

Designed to supplement the curriculum, this Business Education teaching package contains a series of structured lessons. Included are visual materials, twenty-five student workbooks,



and complete software and user guides for the four applications covered. Printer required.

Business Education: Computer Applications in a Small Business

III/4 (D/F) 26-2654 ... 599.00

Business Education Additional Student Manuals

III/4 (D/F) 26-2655 ... 11.95

Computer Reference Books

Reference books from Tandy can help teachers make the best use of their computer resources. The Tandy Educational Software Sourcebook contains more than 3000 listings of educational software programs available from a variety of publishers. The educational booklet My TRS-80 Likes Me helps teachers introduce the BASIC language to elementary students through fun exercises. Number Patterns helps teachers introduce number series concepts in an entertaining way using computers.

Radio Shack's Proposal Writing Guide provides proposal writing assistance for teachers who are seeking grant funds for computer instruction. The TRS-80 Microcomputer Handbook for Educators provides general information on educational computer use for teachers who are new to the field of educational computing.



Tandy Educational Software Sourcebook

26-2747 ... 13.95

My TRS-80 Likes Me

26-2751 ... 2.50

Number Patterns

26-2752 ... 2.50

Radio Shack's Proposal Writing Guide

26-2754 ... 9.95

TRS-80 Microcomputer Handbook for Educators

26-2757 ... 2.50

Minimum Systems Requirements

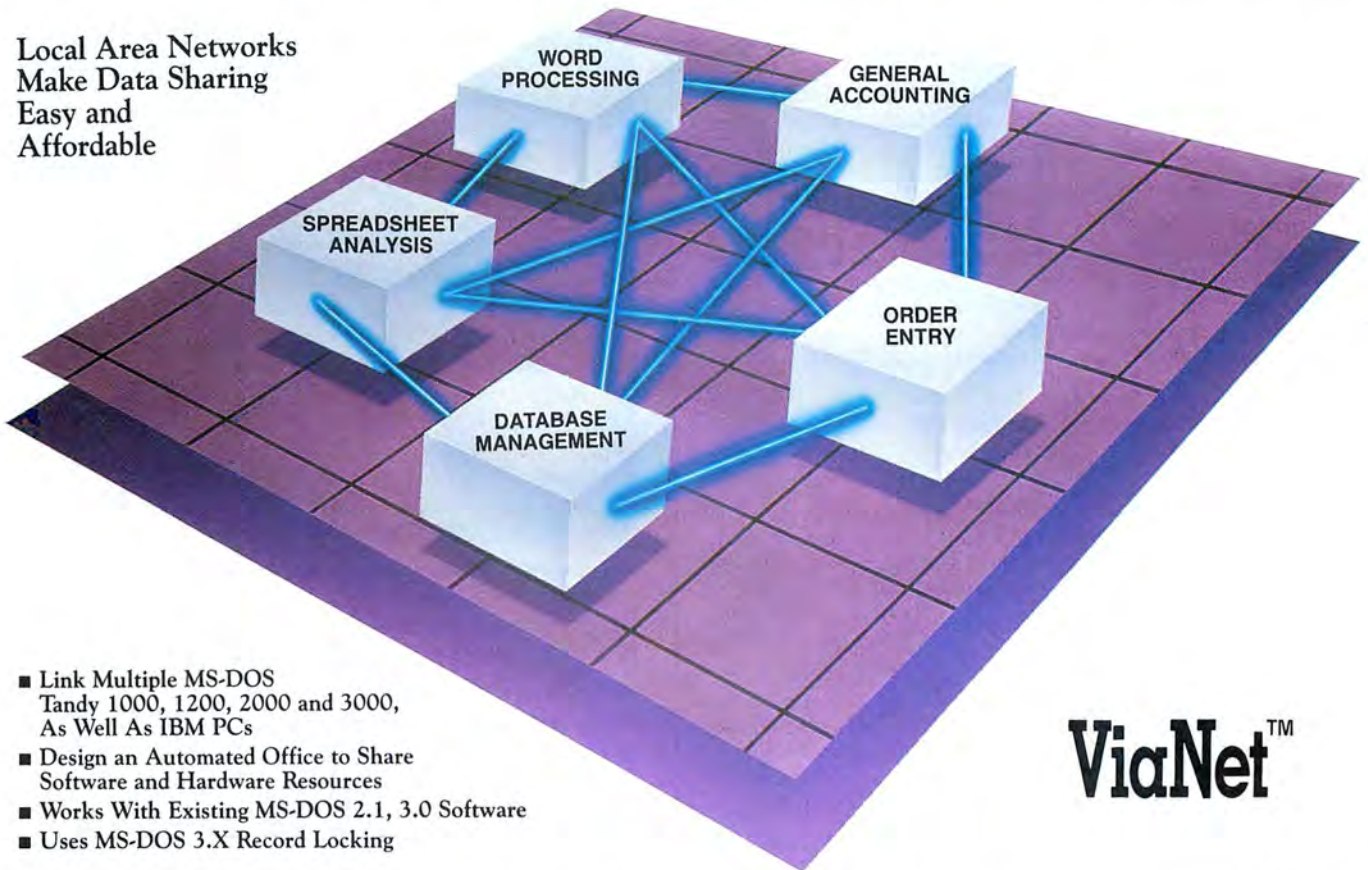
III = Model III 4 = Model 4 Only
I/III = Model I or III III/4 = Model III or 4
CC = Color Computer

(A) 32K 1-Disk (F) 64K 2-Disk
(C) 48K 1-Disk (G) 16K with Cassette
(D) 48K 2-Disk (I) 32K Extended BASIC

*Compatible with Network 3. †Compatible with Network 2.

NETWORK OFFICE AUTOMATION

Local Area Networks
Make Data Sharing
Easy and
Affordable



- Link Multiple MS-DOS Tandy 1000, 1200, 2000 and 3000, As Well As IBM PCs
- Design an Automated Office to Share Software and Hardware Resources
- Works With Existing MS-DOS 2.1, 3.0 Software
- Uses MS-DOS 3.X Record Locking

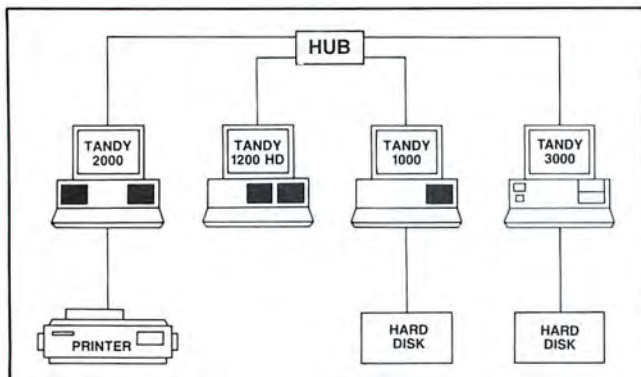
ViaNet™

Why You Need a Local Area Network

Maximum efficiency in today's office is achieved through automation of word processing, filing and other business applications. An ideal solution is to connect your computers together to form a local area network. While the sharing of software and hardware resources offers savings in time and office space, networking has been prohibitive for many businesses. Most micro nets require expensive dedicated file servers. In addition, it is difficult to "mix and match" different computer equipment, because all computers within a network had to be operating system compatible. But now there's ViaNet—a software system that links Tandy's MS-DOS computers into a local area network. Best of all, it is no longer necessary to invest in an expensive dedicated computer file server.

Versatile ViaNet™ Network

ViaNet makes all resources on the network available to each user. With ViaNet, users may easily and quickly share programs, data and such costly resources as letter-quality printers, hard



disks or backup devices. The software is resident at each station, so the network operates as a global supervisor, without requiring a "master" station. Most important, ViaNet is as easy to use as a stand-alone computer. Operating system commands work precisely the same under ViaNet as in a stand-alone environment. Each computer in the system requires an Arcnet Datalink Board, and is connected to a "hub" with coaxial cable. Boards include software and user's guide. Installation recommended (not included). ViaNet requires 128K more RAM than is required for applications and MS-DOS.

Network Hardware

Tandy 2000 ViaNet System. 26-1220	499.95
Tandy 1000/1200/3000 ViaNet System. 26-1221	499.95
ViaNet Administrator's Guide. 26-1222	19.95
Active Hub. Lets you connect eight computers up to 2000 feet apart. Active Hubs can be linked. Adding Passive Hubs to an Active Hub allows service of up to 24 CPUs. 26-6508	695.95
Passive Hub. Connects four computers to each other up to 200 feet apart. Two passive hubs cannot be connected in series. 26-6504	69.95
Coaxial Cable. RG62 with BNC connectors on each end.	
20 Ft. 26-6510	15.95
50 Ft. 26-6511	24.95
100 Ft. 26-6512	39.95
Bulk. 26-6513	Per Foot/21¢
BNC Fitting. 278-104	2.39
BNC/BNC Coupler. 278-115	1.99
UG-306/U BNC Right Angle Adapter. 278-116	3.59
Female BNC. 278-114	2.49
Coax Cable Stripper. 278-240	10.95

CLASSROOM NETWORK SYSTEMS

Classroom Networks Provide Shared Learning Systems



- Link Multiple Tandy 1000, Model III/4 Computers
- Share a Common Hard Disk System and Printer
- Run Existing MS-DOS 2.1 and Standard TRSDOS 1.3 Applications Software
- Supports Programming, Business Education and Computer-Aided-Instruction (CAI) Applications
- One Cable Connects All Stations for Communications
- Master Station Serves Up to 63 Student Stations
- Student Stations Function Like Stand-Alone Computers with 4 Floppy Drives

Network 4. Incorporates some of the most advanced networking technology available to make shared computer learning possible for large groups. Using a twisted-pair cable, the Network 4 connects an entire classroom of upgraded Model III, Model 4 and Tandy 1000 computers to a master computer with a hard disk drive or drives. The student stations can then share the hard disk, each station operating virtually as a stand-alone system. Each user can quickly access programs, data files and storage areas on the hard disk as designated by the teacher. Student stations have full print capabilities at their own local printers. For remote printing, a SPOOL utility directs print output to a file. Spool files can be printed on the printer connected to the master station or other dedicated station.

System Requirements. Network 4 requires a Model 4 host (Model 4 plus Upgrade Kit or a Network 4 Student Station plus cable modification); a Model 4-compatible hard disk (such as the 35-meg primary 26-4171, or 10-meg 25-1025 plus Model 4 Controller 26-1138); Network 4 Operating System 26-2773; and a trunk cable. A disk-equipped Model III or 4 is needed to initialize the network hard disk. An Active Junction Box (available through the Radio Shack Education Division) is required to connect more than 32 stations to the trunk cable, or to extend the trunk cable beyond 1000 feet.

Tandy 1000 Station Requirements. Each Tandy 1000 computer requires at least 256K RAM and the Network 4 Interface Board. Tandy 1000 station software 26-2772 is required for each network, in addition to the Network 4 Operating System. Operating under MS-DOS 2.1, Tandy 1000 stations keep full use of local drives and gain four drives from the Network 4.

Model III/4 Station Requirements. Model 4 Student Stations are ready to add to the network. Model III and Model 4 computers require at least 48K and the Model III/4 Upgrade Kit. At least one disk-equipped Model III or Model 4 station is required for installing application software. Model III/4 stations operate under a network version of TRSDOS 1.3, which is included with the Network 4 Operating System package.

Network 4 Operating Software. Controls network server and hard disk. Includes operating software for Model III/4 stations to share network hard disk and printer. 26-2773 230.00

Network 4 Operating Software for Tandy 1000 Stations. Enables Tandy 1000 stations to share network hard disk and printer. Requires Network 4 Operating System 26-2773. 26-2772 170.00

Tandy 1000 Network 4 Interface. 25-1008 299.95

PLUS Network 4 Interface. 25-1019 299.95

Model III/4 Network 4 Upgrade Kit. Requires installation (not included). 26-1136 299.95

Non-Disk Model 4 Student Station. 26-1058 1099.00

100-Foot Trunk Cable*. 26-1218 16.95

500-Foot Trunk Cable*. 26-1214 69.95

1000-Foot Trunk Cable*. 26-1215 119.95

Tap Box. (Optional.) 26-1216 9.95

Tap Cable. (Optional. For Model III/4 only.) 26-1217 . 9.95

*Trunk cables include termination resistors.

Network 3. III/4. Enables up to 16 student workstations to access and select lessons stored on host system so teacher is freed from repeatedly loading programs. Requires operating software. Minimum student station: 32K Model III/4 with RS-232C port. Minimum host station: 32K 1-Disk Model III/4 with RS-232C port. Cables available separately. U.L. listed. 26-1212 599.00

Network 3 Operating Software. For floppy-disk host. 26-2775 149.00

Network 3 Hard Disk Operating Software. Requires hard disk drive and Model III LDOS installation kit.

26-1133 99.95

Network 2. I/III/4/Color Computer/Model 100. Allows easy management of student programs. You can simultaneously load a program into all 16 student systems at either 500 or 1500 baud, depending on the computers used. Use with Model I/III/4 as host and student stations, or with Color Computers as host and student stations. The Network 2 can be used to transfer ASCII files with Model 100 student stations and either a Model 100 or a Model 4 host. Controllers can be cascaded to connect more stations. Includes all cables. 26-1211 499.00

VIS™ Videotex Information System

- Access Information with Menus or Keywords
- Store and Distribute Text, Programs and Graphics
- Distribute Private or Public Information
- Protect Information Through Multiple Security Levels
- Design the Information Base to Fit Most Any Application
- Access Information with Most Any Terminal

Videotex Information System (VIS). A versatile "Host" program that provides access to information through keywords or menus. The centralized storage of a VIS Information Base can contain organized collections of text, programs and graphics. A "public" VIS Information Base can be designed to allow access to classified ads or local activities for paid subscribers. Departments within large corporations require time-sensitive information distribution. A VIS Information Base can be designed to deliver this information and, at the same time, allow for the centralized storage of spreadsheet templates to be shared between the departments. A VIS user simply logs into the VIS Information Base and enters a request for information. This request can be in the form of keywords or menu options.

VIS Software. 26-6470 3500.00**

VIS Multiplexer Software. (Requires 26-6470.) 26-6471 1000.00**

8-Line Multiplexer. 71-3000 4250.00**

8-Line Multiplexer Upgrade Kit. (Requires 71-3000.) 71-3001 1250.00**

**VIS Software & Multiplexers Available Only Through Radio Shack Videotex Department, 1400 One Tandy Center, Fort Worth, TX 76102.

POPULAR COLOR COMPUTER 2®



A True Family Computer

NEW LOW PRICE!

159⁹⁵

Was \$199.95
in RSC-16

Low As
\$20 Per Month*

Less TV and Program Paks

- Write Sophisticated Programs and Create Color Graphics
- Access 32,000 Characters of Memory With Built-In Extended BASIC Language
- Add a Color Disk Drive and OS-9 Operating System to Access the Full 64K

64K Extended BASIC Color Computer 2. Learn to program or use ready-to-run software. Ideal for a variety of small business and professional uses, too. Simple, one-line commands make detailed color graphics easy to create. Perfect for drawings, designs, charts, engineering applications—even animation! Features 256 × 192 screen resolution (49,152 pixels); multi-character variable names; string arrays up to 255 characters; full-featured editing; tracing; floating point 9-digit accuracy; trigonometric functions; user-definable keys; specific error messages; and more. Software is available for personal and household tasks, education and entertainment. Easy to expand. Attaches to any TV. Includes tutorial manuals. UL listed.
26-3127 159.95



Increase Data Storage

299⁹⁵

156,672 Characters
of User Storage
Per Diskette

Low As
\$20 Per Month*

FD-501 Color Thinline Disk #0. Turn any Color Computer with Extended BASIC into a complete disk system and store over 156,000 characters of data. Write your own programs or use ready-to-run software. Includes 5 1/4" double-density, 35-track floppy disk drive; Program Pak cartridge containing the Disk Operating System; cable; blank diskette; manual and operator's instructions. UL listed. 26-3131 299.95

Second Drive for FD-501. Adds 156K of storage. Requires installation (not included). 26-3132 179.95

TC36

*Installation required (not included). Some installations may require additional-cost hardware.

Save \$69⁹⁵ When You Buy DeskMate™ and a Disk Drive

Complete package includes the FD-501 Floppy Disk Drive and DeskMate 6-in-1 Program. Reg. separate items \$399.90.

For the Color Computer 2.

26-3131/26-3259 329.95

For the Color Computer 3.

26-3131/26-3262 329.95

Color Computer Upgrade Kits

16K RAM Upgrade Kit. Converts a 4K Color Computer to 16K to use larger, more sophisticated programs.

26-3015 29.95*

Low-Profile Keyboard Kit. Upgrades any Color Computer with the old keyboard to our newer version. 26-3016 24.95*

64K RAM Upgrade Kit. Converts a 4K, 16K or 32K Color Computer to the same memory used in 26-3127.

26-3017 59.95*

Extended BASIC ROM Kit. Allows advanced graphics or disk drive capability. Requires 16K RAM. 26-3018 39.95*

POWERFUL COLOR COMPUTER 3



Superb Graphics Resolution and Uncompromising Performance at An Incredible Price

NEW FOR 87

219⁹⁵ Less Monitor

Low As \$20 Per Month*

- Choose From a Palette of 64 Brilliant Colors
- Produce Sharp, Crisp Graphs and Illustrations
- Display 32 × 16, 40 × 24 or 80 × 24 Text
- 160 × 192, 320 × 192 or 640 × 192 Resolution
- Use With a High-Resolution Monitor or Your Own TV
- Expands Easily As Skills and Needs Grow

128K Extended BASIC Color Computer 3. Introducing Radio Shack's newest version of our famous Color Computer. The Color Computer 3 can be used in a variety of applications such as graphics, programming, budgets, word processing, database management, spreadsheet analysis and many others. The Color Computer 3 comes with 128K memory (expandable to 512K), and gives you the advantage of greater programming and data processing power, as well as higher resolution graphics. Simply connect the Color Computer 3 to a high-resolution monitor—

like the new CM-8 monitor (sold separately, at right)—and you can create incredibly detailed charts, graphs and engineering drawings in vivid colors. The special higher graphics mode lets you paint 160 × 192 or 320 × 192-resolution graphics using 16 out of the 64 total colors. Or produce razor-sharp 640 × 192-resolution in 4 colors. The 21 new commands featured in the Color Computer 3's Extended BASIC language allow you to switch between screens, colors and backgrounds at a higher resolution and in a greater variety of colors than any previous Color Computer. When connected to a TV, the Color Computer 3 will display text in a 32-character by 16-line format. Get a 40-character by 24-line or 80-character by 24-line display with a monitor. Best of all, the new Color Computer 3 is compatible with software and accessories designed for the Color Computer 2 (in the Color Computer 2 mode). Expands easily with disk drives, printer, telephone modem and more. UL listed AC. 26-3334 219.95

New! High-Resolution Color Monitor

CM-8 RGB Analog Color Monitor. Designed for use with the Color Computer 3. Displays up to 80 × 24 text and 640 × 192 graphics. It is the perfect complement to the superb graphics capabilities of the Color Computer 3. The CM-8 features a 13" diagonal screen and a built-in speaker with volume control. Includes cable. UL listed AC. 26-3512 299.95

SPECIFICATIONS FOR COLOR COMPUTER 3. Microprocessor: 6809E 8-bit. Clock Speed: 0.894 MHz or 1.788 MHz. Keyboard: 57 keys, including Function, Alternate, F1 and F2. Video Display: 16 lines of 32 characters (uppercase only) to 24 lines of 80 characters (uppercase/lowercase). Color graphics capabilities range from 64 × 32 (8 colors) to 640 × 192 (4 colors and background color) with 6 intermediate display formats. High-resolution graphics in the same range available through machine language, Extended BASIC or Program Paks. Memory: 128K RAM—internally expandable to 512K. Twenty-one commands in enhanced Extended BASIC. Input/Output: 1500-baud cassette (recorder optional). Two joystick ports. RS-232C serial port (4-pin only). Standard TV (300 ohms), composite monitor and RGB Analog Monitor outputs. Dimensions: 3 × 10³/₈ × 14³/₄". Power: 120VAC, 60 Hz.

SPECIFICATIONS FOR COLOR COMPUTER 2. Microprocessor: 6809E, 8-bit. Clock Speed: 0.894 MegaHertz. Keyboard: 53 keys. Video Display: 16 lines of 32 characters (upper case only). Color graphics capabilities range from 64 × 32 (8 colors) to 256 × 192 (1 color and background color) with three intermediate formats. Memory: 16K ROM and 64K RAM. Input/Output: 1500-baud cassette (recorder optional). Two joystick ports. RS-232C serial port (4-pin only). Standard TV (300 ohms) output. Dimensions: 3 × 10³/₈ × 14³/₄". Power: 120VAC, 60 Hz.

*REVOLVING CREDIT AVAILABLE—See Page 2

TC37

COLOR COMPUTER ACCESSORIES



A) Color Mouse. Adds speed and ease to games and graphics creation. Simply "roll" the mouse across tabletop (or any flat surface) to accurately position cursor. You can use it alone or with a joystick. 26-3025 49.95

B) Joysticks. Our lowest-priced joystick. Now two players can experience the fun and excitement of games at the same time. Fast 360° movement! Single-shot button. 26-3008 Pair/19.95

C) Deluxe Joystick. Our best! Patented stick mechanism gives you more accurate cursor control and quicker response. Dual-axis trim controls adjust to your touch—allowing you to "fine tune" joystick to your game, business and graphics software. Select "spring-centering" or "free-floating" operation. 26-3012 Each 29.95



A) Multi-Pak Interface. Connects up to four Program Pak™ cartridges to your Color Computer at once! No more plugging in and unplugging cartridges. Connect disk drives and other accessories, too. Change between slots with selector switch or under program control. U.L. listed. 26-3124 99.95

B) DC Modem Program Pak. RS-232 interface and 300-baud, originate/answer modem. Transfer/receive ASCII files or access information services by phone. 26-2228 89.95

C) Deluxe RS-232 Program Pak. Frees serial port for optional printer while you communicate with major information services and with other computers over telephone lines. Software is built in. Requires modem. 26-2226 79.95



A) Sound/Speech Cartridge. Adds sound, three voices and noise to your BASIC programs. 26-3144 79.95

B) Hard Disk Interface. Use your Color Computer with Primary Drives. Requires 64K, Multi-Pak Interface, floppy disk with controller and OS-9 (2.0 or later). 26-3145 129.95

C) Orchestra-90 CC. Create highly sophisticated electronic music and sound effects with your computer and listen to it on your home stereo. Both musicians and non-musicians can compose in six octave ranges in up to five voices. Simulate various instruments and percussion. 26-3143 79.95

D) Appliance/Light Controller. Connect lights and appliances to Plug 'n Power™ remote control modules (sold separately), attach the controller to your Color Computer, then program times and events. U.L. listed. 26-3142 99.95

Electronic Book Makes Learning Fun

24⁹⁵

Four Fun Programs Available Separately



Electronic Book. Your kids will spend hours learning the fun way! Each of the software packages (sold separately, below) contains "pages" which compose the Electronic Book. Different areas of the book's touch-sensitive surface are pressed to make selections. Interactive routines make learning a game. Safe for kids to use, too—plugs into joystick port. Requires 16K Color Computer and cassette recorder. 26-3141 24.95

Maze Master. 26-2541 19.95

Shape Maker. 26-2542 19.95

The Number Factory. 26-2543 19.95

Word Wizard. 26-2544 19.95

COLOR DISK SOFTWARE

Childpace

Track your child's early development from 3 months to 5 years old. Evaluates dexterity, language, personal and social skills. 26-3248 39.95

D.L. LOGO

Programming language designed to run under OS-9. Includes "MUSIC" to play songs with up to 4 voices, "SAY" for support of Speech/Sound cartridge, and joystick support. 26-3033 99.95

OS-9 Disk Operating System

Accesses the entire memory of our 64K Extended BASIC Color Computer. 26-3030 69.95

New! OS-9 Level II

Same as OS-9 (above), but with enhancements for Level II to support 512K RAM and dual speed. 26-3031 (Avail. 9/30/86) 79.95

PASCAL-09

A complete implementation of this structured programming language. Requires OS-9 DOS. 26-3034 99.95

BASIC-09

An enhanced version of standard BASIC written for the 6809 microprocessor. Includes advanced features derived from PASCAL. Requires OS-9 DOS. 26-3036 99.95

C Compiler

A high-level language that produces assembly language source code for the 6809 microprocessor. Requires OS-9 DOS. 26-3038 99.95

OS-9 Screen Print

Print high-res Color Computer graphics. Requires CGP-220 for four-color printouts or dot-matrix printer with bit-image mode for B&W. Requires OS-9 DOS. 26-3221 14.95

OS-9 Profile

A personalized electronic filing system. Requires 64K and OS-9 operating system. 26-3274 49.95

New! Phantomgraph

Create graphical depictions of data from either database or user input. Incorporate graphs and text, too. 26-3276 (Avail. 12/30/86) 49.95

TRSCOPY

Allows transfer of text files between "OS-9" disks and "Color Computer Disk Basic" disks. 26-3263 24.95

COOKBOOK

Two programs in one—an all-purpose menu planner and recipe index file. 26-3257 39.95

TSEDIT

A high-resolution screen editor that allows upper and lower case in lines from 32-80 columns. 26-3264 34.95

TSWORD

A format program that forms a powerful OS-9 word processing package when combined with TSEDIT. Illustrated menus. Requires 64K. 26-3267 34.95

New! TSSpell

A spelling checker/corrector designed to run under OS-9 in conjunction with TSWORD. 26-3266 (Avail. 11/30/86) 39.95

Investograph

Charts stocks and trends. Features high-resolution graphics. 26-3258 49.95

Cash Budget Management

A sophisticated personal or small business bookkeeping program. Features ready-to-use income, expense and cash

categories—and you can define your own.

26-3261 49.95

New! DeskMate 3

We've made the popular DeskMate even better. DeskMate 3 is an integrated package of seven commonly used personal productivity applications on one disk.

26-3259 (Avail. 9/30/86) 99.95

DYNACALC

A powerful electronic spreadsheet. Features up to 256 columns or 256 rows of cells. Requires 64K and OS-9 DOS.

26-3275 99.95

New! Mickey's Space Adventure

Children will learn problem-solving skills while operating a spacecraft. 26-3247 (Avail. 10/30/86) 29.95

Biosphere

An ecological simulation game that teaches children to create a workable ecology. Requires 64K. 26-3280 29.95

Robot Odyssey I

Helps develop skills in logical problem solving, abstract reasoning and creative thinking. Requires 64K. 26-3284 34.95

Rocky's Boots

Players invent machines to solve puzzles and win over 30 different games, including games they design themselves. Requires 64K. 26-3283 34.95

PAN

Write your own songs! Includes everything you need to compose music in three-part harmony. 26-3279 29.95

New! Zone Runner

Transport various items between the outposts of the galaxy while avoiding the patrols, pirates, escorts and mines.

26-3286 (Avail. 12/30/86) 29.95

Pegasus and the Phantom Riders

Destroy waves of attackers. Requires joystick or Color Mouse. 26-3281 29.95

Pitfall II

Help Pitfall Harry on a treacherous journey to recover the magnificent Raj diamond. Requires 64K RAM and joystick. 26-3287 29.95

One-on-One

Dr. J (Julius Erving) and Larry Bird play basketball, one on one style. Control either player and try to win. 26-3288 34.95

Flight Simulator

Learn the basics in manual control of ailerons (pitch and roll), compass readings, take-off and landing and more. Requires 64K and joystick. 26-3108 24.95

Varloc

Chess pieces must wage a battle for victory of each square. You control one side, the computer the other. 26-3291 29.95

Desert Rider

How long do you think you can survive this treacherous, grueling motorcross track? Joystick required. 26-3292 29.95

Ghana Bwana

You're in an outrigger trying to reach an island. Obtain the treasure and win. Joystick required. 26-3293 29.95

New! Rogue

Rogue is so full of unpredictable monsters, ever-changing magic and hidden dangers that it's never the same game twice.

26-3297 (Avail. 10/30/86) 29.95

New! The Interbank Incident

You try to find the thieves who have stolen a code book from the Interbank Corporation. 26-3296 29.95

COLOR COMPUTER SOFTWARE

DeskMate

Now our popular DeskMate software is available for the Color Computer! Color Computer DeskMate is an integrated package of seven commonly used personal productivity applications on one disk: Text, Ledger, Index Cards, Paint, Telecom, Calendar and Calculator. DeskMate is very user friendly. You can easily select an application (identified by name and icon) with your mouse, joystick or keyboard arrow keys.

TEXT—A general-purpose text entry and editing program that performs search and replace; file merge; and block select, copy and delete. It's ideal for writing correction-free letters, memos and short reports.

LEDGER—A simple spreadsheet which includes an easy-to-use menu and automatic column formatting. You can use Ledger to do budgeting, sales forecasting, profit and loss projections and other "What if . . . ?" calculations.

INDEX CARDS—A personal filing system. You can enter and edit data and perform simple sorts and searches. It's ideal for keeping track of names and addresses.

PAINT—A four-color picture editor to create graphics screens. You can easily create lines, shapes, patterns, fill in areas with color and enter text. Using Paint, you can create colorful charts, graphs, designs, even "doodles" on your screen, then print a copy on a dot-matrix or ink-jet printer.

TELECOM—A communications program to access national information services, plus transmit and receive ASCII files from other computers by phone (requires modem). Telecom makes it easy to access computer bulletin boards.

CALENDAR—A simple monthly calendar that displays "to do's" for any date. Calendar is an easy way to organize your day.

CALCULATOR—A four-function calculator available within any application. This program is similar to a printing calculator. Figures and calculations scroll up the screen. Includes printer support.

DeskMate for the Color Computer. Comes complete with an easy-to-understand manual. 26-3259 99.95

New! Color File II

Our new, improved version of Color File! With Color File II you can easily and quickly store, retrieve and use various types of important data, such as addresses, warranties and personal records. You can easily alphabetize, select, examine, print, change and save your information.

26-3110 (Avail. 11/30/86) 26.95

Spectaculator

Do your planning, forecasting and problem-solving with this "electronic spreadsheet." Just enter numbers and formulas, and Spectaculator will calculate and display the results on command, saving you time and effort. Up to 99 rows and columns. Cassette recorder recommended. 26-3104 29.95

Personal Finance II

This easy to use household budget program features 26 major expense categories. Review your expenditures on a year-to-date or category basis. 26-3106 29.95

New! Color SCRIPSIT II

Color SCRIPSIT II is a word processing system that includes an editor to enter and edit text and text formatting commands. The view mode allows the user the ability to change the format control information while viewing the page.

26-3109 (Avail. 11/30/86) 29.95

Color Screen Print Utility

Provides multi-color printouts of color graphics scenes produced from any graphics program. For use with color ink-jet printer (26-1268) or any dot-matrix printer with bit-image capabilities for black and white printouts. Requires 16K Extended BASIC and cassette recorder. 26-3121 9.95

Editor/Assembler

Develop 6809 software programs or subroutines. You get trial assembly of object code and execution of your program in-

TC40

① Joysticks required. ② Cassette recorder required. ③ Joysticks and cassette recorder required.

memory before final assembly to tape, an editor that enables you to change your program and reassemble, and Z-Bug for quick and easy testing. Requires 16K. 26-3250 39.95

Atom

① Teaches the names of elements, their atomic numbers, configurations and main properties. Includes beautiful wall poster. 26-3149 19.95

Vocabulary Tutor

Match words with their definitions and place words in the appropriate sentences. For grades 3-5.

Vocabulary Tutor 1. ② 26-2568 8.95

Vocabulary Tutor 2. ② 26-2569 8.95

Color Computer Learning Lab

② Self-teaching course in standard Color BASIC. 26-3153 49.95

Color Math

Math skills for ages 6-14. Includes problems in addition and subtraction. 26-3201 19.95

Electronic Book Software

Your kids will spend hours learning the fun way! Each software package contains "pages" which compose the Electronic Book (sold separately). Different areas of the book's touch-sensitive surface are pressed to make selections. Interactive routines make learning a game.

Maze Master

Helps teach some of the basic principles involved in computer programming. 26-2541 19.95

Shape Maker

Challenges children to identify geometrical shapes and make designs. 26-2542 19.95

The Number Factory

Children will enjoy practice in basic arithmetic skills. 26-2543 19.95

Word Wizard

Help your children improve spelling skills the fun way. 26-2544 19.95

Program Pak™ Games

Dragonfire

① You must dodge fireballs tossed by the dragon to get to the treasure room. 26-3098 29.95

Downland

① Alone in a secret cave, you jump and climb from chamber to chamber, collecting keys, gold and diamonds. Each chamber is different—so watch out! 26-3046 19.95

Dungeons of Daggorath

You're pitted against a succession of awesome beasts. Each victory brings you closer to your ultimate opponent—the evil wizard. 26-3093 29.95

Baseball

① Plays just like the real game! You control pitching, running and defense. 26-3095 19.95

Androne

① Your computer has been invaded by Data Bugs. Call on Androne, a user-controlled robot to hunt through your memory banks and "de-bug" them. 26-3096 19.95

Cassette Tape Game

Pyramid

② Perilous adventure game! Explore the ancient pyramid's unknown passages for treasures! 26-3310 14.95

MODEMS & VIDEOTEX SOFTWARE



Communications Modems

Use with any RS-232C-equipped computer. Full duplex, originate/answer, 300 bps. Bell 103 compatible. FCC registered. U.L. listed.

Acoustic Coupler

A AC-4. Accommodates round or square handsets—ideal for use in hotel rooms where direct connection may not be possible. Also half duplex.

26-1179 119.95

New! Intelligent Modem

B DCM 7. Switch selectable between Hayes® and Tandy command sets. Easy-to-use auto-dial/auto-answer. Connects directly to modular phone jack.

26-1394 99.95

Direct-Connect Modem

C DCM 3. Our lowest priced modem! Plugs directly into modular phone jack. Works with either DB25 or 4-pin connector (Color Computer type). Includes a modular phone cable. 26-1178 .. 59.95



High-Speed Intelligent Modem

199⁹⁵

Low As
\$20 Per Month*

DCM 212. This auto-dial/auto-answer modem is switch selectable between Hayes® and Tandy command sets. Easy-to-use menu-driven operation automatically selects 300 or 1200 bps rate. Bell 212A compatible. Avail. 10/30/86.

26-1385 199.95



Integrated Phone and Modem Gives You 2 Devices in 1

Modemfone™ 100. Get the extraordinary convenience of a telephone and modem in one affordable unit. Telephone features switchable Touch-Tone/pulse dialing, adjustable ringer volume and one-button touch redial. Hearing aid compatible. Modem features full duplex, originate/answer, 300 bps. Standard RS-232C computer connection. Bell 103 compatible. FCC registered. U.L. listed AC adapter.

26-1386 99.95



RS-232C Selector Switch

149⁹⁵

Low As
\$20 Per Month*

SW-303. Connect three RS-232C devices to your computer. One configurable port for communications. U.L. listed. Cables not included. 26-1499 149.95

Access Information by Phone

CompuServe Information Service

Get "on line" with this exciting information service—and the first hour is free! CompuServe offers local, national and international news (read headlines before they've gone to press!), weather and sports from major newspapers like *The New York Times* and *The Washington Post*, plus the full newswire service of the Associated Press. Get historical information and updates on over 32,000 stocks, bonds and securities. There's also a home and educational reference service and computer games. Send and receive "electronic mail". Get 16K of RAM workspace and 128K of disk storage. All this available at CompuServe's low hourly rate (additional charges for some services).

Dow Jones News/Retrieval

A "direct line" to Wall Street—and the first hour is free! Dow Jones News/Retrieval gives you current market quotes (subject only to the mandatory 15-minute delay) on all stocks, bonds and options traded on the major exchanges—plus selected U.S. Treasury issues. Detailed financial statistics compiled by Media General Financial Services are available for all NYSE and AMEX traded companies. There's also "electronic editions" of *The Wall Street Journal*, *Barron's* and the Dow Jones "Broadtape"—as recent as 90 seconds and as far back as 90 days.

Low-Cost Videotex Packages

Videotex software packages allow access to national information networks and data bases using your computer and an optional-extra telephone interface. Simply dial a phone number (usually local), press a few keys and the desired information appears on your screen. Each easy-to-use package includes a Videotex software manual, CompuServe manual, ID number and password, and a Dow Jones manual and password. You also get one FREE hour on both the CompuServe and Dow Jones! After that, you'll be billed at their low hourly rates.

Color Computer Package. 26-2222 29.95

Universal Sign-Up Kit. Includes information kit for CompuServe and Dow Jones. Requires software or terminal emulation.
26-2224 19.95

Videotex Plus

A powerful and sophisticated communications package for your disk system. Videotex Plus lets you communicate with any computer information service (with the same communications protocol as Videotex), such as CompuServe and Dow Jones News/Retrieval. It's simple to use, yet loaded with features to help you minimize connection time. Requires modem.

Model I/III Package. 26-1588 49.95

Model 4 Package. Same as above. 26-1598 49.95

Tandy 2000 Package. Same as above. 26-5260 49.95

*REVOLVING CREDIT AVAILABLE—See Page 2. Use Modems only with Bell-compatible equipment. Direct-connect modems are not for multi-line use without optional-extra controller. Hayes/TM Hayes Microcomputer Products, Inc. Modemfone/TM Tandy Corp. CompuServe/TM CompuServe, Inc. Dow Jones News/Retrieval/TM Dow Jones & Co., Inc.

TANDY PORTABLE COMPUTERS

Our Popular Tandy 200



799⁰⁰ ■ Multiplan Built In ■ 24,000-Character Memory Low As \$37 Per Month*

Tandy 200. A powerful problem solver. For complex spreadsheet analysis and calculations, we put popular Multiplan software into the Tandy 200's permanent memory. Do sales forecasts, profit-and-loss projections, budgeting, pricing, engineering calculations and more. An improved version of the Model 100's easy-to-use word processing program makes Tandy 200 especially useful for memos, reports and correspondence. Four other "instant-on" programs are a personal appointment calendar, address and phone directory, and telephone auto-dialer. You can even create your own programs in BASIC. The Tandy 200's high-contrast flip-up liquid crystal display has 240 x 128 resolution for big, clear graphics, or 16-line by 40-character text. Includes parallel printer, RS-232C, cassette and bar code reader interfaces. 26-3860 799.00

SPECIFICATIONS. Microprocessor: 8-bit 80C85 CMOS. Clock Speed: 2.4 MHz. Memory: 72K ROM, expandable to 104K; 24K RAM, expandable to 72K in banks of 24K. Keyboard: Full-sized 56-key typewriter style with embedded data pad, plus 8 programmable function keys, 4 command keys and 4 cursor control keys. Display: 16 x 40 liquid crystal display, upper and lower case ASCII characters, 240 x 128 dot-matrix graphics. Modem: Built-in 300-baud direct-connect modem with auto-dialer. FCC registered. Originate and answer modes. Tone dialing signals. Input/Output: Parallel printer interface. RS-232C serial communications interface programmable up to 19,200 baud. Cassette tape interface loads at 1500 baud. Standard bar-code reader interface. Dimensions: 2 1/16 x 11 3/4 x 8 1/2". Weight: 4.5 lbs. Power Supply: Operations—Up to 16 hours on 4 "AA" alkaline batteries, and can use nickel-cadmium rechargeable batteries with minor additional-cost modification. Optional U.L. listed AC/DC charger/adaptor available. Memory—Internal rechargeable nickel-cadmium batteries.

Slimmer, Lighter Tandy 102

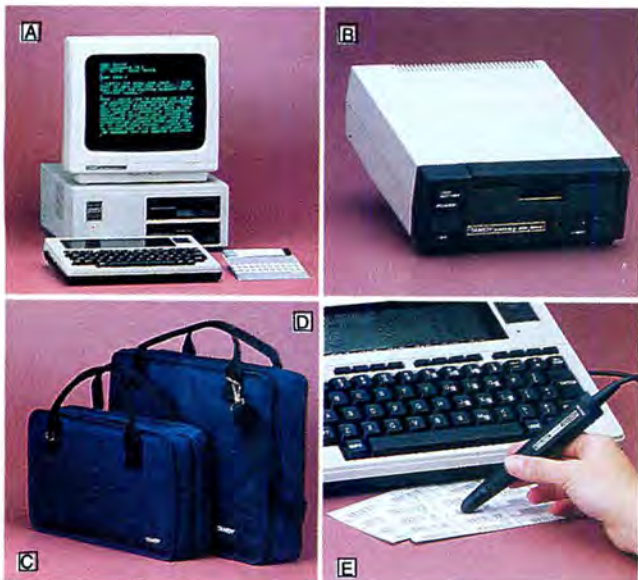


499⁰⁰ ■ 24K Memory ■ 40 x 8 Display ■ Five Built-In Management Programs ■ Direct-Connect Telephone Modem Low As \$23 Per Month*

Tandy 102. We've redesigned our best-selling portable—the famous Model 100—into an even smaller package. But we've retained the same remarkable features, including five instant-on programs, an 8 x 40 display and a modem—all built in. Use the Tandy 102 as a personal word processor, address/phone directory, appointment calendar and telephone auto-dialer. Access other computers or national information services by phone with the built-in modem and communications program. You can even write your own programs in BASIC. Includes parallel, RS-232C, cassette and bar code reader interfaces. Only 3 lbs. Requires four "AA" batteries. 26-3803 499.00

SPECIFICATIONS. Microprocessor: 8-bit 80C85 CMOS. Clock Speed: 2.4 MHz. Memory: 32K ROM; 24K RAM, expandable to 32K. Keyboard: Full-size 56-key typewriter style with embedded 10-key datapad, plus 8 programmable function keys, 4 command keys and 4 cursor control keys. Display: 8 x 40 Liquid Crystal Display, upper and lower case ASCII characters. 240 x 64 dot-matrix graphics. Modem: Built-in FCC-registered direct-connect modem with auto-dialer. 300 baud. Originate and answer. Input/Output: Parallel printer interface. RS-232C serial communications interface programmable up to 19,200 baud. Cassette tape interface loads at 1500 baud. Standard bar-code reader interface. Dimensions: 1 1/2 x 11 7/8 x 8 1/2". Weight: 3 lbs. Power Supply: Operations—Up to 20 hours on 4 "AA" alkaline batteries or optional U.L. listed AC power supply. Memory—Internal rechargeable nickel-cadmium batteries will maintain memory intact for up to 30 days with power off (depending on the amount of RAM installed) and are automatically recharged from "AA" batteries or AC power.

Portable 100/102/200/600 Accessories



- A Disk/Video Interface*.** 184K disk drive and TV/monitor interface. 26-3806 499.00
- B Acoustic Coupler.** 26-3805 39.95
- C Carrying Case*.** 26-3811 39.95
- D Portable Disk Drive*.** 100K of data on 3 1/2" floppies. Requires four "AA" batteries or AC Adapter (not included). 26-3808 199.95
- E Bar Code Wand*.** 26-1183 99.95
- New Low Price! Second Disk Drive.** For 26-3806. Installation not incl. Was \$239.95 in RSC-16. 26-3807 . . . 199.95
- Printer Cable.** 26-1409 14.95
- Modem Cable.** 26-1410 19.95
- AC Adapter.** U.L. listed. 26-3804 5.95
- Legs.** 26-3812 3.99
- Model 100 8K RAM Upgrade.** Req. installation (not incl.). 26-3816 49.95
- New! Tandy 102 8K RAM Upgrade.** 26-3817 14.95
- Tandy 200 24K RAM Upgrade.** Req. installation (not incl.). 26-3866 199.95
- New Low Price! Tandy 600 96K RAM Upgrade.** Install. rec. Was \$399.95 in RSC-16. 26-3910 299.95

TANDY 600 WITH DISK DRIVE

Our Most
Powerful Portable
Computer!

1599⁰⁰ Low As
\$74 Per Month*

- Self-Contained 3 1/2" 360K Disk Drive
- Five Full-Featured, Built-In Applications
- Internal 300-bps Direct Connect Modem
- Typewriter-Style Keyboard

Tandy 600. Features five resident applications. Multiplan, the popular "second-generation" spreadsheet, can do and show more because of the Tandy 600's larger display and expanded memory. Word processing is easy using a subset of Microsoft® Word. File is an electronic database for names and addresses, expenses, client billing, inventory and more. With Telecom and the Tandy 600's built-in modem, you're able to communicate with other computers over phone lines and access national information networks. Telecom will even dial the phone number of anyone listed in File. Calendar helps you keep track of daily tasks and activities. Weighs 9 1/2 pounds and measures 12 x 13 x 2 3/4".
26-3901 1599.00



SPECIFICATIONS: **Microprocessor:** 16 bit 80C88 CMOS. **Clock Speed:** 3.07 MHz. **Memory:** 160K ROM; 32K RAM, expandable to 224K RAM. **Keyboard:** Full-size 73-key typewriter style with embedded 10-key datapad. **Display:** 80 x 16 Liquid Crystal Display, upper and lower case ASCII characters. 480 x 128 dot-matrix graphics. **Modem:** Built-in FCC-registered direct-connect modem with auto-dialer. 300 baud. Originate and answer. **Input/Output:** Parallel printer interface. RS-232C serial communications interface programmable up to 19,200 baud. Cassette tape interface loads at 1500 baud. Standard bar-code interface. **Dimensions:** 23/4 x 12 x 13" **Weight:** 9.5 lbs. unit, 11 lbs. with AC adapter. **Power Supply:** Operations—Up to 8 hours with 1 hour disk access on built-in rechargeable batteries. Optional U.L. listed AC adapter.

Tandy 600 Programs

BASIC ROM. Write your own programs.
26-3904 129.95

Tandy 200 Programs

Bar Code Writer. Takes input from Model 100 TEXT files and produces bar codes in six forms. Requires 24K, cassette recorder, printer and cables. 26-3895 34.95
Bar Code Drivers. Allows bar code wand to read Interleaved Two of Five, Codabar and UPC-E bar codes. Requires 16K, cassette recorder and bar code wand. 26-3896 19.95
Data Manager. Lets you store, examine, update and list a variety of information—from personal records to appointment schedules. Requires cassette recorder.
26-3886 39.95
MultiSolutions. Plugs into ROM socket. Includes three applications: a word processor, a Time Minder and Data Manager. Requires 24K. 26-3894 149.95
Project Scheduler. Divide a large job into individual tasks. Requires 24K and cassette recorder. 26-3893 39.95
Romulus Chess. Choose from seven playing levels. Requires cassette recorder. 26-3890 19.95
Tandy Code Read/Write. Generates and reads modified NATI code. Requires 24K, cassette recorder, printer, cable and bar code wand. 26-3897 24.95
Text Power 200. Turns your Tandy 200 into a true word processor—much more powerful than the built-in word processing program. Includes advanced formatting capabilities. Requires cassette recorder. 26-3881 39.95
Time Minder. Manage your appointments and expenses effectively or just display a calendar for any month of any year. Requires cassette recorder. 26-3883 39.95

Tandy 100/102 Programs

Remote Disk. Allows you to use your Model I/III/4/II/12/2000/Color Computer disk drive as a storage area for your Model 100 files. Includes cassette and diskette. 26-3839 59.95
Assembler/Debugger. Debug, write and assemble machine language code. Requires cassette recorder.
26-3823 49.95
Model 100 Spectaculator®. A mini-spreadsheet. Requires 16K memory and cassette recorder.
26-3828 49.95
Data Manager (Cassette). Requires 24K memory and cassette recorder. 26-3836 39.95
SCRIPSIT® 100. Features advanced formatting capabilities. Requires printer and cassette recorder.
26-3830 39.95
Calculator. Powerful math "scratchpad" for finance and regular math functions. Requires cassette recorder.
26-3827 19.95
Statistics. Generate reports for descriptive statistics, frequency distribution, histogram, correlation, regression, time series analysis and much more. Requires 32K and cassette recorder.
26-3825 29.95
Executive Calendar. Schedule appointments or display a calendar for any month. Requires cassette recorder.
26-3833 19.95
Interactive Solutions. Contains three programs: Data Manager, Spreadsheet and Text Formatter. Uses optional ROM socket—does not occupy RAM. 26-3844 149.95
Multiplan. This ROM program is a portable version of the popular spreadsheet analysis program—does not occupy Model 100 RAM. 26-3829 149.95

*RAM Upgrades Are in Banks of 96K Each—Installation Recommended. *REVOLVING CREDIT AVAILABLE—See Page 2.

HANDY POCKET COMPUTERS

PC-6 Pocket Scientific Computer

119⁹⁵

Low As
\$20 Per Month*

- 65 Built-In Scientific Functions
- Programs in BASIC and Assembly Language

Pocket Scientific Computer PC-6. An ideal tool for engineers and students, the PC-6 combines the best features of a powerful scientific calculator and a pocket computer. Performs up to 65 scientific calculations—or write your own programs in BASIC or assembly language. Retains programs and data even when power is off. A built-in Note and Address File keeps important telephone numbers or engineering data and formulas handy. Features an easy-to-read, 24-character LCD. Uses PC-4 Cassette Interface and Printer with PC-5/6 Cable (all sold separately). 8K RAM. Folds up to only $\frac{3}{4} \times 1\frac{13}{16} \times 5\frac{5}{8}$ "! Includes battery. 26-3672 119.95
8K RAM Module. 26-3674 19.95
PC-5/6 Cable. Use PC-5 or PC-6 with PC-4 Cassette Interface and PC-4 Printer. 26-3671 14.95



NEW FOR **87**

PC-7 Pocket Scientific Computer

69⁹⁵

- With 72 Scientific and 17 Statistical Calculations
- Features 2K RAM
- Programs in BASIC

Pocket Scientific Computer PC-7. Keep track of important data and calculations wherever you go with our new PC-7 Pocket Computer. This incredible, compact unit performs up to 72 scientific calculations and 17 statistical calculations. This makes it perfect for engineers, students and professionals who need exact mathematical data rapidly. Mathematical functions include trigonometric, logarithmic/exponential, absolute value, permutations, standard deviation, linear regression and many others. The PC-7 features 2K random access memory and 35 commands in BASIC including: CLEAR, END, INPUT, DATA, READ AND STAT. You can even write your own programs in BASIC! Keyboard composed of 72 keys. Measures $1\frac{13}{32} \times 5\frac{1}{2} \times 7\frac{3}{32}$ "! 26-3673 69.95



NEW FOR **87**

Low-Cost PC-4 Pocket Computer

59⁹⁵

- Measures $\frac{3}{8} \times 6\frac{1}{2} \times 2\frac{3}{4}$ "
- 544-Character Memory

Pocket Computer Model PC-4. Lets you keep up to 10 short programs in memory or combine the programming area for longer programs. BASIC language includes 23 commands, 15 functions and 10-digit numeric accuracy. Use just two key-strokes to enter up to 16 common commands. Edit and Debug modes make the PC-4 easier to program than a programmable calculator. Typewriter-style keyboard includes 53 alphabetic keys and a 10-key numeric datapad. A big 12-character LCD scrolls to 62 characters. With batteries and manual. 26-3650 59.95
ⓐ PC-4/5 Cassette Interface. Store and load programs on cassette tapes using an optional cassette recorder. Requires two "AA" alkaline batteries. 26-3651 39.95
ⓑ PC-4/5 Printer. Prints at 20 characters per line (60 lpm) in an electro-thermal 5×7 dot matrix. Includes rechargeable batteries and U.L. listed AC adapter/charger. 26-3652 79.95
PC-4 Thermal Paper. 65-711 Pkg. of 5/1.99



A

B

COMPUTER REFERENCE BOOKS



Tandy 1000

- The Complete Guide to the Tandy 1000.** Explains how to get the most from your Tandy 1000. Covers IBM compatibility, software, hardware, expansion and more. 25-1505 . . . 14.95
- MS-DOS: The Basics, Vol. I.** Describes set-up, preparing diskettes, managing files and using a hard disk. 25-1506 . . . 7.95
- MS-DOS: Advanced Applications, Vol. II.** Covers file structure, controlling data flow, personalizing your system, troubleshooting. 25-1507 . . . 14.95
- Learning BASIC for Tandy 1000/2000.** An excellent tutorial for learning BASIC programming by Dr. David Lien, author of our famous Model I Owner's Manual. 25-1500 . . . 19.95
- New! MS-DOS/GW-BASIC Reference Guides.** Includes reference materials for MS-DOS and GW-BASIC 2.11 and 3.20. 25-1508 . . . 29.95
- Programmer's Reference.** Documents all BIOS subroutines and entry points for use in low-level languages. 25-1503 . . . 14.95
- Technical Reference.** Schematic diagrams and theory of operation on the Tandy 1000 and option boards. 25-1504 . . . 29.95

Model I/III/4

- Model 4/4P Technical Reference Manual.** 26-2119 . . . 29.95
- Getting Started with TRS-80 BASIC.** Entertaining introduction to Level II and Model III BASIC programming. 342 pages. 26-2107 . . . 6.95

Color Computer

- BASIC 09 Tour Guide.** A complete reference guide of system commands and lists each BASIC 09 keyword in alphabetical order. 26-3189 . . . 14.95
- Rainbow Guide to OS-9.** Includes an overview of OS-9, hands-on examples, utility commands set, major programming languages, inner workings of OS-9 and more. 26-3190 . . . 16.95
- Getting Started with Extended BASIC.** Teaches Extended BASIC features. 26-3197 . . . 8.95
- The Color Computer Playground.** Features 42 entertaining and useful programs. 26-3196 . . . 7.95
- Color Computer Quick Reference Guide.** Functions, ROM subroutines, handy index and more. 26-3194 . . . 4.95
- TRS-80 Color Computer & MC-10 Programs.** 40 programs. 26-3195 . . . 5.95

Portable Computers

- Tandy 200 Book.** A complete step-by-step tutorial. 26-3869 . . . 19.95
- Tandy 200 Technical Reference Manual.** 26-3861 . . . 29.95

- Model 100 Technical Reference Manual.** 26-3810 . . . 9.95
- The TRS-80 Model 100 Portable Computer.** A complete step-by-step learner's manual. 26-3819 . . . 14.95
- Portable Computing With the Model 100.** Emphasizes practical applications of Model 100. Includes cassette tape with 12 programs. 26-3820 . . . 14.95

Source Books

- New! Applications Software Sourcebook, Vol. 8.** Includes over 2800 ready-to-run programs of all types for sale by a variety of vendors. 26-215 . . . 7.95

Microcomputer News

- TRS-80 Microcomputer Newsletter Reprints.** Includes the first 20 issues published to December, 1980, in one volume. 26-2115 . . . 4.95
- Newsletter Reprints, Jan. thru Dec. 1981.** 26-2240 . . . 6.95
- Newsletter Reprints, Jan. thru Dec. 1982.** 26-2241 . . . 9.95

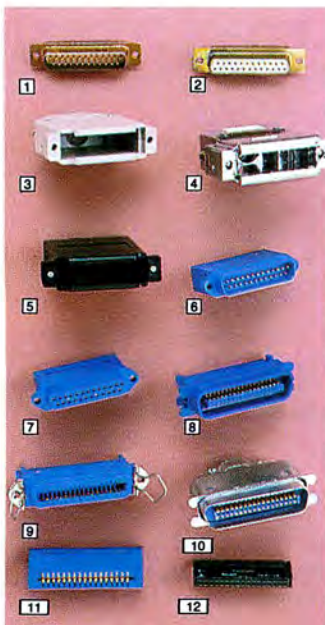
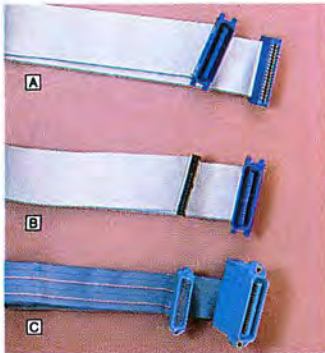
Reference Books

- How to Use Your Radio Shack Printer.** Explains dot-addressable graphics, print codes, more. Includes programming examples. 26-1242 . . . 14.95
- Dictionary of Microcomputer Terms.** Clear, understandable definitions, many with illustrations. Reference section of abbreviations, acronyms and symbols. 96 pages. 62-1392 . . . 2.79

Computer Science

- Computer Reference Handbook.** Model I, II, III, 4, 100, Color Computer and MC-10. 344 pages. 62-2314 . . . 2.95
- Understanding Computer Science, Vol. I.** Covers hardware, programming and languages. 256 pages. 62-1383 . . . 3.95
- Understanding Computer Science, Vol. II.** Covers graphics, networks, communications and application design. 256 pages. 62-1395 . . . 3.95
- Understanding Data Communications.** Explains the transmission of words and symbols from a source to a destination. 256 pages. 62-1389 . . . 3.95
- Understanding Digital Troubleshooting.** Provides basic troubleshooting techniques in an easy-to-learn format. 272 pages. 62-1398 . . . 3.95
- Understanding Digital Electronics.** Explains digital electronic devices, circuits and systems. 240 pages. 62-2010 . . . 3.95
- Understanding Microprocessors.** 296 pages. 62-2017 . . . 2.95
- Understanding Artificial Intelligence.** Covers symbolic processing, expert systems, natural language processing and system applications. 62-1399 . . . 3.95

COMPUTER/PRINTER CABLES



Parallel Printer Cables

Fig	Use With	Description	Cat. No.	Each
A	Model I/III/4/4P/4D/1000/1000 EX	34-pin card edge to 36-pin plug, 6'	26-1401	29.95
A	Model I/III/4/4P/4D/1000/1000 EX	34-pin card edge to 36-pin plug, 12'	26-1368	34.95
B	Model II/12/16/16B/2000/6000	34-pin header to 36-pin plug, 6'	26-4401	29.95
B	Model II/12/16/16B/2000/6000	34-pin header to 36-pin plug, 12'	26-1323	34.95
C	Tandy 1200/3000/IBM PC	DB25 to 36-pin plug, 6'	26-1347	29.95
C	Tandy 1200/3000/IBM PC	DB25 to 36-pin plug, 12'	26-1371	34.95

Serial Printer Cables

Fig	Use With	Description	Cat. No.	Each
D	PC-5/6	12-pin to 12-pin	26-3671	14.95
E	Color Computers/MC-10	4-pin DIN to 4-pin DIN	26-3020	4.95
F	DT-100 Terminal	4-pin DIN to DB25	26-1361	16.95

Color Computer/MC-10 Interface Cables

Fig	Function	Description	Cat. No.	Each
E	To modems	4-pin DIN to 4-pin DIN	26-3020	4.95
F	To RS-232 ports	4-pin DIN to DB25	26-3014	16.95

Cassette Recorder Cable

Fig	Use With	Description	Cat. No.	Each
G	Computers with cassette port	5-pin DIN to Audio (3 plugs)	26-1207	5.95

Keyboard Extension Cable

Fig	Use With	Description	Cat. No.	Each
H	Tandy 1000	5' extension cable	26-1389	14.95

Model 100/Tandy 200/600

Fig	Function	Description	Cat. No.	Each
I	To parallel printer	34-pin header to 36-pin plug	26-1409	14.95
J	Direct connect modem to modular phone jack	Includes free hour on both CompuServe and Dow Jones News/Retrieval Networks	26-1410	19.95

Universal RS-232C Communications

Fig	Function	Description	Cat. No.	Each
K	Model III/4/12/16B/1000/1200/2000/3000/6000	Male DB25 to DB25, 5-ft. Ribbon	26-1408	17.95
L	Extension for 26-1408	Female DB25 to Male DB25, 6' ribbon	26-1398	17.95
M	Tandy 3000 serial cable	DB9 to DB25, 6' round	26-1399	24.95
N	For Model 12/16B/1000/1200/2000/3000/6000 or with 26-1497	10-foot round cable	26-1490	24.95
		25-foot round cable	26-1491	29.95
		50-foot round cable	26-1492	44.95
		100-foot round cable	26-1493	69.95
O	Joins cables together	RS-232C Cable Connector	26-1495	14.95
P	Allows two CPUs to communicate directly through "modem" software	Null Modem Adapter	26-1496	14.95
Q	Allows use of round RS-232C cables with Model III/4/DT-1	8-inch flat extender	26-1497	15.95
P	Allows Tandy 6000 RS-232C card to use standard modem	Modem Adapter	26-1373	19.95

Computer and Peripheral Connectors

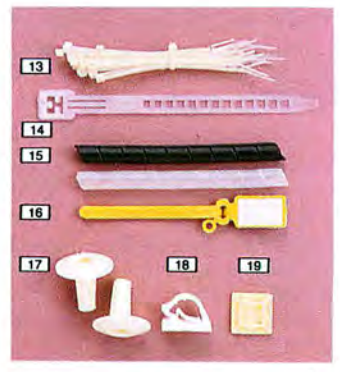
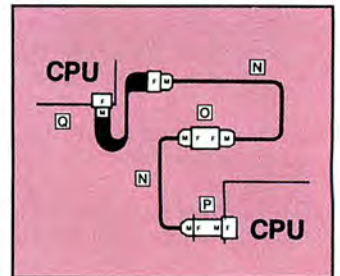
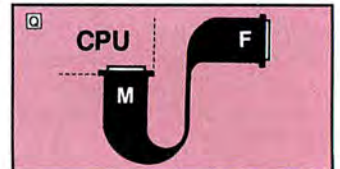
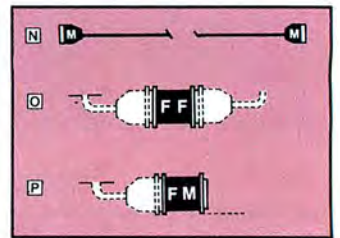
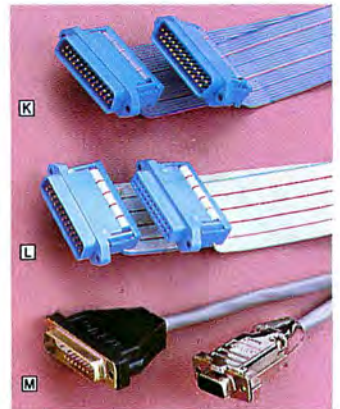
1	25-Position Solder-Type Submini "D" Male Connector.	276-1547	1.99
2	25-Position Solder-Type Submini "D" Female Connector.	276-1548	2.99
3	Hood. 276-1549		1.99
4	Shielded 25-Position Hood. 276-1536		1.99
5	Multi-Purpose Hood. 276-1520		1.79
6	25-Position Solderless Submini "D" Male Connectors.	276-1559	3.99
7	25-Position Solderless Submini "D" Female Connectors.	276-1565	3.99
8	36-Position Male Printer Connector for ribbon cable.	276-1533	5.99
9	36-Position Female Printer Connector for ribbon cable.	276-1523	5.99
10	36-Position Solder-Type Printer Connector.	276-1534	4.99
11	34-Position Solderless Card-Edge Connector.	276-1564	3.95
12	34-Position Header Connector.	276-1525	2.49

Wire and Cable Management Accessories

13	4" Self-Locking Nylon Wire Ties.	278-1632	Pkg. of 30/1.59
13	5" Self-Locking Nylon Wire Ties.	278-1631	Pkg. of 30/1.99
13	8" Self-Locking Nylon Wire Ties.	278-1642	Pkg. of 30/2.99
14	AC Cord Ties.	278-1646	Pkg. of 6/49c
15	Spiral Wrap. 5-ft. clear, 5-ft. black.	278-1638	1.59
16	Cable Tie/Marker.	278-1648	Pkg. of 10/1.99
17	RG62 Cable Feedthrough Bushing.	278-1643	Pkg. of 2/49c
18	Universal Cable Clip.	278-1639	Pkg. of 10/1.99
19	Wire Tie Mounts.	278-441	Pkg. of 10/1.29

Cords, Cables and Cord Cover

20	Computer/Business Machine Power Cord. 6 ft.	278-1257	3.99
21	25-Conductor RS-232 Ribbon Cable. 5 ft.	278-772	3.59
22	36-Conductor Parallel Printer Cable. 6 ft.	278-774	4.69
23	Flexible Cord Cover. Beige. 6 ft.	26-1379	11.95



COMPUTER ACCESSORIES

Standby Power System for Home and Office



**NEW LOW
PRICE!**

595⁰⁰

Was \$695.00 in
Cat. RSC-16

Low As
\$28 Per Month*

BPS 400. Guards against data loss in case of a brownout or electrical failure. Provides more than 10 minutes of full power operation (400 VA) to allow you to shut down your system safely. During normal operation, the BPS 400 also protects your equipment against harmful electrical spikes and transients. Easily handles power requirements of Tandy 6000 or 3000—even when supporting extra drives. Four outlets. 6 × 10³/₄ × 12¹/₂" U.L. recognized. 26-1189 595.00

Power Switching System



NEW FOR 87

79⁹⁵

Adds Versatility
to Any
Computer System

Computer and
monitor not
included

Turn up to five individual accessories on and off from the front panel. Holds all Tandy monitors and swivels for best viewing angle. Provides full power line noise filtration, plus full common and differential mode transient protection. Features status lamp and six outlets (five are switch controlled). Rated 15A. Includes circuit breaker and 10-ft. line cord. U.L. listed. Available Sept. 30, 1986. 26-203 79.95

Twin Outlet Power Protector



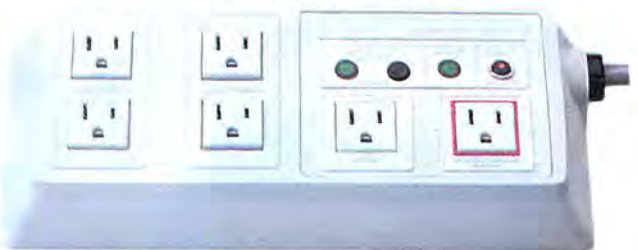
NEW FOR 87

16⁹⁵

- Our Lowest Priced Power Protector—A "Must" for Any Home System
- Protects Computer and Peripheral Against Harmful Power Surges and Line Noise
- Plugs Into Any 120-Volt AC Outlet

Provides common and differential mode transient protection (50 joules per mode, 25 nanoseconds, 340-volt clamping at 50 amps), plus full power line noise filtration. Includes MOV status lamp. Rated 10A. Includes push-to-reset circuit breaker. U.L. listed. Available Oct. 30, 1986. 26-1395 16.95

Deluxe Power Center



NEW FOR 87

69⁹⁵

Protect Your
Computer System

Provides full common and differential mode transient protection with MOV status lamp (80 joules per mode, 25 nanoseconds, 340-volt clamping at 100 amps). Full external and internal noise filtration in four isolated segments. Auto-sense power switch with adjustable sensitivity. "Once-off, stays off" power dropout protection with indicator lamp, reset button. Rated 15A. Push-to-reset circuit breaker. 6-ft. power cord. U.L. listed. Available Oct. 30, 1986. 26-1396 69.95

Computer Cassette Recorders



CCR-81 Recorder

59⁹⁵

CCR-82 Recorder

49⁹⁵

A CCR-81. Ideal for loading and saving your own programs and data on cassette tapes. Battery/Record LED indicator. 10¹/₂ × 5³/₄ × 1¹³/₁₆". Includes cable. U.L. listed AC operation or four "C" batteries (not included). 26-1208 59.95

B CCR-82. Features volume control with preset marker. 7¹/₈ × 4¹¹/₁₆ × 1⁵/₁₆". Includes cable. Requires four "AA" batteries or AC adapter (not included). 26-1209 49.95

AC Adapter for CCR-82. U.L. listed. 273-1454 5.95

Computer Cassette Tapes



Low As **1⁸⁹** Each

- Ideal for Program and Data Storage
- Certified Free of Drop Outs and Defects

Deluxe C-20 Cassette Tape. "Reel-to-reel" design in a clear shell.

26-308 3.79

C-20 Tape. 26-301 ... 2.79

C-10 Tape. 26-302 ... 1.89

Quantity	Deluxe C-20 (Each)	C-20 (Each)	C-10 (Each)
1-11	3.79	2.79	1.89
12-23	3.39	2.49	1.69
24-47	2.99	2.19	1.49
48-Up	2.69	1.99	1.39

*REVOLVING CREDIT AVAILABLE—See Page 2

TC47

COMPUTER ACCESSORIES



Universal Computer Floor Stand

NEW FOR 87

29⁹⁵

Holds CPU in Vertical Position

Computer not included

Save desk space. Place our Universal Computer Floor Stand next to your workstation. Securely holds Tandy and other PCs. Width adjusts to 6". Steel construction. Non-skid rubber feet. Easy to assemble. 26-201 29.95

Universal Monitor Pedestal



16⁹⁵ ■ Adjusts for Better Viewing
■ Works with Most Monitors

Adjustable platform rotates and tilts for best viewing angle. Holds all Tandy monitors and many others. Color and finish of platform matches Tandy monitors. Base measures: 11 x 10 1/4".

26-1369 16.95
Computer and monitor not included.

Monitor Platform



NEW FOR 87

29⁹⁵ Perfect for Tandy 1000 EX

Designed to hold a monitor and disk drive for the Tandy 1000 EX. Also suitable for the Color Computer. Sturdy steel legs, wood top. 5 3/8 x 20 3/4 x 11 7/8". Easy to assemble. 26-210 29.95
Computer system not included.

Deluxe Printer Platform



49⁹⁵

Printer not included.
Stack Paper Under Printer

Saves desk space. The Deluxe Printer Platform elevates your wide-bed (132-column) printer so paper feeds from below (3" clearance). Smoked acrylic. Platform measures 3 1/2 x 22 x 16". A "must" if you want a well-organized computer work area.
26-1383 49.95

Universal Printer Supports



16⁹⁵ Ideal for Home Systems

New Low Price! Elevates your printer so fanfold paper can be placed underneath to save desk space. Use with 80-column printers. Durable crystal polystyrene construction. Easy to assemble. Was \$19.95 in RSC-16.

26-1367 16.95
Printer not included.

Anti-Glare Mesh Screen



NEW FOR 87

24⁹⁵ Cuts Glare and Reflections

For Tandy color monitors (CM-1, 2, 4, 5 and 10). Also fits VM-2 monochrome monitor. Specially woven diagonal nylon mesh provides high viewing resolution. Easy to install. 26-202 24.95

Anti-Glare Mask (not shown). For Model 1/11/111/4/12/16 monochrome screens.

26-511 16.95
Monitor not included

Universal Keyboard Cover



NEW FOR 87

7⁹⁵

Computer and keyboard not included

Protects keyboard when not in use from dust and spills. Fits all detachable Tandy keyboards. Sturdy textured polystyrene. 25 7/8 x 18 3/4 x 8". 26-200 7.95

Model III/4 Keyboard Cover (not shown). 26-1342 12.95

Computer Security System



24⁹⁵

■ Low-Cost Theft Deterrent
■ Easy to Install

Mounting plates attach to tabletop and side of computer and peripheral by special acrylic adhesive. No modification required, no holes to drill. Includes user-resettable combination lock, 3-ft. vinyl-coated steel cable, 3 mounting plates and instructions.

26-1376 24.95

Expansion Set. Two plates and surface preparation kit. 26-1377 11.95
Computer and monitor not included.

Anti-Static Mat



NEW FOR 87

89⁹⁵

Chair not included

Drains static charges that can damage your computer. Carbon fibers remove charges instantly (rated less than 2 x 10⁹ ohms, less than 0.05 second decay time). Clear textured vinyl. Cleats on bottom prevent slipping on carpet. With 10-ft. grounding cord. 45 x 53".

26-214 89.95

COMPUTER SYSTEM FURNITURE

Modular System Furniture for Your Home or Office Workstation

A System Desk. Adjustable glides. 27 x 49 3/4 x 29 3/8". 26-1356 119.95

B Storage Hutch. Mounts on system desk. Assembles with adjustable "second shelf" on either side. 26-1359 . . . 59.95

Half-Width Storage Hutch (not shown). 26-1374 54.95

C NEW! 3-Drawer Module. Bottom drawer (9 1/2 x 13 1/4 x 17 1/2") has letter/legal hanging file rails. Top drawers measure 4 x 13 1/4 x 17 1/2" each. 24 1/4 x 16 3/4 x 19 1/4". 26-1397 129.95

D Corner Section. Mounts on right or left side of desk. Adds approx. 4 sq. ft. of working space. 26-1358 39.95

E Printer Stand. Large enough to accommodate wide-bed printers. Includes bottom-feed paper slot, unique swing-down paper catch for printed output and paper storage shelf. Adjustable glides. 27 x 28 1/2 x 19 1/2". 26-1357 99.95



- Modern Simulated Oak Finish
- Beautiful, Spacious Matching Design
- All System Components Easy to Assemble

Complete Workstation (as shown)
399⁰⁰
 Reg. Separate Items 449.75
 Low As \$20 Per Month*

Computer, printer and accessories not included



99⁹⁵ Simulated Oak Finish

Computer and accessories not included

Computer Workcenter. Features a full-width monitor shelf (41 1/2 x 14 3/4"), space for computer and printer, plus plenty of workspace. Adjustable glides. Simulated oak finish. Easy to assemble. 34 x 43 x 23 3/4". 26-1350 99.95



Terminal Stand
199⁹⁵

Computer and manual not included

System Desk
279⁹⁵

Printer Stand
149⁹⁵

Computer, manual and drawer not included

Printer not included

Deluxe Terminal Stand. Large 30 x 30" top is adjustable at 26", 27" or 28" heights. Easy to assemble. 26-4306 199.95

Deluxe Workstation. Easy to assemble. 27 x 48 x 30". 26-4303 279.95

Desk Drawer. Mounts on left or right. 12 3/4 x 18 1/2 x 20 1/4". 26-4304 . . . 139.95

Printer Stand. Slotted top for bottom paper feed. Includes wire basket. Easy assembly. 27 x 24 x 19". 26-4307 149.95

Locking Casters. Lets you move printer stand easily. Fits Printer Stands #26-4307 and #26-1357. 26-1319 Set of 4/19.95

Computer Table



79⁹⁵

Computer, printer and accessories not included

Computer Table. Small enough to let you set up your system nearly anywhere. Large enough for Tandy 1000, Model 4 or Color Computer. Monitor Platform (26-210) sold separately. Easy to assemble. 27 x 48 x 24". 26-1324 79.95

Compact Computer and Printer Stands



4.9⁹⁵ Each

Computer Stand

Printer Stand

- Inexpensive and Functional
- Beautiful Simulated Hickory Finish

Computer, printer and accessories not included



Compact Computer Stand. Our lowest-priced computer desk. Includes raised platform for your monitor or printer, plus a storage shelf for disk drives, software and accessories. Easy to assemble. 26 x 32 x 19 3/4". 26-1354 49.95

Compact Printer Stand. Large enough to accommodate wide-bed printers. Includes bottom-feed paper slot and paper storage shelf. Easy to assemble. Adjustable glides. 26 x 26 7/8 x 19 3/4". 26-1355 49.95

PRINTER/COMPUTER SUPPLIES

Stock Up Now on Fanfold Printer Paper



- Buy Fanfold Paper in Small Quantities and Save
- Available in Mini-Paks, Totes and Full Cartons
- Store Your Printouts in the Reusable Cartons

Feed paper directly into the printer from the reusable cartons. Letter-size sheets (9 1/2 x 11") have "invisible" detachable, perforated margins. Single-part sheets are high-quality, 15-pound bond, unless a heavier weight is specified. No ground wood or recycled paper. Multi-part sets are clean, carbonless, no-ness paper.

Fanfold Mailing Labels

Low As **6⁹⁵** Pkg./1000



1-Wide. 4 1/2" carrier. Pkg. of 1000.
26-1328, 6.95

1-Wide. 4 1/2" carrier. Pkg./5000.
72-402 24.95
2-Wide. Pkg./2000. 72-401 15.95
3-Wide. Pkg./3000. 72-400 16.95
2-Wide. Dry gum. Pkg./2400.
26-1456 9.95

Roll Printer Paper



Printer	Paper	Cat. No.	Qty./Price
CGP 115	4 1/2" x 150"	26-1428	3/4.95
CGP 220	8 1/2" x 75"	26-1333	3/9.95
CGP 220	8 1/2" x 11" sheets	26-1341	250/6.95
TP-10	Thermal 4 1/8" x 80"	26-1332	2/3.95
PT-210/TRP 100	Thermal 8 1/2" x 100"	76-1003	6/24.95
PC-1	13/4" x 18"	26-3506	6/17.75
PC-2	2 1/4" x 30"	26-3606	6/2.49
PC-3	Thermal 2 1/4" x 7"	26-3592	5/2.49
PC-4	Thermal 1 1/2" x 8 1/2"	65-711	5/1.99
LP I/II/IV/VIII/200	8 1/2" x 500"	26-1402	2/19.95
Plotter/Printer (26-1190)	9" x 90", 8 1/2" pin-to-pin	26-1407	4.95
Quick Printer (26-1153)	Electrostatic 4 3/4" x 130"	26-1405	3/19.95
Quick Printer II (26-1155)	Electrostatic 2 3/8" x 75"	26-1412	2/4.95

Fanfold Printer Paper						
Size	Parts	Design	Vertical Perf.	Qty.	Cat. No.	Price
9 1/2 x 11"	1	Greenbar	Yes	1500	72-304	24.95
9 1/2 x 11"	1	Greenbar	Yes	3500	26-1403	49.95
9 1/2 x 11"	1	White	Yes	500	26-1423	8.95
9 1/2 x 11"	1	20# White	Yes	500	26-1387	10.95
9 1/2 x 11"	1	20# White	Yes	1250	26-1427	24.95
9 1/2 x 11"	1	20# White	Yes	2500	72-311	44.95
9 1/2 x 11"	2	White	Yes	750	72-305	34.95
14 7/8 x 11"	1	Greenbar	No	500	26-1330	11.95
14 7/8 x 11"	1	Greenbar	No	1500	72-300	34.95
14 7/8 x 11"	1	Greenbar	No	3500	26-1417	69.95
14 7/8 x 11"	1	White	No	1500	72-303	34.95



Order Your Own Custom Forms from Any Radio Shack Computer Center

Radio Shack provides a complete selection of custom-designed business forms, envelopes and labels that are guaranteed compatible with our computer systems and accounting software. Visit your nearest Radio Shack Computer Center today to place your order for professional forms.

Get a Protective Dust Cover for Your System



- Protects Against Dust and Dirt
- Durable Vinyl With Reinforced Stitching on All Seams

System Dust Covers	Cat. No.	Each
Model 12/16/6000	26-526	7.95
Model III/4 or DT-1 Terminal	26-506	5.95
Color Computer 2/3	26-532	3.95
Tandy 1000/1200/2000/3000	26-541	9.95
Tandy 1000 EX	26-543	4.95
Printer Dust Covers		
DMP 105	26-530	3.95
DMP 130	26-536	3.95
DMP 430	26-535	4.95
DMP 2100/2110	26-525	4.95
DMP 2200	26-539	4.95
DW II & DWP 510/520	26-508	5.95
DW Printer w/ Tractor (except DWP 520)	26-538	5.95
DWP 220/230	26-537	4.95
Peripheral Dust Covers		
CCR 81 Recorder	26-517	2.95
DT-100 Monitor	26-540	4.95
Color Computer Disk Drive	26-542	3.95
Tandy 1000 EX Disk Drive or Hard Disk	26-544	3.95

Anti-Static Spray
5⁹⁵ Use on Equipment, Screen or Carpet
 Helps eliminate problem-causing static. Safe. 16 fl. oz.
 26-515 5.95

Disk Cartridge
79⁹⁵ **NEW LOW PRICE!**
 Use with our 10-Megabyte Disk Cartridge System. Was \$89.95 in RSC-16.
 26-1372 79.95

Printwheel Cleaning Kit
16⁹⁵
 Clean clogged, recessed areas. 26-1320 . . . 16.95
Refill Fluid and Pad.
 26-1322 5.95

Typing Easel
17⁹⁵ Keeps Pages in Place
 Adjustable T-bar (8 3/4" to 13 7/8") and friction pads keep books open and in place. Cushioned base. 73-2003 .. 17.95
TC50

1/4" Data Tape Cartridge
34⁹⁵
 Use with our TCS-100 Tape Cartridge System for 48 megabytes of archival storage. 450 ft. 26-1391 34.95

Printwheel Binder
9⁹⁵
 Protects printwheels from loss or damage. Holds nine wheels. For DW II, DWP 410/510. 73-2004 9.95

DISKETTES AND DISK STORAGE

Certified 3 1/2", 5 1/4" and 8" Unformatted Diskettes



- Fully Certified for Highest Reliability
- State-of-the-Art Formulation and Lubrication
- All Diskettes Are Unformatted, Double-Density, Soft-Sector

Our diskettes are double coated with an advanced ferric oxide blend to provide maximum lubrication and resistance to diffusion. All diskettes are unformatted, double-density and soft-sectored. Always keep plenty of diskettes on hand. Stock up today.

- 5 1/4" Replacement Labels.
26-307 Pkg. of 54/1.95
- 8" Replacement Labels.
26-4955 Pkg. of 54/1.95

Single-Sided Diskettes

Size	Tracks	Diskettes Per Pkg.	Cat. No.	Quantity Price Per Package		
				1-4 (Each)	5-9 (Each)	10-Up (Each)
3 1/2"	80	3	26-415	15.95	14.49	13.49
	80	10	26-416	44.95	39.95	37.95
5 1/4"	40	1	26-305	2.19	1.99	1.89
	40	3	26-405	5.95	5.29	4.99
	40	10	26-406	15.95	14.49	13.49
8"	77	3	26-4904	10.95	9.95	9.29
	77	10	26-4906	34.95	31.95	29.95

Double-Sided Diskettes

Size	Tracks	Diskettes Per Pkg.	Cat. No.	Quantity Price Per Package		
				1-4 (Each)	5-9 (Each)	10-Up (Each)
3 1/2"	80	3	26-417	16.95	15.29	14.49
	80	10	26-418	49.95	44.95	42.95
5 1/4"	40	3	26-411	6.95	6.29	5.95
	40	10	26-412	16.95	15.29	14.49
	80	3	26-409	8.95	7.95	7.49
	80	10	26-410	24.95	22.95	20.95
	80 (1.6Mb) High-Density	3	26-421	15.95	14.49	13.49
	80 (1.6Mb) High-Density	10	26-422	44.95	39.95	37.95
8"	77	3	26-4961	12.95	11.95	10.95
	77	10	26-4960	39.95	35.95	33.95

Radio Shack COMPUTER CENTER

DISKETTE CLUB Includes 100 Diskettes, 40% Savings

Valid at Radio Shack Computer Centers and participating Stores and Dealers

Issued to: _____

By: _____

Get 40% off any 3-pack of diskettes each month for a year!

Get Your FREE Diskette Discount Card

An incredible offer! Stop by and pick up your free Diskette Discount Card at any Radio Shack Computer Center, participating Radio Shack store or dealer. The Card enables you to save 40% on any 3-Pack of Diskettes each month for a whole year. Get your Card today and start saving!

Diskette Storage Boxes



Low As **12⁹⁵**

Available in 3 Sizes

Disks not included

Organize your floppy disks with five adjustable dividers. High-impact styrene.

3 1/2". Holds 30. 26-1381 12.95

5 1/4". Holds 50. 26-1362 14.95

8". Holds 50. 26-4953 24.95

Protect Your Diskettes



Disks not included

5 1/4" **Wallet File**. Rugged binder for long-term use. Anti-static vinyl pages. Holds 10 diskettes. 26-1366 7.95

Universal 3-Ring Data Binder. 26-1310 5.95

5 1/4" **Disk Envelopes**. Holds 2. Package of 10. 26-510 7.95

8" **Disk Envelopes**. Holds 1. Pkg. of 10. 26-4907 7.95

Disk Library Boxes

Low As **2⁹⁵**

Available in 3 Sizes

Disks not included



Store like a book when closed, flip through disks when opened.

3 1/2". Holds 5. 26-1380 ... Pkg. 2/2.95

5 1/4". Holds 10. 26-1452 4.95

5 1/4" **Tote**. Holds 5. 26-1348 ... 2.95

8". Holds 10. 26-4952 5.95

Helpful Programming Aids



- Produce Professional Worksheets
- Create Easy-to-Follow Flowcharts

- A** Model I/III Graphics Worksheets. 26-2105 100 Sheets/4.95
- B** Printview Ruler. 26-1313 3.50
- C** Flowchart Template. 26-1312 3.95

Disk Drive Verifier Diskette

NEW FOR 87

29⁹⁵

For Tandy 1000 EX and SX, and 1200



Analyzes alignment, rotational speed index sensor position, clamping ability and write/read accuracy. Tandy 1000 requires 256K, Tandy 1000 EX requires 384K. 26-1370 29.95

Disk Drive Head Cleaning Kits

Low As **7⁹⁵** Each

Kits for 3 1/2", 5" and 8" Drives



3 1/2" **Kit**. Single-sided. 26-419 ... 9.95

NEW! 3 1/2" **Kit**. Double-sided. 26-420 9.95

5 1/4" **Drive Kit**. 26-408 7.95

8" **Drive Kit**. 26-4957 8.95

DELUXE BUSINESS PRINTERS



Dot-Matrix Power for Business

1695⁰⁰

Lease for
Only \$65
Per Month¹

- IBM PC Compatible
- Prints 380 cps

DMP 2200. A versatile business printer. Efficient, fast printing means no long delays for reports—and that saves your business money. Supports elongated, double-high, bold, underline, super/subscripts, italics and double-strike. Features bit-image graphics. Prints up to 380 characters per second. Uses 3" to 16" fanfold paper only (bottom or rear paper feed). Built-in tractor—not sprocket. Prints original, plus up to six copies. Parallel interface only. U.L. listed.

26-1279 1695.00

SPECIFICATIONS. Print Density: 10, 12, 17.1 (standard); 10 and 12 (correspondence); proportional and compressed proportional. Print Speed: Standard 10 cpi—380 cps. Correspondence 10 cpi—90 cps. Proportional—77-180 cps. Character Set: 95 ASCII, 31 graphics and special characters. IBM Character Set 1 and 2. Horizontal Dot Resolution: 60-240 dots/inch, 1632-3916 dot columns/line. Dimensions: 4³/₄ x 22¹/₂ x 16⁷/₈". Weight: 39³/₄ lbs. Power: 120VAC, 60 Hz, 200W.



Print Customized Type Styles

1295⁰⁰

Lease for
Only \$50
Per Month¹

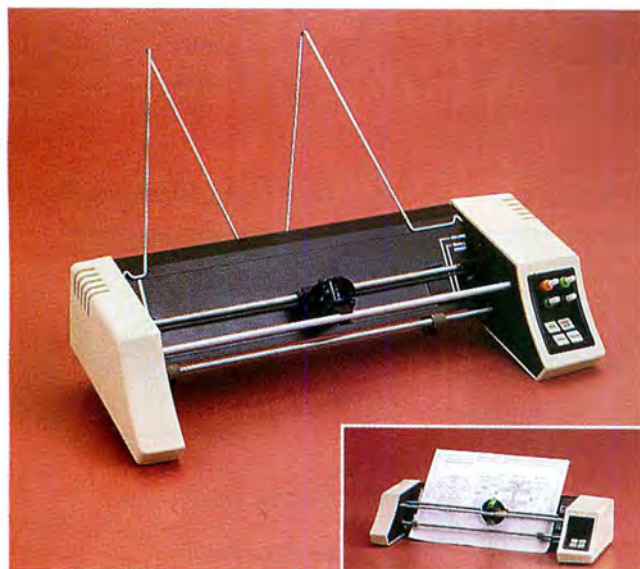
- IBM PC Compatible
- Prints 240 cps

DMP 2110. Use the Font Editing Packages (sold separately) to load different type styles for print quality that rivals a daisy wheel printer! Includes data processing, word processing and graphics modes. Prints up to 240 characters per second. Precision 24-wire print head. Parallel interface. Includes bi-directional tractor. U.L. listed.

26-2810 1295.00

SPECIFICATIONS. Print Density: 10, 12 and 16.7 cpi, plus proportionally spaced and elongated. Print Speed: Standard 10 cpi—121 lpm/80 column, 84 lpm/132 column. Correspondence 10 cpi—33 lpm/132 column. Character Set: 96 ASCII, 31 international and 31 graphics characters. Font Matrix: DP mode—10 cpi and 16.7 cpi: 24 x (13 + 5), 12 cpi: 24 x (13 + 2). WP mode—10 cpi: 24 x 36, 12 cpi: 24 x 30, Proportional: 24 x n. Horizontal Dot Resolution: 360 dots/inch, 4896 dots/line. Paper: Up to 15" wide. Friction feed. Prints original, plus two copies. Dimensions: 5⁷/₈ x 21¹/₁₆ x 15". Weight: 42 lbs. Power: 120VAC, 60 Hz.

NEW
FOR **87**



Turn Complex Numerical Data Into Charts and Graphs with Our 8-Color Digital Plotter

799⁰⁰

Low As
\$37 Per Month*

- Create Pie Charts,
Bar Graphs, Maps,
Tables and More

PC-695. Create incredible graphics—in up to eight colors—and turn rows of numerical data into easy-to-understand graphics. Plot pie charts, tables, maps, bar graphs and more. Ideal for business information such as financial trends, production data and market forecasts. Prints on any high-quality bond paper. Features "self-test" mode. Includes standard hard nib pens in black, red, blue, green, lime green, brown, orange and magenta. Asynchronous RS-232C serial interface. U.L. listed.

26-2830 799.00

SPECIFICATIONS. Print Speed: 3 inches per second axial, 4⁷/₃₂ inches per second diagonal. Interface: Asynchronous serial RS-232-C. Buffer: 256 bytes. Baud Rate: 300, 1200, 2400, 9600. Dimensions: 3³/₁₆ x 17¹/₂ x 7¹³/₁₆. Weight: 6¹/₂ pounds. Power: 120 VAC, 60 Hz, 5 watts.

AFFORDABLE TANDY PRINTERS

Produce Correspondence-Quality Text Using This 132-Column Printer with 18-Wire Print Head

699⁰⁰

Low As
\$33 Per Month*

IBM PC Compatible
Was \$899.00 in Cat. RSC-16

DMP 430. The 18-wire print head gives you superior-quality correspondence fonts in a single pass. Prints 10, 12 or 16.7 cpi, plus elongated standard, elite and condensed. Get micro, italic and double-high fonts, too. Produces bit-image graphics at 7 or 16-bit columns. True pin-driven tractor—not sprocket. Prints original, plus two copies, at up to 180 characters per second. Parallel and Color Computer-compatible serial interfaces. U.L. listed.

26-1277 699.00

SPECIFICATIONS. Print Density: 10, 12, 16.7 cpi, plus elongated. Print Speed: 10 cpi—43 lpm/80 col. Character Set: 96 ASCII, 64 special and 30 block graphics characters. Horizontal Dot Resolution: 480-800 dots per line. Vertical Spacing: 12, 6, 8 lines per inch. Line Feed: 1/6, 1/8, 1/12, 1/72". Dimensions: 3 1/16 x 15 3/8 x 9 7/16". Weight: 8 3/4 lbs. Power: 120VAC, 60 Hz.



NEW LOW PRICE!

Triple-Mode "Personal Printer"

349⁹⁵

Low As
\$20 Per Month*

■ IBM PC Compatible
■ Prints Up to 100 cps

DMP 130. Features word processing, data processing and dot-addressable graphics modes. Prints in four character styles: Standard or italic cursive in draft or correspondence modes. Supports super/subscripts, double-width, bold, double-strike and microfonts. Bi-directional, logic-seeking print head (uni-directional in correspondence and graphics modes). Prints original, plus two copies on 4" to 10" fanfold paper or single sheets. Built-in tractor. Parallel and Color Computer-compatible serial interfaces. U.L. listed.

26-1280 349.95

SPECIFICATIONS: Print Density: Draft Quality—10, 12 and 17 cpi (standard and italic cursive). Correspondence Quality—10 and 12 cpi (standard and italic cursive). Speed: 50 to 100 cps (draft), 20 to 24 cps (correspondence). Character Set: 96 ASCII, plus Tandy or IBM special characters. Bit Image: 480 to 1920 dot columns/line. Dimensions: 4 3/4 x 15 3/8 x 10 1/2". Weight: 10 3/4 lbs. Power: 120VAC, 60 Hz, 33W.



Budget-Priced High-Performer

199⁹⁵

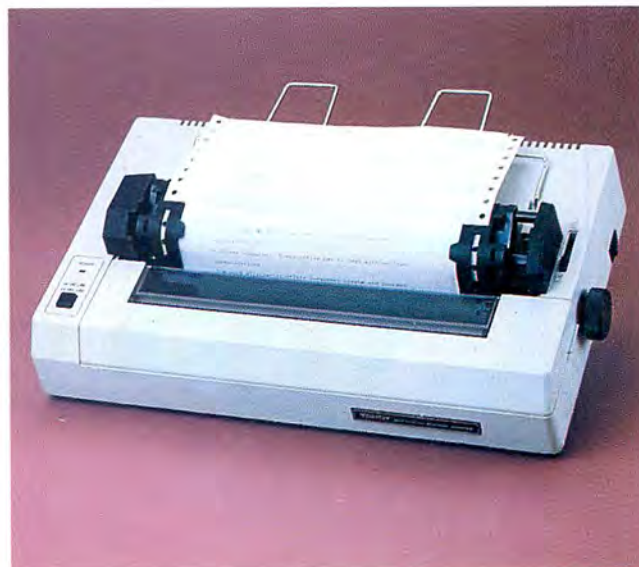
Low As
\$20 Per Month*

■ Bit-Image Graphics
■ Prints 80 cps

DMP 105. Another Radio Shack price breakthrough! Ideal for data processing and general-purpose use. Bi-directional—prints 80 upper and lower case characters per line (8 x 9 matrix) at 43 lines per minute at 10 characters per inch. Elongated and condensed modes. Prints up to 80 characters per second. Removable adjustable tractor uses 4" to 9 1/2" fanfold paper, friction platen for single sheets. Prints original, plus one copy. Parallel and Color Computer-compatible serial interfaces. U.L. listed.

26-1276 199.95

SPECIFICATIONS. Print Density: 10, 12, 16.7 cpi, plus elongated. Print Speed: 10 cpi—43 lpm/80 col. Character Set: 96 ASCII, 64 special and 30 block graphics characters. Horizontal Dot Resolution: 480-800 dots per line. Vertical Spacing: 12, 6, 8 lines per inch. Line Feed: 1/6, 1/8, 1/12, 1/72". Dimensions: 3 1/16 x 15 3/8 x 9 7/16". Weight: 8 3/4 lbs. Power: 120VAC, 60 Hz.



LETTER-QUALITY DAISY WHEELS



Our Best Daisy Wheel Printer

995⁰⁰

Low As
\$46 Per Month*

- IBM Compatible
- Prints 500 wpm

DWP 520. Give your correspondence, reports and memos that clean, crisp "electric typewriter" look. You can print fixed 10 or 12 characters per inch or choose proportional spacing (using appropriate optional 96-character print wheels). Prints up to 43 characters per second. Features forward and reverse paper feed and 1/2-line feed, backspace and underline. Supports boldface, strike-through, double-underline, super and subscripts. "External Program Mode" allows you to use print wheels with different pitch or special characters. Parallel interface only. Includes Courier 10 print wheel and carbon ribbon. U.L. listed. 26-2800 995.00

DWP 520 Bi-Directional Tractor.

26-2801 149.95

SPECIFICATIONS. Print Speed: 19.5 lpm at 10 cpi, 132 column. Carriage Motion: Uni-directional, optimal motion seeking. Character Set: 96 ASCII, plus special and international, 21 control codes. Paper: Up to 16" wide. Original, plus 5 copies. Friction feed. Interface: Parallel. Dimensions: 8 x 24 1/2 x 15 1/2". Weight: 28 lbs. Power: 120VAC, 60 Hz, 141 Watts.



Our Lowest-Priced Daisy Wheel

399⁹⁵

Low As
\$20 Per Month*

- IBM Compatible
- Prints 200 wpm

DWP 230. Now you can get full-featured letter-perfect printing for under \$400. Select 10 or 12 characters per inch, or proportional pitch. Uses interchangeable 96-character print wheels. Prints at 20 cps. Includes forward and reverse paper feed and 1/2-line feed, underline and programmable backspace. Self-test facility lets you see if printer is operating properly before starting. "Ribbon End" feature stops printer when ribbon reaches its end. Automatic impact control prolongs the life of the print wheel. Parallel and Color Computer-compatible serial interfaces. Includes Courier 10 print wheel and carbon ribbon. U.L. listed. 26-2812 399.95

DWP 230 Bi-Directional Tractor. 26-2813 99.95

SPECIFICATIONS. Carriage Motion: Bi-directional, optimal motion seeking. Character Set: 96 (modified ASCII, plus special international), 18 control codes. Paper: Up to 16" wide. Original, plus 3 copies. Friction feed. Interface: Color Computer-compatible serial and parallel. Dimensions: 6 5/8 x 24 3/8 x 13 3/8". Weight: 26 lbs. Power: 120VAC, 60 Hz, 60 Watts.



Printer Controller Saves Time

249⁹⁵

Low As
\$20 Per Month*

**Frees Your Computer
During Printing**

PTC 64 Printer Controller. Now you can print one job while working on another! The PTC 64 assumes control of all printing operations. It accepts and stores information from your computer, then feeds it to your printer as fast as the printer can handle it. This means excellent throughput and no downtime because your computer's memory, processing power and disk drives are free for other tasks. Features a clear memory function, a pause function and a copy function for printing up to 100 consecutive originals. There are even 16 redefinable special characters, as well as unique programmable functions that will give you the option of downloading an alternate operating system to generate a new ASCII character set, graphics data and more by programming the built-in Z-80 microprocessor with the host computer. Activate functions from the panel keys or through software. Standard parallel printer interface. Cable not included. UL listed AC power module. 26-1269 249.95

26-1269 249.95

PRINTER/COMPUTER SUPPLIES

Simplify Your Computer/Printer Cable Connections with Our Printer Selector Interface

99⁹⁵

Low As
\$20 Per Month*

- Automatically Select Printer or Computer
- IBM Compatible

Printer Selector 2 Interface. Stop plugging and unplugging printer cables! Now you can easily connect two printers to one computer or two computers to one printer, then automatically switch between them with our Printer Selector 2 Interface. The appropriate printer/computer channels can be selected by automatic scanning (input channel only), software control codes (input and output channels), or the front panel switches (input and output channels). LED indicators show you which input channel is locked on and the output channel selected. If your printer is not equipped with IBM PC emulation, you can change the interface's mode setting from IBM to Tandy. The Printer Selector 2 Interface is compatible with any standard parallel printer. Cables not included. UL listed. 26-2820 99.95



Daisy Print Wheels Daisy Wheel II/DWP 410/510

DW II/410/510 Wheels	Catalog No.	Price
Courier, 10 Pitch	26-1430	29.95
Prestige Elite, 12 Pitch	26-1431	29.95
Madeleine PS	26-1432	29.95
Cubic PS	26-1433	29.95
Tile Italic, 10/12 Pitch	26-1434	29.95
OCR B, 10 Pitch ¹	26-1435	39.95
Letter Gothic, 12 Pitch	26-1436	39.95
Cubic 15 ²	26-1438	39.95
Bold PS	26-1439	39.95
Scientific A/N ³	26-1486	39.95
Pica 10	26-1290	39.95
Narrator	26-1291	39.95
OCR-A ⁴	26-1292	39.95
Elite 12	26-1293	39.95
Scandia Courier 10	26-1294	39.95
Scandia Elite 12	26-1295	39.95
Cubic PS*	26-1425	7.95
Tile Italic*	26-1426	7.95

External Program Mode: ¹Suggested, ²Required, ³*Daisy Wheel II Only.

DWP 210

DWP 210 Print Wheels	Catalog No.	Price
Courier 10	26-1467	9.95
Prestige Elite 12	26-1468	9.95
Venezia PS	26-1469	9.95

DWP 220

DWP 220 Print Wheels	Catalog No.	Price
Courier, 10 Pitch	26-1230	9.95
Letter Gothic, 12 Pitch	26-1231	9.95
Venezia PS	26-1232	9.95

Plotter Supplies

Hard-Nib Pens for FP-215 (for paper)—\$3.95 each			
Color	Catalog No.	Color	Catalog No.
Black	26-1343	Blue	26-1345
Red	26-1344	Green	26-1346

Plotter Supplies

Pens for Multi-Pen Plotter (26-1191)—\$3.95 each					
Color	Paper	Transparencies	Color	Paper	Transparencies
Red	26-1460	26-1470	Brown	26-1464	26-1474
Blue	26-1461	26-1471	Orange	26-1465	26-1475
Green	26-1462	26-1472	Black	26-1466	26-1476
Violet	26-1463	26-1473			

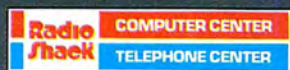
- CGP 115 Black Pens. Set of 3. 26-1480 2.95
- CGP 115 Color Pens. One each: red, green, blue. 26-1481 2.95
- CGP 220 Black Ink Pack. 26-1281 9.95
- CGP 220 Tri-Color Ink Pack. 26-1282 14.95
- PC-695 Black Pens. 26-2831 Pkg. of 4/7.95
- PC-695 Color Pens. Red, green, blue, black. 26-2832 7.95
- PC-695 Color Pens. Lt. green, brown, orange, magenta. 26-2833 7.95

Replacement Printer Ribbons

Printer	Ribbon	Catalog No.	Each	
			1-11	12-Up
LP I, II, IV	Fabric Pack (3/PK)	26-1413	15.95	11.95
LP III, V	Fabric Cart.	26-1414	11.95	8.95
LP VI/VIII, DMP 400/420	Fabric Cart.	26-1418	11.95	8.95
LP VII, DMP 100	Re-inking Fabric	26-1424	8.95	6.70
DMP 110	Re-inking Fabric	26-1283	7.95	5.95
DMP 130	Cartridge	26-1236	10.95	8.20
DMP 130	Refill (3/PK)	26-1238	12.95	9.70
DMP 500	Fabric Cart.	26-1482	13.95	10.45
DMP 120, 200	Fabric Cart.	26-1483	15.95	11.95
DMP 120, 200, 500, 430	Refill Pack (3/PK)	26-1489	15.95	11.95
DMP 105	Fabric Cart.	26-1288	7.95	5.95
DMP 430	Fabric Cart.	26-1296	15.95	11.95
DMP 2100, 2100P, 2110	Fabric Cart.	26-1442	13.95	10.45
DMP 2200	Cartridge	26-1233	39.95	29.95
DMP 2200	Refill	26-1234	14.95	11.20
LMP 2150	Cartridge	26-1287	12.95	9.70
TRP 100	Thermal Film	26-1297	3.95	2.95
TRP 100	Refill Rolls (5/PK)	26-1298	9.95	7.45
DW II, DWP 410, 510	Carbon Film Cart. Multi-Strike (3/PK)	26-1419	21.00	15.75
DW II, DWP 410, 510	Nylon Cart.	26-1449	10.95	8.20
DWP 520, 230, 210	Carbon Film Cart. Multi-Strike (3/PK)	26-1445	17.95	13.45
DWP 520,230,210	Fabric Cart.	26-1458	8.95	6.70
DWP 220	Multi-Strike	26-1299	17.95	13.45
DWP 510	Blue M/S	26-1285	6.95	5.21
DWP 510	Brown M/S	26-1286	6.95	5.21
PC-1	Printer Ribbon	26-3507	2.75	2.75

*REVOLVING CREDIT AVAILABLE—See Page 2

Radio Shack is the World's Largest Computer Retailer



For over 66 years, America has trusted Radio Shack for dependability, quality and value in consumer electronics. Buy with confidence wherever you see one of these signs.

Visit your nearest Radio Shack Computer Center to see the full line of Tandy computers. These centers form a nationwide network of support to business and education, providing professional training, leasing and service plans. Most of our business computer line can also be found at any Radio Shack Plus Computer Center, which is located within a Radio Shack store.

Come to our Computer Center/Telephone Center and you'll find a full-line computer operation also offering advanced telecommunications products.

And of course, you can see our popular-priced computers at any of over 5,175 Radio Shack stores and participating dealers nationwide.

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.
** Available in March 1986.

LOAD 80 • 80 Pine St. • Peterborough, NH 03458

10-86B



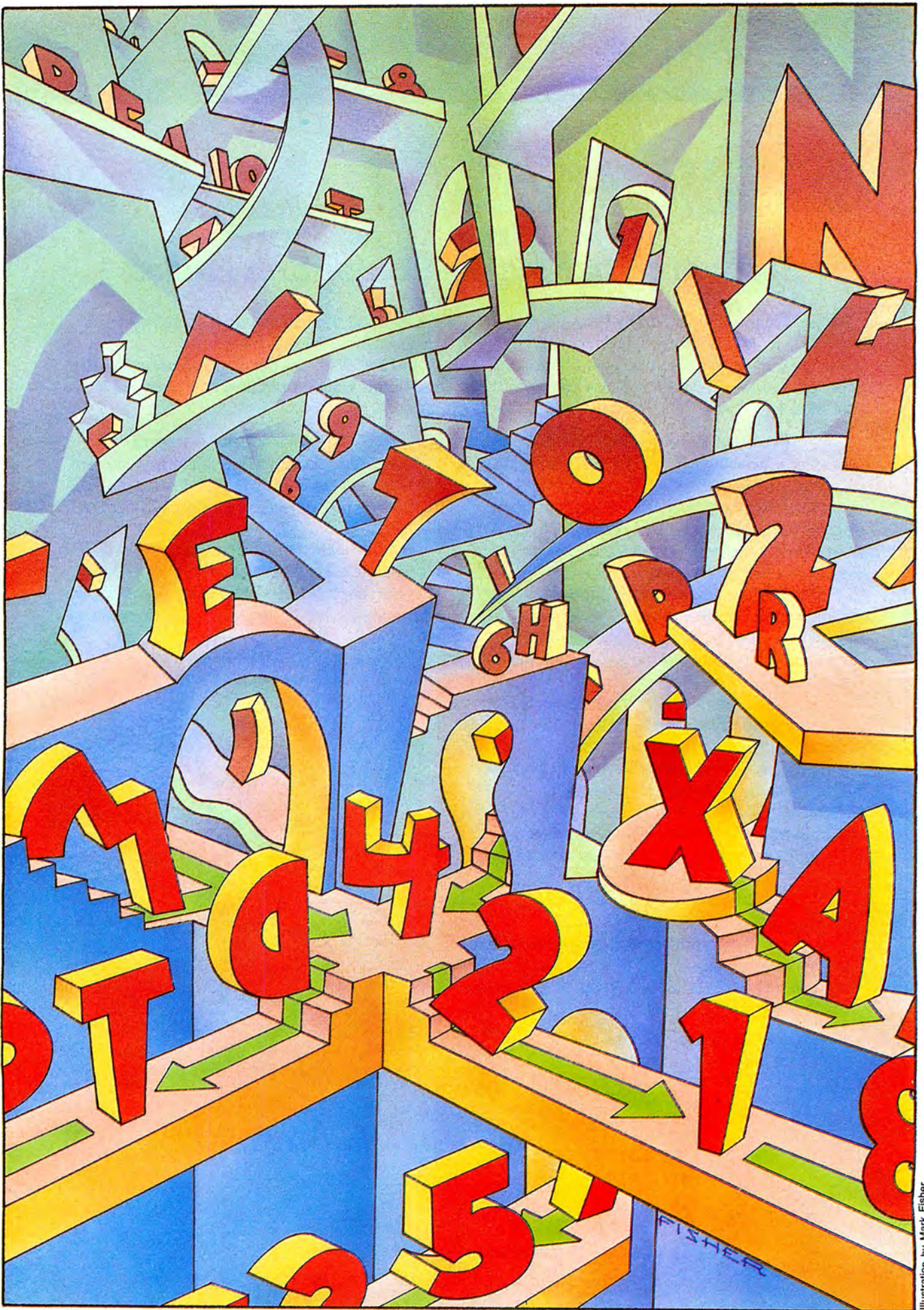


Illustration by Mark Fisher

THE ROAD TO BETTER SORTS

Sooner or later, you'll want to write a sorting routine into a program or speed up the sorts you've already written. Whether you're working with checks, recipes, test scores, or a mailing list, you'll want the computer's help in putting things in order.

Of course, you'll also want the fastest sort possible, but unfortunately, there is no best sorting algorithm for all programs. The best sort for a particular program depends on the amount of data to be arranged, the form your data is in, the amount of time you are willing to spend writing and debugging the new routine, and the speed with which the computer can perform fundamental operations on the data.

I'll show you several simple, well-known sorting algorithms and explain each one. These aren't the only sorting algorithms, nor the fastest, but one will likely be adequate for nearly any application you have in mind.

Most sorting algorithms share several characteristics. Each works with data items that can be accessed with an index, which in some programs is an item's number in an array. In other programs, the index is a record number in a random-access file. Although the program user can be unaware that every item has its own number, the sorting routine must have a consistent way of finding each data item by an index number that can be used in a loop.

Also, almost all sorting algorithms spend most of their time performing two simple operations: comparing two data items and, when necessary, exchanging two data items. The major difference between sorting techniques is how often they have to perform each operation.

The Vocabulary of Sorting

First, I'll present a common vocabulary for discussing sorting operations.

A record is a complete data item. In a program to sort a word list, for example, each word is a record; in a mailing list program, all the information about each person (name, address, zip code, phone number, and so on) is a record. Sometimes a record will reside in a single array element; other programs might have to handle records as parallel items in several arrays or

Find the right sorting technique for the task at hand.

by Hardin Brothers

as elements in a random-access file.

A key is the part of a record a sorting program uses to make comparisons. In a word list, the entire record will be a key. More often, a key is a small part of a record. In a mailing-list program, the key can be as simple as the last name of a person or as complex as the zip code, street name, and street address.

An index is the number a sorting routine uses to locate both the key and the record. In many programs, the index is the record's array element number. Some programs use an indirect method of locating records that requires maintaining a separate array of indexes. In such programs, the array element number becomes an index to an index to a data record.

Finally, overhead is the amount of time or other computer resources, such as memory and disk space, that a program requires that is not spent directly comparing keys or exchanging records. For example, many sort routines employ a For...Next loop. The time needed just to control that loop is part of the sort routine's overhead.

All the sorting algorithms presented here are designed to sort an array in place; there are faster routines that perform sorts by copying each record to a new array, but they often require more memory than is available to Basic.

Slow Sort

There seems to be no official name for this algorithm, so I've dubbed it the special slow sort. Its main attraction is simplicity, and for this reason, it is the only



System Requirements

Models 4, 1000, 1200, 3000
64K RAM
Basic

sorting algorithm I teach beginning programmers. If you only have to deal with a few records—perhaps 20 or fewer—this method's simplicity makes it very attractive. It is also extremely inefficient.

To understand how a slow sort works, imagine a table with several playing cards laid out in a row, face down. Like the computer, you can look at only two cards at a time. Put your left hand on the far-left card and your right hand on the card next to it. Turn both cards over, look at them, and exchange them if they are out of order. Then put both cards back facedown.

Leave your left hand on the leftmost card and move your right hand one card to the right. Again, compare two cards and exchange them if necessary. Continue in the same manner until your right hand gets to the rightmost card. You now know that the card under your left hand is correctly placed.

Now move your left hand one card right, your right hand to the card next to it, and begin again. This time, when your right hand gets to the end of the row, you will be sure that the second card is correctly placed. Continue in the same manner until you've compared the last two cards on the right.

Program Listing 1 shows the slow sort in three forms. First, the program is displayed in a logical format called pseudocode. Next, the pseudocode is translated into Basic in a relatively easy form to read and debug. The final version, starting at line 500, is a condensed form of Basic that runs as fast as possible but is harder to understand.

To keep the listings as consistent as possible, I've assumed that each program is sorting a string array called WORD\$(), that the first string to be sorted is in WORD\$(1), and that the last string to be included in the sort is in WORD\$(SIZE). Further, the listings assume that the array is to be sorted into normal ascending alphabetical order. I've used the format of pseudocode, "logical" Basic, and "tight" Basic for each of the listings.

Bubble Sort

Although the bubble sort (Program Listing 2) is well known and often described in books, it is almost as inefficient as the slow sort and harder to program.

The bubble sort gets its name from the

metaphor of a cylindrical champagne glass. Imagine that the records to be sorted are arranged vertically. On the first pass through the sorting routine, the bottom two keys are compared, followed by the second and third elements, the third and fourth, and so on. Each comparison is followed by an exchange of two records, if necessary. Once you have moved through the entire column of records, one record has "bubbled" to the top and is in the correct place.

Each subsequent pass stops one position lower than the previous one, since each pass positions a record correctly at the top. It's possible, however, that lower records will accidentally fall into the correct positions. In order to avoid unneeded passes through accidentally sorted records, most implementations maintain a test flag of some kind. The flag is reset at the beginning of each pass and set whenever a record exchange occurs. If you have gone through the entire list without setting the flag, no exchanges were needed because everything is in its proper order. The sorting routine can then end ahead of schedule.

Selection Sort

The idea behind a selection sort (Program Listing 3) is simple: finding the record that should be first, moving it into that position, and doing the same with each record in the list.

Most implementations of the selection sort reflect this simplicity. The program assumes that the record currently in the first position has the smallest key. Then it scans through all the records, looking for smaller keys; when it finds one, it remembers the record's position and continues scanning the list. The program then exchanges the record having the smallest key with the first record in the data list. The process is repeated to find the record that should go into each subsequent position.

The selection sort makes many comparisons, but only the minimum number of exchanges. For this reason, it is often used to sort complex records when each exchange uses a large amount of time or computer resources. It is often the best choice for sorting records in a random-access disk file if you need to physically move data from one disk location to another.

Insertion Sort

The insertion sort (Program Listing 4) is patterned after the method many bridge players use to sort a hand of cards. Starting with the second card from the left, move each card to the left until you find a lower-value card. Place this card immediately to the right of the first lower card you find. In computer terms, each record is repeatedly exchanged with the one on its left until the record on its left has a smaller key.

In essence, the insertion sort puts the

first two records in order, then the first three, then the first four, and so on. The only difficulty is in finding an efficient way to keep the lowest record from moving completely off the left side of the data array or list. There are generally three possible solutions.

An obvious method that greatly adds to a sort's overhead is testing a record's position before each two-key comparison. If a record is already in the first position, the key comparison and subsequent exchange are skipped. The problem with this approach is that the position test takes time and will usually be useless.

Another common approach is to begin the sort with one loop of a selection sort. The record with the smallest key will then be in the first position and no other records will be able to move off the end of the list.

The third solution—the one I used in the listings—is to create and place at the beginning of the list a fake "sentinel" record having a key guaranteed to be smaller than that of any data record. Since the sorting routines in the Listings work with an array called WORD\$(), with data items indexed from one to some maximum size, I placed a null string in WORD\$(0) to be sure that no comparison or exchange would cause a "subscript out of range" error.

The insertion sort is excellent for arranging data that is mostly presorted. For example, if you have a data base to which

	Slow sort	Bubble sort	Selection sort	Insertion sort	Shellsort	Quick sort
VSHORT	(all times were one second or less)					
	45 cmp	45 cmp	45 cmp	36 cmp	24 cmp	37 cmp
	zero icp	9 icp	9 icp	zero icp	17 icp	41 icp
	27 swp	27 swp	7 swp	27 swp	13 swp	7 swp
Short	40 sec	48 sec	32 sec	19 sec	11 sec	9 sec
	4,950 cmp	4,922 cmp	4,950 cmp	2,552 cmp	769 cmp	776 cmp
	zero icp	92 icp	99 icp	zero icp	481 icp	682 icp
	2,453 swp	2,453 swp	97 swp	2,453 swp	473 swp	170 swp
NEWHEAD	293 sec	16 sec	282 sec	12 sec	19 sec	169 sec
	44,850 cmp	1,779 cmp	44,850 cmp	980 cmp	1,671 cmp	22,890 cmp
	zero icp	6 icp	299 icp	zero icp	375 icp	1,875 icp
	681 swp	681 swp	267 swp	681 swp	365 swp	395 swp
NEWEND	292 sec	336 sec	281 sec	13 sec	21 sec	227 sec
	44,850 cmp	44,850 cmp	44,850 cmp	1,107 cmp	1,842 cmp	30,924 cmp
	zero icp	299 icp	299 icp	zero icp	534 icp	1,924 icp
	808 swp	808 swp	296 swp	808 swp	524 swp	376 swp
Long	3,934 sec	4,680 sec	3,097 sec	2,855 sec	201 sec	127 sec
	499,500 cmp	497,730 cmp	499,500 cmp	247,446 cmp	14,062 cmp	11,911 cmp
	zero icp	940 icp	999 icp	zero icp	9,051 icp	8,126 icp
	246,447 swp	246,447 swp	995 swp	246,447 swp	9,039 swp	2,382 swp
Ordered	3,214 sec	7 sec	3,084 sec	14 sec	51 sec	2,984 sec
	499,500 cmp	999 cmp	499,500 cmp	999 cmp	5,457 cmp	501,498 cmp
	zero icp	1 icp	999 icp	zero icp	12 icp	6,995 icp
	zero swp	zero swp	zero swp	zero swp	zero swp	999 swp
Reverse	4,676 sec	5,736 sec	3,501 sec	5,771 sec	113 sec	3,013 sec
	499,500 cmp	499,500 cmp	499,500 cmp	500,499 cmp	8,550 cmp	501,498 cmp
	zero icp	1,000 icp	999 icp	zero icp	3,932 icp	6,995 icp
	499,500 swp	499,500 swp	500 swp	499,500 swp	3,920 swp	999 swp

Key: sec = running time in seconds; cmp = number of key comparisons; icp = number of integer (index) comparisons; swp = number of record swaps.

Table. Sorting times and efficiency.

\$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 \$24.95 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.

**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

**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

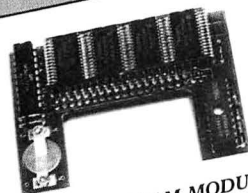
Subscription Dept.
PO Box 981

Farmingdale, NY 11737

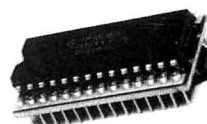
Thank you and enjoy your subscription.

**Your
Number
One Choice**

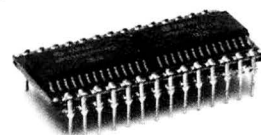
PG Design RAM modules have become the number one choice for Model 100, Tandy 200 users, not just because more people are using PG Design RAMs than any other brand—But because our name has become synonymous with **PREMIUM QUALITY, RELIABILITY, and IMMEDIATE CUSTOMER SERVICE.**



MODEL 100 64K 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 64K 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—\$375 ea. 32K RAM module—\$250 ea. 32K upgrade—\$150
- 8K RAM modules—\$29.95 ea. Set of three \$84.00 (available for NEC 8201A)
- Tandy 200 24K RAM modules—\$139 ea. \$135 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. 66040 Gratiot, Richmond, Michigan 48062 (313) 727-2744
Dealer inquiries invited. TANDY is a registered trademark of TANDY CORP.



you periodically add records, you can use an insertion sort after each update. Also, some sorting algorithms are good at getting records in approximate order, but they become inefficient when making the last few data exchanges. Because of this, the insertion sort is often used to polish off a list that has been mostly sorted by another algorithm.

Shellsort

All four of the preceding algorithms work acceptably well on small data lists but bog down terribly as the lists grow longer. In each algorithm, the time necessary to sort a list is related to the square of the number of items in the list. Therefore, sorting a 1,000-item list takes about 100 times as long as a 100-item list.

The Shellsort (named for Donald Shell) works by dividing the total list of records into several shorter lists and sorting those (see Program Listing 5). The short lists are then combined into longer lists, which are again sorted and combined until the entire data list is in order. Imagine that you have 100 records divided into 20 sublists. The Shellsort will sort each of those sublists, combine the sorted lists into a smaller number of sublists, sort those, and keep combining and sorting until all 100 items are in order.

The real efficiency of the Shellsort lies in its method for selecting the sublists. In the above example, if the first five records were put into one list, the next five into the next, and so on, each record could move no more than four spaces to the left or right in the original sort. When all the sublists were recombined, some records could still be 50 positions from their destinations.

Instead, the Shellsort establishes a "gap" value and puts all records that are gap-places apart in one list. In our example above, one list would contain records that start out in the first, 21st, 41st, 61st, and 81st places. The next sublist is composed of the records that were originally in the second, 22nd, 42nd, 62nd, and 82nd places. The advantage is that most records will move quickly toward their final destinations; records jump a long way through the total data list on the first sort, a shorter distance on the second sort when the gap is smaller, and decreasing distances with each subsequent sort. By the time the gap is down to one, each record should be close to its final destination.

Two important questions must be answered before you can write a Shellsort. The first is deciding how to sort each of the sublists. I've seen implementations based on both the bubble sort and the insertion sort. The Table shows that an insertion sort is generally more efficient than a bubble sort. My experiments show that Shellsorts based on an insertion sort usually run much faster than those based on a bubble sort. One reason for choosing

an insertion sort is that it is most efficient when a list is almost ordered. Since the Shellsort algorithm is constantly sorting almost-ordered lists, the insertion sort seems made to order.

The second question is how to select the gap sizes for a Shellsort. You will see published many implementations of the Shellsort that start with a gap equal to half the number of records. After each sort, the gap is divided by two to find the next gap size. Although this selection of gap sizes seems intuitively correct and is easy to program, it doesn't produce an efficient Shellsort implementation. It's possible that by the time the gap is reduced to one, none of the even-numbered records will have ever been combined in a sublist with any of the odd records. The final pass through the list might therefore end up doing most of the work.

Unfortunately, there is no best series of gap sizes and no rigorous mathematical way to analyze the Shellsort at all, but it has been tested empirically on several kinds of data and with many different series of gap sizes. An efficient series that is easy to implement is (in reverse order) 1, 4, 13, 40, 121, 364, 1093, and so on. Each number in the series is found by multiplying the previous number by three and adding one to the result. You can move from a larger number to a smaller simply by dividing by three and discarding any remainder. I've used this series of gap sizes in the Listings.

The Shellsort is acceptably fast for lists of up to several thousand data items and easy to code and debug. Unless you have complex records that take a long time to exchange (or records that must physically be moved from one disk location to another), the Shellsort is a good, general-purpose sorting algorithm for most programs.

Quick Sort

Like the Shellsort, the quick sort uses a

"divide and conquer" technique (Program Listing 6). It starts by picking a record and placing it in its final location; records above the record will have larger keys and those below it will have smaller keys. The quick sort then performs the same operations on the two sets of records on each side of the newly positioned record.

The only difficulty in implementing a quick sort is having the program remember which sublists remain to be sorted. The easiest way is to use a data structure called a stack. Think of a stack as a pile of plates in a cafeteria. The last plates added to the top are the first ones removed by new customers.

Each time the quick sort divides a list of records in two, it can store the left and right indexes of one sublist on the stack and work on the other. A sublist reduced to a size of one has obviously been sorted, and the quick sort can then retrieve a new sublist to work on.

The quick sort's way of finding the correct insertion point for a record is easy to understand but can be tricky to program. After choosing a record to insert, it uses two variables to hold the index values of the left and right ends of the sublist it is working on. It then moves the left pointer a step at a time to the right until it finds a record that should be to the right of the record to be inserted. Then it moves the right pointer to the left, looking for a record that should be placed on the left side of the insertion record.

The two out-of-place records are then exchanged, unless the value in the left pointer is greater than that in the right pointer. If the pointers have crossed, the insertion point has been located, and the record whose index is in the left pointer is exchanged with the insertion record.

The simplest way to implement a quick sort is to designate the record at one or the other end of a list as the insertion record. The quick sort in the Listing uses this

Program Listing 1. Special slow sort. (See p. 159 for information on using the checksums in Listings 1-7).

```

1 '      Special Slow Sort                                '* 50
2 '                                                                 '* 51
3 '      Algorithm:                                       '* 52
4 '                                                                 '* 53
5 '      For left.pointer = first.record to size.of.array -1 '* 54
6 '          For right.pointer = left.pointer+1 to size.of.array '* 55
7 '              are out of order, then exchange them '* 56
8 '          Next                                         '* 57
9 '      Next                                             '* 97
10 '                                                                 '* 98
11 '          Slow Sort -- "Loose" code                    '* 99
12 '      DEFINT A-Z                                       '* 811
13 '      FOR LEFT = 1 TO SIZE - 1                          '* 1613
14 '          FOR RIGHT = LEFT + 1 TO SIZE                 '* 2009
15 '              IF WORD$(LEFT)>WORD$(RIGHT) THEN SWAP WORD$(LEFT),WORD$(RIGHT) '* 4268
16 '              NEXT RIGHT                               '* 977
17 '              PRINT ". ";                               '* 847
18 '          NEXT LEFT                                     '* 832
19 '          PRINT                                         '* 580
20 '          RETURN                                       '* 664
21 '      RETURN                                           '* 153
22 '          Slow Sort -- "Tight" code                    '* 157
23 '      FOR LEFT=1 TO SIZE-1:FOR RIGHT=LEFT+1 TO SIZE   '* 3186
24 '          IF WORD$(LEFT)>WORD$(RIGHT) THEN SWAP WORD$(LEFT),WORD$(RIGHT) '* 4271
25 '          NEXT RIGHT,LEFT                               '* 1259
26 '      RETURN                                           '* 664
27 '                                                                 '* End

```


★ **SAVE,SAVE,SAVE** ★

Lowest price on software and hardware for most of your computer needs. **Tandy, IBM, Apple, Amiga, Commodore and many more.**

This is the way it works.

We decided to cut down on our advertising costs. Because of the wide range of inventory we sell we would need a catalog larger than your yellow pages. We decided to let our competition pay for our advertising costs and not you.

Simply, after you have seen the lowest current price in any catalog or magazine call our toll-free number and give us the item name, price, catalog name and date of issue with page number, then

WE WILL BEAT THAT PRICE

★ **800-262-3111** ★

in Alabama call 205-438-3476

★ **ComputAmerica** ★

1111 Springhill Rd.
Mobile, Alabama 36604

Circle 225 on Reader Service card.



SafeSkin™

KEYBOARD PROTECTOR

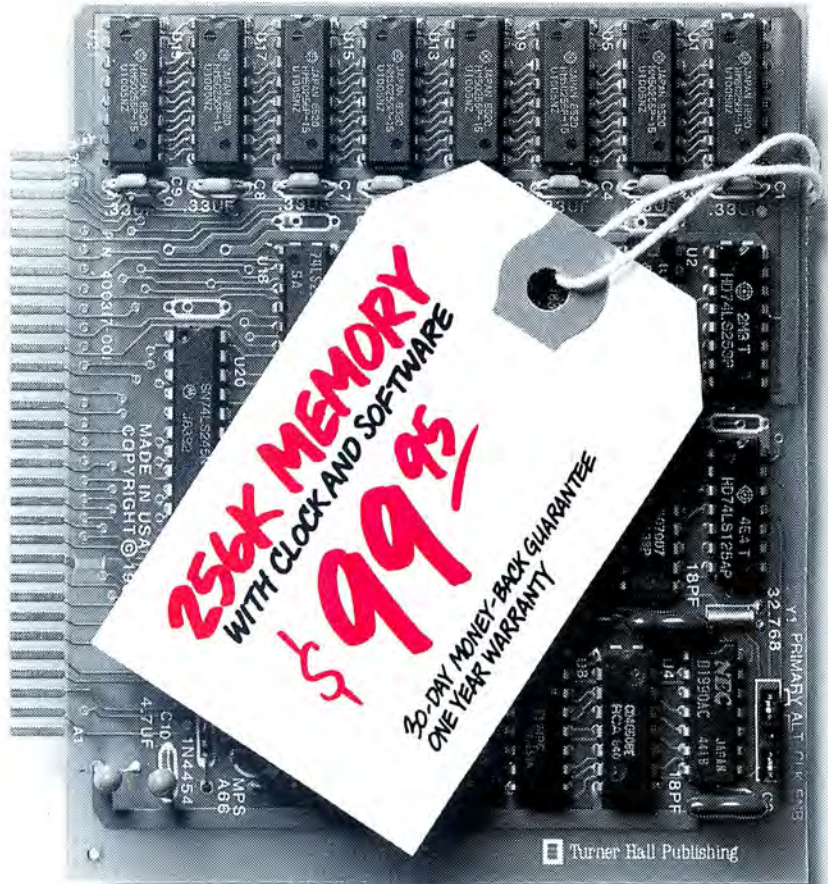
Finally! A keyboard cover that remains in place during use!

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 261 on Reader Service card.

ACTUAL SIZE.



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.

Program Listing 2. Bubble sort.

```

1 '          Bubble Sort                               '* 49
2 '                                                  '* 51
3 '          Algorithm:                               '* 52
4 '                                                  '* 53
5 '          Set test.flag to TRUE: Set ceiling to size.of.array -1 '* 54
6 '          While test.flag is TRUE                 '* 55
7 '              Set test.flag to FALSE              '* 56
8 '              For pointer = 1 to Ceiling           '* 57
9 '                  If record at pointer and at pointer+1 are out of order: '* 97
10 '                      Exchange the records and set Test.Flag to TRUE '* 98
11 '                      Next pointer                 '* 99
12 '                      Move ceiling down one record '* 100
13 '              Wend (repeat if test.flag is true and a swap occurred) '* 101
14 '                                                  '* 102
15 '          Bubble Sort -- "Loose" code             '* 103
90 DEFINT A-Z                                         '* 811
100 TEST = 1: X = 1                                   '* 1023
110 WHILE TEST = 1                                    '* 1081
120     TEST = 0                                       '* 736
130     FOR PTR = 1 TO SIZE - X                       '* 1666
140     IF WORD$(PTR)>WORD$(PTR+1) THEN SWAP WORD$(PTR),WORD$(PTR+1)
:TEST = 1                                             '* 4628
150     NEXT PTR                                       '* 843
160     X = X + 1                                       '* 704
170     PRINT " ";                                       '* 850
180 WEND                                              '* 487
190 PRINT                                             '* 583
200 RETURN                                           '* 658
210 '                                                  '* 147
490 '          Bubble Sort -- "Tight" code           '* 157
500 X=1                                               '* 379
510 TEST=0:FOR PTR=1 TO SIZE-X                         '* 1963
520 IF WORD$(PTR)>WORD$(PTR+1) THEN SWAP WORD$(PTR),WORD$(PTR+1)
:TEST=1                                             '* 4566
530 NEXT PTR:X=X+1                                     '* 1168
540 IF TEST=1 THEN 510                                '* 1307
550 RETURN                                           '* 666

```

End

Program Listing 3. Selection sort.

```

1 '          Selection Sort                             '* 49
2 '                                                  '* 50
3 '          Algorithm:                               '* 51
4 '                                                  '* 52
5 '          For pointer.1 = 1 to size.of.array -1   '* 54
6 '              Assume that record at pointer has smallest key '* 55
7 '              For pointer.2 = pointer + 1 to size.of.array '* 56
8 '                  If record at pointer.2 has smallest key yet found, '* 57
9 '                      save its index number         '* 97
10 '                  Next pointer.2                  '* 98
11 '              If smallest key is not at pointer.1, then exchange '* 99
12 '                  the record at pointer.1 and with the record with the smallest key '* 100
13 '              Next pointer.1                       '* 101
14 '                                                  '* 102
15 '          Selection Sort -- "Loose" code           '* 103
90 DEFINT A-Z                                         '* 811
100 FOR PTR = 1 TO SIZE-1                             '* 1496
110     MIN = PTR                                       '* 841
120     FOR PTR2 = PTR+1 TO SIZE                       '* 1807
130         IF WORD$(PTR2) < WORD$(MIN) THEN MIN = PTR2 '* 3013
140     NEXT PTR2                                       '* 892
150     IF MIN <> PTR THEN SWAP WORD$(PTR),WORD$(MIN) '* 3179
160     PRINT " ";                                       '* 849
170 NEXT PTR                                           '* 781
180 PRINT                                             '* 582
190 RETURN                                           '* 666
200 '                                                  '* 146
490 '          Selection Sort -- "Tight" code         '* 157
500 FOR PTR=1 TO SIZE-1:MIN=PTR:FOR PTR2=PTR+1 TO SIZE '* 3587
510 IF WORD$(PTR2)<WORD$(MIN) THEN MIN=PTR2           '* 2759
520 NEXT PTR2:IF MIN<>PTR THEN SWAP WORD$(PTR),WORD$(MIN) '* 3757
530 NEXT PTR                                           '* 781
540 RETURN                                           '* 665

```

End

Program Listing 4. Insertion sort.

```

1 '          Insertion Sort                             '* 49
2 '                                                  '* 50
3 '          Algorithm:                               '* 51
4 '                                                  '* 52
5 '          Set a sentinel with a null value at bottom of array '* 53
6 '          For pointer.1 = 2 to size.of.array       '* 54
7 '              Set pointer.2 = pointer.1           '* 55
8 '              While the record at pointer.2 and the record at '* 56
9 '                  pointer.2 - 1 are out of order:   '* 57
10 '                  Exchange the records.           '* 97
11 '                  Reduce pointer.2 by 1           '* 98
12 '              Wend (record at pointer.2 now in place) '* 99
13 '              Next pointer.1                       '* 100
14 '                                                  '* 101

```

Listing 4 continued

method, which is fine for random lists but weak for record lists already partially ordered. Also, in my quick sort implementation you must add a false sentinel record to the left side of the data list to keep the right pointer from going off the end if the insertion record is the smallest in the list being sorted.

The quick sort will run faster on large lists and won't require a sentinel record if you use a different technique for choosing the insertion record. At the beginning of each pass through a sublist, pick the leftmost record, the rightmost record, and a record from the center of the list. Select the record that should be in the middle, or the highest of the three if there is a tie, and use that record for the insertion process. Given the extra overhead it causes, using this process is justified only when a list is mostly presorted or when the data list is long.

Picking Up Speed

No matter which sorting algorithm you choose, you will want it to run as fast as possible. There are several things you can do to cut down on a routine's overhead.

One approach that increases efficiency is to avoid Basic's pauses for garbage collection. Whenever you use a string-assignment statement like A\$=B\$, Basic creates a new copy of a string in its string area. When the latter becomes full, Basic suspends other operations to straighten out the string area and free the space holding abandoned character strings. But if you remember to always exchange strings with the Swap command and always assign one string to another with an LSET command, Basic won't create the new copies of strings and will therefore not pause for garbage collection.

Removing unnecessary spaces from the inner loops of a routine also cuts down on overhead. When the Basic interpreter reads a space in a line, it takes a fraction of a second to skip over that space and move on to read the next character. The time spent isn't long but can be significant with loops that repeat many times. After you're sure that it is debugged, you might want to run your sorting routine through the compression utility I described in my December 1985 The Next Step column (p. 108).

Also, avoid While...Wend loops. Although they make a program easier to read and understand, they are much slower than logically equivalent loops controlled by If and GOTO.

Finally, use integer numeric variables whenever possible instead of the single-precision variables that Basic uses as a default type.

While you are debugging, it's a good idea to inform users who must wait while Basic sorts a data list that the computer hasn't locked up in an endless loop. I usually include some simple indication that

the computer is still working by printing a character at the end of each outer loop of the sort. I've included this "alive" indication in the loose forms of the sorts, but not in the tight code, where I wanted the truest time possible.

Timing a Sort

The Table shows the running time of the tight sort codings on a green-screen Model 4P (I used the 4P's internal clock to do the timings). Because Basic's TIME\$ command doesn't report fractions of a second, each of the timings has an accuracy of plus or minus one second.

The arrays used in the tests were composed of words of 10 random characters each and stored in the array WORD\$(). The first data list, VShort, is composed of 10 such words. The results show that with short lists, any sorting technique is nearly instantaneous.

The second data list, Short, consists of 100 words and gives a better idea of the efficiency of the sorting routines. The inefficiency of the bubble sort when you apply it to a randomly ordered list is apparent. Also, it's clear that either a Shellsort or a quick-sort algorithm best suits such a list.

The third and fourth data lists, Newhead and Newend, approximate a typical programming situation. Once you have the records in sorted order, subsequent sorts merely must include a few new records in an otherwise sorted list. A bubble sort is surprisingly efficient for this type of data list maintenance as long as the new records are placed at the beginning of the list to be sorted. However, regardless of whether the new items were placed at the beginning or the end of the original data list, the insertion sort lives up to its reputation for being able to handle presorted lists effectively.

Long, the fifth data list, consists of 1,000 randomly ordered words. With a list this size, a quick sort is obviously the best choice, followed by a Shellsort. The other algorithms take unreasonably long to put the list in order.

Interestingly, the quick sort fails miserably on the last two data sets. Ordered is a list of 1,000 presorted words; Reverse is a list of 1,000 words in reverse order. The bubble and insertion sorts were the winners on the Ordered list; the Shellsort produced the only acceptable time on the Reverse list.

After I timed the sorting routines, I added a bit of code to count the number of key comparisons, index comparisons, and record exchanges each routine made while sorting each list. These are the fundamental operations in any sorting algorithm; the counts should tell you which sorting algorithm best fits the needs of a particular application.

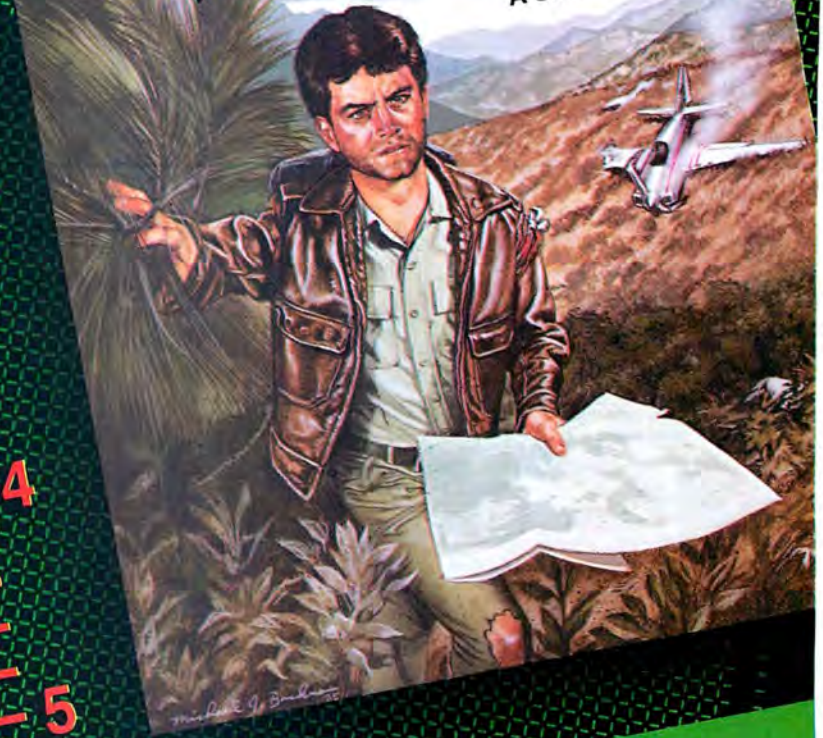
The time required by any sorting routine is a function of how often the funda-

Available for Apple // Series and IBM PC (and compatibles). Apple requires 48 K, Applesoft, IBM PC requires 256 K, one double-sided disk drive, Color Graphics adapter. Color monitor recommended. Apple // is a trademark of Apple Computer, Inc. IBM PC is a registered trademark of International Business Machines Corp.

What To Do After You Crash Your Flight Simulator

WILDERNESS

A Survival Adventure



- Wrap-around 3-dimensional color Pangraphics™. Scan the terrain a full 360 degrees
- On-screen topographic map and a map generator. Create an infinite number of maps at 10 levels of difficulty
- Realistic models of weather patterns, wildlife, and physiologic responses to exposure, injury, and illness
- 116-page illustrated survival guide
- Second scenario. Become an archeologist in search of a lost city
- Additional geographic region disks are available for Bolivia, British Columbia, Burma, Chile, and New Guinea.

BEST GRAPHIC ADVENTURE OF THE YEAR Family Computing
EDUCATIONAL SOFTWARE PACKAGE BEST LIST Science 86

ELECTRIC TRANSIT

501 Marin Street, Suite 116,
Thousand Oaks, CA 91360
805/373-1960

Circle 191 on Reader Service card.



Listing 4 continued

```

15 '                               '** 102
16 '           Insertion Sort -- "Loose" code           '** 103
90 DEFINT A-Z                               '** 811
100 WORD$(0)=" "                               '** 787
110 FOR PTR = 2 TO SIZE                       '** 1404
120   PTR2 = PTR                               '** 910
130   WHILE WORD$(PTR2 - 1) > WORD$(PTR2)       '** 2363
140     SWAP WORD$(PTR2), WORD$(PTR2-1)       '** 2284
150     PTR2 =PTR2 - 1                          '** 1121
160   WEND                                       '** 549
170   PRINT ". ";                               '** 850
180 NEXT PTR                                    '** 782
190 PRINT                                       '** 583
200 RETURN                                     '** 658
210 '                                           '** 147
490 '           Insertion Sort -- "Tight" code       '** 157
500 WORD$(0)=" ":FOR PTR=2 TO SIZE:PTR2=PTR     '** 2672
510 IF WORD$(PTR2-1)<=WORD$(PTR2) THEN 530     '** 2549
520 SWAP WORD$(PTR2),WORD$(PTR2-1):PTR2=PTR2-1:GOTO 510 '** 3484
530 NEXT PTR                                    '** 781
540 RETURN                                     '** 665
                                           End

```

Program Listing 5. Shellsort.

```

1 '           Shellsort (based on Insertion Sort)   '** 49
2 '                                               '** 50
3 '                                               '** 51
4 '           Algorithm:                          '** 52
5 '                                               '** 53
6 '           Set Gap = first number in the series 1,4,13,40... '** 54
7 '           that is larger than size.of.array    '** 55
8 '           While Gap > 1                       '** 56
9 '           Reduce Gap to next lowest number in series '** 57
10 '          Perform Insertion Sort on all records that are '** 97
11 '          Gap spaces apart                    '** 98
12 '          Wend (end of one loop)              '** 99
13 '                                               '** 100
14 '           Shellsort -- "Loose" code           '** 101
90 DEFINT A-Z                               '** 811
100 GAP = 1                                    '** 567
110 WHILE GAP < SIZE                          '** 1242
120   GAP = GAP * 3 + 1                        '** 1113
130 WEND                                       '** 482
140 IF GAP < 4 THEN GAP = 4                   '** 1508
150 '                                           '** 150
160 WHILE GAP > 1                               '** 983
170   GAP = GAP \ 3                             '** 1012
180   PRINT: PRINT "GAP ==> ";GAP;           '** 2031
190   FOR LOOP = GAP + 1 TO SIZE               '** 1866
200     PTR = LOOP                              '** 991
210     IF WORD$(PTR)>= WORD$(PTR-GAP) THEN GOTO 250 '** 3119
220     SWAP WORD$(PTR),WORD$(PTR-GAP)         '** 2414
230     PTR = PTR - GAP                         '** 1347
240     IF PTR > GAP THEN GOTO 210            '** 2028
250 NEXT LOOP                                  '** 912
260 PRINT ". ";                               '** 850
270 WEND                                       '** 487
280 PRINT                                       '** 583
290 RETURN                                     '** 667
300 '                                           '** 147
490 '           Shellsort -- "Tight" code       '** 157
500 GAP=4                                       '** 510
510 IF GAP<SIZE THEN GAP=GAP*3+1: GOTO 510    '** 2578
520 GAP=GAP\3:FOR LOOP=GAP+1 TO SIZE:PTR=LOOP '** 3044
530 IF WORD$(PTR)>=WORD$(PTR-GAP) THEN GOTO 550 '** 2967
540 SWAP WORD$(PTR),WORD$(PTR-GAP):PTR=PTR-GAP:IF PTR>GAP THEN 530 '** 4343
550 NEXT LOOP                                  '** 851
560 IF GAP>1 THEN 520                          '** 1207
570 RETURN                                     '** 668
                                           End

```

Program Listing 6 . Quick sort.

```

30 '           Quicksort -- "Loose" code           '** 99
90 DEFINT A-Z                               '** 811
100 DIM STACK(50)                             '** 983
110 TEMP$ = STRING$(10, " ")                  '** 1478
120 LEFT = 1: RIGHT = SIZE                     '** 1564
130 STACK.PTR = 2                               '** 1021
140 WHILE STACK.PTR > 0                         '** 1430
150   IF RIGHT <= LEFT THEN STACK.PTR = STACK.PTR-2:LEFT = STACK
(STACK.PTR):RIGHT = STACK(STACK.PTR+1):GOTO 200 '** 7136
160   GOSUB 250                                 '** 814
170   IF (PTR-LEFT) > (RIGHT-PTR) THEN STACK(STACK.PTR)=LEFT: ST
ACK(STACK.PTR+1) = PTR-1:LEFT = PTR + 1 ELSE STACK(STACK.PTR
) = PTR+1:STACK(STACK.PTR+1) = RIGHT:RIGHT = PTR - 1 '** 11166
180   STACK.PTR = STACK.PTR + 2                 '** 1863
190   PRINT ". ";                               '** 852
200 WEND                                       '** 480
210 ERASE STACK                                '** 953
220 PRINT                                       '** 577
230 RETURN                                     '** 661
240 '                                           '** 150
250 L.PTR = LEFT-1: R.PTR = RIGHT              '** 2040
260 TEMP$ = WORD$(RIGHT)                       '** 1470
270 WHILE L.PTR < R.PTR                       '** 1460
280   L.PTR= L.PTR + 1: IF WORD$(L.PTR) < TEMP$ THEN 280 '** 3292

```

Listing 6 continued

mental operations must be performed, plus the time needed for such overhead operations as controlling the loops and searching for variables in Basic's tables. Program Listing 7 shows a quick way to determine the amount of time each fundamental operation requires; you should substitute in the Listing mock records and keys of the kind you'll use for A\$ and B\$.

The time required for each operation is roughly equal for my test data. An integer comparison requires about .0013 seconds, a key comparison .0015 seconds, and a swap of two strings .0016 seconds. But if your sorting routine must extract keys from records or do a lot of work to exchange two records, the relative speeds of the sorting algorithms will change significantly.

Index and Disk Sorts

If your data is complex or stored on disk, you should probably create an index to it instead of physically moving it around. Look at the indexing routines in the Basic Data Base System of my March 1986 article, "To Each His Own" (p. 34), for an example of how to create index arrays for complex data lists.

The technique is simple. First, create an integer array with the same number of elements as those in your data list. Then initialize each array element with the index number of a record. Instead of comparing two keys by testing KEY\$(X) and KEY\$(Y), your sorting routine compares KEY\$(INDEX%(X)) and KEY\$(INDEX%(Y)). To exchange two records, just swap the index values with a command like SWAP INDEX%(X), INDEX\$(Y). The data itself is never moved.

When you're done, INDEX%(1) will contain the actual index number of the first record, and INDEX%(SIZE) will contain the index number of the last record. To print out a list of the data, use the following loop:

```

FOR I = 1 TO SIZE
PRINT RECORD$(INDEX%(I))
NEXT I

```

There are, of course, many other sorting algorithms, some of which are faster on long lists of data than those presented here. But if you have a lot of data to sort, you will be much better off with a sorting routine written in a compiled language like Assembly, Pascal, or C. Most of the advanced sorting techniques require too much code or too much data space to be of practical use to Basic programmers. One of the six techniques presented here should meet the needs of almost any application written in Basic. ■

You can contact Hardin Brothers through CompuServe. GoPCS-117 to the Writers' and Editors' SIG (WESIG). Or write to him at 280 N. Campus Ave., Up-land, CA 91786. Enclose a stamped, self-addressed envelope for a reply.

World of Computers

Tandy Xenix 3000



Yes you can run xenix
on your 3000!

3 Work Stations!

Save Over
\$2000.00

System includes:

- Tandy 3000 with 20 Meg Hard 1.2 Floppy
- Tandy VM-1 monitor
- Tandy Dual Display Adapter
- 2 Wyse 60 Terminals
- AST Advantage 512K
- IBM Xenix Operating System
- 2 50 foot terminal cables
- Epson LQ-1000 Printer
- Epson LQ Tractor Option
- Deluxe Shielded Printer Cable
- Lyrix (Word Processing)

List Price
\$8811

Now Only
\$6649

Complete Ready-to-Run Tandy Systems

★Tandy 1000 ★Tandy 1200 ★Tandy 3000

We specialize in Complete-Ready-To-Run Tandy systems designed to meet your needs. From a Tandy 1000 with an internal 20 Meg, a 1200 with an internal tape drive to sophisticated 3000 multiuser system. Let us design a system for you!

Upgrade your 1000

Internal Hard Drive Kits include Segate Mechanism and Westerner Digital Controller (easy to install instructions)
1 Year Warranty!

10 Meg Kit	\$599	\$399
20 Meg Kit	\$799	\$499

Memory Upgrades

ZuckerBoards		
256K with DMA	\$109	\$89
512K with DMA	\$149	\$119

Zucker Multifunction includes 512K with DMA, Clock/Calendar with battery backup, serial port and Ramdisk/Print spooler software. \$249 ~~\$199~~

Modem

Evercom II by Everex - Half Slot internal 300/1200 baud, Hayes compatible with software. 1 Year warranty! List \$359 ~~\$189~~

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 Mail 24 Hours a day!

Order via Mail — Include address

and phone #.

Payment: Cashiers Checks, Money Orders, Credit Card will ship immediately. No COD's! Personal and company checks allow 15 days.

Write for our 40 page catalog.

CDA WORLD OF COMPUTERS
31 Marshall Hill Road • West Milford, NJ 07480

Listing 6 continued

```

290 R.PTR = R.PTR - 1: IF WORD$(R.PTR) > TEMP$ THEN 290      ** 3348
300 IF R.PTR > L.PTR THEN SWAP WORD$(L.PTR), WORD$(R.PTR)  ** 3684
310 WEND                                                    ** 482
320 SWAP WORD$(RIGHT), WORD$(L.PTR)                       ** 2220
330 PTR = L.PTR                                            ** 921
340 RETURN                                                ** 663
350 '                                                      ** 152
360 '                                                      ** 153
490 '              Quicksort -- "Tight" code              ** 157
500 DIM STACK(50):TEMP$=STRING$(10," "):LEFT=1:RIGHT=SIZE:S.PTR=2
510 IF RIGHT<=LEFT THEN S.PTR=S.PTR-2:LEFT=STACK(S.PTR):RIGHT=STACK(S.PTR+1):GOTO 540
520 GOSUB 750:IF (PTR-LEFT)>(RIGHT-PTR) THEN STACK(S.PTR)=LEFT:STACK(S.PTR+1)=PTR-1:LEFT=PTR+1 ELSE STACK(S.PTR)=PTR+1:STACK(S.PTR+1)=RIGHT:RIGHT=PTR-1
530 S.PTR=S.PTR+2
540 IF S.PTR>0 THEN 510
550 ERASE STACK
560 RETURN
570 '
750 L.PTR=LEFT-1:R.PTR=RIGHT:TEMP$=WORD$(RIGHT)
760 L.PTR=L.PTR+1:IF WORD$(L.PTR)<TEMP$ THEN 760
770 R.PTR=R.PTR-1:IF WORD$(R.PTR)>TEMP$ THEN 770
780 IF R.PTR>L.PTR THEN SWAP WORD$(L.PTR),WORD$(R.PTR)
790 IF L.PTR<R.PTR THEN 760
800 SWAP WORD$(RIGHT),WORD$(L.PTR)
810 PTR=L.PTR
820 RETURN

```

End

Program Listing 7. Timing routines for sorting operations.

```

10 '      Timing routines for
11 '      fundamental sorting operations
15 '
100 DEFINT X-Z
110 ITERATIONS=30000
120 DEF FN TIME.DIFF(X$,Y$) = (VAL(Y$)-VAL(X$))*3600 + (VAL(MID$(Y$,4))-VAL(MID$(X$,4)))*60 + (VAL(RIGHT$(Y$,2))-VAL(RIGHT$(X$,2)))
130 '
140 CLS
150 PRINT "Timing Empty Loop"
160 START$=TIME$
170 FOR I=1 TO ITERATIONS
180 NEXT I
190 DONE$=TIME$
200 EMPTY.LOOP = FN TIME.DIFF(START$,DONE$)
210 '
220 PRINT "Timing integer assignments"
230 Z=1
240 START$=TIME$
250 FOR I=1 TO ITERATIONS
260 X=Z
270 NEXT I
280 DONE$=TIME$
290 ASSIGNMENT = FN TIME.DIFF(START$,DONE$)
300 '
310 PRINT "Timing integer comparisons"
320 Y=2
330 START$=TIME$
340 FOR I=1 TO ITERATIONS
350 X=(Y<Z)
360 NEXT I
370 DONE$=TIME$
380 INT.COMP = (FN TIME.DIFF(START$,DONE$))-ASSIGNMENT
390 PRINT "Integer comparison times:"
400 PRINT ,ITERATIONS;"integer comparisons ==>";INT.COMP
410 PRINT , " 1 integer comparison ==>";INT.COMP/ITERATIONS
420 '
430 PRINT "Timing key comparisons"
440 A$="1111111111"
450 B$="1111111112"
460 START$=TIME$
470 FOR I=1 TO ITERATIONS
480 X=(B$<C$)
490 NEXT I
500 DONE$=TIME$
510 KEY.COMP = (FN TIME.DIFF(START$,DONE$))-ASSIGNMENT
520 PRINT "Key comparison times:"
530 PRINT ,ITERATIONS;"key comparisons ==>";KEY.COMP
540 PRINT , " 1 key comparison ==>";KEY.COMP/ITERATIONS
550 '
560 PRINT "Timing record exchanges"
570 START$=TIME$
580 FOR I=1 TO ITERATIONS
590 SWAP A$,B$
600 NEXT I
610 DONE$=TIME$
620 REC.EXCH = (FN TIME.DIFF(START$,DONE$))-EMPTY.LOOP
630 PRINT ,ITERATIONS;"record exchanges ==>";REC.EXCH
640 PRINT , " 1 record exchange ==>";REC.EXCH/ITERATIONS
650 END

```

End

What's Your Function?

Increase your programming prowess
with Basic's DEF FN feature.

Most versions of Basic contain a valuable but seldom exploited feature: the DEF FN (define function) command, which lets you create your own functions. By leveraging the power of the DEF FN command, you can add substantially to your programmer's bag of tricks.

In addition to standard functions such as SIN(X) or SQR(X)—two intrinsic functions of Basic, which compute the sine and the square root of X—DEF FN allows you to create complex, conditionally defined functions such as the following:

If $X < 3$ then $Y = 4X$; if $X > 3$ then $Y = 2X$, but if $X = 0$ then $Y = 99$

In this article, I'll explain how with two examples: one for conditionally calculating a square root and another for PEEKing into addresses greater than 32767 in Basic. To further illustrate the technique, I'll provide you with a separate list of functions for displaying time in 12-hour format, converting lowercase characters to uppercase, and placing the appropriate article—"a" or "an"—in front of nouns.

Definitive Work

First, I'll quickly review the syntax for DEF FN. In most versions of Basic, the DEF FN command is written as follows:

```
DEF FN name(variable list) = (function definition)
```

where the name can be any legal variable name, the variable list is composed of dummy variables, and the function definition describes an operation to be performed. The variables are called "dummy variables" because they have no relation to other like-named variables within your program.

To illustrate how DEF FN works, I'll create a function (admittedly, not a very useful one) that adds two numbers. Type in:

```
DEF FN Y(A,B) = (A + B)
```

where Y is the function name, A and B are the parameters, and A + B is the operation. (You must give this command a line num-

```
DEF FN T$(X) = STR$(VAL(MID$(TIME$,1,2))) + (12*(VAL(MID$(TIME$,1,2)) > 12)) - (12*(VAL(MID$(TIME$,1,2)) = 0)) + RIGHT$(TIME$,6)
```

Explanation: Returns the time in 12-hour format. MID\$(TIME\$,1,2) is the hour part of the time. The function converts that to a number (from a string) and subtracts 12, if necessary. If the hour is zero, then the function adds 12 to the value. The value is then converted to a string and the rest of the time is tacked onto it.

(Note: Model III users can take advantage of this function by changing the 1's after TIME\$ to 10's.)

```
DEF FN S$(X$) = CHR$(ASC(X$) + (32*((ASC(X$) < 123) AND (ASC(X$) > 96))))
```

Explanation: Converts a character to uppercase. The function finds the ASCII code of the character and subtracts 32 from it (to convert it to uppercase) if it was originally lowercase. The function then converts the number back to a character.

```
DEF FN A$(X$) = "a" + CHR$(-110*(INSTR("AEIOUaeiou",LEFT$(X$,1)) > 0)) + " " + X$
```

Explanation: Puts the appropriate article ("a" or "an") in front of a noun. The function strings together the letter "a," either an "n" or a null character (character code zero), a space, and the word. To test for a vowel, the function tests if the value returned by INSTR is greater than zero.

Table. Sample applications of DEF FN.

ber.) After you've defined the function, you can execute it with a Print command:

```
PRINT FN Y(3,2)
```

The computer will respond with a 5.

Conditionally Speaking

The example demonstrates how to use DEF FN to perform a simple, predefined operation on two values. To write something more complex, such as the series of conditional operations I described in the second paragraph, you need to understand how Basic handles logic functions based on true and false values. To represent true and false, Basic uses integers; -1 stands for true and zero stands for false. To see how this works, type in:

```
PRINT (3 = 3):PRINT (3 = 4)
```

The computer will respond with -1 and zero.

You can use these integer values in mathematical expressions. In Basic, the expression:

```
(3 = 3)*45 - (3 > 4)
```

is equivalent to:

```
(-1)*45 - (0)
```

This method for handling true and false makes it possible to create conditionally defined functions.

Suppose, for example, you want a function that will return the square root of a number, except if the number is negative (in which case it has no square root). If the number is negative, the function should return the token for a negative number, say -999.

You might try defining the function using an If...Then...Else statement as follows:

```
DEF FN Y(X) = (IF X >= 0 THEN Y = SQR(X) ELSE Y = -999)
```

However, this will only confuse the computer. But what if you used Basic's true and false values instead? Consider the following expression:

```
-(X > 0)*(SQR(ABS(X)))
```

SQR(X) is the square root of X, and ABS(X) is the value obtained by disregarding the sign with X. (I used SQR(ABS(X)) because taking the square root of a negative number produces an error.) If $X > 0$ then the line is equal to:

```
-(-1)*(SQR(ABS(X)))
```

System Requirements

Models III, 4, and 1000
Basic

Program Listing. Type in and run this demonstration program to see how the functions described in the article work, and to verify that you've entered information correctly. Lines 10 and 20 correspond to the functions described in the main text. Lines 30, 40, and 50 correspond to the functions in the Table.

```

10 X=25: PRINT "1. square = "; FN Y(X)
20 X=655201: PRINT "2. peek = "; FN P(X)
30 PRINT "3. time = "; FN T$(X)
40 X$="j": PRINT "4. uppercase = "; FN S$(X$)
50 X$="angel": PRINT "5. an or a = "; FN A$(X$)

```

** 2406
** 2319
** 1873
** 2928
** 2886
End

which is equivalent to:

+SQR(X)

If X < 0, the line equals:

(0)*(SQR(ABS(X)))

or zero.

Now consider the following expression:

-(X < 0)*(-999)

which equals zero for X >= 0 and -999 for X < 0. If you add the two expressions, their sum equals SQR(X)+0 for X >= 0 and 0+(-999), or -999, for X < 0. Thus, by putting the two together, you could define the function as follows:

```

DEF FN Y(X) = (-((X >= 0)*(SQR(ABS(X))))
+ (- (X < 0)*(-999)))

```

For readability, I'll change some of the

parentheses to brackets:

```

DEF FN Y(X) = { -((X >= 0)*(SQR(ABS(X))))
+ [ - (X < 0)*(-999)]}

```

Don't try to type in this line, however, as Basic will not accept the modifications.

Pointed PEEKs

One of Basic's annoying quirks is that it won't let you PEEK at an address greater than 32767. To do so, you must subtract 65536 from the address. The following defines a function FN P that computes the correct address for PEEKing:

```
DEF FN P(X) = X - ((X > 32767)*65536)
```

The function subtracts 65536 from X only if X is greater than 32767. (I've retained the two minus signs for clarity, but you could change them to a plus sign.)

The examples I've given provide formulas for two situations: when you want a function to vary depending upon the value of the operand and when you want to add or subtract a value conditionally. In the first case, the solution was to multiply each subformula by the negative of a comparison test. Each subformula was then added. In the second case, the answer was to add or subtract the product of the value times the negative of a comparison text.

A few more examples with explanations are contained in the Table. Use the short demonstration program (see the Program Listing) to see how all five of the functions described in this article work and to verify that you've entered the code correctly. ■

Write to Joel M. Hoffman at 19 Hillcrest Lane, Rye, NY 10580.

80 Micro would like to hear from readers with interesting applications of the DEF FN command. Send us a brief description of how your function works. We'll publish a list of user-defined functions in a future issue. Write to 80 Micro, 80 Pine St., Peterborough, NH 03458.

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

Make Great Connections!

- Transfer files directly to/from disk
- Use XMODEM for error correction
- VT100 terminal emulation
- Autodial and logon with any autodial modem

OmnitermTM
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

Restorative Powers

Just what the doctor ordered: a complete set of recovery programs for all versions of Model I/III/4 Scripsit.

In the September 1982 issue of *80 Micro*, I presented a crude, but effective, method of recovering Model I disk Scripsit files after a premature exit caused by an accidental reset (see "Recover," September 1982, p. 256). Since then, I've been flooded with mail from readers needing a similar program for the other versions of Model I/III/4 Scripsit. The program listings contained in this article answer those requests while providing a somewhat more refined method for getting the job done.

The new, improved version of Recovery reflected in Program Listings 1-5 eliminates the complicated keystrokes required by the original. Like its forerunner, the new version recovers text and pointers intact and reformats the screen. If a glitch sends your unsaved text file into oblivion, all you do is execute the program (even if you have to reset). Recovery is instantaneous, and the program returns you to the line you were working on when the accidental exit occurred.

Listing 1 is for Model I cassette Scripsit; Listing 2 is for the Model III cassette-based version. Listings 3 and 4 are for the disk-based versions of Scripsit on the Models I and III, respectively.

Model 4 Maneuvers

As you can see in Listing 5, recovery of Scripsit files on the Model 4 is more complex than on the Models I and III. The program takes some unusual twists in order to overcome two major obstacles. The first has to do with the top byte in memory, address FFFF hexadecimal (hex). On a reboot to check memory size, this byte is overwritten. If you don't have a high-memory driver resident, Scripsit uses this byte as part of its line-format buffer, and it will contain the length of the first formatted line of text. If this value is changed, then



System Requirements

Model I, III, or 4/4P/4D

16K RAM

Model I/III/4 Scripsit

(cassette or disk)

Editor/assembler

Program Listing 1. Recovery program for cassette-based Model I Scripsit.

```

00120 ; RECOVER 1.1 ;
00140 ; DAVID GOBEN ;
00150 ; ;
00200 ;THIS PROGRAM RECOVERS SCRIPSIT AFTER AN ACCIDENTAL RESET ;
00210 ;ON CASSETTE-BASED MODEL I SCRIPSIT. IT RECOVERS ALL ;
00220 ;POINTERS AND REGISTERS. IMMEDIATELY UPON RESET, RUN ;
00230 ;RECOVER ;
00240 ;
6D40 00250 ORG 6D40H ;PLACE IN BREAK BUFFER
00260 ;
6D40 31DE41 00270 RECOVER LD SP,41DEH ;SET STACK POINTER
6D43 FD219E6B 00280 LD IY,6B9EH ;SET REGISTER POINTER
6D47 21BD43 00290 LD HL,43BDH ;SET RETURN ADDRESS
6D4A E5 00300 PUSH HL ;
6D4B CD585B 00310 CALL 5B58H ;CLEAR COMMAND LINE
6D4E CDAF5D 00311 CALL 5DAFH ;INITIALIZE POINTERS
6D51 C35A51 00320 JP 515AH ;REFORMAT SCREEN AND GO
00330 ;
6D40 00340 END RECOVER
00000 TOTAL ERRORS
34335 TEXT AREA BYTES LEFT

```

End

Program Listing 2. Recovery program for cassette-based Model III Scripsit.

```

00120 ; RECOVER 1.2 ;
00140 ; DAVID GOBEN ;
00150 ; ;
00200 ;THIS PROGRAM RECOVERS SCRIPSIT AFTER AN ACCIDENTAL RESET ;
00210 ;ON CASSETTE-BASED MODEL III SCRIPSIT. IT RECOVERS ALL ;
00220 ;POINTERS AND REGISTERS. IMMEDIATELY UPON RESET, RUN ;
00230 ;RECOVER ;
00240 ;
6B10 00250 ORG 6B10H ;PLACE IN BREAK BUFFER
00260 ;
6B10 317F40 00270 RECOVER LD SP,407FH ;SET STACK POINTER
6B13 FD218E6A 00280 LD IY,6A8EH ;SET REGISTER POINTER
6B17 218343 00290 LD HL,4383H ;SET RETURN ADDRESS
6B1A E5 00300 PUSH HL ;
6B1B CD445A 00310 CALL 5A44H ;CLEAR COMMAND LINE
6B1E CD9B5C 00311 CALL 5C9BH ;INITIALIZE POINTERS
6B21 C32A51 00320 JP 512AH ;REFORMAT SCREEN AND GO
00330 ;
6B10 00340 END RECOVER
00000 TOTAL ERRORS
34333 TEXT AREA BYTES LEFT

```

End

Program Listing 3. Recovery program for disk-based Model I Scripsit.

```

00120 ; RECOVER 1.3 ;
00140 ; DAVID GOBEN ;
00190 ; ;
00200 ;THIS PROGRAM RECOVERS SCRIPSIT AFTER AN ACCIDENTAL RESET ;
00210 ;ON DISK-BASED MODEL I SCRIPSIT. IT RECOVERS ALL ;
00220 ;POINTERS AND REGISTERS. IMMEDIATELY UPON RESET, RUN ;
00230 ;RECOVER ;
00240 ;
7CD1 00250 ORG 7CD1H ;PLACE IN BREAK BUFFER
00260 ;
7CD1 31DE41 00270 RECOVER LD SP,41DEH ;SET STACK POINTER
7CD4 FD212F7C 00280 LD IY,7C2FH ;SET REGISTER POINTER
7CD8 21C052 00290 LD HL,52C0H ;SET RETURN ADDRESS
7CDB E5 00300 PUSH HL ;
7CDC CDE96B 00310 CALL 6BE9H ;CLEAR COMMAND LINE
7CDF CD406E 00311 CALL 6E40H ;INITIALIZE POINTERS
7CE2 C3A561 00320 JP 61A5H ;REFORMAT SCREEN AND GO
00330 ;
7CD1 00340 END RECOVER
00000 TOTAL ERRORS
34339 TEXT AREA BYTES LEFT

```

End

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 work-space 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.

Hey!

Remember to mention that you saw their ad in 80 Micro

Thanks. . . .

Circle 374 on Reader Service card.

SPEED UP YOUR APPLICATIONS with ALPS RAMDISK

For Your Tandy 1000, 1200, 2000 IBM PC and Compatibles

RAMDISK is our most popular product. It is useful for any application and is extremely easy to use. RAMDISK is a software product. No hardware modifications are required. With RAMDISK, you set aside extra memory to appear just like an extra disk drive. The RAMDISK is assigned a drive letter, just like any other disk drive. You can use any DOS command (DIR, COPY, etc.) with the RAMDISK. You can copy data and/or programs to the RAMDISK, so that when you access them, it is instantaneous.

**Extremely Powerful and Fast!
Compatible with Existing Applications!
Flexible and Easy to Use!**

With RAMDISK, you can use spare memory to simulate one or more super-fast disks. Any size. Greatly speeds up existing applications. RAMDISK access is faster than the fastest hard disk and 100 times faster than floppy drives. RAMDISK is highly efficient, compact, and thoroughly tested.

The package includes two other utility programs. One utility easily installs and changes RAMDISK size using a simple DOS command. The other utility reports input/output activity to the RAMDISK.

We have been selling the ALPS RAMDISK for over 3 years!

Sale Price — \$39
If You Order This Month
(Add \$3 shipping & handling)



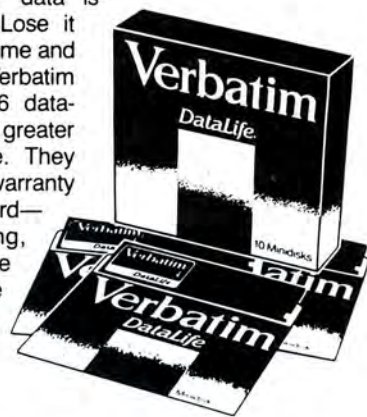
ALL ALPS Software is Fully Guaranteed !!!
Full Customer Support on our Hotline — 303-687-1442
Call or Write for our complete sale catalog of products.

ALPS
1502 County Road 25
Woodland Park, Colorado 80866
800-232-ALPS (Toll-Free)
(303-687-1442 in CO, AK)
MC/VISA/AMEX/COD

Circle 351 on Reader Service card.

Verbatim DataLife

Preserving your data is vitally important. Lose it and you've lost both time and money. That's why Verbatim Datalife Diskettes have 6 data-shielding improvements for greater disk durability and longer life. They come standard with a lifetime warranty that establishes the industry standard—it guarantees trouble-free recording, storage, and retrieval. And to help introduce you to the Verbatim quality standard we're running a special offer on many of their products, including—Datalife Diskettes, Cleaning Kits, and Disk Drive Analyzers.



What separates us from our competition? Simply a combination of the best service in the industry, highly competitive pricing, and an ever widening range of products. Above all we care about our reputation and we are willing to work on a lower margin while delivering what others only claim—and we do it all on a day-in day-out basis.

Every subscriber to 80 Micro will receive our New 96-Page Winter Spring 1986/87 Catalog over the next few months. We hope to be your source for computer supplies & accessories. Now with 15 pages of consumer/industrial products.

Lyben Computer Systems

WATCH FOR OUR NEW 1986/87 CATALOG

1050 E. MAPLE RD. • TROY, MI 48063
(313) 589-3440

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 \$1.90 per item.

Models I, III, and 4 are registered trademarks of Radio Shack, a division of Tandy Corp.

10-865I

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!

80 MICRO presents . . .

NUCLEAR SUBROUTINES

Payment Enclosed

VISA

AE

MC

Card #

Exp. Date

Signature

Name

Address

City

State

Zip

\$21.45
Disk

Prices include postage & handling. Please allow 4-6 weeks for delivery. US funds drawn on US banks only. Foreign Air-mail please add \$1.90 per disk order.

AVAILABLE IN SEPTEMBER 1986.

10-86 SI-S



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED
STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 73 PETERBOROUGH, NH

POSTAGE WILL BE PAID BY ADDRESSEE

CW Communications/Peterborough
Load 80
Elm Street
Peterborough, NH 03458-9988



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.

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

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 just by typing, **PRO-WAM**.

While you operate other programs, you can request its services with a single keystroke. **PRO-WAM** saves you typing with its EXPORT and IMPORT functions which allow you to move data across windows between programs.

PRO-WAM APPLICATIONS MODULES

- **ADDRESS:** Mailing Labels and Rolodex™ Cards
- **BRINGUP:** Tickler File and Appointments
- **CALENDAR:** Any Month From 1582 to 4902
- **CALCULATOR:** Four Function Floating Point
- **RPN CALC:** Seven Function in Bin, Oct, Dec, Hex
- **CARD:** 480 Character 3×5 Cards for Notes and Data
- **CHARSET:** Display All Video Characters
- **DIALER:** Telephone Number List and Auto Dialer
- **DOSAVE:** Save Entire Screen to Disk
- **TERM:** A Really Small Terminal Program
- **TYPWR:** Line-Buffered Typing to Your Printer

CHECK OUT THESE FEATURES!

- ✓ User Definable Activation Characters
- ✓ Run Memory Resident Modules With "F" Keys
- ✓ Direct Access to Disk Applications
- ✓ BOOT Directly to an Application with PRUN
- ✓ Interface to DOS Library Command
- ✓ Data IMPORT and EXPORT Across Applications
- ✓ Comprehensive On-Line HELP Facility
- ✓ DATAFILE SORT Utility is Provided
- ✓ Window Device Driver for BASIC is Supplied
- ✓ Comes With Full Technical Specifications
- ✓ 99 Page User Manual is Provided

At Home

Use the CALENDAR and BRINGUP applications to keep track of medical and dental appointments for the family. Use it for birthdays and that all-important anniversary. Parties and other events can be scheduled, too. The 3×5 CARD filer is great for jotting down notes which won't get lost. Enter recipes, or just use it to easily log your children's development. **PRO-WAM**'s export function lets you transfer the notes directly to most word processors. The ADDRESS file can keep your mailing list handy. Easy editing keeps it current.

At the office

The ADDRESS file data base can print both Rolodex cards and mailing labels for you. Forget about that 30-button dialer; use the DIALER telephone list to autodial hundred's of numbers through your modem. Dialing macros gives you very long number support. Use the BRINGUP tickler file and appointment book to schedule up to 12 times per day by time. Arrange your appointments. Log when payments are due. With **PRO-WAM**'s 4 function CALCULATOR, you can use your computer for quick math and clear your desk of that old TI. **PRO-WAM** even turns your printer into a TYPEWRITER!

only \$ **59.95** VA residents add 4% Tax
plus S&H (\$3 US, \$4 Canada, \$10 Foreign)



MISOSYS, Inc.

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

"Visit our CompuServe SIG-GOPCS49"

PRO-WAM is also available at Radio Shack via Express Order (90-0353).

With Recovery loaded on your disk or cassette, your exits will always be covered.

the entire display format might be off.

To account for this, Listing 5 includes a small Scripsit patch at the beginning of the program. The patch decrements the high-memory address by one, thus preventing the top buffer byte from being overwritten during a reset. It eliminates the problem and costs you a paltry byte of text-buffer space.

The second obstacle is also the result of a computer reset. On a reboot, memory pages 40 hex and 43 hex (addresses 4000-40FF hex and 4300-43FF hex) are overwritten by disk-boot information. This is a problem on the Model 4, since the Model 4 version of Scripsit contains program code in this region. During a recovery operation, you have to restore the memory area.

Thus the reason behind Recover/CMD, a subprogram created by Listing 5 that saves the recovery routine and all of the Scripsit code in the memory addresses from 4000-43FF hex. It loads Scripsit and moves the needed data into an area that won't be affected by a reset. From there, it can be reloaded during the recovery operation and then moved back to its proper place. The safe area is the Scripsit RAM-based screen-image buffer that occupies addresses 3000-37FF hex.

Return to Forever

Make sure you name the assembled version of Listing 5 something other than Recover—RECM4/CMD might be one possibility. When you execute it, a copy of Model 4 Scripsit must be disk-resident, as it will be needed to create Recover/CMD. Also, if you use Radio Shack's Assembly Language Development System (ALDS) to assemble the listing, you must change the ORG statement in line 340 to PSECT.

All five recovery routines should work even on heavily modified versions of Scripsit, as all occupy memory space impossible for memory-resident patches to occupy. (For Listings 1-4, the safe area is the break-mode keyboard-input buffer.) With Recovery loaded on your cassette or disk, your exits will always be covered. ■

You can write to David Goblen at RR #2, Story City, IA 50248.

Program Listing 4. Recovery program for disk-based Model III Scripsit.

```

                                00120 ;                RECOVER 1.4                ;
                                00140 ;                DAVID GOBEN                ;
                                00190 ;
                                00200 ;THIS PROGRAM RECOVERS SCRIPSIT AFTER AN ACCIDENTAL RESET
                                00210 ;ON DISK-BASED MODEL III SCRIPSIT. IT RECOVERS ALL
                                00220 ;POINTERS AND REGISTERS. IMMEDIATELY UPON RESET, RUN
                                00230 ;RECOVER
                                00240 ;
7C27                                00250                ORG                7C27H                ;PLACE IN BREAK BUFFER
                                00260 ;
7C27 31DE52                        00270 RECOVER LD                SP,52DEH                ;SET STACK POINTER
7C2A FD21737A                      00280 LD                IY,7A73H                ;SET REGISTER POINTER
7C2E 218653                        00290 LD                HL,5386H                ;SET RETURN ADDRESS
7C31 E5                            00300 PUSH               HL
7C32 CD296C                        00310 CALL               6C29H                ;CLEAR COMMAND LINE
7C35 CD806E                        00311 CALL               6E80H                ;INITIALIZE POINTERS
7C38 C3A662                        00320 JP                62A6H                ;REFORMAT SCREEN AND GO
                                00330 ;
7C27                                00340                END                RECOVER
000000 TOTAL ERRORS
34337 TEXT AREA BYTES LEFT

```

End

Program Listing 5. Recovery program for Model 4 Scripsit.

```

                                00120 ;                RECOVER 2.1                ;
                                00130 ;
                                00200 ;This program recovers Model 4 SCRIPSIT after an accidental
                                00210 ;RESET.
                                00230 ;----- NOTICE -----
                                00240 ;
                                00250 ;To take full advantage of this recovery program, you must ALSO
                                00260 ;apply the following patch to SCRIPSIT. This patch decrements the
                                00270 ;HIGH MEMORY address by one to prevent the top buffer byte from
                                00280 ;being over-written, as might happen during a computer reset.
                                00290 ;
                                00300 ;PATCH SCRIPSIT (X'3933'='44 3E 64 EF 2B)
                                00310 ;
                                00320 ;
                                00340 ;-----
8400                                00340                ORG                8400H
8400 4C                            00360 LOAD          DEFM          'LOAD SCRIPSIT' ;LOAD SCRIPSIT/CMD FILE
                                4F 41 44 20 53 43 52 49
                                50 53 49 54
8400 0D                            00370                DEFEB          13
840E 44                            00390 DUMP          DEFM          'DUMP RECOVER/CMD (S=X''3000'',E=X''3428'',
                                55 4D 50 20 52 45 43 4F
                                56 45 52 2F 43 4D 44 20
                                28 53 3D 58 27 33 30 30
                                30 27 2C 45 3D 58 27 33
                                34 32 38 27 2C
8434 54                            00400                DEFMB          'T=X''3000''
                                3D 58 27 33 30 30 30 27
                                29
843E 0D                            00410                DEFEB          13
843F 210030                        00430 DATA        LD                HL,3000H                ;SET SOURCE
8442 012800                        00440 LD                BC, LAST-DATA            ;OFFSET
8445 09                            00450 ADD                HL, BC
8446 110040                        00460 LD                DE, 4000H                ;DESTINATION
8449 010004                        00470 LD                BC, 400H                 ;NUMBER OF BYTES TO MOVE
844C EDB0                            00480 LDIR
844E 31FF38                        00500 LD                SP, 38FFH                ;SET STACK POINTER
8451 0E0F                            00510 LD                C, 15                    ;TURN OFF CURSOR
8453 3E02                            00520 LD                A, 2
8455 EF                            00530 RST                28H
8456 FD21B85E                      00540 LD                IY, 5EB8H                ;SET INDEX POINTER
845A 219339                        00550 LD                HL, 3993H                ;SET WARM ENTRY ADDRESS
845D E5                            00560 PUSH               HL
845E CD6D50                        00570 CALL               506DH                ;CLEAR THE COMMAND LINE
8461 CDCB52                        00580 CALL               52CBH                ;SET POINTERS
8464 C31148                        00590 JP                4811H                ;REPRINT SCREEN
8467                                00610 LAST          EQU                $
                                00630 ;-----
                                00650 ;HERE IS THE ENTRY FOR THE RECOVER FILE CREATION PROGRAM
8467 CD0D85                        00680 MAIN          CALL          PRINT
846A 1C1F                            00690 DEFWD          1F1CH                ;CLS
846C 53                            00700 DEFMB          'SCRIPSIT Recovery Program Creator.'
                                43 52 49 50 53 49 54 20
                                52 65 63 6F 76 65 72 79
                                20 50 72 6F 67 72 61 6D
                                20 43 72 65 61 74 6F 72
                                2E
848E 0D                            00710                DEFEB          13
848F 43                            00720                DEFMB          'Copyright (c) 1985 by David Goblen'
                                6F 70 79 72 69 67 68 74
                                20 28 63 29 20 31 39 38
                                35 20 62 79 20 44 61 76
                                69 64 20 47 6F 62 65 6E
84B0 0D0D                        00730 DEFWD          0D0DH
84B2 00                            00740 DEFEB          0
84B3 210084                        00760 LD                HL, LOAD                ;LOAD SCRIPSIT/CMD FILE
84B6 3E19                            00770 LD                A, 25
84B8 EF                            00780 RST                28H

```

Listing 5 continued

Listing 5 continued

```

84B9 280E 00790 JR Z,OK ;LOADED OK
84BB 1806 00800 JR EXIT
84BD CBF7 00820 ERROR SET 6,A ;PRINT FULL ERROR MESSAGE
84BF 4F 00830 LD C,A
84C0 3E1A 00840 LD A,26
84C2 EF 00850 RST 28H ;AND EXIT TO DOS
84C3 3E16 00860 EXIT LD A,22
84C5 210000 00870 LD HL,$-$
84C8 EF 00880 RST 28H
84C9 213F84 00900 OK LD HL,DATA ;MOVE INFO
84CC 110030 00910 LD DE,3000H
84CF 012800 00920 LD BC,LAST-DATA
84D2 EDB0 00930 LDIR
84D4 210040 00950 LD HL,4000H ;MOVE SCRIPSIT DATA
84D7 010004 00960 LD BC,400H ;MOVE 1024 BYTES TO (DE)
84DA EDB0 00970 LDIR
84DC 210E84 00990 LD HL,DUMP ;DUMP DATA TO RECOVER/CMD
84DF 3E19 01000 LD A,25
84E1 EF 01010 RST 28H
84E2 20D9 01020 JR NZ,ERROR
84E4 CD0D85 01030 CALL PRINT
84E7 52 01040 DEFW 'RECOVER/CMD file has been saved...'

45 43 4F 56 45 52 2F 43
4D 44 20 66 69 6C 65 20
68 61 73 20 62 65 65 6E
20 73 61 76 65 64 2E 2E
2E

8509 0D00 01050 DEFW 13
850B 18B6 01060 JR EXIT
01100 ;::::: PRINT SUBROUTINE :::::::
850D E1 01120 PRINT POP HL ;GET TEXT POINTER
850E 7E 01130 LD A,(HL) ;GET A BYTE
850F 23 01140 INC HL ;BUMP POINTER
8510 B7 01150 OR A ;END OF TEXT MARK?
8511 2806 01160 JR Z,PRINTX
8513 4F 01170 LD C,A ;NO, PRINT BYTE
8514 3E02 01180 LD A,2
8516 FE 01190 RST 28H
8517 18F5 01200 JR PRINT+1
8519 E9 01210 PRINTX JP (HL) ;GO TO CALLER
01230 ;-----
8467 01250 END MAIN
00000 Total errors
    
```

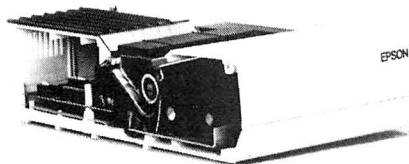
End

Circle 452 on Reader Service card.

Attention all FX80, FX100, JX, RX, & MX owners:
**You already own half of
 a great printer**

**Now
 Only
 \$79.95**

Dealer
 inquiries
 welcome.



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



Sample of letter without Dots-Perfect

837 E. Alostia 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.

FOR TRS-80 MODELS 1, 3, 4, 4P
 IBM PC/XT, AT&T 6300, ETC.

**THREE TOUGH
 QUESTIONS
 WITH ONE EASY ANSWER:**

- 1. WHEN IS A COMPUTER LANGUAGE NOT A LANGUAGE?**
 MMSFORTH includes DOS, Assembler and high level commands and extraordinary utilities, extends to become any other language (or application), is an interpreter and a compiler, and is remarkably fast and compact!
- 2. WHICH SOFTWARE RUNS THE SAME DISKS IN IBM PC AND TRS-80 MODEL 4?**
 MMSFORTH disks run on those and Compaq, and TRS-80 Model 3, and Tandy 1200, and TRS-80 Model 1, and AT&T 6300, etc., with your choice of formats up to 200K single-sided or 400K double-sided!
- 3. WHO OFFERS SOURCE CODE WITH ITS LANGUAGE, UTILITIES, DATABASE, WORD PROCESSOR AND COMMUNICATIONS SOFTWARE?**
 Nearly all MMSFORTH software includes source code.

mmsFORTH

All the software
 your computer may ever need.

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, 1 40-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



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 menus 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.

SYS2M 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.

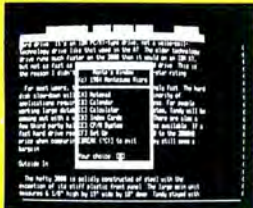


MONTEZUMA MICRO

PRESENTS

MONTE'S WINDOW™

NOTEPAD



CALENDAR

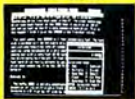


WINDOWS ON
YOUR MODEL 4!

TAKES NO
USER RAM!



CALCULATOR



Pop Up Menus!

\$49

Easy to Use!

INDEX
CARD FILE



REQUIREMENTS
Montezuma Micro CP/M®
2.2 version 2.21+
128K RAM
Model 4 or 4P
8 bit Fever

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 its 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.

Dave Answers His Mail

No excuses. I'm behind—about a month on my column and more than I'll admit on my correspondence. To help catch up, I'm going to answer some letters in this month's column. I've picked out questions concerning 1000A video problems, the color brown, memory chips, batch files with DeskMate, Tandy 3000 floppy drives, and several other topics. So without further ado...

Over Resistant

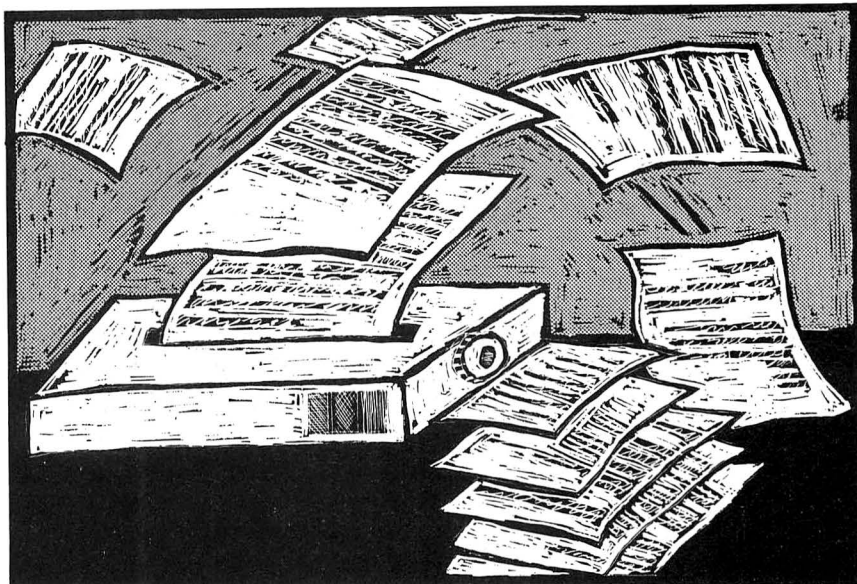
Edward K. Rhodes (Plattsburg, NY) expresses concern over his Tandy 1000A's resistor pack RP12. I detailed in my July 1986 column (p. 84) how some 1000As went out with wrong resistor packs that cause fuzzy displays on Tandy's CM-2 and other RGB color monitors. RP12 should produce 33 ohms resistance. The errant 1000As contained higher-resistance packs, usually 100 ohms. Rhodes wonders if his RP12, marked "DALE 3-101G-8405," is one of these.

I pulled apart one of 80 Micro's 1000As and found RP12 (under the power supply) labeled "B 330 GA." The manufacturers of these parts don't follow any standard for marking them, but the resistance is usually indicated in some way. The 330 on our resistor pack probably signifies 33 ohms, and the number on yours probably indicates some other resistance (101 ohms?). If you can't judge the quality of your video monitor, either through experience or direct comparison with a good display, have a Radio Shack repair center check it out.

To test your display, type a row of capital M's and W's—they should be clearly distinguishable on a CM-2 monitor. If they're not, you have the wrong resistor pack in your 1000A. It's tougher to tell on the lower-priced CM-4. Publicly, Tandy honors its 90-day warranty. I've heard that Tandy's nonpublic (but official) policy on the RP12 is to fix it free regardless of warranty period.

Browner Browns

Jim Crist (Westminster, MD) wonders if the 1000's new Basic (version 1.01) properly displays the color brown (a.k.a. dark yellow). I've heard other complaints about this color, so I did a little testing with the help of a Basic program



Program Listing 1. Jim Crist's screen-color test pattern for the Model 1000.

```
10 CLS: CLEAR , , 327681: SCREEN 5: KEY OFF
20 FOR I%=0 TO 15: LINE (I%*20, 5) - ((I%+1)*20-2, 158), 15, B: NEXT I%
30 FOR I%=0 TO 15: PAINT (I%*20+10, 10), I%, 15: NEXT I%
40 FOR I%=0 TO 14 STEP 2: LOCATE 22, I%/2*5+1: PRINT RIGHT$(STR$(I%), 2): NEXT I%
50 FOR I%=1 TO 15 STEP 2: LOCATE 23, I%/2*5: PRINT STR$(I%): NEXT I%
60 WHILE INKEY$="" : WEND
```

End

Program Listing 2. Itokawa's two-line DeskMate-to-batch-file converter.

```
10 OPEN "TEXT.DOC" FOR INPUT AS #1: OPEN "TEXT.BAT" FOR OUTPUT AS #2
20 WHILE NOT EOF(1): LINE INPUT #1, L$: PRINT #2, L$: WEND: CLOSE
```

End

Program Listing 3. Demo of On Key with F11 and F12 (Model 1000).

```
10 KEY(21) ON: ON KEY(21) GOSUB 100
20 KEY(22) ON: ON KEY(22) GOSUB 200
30 GO TO 30 'Endless loop -- Press Ctrl-Break
100 SOUND 1200, 1: PRINT "F11": RETURN
200 SOUND 5000, 1: PRINT "F12": RETURN
```

End

Crist provided (see Program Listing 1). Crist's color test pattern displays all 16 colors that the 1000 can produce.

I ran Crist's screen test with both 1000 Basics (old and new) under four different versions of MS-DOS (PC-DOS 2.0, Tandy 1000 MS-DOS versions 2.11.00 and 2.11.22, and Tandy 3000 MS-DOS 3.1) and produced the same brown color in each test. I could, however, vary the brown hue by adjusting the contrast or

brightness knobs on my CM-2 display. Low settings produced a color indistinguishable from dark red and high settings verged on dirty orange. Brown was the only color that changed so much with monitor adjustment.

An RGBI monitor like the CM-2 can only produce 16 colors—all possible combinations of the red, green, blue, and intensity signals. A brown pixel is produced by combining the red and green

signals. Adding the intensity signal to red and green produces a true yellow (also known as light yellow). As noted, however, the colors you see can depend on monitor adjustment. Not all color monitors can produce 16 colors. The Tandy CM-1 display is not an RGBI monitor. It provides crisp displays on the 1200, 2000, and 3000, but only eight colors (there is no intensity signal).

Illegal Mode 5

Speaking of screen mode 5, Tony Jackson (Port Angeles, WA) receives an "illegal function call" message when he attempts mode 5 on his 1000 (16 colors at 320- by 200-pixel resolution). It's not obvious in the manual, but you must set aside extra memory for screen modes 5 and 6 with the Clear statement.

Both modes 5 and 6 are found only in the PCjr and Tandy 1000 and require 32K of video RAM (twice the normal 16K). Jim Crist's screen test (Listing 1) uses mode 5, and you'll notice the Clear statement in line 10 (32768 is 32K). Like the IBM PCjr, the 1000 appropriates user RAM for video memory. If you have a 128K 1000, you won't have much memory left to work with after clearing 32K for graphics (less than 5K).

Memory More (Chips Up)

Recently, Keith Risler (London, Ontario) purchased his 1000 HD (for less than the 48K, single-drive Model III he bought in 1982). He wants to add memory to his 1000's Memory PLUS board, but doesn't want to "pay Radio Shack's going rate." When you buy the 1000 HD, you don't get instructions for upgrading the Memory PLUS board that comes in it.

The Memory PLUS board holds 16 memory chips in two rows of eight. The base version sockets two banks of 64-Kbit chips, adding 128K to the 128K on the motherboard (totaling 256K). The chips work in banks—eight 64-bit chips provide 64K of RAM with each chip storing 1 bit of each byte. To add more memory, you must remove all the 64-Kbit chips, add one or two banks of 256-Kbit chips, and set a jumper on the Memory PLUS board. The Memory PLUS board can't handle both types of chip at once.

One bank of 256-Kbit chips brings the system RAM to 384K (128K plus 256K), and two banks bring your 1000 to the maximum 640K. The inner bank must be filled first. A jumper is located near the medial end of the edge connector that plugs into the motherboard. On a 128K Memory PLUS board, the jumper connects the pins labeled E3 and E4. If you install one bank of 256-Kbit chips, move the jumper to connect pins E1 and E2. If you install two banks of 256-Kbit chips, remove the jumper altogether.

You can buy 256K chip sets (the "bit" is dropped in normal usage) at computer or electronics stores or through the mail. Check the ads in any magazine covering IBMs. Prices were at their lowest early this year but have crept up since. The 1000 requires 200-nanosecond (ns) chips. Buying faster, more expensive 150-ns chips is a waste of money.

The number on the chip varies with the manufacturer, but 256 is usually in there somewhere. If you are not sure, ask for an IBM PC 256K chip set. They usually come in sets of nine because of IBM's parity memory-checking scheme. The ninth chip stores a parity bit for

each byte in the other eight RAM chips in the bank. Even Tandy is selling 256K chips in sets of nine now. Keep the ninth chip as a spare.

Tandy 3000 and 360K Drive

Paul Mayo, stationed somewhere overseas, is examining his drive options for the Tandy 3000 he intends to buy. In addition to the 1.2 megabyte (MB) floppy drive that comes with Tandy's AT clone, he wants a fast 30MB or 40MB hard drive, a 360K floppy drive, and a tape drive to back up the hard drive. His primary concern is how the 3000 handles a 360K floppy drive.

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.*

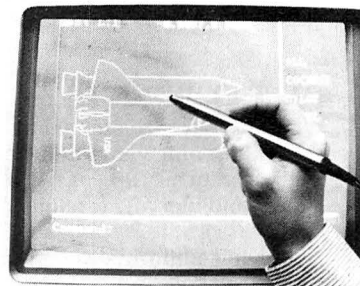
The WARP SPEED Light Pen is a professional quality, stainless steel pen that has been selected by the nation's leading Corporations to perform computer control operations, data input, high resolution graphics and many other applications. The Light Pen is now plug compatible with the TANDY computers and 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:

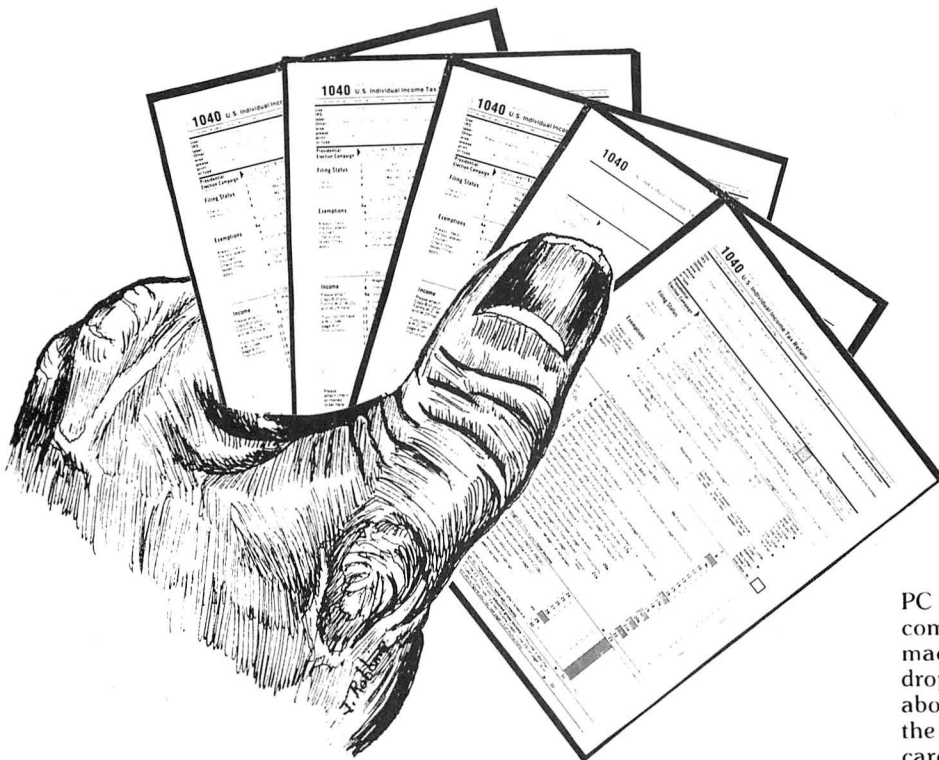
1-800-874-4315
 (In California 1-800-826-1563)



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.

the winning hand!

PC-TaxTM 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

CSA CONTRACT SERVICES ASSOCIATES

For *FINAL* solutions

First the hard drive: Voice-coil, half-height hard drives are still rare. (I've heard of some people fitting fast full-height hard drives in the 3000 with a homemade bracket.) Tandy, however, has recently introduced a 35MB, AT-fast hard drive version of the 3000 (\$4,499). The half-height 35MB drive plus controller runs around \$2,200, nearly half of total cost. They're new; they're expensive.

The 3000's 1.2MB floppy drive can read 360K-format disks. It can also format and write 360K disks, but not with total reliability. If the disk is new or has been bulk erased before formatting on the 1.2MB drives, you probably won't have problems. I've talked with several people who've had good luck. If the disk has been written to by a 360K floppy drive and not bulk erased, then you have problems. The write tracks are thinner on the high-capacity drives, and they write to a 360K format by skipping tracks. If a 1.2MB drive writes over a thicker 360K track, the good data is bordered by old data. When this is read by the wide heads of a 360K drive, they pick up a garble of old and new.

If you need reliable 360K capability, install a 360K drive in the 3000. The drive plugs into the existing drive controller.

Both the floppy controller that comes with a floppy-only 3000 and the hard-drive controller in the 3000 HD support two floppies. You must run the Setup program to tell DOS that you've installed new hardware. If you then format a disk in drive B, MS-DOS automatically uses the 360K double-sided format.

The MS-DOS 3.1 Format command has a parameter (/4) for forcing the 360K format in the 1.2MB drive. Once a disk has been formatted as 360K, DOS recognizes it as such in either type of floppy drive, then reads and writes accordingly. Just don't write with the 1.2MB drive to floppies that have been written to in the 360K drive.

DeskMate Batch Files

I've stated in the past that DeskMate doesn't do batch files. DeskMate's Text module adds only the carriage-return (CR) character to the end of text lines, not the CR/LF (line-feed) combination required by the MS-DOS batch file processor. Yoe Itokawa (University of Connecticut Math Department, Storrs, CT) has come up with a clever way around this problem. GW-Basic's LINE INPUT# statement needs only a CR as a delimiter, so it can read in each text line from

a DeskMate DOC file. The PRINT# statement, however, adds a CR/LF to each text line it sends out to a file.

A two-line Basic program (Program Listing 2) can therefore convert a DeskMate file into an honest-to-ASCII batch file. Itokawa incorporated those two lines into a glamorous conversion program, which, unfortunately, won't fit here. You'll have to add your own name-input and error-trapping routines. Thank you, Yoe Itokawa.

New On Key Codes

Wayne Stoner (Salem, WI) writes that the newer version of Basic (version 1.01) changes the On Key codes for F11 and F12 from 11 and 12, respectively, to 21 and 22. Program Listing 3 demonstrates use of event trapping with these keys. ■



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.

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 market today. Newdos-80 or TRSDOS 6.X

SPECIAL SUMMER PRICE \$ 25.00

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 \$30 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

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

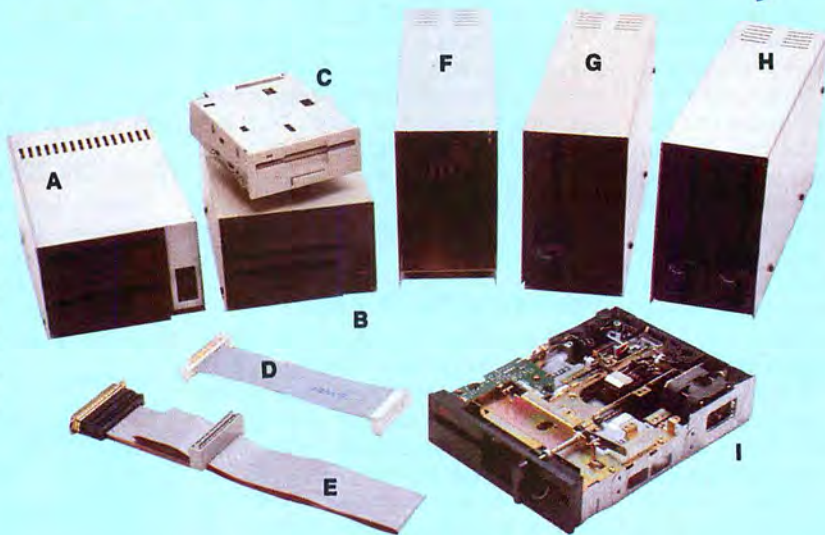
We accept Master Card, VISA, money orders, and checks.
We ship within five days of receiving your order.

PG Design Electronics, Inc.
Dept. B, 37560 Thirty-one Mile Rd,
Richmond, MI 48062
313/727-2744

Circle 470 on Reader Service card.

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 w/gold 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
- TEAC DS 8" TM848-2E 335
- TEAC FD55A/B/F Ser. Man. 20
- TM100-1/2 Service Manual 20
- TM848-1/2 Service Manual 20

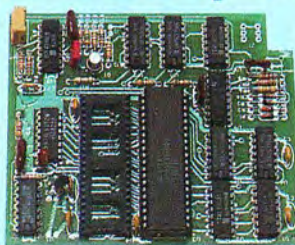
Aerocomp continues to lead the way to the BEST value in disk drives and related peripheral products for your computer. Sound engineering, high performance, quality construction, no-risk free trial, outstanding warranty service and a reputation for doing the right thing make your decision to buy AEROCOMP 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

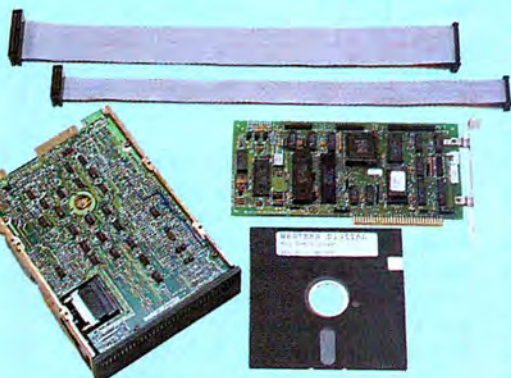
	PRIMARY	SECONDARY
10 Megabyte	\$699	\$599
20 Megabyte	849	749
30 Megabyte	999	899

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.

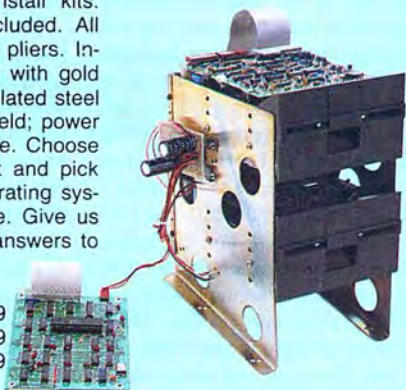


20 Megabyte \$ 549
 30 Megabyte 749
 Add \$10 shipping

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: 214-337-4981 * SERVICE: 214-337-4346
 © 1986 by Aerocomp. All rights reserved.

Random File Access: Reaching for the Record

My last two columns have focused on the proper handling of disk files, both sequential and random. I've told you how to open them, how to put records into them, and how to manage space in them most effectively. This month, I'll conclude my series on disk files with a discussion of random-file access.

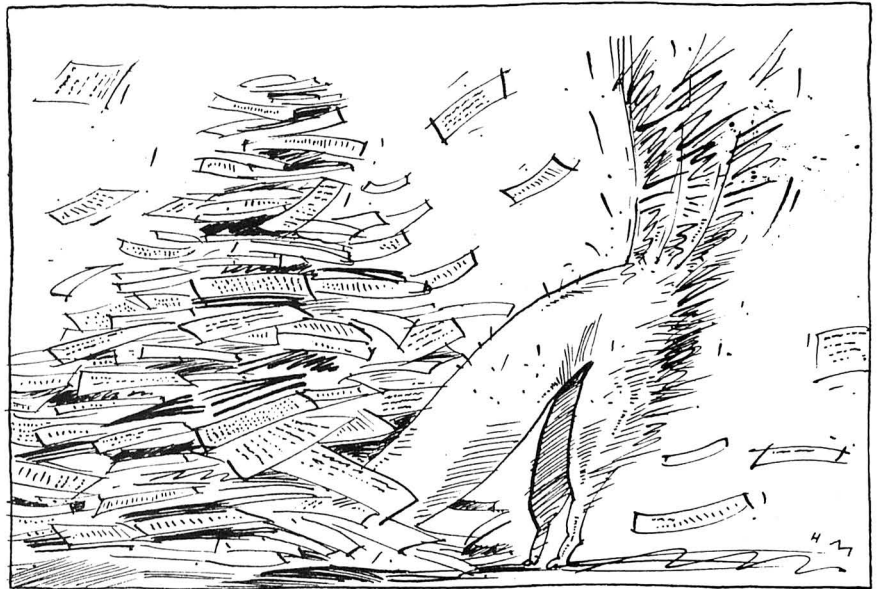
To retrieve records from a random file, you can write programs using one of four methods: access by record number, access by hashed index, access by binary search, and access by binary-tree (B-tree) index. The first method is the simplest: The program asks the operator for the record number it should retrieve. If the file doesn't contain many records, and if the records are in an order that's easy for the operator to remember, then this method of retrieving records is as efficient and effective as any other.

Hashing Routines

No matter which access method a program employs, the computer needs a number in order to retrieve a record. Computer operators, however, are more likely to remember a key item than a record number. For that reason, many programmers prefer hashing, which converts easy-to-remember key items into record numbers.

A simple hashing method is to add the ASCII values of each character in a key item. Suppose, for example, that the key is always exactly five characters long. If the key field contains only uppercase letters, the smallest value the hashing routine might return is the value for the key "AAAAA." Adding the ASCII values of these characters (65×5) gives you the number 325. The largest value the routine could return would be for the key "ZZZZZ" ($91 \times 5 = 455$). To make sure records started with the number 1, you'd subtract 324 from whatever number the routine returned.

This hashing method supplies unique numbers for 131 records. When the operator types in the key, the hashing rou-



tine supplies the record number for that key. Simple, right? Unfortunately, all hashing-based record-retrieval methods, including this one, have problems.

One problem is that a record with the key "AAAAZ" will return the same value as those with the keys "AAAZA," "AAZAA," "AZAAA," and "ZAAAA." The same is true of records with the keys "BAAYA," "CAAXA," and so on. This is known as a collision. Programs must provide means of handling collisions, or they must be constructed in a way that makes collisions impossible. The latter can be done, but it's often only practical if you know each key value in advance.

Another problem is that the number of records returned by the hashing method won't (and often shouldn't) correspond exactly with the number of records in the data file. In fact, the precise number of records to be stored usually isn't known in advance. The method I described above could return 131 numbers, but what if you want to store 200 records?

A third problem has to do with the record numbers themselves. For example, what happens if you're entering the first record, and the routine returns a record value of 99? You often can't write record 99 unless you've already written records 1 through 98. That means you might have to prewrite every record in the file before you can write even one of them.

Routine Fixes

Now that I've told you what's wrong with hashing, I'll give you the good news. Solutions exist to all three problems. For handling collisions, you have the following choices: You can create an "overflow" area, you can employ another hashing method, or you can conduct a systematic search for space.

The purpose behind overflow areas is to give programs alternate areas to search for records whose hash keys collide. The program writes the records to a specific area, which needn't be in the same file. If the operator asks for a record and the program finds another record at the numbered position, it searches the overflow area for the correct record.

The second solution for handling collisions—employing another hashing method—is a matter of providing a different algorithm or a different key value for the same algorithm. Using the previous example, you could obtain a different key by replacing the lowest letter in the key with the letter "Z." This would allow an overflow area for a maximum of five collisions per position, which probably isn't enough under most circumstances. In other words, using a different algorithm won't prevent all collisions.

The third solution—performing a systematic search for space—can be handled in a number of ways, but the easiest

System Requirements

All Systems

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 HINRICHS 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.

10-86E

Mail to: Load 80 • Elm Street • Peterborough, NH 03458

► **Return the coupon, or ☎ CALL TOLL FREE**
1-800-258-5473 (In NH, dial 1-924-9471)

is to search for the next available slot. Most microcomputers are about 10 times faster at reading sequentially than they are at skipping around in a file. In effect, this method creates an overflow area equal to all the unallocated space in the file. You must make sure, however, that the file has enough space to hold all conceivable records. Also, if the file becomes very full, at least some records will be far out of position, and record access will be slowed.

The problem of hashing-routine numbers not corresponding with the number of records in a data file is easier to fix. If the hashing method returns only 131 record positions, you can multiply by a proportion that gives the number of slots desired. For 200, you'd multiply by $200/131$ and round to the nearest whole number.

The easiest way to handle the third problem is to write all records with a predetermined pattern that tells the program "blank record here." A more sophisticated method is to use an index file, which contains a pointer to the record at the position returned by the hashing routine. You could add data in sequential order, and the data-file space wouldn't need to be prewritten. Instead, the index file would be.

This sounds fancy, but it really isn't. Suppose the hashing routine returned a value of 99, and you want to write the first record in the data file. The program looks at record 99 in the index and finds that no previous record occupies that position. It then puts the value 1 in the index file at position 99 and writes the record in the data file at record number 1.

To retrieve the record, the program calls the hashing algorithm, which returns the value 99. Then it looks at position 99 in the index, reads the value 1, then reads record number 1, and compares the key value to the search key. Since it matches, the record can be displayed.

Hashing techniques offer two distinct advantages: speed and lack of file maintenance. You never have to sort or reorganize the data file, and a good hashing algorithm can find most records in only two disk accesses—one to read the index and one to retrieve the record. The most difficult job is picking the correct hashing algorithm. One disadvantage of hashing is that the records in the file are generally not in sorted order. Retrieving the previous or next record by key value is, therefore, impossible.

Binary Searches

The third file-access method—a binary search—finds a record by selectively halving the record interval to be searched. For this method to work correctly, the records must be in sorted order.

Suppose you want to find a record

with the key "Bruce" in a file containing 100 records. First, you must determine whether the record is in the top or bottom half of the file. Let's say you look at record number 50, which is keyed "Maria." If the records are sorted alphabetically, then "Bruce" must be among records 1-49. Suppose you next look at record number 25, which has the key "Duane." Your search area then becomes records 1-24.

You would next look at record number 12. If its key turned out to be "Brian," your search area would become records 13-24. You'd next check record 18 $[(13 + 24)/2]$. Say the key value is "Carol." The search area then becomes record numbers 13-17, and the next record to examine is 15 $[(13 + 17)/2]$. Even if the key value of record 15 is "Bruce," you're still not done. You ought to check records 14 and 13, as well as 16 and 17, to see if there are any more occurrences of "Bruce."

In general, a binary search requires, at most, $\log_2(N)$ record reads (rounded up) to find a particular record in a file of N records. In a 100-record file, no more than seven reads are required to find a record or to determine if the record isn't present.

The chief advantage of a binary search is that you can always retrieve the next and previous records (sorted alphabetically). The main disadvantage is that for the search to be efficient, the file must be sorted. If you haven't sorted the file recently, new records will be out of order and you will have to search them individually.

B-Tree Indexes

B-trees provide all the advantages of a binary search without the need for sorting when you add or delete records. Records must be indexed, but you deliberately create a B-tree index with holes where additional indexes or pointers can be inserted.

Several methods exist for using B-trees. I'll describe a basic approach using an index file of random records called blocks. Each block contains pointers, as well as space for adding new ones. When a block becomes full, it splits. The pointers in the upper half then migrate to the new block, while those in the lower half stay with the old.

The old block may contain another pointer in a special position that tells the program using the B-tree that the next block of pointers can be found in block number N . Thus, the block of pointers form what is called a "linked list." If the blocks also contain an index to the previous block, the list is "doubly linked." Alternatively, when a block splits, the whole index file beginning with the next block could slide up one position. The new block could then be inserted in the open position thus created.

On most microcomputers, a typical file contains several-thousand records. Since the index file might contain 100 or more pointers per block, only 20 records need be moved, even if the first block is split. That takes only several seconds and should occur only once every 50 records or so.

I prefer to use an index file with a block size of 512 or 1,024, and I split a block only when it is full. If I use integers for the data-file record numbers, then each block would contain pointers for 256 or 512 records. Blocks would be moved, on average, every 128 or 256 times I added a new record.

For most data files, a block size of 1,024 means that no file would require more than 64 blocks for all possible pointers for a particular key. In fact, since few microcomputer data bases contain more than 4,000 records, most data files require only eight index blocks.

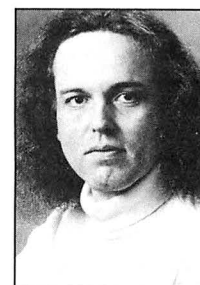
The advantages of using B-trees are easily summarized:

- The data file and the index file grow dynamically.
- All records are always sorted on the keys used.
- You can always find the next and the previous records.
- No file maintenance is required.
- Record access is relatively fast.

The disadvantages are more subtle. I can name three:

- To find a record, the program must skip through the data file, which is often slower than hashing and puts more wear on your drives.
- Adding or deleting one record in a large file can mean moving a large number of index blocks, resulting in long delays.
- B-trees are more complex pieces of code than hashing routines. They require more memory and can be difficult to debug.

Overall, I'll consider only two methods for retrieving records from a random file: hashing and B-trees. In the past, I used hashing almost exclusively. If an application required that the operator be able to retrieve the next or previous record, I used a B-tree. Recently, I used a B-tree in a spelling checker and found that to be an ideal application. ■



*Bruce Tonkin is an independent software developer, industry critic, and author of *The Creator data-base manager*. You can reach him at 34069 Hainesville Road, Round Lake, IL 60073.*

~~\$48~~

\$24.97

Try 80 MICRO for
12 issues for just
\$24.97—That's almost
48% off the \$48 you'd pay
at the newsstand

Name _____

Address _____

City _____

State _____

Zip _____

PAYMENT ENCLOSED BILL ME LATER

Please allow 6-8 weeks for delivery.
U.S. funds on U.S. banks only.

80
micro
the magazine for 1980s of years

36AB8R



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED
STATES

BUSINESS REPLY MAIL

First Class Permit No. 73 Peterborough NH 03458

POSTAGE WILL BE PAID BY ADDRESSEE

CW Communications
80 Micro
P.O. Box 981
Farmingdale, NY 11737





MARYMAC

INDUSTRIES INC.

Radio Shack
Tandy®

Radio Shack
Tandy®



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

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.



Public Utilities

Over the years, one area of interest consistently ranks either first or second among *80 Micro* readers: programming utilities. Programs that let the user look deep into the memory of his machine or scan the magnetic information stored on his disks are very popular with TRS-80 users. This month's public-domain (PD) prizes are utilities. You can download them from *80 Micro*'s BBS (603-924-6985); UART settings are 300/1,200 baud, 8-bit words, 1 stop bit, no parity.

Two programs for the Model 4 and two for the Tandy 1000 are featured this month. The first is David Goblen's Utility4/CMD, a miniature Super Utility clone for the Model 4, while the second is a program from Chuck Harper called DSKCAT4/CMD. DSKCAT4 is a disk-file cataloging program that helps you organize your disks. The Tandy 1000 programs are Membrain.EXE, a RAM-disk program submitted to the public domain by Dennis Lee, and ARC.COM, Systems Enhancements Associates' squeezing and archiving program for MS-DOS systems.

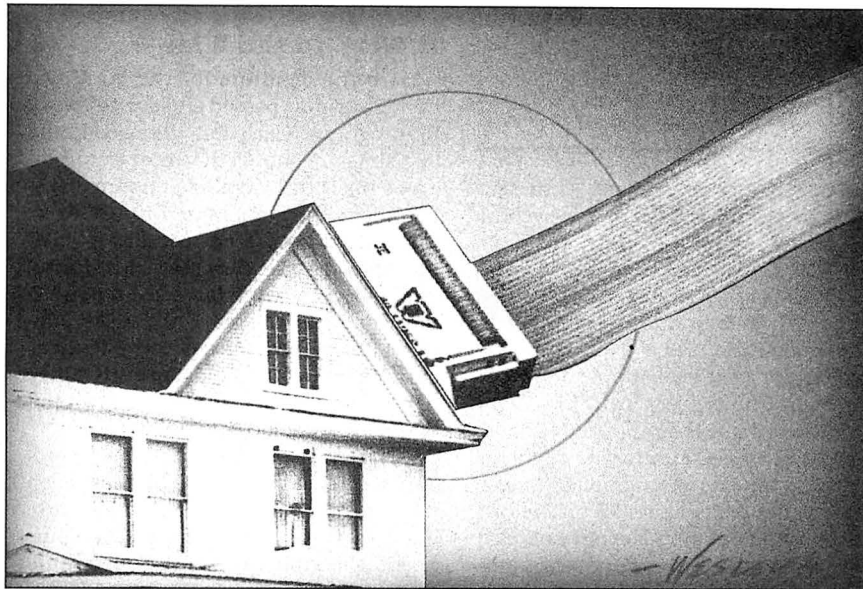
Son of Super U

David Goblen's Utility4 is a machine-language program that lets you examine the information on a TRSDOS 6.x disk and modify that information. Utility4 does not have the extensive set of menus found in PowerSoft's Super Utility program for the Model 4, or many of the powerful disk-editing features of the commercial program, but as an inexpensive means of finding out how information is stored on your disks, Goblen's program works nicely.

The initial menu lists all the functions available to you. Options include displaying disk, cylinder, or file sectors. These options display the information at the sectors you specify and then let you page through neighboring sectors on the disk, where you can modify stored information if desired.

Utility4 also lets you display specified portions of the main memory, copy information to another disk by sector, or copy information by file. Utility4 has password encoding and decoding capabilities, as well.

No documentation file accompanies



Utility4, but if you have any experience using Debug or Super Utility, moving around through your disks with Utility4 will come quite naturally. Model 4 owners who are new to disk editing will have to explore the options available. I recommend using a backup disk for practice sessions.

Disk-File Dilemmas

If you've had your Model 4 for any significant period of time, you probably have quite a collection of disks—in boxes, on shelves—with no easy way to tell what files are on each disk. The answer to all the disorganization is a cataloging program that creates a volume of file names from each of your disks under a single name.

Chuck Harper, a familiar name to those who look for quality PD software, wrote DSKCAT4/CMD for Model 4 owners who have more files and disks than they can remember. With DSKCAT4, you can create a single disk that contains the names of all the files you have on all your disks, each disk with its own catalog name. Then, as necessary, you can edit each catalog when you add or delete files to or from disks, display a disk's file catalog, and print that catalog.

DSKCAT4 reads disks formatted under all versions of TRSDOS 6, TRSDOS 1.3 in 40 or 80 tracks, all formats of LDOS 5.1.x, Radio Shack's CP/M Plus

(CP/M 3.0), and Montezuma Micro's CP/M 2.2. The two menu screens tell how the program works. All you do is line up those disks full of unknown files and let DSKCAT4 organize them for you. The lack of a documentation file won't hinder the use of the program in the least. And once you've got all those files cataloged, you might find some long-lost PD treasures of your own.

A Free RAM Disk

One of the hottest PD programs for the Tandy 1000 these days is a RAM-disk utility from Dennis Lee called Membrain.EXE. Taking advantage of extra RAM in a Tandy 1000 with 128K or more, Membrain creates a system file, Membrain.SYS, which is a DOS device driver for an emulated disk drive configured to your specifications.

By including a Device command in the CONFIG.SYS file on your DOS disk to initialize Membrain.SYS, you can instantly add another disk drive to your system when you boot your Tandy 1000. The RAM drive works the same as a hardware drive with three exceptions. First, you don't have to format it. Second, you lose everything on the drive when you turn off the computer, so be sure to save what you need to keep. And third, the RAM drive is *fast*.

Depending on the amount of RAM in your machine, you can configure the

Non-PD programs cannot be submitted to BBSes because the owners have not put them in the public domain.

RAM disk to any size as long as there is 64K or more memory left for the system. The default configuration of Membrain gives you an emulated 160K drive with 512 bytes per sector and one sector per cluster. The default number of directory slots on the RAM disk is 64.

Membrain is a fine example of the elegant programming you can find in the public domain. It is simple yet provides a service for MS-DOS users who might not otherwise take advantage of their machines' RAM-disk capabilities. The program's documentation is short and easy to follow. Tandy 1000 owners with minimally configured systems can use their machines in ways not possible otherwise without purchasing a second disk drive.

Archive Adventures

System Enhancement Associates of Wayne, NJ, has placed version 5.1 of their MS-DOS file-archiving program, ARC.COM, in the public domain as a freeware program. It is well worth adding to your Tandy 1000 collection of disk-file utilities. Though ARC works much the same as LU4, which I featured last month for Model 4 owners, it includes a variety of options not available in many other archiving programs.

As a programming utility, ARC creates and maintains an archive of disk files collected as one file in such a way that you can recover individual files intact at a later time. But ARC differs from other archiving programs and library utilities because it automatically compresses the files being archived. The resulting archive takes up a minimum amount of disk space.

ARC provides functions that add files to an archive, move files between archives, update files in an archive, delete archive files, extract files from an archive, run files from an archive, and more. The program even has an option that encrypts the information in an archive, making it less readable than it appears in its compressed state and thus more secure from snooping.

Included on most bulletin-board sys-

tems (BBSes) that have ARC.COM is an extensive documentation file and a shorter instructional file for people already familiar with archiving programs. Readers who want to obtain the most up-to-date version of the program can order it from System Enhancement Associates, 21 New St., Wayne, NJ 07470, for \$50 including the extensive printed documentation.

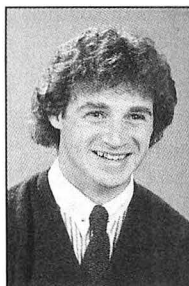
A Word to the Wise

With the deadline for the 80 Micro Disk Swap now passed and our coffers of PD programs nearly full, it's a good time to point out one of the most common problems with swapping program disks. Some programs submitted to BBSes or to PD libraries are not actually public-domain software. Several times during the disk swap, copyrighted and non-PD programs turned up on the disks submitted to the swap. Programs like these cannot be swapped or submitted to BBSes because the owners have not put them in the public domain.

How do you tell what is not a PD program? First, any program that has been published by a magazine is not a PD program. By buying the magazine, you purchase the right to use the programs therein for your own use and not for public distribution. The same rule applies when you purchase a disk or tape of programs from a publication.

Be suspicious of supposedly PD programs that appear to be too good to be true. If you can, break into the program and look at the code for copyright notices or statements that put the program into the public domain. And when writing programs that you want to make available to the public, put in a comment line stating that you are doing just that.

The PD software network extends the useful life of your computer after manufacturer support ends and new sources of commercial software dry up. But the harm done by putting nonpublic programs into the public domain damages the credibility of the system. Scrutinize the programs you upload and download, and if you find programs that are not in the public domain, notify the sysop of the BBS where you found them. ■



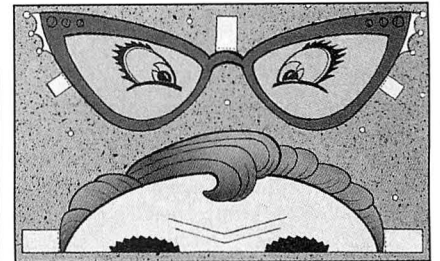
Bradford N. Dixon is an 80 Micro technical writer and telecommunications enthusiast. You can contact him via 80 Micro's bulletin-board system or at 80 Micro, 80 Pline St., Peterborough, NH 03458.

Perfect Disguise

My August 1986 article, "Disguise Your Data" (p. 48), contains a typographical error in line 510 of the Program Listing. The complete line should read:

```
510 PRINT "1. View key number for a specific
date": PRINT "2. View ALL key num-
bers": PRINT "3. Write 1 year's worth of
key numbers to a disk file": PRINT
```

I hope this helps anyone having problems with the incorrect version. (Tom Higginbotham, Fort Worth, TX)



Filekeeping Fix

A reader has pointed out an error in line 120 of Filekeep, my program appearing in the August 1986 80 Micro ("Good Filekeeping," p. 60).

The correct line should read:

```
120 IF S4LSB > 255 THEN S4LSB = S4LSB -
256: S4MSB = S4MSB + 1
```

In addition, you must change the PRINT# statement in lines 900 and 910 to WRITE#, and the semicolon in 910 to a comma. This will cause a later screen display to print the DK1 and DK2 variables properly. Otherwise, the two variables could be read in and later printed as one variable because of the method with which they were saved.

Readers using TRSDOS 6.02.xx might want to use CAT instead of DIR in line 1720. (David L. Kuzminski, Petersburg, VA)

Plus and Minus

Roger Alford's June 1985 Project 80 column (Power Play: Building Single and Dual Power Supplies, p. 90) contains an error in the schematics for the +5- and -5-volt power supplies. The 7805 is a positive regulator, while the 7905 is a negative one. (David C. Valenti, Ocean Springs, MS)

No Hits, No Runs, One Error

Roger Alford's May 1986 Project 80 column (Ports Illustrated, p. 66) contained an error in Fig. 4. Since a differential receiver adds signals -A and -B algebraically, common mode noise is subtracted. Your sketch shows noise as both plus and minus spikes, which would add instead. The spikes should be facing in the same direction to cancel each other. (W.R. Beer, Keyboard Products Co.)



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 \$2 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

- Add \$4 shipping.
- WordStar 3.3 (Specify MM or R/S format) \$ 195
 - MailMerg, 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 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 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**

The Mod 4 Goes to Math Class

The Model 4's Z80 CPU has only limited arithmetic abilities. It can add and subtract 8- and 16-bit values, compare two 8-bit values, and handle 8-bit binary-coded decimal (BCD) arithmetic, but not much more. (See the May 1984 *The Next Step*, p. 192, for an explanation of BCD arithmetic.) TRSDOS 6 has four arithmetic supervisory calls (SVCs) that add some arithmetic capabilities. Your programs can call SVCs to multiply or divide two 8-bit values or an 8-bit value by a 16-bit value.

Arithmetic based on 8-bit bytes and 16-bit words is useful for system-level programming that is mostly concerned with calculating memory addresses, disk sector numbers, and the like. However, the real world seldom cooperates with programmers by limiting the numbers about which humans are concerned to integers between zero and 255 or zero and 65,535.

If you're writing a program that needs to handle numbers outside these ranges or needs to work with real numbers, you have three choices. The first is to change languages and use the floating-point routines in Basic, C, or Pascal. The second is to create a library of Z80 floating-point or BCD routines to handle the arithmetic. The third choice, and the one I want to discuss this month, is to perform some simple conversions and work with extended-length integer arithmetic.

Long Integers

One byte can represent values between zero and 255; 2 bytes are sufficient for representing values up to 65,535. If you increase the storage available for a value to 4 bytes, you can represent any number between zero and 4,294,967,296. And 8 bytes can hold values up to nearly 20 quintillion (1.8E19 hexadecimal). Clearly, if you create arith-

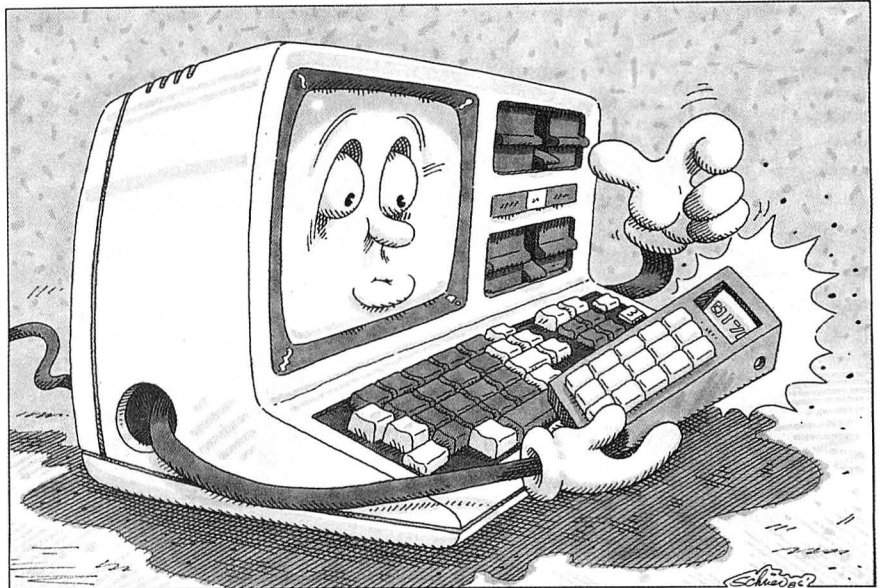


Table 1. Binary multiplication.

Normal long multiplication:		In the computer:
Multiplicand:	10110	000010110
Multiplier:	10011	000010010
Partial products:	$\begin{array}{r} 10110 \\ \times 10011 \\ \hline 10110 \\ 10110 \\ \hline 110100010 \end{array}$	$\begin{array}{r} 000010110 \\ 000010010 \\ \hline 000010110 \\ 000101100 \\ \hline 101100000 \\ 110100010 \end{array}$
Product:	110100010	110100010

Calculation algorithm:

Setup:	Multiplier:	10011	Carry flag: 0
	Multiplicand:	000010110	
	Result:	000000000	

Iteration 1:

Shift multiplier right:	01001	Carry flag: 1
Carry flag set, add multiplicand to result:		
Multiplicand:	000010110	(first partial product)
Result:	000010110	
Now shift multiplicand left:		
Multiplicand:	000101100	

Iteration 2:

Shift multiplier right:	00100	Carry flag: 1
Carry flag set, add multiplicand to result:		
Former result:	000010110	
Multiplicand:	000101100	(second partial product)

Table 1 continued



System Requirements

Model 4/4P/4D
Editor/assembler

Integer arithmetic isn't subject to the round-off errors that plague floating-point routines.

metic routines for multibyte values, you can manipulate astronomical numbers.

At first, it seems that these large numbers solve only half the problem, because they are all still integers. None of them can represent a value like \$1.25. However, programmers who use languages that do not support floating-point operations know how to use long integers to advantage.

When you're doing arithmetic with numbers representing money, you almost always think in terms of dollars. A cent is written as 1/100 of a dollar, requiring a decimal point. But if you change your focus, it's just as easy to think of \$1.25 as 125 cents. If you multiply all money values by 100 before starting to work, you can deal with money values as integers. Once you complete the calculations, you can convert the answer back to its normal form.

The same applies to most other floating-point values. Depending on the problem, it is almost always possible to convert floating-point numbers into large integers, perform integer arithmetic, then convert the answer back into a real number.

It is much easier to write and understand multibyte-integer arithmetic routines than floating-point routines. As an added bonus, integer arithmetic is not subject to the round-off errors that inevitably plague floating-point routines. However, you cannot easily scale some problems into an extended-integer form, most notably problems involving trigonometric functions. While you cannot use extended-integer arithmetic in all situations, it is a useful tool for many numeric applications.

The Routines

The Program Listing this month demonstrates addition, subtraction, multiplication, and division on multibyte integers. It is not a complete program, but a collection of subroutines that handle the multibyte arithmetic. You can call these routines from any Assembly-language program and, with a little modification,

Table 1 continued

Result:	001000010	
Now shift multiplicand left:		
Multiplicand:	001011000	
<hr/>		
Iteration 3:		
Shift multiplier right:	00010	Carry flag: 0
Carry flag not set.		
Shift multiplicand left:		
Multiplicand:	010110000	
<hr/>		
Iteration 4:		
Shift multiplier right:	00001	Carry flag: 0
Carry flag not set.		
Shift multiplicand left:		
Multiplicand:	101100000	
<hr/>		
Iteration 5:		
Shift multiplier right:	00000	Carry flag: 1
Carry flag set, add multiplicand to result:		
Former result:	001000010	
Multiplicand:	01100000	(third partial product)
Result:	110100010	
Now shift multiplicand left:		
Multiplicand:	001011000	
<hr/>		
Final result:	110100010	

Table 2. Binary division.

Normal long division:

Divisor:	10110	10011 = Quotient
		110100010 = Dividend
		10110
		100001
		10110
		10110
		10110
		0 = Remainder

Calculation algorithm:

Setup:	Quotient:	xxxxxxxxx
	Dividend:	00000 110100010
	Divisor:	10110
	Carry flag:	0

Iteration 1: Shift dividend left:

Dividend:	00001 101000100
Divisor:	10110
Compare divisor with left 5 bits of dividend:	
Carry flag:	1
Complement carry flag and rotate quotient left:	
Quotient:	xxxxxxxxx0

Iteration 2: Shift dividend left:

Dividend:	00011 010001000
Divisor:	10110

Table 2 continued

from a program written in Basic.

All the routines expect the multibyte integers to be in the same format: a string of bytes in memory with the most-significant value at the lowest memory address and the least-significant byte at the highest address. Also, you call all the routines with the DE and HL register pairs pointing to (containing the address of) the multibyte operands and with the C or BC register holding the length of the operands.

Since the length of each operand must be held in a single register, it is im-

possible to use these routines with operands that are more than 255 bytes or 2,040 bits long. The multiplication and division routines are somewhat more limited: The total length of both their operands must be no more than 255 bytes. I doubt that this will present any important actual restrictions, since these routines can still handle values that, expressed in base 10, can be 38 digits long.

All four routines return results in the same most-significant-to-least-significant format, with HL pointing to the re-

sult and with the length of the result in the C register. The addition and subtraction routines are self-contained: They need no extra buffer or work space. However, the multiplication and division routines each require two buffers besides the original operands. All the routines destroy one or both of the original operands.

The addition and subtraction routines are simple. Each of them handles the arithmetic in the same way that you were taught in elementary school. The routines start on the right, or least significant, side of the operands and add them together byte by byte toward the left, correctly handling any carry or borrow as they go. In the case of a carry or borrow from the last byte, the routine will return with the carry flag set to indicate an overflow from the addition or underflow from a subtraction operation.

The multiplication and division routines are not much more complicated in theory, but the implementations are more confusing. They are based on the calculation methods taught in elementary school for long division and long multiplication, but they also make use of the fact that binary numbers are written with 1's and zeros only.

To use the multiplication routine, you must correctly set up the two operands and the HL, DE, and BC registers. Also, the calling routine must provide two buffers. The first buffer, whose address is passed to the routine in the IX register, must be 1 byte longer than the two operands together. This buffer will hold the final result. The second buffer must reside in memory immediately below one of the original operands (the one to which HL points). It is essentially an extension of the multiplicand and will hold partial products as the answer is calculated.

The multiplication routine begins by checking the multiplier's rightmost bit. If that bit is a 1, the multiplicand is added to the final product. Then the multiplicand is shifted to the left and the next bit of the multiplier is tested. The process repeats for the total length, in bits, of the multiplier. If you look at Table 1 while studying the multiplication routine, the process should be easier to understand.

The division routine also needs two extra buffers: one to hold the result and another as a work space. It uses the standard long-division computational technique: It tries to divide the divisor into the first bit of the dividend, then into the first 2 bits, the first 3 bits, and so on. Whenever a division is possible, the routine records a 1 in the result buffer and subtracts the divisor from a portion of the dividend. As part of each step, the routine multiplies the quotient by 2 and shifts another bit of the dividend into the working buffer (see Table 2).

Table 2 continued

```
Compare divisor with left 5 bits of dividend:
  Carry flag:          1
Complement carry flag and rotate quotient left:
  Quotient:           xxxxxxx00
```

Iteration 3: Shift dividend left:

```
Dividend:             00110 100010000
Divisor:              10110
Compare divisor with left 5 bits of dividend:
  Carry flag:          1
Complement carry flag and rotate quotient left:
  Quotient:           xxxxxx000
```

Iteration 4: Shift dividend left:

```
Dividend:             01101 000100000
Divisor:              10110
Compare divisor with left 5 bits of dividend:
  Carry flag:          1
Complement carry flag and rotate quotient left:
  Quotient:           xxxxx0000
```

Iteration 5: Shift dividend left:

```
Dividend:             11010 001000000
Divisor:              10110
Compare divisor with left 5 bits of dividend:
  Carry flag:          0
Subtract divisor from left 5 bits of dividend:
  Dividend:           00100 001000000
  Divisor:            10110
Set carry flag and rotate quotient left:
  Quotient:           xxxx00001
```

Iteration 6: Shift dividend left:

```
Dividend:             01000 010000000
Divisor:              10110
Compare divisor with left 5 bits of dividend:
  Carry flag:          1
Complement carry flag and rotate quotient left:
  Quotient:           xxx000010
```

Iteration 7: Shift dividend left:

```
Dividend:             10000 100000000
Divisor:              10110
Compare divisor with left 5 bits of dividend:
  Carry flag:          1
Complement carry flag and rotate quotient left:
  Quotient:           xx0000100
```

Table 2 continued



Circle 78 on Reader Service card.

USE THE BRAINS YOUR TANDY WASN'T BORN WITH.

Right at your fingertips in CompuServe's Tandy® Forums.

Our Tandy forums involve thousands of Tandy users worldwide. These forums will show you just how easy it is to get the most from your Tandy computer.

The **Tandy Professional Forum** supports users of the larger Tandy computers, including the MS-DOS and XENIX operating systems, encompassing the largest spectrum of Tandy microcomputer users of any of our Tandy forums.

The **Model 100/Portables Forum** is for users of Tandy laptop computers, providing functionality and portability in one package.

The **Color Computer Forum** is for the dual personalities of the Tandy Color Computer, the perfect home computer and highly respected microcomputer.

The **OS-9 Forum** provides support to an international group of users linked by a common operating system.

The **LDOS/TRSDOS® Forum** supports users of the LDOS operating system for Tandy Model 1 and 3 computers, as well as TRSDOS-6 users on the Tandy Model 4.

Easy access to free software.

- Download first-rate, non-commercial user-supported software and utility programs.
- Take advantage of CompuServe's inexpensive weeknight and weekend rates (when forums are most active, and standard online charges are just 10¢ per minute).
- Go online in most major metropolitan areas with a local phone call.
- Receive a **\$25.00 Introductory Usage Credit** when you purchase your CompuServe Subscription Kit.

Information you simply can't find anywhere else.

Use the Forum Message Board to exchange mail with fellow members. Join ongoing, real-time discussions in a Forum Conference. Scan Forum Data Libraries for free software, documentation and contributions from Tandy enthusiasts.

Enjoy other useful services too, like electronic editions of your favorite magazines, newsletters and articles, including the Tandy Corporate Newsletter, TCBUG (the Tandy Computer Business Users Group), and the Fort Worth Computer Chronicles.

All you need is your Tandy computer and a modem... or almost any other personal computer.

To buy your CompuServe Subscription Kit, see your nearest computer dealer. Suggested retail price is \$39.95. To receive our free brochure, or to order direct, call 800-848-8199 (in Ohio, call 614-457-0802). If you're already a CompuServe subscriber, just type GO TANDYNET at any ! prompt and see what you've been missing.

CompuServe®

Information Services, P.O. Box 20212
5000 Arlington Centre Blvd., Columbus, Ohio 43220

800-848-8199

In Ohio, call 614-457-0802
An H&R Block Company

The multiplication and division routines need the help of some auxiliary sub-routines. The final three routines in the Listing are extended-integer shifts and a multibyte comparison operation. All three utility routines are simple and the listings should make their operation clear. It would be easy to implement other kinds of multibyte shift operations if you need them for your own programs.

Building a Calculator

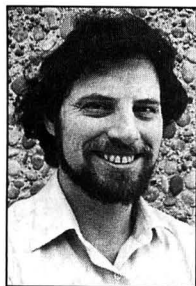
It would not be difficult to expand on these routines and build a multibyte calculator program, but I do not have the space in this column to do so. At first, the process of translating between ASCII decimal numbers and the multibyte binary numbers that these routines require might seem difficult, but you can use the routines themselves to help you.

To translate from an ASCII string to binary form, you need to write a program that can read the ASCII string from a buffer. It must move through the buffer from left to right until it finds a byte that is not an ASCII digit. Each time it picks up a digit, it must multiply the value in a result buffer by 10, then add the value of the digit to the result buffer.

To translate from a multibyte binary value back to ASCII, you need to reverse the process. First, clear a result buffer to all ASCII spaces. Divide the binary value by 10, translate the remainder into an ASCII digit, and place that digit to the left of the digits already in the output buffer. The process then repeats until the binary value has been reduced to zero.

Short routines like those in the Listing make excellent additions to a library. You can keep such a library in source-code form inside a partitioned data set if you use EDAS/PRO-Create and the PDS utility from MISOSYS.

If you use MRAS or M80, you can assemble the routines into relocatable object files, store them in a library, and link them into your own programs as you need them. As you build such source-code or object-code libraries, you'll find that you spend considerably less time developing new programs because you can reuse routines that you have already written and debugged. ■



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).

Table 2 continued

Iteration 8: Shift dividend left:

```
Dividend:          00001 000000000
Carry flag:        1
Divisor:           10110
Carry flag is set so subtract divisor from left 5 bits of dividend:
Dividend:          01011 000000000
Divisor:           10110
Set carry flag and rotate quotient left:
Quotient:          x00001001
```

Iteration 9: Shift dividend left:

```
Dividend:          10110 000000000
Divisor:           10110
Compare divisor with left 5 bits of dividend:
Carry flag:        0
Subtract divisor from left 5 bits of dividend:
Dividend:          00000 000000000
Divisor:           10110
Set carry flag and rotate quotient left:
Quotient:          000010011
Remainder:         00000 (left 5 bits of dividend)
```

Program Listing. Multibyte arithmetic routines.

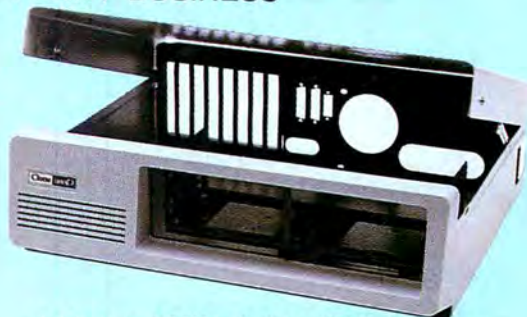
```
00100 ;Program Listing. Multibyte arithmetic routines.
00110 ;=====
00120 ;      Multibyte Arithmetic Routines
00130 ;=====
00140 ;
00150 ;
00160 ;      Multi-Byte Addition Routine
00170 ;
00180 ;      Entry: HL ==> Operand 1
00190 ;             DE ==> Operand 2
00200 ;             C = Number of bytes in each operand
00210 ;
00220 ;      Return: HL ==> Result (opl + op2)
00230 ;             C = Number of bytes in result
00240 ;             CF set if overflow
00250 ;             Operand 1 destroyed
00260 ;             Operand 2 unchanged
00270 ;
00280 ;      Uses AF
00290 ;-----
00300 MADD    EQU    $
00310        PUSH   BC           ;Save count
00320        LD     B,0           ;BC holds count
00330        ADD    HL,BC        ;HL ==> (LSB of opl) + 1
00340        EX     DE,HL
00350        ADD    HL,BC        ;HL ==> (LSB of op2) + 1
00360        EX     DE,HL
00370        LD     B,C
00380        XOR    A           ;Both B and C have original count
00390 ;                               ;Clear carry flag
00400 MADD$$ DEC    HL           ;Point to byte in opl
00410        DEC    DE           ;Point to byte in op2
00420        LD     A,(DE)       ;Get byte from op2
00430        ADC    A,(HL)       ;Add byte from opl
00440        LD     (HL),A       ;Store result
00450        DJNZ  MADD$$       ;Loop until done
00460        POP   BC           ;Recover original count
00470        RET
00480 ;-----
00490 ;      Multibyte Subtraction Routine
00500 ;
00510 ;      Entry: HL ==> Operand 1
00520 ;             DE ==> Operand 2
00530 ;             C = Number of bytes in each operand
00540 ;
00550 ;      Return: HL ==> Result (opl - op2)
00560 ;             C = Number of bytes in result
00570 ;             CF set if underflow
00580 ;             Operand 1 destroyed
00590 ;             Operand 2 unchanged
00600 ;
00610 ;      Uses AF
00620 ;-----
00630 MSUB    EQU    $
00640        PUSH   BC           ;Save count
00650        LD     B,0           ;BC holds count
00660        ADD    HL,BC        ;HL ==> (LSB of opl) + 1
00670        EX     DE,HL
00680        ADD    HL,BC        ;HL ==> (LSB of op2) + 1
00690        LD     B,C           ;Both B and C have original count
```

Listing continued

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



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

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

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



2X THE POWER OF AN IBM

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

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.



Standard \$ 89



Deluxe \$ 129

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



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 smolO **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

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 & 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.

THE NEXT STEP

Listing continued

```

00700 XOR A ;Clear carry flag
00710 MSUB$$ DEC HL ;Point to byte in op2
00720 DEC DE ;Point to byte in opl
00730 LD A,(DE) ;Get byte from opl
00740 SBC A,(HL) ;Sub byte from op2
00750 LD (DE),A ;Store result in opl
00760 DJNZ MSUB$$ ;Loop until done
00770 EX DE,HL ;Restore pointers
00780 POP BC ;Recover original count
00790 RET
00800 ;-----
00810 ; Multibyte Multiplication Routine
00820 ;
00830 ; Entry: HL ==> Operand 1
00840 ; DE ==> Operand 2
00850 ; IX ==> buffer of length B + C + 1
00860 ; B = Number of bytes in operand 1
00870 ; C = Number of bytes in operand 2
00880 ;
00890 ; Operand 1 must be preceded by C+1 unused bytes
00900 ;
00910 ; Return: HL ==> Result (opl * op2)
00920 ; C = Number of bytes in result
00930 ; Operand 1 destroyed
00940 ; Operand 2 destroyed
00950 ;
00960 ; Uses AF
00970 ;-----
00980 MLTCNT DW $$
00990 ;
01000 MMULT EQU $
01010 LD (MLTCNT),BC ;Save counter for later
01020 PUSH BC ;Also place on stack
01030 PUSH HL ;And pointer to opl
01040 LD A,B ;Find length of IX
01050 ADD A,C ; scratch buffer - 1
01060 EXX ;Use the alternate registers
01070 LD C,A ;Save in C
01080 LD B,0 ;BC = size of buffer - 1
01090 PUSH IX ;Copy IX pointer
01100 POP HL ; to HL
01110 PUSH IX ;Copy it again
01120 POP DE ; to DE
01130 INC DE ;DE ==> scratch buffer + 1
01140 LD (HL),0 ;Zero-out first byte
01150 LDIR ;Zero entire buffer
01160 POP HL ;Get pointer to opl
01170 DEC HL ;HL ==> highest unused byte
01180 PUSH HL ;Transfer
01190 POP DE ; to DE
01200 DEC DE ;And move back one space
01210 POP BC ;Get original count
01220 LD B,0 ;BC = # of empty bytes - 1
01230 LD (HL),0 ;Prepare to empty these bytes
01240 LDDR ;All empty bytes set to 0
01250 INC DE ;DE ==> opl - c - 1
01260 PUSH DE ;Save this pointer on stack
01270 PUSH IX ;Transfer pointer
01280 POP HL ; to HL
01290 INC A ;A = length of IX buffer
01300 LD C,A ;Store in C
01310 LD B,0 ;BC = length, DE==> opl buffer
01320 EXX ;Back to regular registers.
01330 POP HL ;HL ==> opl - c - 1
01340 LD B,A ;B = length of HL + C + 1
01350 LD (MLTCNT),BC ;Save new counters
01360 LD B,0 ;BC = length of op2
01370 SLA C ;C = C * 2
01380 RLC B ;BC = orig value * 2
01390 SLA C
01400 RLC B ;BC = orig value * 4
01410 SLA C
01420 RLC B ;BC = length of op2 * 8
01430 MMLT1$$ PUSH BC ;Save bit count of op2
01440 LD BC,(MLTCNT) ;Pick up operand lengths
01450 CALL MSHR ;Test least bit of multiplier
01460 JR NC,MMLT2$$ ;No carry -- leave
01470 EXX ;Else exchange registers
01480 CALL MADD ;Add partial product to total
01490 EXX ;Back to regular registers
01500 MMLT2$$ OR A ;Clear carry flag
01510 CALL MRL ;Mult. partial product * 2
01520 POP BC ;Get back bit count
01530 DEC BC ;Finished with one loop
01540 LD A,C ;Get least significant byte
01550 OR B ;Merge in most significant byte
01560 JR NZ,MMLT1$$ ;loop until done
01570 PUSH IX ;Transfer result pointer
01580 POP HL ; to HL
01590 LD BC,(MLTCNT) ;Get return length
01600 RET
01610 ;-----
01620 ; Multibyte Division Routine
01630 ;
01640 ; Entry: HL ==> Dividend (operand 1)
01650 ; DE ==> Divisor (operand 2)
01660 ; IX ==> buffer of length B
01670 ; C = Length of dividend and divisor
01680 ;
01690 ; Dividend must be preceded by C unused bytes.
01700 ;

```

Listing continued

Listing continued

```

01710 ; Return: HL ==> Result (opl / op2)
01720 ; DE ==> Remainder
01730 ; Dividend is destroyed
01740 ;
01750 ; Uses AF,B
01760 ;-----
01770 DIVCNT DW $-$ ;Storage for original counts
01780 MDIV EQU $
01790 LD B,C ;Both B and C have length count
01800 LD (DIVCNT),BC ;Save the B and C registers
01810 EXX ;Move to alternate registers
01820 PUSH IX ;Move pointer to result
01830 POP HL ; to HL
01840 LD BC,(DIVCNT) ;Get count
01850 EXX ;Finished with alternate setup
01860 PUSH DE ;Save pointer to divisor
01870 DEC HL ;HL ==> highest scratch byte
01880 PUSH HL ;Copy to DE
01890 POP DE
01900 DEC DE ;DE ==> second highest scratch byte
01910 LD B,0 ;BC = length of scratch area
01920 PUSH BC ;Save on stack
01930 DEC C ;BC = scratch length - 1
01940 LD (HL),0 ;Empty high byte
01950 LDDR ;Empty scratch space
01960 POP BC ;Recover count
01970 POP DE ;DE ==> divisor; HL ==> dividend
01980 SLA C ;C = C * 2
01990 RLC B ;BC = orig value * 2
02000 SLA C
02010 RLC B ;BC = orig value * 4
02020 SLA C
02030 RLC B ;BC = length of op2 * 8
02040 PUSH BC ;Save on stack
02050 LD BC,(DIVCNT) ;Get count again
02060 LD A,B ;Add dividend length
02070 ADD A,C ; to divisor length
02080 LD B,A ;Store back in dividend length
02090 LD (DIVCNT),BC ;And save
02100 POP BC ;Recover shift counter
02110 MDV1$$ PUSH BC ;Save shift counter
02120 LD BC,(DIVCNT) ;Get length of operands
02130 CALL MRL ;Shift dividend left
02140 JR C,MDV2$$ ;Go if carry
02150 CALL MCMP ;Compare divisor
02160 CCF ;Flip the carry flag
02170 JR NC,MDV3$$ ;Go if divisor is larger
02180 MDV2$$ CALL MSUB ;Else subtract divisor
02190 SCF ;And set carry flag
02200 MDV3$$ EXX ;Move to alternate set
02210 CALL MRL ;Shift quotient left
02220 EXX ;Return to regular set
02230 POP BC ;Get shift counter
02240 DEC BC ;Finished one iteration
02250 LD A,B ;Merge the MSB
02260 OR C ; with the LSB
02270 JR NZ,MDV1$$ ;Loop until finished
02280 EXX ;Move to alternate side
02290 PUSH BC ;Save original count
02300 EXX
02310 EX DE,HL ;DE ==> remainder
02320 PUSH IX ;Get result pointer
02330 POP HL ; in HL
02340 POP BC ;Recover counts
02350 RET
02360 ;-----
02370 ; Multibyte Rotate-Left Routine
02380 ;
02390 ; Entry: HL ==> Operand
02400 ; B = Number of bytes in each operand
02410 ;
02420 ; Return: HL ==> Result
02430 ; CF set if shift out of most significant bit
02440 ; Operand shifted one position left
02450 ;
02460 ; Uses AF
02470 ;-----
02480 MRL EQU $
02490 PUSH BC ;Save counter
02500 PUSH AF ; and carry flag
02510 LD C,B ;Move count to C
02520 LD B,0 ;BC has count
02530 ADD HL,BC ;HL ==> last byte + 1
02540 LD B,C ;Copy count to B
02550 POP AF ;Get back carry flag
02560 MRL$$ DEC HL ;Move to next byte
02570 RL (HL) ;Shift it
02580 DJNZ MRL$$ ;Loop through all bytes
02590 POP BC
02600 RET
02610 ;-----
02620 ; Multibyte Shift-Right Routine
02630 ;
02640 ; Entry: DE ==> Operand
02650 ; C = Number of bytes in operand
02660 ;
02670 ; Return: DE ==> Result
02680 ; CF set if shift out of least significant bit
02690 ; Operand shifted one position right
02700 ;
02710 ; Uses AF
02720 ;-----
    
```

Listing continued

MAC INKER™

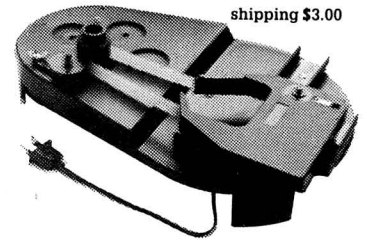
Re-ink Any Fabric Ribbon
Automatically for less
than 5 cents.

 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

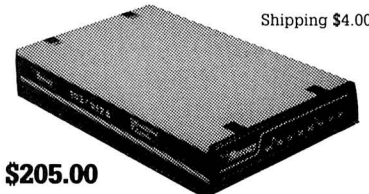
Really 100% Hayes* Compatible.

■ 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 **\$ 7500**

 4 Ports Parallel or Serial **\$15000**

 2 Computers/2 Printers
Parallel or Serial **\$15000**

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.

PRINTER SALE

CANON LASER PRINTER

\$1999. *THE PRICE SAYS IT ALL.



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

THE NEXT STEP

Listing continued

```

02730 MSHR EQU $
02740 PUSH DE ;Save pointer
02750 PUSH BC ;Save counter
02760 EX DE,HL ;Pointer to HL
02770 LD B,C ;Copy count to B
02780 OR A ;Clear carry flag
02790 MSHR1$$ RR (HL) ;Shift a byte
02800 INC HL ;Move to next byte
02810 DJNZ MSHR1$$ ;Loop through all bytes
02820 EX DE,HL ;Restore HL
02830 POP BC ;Recover count
02840 POP DE ;Recover pointer
02850 RET

-----
02870 ;
02880 ; Multibyte Comparison Routine
02890 ;
02890 ; Entry: HL ==> Operand 1
02900 ; DE ==> Operand 2
02910 ; C = Number of bytes in each operand
02920 ;
02930 ; Return: CF, NZ if op2 > opl
02940 ; NC, NZ if opl < op2
02950 ; NZ, C if opl = op2
02960 ;
02970 ; Uses AF
02980 ;
-----
02990 MCMP EQU $
03000 PUSH BC ;Save count
03010 PUSH DE ;Save pointers
03020 PUSH HL
03030 EX DE,HL ;Swap pointers
03040 LD B,C ;B holds count
03050 MCMP1$$ LD A,(DE) ;Get byte from opl
03060 CP (HL) ;Are they different
03070 JR NZ,MCMP2$$ ;Yes -- go
03080 INC HL ;Else bump
03090 INC DE ; pointers
03100 DJNZ MCMP1$$ ;And loop until done
03110 MCMP2$$ POP HL ;Recover original values
03120 POP DE
03130 POP BC
03140 RET ;Return flags status
03150 END
    
```

End

Circle 90 on Reader Service card.

FREEDOM ELECTRONICS



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.

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 1/2% SALES TAX

**A small handling charge for returns.

Circle 427 on Reader Service card.

T.K.O. master utility

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 BBS, dump a 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

NEW!

direct

The DOS assist 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.

☐ check here to order DIRECT @ \$59.95

day by day

If what you need is a professional appointment/calendar program, here's a full featured, economical alternative to those expensive and awkward multi-function utilities like DESKMATE. 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.

☐ check here to order DAY*BY*DAY @ \$59.95

TRScat

At last 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!

☐ check here to order TRScat @ \$39.95

fast80 BBS

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

☐ check here to order fast80 (2nd Edition) @ \$79.95

NEW • VERSION 2 • NEW
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.

☐ check here to order FORTH @ \$149.95
choose 1 of: ☐Model I ☐Model III ☐Model 4/4P/4D
DCP/M (Ver 2.x) DCP/M Plus (Ver 3.x)

microzap ☐ check here to order @ \$49.95

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.

designe ☐ check here to order @ \$39.95

A must for the Model 4/4P/4D BASIC or Assembly Language Programmer. Create imaginative screen displays using *designe's* powerful screen editor - then let *designe* prepare source files to reproduce your art.

HOW TO ORDER:

INSTRUCTIONS: Check off the products you wish to order and remit this ad together with the total amount (US Funds). We accept payment by check, money-order, VISA or MasterCard (if paying by charge card, please remember to include your card number and expiry date). Prices include shipping. Purchase orders welcome but are subject to a \$5.00 handling fee. Prices are higher outside the U.S. and Canada - write for details.

MOST IMPORTANTLY • DON'T FORGET TO INCLUDE YOUR FULL NAME & ADDRESS WITH YOUR ORDER

ORDER TODAY

213-1080 Broughton Street
Vancouver, B.C.
Canada • V6G 2R8

Order by Mail or Phone
MasterCard • (604) 688-5009 • VISA

SOTA Computing Systems Limited

TRS-80 & TRSDOS are registered trademarks of Radio Shack.

Glossary

Assembly language. This programming language looks like the sample in Fig. 1. If you're a beginner, we recommend that you stay away from Assembly language until you become familiar with your computer.

You'll need an editor/assembler to enter and save Assembly-language programs. You cannot enter an Assembly-language program into Basic.

Basic. This is the most commonly used programming language among Tandy and TRS-80 users. A Basic program will look like the example in Program Listing 1.

Many forms of Basic exist; some are alike and some aren't. For instance, a program written in Apple Basic won't run on the 4 or 1000. However, many Model 4 programs will run on the 1000. Some Basics you might encounter are:

- **Level II Basic.** This Basic is built into the Models I and III, and the Model 4 in Model III mode. You can access it by holding down the break key while pressing the reset button. You must have a cassette player to store programs and data in Level II Basic.

- **Disk Basic.** The common term for the Basic provided on Model I, III, and 4 DOS disks.

- **GW-Basic.** A more advanced version of the language that comes with MS-DOS machines.

- **BasicG.** The Basic that comes with Tandy's high-resolution board for the Models III and 4.

- **BasicA.** Standard IBM PC Basic.

Debugging. The process of removing errors from a program so that it will run properly.

DOS. This is a disk operating system, which is the software that lets you communicate with the computer. The Model 4 uses TRSDOS 6.2, and the Model 1000 uses MS-DOS. The Model III uses TRSDOS 1.3. To use the Model 4 in Model III mode, you must buy a Model III DOS.

Model III and 4 owners can buy several DOSes made by companies other than Tandy. Many Model 4 users buy LDOS for the Model III mode, since you can access LDOS data from TRSDOS 6.2 and vice versa.

Other DOSes Model III and 4 owners might run into are DOSPLUS, NEWDOS, and MULTIDOS, although only DOSPLUS is still available.

Model 4 and 1000 owners get a DOS disk with their computers. When you put your DOS disk in your disk drive and push the reset button, the computer looks for the DOS and loads it automatically into memory. Without a DOS on your disk, you cannot access the information on that disk or use most programs.

Many DOSes are machine specific. For example, you cannot use TRSDOS on a Model 1000.

Editor/assembler. See Assembly language.

Program. A program comprises the instructions that tell the computer to do something. A program can be simple, like the one in Program Listing 1, which prints the numbers 1 through 10 on the screen. On the other hand, it can be vastly complex, like most commercial software.

Programming language. The programming language is what the programmer uses to write programs. Like human languages, a programming language has a vocabulary and a syntax. The computer "reads" the language and translates it into an action.

RAM. Random-access memory is empty until you put something in it. For example, when you load a DOS, you put it into RAM. When you turn your machine off, data in RAM disappears.

ROM. This is read-only memory. A ROM has a program or programs permanently burned into it; the code sits there whether or not the computer is on. ■

How to Read 80 Micro

If you're new to computing, you might be overwhelmed by some of the articles and programs in *80 Micro*. We admit that most of our articles assume you know something about how to use your machine. But we also don't think you should be intimidated by all of the jargon and odd-looking programming code. You can use many of the programs in *80 Micro* even if you only know how to turn on your machine and boot up a disk.

The following guide will help you to get started. We'll take you step by step through the process of entering a program into your computer and running it. (If you have any trouble with the terms, refer to the Glossary.)

First Things First

Let's say you've found a program in *80 Micro* that you'd like to use. Your first step is to determine whether you can use the program on your computer. The information you need is in the System Requirements box, usually toward the front of the article. Figure 2 is the box for a mythical program we'll call Sample/BAS.

The first line of the box tells you what computer the program runs on. Sample/BAS runs on the Model 4. The next line tells you how much memory you need—in this case, 128 kilobytes (K). Line 3 tells you that you must have the TRSDOS 6.2 disk operating system (DOS); in other words, the program won't run under TRSDOS 6.0. (The version should be stamped on the disk Tandy provides with the machine.) The fourth line says that the program is written in Basic.

Let's look at each line in more depth.

The computer. We will always tell you whether the program runs on the III, 4, or 1000. (The Model 4 includes the 4P and the 4D.) If the box says "Model III," the program will not run on the 4 or 1000. If it says "Models 4 and 1000," the program won't work on the Model III.

We test our programs only on the III, 4, and 1000. A Model 1000 program will probably run on the 1200, 2000, and 3000, but we can't guarantee it. Many of our programs—particularly ones written in Basic—will run on other systems, such as the Models I, II, 12, 100, or the Color Computer, but again, you'll have to find out for yourself. The number of Tandy and TRS-80 computers currently in use prohibits us from testing our programs on every machine.

Occasionally, you'll see a line that reads some-

```
0022B UP EQU $
0023B LD A,(IX+TOP_ROW)
0024B LD (IX+CUR_ROW),A
0025B CR_2_NL
```

Fig. 1. Example of Assembly-language code.

System Requirements

Model 4
128K
TRSDOS 6.2
Basic

Fig. 2. System Requirements for Sample/BAS.

thing like "Model 4 with changes." This means that you'll have to change some of the original program lines (we tell you what to change) to make it work on the 4.

Memory requirements. This is simple enough; it tells you how much memory you need to accommodate the program. If the box says "128K RAM," the program won't work on a 64K machine.

Operating system. We'll only give you this information if the program is specific to a particular operating system or systems. Otherwise, you can assume that the program will work with all DOSes for the pertinent machines.

The language. In the majority of cases, this line will tell you that the program is written in Basic, Disk Basic, Assembly language, or a combination of Basic and Assembly.

A Basic program will run under any Basic provided by Tandy with your machine. In other words, if it's a Model III program, it'll work with Level II Basic or Disk Basic.

If the box says "Disk Basic," the program will not run on a cassette system. This applies only to Model III owners.

If the box says "Assembly language," the program is written in Assembly code. You might need an editor/assembler to use the program (more on editor/assemblers below).

If the box says "Disk Basic" and "Assembly language," the program combines both. Again, you might need an editor/assembler.

If you need an editor/assembler, the next line will tell you so. An editor/assembler is a special piece of software you use to enter, save, and run Assembly-language programs. Occasionally, we will include a Basic program that will create the Assembly-language program for you. If so, we'll tell you that the editor/assembler is optional.

The System Requirements box will sometimes give you other information, such as whether the program requires a printer or a particular piece of hardware.

Entering the Program

You've read the System Requirements box and are certain that the program will run on your computer. What's next? Let's use the Basic program in Program Listing 1, called Guess/BAS, as an example. It will run on the III, 4, and 1000.

First, turn the machine on, insert a DOS disk in drive zero, and press the reset button. (Do not use your original DOS disk; make a backup. See the manual for instructions.) Answer the date and time prompts if necessary. At the TRSDOS Ready prompt (>A on the 1000), type BASIC (you can type it in lowercase if you want). The disk drive light will go on, meaning that the computer is retrieving the program Basic from your disk and putting it into memory. After a few seconds, a copyright notice will appear on the screen, along with a Ready prompt and a cursor. (The notice and prompt will vary slightly among machines.)

Below is a short, two-line program to warm you up for entering listings. Type the lines exactly as presented, pressing the enter key after each one.

```
10 CLS <enter>
20 PRINT "Hello" <enter>
```

Now type LIST. The two lines you just typed will appear on the screen. This means that the program is now in memory. To run it, simply type RUN. The

computer will execute the program.

Let's go on to Listing 1. Type NEW to erase the above program from memory. Now, using the procedure described above, enter Guess/BAS. Be sure to type everything—spaces and all—*exactly* as they appear, with one exception—do not enter the numbers in the far right column or the preceding ** characters. These are called checksum values and will help you to proofread the program. More on that later.

Use the backspace (Models 4D and 1000) or left arrow (Models III, 4, and 4P) to correct errors while typing. If you've already pressed the enter key and see a mistake, the easiest solution is to simply retype the entire line. There are much simpler and more sophisticated ways to correct errors; refer to your manual for instructions on program editing (Chapter 3 of the *Model 4 Disk System Owner's Manual*, Chapter 23 of the *Model III Operating and Basic Language Reference Manual*, and Chapter 4 of the *Model 1000 Basic Reference Manual*).

Press enter at the end of the program line, not at the end of the printed line.

Program Listing 1. Guess/BAS.

```
10 'The computer picks a number, and
you must guess it.
20 'After 10 rounds, the computer will
11 print your totals and average.
30 AVERAGE$=" .###"
40 FOR LOOP=1 TO 10
50 CLS
60 NUMBER=RND(10)
70 LINE INPUT "Pick a number from 1
to 10: ";GUESS$
80 PRINT:IF VAL(GUESS$)=NUMBER THEN
PRINT "That's correct!":RIGHT=RIGHT+
1: ELSE PRINT "Sorry, but that's wro
ng!":WRONG=WRONG+1
90 FOR TIMER=1 TO 800:NEXT TIMER:NEX
T LOOP
100 CLS:PRINT "Correct guesses: ";RI
GHT
110 PRINT "Wrong guesses: ";WRONG
120 PRINT:PRINT "Your Average: ";
:PRINT USING AVERAGE$;RIGHT/10
130 GOTO 130
```

End

When you're done, list the program and proofread it. Reenter or edit lines with typographical errors. If you have a printer and would like a paper copy to proof, type LLIST.

Once you're certain that you've typed in the program accurately, save it to disk (type SAVE "GUESS/BAS"). Always save your programs before you run them; this will protect you should running the program cause your computer to lock up. (When the computer locks up, it won't respond to any keyboard input and usually requires that you press the reset button.)

Now type RUN and press the enter key. If all is well, you'll get to play a little guessing game with the computer. To exit the program, press the break key; the Ready prompt should return.

That, in a nutshell, is how you enter, save, and run a Basic program.

Debugging

Nobody's perfect when it comes to entering program listings. Unfortunately, even the slightest typographical error can cause your program to malfunction.

In most cases, you'll have no trouble identifying such malfunctions. The program will usually stop running and the computer will flash an error message on the screen. Sometimes the program will run but won't do what it's supposed to do. In extreme cases, the program might cause your computer to lock up.

Sometimes the computer will help you out by telling you the line in which the error occurred. Other times you'll have to do some careful proofreading to find the mistake. In either case, once you find the error you'll have to fix it. See your manual for instructions on editing.

Typos can be infuriatingly difficult to root out. You'll be amazed at how well they hide. Here are some common errors to look for:

- A colon where a semicolon should be, or vice versa.
- A comma in place of a period, or vice versa.
- A minus sign (-) in place of an equals sign (=), or vice versa.

● Swapped greater-than (>) and less-than (<) signs.

● A missing parenthesis.

● A missing quotation mark ("").

● Mixed-up operators (*, /, +, -).

● Swapped characters; for example, B's for 8's, zeros for O's, and the letter l for the number 1.

We don't have room here to go into a lengthy discussion on debugging techniques. But the above hints should get you started.

A Little Help

Program Listing 2, Checksum/BAS, is a simple program proofer that will help you check your listing after you've entered it. It uses the checksum values at the far right of each program listing to identify typographical errors. The text accompanying Listing 2 will tell you how to use it. Checksum/BAS appears each month on Load 80 (p. 6).

Another program that might be helpful is MakeData, which appeared on p. 64 of the June 1986 issue. This utility lets you automatically enter long Data statements (a Data statement looks like this: DATA 12,233,45,65,121), thus reducing the possibility of a costly error. MakeData is also available on the June edition of Load 80.

Finally, Model III owners can use Loc-Editor, a proofing program originally published on p. 206 of the April 1982 *80 Micro*. Loc-Editor traps errors and displays the line in which the error occurred. It is available each month on Load 80.

Got a Problem?

80 Micro's technical staff checks and double-checks all programs before they're published. The listings are printed out directly from disk, thus eliminating input errors. The listings in the magazine are therefore debugged, and the programs will run if typed in correctly.

Alas, occasionally a rare production goof will cause a program to act up. If you're completely convinced that the error is ours and not yours, write or call our technical staff (*80 Micro*, 80 Pine St., Peterborough, NH 03458, 603-924-9471). ■

Program Listing 2. Checksum/BAS. Use this to check for typographical errors in programs you've entered from *80 Micro*.

```
10 'CHECKSUM/BAS by Beve Woodbury -- 2/7/86
20 CLEAR 1000:CLS:PRINT@140,"VERIFY CHECKSUMS ON PROGRAM"
30 PRINT:PRINT:INPUT "Enter name of File to verify";F$
40 PRINT:PRINT:PRINT "List Checksums to:"
50 PRINT TAB(20) "<P>rinter":PRINT TAB(20) "<S>creen"
60 PRINT:PRINT:PRINT TAB(30);"? ";
70 K$=INKEY$
80 IF K$="P" OR K$="D" OR K$="S" OR K$="a" THEN 90 ELSE 70
90 PRINT K$:IF K$="P" OR K$="p" THEN LP=1
100 OPEN "I",1,F$
110 IF EOF(1) THEN CLOSE:END
120 LINE INPUT#1,L$:L=VAL(LEFT$(L$,6))
130 IF Z=2 AND L=0 THEN 110
140 A=VARPTR(L$):GOSUB 200:Q=PEEK(A)
150 LS=PEEK(A+1):MS=PEEK(A+2):A=MS*256+LS:GOSUB 200
160 IF INSTR(L$,"") THEN GOSUB 300
165 IF RIGHT$(L$,1)=" " THEN IQ=Q:GOSUB 320
170 Z=2
180 FOR K=1 TO Q:P=PEEK(A):CS=CS+P:A=A+1:NEXT K
190 IF CS=0 THEN 110
200 IF CS<1000001 THEN D$="-"
210 IF CS<100000 THEN D$="-"
220 IF CS<10000 THEN D$="-"
230 IF CS<1000 THEN D$="-"
240 IF LP=1 THEN LPRINT "Line";L;D$;CS,:CS=0:GOTO 110
250 PRINT "Line";L;D$;CS:CS=0:X=X+1
260 IF X=14 THEN X=0:PRINT TAB(30) "Press <ENTER> to continue."
ELSE 110
270 K$=INKEY$:IF K$<>CHR$(13) THEN 270 ELSE 110
280 IF A>32767 THEN A=(655361-A)*-1
290 RETURN
300 I=INSTR(L$,""):IQ=I-1
310 IF LEN(L$)=INSTR(L$,"") THEN RETURN
320 FOR I=IQ TO 1 STEP -1
330 C=ASC(MID$(L$,I,1))
340 IF C<33 THEN NEXT I
350 RL$=LEFT$(L$,I):Q=LEN(RL$):RETURN
```

End

Using the Checksum Program

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. You can use these values to test the accuracy of your typing after you copy listings from the magazine.

To check your typing, follow these steps:

- Type in program code *exactly* as listed, omitting the indentations when program lines continue to a second or third magazine line, the ** characters and checksum values, and comments.
- Save the program in ASCII format with the command SAVE "file name",A.
- Load and run Checksum (see Program Listing 2). The program will prompt you for the name of the file to be verified and give you the option of sending the line numbers and checksum values to the printer or to the screen. Enter P for printer, S for screen.

When printing to the screen, Checksum lists 14 lines and waits for you to press the enter key. Checksum ignores comments lines.

- Compare the displayed line numbers and checksum values with the checksums shown in the listing. Find and correct errors in lines having checksum values that don't match.

—Beverly Woodbury
Technical Editor

"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.

▶ For even quicker service, ☎ **CALL TOLL FREE 1-800-258-5473** (in NH, dial 1-924-9471) and charge it to your credit card!



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

Continued from p. 33

ing the supplied undocumented macros in the process.

As for the applications themselves, I lost interest in the word processor as soon as I started to type; I completed most of my second line while my first was still undergoing word-wrap.

The word processor has move and copy commands, but the only everyday editing function besides backspacing involves pressing the delete key, which highlights text from the cursor to the right margin, and then shrinking or enlarging the block to be deleted. Able One gives you the option of saving deleted text to disk to be printed as strikeouts in the final file; I'd rather have a delete-word or delete-line command.

Able One's spreadsheet offers versatile cell referencing (description by cell name or row and column headings, as well as absolute and relative addresses) and the shorthand functions ADDROW and ADDCOL to cut down on sum formulas, but it's generally as good as the word processor despite its windowed bar, pie, and scatter graphs. The default size fits on one screen, a Lotus-busting 23 rows by nine columns; you can expand to over 10,000 active cells with 640K, adding rows or columns 100 at a time, but the spreadsheet is still small, slow, and short on financial functions.

The data-base component reminded me of another program: not dBase III or PFS:File, but Traveling Software's T-base for the Model 100. Instead of a free-form approach, Able One requires ample preplanning; you have to enter labels followed by data types (such as alphanumeric or integer), number of characters, and sorting parameters in brackets (Last Name: [A20,P]).

That might be all right if the data base worked, but when I tried one parameter (specifying a unique data item that can occur only once per file to prevent duplicate records) I got hopelessly scrambled entries.

Conclusion

Able One offers conveniences like background printing and communications (a simple terminal program with CRC instead of XMODEM protocol and a clumsy data-capture toggle), and it's good at linking spreadsheet cells or attaching a spreadsheet or graph file for printing inside a word-processing document, although it attaches whole files instead of selected data and its destination-to-source copying is a chore compared to other programs' clipboards.

But while it's okay at running applications in windows, its applications are awful. Extensively rewritten and debugged, Able One would be about half as good as DeskMate. ■

Basic Conversions by David Engelhardt

★★★

GW-Convert runs on the Model 4 (64K) and requires one disk drive. The Alternate Source, 704 N. Pennsylvania Ave., Lansing, MI 48906, 517-482-8270. \$99.95.

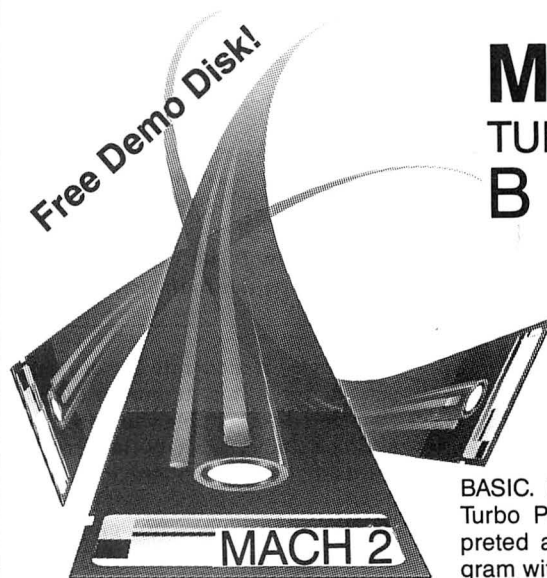
GW-Convert converts MS-DOS programs to Model 4 Basic for use on TRSDOS 6.x. It requires no other hardware except the optional Model 4 high-resolution graphics board. You need the board in the event that the MS-DOS program contains graphics commands.

Before running GW-Convert, you must transfer the MS-DOS Basic program to the Model 4 and save it in ASCII form. Utilities are currently available to perform this transfer directly to a Model 4 disk, but I used the communication programs already available in the Models 4 and 1000 (the COM/DVR program and the Telecom option in DeskMate), along with an RS-232 cable.

GW-Convert comprises modules on a data disk that perform various conversion functions, as required by the commands that need converting. Some are used only in Basic compiled programs.

The disk also contains several sample

Circle 240 on Reader Service card.



MACH 2 TURBOCHARGES BASIC

(Turbo Pascal Version
coming soon!)

Brand new from the publishers of The Inside Track and Peeks 'n Pokes, MACH 2 is a library of ultra fast assembler subroutines for interpreted and compiled BASIC. Many functions faster than Turbo Pascal and C. Debug interpreted and compile the same program with no changes.

MACH 2 includes: Window Manager (also draws boxes) • Extra Memory Manager—store/sort/search data using all available DOS memory • Controlled input routine ignores Ctrl-C and Ctrl-Break • Display data 4-10 times faster than BASIC—instantly when compiled • BLOAD/BSAVE in compiled BASIC • Read/write files at DOS speeds • Scroll windows any direction • Print using for numbers up to 6 times faster than BASIC • Change file attributes — hide, unhide, read-only, etc • Get & change default drive/current directory • DOS/BIOS function calls and interrupts • Many more functions, sample programs and a manual explaining the use of each routine.

No assembler program or knowledge of assembler programming is required. MACH 2 can be used by beginners.

Still not convinced? Call toll free 1-800-922-3383 and get a free demo disk. Demo requires IBM PC, XT, AT or compatible.

MACH 2 is only \$75.00 and is not copy protected. Include our subroutines in your programs with no royalties. Requires DOS 2.00+, GW-BASIC or IBM BASIC. Video routines require IBM or compatible. Others run under any MS-DOS 2.00+. Compatible with Quick BASIC, BASCOM 1.00 and 2.00, MS compilers.

SHIPPING AND HANDLING. \$3 USA, \$5 1st class (Canada) \$18.00 elsewhere. We welcome MC/Visa/COD (add \$3 COD). To order call 1-800-922-3383. In Georgia, or for tech support, call 404-973-9272.

MicroHelp, Inc. • 2220 Carlyle Drive • Marietta, Georgia 30062

programs for standard and high-resolution graphics applications. These programs will help you become familiar with using GW-Convert's commands.

Once you start the program, an on-line help file is available as a reference guide to every GW-Convert command. I found this feature helpful; each command's use and function is well documented.

To convert an MS-DOS Basic program once it resides on the Model 4 in ASCII form, you enter the MS-DOS input-file name and the output-file name for the converted file. Conversion options include shipping the source and converted code to the printer along with a cross-reference list. I found these features extremely helpful. GW-Convert saves the cross-reference list to disk so you can refer to it later.

Once you have converted the source program, you might be able to run it directly under Model 4 Basic. I say "might be able" because not all commands can be converted. In most cases, you will have to make some modifications to the program or add entire routines in order to duplicate those commands that you cannot convert.

Model 4 Basic doesn't support the following GW-Basic reserved words: Beep, BLOAD, BSAVE, Calls, CHDIR, Circle, Color, COM, CSRLIN, Draw, Environ, ERDEV, Files, IOCTL, Key, Locate, Motor, Noise, Paint, Palette, PCOPY, Pen, Play, PMAP, Point, Preset, PSET, Randomize, Reset, RMDIR, Screen, SEG, Shell, Stick, STRIG, Timer, View, and Window.

GW-Convert's cross-reference file or printout lists all Basic reserved words that were either incompatible with Model 4 Basic or could not be translated. The GW-Convert manual contains many tips to help you in either case.

To test GW-Convert, I took one of the sample programs and ran an already supplied converted version. I then created my own converted copy using GW-Convert. Upon running the newly converted program, I found many syntax problems. I then referred to the cross-reference list to see what commands were incompatible or could not be converted.

The first on the list was Width, with a reference to its supposed line number. I referred to the line and found no Width command. I then looked in the manual and discovered that some commands are converted to a command string that might include some GBasic high-resolution commands. To get some of these commands to work, you have to remove the ones that are not applicable to the converted application or a syntax error might result.

I also noticed that some commands were not converted to anything. The man-

Command	Problem
Clear	You might have to alter allocation requirements.
INP	Model 4 ports are different.
INPUT;	No echo suppression for a carriage return.
LOC()	The Model 4 doesn't return to the number of bytes allocated to the file.
On event	Model 4 Basic offers only On Error GOTO.
Out	Model 4 ports are different.
PEEK	You might have to reassign the location.
POKE	You might have to reassign the location.
Randomize	Model 4 Basic can't specify a reseed value.
RND	Model 4 Basic can't reseed or ask for a previous random number.
Sound	The Model 4's tone and duration are different.
USR	You might have to recalculate the memory address.

Table. GW-Basic reserved words not compatible with Model 4 Basic.

ual showed a moderate list of Basic reserved words not supported by or not considered compatible with Model 4 Basic. The Table lists GW-Basic reserved words that are incompatible with Model 4 Basic.

GW-Convert does not check some commands for parameter errors. Running my converted copy gave a syntax error because the command syntax was "SOUND 400,0", the same as in the MS-DOS version. The Sound command exists on both machines, but its parameters are different. These errors are easy to locate by running the program.

GW-Convert contains a short list of commands, so it's easy to learn and use. The manual is well documented and contains many tips. It even contains sections that describe reserved words that can be converted, those that can't, and why. The manual has a handy index of command words for quick reference.

I did not discover any serious problems with GW-Convert. If at all possible, I recommend that you become familiar with the MS-DOS version of your program before you attempt any conversions. This is beneficial when you debug and modify the target program.

GW-Convert gives you a good start, but you have to be prepared to enhance and modify the target program. GW-Convert is neither foolproof nor 100 percent accurate, but it's good enough to get you going and can be a real time saver. ■

AT4X4Plus

★ ★ ★ ★

The AT4X4Plus works on the Model 3000. Qubié, 507 Calle San Pueblo, Camarillo, CA 93010, 800-821-4479; California residents call 800-987-9741. \$395 for 1,024K, \$595 for 2,048K.

Now that you have your Model 3000, with its blazing speed and exceptional graphics, you need to fill it up. The 3000 comes with only 512K, and you have eight slots to play with. Well, memory is cheap and the AT4X4Plus can put a slot to good use.

The AT4X4Plus comes with 1,024K—1 megabyte (MB)—of memory and a serial and parallel port. It has a variety of options: another 1,024K of RAM (expandable to 4MB with the optional 2MB RAM-PAK), three serial ports, and a game port.

You can configure the board into split or nonsplit addressing. Model 3000 users who have added the 128K to bring their systems up to 640K would use nonsplit addressing; those with 512K would round out the memory to 640K and split the rest to above MS-DOS's 1MB range.

To use the board, you must configure it by setting its dual in-line package (DIP) switches, install it, and run the 3000's DOS setup utility so the computer will recognize the additional memory.

The tables and diagrams for configuring the board are somewhat confusing. You have to understand the board's bank setup to understand the tables. In spite of several diagrams and tables of switch locations and configurations, I found the text more helpful.

You also need to configure the parallel printer port and serial port, and they each have an interrupt to set. The RS-232C serial ports support the shared interrupt of Xenix and Multilink. The serial port has a DB9P connector, standard for an AT computer, but since serial devices use a DB25P, you'll need an adapter cable between the DB9P and DB25P connectors. The parallel printer port has the standard DB25 female connector.

Once you configure the board, you are ready to install it in the 3000. The installation instructions are clear and concise. You can install the board in any slot from 3 through 6. After installation, you need to run the 3000's setup program to change the user memory and extended memory amounts.

But what do you do with all this memory? MS-DOS can directly access up to only 640K; the rest is relegated to a RAM disk or print spooler. One deficiency in this board is that it has no software support for the expanded memory specification by Lotus/Intel/Microsoft. Other special software, such as Xenix or a local

TANDY Model 1000 & MS-DOS TRS-80™ Models 1, 3 & 4 SOFTWARE

SOFTWARE FOR TRS-80™ MODELS 1, 3, and 4 Only

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.

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.

area network (LAN), is required to access the memory.

The board is easy to install, is reasonably priced, and works well. While it doesn't take advantage of expanded memory, the AT4X4Plus would be ideal for anyone who needs a large RAM disk or Xenix system.

—Beve Woodbury

The Norton Editor

★★★★

The Norton Editor runs on the Tandy 1000/1200/3000 (256K) and requires one disk drive. Peter Norton, 2210 Wilshire Blvd., Santa Monica, CA 90403, 213-453-2361. \$50.

I have been using WordStar for years to create programming source code and I questioned the need for yet another editor, even one from the man who wrote the Norton Utilities. After using the Norton Editor, I found myself admitting defeat. The program is good. In fact, it is so good that I probably won't use WordStar for source-code generation again.

The Norton Editor is a text-processing program specifically designed for programmers. Most word-processing software is designed for generalized use and lacks some of the features found in a programmer's editor.

The program groups its functional commands into the following categories, which you access by pressing the appropriate function key: Help (F1), Status (F2), File Commands (F3), Block Commands (F4), Screen Format (F5), Miscellaneous (F6), Printer Commands (F7), and DOS Processor (F9).

The Editor contains most of the useful commands found in word processors. The block commands let you mark blocks of text for deletion, copy a block to another part of the text, move a marked block of text, and find blocks of text.

One important feature lets you open and work on two documents or programs simultaneously. The Editor splits the screen into two windows that each contain a separate document. A block command lets you "window copy" a block of text from one program into the other. This is handy for programmers who often use a standard module header at the beginning of their source code.

Another programmer's feature not found in most word processors is a command that lets you display the file being edited in a "condensed format." In this mode, the Editor displays only those lines in the program that contain a letter or symbol in the first column. Most module names and labels found in a program begin with a character in column one

Because it is such a straightforward program, TRScat doesn't require a lot of documentation.

(such as in C, Pascal, and Assembly language), so you can quickly find a desired label. You can scan through your program using the arrow, page-up, and page-down keys. When you find the label you wish to edit, press any other key to activate the full-screen mode. This feature is especially useful for editing Assembly-language programs where labels must begin in the first column.

The Norton Editor is extremely capable. You can use it for creating documents as well as for programs. The editor contains a word-wrap feature, so you could use it for correspondence or other simple word-processing functions. It doesn't contain complex functions such as automatic hyphenation.

If you write your own programs, you should consider the Norton Editor. It's a bargain.

—Gary Shade

TRScat

★★★★

TRScat runs on the Model 4 (64K) and requires TRSDOS 6.2 and two disk drives. SOTA Computing Systems Ltd., 213-1080 Broughton St., Vancouver, BC V6G 2A8, 604-688-5009. \$39.95.

It can be difficult to remember on which disk you have recorded a program. Because I have a terrible memory, I spend a lot of time with the TRSDOS DIR command. I will often search through 10 or more disks before stumbling onto a sought-after program.

To alleviate this situation, I recently had the pleasure of using TRScat. TRScat lets Model 4 owners quickly and easily catalog, sort, and locate all the programs in their disk library. Besides TRSDOS 6.x.x disks, TRScat can catalog DOSPLUS 3.4/3.5, MultiDOS 1.3/1.5/1.6, and LDOS 5.x.x disks.

You execute TRScat as a command file from the TRSDOS level by entering TRSCAT. Once executed, TRScat searches for a printer configuration file called TRSCAT/CFG. If TRScat doesn't

locate the file or is making its initial run, you must set up the configuration file by either staying with the preset defaults or manually setting parameters such as the size of the left margin and the number of columns per printed page. You can specify printer control codes for condensed type or alternate type styles.

With the printer configuration set, TRScat presents a 14-option main menu: build a disk catalog, view the catalog file on the video, print the catalog file, sort the catalog, display a disk directory, enter file names manually, search for a file name or a disk ID code, write the catalog file on a disk, read a catalog file from a disk, kill a disk file, configure TRScat, remove a disk from the catalog, print a disk-space map, or exit from TRScat.

TRScat has a few drawbacks. It accepts only drives zero through 3, so it won't support a hard-disk drive. And it doesn't cope well with catalog having more than 140 entries. TRScat also isn't compatible with Pronto, the memory-resident application from MISOSYS. You can call up Pronto from TRScat, but your computer goes off on a strange voyage if you try to use one of Pronto's applications.

Because TRScat is an in-memory database program, a catalog file must either be built or read from a disk before TRScat can be of any real use. You can easily build a catalog file by assigning each disk a four-digit alphanumeric ID code and letting TRScat read the disk's directory. Once built, the catalog file can be sorted by disk or file name. You can search for program names or disk ID codes by either exact or partial match.

Because it is such a straightforward program, TRScat doesn't require a lot of documentation. However, SOTA doesn't use the program's ease of use as an excuse for a shoddy manual; TRScat comes with an excellent 20-page manual. Its organization is superb and its content should answer even the most inexperienced user's questions.

Even though TRScat is a simple program, it is useful and well done. While its narrow purpose makes the price a bit steep, anyone with more than a few disks will find TRScat a great time-saver.

—Mark D. Goodwin

Dots-Perfect

★★★★

Dots-Perfect works with the Epson FX/JX/RX printers. Dresselhaus Computer Products, 837 East Alosta Ave., Glendora, CA 91740, 818-914-5831. \$79.95.

If you own an Epson printer, you know that it is a reliable workhorse. And if you

EXPRESS CHECKOUTS

own an older model, you might wish that it had a near-letter-quality (NLQ) mode. Should you spend more money on a new machine? Save your dollars. Dots-Perfect, a modification for Epson printers, consists of three chips that plug into the printer's main circuit board. This gives you an NLQ mode and provides a selection of 160 different font styles.

Everything you need is enclosed in the package, including clear installation instructions. The manual's first page warns you that if you do not feel qualified to install Dots-Perfect, you should have a dealer do it for you.

Accurate instructions help you open the printer case and access the circuit board. Since some FX printers and all JX-80 printers have an auxiliary circuit board, instructions show you how to temporarily remove it so you can insert the chips in the main circuit board. Removing this board on my FX-80 was simple.

Once you have access to the main board, you have to locate the two chips that need replacing and the empty chip socket for installing the third chip. The photographs in the manual are exceptionally clear, and you can easily identify the chips. The manual carefully explains precautions in handling chips.

Once you have installed the new chips, you might have to cut a jumper on the main board. Again, the photographs clearly show where the jumper is and where to cut it. The manual even suggests using ordinary nail cutters if you don't own a pair of diagonal trace cutters. Finally, you must check a shorting block to see if it is in the correct position.

Before you assemble the printer, you have to reset the DIP switches according to the Dots-Perfect manual. This modification redefines the functions of several switches so your printer will work properly.

Once you have reinstalled the auxiliary circuit board and put the cover back on your printer, you should run the self-test to verify proper installation. The test prints both draft and NLQ mode. The manual provides software codes in ASCII, hexadecimal, decimal, and Basic CHR\$ to activate and deactivate the NLQ mode.

Dots-Perfect includes an adhesive decal for placement on the front of the printer; it gives brief instructions on the modification's operation so you don't have to refer to the manual.

I tested Dots-Perfect with a Model 4 using Allwrite. While Allwrite works fine on an Epson with Dots-Perfect, you must activate the NLQ mode by pressing the FF button, not by a software driver. With Dots-Perfect, my Epson has taken on a new life and my correspondence is much more legible.

—Arthur N. McAninch Jr.

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?

Since 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
DFW
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

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.

10-86BI

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

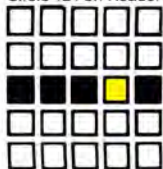
Utility Pak —15 outstanding programmer's aids. Includes III-to-4 Basic converter, disk drive timer, string sorter to replace TRSDOS 1.3's CMD"O", pop-up help screen generator, disk-space mapper (**previously unpublished**), enhanced Debug, Model 100-like bar cursor directory program, routine to add Point, 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)



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

TANDY 3000	LIST PRICE	OUR PRICE
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

TANDY 100, 200, 600	LIST PRICE	OUR PRICE
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

MODEL 4D	LIST PRICE	OUR PRICE
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

MODEL 6000 COMPUTERS	LIST PRICE	OUR PRICE
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	LIST PRICE	OUR PRICE
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	LIST PRICE	OUR PRICE
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	LIST PRICE	OUR PRICE
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	LIST PRICE	OUR PRICE
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.

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 (Return) (Material) (Authorization) to insure speedy service.
IBM, TAVA, COLUMBIA, 5151, COMPAQ, EAGLE, TRS/80, HEALTH/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 Quikfit 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-a-round 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
184-185**

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 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

Our New Company

Service & Returns: It is our policy to repair all service returns within 24-48 hours. Normally same day turn-a-round 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.

Astral Projection

by Delmar Searls

The best games are those that teach. To that end, I've written a program simulating the gravitational pull of stars on a space probe that you launch toward a target at one end of the screen.

The challenge is to find the starting position and velocity that will enable the probe to reach its destination—but that's only part of the fun. Try different launches to see what interesting paths the probe will take. It sometimes loops around stars and even settles into stable orbits.

Ode to Galileo

The program, which I've called Gravity, is based on simple physics. The gravitational force exerted on the probe by a star is directly proportional to the star's mass and inversely proportional to the square of the distance between the two objects. In other words, a star twice as massive as another exerts twice the force at the same distance; double the distance and the force becomes one-fourth as strong.

For each star in the scene, the gravitational force is calculated and applied to the probe. This enables the program to vividly illustrate the motion of such astronomical objects as comets. The probe speeds up noticeably as it approaches a star and slows down as it leaves. A close pass alters the probe's course more than one from farther away; furthermore, the faster the probe goes, the less it is affected by gravity.

If Only NASA Had This

Gravity asks you a series of questions for setting up the game. You can choose up to 10 stars; using four or fewer produces somewhat faster movement. The next prompt asks for the number of players (two is the maximum).

There are two launch modes: side to side and corner to corner (the first player's probe starts from the left toward a target on the right, and the second player's does the opposite). You select the entry row from zero (bottom) to 191 (top) and the initial velocity (zero to 9) before launch.

System Requirements

16K RAM
Extended Color Basic

Program Listing. Gravity.

```

10 GOTO 1000
20 FOR I=1 TO N:T1=X(I)-X:T2=Y(I)-Y:R2=T1*T1+T2*T2:R=SQR(R2):IF R<=D THEN RETURN ELSE F=M(I)*G/R:2:VX=VX+F*T1/R:VY=VY+P*T2/R:NEXT I
30 X=X+VX:Y=Y+VY:IF X>1 AND X<25 AND Y>1 AND Y<191 THEN PSET(X,191-Y)
40 AS=INKEYS:IF AS="" THEN 20 ELSE RETURN
997 *****

998 ' INITIAL USER INPUT
999 *****

1000 CLS:PMODE4,1:PCLS
1010 INPUT"HOW MANY 'STARS' ";N:PRINT
1020 INPUT"NUMBER OF PLAYERS (1 OR 2) ";NP
1030 PRINT
1040 PRINT"LAUNCH"
1050 PRINT" 1. SIDE TO SIDE"
1060 PRINT" 2. CORNER TO CORNER"
1070 INPUT"WHICH ";L
1080 PRINT
1090 PRINT" 1. GRAVITY"
1100 PRINT" 2. ELECTRIC CHARGE"

1110 INPUT"WHICH ";T
1120 IF T=2 THEN 1170
1130 PRINT
1140 PRINT" 1. NO BLACK HOLE"
1150 PRINT" 2. BLACK HOLE"
1160 INPUT"WHICH ";S
1170 PN=1:CLS
1180 GOSUB 2000 'INITIALIZATION

1190 CLS
1200 GOSUB 3000 'DRAW SKY
1210 AS=INKEYS:IF AS="" THEN 1210
1220 GOSUB 4000 'GET USER INPUT

1230 GOTO 1220
1997 *****

1998 ' INITIALIZATION
1999 *****

2000 G=50:PI=3.14156:D=6
2010 INPUT"RANDOM DATA (Y OR N)";AS:IF AS="N" THEN 2150
2020 X(1)=RND(210)+25
2030 Y(1)=RND(140)+25
2040 M(1)=RND(10):IF T=2 THEN M(1)=M(1)*(-1)^RND(T)
2050 FOR I=2 TO N
2060 X(I)=RND(210)+25
2070 J=1
2080 IF ABS(X(I)-X(J))<10 THEN 2060 ELSE J=J+1:IF J<I THEN 2080

2090 Y(I)=RND(140)+25
2100 J=1
2110 IF ABS(Y(I)-Y(J))<10 THEN 2090 ELSE J=J+1:IF J<I THEN 2110

2120 M(I)=RND(5):IF T=2 THEN M(I)=M(I)*(-1)^I
2130 NEXT I
2140 RETURN
2150 FOR I=1 TO N
2160 PRINT"X";:PRINT USING"###";I:;INPUT X(I)
2170 PRINT"Y";:PRINT USING"###";I:;INPUT Y(I)

2180 PRINT"MASS";:PRINT USING"###";I:;INPUT M(I)
2190 NEXT I
2200 RETURN
2997 *****
2998 ' DRAW SCENE
2999 *****
3000 SCREEN1,1
3010 IF S>N THEN 3060
3020 FOR I=S TO N
3030 CIRCLE(X(I),191-Y(I)),INT(ABS(M(I))/2+.5)
3040 PAINT(X(I),191-Y(I))
3050 NEXT I
3060 IF L=2 THEN 3100
3070 LINE(255,88)-(250,88),PSET:LINE-(250,104),PSET:LINE-(255,104),PSET
3080 IF NP=2 THEN LINE(0,88)-(-5,88),PSET:LINE(-5,104),PSET:LINE-(0,104),PSET
3090 RETURN
3100 LINE(240,0)-(-255,10),PSET
3110 IF NP=2 THEN LINE(0,181)-(-15,191),PSET
3120 RETURN
3997 *****
3998 ' MAIN PROGRAM
3999 *****
4000 IF L=2 THEN 4060
4010 IF NP=1 THEN 4030 ELSE IF PN=2 THEN PRINT TAB(16);
4020 PRINT"###":PRINT USING"##";PN:;PRINT" ";
4030 INPUT"R,V";Y,VX
4040 X=1:IF VX>=10 THEN 4030 ELSE E VY=0:IF PN=2 THEN VX=-VX:X=255
4050 GOTO 4120
4060 IF NP=1 THEN 4080 ELSE IF PN=2 THEN PRINT TAB(15);
4070 PRINT"###":PRINT USING"##";PN:;PRINT" ";
4080 INPUT"A,V";A,V
4090 IF V>=10 THEN 4080
4100 IF PN=2 THEN X=254:Y=190 ELSE X=2:Y=2
4110 A=A*PI/180:VX=V*COS(A):VY=V*SIN(A):IF PN=2 THEN VX=-VX:VY=-VY
4120 SCREEN 1,1:IF NP=2 THEN PN=PN+1:IF PN=3 THEN PN=1
4130 AS="":GOSUB 2000:IF AS<>" " THEN 4170
4140 LINE(0,0)-(-4,4),PSET,BF
4150 AS=INKEYS:IF AS="" THEN 4150
4160 LINE(0,0)-(-4,4),PRESET,BF
4170 SCREEN 0,0
4180 IF AS="Q" THEN 5000
4190 IF AS="E" THEN PCLS:GOSUB 3000:RETURN
4200 IF AS="C" THEN RETURN
4210 PRINT"C, E, OR Q"
4220 AS=INKEYS:IF AS="" THEN 4220
4230 GOTO 4180
4997 *****
4998 ' SHOW DATA
4999 *****
5000 PRINT" # X Y M"
5010 PRINT"--- --- ---"
5020 FOR I=1 TO N
5030 PRINT USING"###";I;
5040 PRINT USING"#####";X(I);
5050 PRINT USING"#####";Y(I);
5060 PRINT USING"#####";M(I)
5070 NEXT I
5080 END

```

End

In the diagonal version, player 1 launches the probe from the lower-left corner toward a target in the upper-right corner; the target corner is always the other player's entry point. Entry is specified as an angle of elevation in de-

grees—zero for horizontal and 90 for vertical. For the player starting in the upper right, a zero-degree angle goes out to the left and 90 is straight down.

Another prompt lets you change the stars into electrically charged particles.

Since like charges repel, the probe veers away from some particles and toward others. At first, however, you'll have no idea which particles attract and which repel. Hitting the target will be difficult if not impossible.

In the gravity option, you can have one of the stars be a black hole—invisible on screen but still exerting its gravitational pull.

The final prompt lets you use random data for the stars' mass and placement, or set both yourself. The x coordinate can range between 10 and 245, and the y coordinate between 10 and 181 (values outside this range place the stars too close to the edge). Since the program displays its random data at the end of each game, you can use this option to reproduce interesting setups.

Gravitational Pull Toy

After you select parameters, Gravity displays the probe's path as it moves slowly across the screen. Processing continues even when the probe moves off screen. Sometimes the probe loops back into view.

The probe is destroyed when it passes too close to a star. A box in the upper-left

corner lights up, and the probe stops moving.

Press the enter key to go back to the prompt screen so you can change your coordinates. The C key puts you back in the game and launches the probe according to the new coordinates; the E key does the same, but removes the old path lines. Q terminates play.

The goal is to reach the target area in the fewest tries. When two people play, the first to succeed is the winner. There are no bells, whistles, or flashing lights if you make it.

For Quantum Mechanics Only

You can best simulate stable orbits by altering the program. On line 4040, change the value of X=1 to a number near 128. Choose the one-player version (side to side) and press N at the random-data prompt. Place a single star at x=128 and y=96, with an initial mass of about seven. Changing the probe's launch point and velocity produces a variety of stable orbits. Some orbits simulate precession, a term referring to orbits that vary with each revolution.

Gravity takes a long time to make cal-

culations if you've chosen several stars. Apply the speed-up POKE (POKE 65495, 0) if your CoCo will take it.

The program calculates changes in the probe's path at discrete points, producing only an approximation of what happens in nature. The approximation breaks down a little at high speeds, so I usually set the initial velocity at no greater than five.

The approximation also breaks down when the probe moves close to a star; this can cause particularly bizarre effects when combined with high speed. It's even possible to zoom right through a star. But if I provided all the checks to prevent such imperfections, the program would be too slow to be much fun.

The screen prompts for launch parameters were kept short so information could be retained on screen as long as possible. You must enter two parameters at a time for the same reason. ■

Delmar Searls welcomes questions and comments. You may write to him at 205 W. Main St., Wilmore, KY 40390. Send a self-addressed, stamped envelope for a reply.

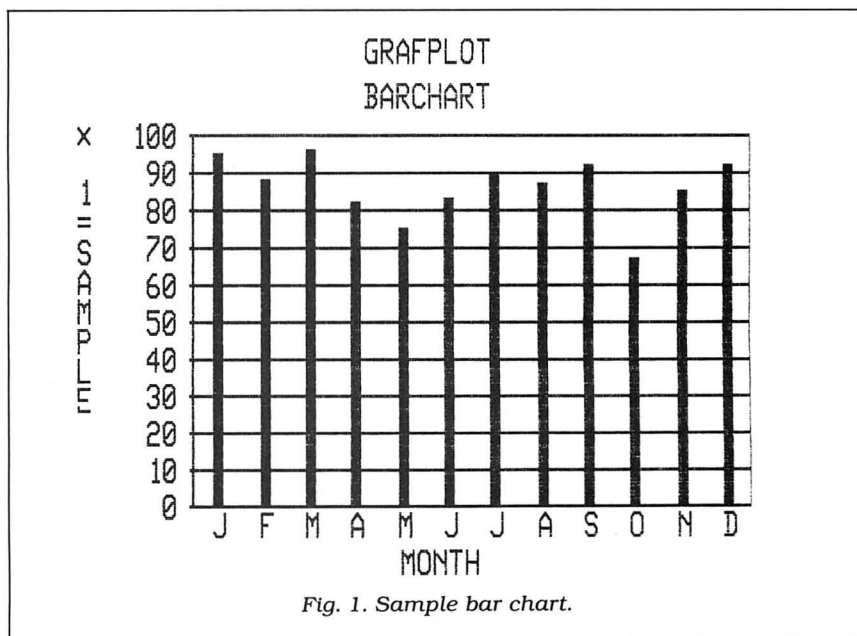
Graph-Itti

by Milton Simpson

Graphing programs for the Color Computer are not difficult to find, but few give you all the capabilities you need. My program Grafplot is different: It provides you with umbrella software for creating line graphs, bar graphs, cumulative bar graphs, and pie charts. You select the type of graph you want, enter the data, and the program does the rest. Text placement is automatic. You can edit your data with the program's manual text-entry/edit routine and produce printouts with an embedded screen-dump routine.

System Requirements

64K RAM
Extended Color Basic
Disk drive
DMP 120 printer



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.)

10-861C

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

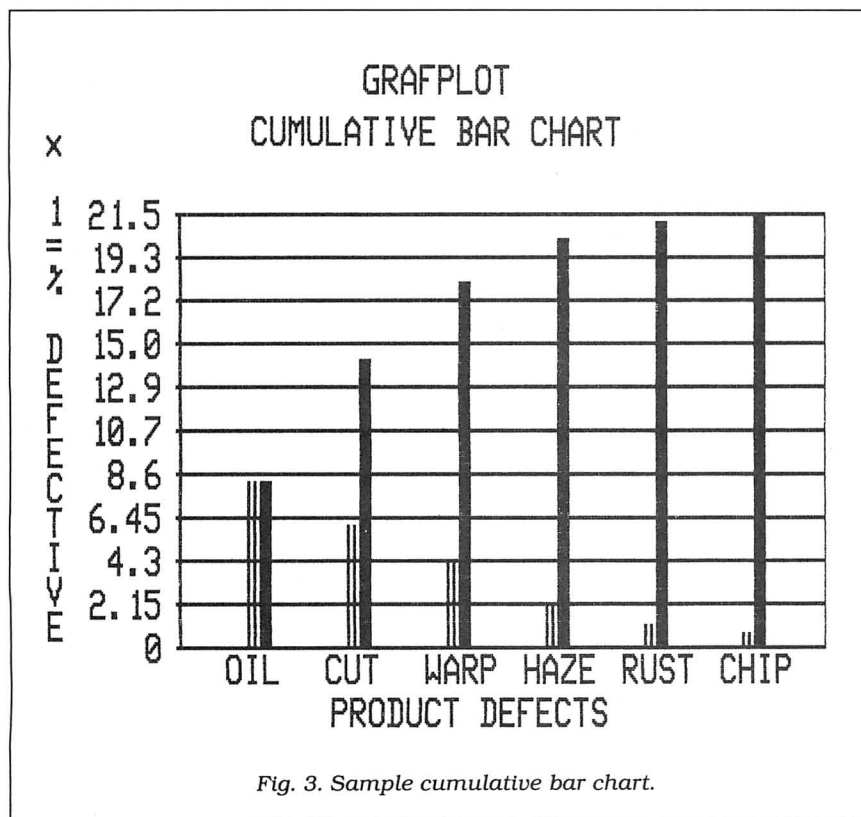
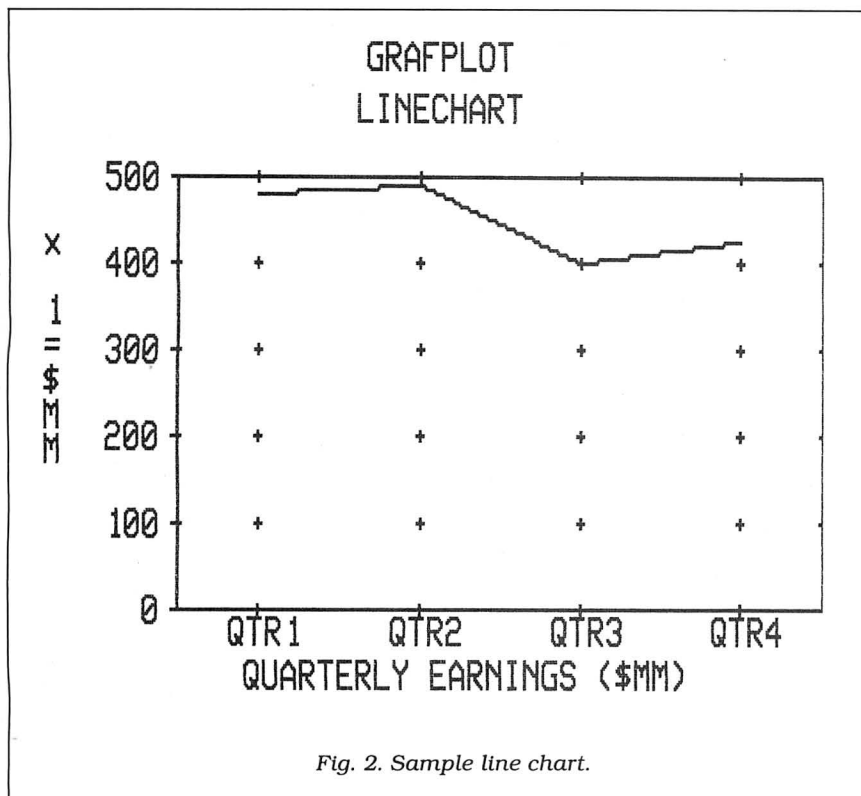
Address

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



Plotting Your Course

To put Grafplot to work, type in and run the Basic code in the Program Listing. The first screen you'll see is a notice that the machine-language routines are being loaded. When the task is complete,

the program will ask if you want instructions on how to use the manual text-entry/edit routine. Since text placement is automatic, you might skip these instructions at first. I'll explain how the routine works in more detail later.

If you bypass the instructions, the next screen you'll see is the main menu. It provides you with seven options: copy to printer, view screen, enter graph data, print text, clear screen, load a saved graph from disk, and save a graph on disk. Your first step should be to clear the screen (option 5). Next, check the screen (option 2) to make sure it is solid black. If it is, you are ready to create a graph.

Select option 3 to display the graph-selection menu; then enter the number for the type of graph you want to create. When the data-entry screen appears, fill in the title/notation lines at the top. Also enter the full-scale value, which is the maximum value you want to appear on the vertical axis.

Data entry is handled the same for bar, line, and cumulative bar graphs. (See Figs. 1, 2, and 3 for sample graphs.) Because of screen-width limitations, you are limited to 13 data entries. First specify the number of items you want to have on your graph and then begin entering data in the specified format (label, data). Be sure to observe the label-length limit. If you make a mistake, type in 999,0 and press the enter key. This returns you to the main menu, from which you can start over by clearing the screen.

When data entry is complete, specify the number of divisions you want on the graph's vertical axis. The program uses this data in conjunction with the full-scale value to calculate the multiplier for the vertical axis. The computer then draws the graph and places the horizontal-axis labels on screen.

When you're finished creating the graph, the computer returns you to the main menu. It's a good idea to view the graph on screen (option 2) to make sure it appears the way you intended. If you're satisfied with the results, select option 7 to save the graph on disk or option 1 to produce a screen dump.

Slicing the Pie

When creating a pie graph (see Fig. 4), you can enter data for as many items as you wish. Be careful, however, not to create too many pie slices, since labels might overwrite each other if placed too close together on the graph. Though the program should accommodate at least 12 slices, you might have to experiment with each data set.

Labels might also be overwritten if you place too many narrow slices next to each other on the graph. If there is no way to avoid this, try leaving the labels blank on the data-entry screen and using the print-text option to edit them to a suitable length.

The print-text option is a modified version of a program written by William

From Computer Plus to YOU...

PLUS after PLUS after PLUS



Tandy 200 24K \$649
Tandy 600 32K \$1269
Tandy 102 32K \$395



Tandy 3000 \$1969
Tandy 3000 HD \$2699



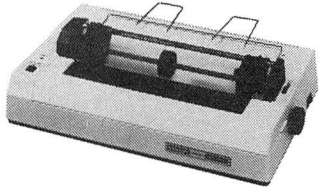
Tandy 1000 \$685
Tandy 1200 HD \$1599



DMP-130 \$269



Color Computer II
w/64K Ext. Basic \$145



DMP-105 \$160

BIG SAVINGS ON A FULL COMPLEMENT OF RADIO SHACK COMPUTER PRODUCTS

COMPUTERS

Tandy 1000 1 Drive 128K	685.00
Tandy 1200 2 Drive 256K	1159.00
Tandy 1200 10 Meg. 256K	1599.00
Tandy 3000 1 Drive 512K	1969.00
Tandy 3000 HD 20 Meg. 512K	2699.00
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-220 Daisy Wheel	359.00
Radio Shack TRP-100 Portable	169.00
Silver Reed EXP-500P Daisy Wheel	229.00
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 192 160 CPS	375.00
Epson LX-80 100 CPS	275.00
Epson FX-85 160 CPS	419.00
Epson HS-80 Portable Ink Jet	389.00

Tandy 1000/1200 ACCESSORIES

Tandy 1000 Disk Drive Kit	135.00
Tandy 1000 10 Meg. Hard Drive	579.00
Hard Drive Controller Board	249.00
256K Memory Plus Expansion Brd.	155.00
512K Ram Board (includes 128K)	119.00
PBJ Multi-Function Board (128K)	199.00
PBJ Multi-Function Board (256K)	209.00
PBJ Multi-Function Board (512K)	229.00
128K Ram Upgrade Kit (NEC)	78.00
256K Ram Upgrade (for PBJ Board)	69.00
Hayes 1200B Half Card Modem	429.00
1200 Baud Modem Board	179.00
Plus RS-232 Serial Board	69.00
Digi-Mouse/Clock Board	89.00

Tandy 1000/1200 MONITORS

Tandy VM-4 Green Monitor	99.00
Tandy CM-10 RGB Color Monitor	379.00
Tandy CM-4 RGB Color Monitor	249.00
Tandy VM-3 TTL Green Monitor	179.00
Tandy 1200 Deluxe Display Adapt.	299.00
Tandy 1200 Text Monitor Adapt.	219.00
Tandy 1200 Dual Display Adapt.	210.00

** COMPUTER PLUS SPECIALS **

The PBJ MFB-1000 Multi-Function Board with 512K Ram, DMA, RS-232 Serial Port, Clock Calendar with Battery Backup, and Ram Disk Software229.00

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.....559.00

Tandy 1000 20 Megabyte External Hard Drive with Controller, Cables, Case and Power Supply649.00

Radio Shack software 10% off. Send for complete catalog. Prices subject to change without notice. Not responsible for typographical errors.

**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

Barden, Jr., and published in the November/December 1983 issues of *The Color Computer Magazine*. After you've drawn a graph, you might want to restart the program and look at the print-text instructions. (As long as you don't clear the screen or shut off the computer, you can return to a graphics screen after you restart the program.)

I wrote the program for use with a DMP 120 printer; if you have a different printer, you might have to change lines 2030-2150 to call your own screen-dump program and delete lines 1040-1710. Here's a brief description of how it works. Line 2050 sets the computer output to 1,200 baud. The instruction in line 1030 does the same for the printer. The high baud rate reduces the time to execute the screen dump from 15 minutes to 7½ minutes. Line 2060 sets up the printer. The CHR\$(27);CHR\$(20) sets condensed print. CHR\$(18) sets the graphics mode. Line 2070 sets the graphics screen; 2080 calls the machine-language screen dump. Lines 2120 and 2125 return the printer and the computer to the 600-baud rate. ■

Milton Simpson welcomes questions and suggestions. Write to him at 831 Hillcrest Drive, Martinsburg, WV 25401.

GRAFPLOT
PIECHART

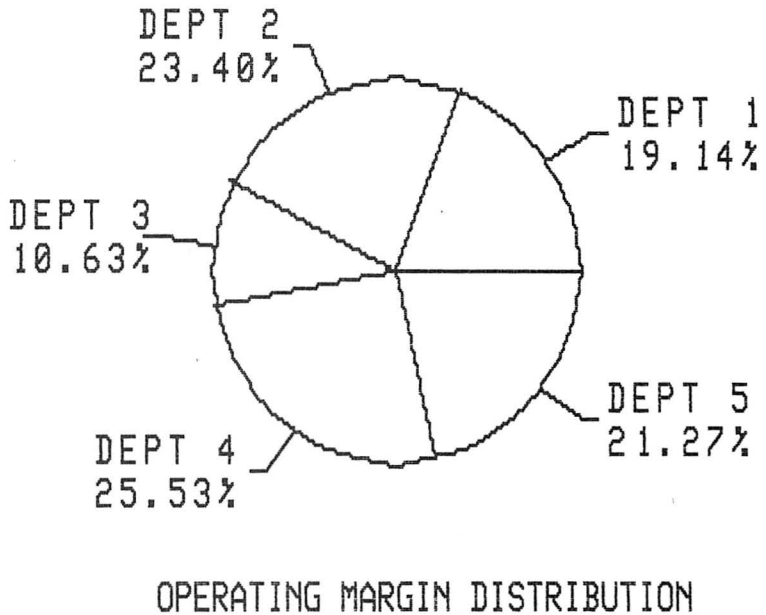


Fig. 4. Sample pie chart.

Program Listing. Grafplot.

```

1# 'GRAFPLOT <GRAPH PLOTTING PRO 46# DATA31,16,16,3#16,16,31,# 95# DATA2#6,116,24#166,66,198,3 9
GRAM> 47# DATA31,16,16,28,16,16,16, 2,61,227,69,52,6,23#65,84,84 115# DATA13,182,124,229,129,1,39
2# CLS:PRINT@128," SETTING-UP 48# DATA15,16,16,19,17,17,15,# 96# DATA84,79,227,225,31,1,23#6 16#127,124,229,126,117,118,142
SCREEN DUMP AND TEXT MACHIN 49# DATA17,17,31,17,17,17,# 5,196,7,52,4,198,7,224,224 124
E LANGUAGE ROU- TINES" 50# DATA4,4,4,4,4,4,14,# 97# DATA92,52,4,52,4,23#196,79, 116# DATA24#166,132,16,19#124,
3# CLEAR 2#0,28927 51# DATA1,1,1,1,1,17,14,# 88,73,88,73,88,73,227,67 236,167,164,49,33,16,191,124,236
4# FORI=&H71# TO &H73CF:READA:P 52# DATA17,18,2#24,2#18,17,# 98# DATA31,2,95,166,71,89,2#2,1, 48
OKEI,A:NEXT 53# DATA16,16,16,16,16,31,# 74,38,25#83,134,255,88,73 117# DATA1,14#124,248,37,235,12
5# DATA#,#,#,#,#,#,# 54# DATA17,27,21,21,17,17,17,# 99# DATA1#6,228,38,25#52,6,198, 4,124,226,182,124,226,129,32,16,
6# DATA31,31,31,31,31,31,31,31 55# DATA17,25,21,19,17,17,17,# 8,52,4,166,1#167,99,23#16# 37
7# DATA#4,8,31,8,4,# 56# DATA14,17,17,17,17,14,# 1#0# DATA79,88,73,1#6,99,38,25# 118# DATA255,57,127,124,226,134,
8# DATA#4,2,31,2,4,# 57# DATA3#17,17,3#16,16,16,# 52,6,166,132,164,99,17#228,167 254,151,111,142,125,255,16,142,1
9# DATA#4,4,21,14,4,# 58# DATA14,17,17,21,18,13,# 1#1# DATA132,166,1,164,1#0#17#9 26,#
1#0# DATA4,4,4,4,4,# 59# DATA3#17,17,3#2#18,17,# 7,167,1,48,136,32,5#98,1#6,228 119# DATA166,132,23,2,137,166,13
11# DATA17,17,17,#,#,# 60# DATA14,17,16,14,1,17,14,# 1#2# DATA38,216,53,178 2,23#164,183,124,238,247,124,23
12# DATA1#1#31,1#1#31,1#1#1# 61# DATA31,4,4,4,4,4,# 1#3# FORI=&H747# TO &H74E3:READA 9,129
13# DATA4,15,2#14,5,3#4,# 62# DATA17,17,17,17,17,14,# 12#0# DATA#16,39,2,8,161,164,16, 12#0# DATA#16,39,2,8,161,164,16,
14# DATA12,13,2,4,8,19,3,# 63# DATA17,17,17,1#1#4,4,# 1#4# DATA142,125,255,111,128,14# 39,2,2,193,#16,39,1
15# DATA8,2#2#8,21,18,13,# 64# DATA17,17,17,17,21,27,17,# 121# DATA252,132,1,129,1,38,38,1 96,1,193,1,39,32,23#164,196
16# DATA12,12,8,16,#,#,# 65# DATA17,17,1#4,1#17,17,# 122# DATA6,193,6,38,24,166,132,1 32,6,129,6,39,16,182,124,238
17# DATA2,4,8,8,8,4,2,# 66# DATA17,17,1#4,4,4,4,# 1#5# DATA127,124,235,127,124,225 123# DATA138,2,183,124,238,246,1
18# DATA3,4,2,2,2,4,8,# 67# DATA31,1,2,4,8,16,31,# 142,124,255,191,124,236,127,124 24,239,2#2,1,247,124,239,166,132
19# DATA4,21,14,31,14,21,4,# 68# DATA4,14,21,4,4,4,# 1#6# DATA224,134,7,183,124,23#1, 24,239,2#2,2,247,124,239,166,132
2#0# DATA#4,4,31,4,4,# 69# DATA#,#14,1,15,17,15,# 34,1,183,124,234,142,124,24#111 124# DATA164,132,3,129,3,38,38,1
21# DATA#,#,#,#,12,12,8,16 70# DATA16,16,22,25,17,25,22,# 127,255,37,249,127,124,226,127, 96,3,193,3,39,32,23#164,196
22# DATA#,#,#,31,#,#,# 71# DATA#,#14,17,16,17,14,# 124,228 1#7# DATA14#124,248,37,249,134, 125# DATA12,193,12,38,24,166,132
23# DATA#,#,#,#,12,12,# 72# DATA1,1,13,19,17,19,13,# 5,14,#251,124 132,12,129,12,39,16,182,124,238
24# DATA#1,2,4,8,16,# 73# DATA#,#14,17,31,16,14,# 5,14,#251,124 24,239,2#2,1,247,124,239,166,132
25# DATA14,17,19,21,25,17,14,# 74# DATA2,5,4,14,4,4,4,# 1#8# DATA226,31,1,166,132,183,12 24,239,2#2,2,247,124,239,166,132
26# DATA2,6,2,2,2,2,7,# 75# DATA#,#13,19,19,13,17,14 4,227,124,124,224,182,124,224,12 127# DATA164,132,6,129,6,38,7#1
27# DATA14,17,1,14,16,16,31,# 76# DATA16,16,22,25,17,17,17,# 9,2 96,6,193,6,39,64,23#164,196
28# DATA14,17,1,6,1,17,14,# 77# DATA4,#12,4,4,14,# 1#9# DATA44,6,182,124,228,183,12 128# DATA1,193,1,38,24,166,132,1
29# DATA2,6,1#18,31,2,2,# 78# DATA#,#26,21,21,21,21,# 4,229,124,124,229,122,124,23#12 32,1,129,1,39,16,182,124,238
3#0# DATA31,16,3#1,1,17,14,# 79# DATA16,16,18,2#24,2#18,# 2,124 129# DATA138,1,183,124,238,246,1
31# DATA6,8,16,3#17,17,14,# 8#0# DATA12,4,4,4,4,14,# 6 11#0# DATA124,227,134,7,183,124,2 24,239,2#2,2,247,124,239,23#164
32# DATA31,1,2,4,8,16,16,# 81# DATA#,#22,25,17,17,17,# 133# DATA124,233,128,1,183,124,2 24,239,2#2,2,247,124,239,166,132
33# DATA14,17,17,14,17,17,14,# 82# DATA#,#22,25,17,17,17,# 33,38,245,182,124,234,61,235,132 131# DATA138,8,183,124,238,246,1
34# DATA14,17,17,15,1,17,14,# 83# DATA#,#14,17,17,17,14,# 231 124,231,182,124,232,72,183,124,2 24,239,2#2,4,247,124,239,166,132
35# DATA#12,12,#12,12,8,# 84# DATA#,#22,25,25,22,16,16 6 113# DATA132,182,124,231,68,183, 129# DATA164,132,12,129,12,38,7#
36# DATA#12,12,#12,12,8,16 85# DATA#,#13,19,19,13,1,1 124,231,182,124,232,72,183,124,2 196,12,193,12,39,64,23#164,196
37# DATA2,4,8,16,8,4,2,# 86# DATA#,#22,25,16,16,16,# 32,48 132# DATA164,132,12,129,12,38,7#
38# DATA#,#31,#31,4,# 87# DATA#,#15,16,14,1,3#,# 114# DATA1,49,63,38,2#2,182,124, 196,12,193,12,39,64,23#164,196
39# DATA#4,2,1,2,4,8,# 88# DATA4,4,31,4,4,4,4,# 234,72,183,124,234,182,124,23#3 133# DATA3,193,3,38,24,166,132,1
4#0# DATA14,17,1,2,4,8,4,# 89# DATA#,#17,17,17,19,13,# 234,72,183,124,234,182,124,23#3 133# DATA3,193,3,38,24,166,132,1
41# DATA14,17,1,13,21,21,14,# 9#0# DATA#,#17,17,17,1#4,# 234,72,183,124,234,182,124,23#3 133# DATA3,193,3,38,24,166,132,1
42# DATA4,1#17,17,31,17,17,# 91# DATA#,#17,17,21,21,1#0# 234,72,183,124,234,182,124,23#3 133# DATA3,193,3,38,24,166,132,1
43# DATA3#9,9,14,9,9,3#,# 92# DATA#,#17,17,4,1#17,# 234,72,183,124,234,182,124,23#3 133# DATA3,193,3,38,24,166,132,1
44# DATA14,17,16,16,16,17,14,# 93# DATA#,#17,17,31,1,17,14 234,72,183,124,234,182,124,23#3 133# DATA3,193,3,38,24,166,132,1
45# DATA3#9,9,9,9,9,3#,# 94# DATA#,#31,2,4,8,31,# 234,72,183,124,234,182,124,23#3 133# DATA3,193,3,38,24,166,132,1
    
```

Listing continued

80 MICRO'S LIST of ADVERTISERS

Index for 80 Micro Magazine—OCTOBER 1986

Reader Service Number	Page	Reader Service Number	Page	Reader Service Number	Page
82	Aerocomp 138, 139	Instant CoCo 172		281	Nibble Notch 186
82	Aerocomp 153	Load 80 192, 193		232	Nocona Electronics 43
202	Aerocomp 22	Load 80 Back Issues 166		492	PCA Technologies 26
302	Aerocomp 32A-D	Load 80 Subroutines 128		470	P.G. Design Electronics 117, 137
30	Allwrite (Prosoft) 7	Moving 188		124	Perry Computers 167
215	Alcor Systems 31	Reader Service 187		437	Portable Software 198
17	Alpha Products 13, 15	Say You Saw It 127		108	Powersoft 21
374	ALPS 127	Subscription 160		308	Powersoft 4
141	Anitek Software Products 23	Subscription Christmas 144		449	Professor Jones/Frog House 188
378	ATD 48, 48A	Subscription Problems 117		75	Radio Shack 38, 39
238	Automation Facilities CII	University Micro 117		75	Radio Shack 190, 191
152	BCCOMPCO 51	191 Electric Transit Inc. 121		75	Radio Shack (RS 1-56) 57-112
145	Beamman-Porter, Inc. 22	45 Electric Webster 1		371	Seatronics 137
301	Big D Computers 196	214 Ft. Worth Computers 45			Software Support 168, 169, 184, 185
186	Blue Ridge 22	90 Freedom Electronics 157		245	Software Sales 176
86	Compulogic Corp. 200	* GE Information Services 17		427	SOTA Computing Systems, Ltd. 157
78	Compuserve 151	185 Gooth Software 201		444	Southwestern Digital 205
242	ComputAmerica 119	199 Group Technology 186		456	Sunlock Systems 187
133	Computer Discount of America 123	9 H&E Computronics CIV		297	SJS Engineering 154
357	Computer Friends 155	455 Hard Drive Specialist 28		81	Total Access 147
18	Computer Plus 174	491 HJL Products 181		227	Trisoft 176
142	Computer Supplies of Peterborough 206	175 Howe Software 163		247	True Data Products 178, 179
415	Computer System Consultants 188	46 Hypersoft 200		261	Turner-Hall Publishing 119
532	Contract Services Assoc. 136	101 J&M Systems, Ltd. 182		289	Warp Speed Computer Products 135
45	Cornucopia Software 1	534 Jameco 199			
397	DAC Software CIII	* Lindbergh Systems 125			
282	DFW Computer Center 165	235 LSR Learning 201			
114	Digital Vision 198	351 Lyben Computer Systems Inc. 127			
204	DiskCount Data 2, 3	274 Lyons Products 117			
91	Dotwriter (Prosoft) 9	311 Manzana Micro 56			
452	Dresselhaus Computer 131	250 Marymac Industries, Inc. 143			
85	Educational Micro Systems 18	225 Merritt Computer 119			
	80 MICRO	240 Micro Help 161			
	Back Issues 127	464 Micro Labs, Inc. 204			
	Best of Model III 141	137 Miller Micro 131			
	Best of Model IV Utilities 113	107 Misosys 24, 129			
	Classified 129	411 Montezuma Micro 132			
549	Classified Ads 207	416 Montezuma Micro 194, 195			
	Dealer Sell 129	424 Montezuma Micro 156			
	Foreign Dealer 125	524 Montezuma Micro 133			

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

Circle 245 on Reader Service card.

Circle 227 on Reader Service card.

WORD PROCESSING SOFTWARE SALE

- Allwrite *35% off* \$ 129.99
- Lscript *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 11/10/86 while supplies last!

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

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

READER SERVICE

This card valid until November 30, 1986

- A. How would you describe your interest in MS-DOS, IBM Compatible Systems?
 1. I own an MS-DOS, IBM compatible system. 3. I'm interested but have no immediate plans to purchase.
 2. I intend to purchase. 4. Not interested.
- B. On a scale of 1 (no interest) to 5 (great interest), please rate your interest in seeing the following types of programs published in 80 Micro:
 _____ 1. Business applications _____ 4. Money management applications
 _____ 2. Science/math applications _____ 5. Games
 _____ 3. Home management applications _____ 6. Programming Utilities
- C. Excluding yourself, how many people read your copy of 80 Micro?
 1. One 3. Three 5. Five or more
 2. Two 4. Four
- D. What type of TRS-80/Tandy Computer do you own? Check all that apply.
 1. Model I 6. Model 16/16B/6000 11. Model 2000
 2. Model II/12 7. Model 100/200 12. Model 3000
 3. Model III 8. Model 600
 4. Model 4/4P/4D 9. Model 1000
 5. Model 4D 10. Model 1200
- E. How long have you owned your TRS-80/Tandy Computer?
 1. Less than 1 year 4. 3-4 years
 2. 1-2 years 5. More than 4 years
 3. 2-3 years
- F. Do you subscribe to an information utility, such as CompuServe, Dow Jones News Retrieval, etc.?
 1. Yes 2. No 3. Not now, but intend to within 12 months.
- G. Do you plan to purchase another TRS-80/Tandy Computer during the next 12 months?
 1. Yes 2. No 3. Don't know
- H. Where do you use your TRS-80/Tandy Computer? Check all that apply.
 1. At home for pleasure 4. At school
 2. At home for business 5. For math/science applications in any location
 3. At work
- I. The articles in 80 Micro are:
 1. Too simple 2. Too complex 3. Just right
- J. How many purchases have you made based on an ad you saw in 80 Micro?
 1. 0 2. 1-3 3. 4 or more
- K. Which of the following columns do you read? Please rate them on a scale of 1 (seldom read) to 5 (always read).
 _____ 1. Slide Tracks _____ 5. The Next Step _____ 9. Reviews
 _____ 2. Feedback Loop _____ 6. Dave's MS-DOS Column _____ 10. New Products
 _____ 3. Pulse Train _____ 7. Fine Lines _____ 11. Hot CoCo
 _____ 4. The Art of Programming _____ 8. Reader Forum
- L. If you are not a subscriber, please circle 500.
- M. If you would like a one year subscription to 80 Micro, please circle 501 on the Reader Service Card. Each subscription costs \$24.97, (Canada & Mexico \$27.97, Foreign Surface \$44.97, one year only). Please allow 10-12 weeks for delivery.

Reader Service: To receive more information from any of the advertisers in this issue, circle the number of the Reader Service Card that corresponds with the Reader Service number on the ad in which you are interested. You will find numbers. Complete the entire card, stamp and drop into a mailbox. In 4-6 weeks you will hear from the advertiser directly.

1 6 11 16 21	151 156 161 166 171	301 306 311 316 321	451 456 461 466 471
2 7 12 17 22	152 157 162 167 172	302 307 312 317 322	452 457 462 467 472
3 8 13 18 23	153 158 163 168 173	303 308 313 318 323	453 458 463 468 473
4 9 14 19 24	154 159 164 169 174	304 309 314 319 324	454 459 464 469 474
5 10 15 20 25	155 160 165 170 175	305 310 315 320 325	455 460 465 470 475
26 31 36 41 46	176 181 186 191 196	326 331 336 341 346	476 481 486 491 496
27 32 37 42 47	177 182 187 192 197	327 332 337 342 347	477 482 487 492 497
28 33 38 43 48	178 183 188 193 198	328 333 338 343 348	478 483 488 493 498
29 34 39 44 49	179 184 189 194 199	329 334 339 344 349	479 484 489 494 499
30 35 40 45 50	180 185 190 195 200	330 335 340 345 350	480 485 490 495 500
51 56 61 66 71	201 206 211 216 221	351 356 361 366 371	501 506 511 516 521
52 57 62 67 72	202 207 212 217 222	352 357 362 367 372	502 507 512 517 522
53 58 63 68 73	203 208 213 218 223	353 358 363 368 373	503 508 513 518 523
54 59 64 69 74	204 209 214 219 224	354 359 364 369 374	504 509 514 519 524
55 60 65 70 75	205 210 215 220 225	355 360 365 370 375	505 510 515 520 525
76 81 86 91 96	226 231 236 241 246	376 381 386 391 396	526 531 536 541 546
77 82 87 92 97	227 232 237 242 247	377 382 387 392 397	527 532 537 542 547
78 83 88 93 98	228 233 238 243 248	378 383 388 393 398	528 533 538 543 548
79 84 89 94 99	229 234 239 244 249	379 384 389 394 399	529 534 539 544 549
80 85 90 95 100	230 235 240 245 250	380 385 390 395 400	530 535 540 545 550
101 106 111 116 121	251 256 261 266 271	401 406 411 416 421	551 556 561 566 571
102 107 112 117 122	252 257 262 267 272	402 407 412 417 422	552 557 562 567 572
103 108 113 118 123	253 258 263 268 273	403 408 413 418 423	553 558 563 568 573
104 109 114 119 124	254 259 264 269 274	404 409 414 419 424	554 559 564 569 574
105 110 115 120 125	255 260 265 270 275	405 410 415 420 425	555 560 565 570 575
126 131 136 141 146	276 281 286 291 296	426 431 436 441 446	576 581 586 591 596
127 132 137 142 147	277 282 287 292 297	427 432 437 442 447	577 582 587 592 597
128 133 138 143 148	278 283 288 293 298	428 433 438 443 448	578 583 588 593 598
129 134 139 144 149	279 284 289 294 299	429 434 439 444 449	579 584 589 594 599
130 135 140 145 150	280 285 290 295 300	430 435 440 445 450	580 585 590 595 600

Name _____ Title _____

Address _____

City _____ State _____ Zip _____

Telephone () _____

80micro

October 1986 10

READER SERVICE

This card valid until November 30, 1986

- A. How would you describe your interest in MS-DOS, IBM Compatible Systems?
 1. I own an MS-DOS, IBM compatible system. 3. I'm interested but have no immediate plans to purchase.
 2. I intend to purchase. 4. Not interested.
- B. On a scale of 1 (no interest) to 5 (great interest), please rate your interest in seeing the following types of programs published in 80 Micro:
 _____ 1. Business applications _____ 4. Money management applications
 _____ 2. Science/math applications _____ 5. Games
 _____ 3. Home management applications _____ 6. Programming Utilities
- C. Excluding yourself, how many people read your copy of 80 Micro?
 1. One 3. Three 5. Five or more
 2. Two 4. Four
- D. What type of TRS-80/Tandy Computer do you own? Check all that apply.
 1. Model I 6. Model 16/16B/6000 11. Model 2000
 2. Model II/12 7. Model 100/200 12. Model 3000
 3. Model III 8. Model 600
 4. Model 4/4P/4D 9. Model 1000
 5. Model 4D 10. Model 1200
- E. How long have you owned your TRS-80/Tandy Computer?
 1. Less than 1 year 4. 3-4 years
 2. 1-2 years 5. More than 4 years
 3. 2-3 years
- F. Do you subscribe to an information utility, such as CompuServe, Dow Jones News Retrieval, etc.?
 1. Yes 2. No 3. Not now, but intend to within 12 months.
- G. Do you plan to purchase another TRS-80/Tandy Computer during the next 12 months?
 1. Yes 2. No 3. Don't know
- H. Where do you use your TRS-80/Tandy Computer? Check all that apply.
 1. At home for pleasure 4. At school
 2. At home for business 5. For math/science applications in any location
 3. At work
- I. The articles in 80 Micro are:
 1. Too simple 2. Too complex 3. Just right
- J. How many purchases have you made based on an ad you saw in 80 Micro?
 1. 0 2. 1-3 3. 4 or more
- K. Which of the following columns do you read? Please rate them on a scale of 1 (seldom read) to 5 (always read).
 _____ 1. Slide Tracks _____ 5. The Next Step _____ 9. Reviews
 _____ 2. Feedback Loop _____ 6. Dave's MS-DOS Column _____ 10. New Products
 _____ 3. Pulse Train _____ 7. Fine Lines _____ 11. Hot CoCo
 _____ 4. The Art of Programming _____ 8. Reader Forum
- L. If you are not a subscriber, please circle 500.
- M. If you would like a one year subscription to 80 Micro, please circle 501 on the Reader Service Card. Each subscription costs \$24.97, (Canada & Mexico \$27.97, Foreign Surface \$44.97, one year only). Please allow 10-12 weeks for delivery.

Reader Service: To receive more information from any of the advertisers in this issue, circle the number of the Reader Service Card that corresponds with the Reader Service number on the ad in which you are interested. You will find numbers. Complete the entire card, stamp and drop into a mailbox. In 4-6 weeks you will hear from the advertiser directly.

1 6 11 16 21	151 156 161 166 171	301 306 311 316 321	451 456 461 466 471
2 7 12 17 22	152 157 162 167 172	302 307 312 317 322	452 457 462 467 472
3 8 13 18 23	153 158 163 168 173	303 308 313 318 323	453 458 463 468 473
4 9 14 19 24	154 159 164 169 174	304 309 314 319 324	454 459 464 469 474
5 10 15 20 25	155 160 165 170 175	305 310 315 320 325	455 460 465 470 475
26 31 36 41 46	176 181 186 191 196	326 331 336 341 346	476 481 486 491 496
27 32 37 42 47	177 182 187 192 197	327 332 337 342 347	477 482 487 492 497
28 33 38 43 48	178 183 188 193 198	328 333 338 343 348	478 483 488 493 498
29 34 39 44 49	179 184 189 194 199	329 334 339 344 349	479 484 489 494 499
30 35 40 45 50	180 185 190 195 200	330 335 340 345 350	480 485 490 495 500
51 56 61 66 71	201 206 211 216 221	351 356 361 366 371	501 506 511 516 521
52 57 62 67 72	202 207 212 217 222	352 357 362 367 372	502 507 512 517 522
53 58 63 68 73	203 208 213 218 223	353 358 363 368 373	503 508 513 518 523
54 59 64 69 74	204 209 214 219 224	354 359 364 369 374	504 509 514 519 524
55 60 65 70 75	205 210 215 220 225	355 360 365 370 375	505 510 515 520 525
76 81 86 91 96	226 231 236 241 246	376 381 386 391 396	526 531 536 541 546
77 82 87 92 97	227 232 237 242 247	377 382 387 392 397	527 532 537 542 547
78 83 88 93 98	228 233 238 243 248	378 383 388 393 398	528 533 538 543 548
79 84 89 94 99	229 234 239 244 249	379 384 389 394 399	529 534 539 544 549
80 85 90 95 100	230 235 240 245 250	380 385 390 395 400	530 535 540 545 550
101 106 111 116 121	251 256 261 266 271	401 406 411 416 421	551 556 561 566 571
102 107 112 117 122	252 257 262 267 272	402 407 412 417 422	552 557 562 567 572
103 108 113 118 123	253 258 263 268 273	403 408 413 418 423	553 558 563 568 573
104 109 114 119 124	254 259 264 269 274	404 409 414 419 424	554 559 564 569 574
105 110 115 120 125	255 260 265 270 275	405 410 415 420 425	555 560 565 570 575
126 131 136 141 146	276 281 286 291 296	426 431 436 441 446	576 581 586 591 596
127 132 137 142 147	277 282 287 292 297	427 432 437 442 447	577 582 587 592 597
128 133 138 143 148	278 283 288 293 298	428 433 438 443 448	578 583 588 593 598
129 134 139 144 149	279 284 289 294 299	429 434 439 444 449	579 584 589 594 599
130 135 140 145 150	280 285 290 295 300	430 435 440 445 450	580 585 590 595 600

Name _____ Title _____

Address _____

City _____ State _____ Zip _____

Telephone () _____

80micro

October 1986 10

PLACE
STAMP
HERE

80 Micro
P.O. Box 306
Dalton, MA 01227

PLACE
STAMP
HERE

80 Micro
P.O. Box 306
Dalton, MA 01227

Listing continued

```

32,3,129,3,39,16,182,124,238
134# DATA138,2,183,124,238,246,1
24,239,2#2,4,247,124,239,23#164
,196
135# DATA48,193,48,38,24,166,132
,132,48,129,48,39,16,182,124,238
136# DATA138,16,183,124,238,246,
124,239,2#2,8,247,124,239,166,13
2,23#
137# DATA164,132,24,129,24,38,7#
,196,24,193,24,39,64,23#164,196
138# DATA6,193,6,38,24,166,132,1
32,6,129,6,39,16,182,124,238
139# DATA138,4,183,124,238,246,1
24,239,2#2,8,247,124,239,23#164
,196
140# DATA96,193,96,38,24,166,132
,132,96,129,96,39,16,182,124,238
141# DATA138,32,183,124,238,246,
124,239,2#2,16,247,124,239,166,1
32,23#
142# DATA164,132,48,129,48,38,7#
,196,48,193,48,39,64,23#164,196
143# DATA12,193,12,38,24,166,132
,132,12,129,12,39,16,182,124,238
144# DATA138,8,183,124,238,246,1
24,239,2#2,16,247,124,239,23#16
4,196
145# DATA64,193,64,38,24,166,132
,132,64,129,64,39,16,182,124,238
146# DATA38,64,183,124,238,246,
124,239,2#2,32,247,124,239,166,1
32,23#
147# DATA164,132,64,129,64,38,38
,196,64,193,64,39,32,23#164,196
148# DATA48,193,48,38,24,166,132
,132,48,129,48,39,16,182,124,238
149# DATA138,32,183,124,238,246,
124,239,2#2,64,247,124,239,166,1
32,23#
150# DATA164,132,96,129,96,38,38
,196,96,193,96,39,32,23#164,196
151# DATA24,193,24,38,24,166,132
,132,24,129,24,39,16,182,124,238
152# DATA138,16,183,124,238,246,
124,239,2#2,247,124,239,23#164
,117
153# DATA182,124,238,141,1#5,182
,124,239,141,1#5,48,1,49,33,16,1
4#
154# DATA126,255,16,38,253,2#7,1
66,164,141,84,134,13,173,159,16#
,2
155# DATA142,125,255,16,142,125,
255,166,128,167,16#149,125,255,
37,247
156# DATA142,124,255,16,142,125,
255,166,128,167,16#149,125,255,
37,247
157# DATA182,124,228,76,124,124,
235,183,124,228,129,2,39,11,182,
124
158# DATA225,139,3,183,124,225,1
26,12#184,127,124,228,182,124,2
25,139
159# DATA4,183,124,225,182,124,2
35,129,55,16,38,252,152,57,139,1
28
160# DATA173,159,16#2,2,57,166,13
2,23#164,132,96,196,96,129,96,3
8
161# DATA38,193,96,38,3,126,121,
27,23#169,255,#196,3,193,3
162# DATA38,53,23#137,255,#196
,3,193,3,39,43,246,124,239,2#2
163# DATA64,247,124,239,126,21#2
27,193,96,38,28,23#137,255,#19
6
164# DATA3,193,3,38,18,166,169,2
55,#132,3,129,3,39,8,182
165# DATA124,238,138,64,183,124,
238,166,132,23#164,132,3,196,3,
129
166# DATA3,38,193,3,38,3,126,1
21,1#9,23#169,1,#196,96
167# DATA193,96,38,53,23#137,1,
#196,96,193,96,39,43,246,124
168# DATA239,2#2,1,247,124,239,1
26,121,1#9,193,3,38,28,23#137,1
169# DATA#196,96,193,96,38,18,1
66,169,1,#132,96,129,96,39
170# DATA#182,124,238,138,1,183
,124,238,57
171# FORI=#H7543 TO #H796D:READA
:POKEI,A:NEXT
172# POKE12#4#
173# CLS:PRINT#12,"GRAFLOT":PRI
NT:PRINT" BY: MILTON T. SIMPS
ON":PRINT"*****ACKNOWLEDGEMEN
T*****"
174# PRINT" THE TEXT ROUTINE
USED IN THIS PROGRAM IS A SLI
GHLY MODI-FIED VERSION OF 'UNFO
RGETTABLE CHARACTERS' BY MR. WI
LLIAM BARDEN, JR., WHICH WA
S PUBLISHED IN THE NOVEMBER AND D
ECEMBER, 1983 ISSUES OF 'THE C
OLOR COMPU-TER' MAGAZINE."
175# PRINT"*****"
*****:PRINT"DO YOU NEED I
NSTRUCTIONS? (Y/N)"
176# AS=INKEY$
177# IFAS="N"THEN187#
178# IFAS<"Y"THEN176#
179# CLS:PRINT#6,"TEXT INSTRUCTI
ONS":PRINT
180# PRINT" USE SHIFT FOR UPPER
/LOWER CASE TO BACKSPACE 1 CHARA
CTER, PRESS LEFT ARROW
:PRINT" TO SKIPSPACE 1 CHARACTER
PRESS SPACEBAR":PRINT
" TO MOVE CURSOR DOWN 1 LINE,
PRESS DOWN ARROW"
181# PRINT" TO MOVE CURSOR UP 1
LINE, PRESS UP ARROW":P
RINT" TO MOVE DOWN 1/10 LINE (TO
SUB-SCRIPT / END SUPERSCRIP
T), PRESS SHIF DOWN ARROW"
182# GOSUB526#
183# CLS:PRINT" TO MOVE CURSOR U
P 1/10 LINE (TO SUPERSCRIP/E
ND SUBSCRIPT), PRESS SHIF T
UP ARROW"
184# PRINT" TO ADVANCE 1/5 CHARA
CTER, PRESS RIGHT ARROW
":PRINT" TO START UNDERLINE,
PRESS SHIF RIGHT AR
ROW":PRINT" TO END UNDERLINE,
PRESS SHIF LEFT
ARROW"
185# PRINT" EACH CHARACTER IS 5
DOTS WIDE. YOU SELECT THE CHARA
CTER SPAC-ING BY ENTERING THE
NUMBER OF BLANK DOTS YOU WANT
BETWEEN CHARACTERS, PLUS 5.
COMMON SPACINGS: 6,7,8"
186# GOSUB526#
187# DIMH(256),B(13),P(13),N$(13
),D(13),M$(13),SS(3)
188# DEFUSR#=#H747#
189# PMODE4,1
190# SCREEN#
191# C=#:CLS:PRINT#39,"GRAFLOT
MAIN MENU":PRINT:PRINT" TO COPY
ONTO PRINTER ENTER 1 TO VIEW
SCREEN ENTER 2"
192# PRINT" TO ENTER GRAPH DATA
ENTER 3 "
193# PRINT:PRINT" TO PRINT TEXT
ENTER 4"
194# PRINT" TO CLEAR THE SCREEN
ENTER 5 TO LOAD A SAVED GRA
PH ENTER 6"
195# PRINT:PRINT" TO SAVE A GRAP
H ENTER 7"
196# PRINT:PRINT" PRESS <CLEAR>
TO RETURN HERE."
197# PRINT" ENTER YOUR CHO
ICE "
198# CS=INKEY$
199# IFCS=" "THEN198#
200# C=VAL(CS)
201# IFC<10OR C>7THEN198#
202# ONC GOTO#3#5,216#2,19#226#
,3#4#4,45#5,455#
203# CLS:PRINT"TURN PRINTER SW#3
OFF"
204# GOSUB526#
205# POKE15#4#
206# PRINT#-2,CHR$(27);CHR$(2#)+
CHR$(18)
207# SCREEN1,1
208# EXCB#H7543
209# SCREEN#
210# PRINT"
211# CLS
212# PRINT"TURN PRINTER SW#3 ON"
2125 POKE15#87
213# GOSUB526#
214# PRINT#-2,CHR$(3#)
215# GOTOL9#
216# SCREEN1,1
217# AS=INKEY$:IFAS=" "THEN217#
218# GOTOL9#
219# CLS:PRINT#33,"GRAPHLOT GRA
PH SELECTION MENU":PRINT:PRINT"
TO ENTER BARGRAPH DATA ENTER 1
TO ENTER LINGRAPH DATA ENTER 2"
220# PRINT:PRINT" TO ENTER CUMGR
APH DATA ENTER 3 TO ENTER PIEGR
APH DATA ENTER 4"
221# PRINT" ENTER YOUR CHO
ICE "
222# CS=INKEY$
223# IFCS=" "THEN222#
224# C=VAL(CS)
225# ONC GOTO#3#5#5,317#3,31#3,368
#
226# X=#:Y=#
227# CLS:INPUT"ENTER THE CHARACT
ER WIDTH (SPAC-ING) YOU WANT TO
USE";W:SCREEN1,1
228# AS=INKEY$
229# IFAS=CHR$(12)THEN19#
230# IFAS=CHR$(8)THEN44#
231# IFAS=CHR$(32)THEN432#
232# IFAS=CHR$(1#)THEN436#
233# IFAS=CHR$(9#)THEN44#
234# IFAS=CHR$(91)THENY=Y+1:GOTO
228#
235# IFAS=CHR$(95)THENY=Y-1:GOTO
228#
236# IFAS=CHR$(9)THEN X=X+1:GOTO
228#
237# IFAS=CHR$(93)THENL=1:GOTO22
8#
238# IFAS=CHR$(21)THENL=#:GOTO22
8#
239# N=1:GOSUB25#
240# N=#:GOSUB25#
241# IFAS=" "THEN228#
242# GOSUB24#
243# GOTOA43#
244# N=ASC(AS)
245# IFN=32THENN=#
246# IFN=#8ANDN=<1#THENN=N-6
247# IFN=>33ANDN=<9#THENN=N-28
248# IFN=94THENN=63
249# IFN=>97ANDN=<122THENN=N-33
250# POKE#H74F#N,POKE#H74F1,X
251# POKE#H74F2,Y:POKE#H74F7,W
252# POKE#H74F3,113:POKE#H74F4,#
253# POKE#H74F5,14:POKE#H74F6,#
254# A=USR#(#)
255# IFL=1THEN POKE(3584+(Y+8)*3
2+INT(X/8)),255
256# RETURN
257# CLS:PRINT:INPUT"ENTER THE N
UMBER OF VERTICAL DI-VISIONS YOU
WANT ON THE GRAPH 12 MAX";A
258# IFA=12THEN257#
259# IN=C/A
260# VV=IN*(-1)
261# W=6
262# A=1#/#A
263# SCREEN1,1
264# VS=1
265# IFC=1#THEN VS=1#
266# IFC=1#THEN VS=1#
267# IFC=1#THEN VS=1#
268# IFC=1#THEN VS=1#
269# IFC=1#THEN VS=1#
270# FORZ=156TO56STEP -A
271# VV=VV+IN:Y=Z-3
272# NS=STR$(VV/VS)
273# L=LEN(NS)
274# IFL>5THENL=5
275# FORK=1TO L-1
276# AS=MID$(NS,K+1)
277# X=44-L*6+(K-1)*6:GOSUB24#
278# IFC=5THEN28#
279# NEXT
280# IFLC=1THEN28#
281# FORU=1TONN
282# X=46+INT((U-.5)*2#/#NN)
283# LINE(X+1,Z)-(X-1,Z),PSET
284# LINE(X,Z+1)-(X,Z-1),PSET
285# NEXT
286# LINE(44,Z)-(47,Z),PSET
287# PSET(254,Z)
288# GOTO29#
289# LINE(45,Z)-(255,Z),PSET
290# NEXT
291# LINE(46,56)-(255,156),PSET,
2#
292# GOSUB49#
293# SCREEN# INPUT"ENTER Y UNITS
16 CHARACTERS MAX";E$
294# P=LEN(E$):IFP>16THEN293#
295# SCREEN1,1:E$="X"+STR$(VS)+
" "+E$
296# P=LEN(E$):Q=P/2
297# X#
298# FORY=96-Q*8TO95+Q*8STEP8
299# AS=LEF$(E$,1)
300# P=P-1:E$=RIGHT$(E$,P)
301# GOSUB24#
302# NEXT
303# GOTOL9#
304# PCLS:GOTOL9#
305# LC=1:GOSUB461#GOSUB48#
306# GOSUB48#
307# R=#:W=6
308# GOSUB48#
309# B=156-B
310# SCREEN1,#
311# FORI=X TO X+3
312# LINE(I,B)-(I,156),PSET
313# NEXT
314# Y=158:GOSUB361#
315# IFR=NN GOTO257#
316# GOTO3#8#
317# LC=2:GOSUB461#GOSUB48#
318# GOSUB48#
319# R=#:W=6:K=#
320# GOSUB48#
321# Y=156-B
322# IFC<>#THEN327#
323# LINE-(X,Y),PSET
324# PSET(X,Y)
325# K=K+1
326# GOTO32#8#
327# LINE-(X,Y),PSET
328# Y=158:GOSUB361#
329# IFR=NN THEN52#
330# GOTO3#6#
331# LC=1:GOSUB461#GOSUB48#
332# R=#:W=6:C=#
333# FORJ=1TO NN
334# PRINT"TO END DATA ENTRY EN
TER (999,)#"
335# PRINT"ENTER DATA ID AND DAT
A"
336# XL=4:IFNN>6THEN XL=3
337# IFNN>8THENXL=2
338# PRINT"ID IS LIMITED TO";XL;
"CHARACTERS"
339# INPUTM$(J),B(J)
340# M=LEN(M$(J))
341# IFM>XL THEN CLS:PRINT"DATA
ID LIMITED TO";XL;"CHAR.":GOTO33
4#
342# C=C+B(J)
343# IFM$(J)="999"THENL=J-ELSE
L=J
344# IFM$(J)="999"THEN348#
345# P(J)=P(J-1)+B(J)
346# PRINT"NN=";NN
347# IFR=NN THEN348#
348# NEXT
349# SCREEN1,1:FORJ=1TO L
349# IFNN<3THEN X=INT((J-.5)*26
/NN)
350# IFNN>3AND NN<7THENX=(J-.5)*
(1#-NN)+1
351# IFNN>8THENX=J*2+12-NN
352# IFNN>7OR NN=8THENX=J*3+8-NN
353# T=INT((156-1#*B(J)/P(L))
354# CC=INT((156-1#*P(J)/P(L))
355# FORY=T TO156:POKE(3589+Y*32
+X),1#
356# FORY=CC TO156:POKE(359#Y*3
2+X),24#
357# X=X*8+46
358# NS=M$(J):Y=158:GOSUB361#
359# NEXT
360# GOTO257#
361# X=X-M*/2
362# FORK=1TOM
363# AS=MID$(NS,K)
3635 IFAS=" "THEN366#
364# GOSUB24#
365# X=X+M
366# NEXT
367# RETURN
368# GOSUB461#GOSUB49#GL=#:GC
=#:DT=#:CLS:PRINT"YOU MAY CHART
DATA FOR UP TO 13 ITEMS. EACH I
TEM'S NAME MUST BE 6 CHARACTERS
AND SPACES LONG."
369# FORJ=1TO13
370# PRINT:PRINT"TO END DATA ENT
RY ENTER <END,)#"
371# INPUT"ENTER THE NAME OF AN
ITEM AND IT'S DATA (NAME,DATA)"
<ENTER> ";N$(J),D(J)
372# IFN$(J)="END"THENN$(J)="":G
OTO376#
373# DT=DT+D(J)
374# H=J
375# NEXT
376# CIRCLE(128,96),6#1,.75
377# LINE(128,96)-(188,96),PSET
378# SCREEN1,1
379# FORJ=1TO H
380# P(J)=D(J)/DT
381# PI=3.141592653
382# G=P(J)*2*PI
383# GC=GL+G/2
384# GL=GL+G
385# IFGL=>6.28THEN387#
386# LINE(128,96)-(128+6#*COS(GL
),96-45#*SIN(GL)),PSET
387# XF=128+77#*COS(GC):YF=96-55#
SIN(GC)
388# LINE(128+6#*COS(GC),96-45#*
SIN(GC))-(XF,YF),PSET
389# Y=YF-8
390# V=LEN(N$(J))

```

Listing continued

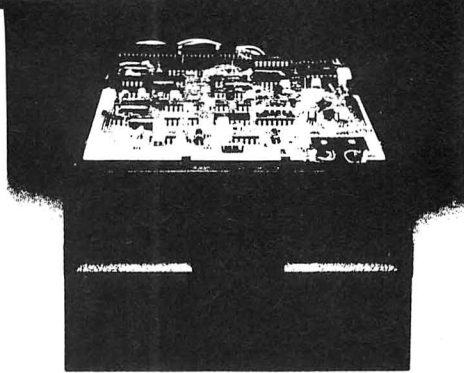
NEW DISK DRIVES

STARTING AT

\$ 89.⁹⁵

**WITH CASE &
POWER SUPPLY**

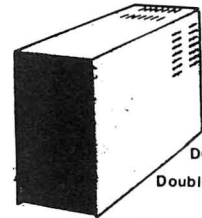
\$129.95



TANDON MPI TEAC

Speed 6 ms tk to tk and up
Capacity 250k unformatted
Tracks 40
Warranty **now 1 YEAR**

New Low Price!



40 Tks 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 & WARRANTEED

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) ^{Tracks 40} **\$119.95**

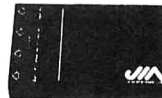
1/2 ht double sided double density Disk Drive with ps & case ^{Tracks 40} ~~\$199.95~~ **CALL**



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 5 MS 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 ^{10 Diskettes} **\$17.95**

Unadvertised Specials **\$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)

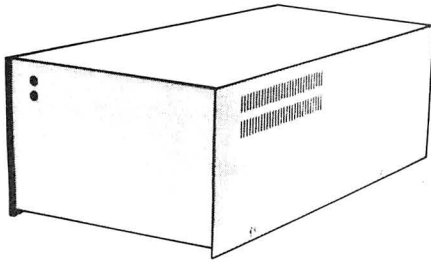
We welcome

- 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 ⁹⁵
10 MEG HD SYSTEM	599 ⁹⁵
20 MEG HD SYSTEM	799 ⁹⁵



HARD DRIVE SYSTEMS READY TO RUN ON THE TRS 80 MODEL 1/III/IV/4P AND COLOR COMPUTER

TANDY CORNER

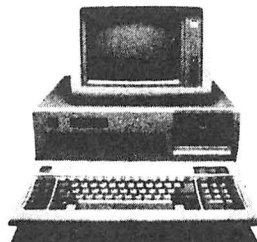
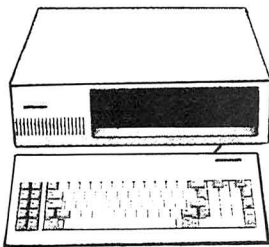
New Multifunction Card	Call
Clock/Calendar Option	39 ⁹⁵
256K Memory Board	99 ⁹⁵
512K Memory Board	139 ⁹⁵
10 MEG Kit	359 ⁹⁵
20 MEG Kit	429 ⁹⁵

PRINTERS

STAR LV1200	199 ⁹⁵
STAR NX10	239 ⁹⁵
Panasonic 1091	239 ⁹⁵
Panasonic 1092	359 ⁹⁵
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 469⁹⁵

AT System

AT Case
80826 (8Mhz)
200 Watt PS
640K
1.2Meg Floppy
Floppy & HD Controller

Only 1495⁹⁵

Baby AT System

AT Case
8088 Turbo
150 Watt PS
AT Style Keyboard
360K Floppy
256K expandable to 640K

Only 499⁹⁵



TRUE DATA PRODUCTS

9 S. Main
Uxbridge, MA 01569



**CALL US TODAY!!
ORDER TOLL FREE**

**(617) 278-6555
1-800-635-0300**

Listing continued

```

391Ø IPGC>.5*PI AND GC<1.5*PI TH Ø)
EN427Ø
392Ø LINE-(XF+5,YF),PSET
393Ø X=INT(XF+5)+1
394Ø IFX>2Ø8THENX=2Ø8
395Ø XK=X
396Ø GOSUB4Ø1Ø
397Ø X=XK
398Ø GOSUB4Ø8Ø
399Ø IFJ=H THEN191Ø
4ØØ NEXTJ
4Ø1Ø FORI=1TO V
4Ø2Ø AS=MIDS(NS(J),I,1)
4Ø3Ø IFAS=CHRS(32)THENN=Ø:GOSUB2
5ØØ:GOTO4Ø5Ø
4Ø4Ø GOSUB244Ø
4Ø5Ø X=X+8
4Ø6Ø NEXTI
4Ø7Ø RETURN
4Ø8Ø Y=Y+1Ø
4Ø9Ø P=1ØØ*P(J)
41ØØ IPP<1THEN418Ø
411Ø IPP<1ØTHEN415Ø
412Ø N=2Ø+INT(P/1Ø)
413Ø GOSUB25ØØ
414Ø X=X+8
415Ø N=2Ø+INT(P-1Ø*INT(P/1Ø))
416Ø GOSUB25ØØ
417Ø X=X+8
418Ø N=18:GOSUB25ØØ:X=X+8
419Ø N=2Ø+INT((P-INT(P))*1Ø)
42ØØ GOSUB25ØØ:X=X+8
421Ø N=2Ø+INT((1Ø*P-INT(1Ø*P))*1
422Ø GOSUB25ØØ
423Ø X=X+8
424Ø N=9
425Ø GOSUB25ØØ
426Ø RETURN
427Ø LINE-(XF-5,YF),PSET
428Ø X=XF-(V+1.25)*8
429Ø IFX<ØTHENX=Ø
43ØØ GOTO395Ø
431Ø GOTO191Ø
432Ø X=X+W:IFX<256-W THEN228Ø
433Ø X=Ø:Y=Y+1Ø
434Ø IFY>181THENY=Ø
435Ø GOTO228Ø
436Ø Y=Y+1Ø:IFY<181THEN228Ø
437Ø Y=Ø:X=X+W
438Ø IFX>255THENX=Ø
439Ø GOTO228Ø
44ØØ Y=Y-1Ø:IFY>-1THEN228Ø
441Ø Y=18Ø:X=X-W
442Ø IFX<ØTHENX=256-W
443Ø GOTO228Ø
444Ø N=Ø
445Ø GOSUB25ØØ
446Ø X=X-W:IFX>-1THEN228Ø
447Ø IFW<>8THENX=252-W ELSEX=248
-W
448Ø Y=Y-1Ø:IFY<ØTHENY=181
449Ø GOTO228Ø
45ØØ CLS
451Ø PRINT:INPUT"ENTER THE NAME
OF THE GRAPH ";NS
452Ø PCLS:PMODE4,1:SCREEN1,1
453Ø LOADM NS
454Ø GOTO191Ø
455Ø CLS
456Ø PRINT:INPUT"ENTER THE NAME
OF THE GRAPH ";NS:PRINT
457Ø SAVEM NS,3584,9728,Ø
458Ø PRINT" THE NAME OF THE GRA
PH IS ";NS
459Ø INPUT"PRESS <ENTER> TO CONT
INUE";AS
46ØØ GOTO191Ø
461Ø CLS:PRINT" ENTER THE TITLE
OF THE GRAPH. YOU MAY USE 3 LI
NES."
462Ø FORK=1TO3
463Ø PRINT"ENTER LINE NO.";K;" -
Ø" CHAR MAX"
464Ø LINEINPUTS$(K)
465Ø IF LEN(S$(K))>4ØTHEN463Ø
466Ø NEXT
467Ø IFC<>4THEN Y=6ELSE Y=2
468Ø W=6:FORK=1TO3
469Ø ES=S$(K)
47ØØ IPES=""THEN477Ø
471Ø P=LEN(ES):Q=P/2
472Ø FORX=125-Q*6TO119+Q*6STEP6
473Ø AS=LEP$(ES,1)
474Ø GOSUB244Ø
475Ø P=P-1:ES=RIGHT$(ES,P)
476Ø NEXT
477Ø IFC<>4THEN Y=Y+12ELSE Y=Y+1
478Ø NEXT
479Ø RETURN
48ØØ CLS:K=Ø:PRINT"YOU MAY PLOT
A GRAPH FOR UP TO 13 ITEMS."
481Ø PRINT:INPUT"ENTER THE NUMBE
R OF ITEMS YOU WILL GRAPH (1-1
3)";NN
482Ø IFNN>13THEN48ØØ
483Ø RETURN
484Ø PRINT:INPUT"ENTER THE FULL-
SCALE VALUE OF THE GRAPH.";C:R
ETURN
485Ø PRINT"TO END DATA ENTRY ENT
ER (999,Ø)"
486Ø PRINT"ENTER DATA ID AND DAT
A"
487Ø XL=4:IFNN>7THEN XL=3
488Ø IFNN>1ØTHEN XL=2
489Ø PRINT"ID IS LIMITED TO";XL;
"CHARACTERS"
49ØØ INPUTNS,B
491Ø IPNS="999"THEN191Ø
492Ø M=LEN(NS)
493Ø IFM>XL THEN CLS:PRINT"DATA
ID LIMITED TO";XL;"CHAR.":GOTO48
5Ø
494Ø B=1ØØ*B/C
495Ø R=R+1
496Ø X=46+INT((R-.5)*2Ø8/NN)
497Ø IFM>4THENM=4
498Ø RETURN
499Ø FORK=1TO2

```

End

File and Error

by Joe Finamore

When I needed to learn more about disk file structure, I consulted the Color Computer's disk owner's manual, *Color Computer Disk System*. Relying on the manual's comprehensive description of the directory, FAT (file-allocation table), and Basic's powerful `DSKIS` command, I wrote FileDump, a Basic utility that dumps an entire disk file to the screen or printer for further study (see the Program Listing).

FileDump uses information garnered from the directory and FAT to calculate the number of bytes in a file. It then follows the FAT's granule map and prints the hexadecimal (hex) and ASCII values for the appropriate sector(s).

Dump Run

Type in the Listing and run FileDump; the program initializes and displays a

System Requirements

16K RAM
Disk Extended Color Basic
Printer optional

```

64-K /BIN
TRACK- 16 SECTOR- 10
38 BYTES IN FILE
DIRECTORY
36 34 2D 4B 20 20 20 20 42 49 4E 2 0 21 0 26
-----
00 00 1C 7E 00 1A 50 8E 80 00 EC 84 B7 FF DF ED 81 8C E0 00 27 05 B7 FF DE 20
. . . . . P . . . . .
-----
EF 1C AF 39 00 FF 00 FF 00 00 7E 00
. . . . . 9 . . . . .

```

Fig. 1. Sample printout of a machine-language file.

```

TEST /BAS
TRACK- 16 SECTOR- 1
16 BYTES IN FILE
DIRECTORY
54 45 53 54 20 20 20 20 42 41 53 0 0 20 0 10
-----
FF 00 0D 26 0C 00 0A 3A 83 54 45 53 54 00 00 00
. . . . . & . . . . . T E S T . . . . .
-----

```

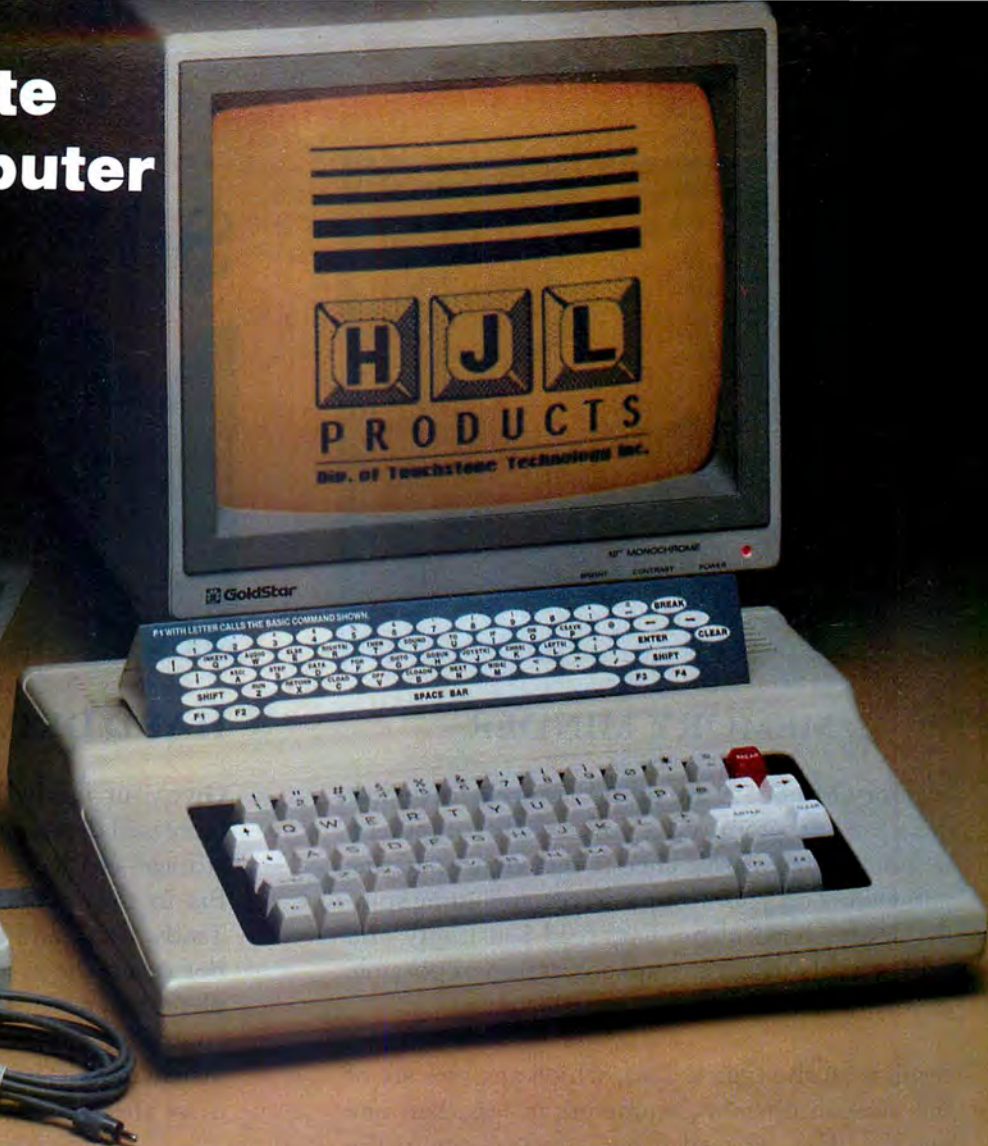
Fig. 2. Sample printout of a Basic program.

menu. When you type F to see a file dump, FileDump asks you choose a printout or screen dump. The next prompt requests the name of the file you want to dump. When you supply a legal file name from your working disk, the dump begins. Press any key to return to the main menu after the dump ends.

Figure 1 shows a dump of a short machine-language program, 64-K/BIN, that enables 64K and copies ROM (read-only memory) to RAM (random-access memory). The top section of the dump displays the file name, the track and sector used, and the number of bytes in the file. The second section is a hexadecimal

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.

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**

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

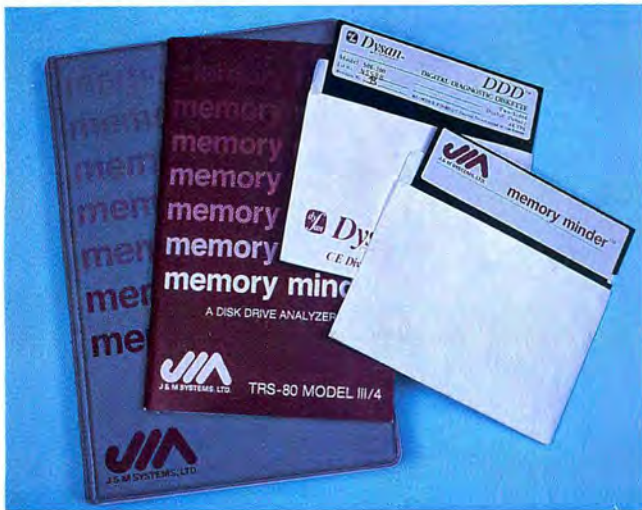


PRODUCTS

Div. of Touchstone Technology Inc.

955 Buffalo Road • P.O. Box 24954
Rochester, New York 14624

Circle 491 on Reader Service card.



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

Program Listing. FileDump.

```

Ø CLEAR1ØØØ
1 CLS:PRINT@5,CHR$(142);STRINGS(
19,14Ø);CHR$(141):PRINT@H25,CHR
$(138);" FILE-DUMP UTILITY ";CHR
$(133):PRINT@H45,CHR$(139);STR
INGS(19,131);CHR$(135):GOSUB9
2 PRINT@HAC,"(F)ILE":PRINT@HEC
,"(S)ECTOR":PRINT@H12C,"(D)IREC
TORY":PRINT@H16C,"(Q)UIT"
3 GOSUB22:F1$=I$
4 IFF1$="P"ORF1$="S"ORF1$="D"THE
NELSEIFF1$="Q"THENENDELSE3
5 CLS:PRINT@HAC,"(S)CREEN":PRIN
T@HEC,"(P)RINTER"
6 GOSUB22:F2$=I$:IFF2$="S"THENDV
=ØELSEIFF2$="P"THENDV=-2ELSE6
7 IFF1$="S"THEN23ELSEIFF1$="D"TH
EN4ELSE1Ø
8 CLS:PRINT@26Ø,"**** INVALID IN
PUT ****"
9 PORT=1TO2ØØØ:NEXT:RETURN
1Ø CLS:INPUT"FILENAME":FF$:IFFF$
=" "THEN1ØELSEFF$=FF$+STRINGS(7,3
2):FF$=LEFT$(FF$,8)
11 FORX=1TO8:IFMIDS$(FF$,X,1)=":
ORMIDS$(FF$,X,1)=":ORMIDS$(FF$,X
,1)=":THENX=8:NEXT:GOSUB8:GOTO1Ø
ELSENEXT
12 CLS:INPUT"EXTENSION":EX$:IFEX
$=" "THEN12ELSEEX$=EX$+" ":EX$=L
EFT$(EX$,3)
13 CLS:PRINT"DRIVE #":GOSUB22:IF
F1$<"Ø"ORIS">"3"THEN13ELSESDN=VAL(
I$):CLS
14 FF$=FF$+EX$:FORCS=3TO11:DSKI$
DN,17,CS,AS,BS:AS=AS+LEFT$(BS,11
2)
15 FOROF=ØTO24ØSTEP32:IFFF$=MIDS
$(AS,OF+1,11)THENNM$=MIDS$(AS,OF+1
,16):GOTO17
16 NEXTOF,CS:PRINT"FILE ";LEFT$(
FF$,8);"/":EX$: NOT FOUND IN D
RIVE #":DN:GOSUB9:GOSUB9:GOTO1
17 OF=24Ø:CS=11:NEXTOF,CS:CG=ASC
(MIDS$(NM$,14,1))
18 GOSUB38:GOSUB36:FF$=LEFT$(FF$
,8)
19 PRINT#DV,FF$;"/":EX$:PRINT#DV
,"TRACK-";TK;" SECTOR-";CS:PRI
NT#DV,LN;" BYTES IN FILE"
2Ø PRINT#DV,"DIRECTORY":FORX=1TO
16:PRINT#DV,USING" % ";HEX$(ASC
(MIDS$(NM$,X,1)));NEXT:PRINT#DV,
" ":PRINT#DV," "
21 GOSUB26:GOSUB22:GOTO1
22 IS=INKEY$:IFI$=" "THEN22ELSER
TURN
23 CLS:INPUT"TRACK ";TK:IFTK<ØOR
TK>34THENGOSUB8:GOTO23
24 PRINT:INPUT"SECTOR":CS:IFCS<1
ORCS>18THENGOSUB8:GOTO24
25 LN=256:CLS:PRINT#DV,"TRACK-";
TK;" SECTOR-";CS:GOSUB37:GOSUB
26:GOSUB22:GOTO1
26 IN=1Ø-DV*8:X=Ø:A1$=" "
27 FORXX=1TOLN:IFAS=" "THENIF(XX
AND255)=1THENGOSUB35ELSEAS=BS
28 B1$=LEFT$(AS,1):A1$=A1$+B1$:A
$=RIGHT$(AS,LEN(A$)-1)
29 HX$="Ø"+HEX$(ASC(B1$)):PRINT#
DV," ";RIGHT$(HX$,2);
3Ø X=X+1:IFX=IN ORXX=LN THENX=Ø:
PRINT#DV," "ELSENEXTX
31 FORY=1TOLEN(A1$):B1$=MIDS(A1$
,Y,1):IFB1$<" "ORB1$>"z"THENB1$=
" "
32 PRINT#DV," ";B1$;NEXTY:A1$=
" "
33 PRINT#DV," ":PRINT#DV,STRINGS(
IN*3,"-"):NEXTXX
34 IS=INKEY$:RETURN
35 CS=CS+1:IFCS=1ØORCS=19THENDSK
I$DN,17,2,AS,BS:CG=ASC(MIDS$(AS,C
G+1,1))ELSE37
36 TK=INT(CG/2)-(CG>33):CS=1-(C
G AND1)=1)*9
37 DSKI$DN,TK,CS,AS,BS:RETURN
38 X=CG:LN=(ASC(MIDS$(NM$,15,1))*
256)+ASC(MIDS$(NM$,16,1)):DSKI$DN
,17,2,AS,BS
39 Y=ASC(MIDS$(AS,X+1,1)):IFY<68T
HENLN=LN+6H9ØØ:X=Y:GOTO39
4Ø LN=LN+(Y AND15)-1)*256:RETUR
N
41 POKEH67,((DV+256)AND255):DIR
:GOSUB22:GOTO1

```

End

13 bytes contain the tokenized program: Bytes 1 and 2 are the next-line pointer; bytes 3 and 4 store the line number (00 0A); byte 5 is the ASCII code for a colon (which precedes a remark marker in memory); byte 6 is the token for a remark; bytes 7-10 are the ASCII codes for TEST; byte 11 (00) signifies the end of a line; and bytes 12 and 13 contain the next-line pointer 0000, which signifies the end of the program.

Data file structure is simpler. Data files contain only information pertinent to the file itself. However, the format of the data varies according to the command used to create the document.

For example, if you write a string to a data file, the string appears on the disk file, bracketed within quotation marks and followed by a carriage return (0D hexadecimal [hex]). When you print the same string to a data file, no brackets are used; the file contains only the original ASCII characters. If you print to a data file, all the standard rules of Print or Print Using statements apply. Therefore, no carriage return is appended if the Print statement ends with a semicolon; however, 0D does appear if you don't use a semicolon.

LSET and RESET left- and right-justify text (respectively) in direct-access files within a specified field. Spaces (20 hex) fill the remaining bytes in the field.

I've used FileDump to develop Assembly-language routines that read and write Basic-compatible files, but its applications extend beyond programming. Combined with a disk zapper, for example, FileDump could make it easier to pinpoint and correct errors on glitched disks. ■

Write to Joe Finamore at 1100 S. Cedar, Marshfield, WI 54449. Enclose a self-addressed, stamped envelope for a reply.

dump of the directory entry; the final section gives a byte-by-byte hex translation of the file.

The first byte, 00, designates a non-segmented machine-language file. The next 2 bytes tell the number of program bytes in the file—001C, in this case. The following 2 bytes point to the loading address of the file; the next 28 bytes contain the object code of the machine-

language program. The byte sequence FF 00 00 signals the end of the binary file, which is followed by the file's 16-bit (2-byte) execution address.

The sample printout of the one-line Basic program in Fig. 2 has a different disk file structure. The first byte, FF, labels the file as a Basic file. The next 2 bytes tell the number of bytes in the file—00 0D (decimal 13). The remaining

Doctor ASCII

by Richard E. Esposito

Having technical difficulties? Consult the Doctor for an answer. Due to the volume of mail Doctor ASCII receives, we can't guarantee publication of your query. Please send a self-addressed, stamped envelope with all letters to Doctor ASCII, c/o 80 Micro, 80 Pine St., Peterborough, NH 03458.

Auto Problems

Q: The Tapesix program you printed in June (p. 132) is just what I was looking for. Unfortunately, I couldn't get it to work with Zaxxon. Can you help? (Brian Collins, Waldorf, MD)

A: The problem is that Zaxxon is auto-loading. Tapesix is designed to allow the

CoCo to execute programs of up to 24K that have starting addresses below E00 hexadecimal. This accommodates many machine-language cassette programs for the CoCo.

The only solution for Zaxxon is a detailed disassembly of the code, especially the loader. You can then customize the

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 \$199.95	Monochrome Graphics Card with Printer Port \$79.95	Floppy I/O Card Controls Two Floppy Drives, Serial Port Parallel Port Clock Calendar Game Port \$99.95	Winchester Hard Drive Controller \$134.95	10 Megabyte and 20 Megabyte Drives Complete System Drive Controller, Cables and easy to follow instructions \$349.95 — \$449.95	Color Graphics Card with Printer Port \$94.95	
150 Watt Power Supply \$79.95	Multi Function Card with Space for 384K of Memory, Serial Port, Parallel Port Clock Calendar, Game Port \$79.95	5151 Compatible Keyboard with Separate Cursor and Number Pads \$89.95	Monochrome Monitor with High Resolution Tilt/Swivel Base \$159.95	Floppy Drive Card Control up to Four Drives \$39.95	P.C. DOS 3.1 \$80.00	Flip Top Cabinet with Speaker \$49.95

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

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 **TRS/80** \$ 699.95
 10mb + 5mb removable 949.95
 20mb + 5mb removable 1199.95
 5 megabyte removable 499.95

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
1-617-873-9090

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 iReturn iMaterial iAuthorization 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: 200 Homer Avenue
Ashland, MA 01781
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 (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.

machine-language code. The effort required generally doesn't justify the time spent, unless you are doing it for educational purposes.

Under Control

Q: I purchased a Shugart drive for my CoCo and now need a controller. How many DOSes are compatible with my CoCo? Can you install more than one in the J&M controller? Where can I get information on these and other products for my CoCo? (*Chip Rogers, Aurora, IL*)

A: Many companies market controllers that support more than one ROM-based DOS. J&M Systems (15100-A Central SE, Albuquerque, NM 87123, 505-292-4182) sells the JFD-CP controller. Hard Drive Specialist (16208 Hickory Knoll, Houston, TX 77059, 800-231-6671) also sells a controller.

ADOS (SpectroSystems, 1111 N. Kendall Drive, Miami, FL 33176, 305-274-3899), BDOS (J&R Electronics, P.O. Box 2572, Columbia, MD 21045), JDOS (J&M Systems), and Spectrum DOS (Spectrum Projects, P.O. Box 21272, 93-15 86th Drive, Woodhaven, NY 11421, 718-441-2807) are all ROM-based DOSes. If you choose one of these (with

the possible exception of the highly compatible ADOS), I suggest you also get a copy of Radio Shack's DOS; many commercial software packages for the CoCo won't work with other DOSes.

The two best-supported DOSes for scientific and business software are Flex (Frank Hogg Laboratory, The Regency Tower, Suite 216, 770 James St., Syracuse, NY 13202, 315-474-7856) and OS-9 (Radio Shack catalog no. 26-3030); both are loaded into RAM from disk. A wealth of information is available in Radio Shack's *Software Reference and Tandy Computer Guide*; check ads and reviews in back issues of *HOT CoCo* and in *80 Micro*.

Copy-Protection Woes

Q: I'm having trouble using Deft Pascal with my new Radio Shack controller. Deft has offered to refund my money, but I would prefer to get the software working on my CoCo. Can you help? (*Edward E. Fitzpatrick, Mariposa, CA*)

A: The problem arises from Deft's copy protection on the disk that uses single-density sectors. Radio Shack's newest controller doesn't support this single-density mode.

You'll have to purchase a third-party controller that supports single-density operation.

Identity Crisis

Q: I have a disk-based CoCo with one Radio Shack (drive zero) and one Tandon drive (drive 1). When drive 1 is connected to my system, it works fine, but when I try to use my Radio Shack drive, the indicator light goes on but the head inside the Tandon drive goes back and forth looking for the program or directory. I eventually get an input/output (I/O) error.

If I disconnect or turn off the Tandon drive, drive zero works correctly. What is wrong? (*Ben T. Takemura, Honolulu, HI*)

A: It sounds as if your Tandon drive 1 is configured as Tandon drive zero. When you ask your CoCo to access drive zero, it gets confused because it is talking to two pieces of hardware at the same time. Since it can't handle the confusion, you get an I/O error.

The Tandon's printed circuit board has a jumper. My guess is that this jumper is set to the drive-zero position. If I am right, you can solve the problem by moving the jumper to the drive 1 position.

Circle 199 on Reader Service card.

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.

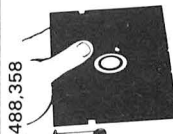
Write for our catalog of books, interface boards, and scientific software.



Trademarks: Tandy 1000, Tandy 2000, TRS-80; Tandy Corp. IBM-PC; IBM Corp.

Circle 281 on Reader Service card.

IT'S LIKE FREE DISKETTES



U.S. PAT. 4,488,358

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!

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¢

\$2190*
ONLY PLUS P&H

**SATISFACTION GUARANTEED
OR YOUR MONEY BACK!**

TOLL FREE 1-800-642-2536

215-527-1553, 9 am-6 pm ET
or send check
or money order to:

nibble notch®
computer products

**ORDER
TODAY**



1020 Ford Rd #2 West
West Conshohocken, PA 19428
215-828-8600

No Joy

Q: My joysticks work fine when I use them one at a time, but when I try to use them together, the values aren't accurate. (Bryan Oswalt, Orange, TX)

A: I assume that you are using the JOYSTK function in Basic. Your Basic loops to poll the joystick can't keep up with the joysticks' movements. The so-

lution is to write these real-time routines in machine language.

Off the Top

Q: I have many pictures that I created using Micropainter when I had a cassette-based CoCo. Now that I have a disk system, I find that the top of each picture gets cut off when I load it from tape. Can I load my pictures correctly and save

them to disk? (Mark Aguiler, St. Petersburg, FL)

A: Extended Color Basic uses memory addresses 1536-7679 for PMODE3 and PMODE4 pictures. Disk Extended Color Basic moves this area to 3584-9727. You can CLOADM your pictures with an offset of 2048 and save them to disk using the proper addresses. ■

Color Monitor

by Scott Norman

A lot of space in Color Monitor has lately been devoted to spreadsheets and integrated software—two subjects that I found endlessly fascinating topics. This month, I'll take a look at another subject dear to my heart: word processing.

Not Quite the Last Word

Mike Bailey's latest effort, The Last Word, is an inexpensive word processor that runs under Microware's OS-9 DOS (disk operating system). I became excited about getting my hands on it when I heard about some of its features.

The Last Word lets you use either the cursor keys or a mouse (or a joystick, if you insist) to select commands from a Macintosh-like menu bar, while still allowing power users to enter keyboard equivalents for many commands. You can also use the mouse to reformat text

80micro

Reader Service

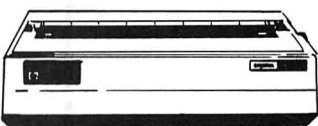
TO RECEIVE MORE INFORMATION ON THE PRODUCTS AND SERVICES IN THIS ISSUE, PLEASE TURN TO READER SERVICE CARD.

Circle 456 on Reader Service card.

PRINTER SALE

We have among the lowest prices in the country on brand name printers.

FEATURED SPECIAL



OKIDATA ML93 \$299 LIST \$699

Features

- 180 cps bidirectional printing
- 40 cps correspondence quality printing (NLQ)
- Enhanced, emphasized and expanded printing
- 136 columns with standard characters
- 233 columns with condensed characters
- 183 columns with twelve pitch
- 9-pin, long-life 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
- 8 and 8 line per inch vertical spacing
- 12-channel electronic VFU (Vertical Format Unit) for extensive format controls
- 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	NX10	\$449	\$269	P760	\$895	\$599
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	799	569	SD10	449	349			
LQ-800	799	549	SD15	599	469	HR-25	695	469
LQ-1000	995	699	SR10	649	499	HR-35	995	699
DX-10	299	249	SR15	799	599	2024L	1295	809
DX-35	899	649	SB10	799	549	Twin 5	1295	849
SQ-2000	2395	1599	NB15	1449	1049	M1509	499	349
420I	2195	1439	P.Type	499	329			

Okidata	List	Sale	C.itech	List	Sale	Brother	List	Sale
ML-182	299	239	ProWtr.	329	239	HR-25	695	469
ML-182S	359	279	8510SP	499	339	HR-35	995	699
ML-83	549	359	8510SCP	649	469	2024L	1295	809
ML-183	549	389	8510SR	629	439	351P	1549	1059
ML-192	499	369	1550SCP	899	599	341 Trac	149	119
ML-192S	578	439	1550SP	749	499	321 Trac	99	89
ML-93	699	299	1550SCR	949	619			
ML-292*	589	459	1550SR	849	549			
ML-293*	789	599	C310	599	419			
*Intfc.	110	69	24LPQ	1295	799			
			Y10-20	549	389			
			F10-40	1199	799			
			F10-55	1449	949			
			D10-40	949	639			

Silver Reed	List	Sale	Toshiba	List	Sale	Citizen	List	Sale
EXP500	349	229	T340P	799	439	321P	695	519
EXP550	649	399	TZ0D	341P	1099	341P	1099	819
			MSP10	449	299	MSP15	599	399
			MSP20	499	349	MSP25	749	519
			Prem 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.)

Circle 449 on Reader Service card.


**PROF
JONES**

 1940 WEST STATE ST.
 BOISE, IDAHO 83702
 (208) 342-6939

PROFESSIONAL HANDICAPPING SYSTEMS


**PROFESSIONAL
S E R I E S**
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™	\$299.95
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

and move chunks of it around the screen. The program includes a modest built-in spelling checker and supports PBJ Inc.'s Word-Pak 80-column display boards. All in all, it sounded like the CoCo's best shot yet at WYSIWYG (what you see is what you get) word processing.

I was a trifle optimistic. Inside Last Word is a potentially terrific program trying to get out, but I had some problems with it. Mike has spent a lot of time on the code, and it may be great, but the documentation is too terse and too shy of examples for me to tell.

While I consider myself to be adept with word processors, sometimes I couldn't tell if I had encountered a genuine gremlin or simply messed up. The 23-page instruction booklet was often unhelpful. It's too much to expect fancy manuals with a \$50 program, but this is one case where more documentation would have been worth the money.

The Last Word still has promise, however, and I plan to get back to it soon. In the meantime, regard what follows as an interim report.

Setting Up

The Last Word deviates from the increasingly common practice of bundling

an OS-9 bootstrap routine with an application program; it requires that you have the operating system on hand. The Last Word is supposed to work with all varieties of OS-9, although the manual says you'll have to fall back on The Last Word's own 51-column by 24-row text display if you have OS-9 version 2.0. The program won't work with Word-Pak's device driver for the newest OS-9 upgrade, version 2.0.

I ran the program with OS-9 versions 1.00 and 1.01, both with Word-Pak and without. Word-Pak gives you an auto-repeat function for every key, but it's easy to outrun the text buffer and lose material at the end of a video line.

Although the program comes on a double-sided disk, you can easily make copies on a pair of single-siders. Once you have, it's a simple affair to use them (one is called Install/Dictionary and the other, Commands) to construct the disk you'll use for working sessions. The disk includes a configuration file that tells the program whether you have one or more floppy drives, a hard disk, a mouse, or Word-Pak. It also sets up defaults for such things as scratch-file path names, auto-indentation for new paragraphs, and other useful items.

Circle 415 on Reader Service card.

**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™ Micro-ware; MS-DOS™ Microsoft.

Moving?

Subscription Problems?

Get help with your subscription by calling our new toll free number:

1-800-227-5782

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.

You can connect a mouse to the left joystick port or through Colorware's CoCo Max graphics box. The latter won't increase cursor accuracy on The Last Word's screen, however. I frequently had to use cursor keys for fine control—especially with a screenful of text.

Even after building a working disk, you must boot from a separate operating-system disk to begin a word-processing session; the program/dictionary combination leaves only about 10 sectors free. After booting OS-9, you have to swap disks in drive zero (assuming you keep text files in drive 1), and change the execution directory with the usual command:

```
chx /DO/CMDS
```

before calling the program.

Exercise caution if you customize the modules that OS-9 loads into RAM during the boot sequence. The Last Word can fail unless you leave at least 162 pages of contiguous memory free for the version that uses the self-contained high-resolution display, or 150 pages if you're using Word-Pak. My plain-vanilla copy of OS-9 version 1.00 left me with only 168 contiguous pages, and version 1.01 turned in a skimpy 162.

The master disk also contains a slightly shorter version of The Last Word for the memory deprived, but it can't use the spelling checker. That seems like an awful restriction.

Off and Running

The menu bar atop the screen has seven entries: Character, Line, Block, File, Format, Miscellaneous, and Break. Some of the menu names have funny capitalization—foRmat, for example. The idea is to show the letter required to issue commands from the keyboard (after all, you could use F for both the File and Format commands). This system is also used for several of the commands that appear when you open a menu.

The first four menus are for manipulating text by the character, line, user-defined "block," and disk file, respectively. The character and line commands let you do all the usual insertion and deletion chores, as well as search for and change an arbitrary string. Block commands are used to cut and paste text, employing one or more scratch files (you can even cut text from one document and paste it onto another). The File menu is primarily used to control reading and writing operations; I'll return later to some of the problems it gave me.

The Format menu controls some aspects of your text's appearance on both the CRT (cathode-ray tube) and the printed page. (Printing is actually handled by LPRINT, a separate routine.) The WYSIWYG aspect of The Last Word

arises from Format's ability to set up graphic indicators of line lengths and alignment on screen. You can get quantitative and type the specifications for left and right margins on these lines, and "grab" the lines with the mouse to move text horizontally.

The Last Word also has a good-sized vocabulary of dot commands that you can embed anywhere in a file. These commands provide the only way of controlling many functions (such as line spacing), and should be familiar to most word-processing devotees. They are very versatile; for example, you can specify different left and right margins for the odd- and even-numbered pages of your manuscript. You need at least one margin-setting line in your file to activate video word-wrap, however.

The Miscellaneous menu performs such useful functions as setting tabs and causing carriage-return symbols to appear or disappear, and is used to activate the spelling checker. It also contains an unusual command, WordChange, which makes it easy to substitute long words for shorter ones. WordChange automatically shifts from The Last Word's normal overwrite mode to insertion mode; without it, you'd have to keep track of the cursor's position and issue an Insert command at the end of the original word.

The Break menu isn't really a menu, but a single item; you move the cursor to it and click the mouse button for the equivalent of pressing the break key. You might think the latter is easier, and I agree. Although mice are useful for some things, other operations are easier to perform from the keyboard—particularly in word processing.

The Last Word gives you two options for choosing and executing menu items. First, you can move the cursor to the menu bar with the clear-O combination, use the left- and right-arrow keys to select a menu, and press the clear and break keys together (the equivalent of a mouse click) to open the menu. Then move to the desired command with the up- and down-arrow keys, and select it by pressing the clear and break keys again.

Somewhere in the midst of all this, you'll be willing to commit Murder One for a real control key. The second option is only a little smoother than the first: type clear-C, followed by one letter for the menu and another for the command. Which letters? Why, the capitalized ones on the menus, of course. I foresee a cottage industry in plasticized templates to remind users of the proper command syntax.

So What's the Problem?

The Last Word has two operating modes: text editing and word processing. The first is for programming and for

editing other programs' ASCII files. It lacks word-wrap, control codes, and other formatting capabilities. The program wakes up in text-editor mode, however, and to use it as a word processor you must either insert some commands from the Format menu or read in a file containing them.

I had trouble doing that, which is why I'm less than thrilled with the documentation. It took me a while to understand that using the FileEdit command, and not FileRead, is the way to load an existing disk file into RAM for further work. FileRead, it turns out, is for merging something from disk with something already in RAM; if you use it for an initial load, your text might not show up, or it might appear at a funny spot in the RAM buffer.

There could be exceptions to this, just as there are several ways to quit the program and either preserve or discard any changes you've made since loading the current file. The Last Word makes it difficult to lose text accidentally, but sometimes it's hard just to figure out what's going on.

Bottom-Line Time

I've devoted a lot of space to alternative ways of entering commands, and relatively little to file input/output (I/O) problems, because I hope to understand the I/O better someday. Again, I think the problems are mostly in the documentation: It should be longer, with some examples, and perhaps the order of topics should be rearranged. For example, page 7 describes double-clicking the mouse as a shortcut to defining the start of a text block, but it's not until page 11 that you learn that this method is only useful in the text-editing mode—not in word processing. That probably explains the endless disk-drive sawing I ran into after a double-click.

Computerware has a history of getting things right eventually, so I remain optimistic. The Last Word seems to have some of the right stuff and a low price. They could have a winner yet. ■

Scott Norman is the manager of solid-state science at GTE Laboratories in Waltham, MA. Write to him at 8 Doris Road, Framingham, MA 01701.

Products Mentioned

Computerware
4403 Manchester Ave.
Suite 102-Box 668
Encinitas, CA 92024
The Last Word requires 64K and OS-9. It sells for \$49.95.

Radio Shack has the

Computer System Furniture

299⁰⁰ Reg. Separate Items 319.80



Spacious modular workstation is ideal for home or office. Features simulated oak finish. Easy to assemble.

A System Desk. Twin cable management slots for easy connections.

26-1356 119.95

B Storage Hutch. Mounts on system desk. Features adjustable "second shelf" on either side.

26-1359 59.95

Half-Width Hutch. (Not shown). 26-1374 . . . 54.95

C Corner Section. Connects system desk and printer stand for a convenient "work corner."

26-1358 39.95

D Printer Stand. With output paper catcher and storage shelf.

26-1357 99.95

Monitor Pedestal



16⁹⁵

Adjustable platform rotates and tilts. Holds all Tandy monitors. Color and finish match monitors. Base: 11 x 10 1/4". (26-1369)

Printer Supports



16⁹⁵

Elevates printer so fanfold paper can be placed underneath. Use with 80-column printers. Durable crystal polystyrene. Easy to assemble. (26-1367)

Diskette Storage



Low As **12⁹⁵**

3 1/2". Holds 30. 26-1381 12.95
5 1/4". Holds 50. 26-1362 14.95
8". Holds 50. 26-4953 24.95

Disk Drive Head Cleaning Kits

Low As **7⁹⁵** Each



Disk Size	Cat. No.	Each
*3 1/2"	26-419	9.95
5 1/4"	26-408	7.95
8"	26-4957	8.95

*Single sided only

Fanfold Printer Paper



Size	Parts	Design	Vertical	Qty.	Cat. No	Price
147/8 x 11"	1	Greenbar	No	500	26-1330	11.95
147/8 x 11"	1	Greenbar	No	1500	72-300	34.95
147/8 x 11"	1	Greenbar	No	3500	26-1417	69.95
147/8 x 11"	1	White	No	1500	72-303	34.95
9 1/2 x 11"	1	Greenbar	Yes	1500	72-304	24.95
9 1/2 x 11"	1	Greenbar	Yes	3500	26-1403	49.95
9 1/2 x 11"	1	White	Yes	500	26-1423	8.95
9 1/2 x 11"	1	20# White	Yes	500	26-1387	10.95
9 1/2 x 11"	1	20# White	Yes	1250	26-1427	24.95
9 1/2 x 11"	1	20# White	Yes	2500	72-311	44.95
9 1/2 x 11"	2	White	Yes	750	72-305	34.95

Mailing Labels

Pressure-Sensitive Fanfold

Low As **6⁹⁵**



1-Wide. 4 1/2" carrier. Pkg./1000. 26-1328 6.95
1-Wide. 4 1/2" carrier. Pkg./5000. 72-402 24.95
2-Wide. 9 1/2" carrier. Pkg./2000. 72-401 15.95
3-Wide. 9 1/2" carrier. Pkg./3000. 72-400 16.95
2-Wide. Dry gum. 9 1/2" carrier. Pkg./2400. 26-1456 . . . 9.95

Items Shown With Optional Computer Components (Not Included).

best of everything.

Low-Cost, Compact Computer Workcenter

99⁹⁵

- Organize Your Computer System With This Compact, Efficient Workstation
- Beautifully Designed and Finished to "Fit In" with Other Furniture

Our beautifully styled, simulated oak finish workcenter features a full-width monitor shelf (41 1/2 x 14 3/4"), space for computer and printer, plus plenty of workspace. This easy-to-assemble workcenter comes with adjustable glides. (26-1350)



Perfect for Home, Office or School

Data Communications Modem



59⁹⁵

DCM 3. 300-bps modem plugs directly into modular phone outlet. DB25 and 4-pin DIN connectors. Bell 103 compatible, full duplex. FCC registered. (26-1178)

Certified Unformatted Diskettes

- Double Density
- Manufactured to the Highest Standards of Excellence
- Buy in 10-Pack Quantities and Save



Single Sided

Size	Tracks	Quantity	Cat. No.	Price
3 1/2"	80	3	26-415	15.95
	80	10	26-416	44.95
5 1/4"	40	1	26-305	2.19
	40	3	26-405	5.95
	40	10	26-406	15.95
8"	77	3	26-4904	10.95
	77	10	26-4906	34.95

Double Sided

Size	Tracks	Quantity	Cat. No.	Price
5 1/4"	40	3	26-411	6.95
	40	10	26-412	16.95
	80	3	26-409	8.95
	80	10	26-410	24.95
80 (high density)	3	26-421	15.95	
	10	26-422	44.95	
8"	77	3	26-4961	12.95
	77	10	26-4960	39.95

Circle 75 on Reader Service card.

Radio Shack®
The Technology Store™

A DIVISION OF TANDY CORPORATION

Send me an RSC-17
Computer Catalog.

Name _____

Address _____

City _____

State _____ ZIP _____

Phone _____

Radio Shack
Dept. 87-A-1014
300 One Tandy Center
Fort Worth, Texas 76102

*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 5.25-inch floppy disk. The magazine cover features a photograph of a man and a woman on a beach. The man is sitting and looking at a computer manual titled 'LDOS SYSTEM OWNERS MANUAL'. The woman is standing, wearing a red cap and sunglasses, looking towards the man. The magazine title '80 micro' is in large yellow letters, with 'the magazine for TRS-80 users' below it. The issue date and price are listed in the top right. A red banner in the top right corner lists items reviewed in the issue. The main article title is 'MASTERING MODEL 4 BASIC' with a sub-headline 'What Better Way To Spend Your Summer?'. Other articles include 'PATCH WORK REVISITED' and 'MODEL 4 MAGIC'. A 'SOFTWARE RIOT!' section is highlighted in yellow. A barcode is at the bottom left. The floppy disk is black with a white label that says 'LOAD 80' and 'CW Communications/Peterborough'. A red circular sticker on the disk says 'FEATURE: S-DOS Coll'. The disk is shown partially inserted into a light blue floppy disk drive, which is labeled 'SIDE B' and '500 Baud'.

80 micro
the magazine for TRS-80 users

AUGUST 1985
USA \$4.00
CANADA \$4.50
A CWCI 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

LDOS SYSTEM
OWNERS
MANUAL
TRS-80 Model

LOAD 80
CW Communications/Peterborough
© 1985 Peterborough, NH 03458

FEATURE:
S-DOS Coll

SIDE B
500 Baud
CW Communications/Peterborough
© 1985 Peterborough, NH 03458

74470 65947

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 • 80 Pine Street • Peterborough, NH 03458

8610

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

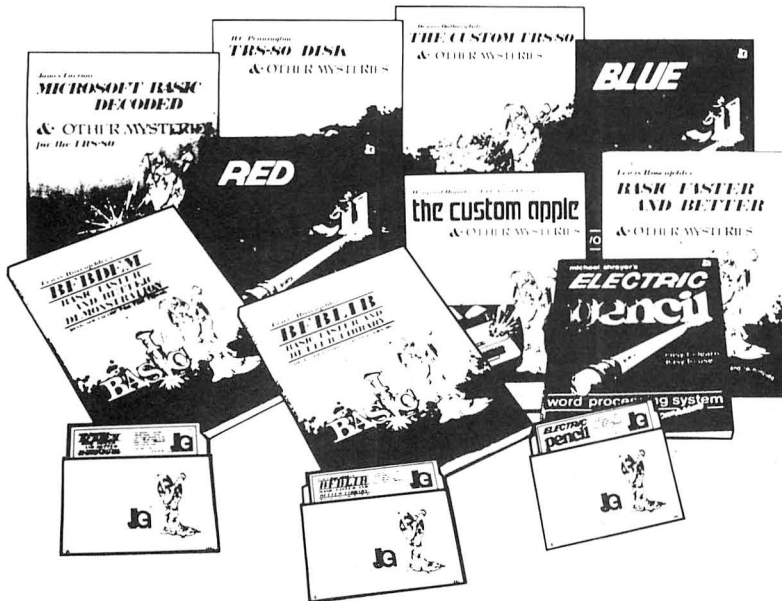
WordStar®
MailMerge™
SpellStar™
StarIndex™
dBASE II®
TurboPascal™
Montezuma Micro CP/M®

\$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**

Due to the nature of this business, there are **NO REFUNDS** on software. We accept American Express, MasterCard, Visa and C.O.D. Your card is not charged until we ship your order. Personal and company checks are accepted without delay (call for details). Delivered prices are for the lower rightmost 48 States only. Prices and specifications subject to change without notice. If you don't understand any of this, just give us a call and we will take the time to explain it until you do. First-timers are always welcome here.

© 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.

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 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 Gameworlds	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

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 Shop 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'	9
Gender Changer. Specify M/M or F/F	9
Printer A/B Switch Box Cable 6'	20

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.

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



Circle 301 on Reader Service card.

WHY PAY MORE...

When you can own for MUCH LESS!



**TANDY®
COMPUTERS**

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**

**NEW
MODEL 3000
In Stock**

BIG D COMPUTERS

ROANOKE CENTER-ROANOKE, TX 76272

CALL 1-800-FOR BIG D
(1-800-367-2443)



In Texas call (817)491-2461

MS-DOS

Faster Floppies

The Pelican 3.3 from Pacific Micro Systems is a mass-storage system incorporating the Kodak 3.3-megabyte (MB) half-height drive in an anodized-aluminum housing. Packing 2.78MB of formatted data onto 5.25-inch disks, the system includes a half-slot controller card with cache software to decrease data-access time.

The Kodak drive uses a proprietary head-positioning system to record 192 tracks per inch, compared to 48 tracks per inch with conventional floppies. The Pelican can also read conventional single- or double-sided disks.

The Pelican operates with the IBM PC and IBM-compatible computers running DOS 2.0 or later. The price is \$695, with a one-year warranty. A package of five Kodak high-density disks (13.9MB of storage) is \$65.

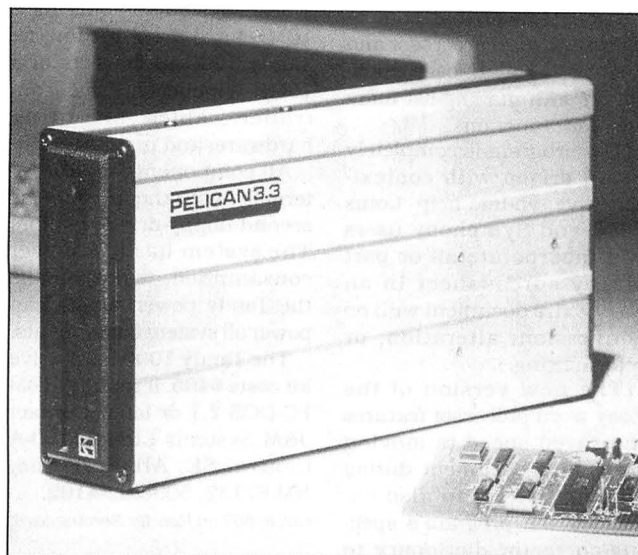
For more information, contact Pacific Micro Systems Inc., 160 Gate 5 Road, Sausalito, CA 94965, 415-331-2525. Circle 586 on Reader Service card.

Calling All Writers

Simon & Schuster Software announces Webster's New World Writer, a word processor designed specifically for writers. It incorporates Webster's New World Spelling Checker and Webster's New World On-Line Thesaurus with over 120,000 synonyms and phrases.

The word processor requires no special codes and commands. Its format options allow you to insert headings, subheads, and page numbers on any page; draw tables or boxes around your copy; and adjust margins. Text displays on screen exactly as it will appear on paper.

The software package in-



The Pelican 3.3 packs 2.78MB of data on a 5.25-inch disk.

cludes *The Writer's Guide*, which suggests ways to prepare book-length manuscripts, scripts, poetry, speeches, press releases, business correspondence, resumes, cover letters, and form documents, such as contracts.

Webster's New World Writer runs on the IBM PC/XT/AT and compatible systems with 256K, two double-sided disk drives (or one double-sided disk drive and one fixed disk drive), and an 80-column color or monochrome display. It retails for \$150. For more information, contact Simon & Schuster Software, Simon & Schuster General Reference Group, One Gulf and Western Plaza, New York, NY 10023, 212-333-5800.

Circle 581 on Reader Service card.

On an Upward Track

MicroHelp Inc. has released version 3.1 of *The Inside Track*, a package of advanced programmer's utilities for PC-DOS and MS-DOS computers. The package consists of more than 80 program files, a user's manual, and a reference sheet with memory map and summary of PC-DOS BIOS calls.

Version 3.1 provides sup-

port for DOS 3.1, 80286 machines, QuickBasic, and IBM's BASCOM 2. The new version includes features that show how to exceed the 64K data limit in high-level languages (including Basic), how to read characters from the screen, and how to create windows.

The new version also has updated functions for faster on-screen data displays, faster file reads and writes, faster loading of large programs, and faster reads and changes to the current directory. Other utilities are included for controlling the keyboard, copying memory from one location to another, limiting the amount of memory used by compiled Basic programs, using DOS and BIOS function calls in Basic and other high-level languages, and rebooting the computer.

The package requires a minimum of 64K RAM, any version of PC-DOS or MS-DOS, one disk drive (320K), and an 80-column monitor. Many of the utilities require DOS 2.0 or later and 128K RAM. The price of the package is \$65, plus shipping and handling charges (\$3 per order for UPS deliveries in the United States; \$5 per order

for UPS deliveries in Canada; and \$18 per package for deliveries to other countries).

The reference sheet with memory map and IBM BIOS calls is available separately at no cost. To order, send \$3 to cover shipping and handling.

For more information, contact MicroHelp Inc., 2220 Carlyle Drive, Marietta, GA 30062, 800-922-3383 or 404-973-9272 in Georgia.

Circle 582 on Reader Service card.

Want to C Better?

Phoenix Computer Products Corp. introduces PforCe, a library of object-oriented functions and subsystems for the C programming language. The functions are fully integrated, debugged, and ready to use.

High-level functions allow users to manipulate windows, screens of fields, menus, and data bases for faster and more economical programming. Low-level functions give programmers complete hardware control and defaults that can be changed at will. PforCe also includes a data-base system with demand paging, B-trees for storing access and index data, a complete windowing system, interrupt-driven communications, and background tasks. The package includes source code for all functions and utilities.

PforCe costs \$395. For more information, contact Phoenix Computer Products Corp., 320 Norwood Park South, Norwood, MA 02062, 617-762-5030.

Circle 583 on Reader Service card.

Scientific Plots

Sigma-Plot, a new graphics package from Jandel Scientific, produces publication-quality scientific graphs and charts. It is designed to run on IBM and compatible computers with a Hewlett-Packard or compatible plotter.

Sigma-Plot lets you create scatter, line, histogram, bar, and grouped bar charts with one- or two-way standard deviation, standard error of the mean, and 95 or 99 percent confidence-interval error bars. Other features include log-log scales, semi-log scales, independent x-y plotting, linear regression, cubic spline-curve fitting, and unlimited data-set size.

Sigma-Plot uses on-screen menus, which you can operate from the keyboard or by using the cursor of various digitizers. You can input data from the keyboard; from files of such programs as Lotus's 1-2-3, Symphony, dBase II and dBase III; or from files of Jandel's Sigma-Scan measurement system.

The package price is \$350. For more information, contact Jandel Scientific, 2656 Bridgeway, Sausalito, CA 94965, 800-874-1888. (Residents of California, Alaska, and Canada call 415-331-3022.)

Circle 584 on Reader Service card.

Easy Does It

Easy Extra is a word-processing and mailing system designed for novice computer users. Offered by MicroPro, the package consists of a new version (1.5) of that company's Easy word processor and EasyMail, a data-base application with mailing-list management functions.

The program is completely menu driven with context-sensitive, on-line help. Lotus 1-2-3 and Symphony users can incorporate all or part of any spreadsheet in an Easy Extra document with no conversion, alteration, or reformatting.

The new version of the Easy word processor features improved speed in moving through a document during editing. MicroPro also expanded the program's spelling-corrector dictionary to 87,000 words and recoded it for faster operation.

Easy Extra retails for \$149. The stand-alone word processor costs \$99. Contact Micro-

Pro International Corp., 33 San Pablo Ave., San Rafael, CA 94903, 415-499-1200.

Circle 585 on Reader Service card.

Hard-Drive Kit

J&M Systems is offering a 10MB hard-drive kit for the Tandy 1000. It consists of a 10MB Winchester drive, controller, cables, mounting hardware, and manual.

All components mount internally, with the drive in the second floppy-drive position. The system has low power consumption, which means the Tandy power supply can power all system components.

The Tandy 1000 hard-drive kit costs \$495. It requires IBM PC-DOS 2.1 or later. Contact J&M Systems Ltd., 15100-A Central SE, Albuquerque, NM 87132, 505-292-4182.

Circle 587 on Reader Service card.

Basic-to-C Translations

JMI Software Consultants Inc. has introduced a new version of its Basic-to-C trans-

lator, BASTOC. Version 2.0 optimizes the C-language output of the translator, permitting dramatic reductions in execution time.

BASTOC analyzes the use of numeric variables to determine which floating-point variables can be replaced by integer variables. Replacement can be done either automatically or interactively.

In addition to its use as a conversion aid, BASTOC can serve as a conventional Basic compiler. It includes a Basic compiler program, which uses BASTOC as a preprocessor to the C compiler.

Binary versions are available for the IBM PC and compatible systems, as well as for the Radio Shack Model 16. Any system supporting a standard C compiler is a potential host.

BASTOC costs \$495. For more information, contact JMI Software Consultants Inc., Box 481, Spring House, PA 19477, 215-628-0846.

Circle 588 on Reader Service card.

Circle 437 on Reader Service card.

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.

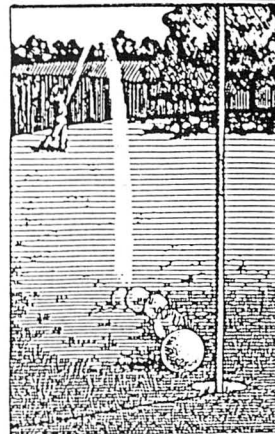
See your dealer or order direct. Mass. residents add 5% sales tax. Mastercard, Visa accepted. To order, or for more information, write or call:

DIGITAL VISION, INC.

14 Oak Street — Suite 2 Needham, MA 02192 (617) 444-9040, 449-7160

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



and





Xidex Corp.'s diagnostic software package, *The Investigator*, performs seven disk-drive performance tests.

Circle 534 on Reader Service card.

Library of Science

The BasicA Science & Graphics Handbook from Simplification UnLtd. is a library of over 40 programs for students and professionals in the fields of mathematics, physics, and engineering. Programs are divided into four subject areas: graphics techniques, imaging and transformations, probability and statistics, and matrix and vector operations.

The programs are unprotected source code, which can run as presented or be incorporated as modules or subroutines in custom programs. The library includes a reference manual.

The price of the handbook is \$60. For more information, write to Simplification UnLtd., P.O. Box 654, Menlo Park, CA 94026.

Circle 589 on Reader Service card.

Test Drives

The Investigator, a new diagnostic software package available from Xidex Corp.,

can test disk-drive performance of over 20 IBM PC-compatible computers. Combining both the program and test tracks on one disk, it is designed for easy use and speedy analyses.

The Investigator prompts you through its setup procedure and then performs seven tests of the disk drive in approximately a minute. The program tests for read/write accuracy, spindle speed, static head alignment, timing of the index data, azimuth head rotation, hysteresis (dynamic head alignment), and disk centering.

A printout of the results can be produced with a single command. Users receive a pass/fail report or can request a more detailed analysis that provides exact numerical results.

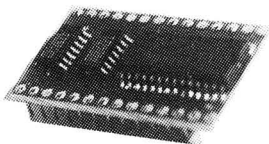
The package retails for under \$35. For more information, contact Xidex Corp., P.O. Box 58053, Santa Clara, CA 95050, 408-988-3472.

Circle 593 on Reader Service card.



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.

M1108K (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

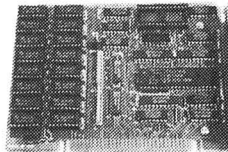
Easy to install Kit comes complete with 8 each 4164N-20 (200ns) 64K Dynamic RAMs and documentation for conversion. Converts TRS-80 Color Computers with D, E, ET, F and NC circuit boards to 32K. Also converts TRS-80 Color Computer II to 64K. Flex DOS or OS-9 required to utilize full 64K RAM on all computers.

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 6 1/2% 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
10/86 Phone Orders Welcome (415) 592-8097 Telex: 176043

©1986 Jameco Electronics

THE RS-232

MODEL III **MODEL 4**



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 Mastercard also accepted.
Add \$3.00 shipping & handling
(Foreign orders quoted on request)



4831 SOUTH HAMPTON RD. LB#1
DALLAS, TEXAS 75232
214/330-1332

Circle 46 on Reader Service card.

TRS80 - CP/M - MS-DOS - CoCo!

Hypercross 3.0 - The Third Generation in File Transfer.

Using **HYPERCROSS 3.0** 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, Visicalc 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 I/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! \$49.95 ppd

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** up to 1000 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 \$52.95 ppd

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 \$79.95 plus \$3.00 shipping

HYPERSOFT

PO Box 51155, Raleigh, NC 27609
(919) 847-4779 8 am-11 pm EST



The CP/M Solution

Accelerate 8/16 is a combination hardware and software package that lets you read CP/M disks and run CP/M software on MS-DOS machines. Copublished by Intersecting Concepts Inc. and The Software Toolworks, the package incorporates the NEC V20 processor; Media Master, a disk-to-disk conversion program; and ACCEL, an 8-bit CP/M emulation program for MS-DOS.

The V20 processor is a plug-in chip that replaces the 8088 processor in most MS-DOS computers, allowing them to run both 16- and 8-bit code. The ACCEL software uses the 8080 mode of the NEC V20 processor to emulate CP/M software at an equivalent processor speed of approximately 3 megahertz. For Z80 CP/M programs, which the NEC chip does not currently support, ACCEL provides a special software-only Z80 CP/M emulation mode.

Accelerate 8/16 requires a minimum of 192K RAM. Owners of 8086-based computers can purchase the NEC V30 chip (an 8086 replacement) separately. The package is compatible with all popular CP/M computers and is capable of running most CP/M software.

The package retails for \$99.95 and is not copy protected. Intersecting Concepts and The Software Toolworks also copublish Media Master Plus, a \$59.95 software-only solution to the problem of converting 8-bit CP/M programs for 16-bit MS-DOS machines.

For additional information, contact Intersecting Concepts Inc., 4573 Heatherglen Court, Moorpark, CA 93021, 805-529-5073.

Circle 590 on Reader Service card.

Optimal Sorts

Opt-Tech Data Processing has released version 3.0 of Opt-Tech Sort, an Assembly-language sort/merge/select utility for use in compilers, data-base managers, and application packages.

New features with version 3.0 include record selection,

record reformatting, comma delimited files, dBase III support, dynamic memory allocation, alternate collating sequences, expanded index-file options, unlimited number of input files, and expanded parameter options.

Opt-Tech Sort can be called from 25 languages or from DOS as a stand-alone utility or as a batch file. It is available in stand-alone, linkable, and resident versions. The program supports unlimited file sizes of many types, including fixed length, variable length, random, dBase, and Btrieve. The software is fully documented with sample programs and data files for each language.

Opt-Tech Sort costs \$149. For more information, contact Opt-Tech Data Processing, P.O. Box 678, Zephyr Cove, NV 89448, 702-588-3737.

Circle 591 on Reader Service card.

Disk Utilities

A&T Systems Inc. announces The Disk Management System, a package of disk and file utilities for the IBM PC and compatible computers. Over 40 utilities are provided to help you with such tasks as recovering lost data, increasing system speed and reliability, locating or reorganizing information, executing applications, and customizing files and directory attributes.

The package retails for \$99. For more information, contact A&T Systems Inc., 12904 Olive Way, Silver Spring, MD 20904, 301-384-1425.

Circle 592 on Reader Service card.

TRSDOS

Editorial Staff

THEME: The Music Editor is a "music processor" for the Model 4 that lets you compile, print, and edit scores of up to 32 voices. Information on note pitch, duration, accidentals, and beams is immediately displayed on screen after being typed in.

You use the special cursor to position a note on the staff lines and the other prepro-

NEW PRODUCTS

grammed keys to add accidentals and special articulation, as well as designate the note's duration. Note beams and stems are realistically displayed. In addition, THEME lets you scroll through a score and edit your notation before making a printout.

THEME requires 128K RAM, at least two disk drives, a high-resolution graphics board, TRSDOS 6.2, and an Epson-compatible dot-matrix printer. The cost is \$400 plus \$25 for the manual. For information, contact THEME Software Co., P.O. Box 3997, Charlottesville, VA 22903, 804-979-9665.

Circle 594 on Reader Service card.

Compiler For the I/III/4

MISOSYS's EnhComp is a Basic compiler for the Models I, III, and 4 that features a line editor, run-time support library, and reference utility.

EnhComp supports strings up to 32K long, single- and double-precision math functions, user-defined commands, a built-in array sort, and access to DOS commands. A built-in Z80 assembler lets you insert in-line Assembly code with access to Basic variables.

Model I/III EnhComp comes on a small LDOS 5.1.4 disk and is ready to run; Model 4 PRO-EnhComp requires TRSDOS 6.2 or the equivalent. Each is priced at \$124.95. For further information, contact MISOSYS Inc., 1 Tyler Lane, P.O. Box 239, Sterling, VA 22170, 703-450-4181.

Circle 595 on Reader Service card.

Model 4 Enhancements

The T.K.O. filter program from SOTA Computing Systems Ltd. provides enhancements to the Model 4's video display, printer, keyboard, and RS-232/modem connection.

The screen editor lets you capture, edit, or redisplay any video line as a keyboard macro. Keyboard enhancements include seven user-programmable macro keys, quick enabling and disabling

of the click function, a keyboard lock, and one-key recall of the TRSDOS date. RS-232/modem enhancements include three user-programmable dialer keys, a dumb terminal, and the option of directing screen output to the printer. Two additional macro keys can help speed up printer formatting.

T.K.O. runs on Models 4/4P/4D with at least one disk drive, 64K RAM, and TRSDOS 6.2.x. It sells for \$69.95. For information, contact SOTA Computing Systems Ltd., 213-1080 Broughton St., Vancouver, British Columbia, Canada V6G 2A8, 604-688-5009.

Circle 596 on Reader Service card.

Revising LeScript

Anitek Software Products has added several features to its LeScript word processing program with the release of version 1.68.

LeScript now works with Borland International's Turbo Lightning, a spelling checker that runs on MS-DOS computers, and with DoubleDuty, a Radio Shack program for running two programs simultaneously on the Models 4 and 4P. LeScript now also works with Pronto, MISOSYS's memory-resident program for the 4 and 4P.

LeScript 1.68 also features automatic hanging indents, letting you indent blocks of text for display purposes. Ten editing functions have been added to simplify entry of character attributes, and a wider range of printer drivers is now available.

A new option lets LeScript run with Alpha Technology's 1MB Supermem board, allowing users to work on files up to one million characters long—the equivalent of 500 text pages.

The cost of updating a LeScript master disk from version 6.7 is \$5; from 1.60 to 1.66, \$10; from 1.5.x, \$20; from 1.4.x, \$25; and from 1.1.x, 1.2.x, or 1.3.x, \$30. For information, contact Anitek Software Products, P.O. Box 361136, Melbourne, FL 32935, 305-259-9397.

Circle 597 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!



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 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**

ETC.

Printing Rainbows

Toshiba has introduced a color version of its P351 dot-matrix printer.

The P351C can print overhead transparencies and emulate Qume Sprint 11 daisy-wheel and IBM color printers; bottom feed and six-part forms printing capability are standard features. The printer operates at up to 288 characters per second in draft mode, supports P351-compatible software packages and downloadable fonts, and has a noise level of 58 decibels. A \$199 bi-directional tractor and two ribbon types (\$15) are available.

The P351C sells for \$1,749. For further information, contact Toshiba America Inc., Information Systems Division, 2441 Michelle Drive, Tustin, CA 92680, 714-730-5000. Circle 601 on Reader Service card.

Gracious Host

The TMC-820 is a new Small Computer Systems Interface (SCSI) "plug and play" host adapter from Future Domain Corp. It runs on the Tandy 1000/1200/3000 and other IBM compatibles.

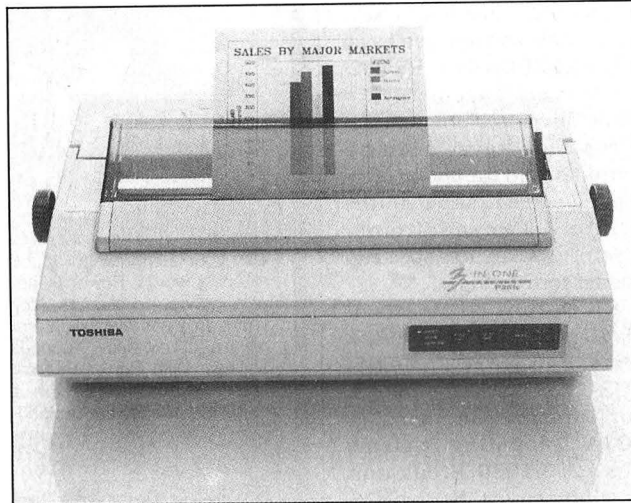
The TMC-820 has no switches and, with built-in firmware, requires no additional software. It is designed to interface with other peripherals meeting the SCSI standard, including Seagate and Rodime embedded disk drives and TEAC tape drives. The company plans to expand compatibility to other peripherals in the near future.

The adapter comes in four models and costs \$99; ribbon cables and manuals are extra. For information, contact Future Domain Corp., 1582 Parkway Loop, Suite A, Tustin, CA 92680, 714-259-0400. Circle 599 on Reader Service card.

A Field of Daisies

Interactive Structures' Daisy product line is a modular system of interfaces for the IBM PC/XT/AT and compatibles.

Each Daisy system contains the hardware required to connect the computer to laboratory experiments or to dem-



Toshiba's P351C 24-pin color printer.

onstrate live computer-logic signals. A master interface, the DMI-110 (\$220) fits in one slot and holds up to four snap-on modules. Two are currently available: the DAI-120 (\$450) for analog data acquisition, and the DDI-160 (\$220), which performs digital logic input/output and precision timing and counting. A menu-driven demonstration disk manages system configuration, shows live data collection on screen, and provides a language for writing Basic programs. The DAISI/Notebook (\$895) is a software package providing live data acquisition, control, and color graphics plotting.

For information, contact Interactive Structures Inc., 218 Great Valley Parkway, Malvern, PA 19355, 215-644-8877.

Circle 598 on Reader Service card.

Modem Bodyguard

The Zapstar Modem Protector/Filter (MP-1) is designed to protect transmitted data and communications hardware.

A Zener diode and gas-discharge device combine to intercept and absorb overvoltage transients that appear on the telephone line. A comprehensive filter reduces or eliminates high-frequency signals.

The MP-1 is installed between the modem, modem card, or electronic telephone system and the telephone line. It sells for \$59.95. For more information, contact Severts-

Zorman Engineering Inc., 7144 W. McNab Road, Fort Lauderdale, FL 33319, 305-722-7770 or 800-624-8189.

Circle 602 on Reader Service card.

Freeing The CP/M 8,000

Elliam Associates has updated its catalog of CP/M public-domain software.

The 100-page catalog features information on about 400 disks containing more than 8,000 public-domain programs and files. Each listing includes a volume number and information on program size and type; in most cases, a short description and source code are provided. Elliam Associates distributes the software on 3½-, 5¼-, and 8-inch disks (both 40- and 80-track) in 75 formats.

The catalog sells for \$7.50. For information, contact Elliam Associates, 24000 Bessemer St., Woodland Hills, CA 91367, 818-348-4278.

Circle 600 on Reader Service card.

Intelligence Reports

The 1986 edition of *The Artificial Intelligence Directory* from DM Data Inc. profiles more than 300 companies actively involved in artificial intelligence (AI) and related disciplines.

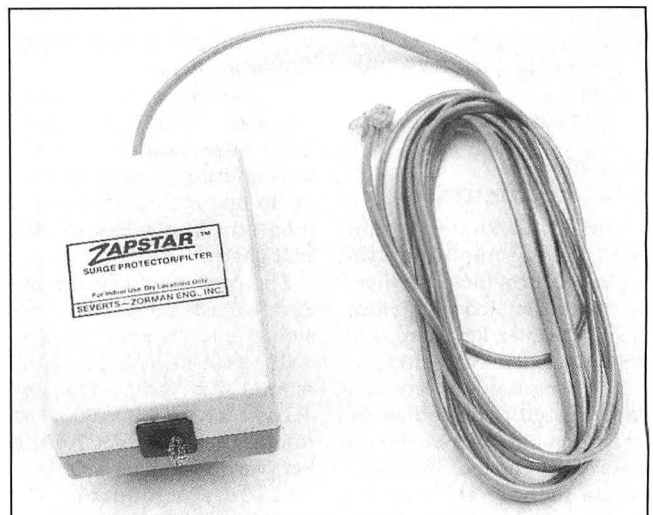
Each listing includes the company's name, address, and telephone number, names of contacts, a brief description of products and services, an alphabetical listing of company profiles, and a master telephone directory. Categories include AI and AI programming languages, expert systems, voice recognition systems, artificial vision, natural languages, and symbolic computing.

The 8½- by 11-inch directory sells for \$49.95 (\$64.95 for international delivery). For further information, contact the Publications Department, DM Data Inc., 6900 E. Camelback Road, Suite 1000, Scottsdale, AZ 85251, 602-945-9620.

Circle 603 on Reader Service card.

Education Newsletter

Educational Products Information Exchange (EPIE) lists educational software programs and companies in a



The Zapstar MP-1 protects your modem.

new feature in *MICROgram*, its monthly newsletter for computing educators.

TESS In-Basket lists about 150 recently released programs in subjects ranging from administration to the social sciences. The list is arranged alphabetically by subject area and includes each program's name, computer system, and supplier. (TESS refers to *The Educational Software Selector*, EPIE's 980-page directory, available for \$59.95 plus \$5.50 postage and handling.)

MICROgram is published nine months a year (October to June); a one-year subscription costs \$40. For more information, contact Educational Products Information Exchange, P.O. Box 839-RB, Water Mill, NY 11976, 516-283-4922.

Circle 604 on Reader Service card.

Unix Time-Saver

Specialized Systems Consultants Inc. (SSC) publishes *Text Processing Reference*, a pocket guide to Unix word-

processing commands.

The 32-page guide explains mm macros and the tbl, eqn, nroff, and troff commands. It is intended to save users the inconvenience of looking through lengthy manuals.

Other pocket references available from SSC include *Unix Command Summary*, *C Library Reference for Standard System V*, *MS-DOS Command Summary*, *Fortran 77 Reference*—all \$6 each—and *VI Reference*, a summary of Berkeley's Visual editor. Each booklet includes editor and shell commands.

For more information, contact Specialized Systems Consultants Inc., P.O. Box 55549, Seattle, WA 98155, 206-367-8649.

Circle 605 on Reader Service card.

Pamper Your Portable

Omni Enterprises offers a laptop-computer carrying case designed to fit under an airplane seat.

The 13- by 11- by 7-inch case is made of water-repel-



A Model 100/200 carrying case from Omni Enterprises.

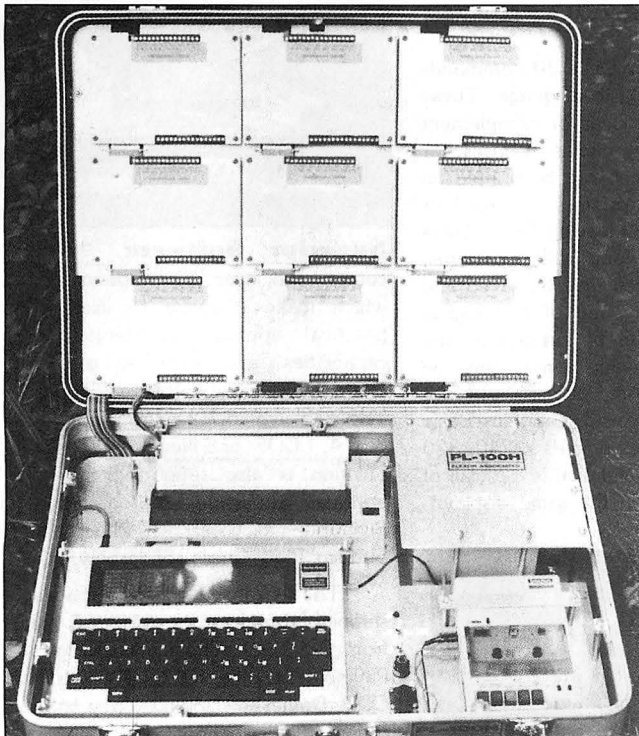
lent, black Cordura nylon and features interior pockets on all four sides. A false-bottom compartment lets you store accessories and infrequently used items. You can also reposition the padded compartment partitions and all padding is made of anti-static-treated foam. The adjustable shoulder strap doubles as a handle.

The carrying case was de-

signed to hold Tandy 100/200 portable computers, but it can accommodate 13 other popular laptops. It sells for \$68 plus shipping and handling (\$4 in the continental United States, \$9 elsewhere). For more information, write to Omni Enterprises, Suite 29, 8200 W. Manchester Ave., Playa del Rey, CA 90293.

Circle 606 on Reader Service card.

Different Track



The DataLog-100 is all set to go out into the field.

Roughing It With a Portable

Elexor Associates offers the DataLog-100, a completely portable data-acquisition system in a weather-resistant instrument case. The DataLog-100's standard configuration includes a Tandy Model 100 computer, Elexor Associates' Data Acquisition board, data tape recorder, 80-column printer, internal heavy-duty rechargeable battery, and recharger. The system case is suitable for rugged environments such as oil rigs, field installations, and environmental monitoring stations.

The DataLog-100 runs for up to 40 hours on internal batteries. Auxiliary power can be supplied from an ac source, 12-volt car battery, solar array, and so on. The standard system has 16 channels, 12-bit A/D, 32 digital I/O bits, and four DACs. The system is expandable to more than 400 analog channels, and customized systems are available.

Complete acquisition software is included with full modem support (both telephone and radio). Custom configurations are available for specific applications. Elexor Associates also has available hardware signal conditioning and software conversions for most transducers, such as thermocouples, pressure transducers, strain gauges, and inclinometers. The DataLog-100 sells for \$3,895. For more information, contact Elexor Associates, P.O. Box 246, Morris Plains, NJ 07950, 201-299-1615.

Circle 607 on Reader Service card.

New Products Index

MS-DOS

Reader Service Number	Company	Page
592	A&T Systems Inc.	200
590	Intersecting Concepts Inc.	200
584	Jandel Scientific	197
588	JMI Software Consultants Inc.	198
587	J&M Systems Ltd.	198
582	MicroHelp Inc.	197
585	MicroPro International Corp.	198
591	Opt-Tech Data Processing	200
586	Pacific Micro Systems	197
583	Phoenix Computer Products Corp.	197
589	Simplification UnLtd.	199
581	Simon & Schuster Software	197
593	Xidex Corp.	199

TRS-80

Reader Service Number	Company	Page
597	Anitek Software Products	201
595	MISOSYS Inc.	201
596	SOTA Computing Systems Ltd.	201
594	THEME Software Co.	200

Etc.

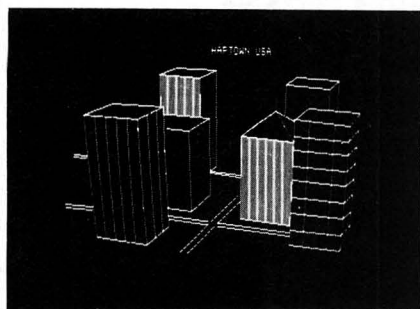
Reader Service Number	Company	Page
603	DM Data Inc.	202
604	Educational Products Information Exchange	202
600	Elliam Associates	202
607	Elexor Associates	203
599	Future Domain Corp.	202
598	Interactive Structures Inc.	202
606	Omni Enterprises	203
602	Severts-Zorman Engineering Inc.	202
605	Specialized Systems Consultants Inc.	203
601	Toshiba America Inc.	202

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.

Circle 464 on Reader Service card.

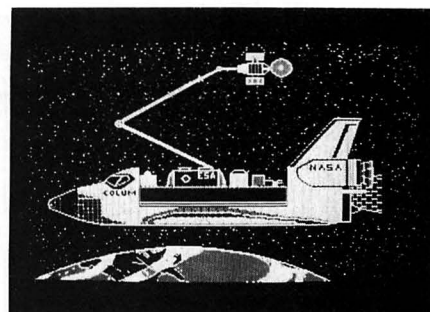
Grafyx Solution™ Save \$100.00

Hi-Resolution Graphics for Mod 4/4D/4P/III



Superior Hardware. The Grafyx Solution provides 153,600 pixel elements which are arranged in a 640 x 240 or on the Model III a 512 x 192 matrix. Hundreds of new business, personal, engineering, and educational applications are now possible. The hi-res display can be shown on top of the standard display containing text, special characters, and block graphics. This simplifies program debugging, text labeling, and upgrading current programs to use graphics. The Grafyx Solution fits completely within any tape or disk based Model 4, 4D, 4P, or III. Installation is easy with the plug-in, clip-on Grafyx Solution board.

Superior Basic. Over 20 commands are added to the Basic language. These commands will set, clear or complement points, lines, boxes, circles, ellipses, or arcs. The hi-res screen can be printed on any of 30 popular printers or saved or loaded to disk without leaving Basic. Areas may be filled in with any of 256 patterns. Sections of the screen may be saved and then put back using any of five logical functions. Labels can be printed in any direction. The viewing area can be changed. The entire screen can be complemented or cleared. Graphics Basic provides dot densities of 640 x 240, 320 x 240, 160 x 240, and 160 x 120, all of which can be used in the same display.



Superior Software. The board comes with over 40 programs and files which make it easier to use, serve as practical applications, demonstrate its capabilities, and serve as programming examples. The software works with TRSDOS 1.3, 6.1.2, 6.2; DOSPLUS 3.4, 3.5, 4; LDOS; and Newdos80. The Grafyx Solution is also supported by over 20 optional applications programs: Draw, Bizgraph, xT.CAD, 3D-Plot, Mathplot, Surface Plot, Chess, Slideshow, etc.

The Grafyx Solution package is shipped complete for \$199.95 (reduced from \$299.95). The manual only is \$12. Payment may be by check, Visa/MC, or COD. Domestic shipping is free on pre-paid orders. Texas residents add 5% tax.

MICRO-LABS, INC. 214-235-0915
902 Pinecrest, Richardson, Texas 75080

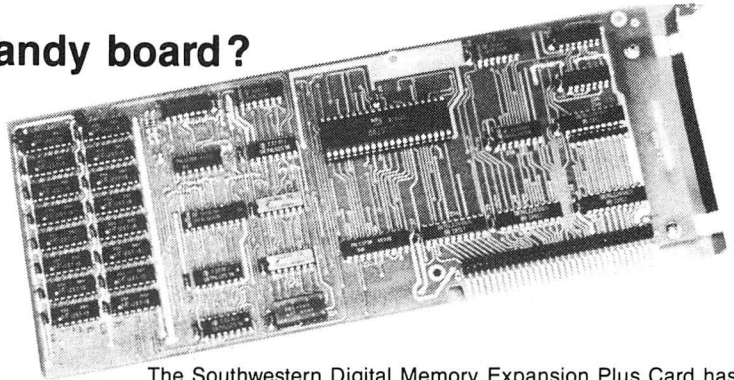
Tandy 1000 Memory Card

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

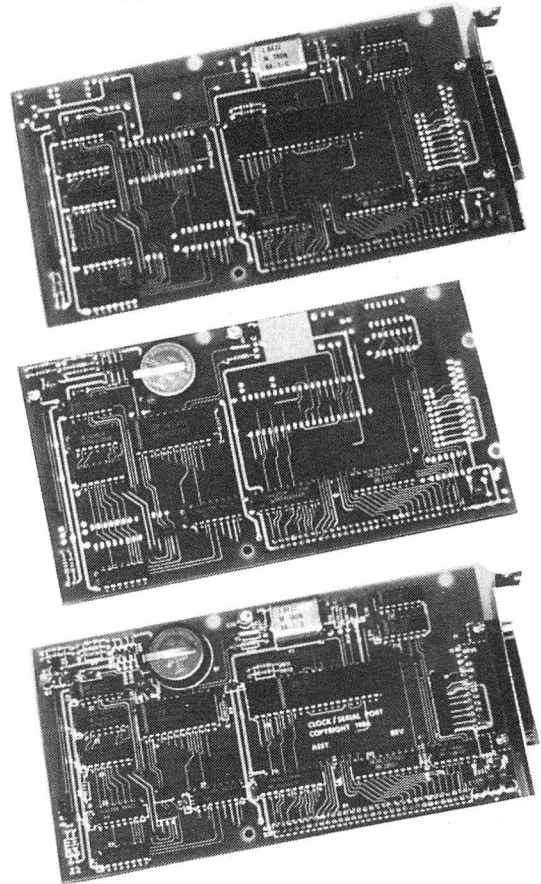
512K, RS232C-Serial Port, and Clock \$245.
(Includes RAM DISK and PRINTER SPOOLER)

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.



Order Line

1-713-480-3296

Southwestern Digital

2515 West Main Street, Suite #337
Houston, Texas 77098

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.

JUST IN TIME FOR SUMMER!
GREAT PRICES!

CSP

Computer Supplies of Peterborough



Tilt and Swivel Power Center

SURGE PROTECTOR NOISE EMI/FILTER

- 15A Circuit Breaker
- 6FT Cord
- 14/3 AWG SJT
- 15A, 125V, 60Hz, 1800W
- Master Power On/Off Switch
- Lighted Rocker Switches Correspond to Five Individual Sockets on Rear Panel
- High Grade Against Fire ABS Construction.
- Can Swivel & Tilts
- 11" x 10" x .75"

NEW!
ONLY \$79.95



Night Flight

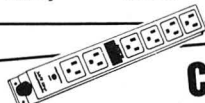
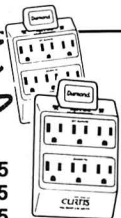
Take part in pivotal WWII battle as you take off, land and fly photo recon missions to determine the location of enemy ships (cassette only)

ONLY \$8.57

CALL FOR OTHER SPECIALS!!

CURTIS SURGE PROTECTORS

	LIST	SALE
Diamond	\$49.95	\$39.95
Emerald	\$59.95	\$49.95
Sapphire	\$79.95	\$69.95
Ruby	\$89.95	\$79.95



Super Value!
Priced at only \$19.95

CURTIS SAFE-STRIP

LIST \$29.95

Protect Valuable electronic equipment and data files from damage. Surge and spike suppressor and noise combination converts one outlet into six.

FAN FOLD COMPUTER PAPER

	LIST	SALE
20# 1000 Sheets micro-perfed	\$19.95	\$14.95
20# 2500 Sheets micro-perfed	\$32.95	\$26.95
15# Green bar 3500 Sheets	\$47.95	\$37.95

LOOK!

ONLY \$3.00 FOR THESE INFORMATIVE AND EDUCATIONAL BOOKS!

ONLY \$3.99

80 MICRO REVIEW
 Read Reviews of Software and Hardware.

LOW-COST COSTING
 Run Your Business Better with Cost Management Book.

COLOR COMPUTER BOOKS
 TRS-80 Color Computer Interfacing
 TRS-80 Model I/III Color Computer

BOOKS
 TRS-80 Interfacing Bk I
 TRS-80 Interfacing Bk II
 Mostly Basic Applications Bk I
 Mostly Basic Applications Bk II
 Intermediate Programs for TRS-80
 TRS-80 More Than Basic
 Real Time Control for TRS-80
 Using the Z-80 in the TRS
 TRS Assembly Made Simple
 Battlestar Basic for TRS-80

GEOGRAPHY EXPLORER
 Essential geographical facts are presented in an entertaining manner with fun features like animated graphic rewards for correct answers.
 A real steal at **\$9.97** for disk and only **\$8.57** on cassette!!

TRS-80 ENCYCLOPEDIAS !!

Get a \$200.00 value for only \$30.00! Ten volumes at \$3.00 each. You get articles on business, hardware, interfacing as well as utilities and tutorials. Call now and get the entire set while supplies last.

ANNOTATED BASIC

Two volumes of basic programming technique. **ONLY 3.00 each**

TRS-80 DATA FILES

DB management with simple basic. **3.00**

CHECK OUT THESE LOW PRICES ON GREAT TRS-80 PROGRAMS!!!

All programs guaranteed to run.
DISK PROGRAMS \$9.97

CASSETTE PROGRAMS \$8.57

GAMES

Sparrow Commander	d
Kitchen Sink	d
Space Shuttle	c
Battle Ground	c
Mystery Fun Hse	c
Galactic Empire	c&d
Dragonquest	c
Temple of the Sun	c&d
Ball Turret Gunner	c
Alien Attack Force	c
Cosmic Patrol	c&d
Swamp War	c
House of 30 Gables	c
Domes of Kilgary	c&d
Flying Circus	d
Master Reversi	c&d
Key Commander	c
Air Mail Pilot	c
Geography Explorer: USA	c&d
Geography Explorer: Europe	c&d
Savage Island	d

UTILITIES AND EDUCATION

Cassette Scope	c
Terminal -80	c
Music Master	c
Programers Converter	c
Programers Primer	c
Investors Paradise	c
Renum Compress	c
Disassembler	c
Music Teacher	c
The Elements	c
Everyday Russian	c
Omni Converter	c
Archimedes' Apprentice	c
Typing Teacher	c
Elements	c
Astrology	c
Santa Paravia	c
Disk Editor	d
Teachers Aide	c&d

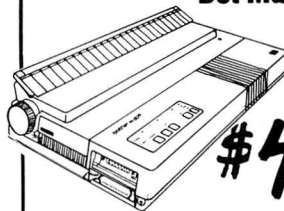
FAMOUS BRAND \$ DOLLAR \$ DISKS!

- Quality Nationally Known Brand 5 1/4" disks
- Reliable, lifetime warranty
- SS/DD only \$1.00 each
- DS/DD only \$1.15 each
- Any quantity

BULK VALUE

GREAT SAVINGS

Brother M-1509 Serial Impact Dot Matrix Printer



ONLY \$425.00

List \$550.00

- High speed output (180 cps)
- Near Letter Quality printing
- Variety of printing fonts and functions
- Large buffer memory
- Optional auto cut sheet feeder
- Compatible with IBM PC® and Epson FX-100+®
- One inch paper cut function
- Slim, compact, and attractively styled
- Quiet Operation

Protect Your Software FLIP 'N' FILE /15

Protect Software from dust, debris and moisture. Stores up to 15 5 1/4" diskettes.



List Price \$9.95

Sale \$7.95

Also Available
 Teak Roll Tops 5 1/4"-50
 Teak Roll Tops 3 1/2"-45
 Teak Rolltop/100
 Flip 'n' File/50
 Flip 'n' File/15
 Teak Roll Top/100

	LIST	SALE
Teak Roll Tops 5 1/4"-50	\$32.95	\$18.95
Teak Roll Tops 3 1/2"-45	\$23.95	\$16.95
Teak Rolltop/100	\$48.95	\$34.95
Flip 'n' File/50	\$19.95	\$14.95
Flip 'n' File/15	\$ 9.95	\$ 7.95
Teak Roll Top/100	\$49.95	\$39.95

BUY NOW!

ORDER TOLL FREE 800-843-6700

QUESTIONS? Call 603-924-9261 Ext. 133

Hours: M-F 8:00-5:00 EST

\$3.00 Postage & Handling. Quantities Limited.

Selection may vary. All sales final. Returns need RMA. Allow 2-6 weeks for delivery.

We reserve the right to substitute similar items.

MC VISA Money Order



THE CLASSIFIED

80micro

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.

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.

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. KOMPETERWERK, INC., Dept 80, 851 Parkview Blvd., Pittsburgh, PA 15215. ORDERS 1-800-423-3400 INFO. 412-782-0384.

COCO SOFTWARE

Casper CoCo Quick Assembler \$20 602-268-5077.

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.

SOFTWARE

Profile & pfs:file Users! PROAID 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.

Educational home and school for IBM compatibles and TRS-80 III/4/CoCo FREE catalog Aladin Software, 1001 Colfax St., Danville, IL 61832

Follow your stocks or 'Play' the NYSE with STOCTRAC. Disk. \$15.00. Specify Model III or IV. P.O. Box 6988. Burbank, CA 91510.

LeScript USERS (III/4) customize your word processor. FREE info.: J.L., 245 Richelieu, McMasterville, Que., Canada, J3G1T7.

INVEST-SOFT for TRS-80 III/IV: Analyze 150 companies for eight financial ratios: print reports: stores and sorts data for retrieval: 64K or 128K? \$69.95. Invest-Soft, 260 South First Street, Wytheville, VA 24382.

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.

CHECK RECORDING SYSTEM

Model 4—menu driven—very user friendly—money back guarantee—\$29.95—NEW GENERATION SOFTWARE, 907 20th St., Vienna, WV 26105.

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. 800-642-6524.

HARDWARE

MODEMS, PRINTERS, TERMINALS. Distributor pricing to end users and dealers—FREE SHIPPING CALL 1-800-833-2600 for catalog.

TRS-80 COMPUTERS;

Models 16,4, II, Tandy 1200. Include Software. 100% Functional GUARANTEED. 1-306-522-8448.

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.

Get the attention you deserve. For only \$5 per word, your ad will be seen by over 100,000 dedicated TRS-80/Tandy users. Ads must be received by the 20th of the month 3 months prior to publication date. **Send yours today.**

Name _____
 Address _____
 City _____ State _____ Zip _____
 Telephone _____

CATEGORY _____ (3 words)
 _____ (6)
 _____ (9)
 _____ (12)
 _____ (15)
 _____ (18)
 _____ (21)
 _____ (24)

Total Number of Words x \$5/issue = _____
 For _____ issue

Make Checks Payable to 80 Micro
NO AD ACCEPTED WITHOUT PAYMENT
 80 Pine St., Peterborough, NH 03458 10

Modes of Entry

Since we put no length limit on input routines, you proved yet another of Murphy's Laws: Programs expand to fill available memory. While our Panel of Selectors enjoyed having so much more to work with, they left it to me to whittle down the T-shirt winners' programs to fit the lower-right corner of this page.

Input/Output

Ed Boysun (Wolf Point, MT) shows us a classy way to handle numeric input. Even without its bells and whistles, the heart of Ed's program (Program Listing 1) is impressively flexible. It treats several qualities of the expected input individually.

In the setup in line 20, M represents the maximum absolute value permitted, while P controls the number of places to the right of the decimal point. You could easily add a minimum value for the number, and P rather than decimal places could just as well fix the number of digits in the various segments of a telephone, social security, or part number. Finally, Ed's program maintains the sign independent of the value and reads it with GW-Basic's Screen command after the input is terminated.

The ability to read the video display directly—with GW-Basic's Screen (x,y) statement, for instance—is a familiar tool to Model I and III users. In fact, many Model I and III entries filled a properly sized field with a distinctive character and limited the lengths of inputs by testing the display for the end of the field.

Dan Nugent (Sterling Heights, MI) uses video PEEKing to do more. In Program Listing 2—just the core of his entry—Dan gives us a nondestructive cursor we can move with the left- and right-arrow keys or send to either end of the input field with shifted arrows. The routine also uses the clear key to erase an entry and start over, control-D to delete characters, and control-S to insert them.

Other entries deserve your attention even though I don't have room to show them to you. Roberto Dorich (Lima, Peru) puts all his acceptable criteria in a function, like this:

```
DEF FNX=(K$>=MIN$) AND (MAX$>=K$)
OR (LEN(B$)>=1 AND K$=CHR(13)) OR
(K$=CHR(8) AND B$<>" ") OR (K$=" ")
OR...
```

Here, K\$=INKEY\$ and B\$=B\$+K\$; thereafter, you use IF FNX THEN... to verify keystrokes. By changing the val-

ues of the variables named in the function—MIN\$ and MAX\$, for example—you can use the same test for each input in your program.

Dr. A. Monnet (Toulouse, France) uses the Model 4's three function keys to terminate input. His routine then returns to the main program with one of three values assigned to a variable, and an On...GOTO statement branches to one of three possible actions on the input. Donn Young (Narberth, PA) substitutes a string array to hold individual keystrokes for his Model 4's inability to read video memory directly—a nice touch. And Barry Mitchel (Reading, MA), working on the MC-10 and the Color Computer, offers several ways to get around the limits of those Basics. For example, he uses a For...Next loop with step zero to simulate While...Wend. Clever!

Back to the Future

Labor Day, 1887? In Oregon, the first of these United States to adopt the holiday, folks celebrated on the second Saturday in June. A more vital question: Will New Year's Day give us a three-day weekend at the turn of the millenium?

Model 4 users who look for the answer from the computer's system prompt (which returns the day of the week) will be disappointed. TRSDOS 6.x doesn't accept dates after 1987. Users of Tandy's MS-DOS machines, on the other hand, have reason for optimism: MS-DOS handles dates through 2099.

Let's banish chronological ambiguity.

Rise to this month's challenge by writing a perpetual calendar in three or fewer lines of Basic. Make it accurate since October 15, 1582—the day our Gregorian calendar was first adopted for most of Europe—and into the future until the Star Trek calendar inevitably replaces it. Beam us aboard, Scotty.

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 October 15, 1986. Although this doesn't give everyone the same amount of time (we apologize to our overseas readers especially), extending the deadline would add another month to our publishing your solutions.
3. This month's winners will appear in the January 1987 issue.
4. Employees of CW Communications are not eligible.
5. Send your entry to: 80 Micro, Fine Lines, 80 Pine St., Peterborough, NH 03458. We will not, unfortunately, be able to return entries.
6. Specify your T-shirt size.

Oops!

Several of you wrote to point out the error in our listing of Kevin Gross's Wall Wars program in the August 1986 issue. That odd-looking "Gh" at the end of the line should have been GOTO. ■

Harry Bee is a freelance writer, puzzle creator, programmer, and dreamer. Contact him at P.O. Box 567, Cornish, ME 04020.

Program Listing 1. Shortened version of Ed Boysun's GW-Basic input routine.

```
20 M=4999.49:P=2:C=2:V$="":D=0:Z$="0."+STRING$(P,48):PRINT "Z$;:LOCATE CSRLIN,C
:WHILE M:N$=INPUT$(1):IF N$=CHR$(13) THEN M=0:GOTO 90 ELSE IF N$=CHR$(8) AND V$>
"" THEN V$=LEFT$(V$,LEN(V$)-1):D=D+(D>0):GOTO 80 ELSE IF N$=CHR$(8) OR N$="+ " TH
EN N$=" "
60 IF N$="-" OR N$="." THEN LOCATE CSRLIN,C-1:PRINT N$: ELSE IF N$="." AND D=0 A
ND P>0 THEN D=1:V$=V$+N$ ELSE IF N$<"0" OR N$>"9" OR D=P+1 OR VAL(V$+N$)>M OR VA
L(V$)=0 AND N$="0" AND D=0 THEN 90 ELSE V$=V$+N$:IF D>0 THEN D=D+1
80 LOCATE CSRLIN,C:PRINT V$:PRINT RIGHT$(Z$,P+1-D) "STRING$(2+P-D,29);
90 WEND:V#=(VAL(V$)*SGN((SCREEN(CSRLIN,C-1)+45)+.5)):PRINT,V#:GOTO 20
```

End

Program Listing 2. Distillation of Dan Nugent's Model III entry.

```
1 IFGTHENC=PEEK(K):POKEK,143ELSECLS:S=15360:K=S:L=20:M=S+L:PORT=STOS+L-1:POKET,46:
NEXT:POKET,32:G=1:GOTO1
2 Q$=INKEY$:IFQ$=""THEN2ELSEQ=ASC(Q$):IF(Q=8ANDK>S)POKEK,C:K=K-1:GOTOELSEIF(Q=9AN
DK<M)POKEK,C:K=K+1:GOTOELSEIF(Q=13ANDK<M)POKEK,C:PORT=M-1:POKSTEP-1:POKET,PEEK(T-1)
:NEXT:POKET,32:GOTOELSEIF(Q=4ANDK<M)PORT=K+1TOM:POKET-1,PEEK(T):NEXT:GOTO1
3 IFQ=31THENC=0:GOTOELSEIFQ=24POKEK,C:K=S:GOTOELSEIFQ=25POKEK,C:K=M:GOTOELSEIFQ
>31ANDQ<123ANDK<MPOKEK,Q:K=K+1:GOTOELSEIFQ<13THEN2ELSEFPORT=K+1TOM:POKET,32:NEXT:
IFK<>SFORT=STOK-1:A$=A$+CHR$(PEEK(T)):NEXT:PRINT:PRINT:PRINTA$
```

End

Dac-Easy Accounting

"Best Software Value"

InfoWorld
1985 "Product of the Year" Awards



"Trendsetting Accounting Product of the Year"

PC World
December, 1985

100,000 and more every day. That's how many smart buyers have already streamlined their accounting with the fastest-selling, most highly praised accounting package ever introduced.

Dac-Easy offers seven full feature accounting modules in a perfectly integrated package, with instant access to:

- General Ledger
- Accounts Receivable
- Accounts Payable
- Forecasting
- Inventory
- Purchase Order
- Billing

You can generate over 300 reports from 80 different routines. And best of all, Dac-Easy Accounting can be used to manage either service- or product-based businesses.

Now the Dac-Easy Series expands with the addition of the widely acclaimed Dac-Easy Payroll and Dac-Easy Word. Dac-Easy Accounting and Payroll are even more powerful and flexible with the company of Dac-Easy Mate and Dac-Easy Port. Also new for 1986 are Dac-Easy Accounting Tutor and Dac-Easy Payroll Tutor.

The best-selling business solution is now complete. Read what the experts say. Compare power, features, ease of use and price. Then join more than 100,000 people who have said "Yes!" to Dac-Easy.

All the Dac-Easy products are non-copy protected, fully documented, and come with a 30-day money back guarantee.

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.

Minimum Hardware Requirements:
IBM or other compatibles. 256K memory, two disk drives, MS-DOS, PC-DOS 2.0 or later, E32 column printer in compressed mode, color or monochrome monitor.

MS-DOS is a trademark of MicroSoft Corp. IBM and PC-DOS 2.0 are registered trademarks of International Business Machines Corp.



"Dac-Easy is a genuinely amazing deal."

PC Magazine
October 15, 1985
"Editor's Choice"

"I've never before in a review come right out and told readers to buy a product, but I'm doing it now. Dac-Easy is an incredible value."

PC Week
August 27, 1985

Call toll free or return coupon below today

Ask for Operator #755
In Texas or
for more information call
214-458-0038

TELEX: 5106000715 dac software

dac software, inc.
4801 Spring Valley Rd., Bldg. 110-B
Dallas, TX 75244

Please rush me the following products:

Product	#Copies	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	_____
ACCOUNTING TUTOR	_____	\$19.95	_____
PAYROLL TUTOR	_____	\$19.95	_____

Add Shipping Charge **\$7.50**

Texas Residents Add Sales Tax (6 1/8%) _____

TOTAL _____

- Check Money Order
 AMEX VISA MASTERCARD

Account # _____

Expires _____

Name _____

Company _____

Street Address _____

City _____

State _____ Zip _____

Phone _____

Computer brand _____

Signature _____

#755

Dac Easy Payroll

The best in personnel and payroll processing. Automatic tax calculations for all 50 states. Tremendous report features. Multi-departments, after-the-fact payroll, interfaces with Dac-Easy Accounting or can stand alone.

Dac Easy Word

Powerful, easy and flexible. Includes 70,000 word spell checker, mail merge, windows for up to four documents, cut and paste, search, word-breaking, word count, and much more.

Dac Easy Mate

The perfect companion to our best-selling accounting and payroll programs. Add the Dac Road Map, calculator, color or intensity selection, macros, print to screen option, and file windowing. Dac-Easy Mate makes your accounting fun.

Dac Easy Port

A great program that sends your accounting and payroll files to your favorite spreadsheet. Pick from your customer, vendor, chart of account, inventory, or employee files. Select ranges and select individual fields. Fast, easy operation.

Dac Easy Accounting Tutor

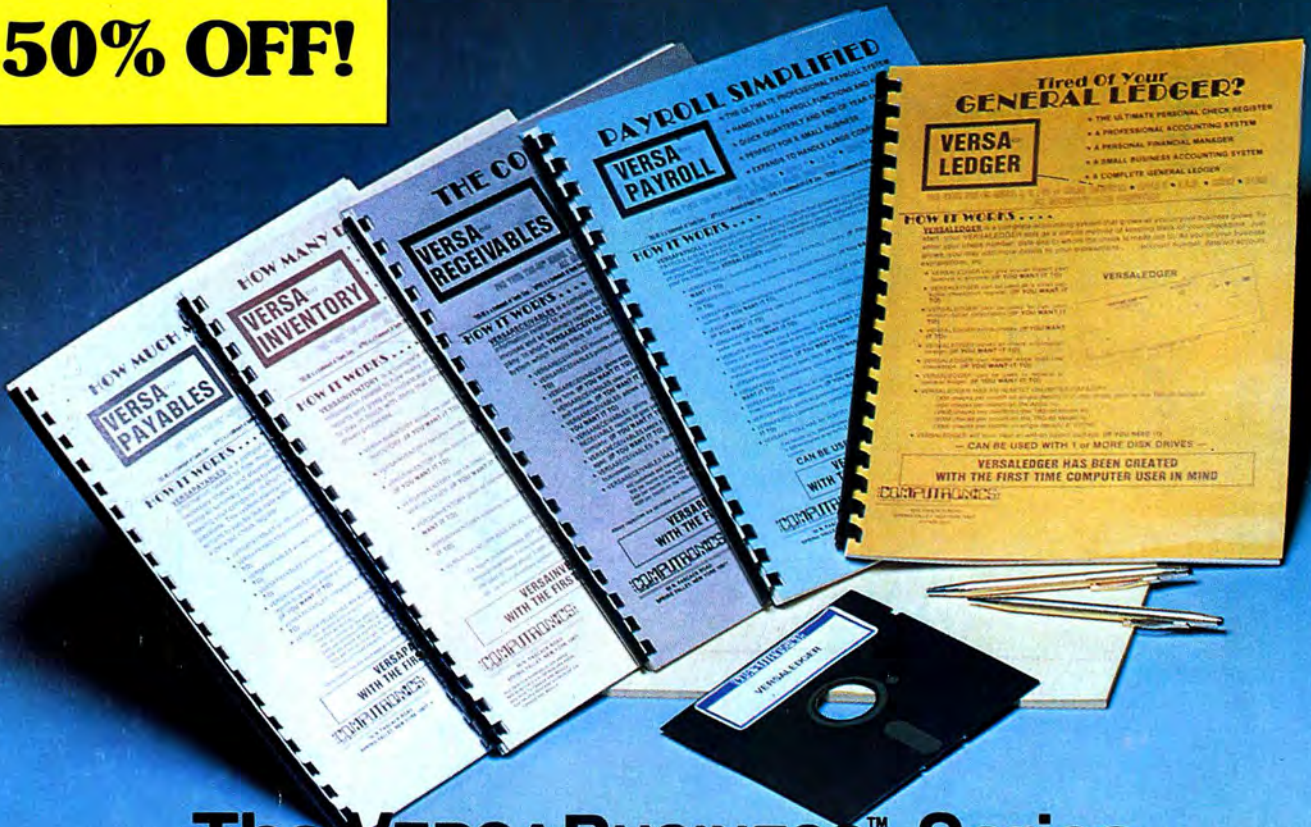
Dac Easy Payroll Tutor

These two programs make accounting and payroll a snap to learn. Can be used by the beginner or by the current user as a handy, stand-alone supplement to the user's manual.

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 \$5 to CANADA or MEXICO
- * add \$4 for C.O.D. or non-UPS areas
- * add proper postage elsewhere

DEALER INQUIRIES WELCOME

All prices and specifications subject to change / Delivery subject to availability.

COMPUTRONICS INC.

50 N. PASCACK ROAD, SPRING VALLEY, N.Y. 10977

