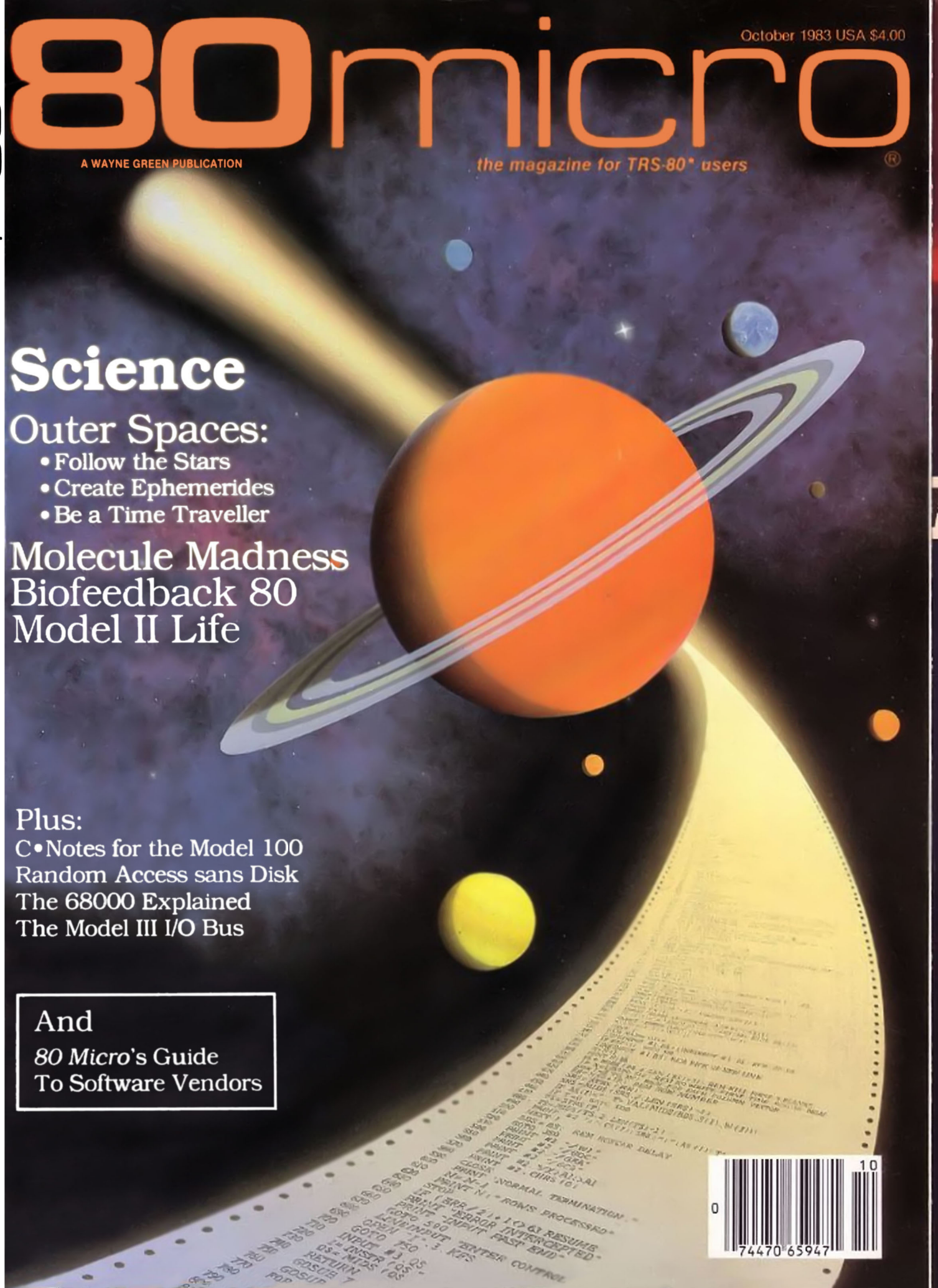
October 1983 USA $4.00

80micro

A WAYNE GREEN PUBLICATION

the magazine for TRS-80* users



Science

Outer Spaces:

- Follow the Stars
- Create Ephemerides
- Be a Time Traveller

Molecule Madness
Biofeedback 80
Model II Life

Plus:

C•Notes for the Model 100
Random Access sans Disk
The 68000 Explained
The Model III I/O Bus

And

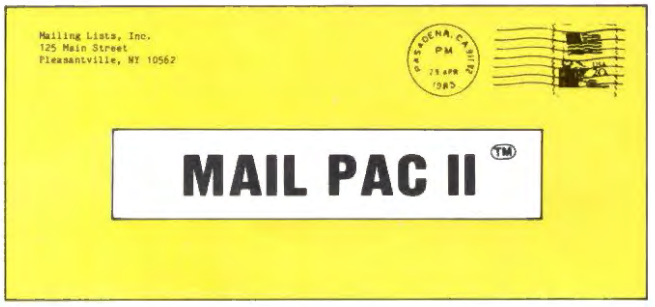
80 Micro's Guide
To Software Vendors

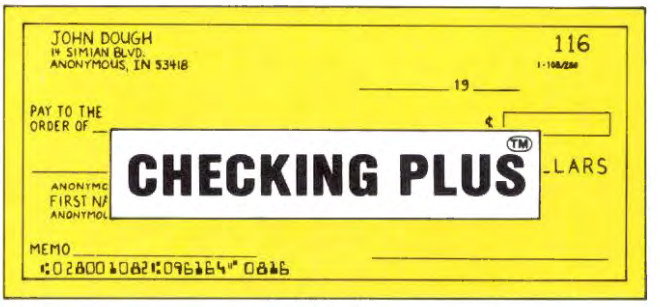
0 74470 65947 10

80micro 10/83 #45

ANYONE CAN USE OUR SOFTWARE!

MAIL PAC II and CHECKING PLUS represent a new generation of computer software. Our software doesn't even need a manual! Anyone can quickly learn to use either package by following simple, explicit on-screen instructions. But, for those of you who insist -- we've included a complete user's manual as well.





MAIL PAC II FEATURES:

High Capacity --

Stores from one to one million names in Zip Code, Numerical or Alphabetical order. The only limitation is your disk storage space.

Flexibility --

Prints your mailing list on 1, 2, 3, or 4-across labels (with up to 5 user-defined lines on each label) or as a compact, user-designed directory. The record length is completely user-defined, and each field within each of your records is completely variable (allowing storage of any number of characters for any particular address entry). Devote fields to telephone numbers, codes, or even special messages related to each particular name on file.

Powerful --

A built-in word processor allows you to create personalized form letters for each address on your list (or just a particular group of addresses).

Ease of Use --

Create new mailing lists, review existing lists, handle changes of address, delete cancelled names, sort lists, and purge duplicate names from your files. Complete on-screen instructions tell you in plain english exactly how to accomplish all of these tasks.

MAIL PAC II $99.95

CHECKING PLUS FEATURES:

Complete Check Register --

Checking Plus stores your entire check register in a disk file, and then uses the data to balance your account, track your expenses, and help you make budget projections. Review the entire checkbook, enter checks, deposits, fees and adjustments, mark outstanding checks when paid, and get an instant cash balance at any time. All data can be viewed onscreen or printed out in report form.

Tax Preparation --

Storage of monthly and yearly totals and other important information aids in income tax preparation, for your personal use or for your accountant.

Handles the Details --

Store names and addresses for frequently written checks, then print checks to fit standard window envelopes, eliminating the need for extra typing. You can even store any comment, explanation or other message (up to 255 characters) related to a particular check.

Automatic Monthly Bill Payments --

Enter amounts and names of payees for all of your fixed-cost monthly payments, and then sit back while the system automatically prints checks.

CHECKING PLUS $99.95

Both Programs Require 48K And At Least One Disk Drive (2 Drives For Higher Storage Capacities). And All Hard Disk Systems Are Supported.

FREE--TRS-80 Mod I,III & 4 programs supplied on DosPlus (minimum system). Complete DosPlus also available.

FOR YOUR TRS-80™ • APPLE™ • IBM PC™ • NEC™ • OSBORNE™ • XEROX™ • KAYPRO™ • TELEVIDEO™ • ZENITH™ • SANYO™
DEC™ • TI PROFESSIONAL COMPUTER™ • SUPERBRAIN JR.™ • EPSON™ • Any CP/M™ Computer

CP/M-based Computers must be equipped with Microsoft BASIC (MBASIC or BASIC-80)

TRS-80 trademark Tandy Corp. - APPLE trademark Apple Corp. - IBM PC trademark IBM Corp. - ATARI trademark Atari, Inc. - OSBORNE trademark Osborne Corp. - XEROX trademark Xerox Corp.
KAYPRO trademark Non-Linear Systems, Inc. - TELEVIDEO trademark Televideo Systems, Inc. - SANYO trademark Sanyo Corp. - NEC trademark NEC Corp. - DEC trademark Digital Equipment Corp.
ZENITH trademark Zenith Corp. - TI PROFESSIONAL COMPUTER trademark Texas Instruments, Inc. - SUPERBRAIN trademark Intertec Corp. - CP/M trademark Digital Reseaech - EPSON trademark Epson Corp.

OUR SOFTWARE CATALOG

H & E Computronics, Inc., has mailed more than 1 million software catalogs since 1978. Send $2 for our new 64-page catalog today! (We also send you our catalog FREE with every order). DEALER INQUIRIES WELCOME

30-DAY MONEY BACK GUARANTEE

*** ALL PRICES & SPECIFICATIONS SUBJECT TO CHANGE ***
DELIVERY SUBJECT TO AVAILABILITY

COMPUTRONICS

50 N. PASCACK RD., SPRING VALLEY, N.Y. 10977

24 HOUR ORDER LINE
(914) 425-1535

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

ADD $3.00 FOR SHIPPING IN UPS AREAS
ADD $4.00 FOR C.O.D. OR NON-UPS AREAS
ADD $5.00 TO CANADA & MEXICO
ADD PROPER POSTAGE OUTSIDE OF U.S., CANADA & MEXICO

VISA MasterCard

✓9

Introducing the Most Powerful Business Software Ever!

TRS-80™ (Model I, II, III, or 16) • APPLE™ • IBM™ • OSBORNE™ • CP/M™ • KAYPRO™

FREE--TRS-80 Mod I,III & 4 programs supplied on DosPlus (minimum system). Complete DosPlus also available.

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.

SATISFACTION GUARANTEED!

Every **VERSABUSINESS™** module is guaranteed to outperform all other competitive systems, and at a fraction of their cost. If you are not satisfied with any **VERSABUSINESS™** module, you may return it within 30 days for a refund. Manuals for any **VERSABUSINESS™** module may be purchased for $25 each, credited toward a later purchase of that module.
All CP/M-based Computers must be equipped with Microsoft BASIC (MBASIC or BASIC-80)

To Order:
Write or call Toll-free (800) 431-2818 ~9
(N.Y.S. residents call 914-425-1535)

* add $3 for shipping in UPS areas
* add $4 for C.O.D. or non-UPS areas
* add $5 to CANADA or MEXICO
* add proper postage elsewhere

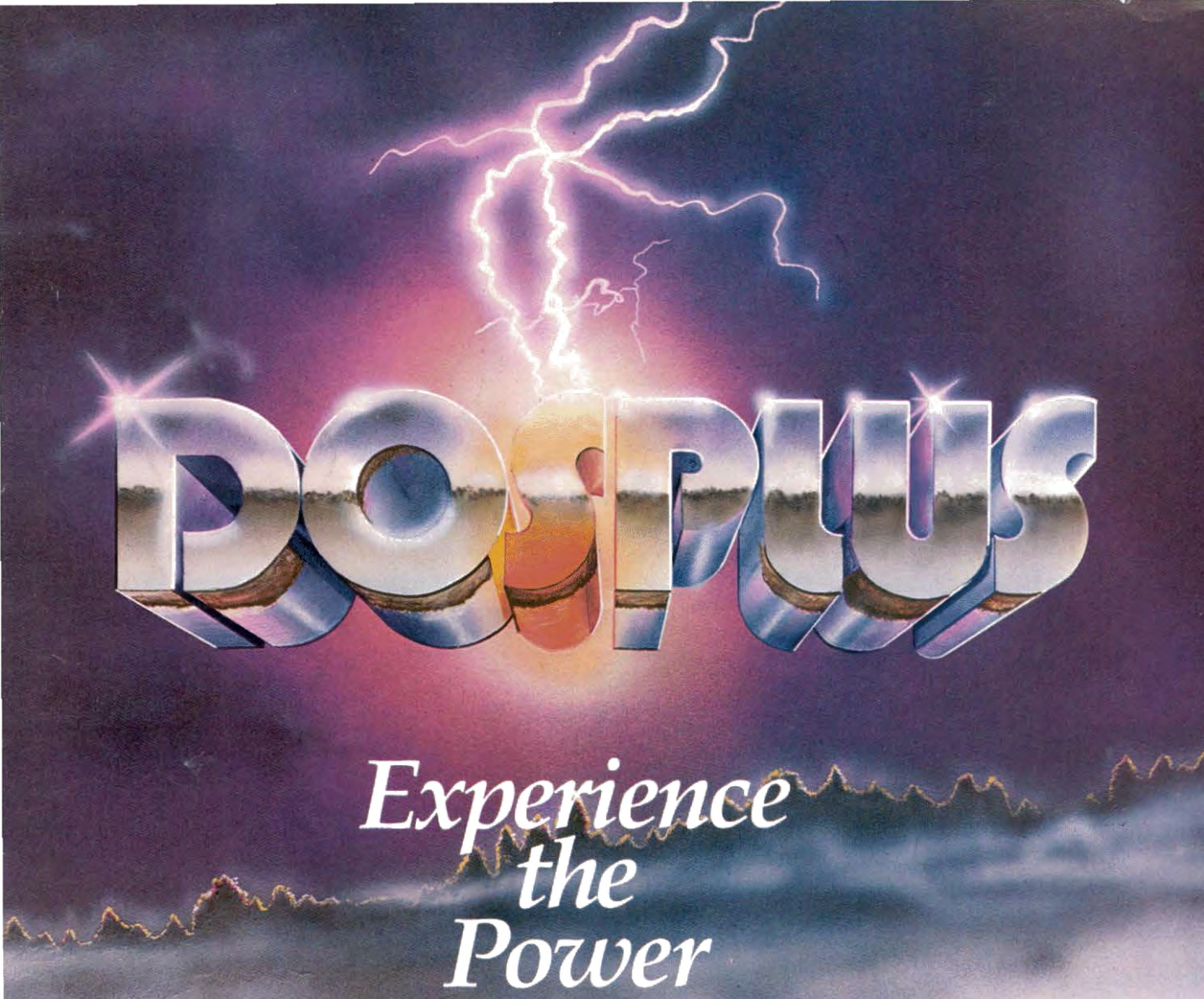
VISA

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

TRS-80 trademark Tandy Corp. - APPLE trademark Apple Corp. - IBM PC trademark IBM Corp. - OSBORNE trademark Osborne Corp. - XEROX trademark Xerox Corp. - KAYPRO trademark Non-Linear Systems, Inc. - TELEVIDEO trademark Televideo Systems, Inc. - SANYO trademark Sanyo Corp. - NEC trademark NEC Corp. - DEC trademark Digital Equipment Corp. - ZENITH trademark Zenith Corp. TI PROFESSIONAL COMPUTER trademark Texas Instruments, Inc. - SUPERBRAIN trademark Intertec Corp. - CP/M trademark Digital Research - EPSTON trademark Epson Corp.



Experience the Power

"Awesome". The word only begins to describe the power of DOSPLUS 3.5, the latest in the line of popular Disk Operating Systems from Micro-Systems Software, Inc.

Long known for its production of high quality, user friendly operating systems, Micro-Systems Software introduces a whole new breed of DOSPLUS. Version 3.5 explores avenues of power and flexibility previously untouched in TRS-80 DOS'.

DOSPLUS 3.5 is the last word in professionally crafted operating systems and combines unlimited power and flexibility with the same reliable and steady performance you have come to expect from the name DOSPLUS. In short, DOSPLUS puts you in total control. From its parameter rich library, to the many and powerful utilities, to the full featured BASIC, DOSPLUS is THE system for the TRS-80 Model I or III.

Priced at $149.95, DOSPLUS gives your microcomputer mainframe power without mainframe price. Order yours today and experience the power ... DOSPLUS!

- DOSPLUS 3.5's total device independence and completely external device structure allow interface to almost ANY kind of peripheral. Support will be given for hard disks, printers, and non-standard floppy drives.
- In addition, DOSPLUS 3.5 offers many utilities including a menu driven user interface that allows file manipulation at the touch of a key, full file and disk editing utilities, and a directory check utility with optional repair. Standard utilities let you map file locations, restore killed files, or offset file locations in memory.
- DOSPLUS 3.5 also includes one of the best Disk BASIC interpreters available with any DOS. With exclusive features like controlled screen formatting and label addressing, DOSPLUS BASIC puts you a step ahead. Single step debugging, global text editing, program cross referencing, and a multi key/multi array sort are all standard.
- The DOSPLUS 3.5 manual will set new standards in documentation. Almost 400 pages of clear, easy reading text that will acquaint you with all areas of system operation. The user's manual is written in English instead of "computerese" and is aimed at both the novice and the experienced user alike. The technical manual clearly documents every part of the system and will prove a gold mine to programmers seeking to interface with DOSPLUS.

MICRO-SYSTEMS SOFTWARE, INC.

4301-18 Oak Circle, Boca Raton, Florida 33431, Telephone: (305) 983-3390

Orders Only 1-800-327-8724

384

ONE

FOR ALL

IE • IBM-PC • APPLE II • TRS-80 • R

Percom Data Corporation has one hard disk drive system for just about ALL personal computers . . . including of course . . . IBM®-PC, APPLE® II, and TRS-80®. Percom Data's innovations with 5¼" Winchester technology mean that for most personal computers . . . having a reliable hard disk system is as easy as hooking up a cable.

A Percom Data PHD™ will interface with your present system . . . and your future system . . . so if you do change computers, you can still keep your most important investment . . . your Percom Data Hard Disk Drive.

Because Percom Data helped create the industry standards of today . . . new designs in software and hardware will make your selection of a Percom Data Hard Disk Drive pay off tomorrow through system compatibility.

A Percom Data PHD works to capacity because we take the time to correctly develop interface software to your computer which leaves no performance holes for you to fall into. Percom Data knows software functionality is the key to hardware performance.

Today, Percom Data PHD supports a variety of software to match your computer:

IBM®-PC, PC DOS™ 1.1 OR 1.0

CP/M-86®, CONCURRENT CP/M-86™

APPLE®, DOS 3.3, CP/M™

TRS-80® MODELS III & I, DOPLUS, LDOS

IMAGINE . . . Percom Data Winchester 5¼" technology . . . for today's computers . . . and tomorrow's.

To receive an informational booklet describing Percom Hard Disk Systems, or to determine if we have a system for your computer call our
Hard-Line Hot-Line at 1-800-527-1222.
We will also give you the name of a nearby authorized Percom Data Dealer.
Dealer inquiries are welcome.

PERCOM DATA
CORPORATION

Expanding Your Peripheral Vision

DRIVES • NETWORKS • SOFTWARE

(214) 340-7081 • 1-800-527-1222 • TELEX: 73-0401 (PERCOM)

IBM® is a registered trademark of International Business Machines. APPLE® is a registered trademark of Apple Computer, Inc.
TRS-80® is a registered trademark of Tandy Radio Shack Corp. PHD is a registered trademark of Percom Data Corporation
COPYRIGHT 1983 PERCOM DATA CORPORATION

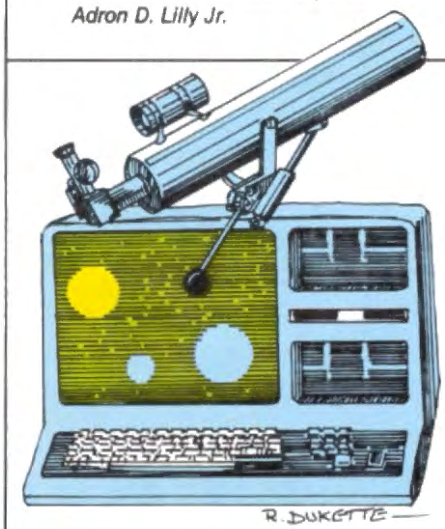
80 Contents

Features

90. Ephemeris for Comets and Minor Planets
Your TRS-80 goes into orbit to project the positions of comets and asteroids.
James H. Fox

100. Molecular Matters
Molecular orbital theories of chemistry are elementary for the Model III.
Karl Sarnow

114. What's Up and When
A program that turns casual skywatchers into celestial experts.
Adron D. Lilly Jr.



136. Life with the Model II
From office management to population management.
David G. Faske

148. Physically Astronomycal
Learn about physics while you tour the stars.
Sam Conviser

186. The Biobox
Monitor and control stress and tension with this Model II biofeedback interface.
J.J. Barbarello

196. Directory of Software Manufacturers and Distributors
Everyone who's anyone in the TRS-80 software world.

Articles

Game

244. In Search of...
Hide words in diabolical puzzles and frustrate your friends.
James Blatt

Hardware

126. Using the Model III I/O Bus
If the Model I's system expansion port had you stumped, here's a guide to its Model III improvement.
James N. Cameron

Review

110. Super Utility Plus 3.1a— The Jaws of Life
New features and more raw power mark the newest SU+.
William D. Allen

160. DOSPLUS 3.5
Micro-Systems Software takes another few steps beyond TRSDOS.
John B. Harrell III

Science

236. Brief Exposures
How's your short-term memory? A tachistoscope program to test your perceptions.
Brian Durell

Model II/12/16

44. Suite 16

90. Ephemeris for Comets and Minor Planets

120. Meet the MC68000

136. Life with the Model II

172. Sorting in Place

186. The BioBox

244. In Search of...

256. Catching Rays

256. Catching Rays
Calculate altitude and azimuth to find the sun's exact position.
Smith Harris

Technique

172. Sorting in Place
What to do when there's no room for a random-access disk file.
George Reardon

Tutorial

120. Meet the MC68000
A look at the Model 16 CPU's features for Assembly programmers.
John Edward Crew

234. Making Hay with Arrays
Random access without disk drives.
Karl Townsend

Utility

252. DATATP
A hybrid Basic and Assembly listing to simplify tape data handling.
Jeff W. Collins

Departments

6. Side Tracks
Copyright, piracy, and the TRS-80 market.
Eric Maloney

8. Proof Notes
Science for the micro masses.

10. Input
Speeding up Andreassen's cipher. CoCo Robot Reader. Z80 versus 68000. Who is Suzuki Hayashki? Structured Basic debate. Scripsit and Pencil Plus patches. Logo computations. Playing Pascal cribbage. Comal.

20. Aid
Missing issues. Model I Vidtex wanted. Law enforcement assistance. Graftrax chip. Stringy editor/assembler.

80 Contents

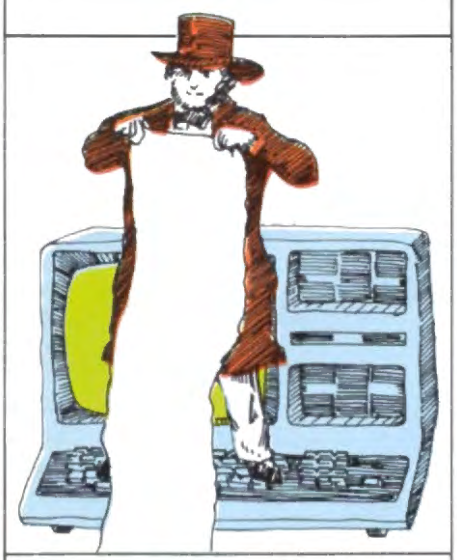
22. Debug
Fixing Strip Blackjack and Profile File Transfer.

24. The Next Step
Restoring June's Model III Restore patch.
Hardin Brothers

36. The Color Key
Indulging a passion for mathematics.
Scott Norman

44. Suite 16
The faster master oscillator.
Dan Keen and Dave Dischert

48. Reviews
Library Support Option. TRS-80 Pascal 2.0. Newbasic. Kuzel II/12/16 games. Guide to WordStar. Mannesmann Tally MT160. Typitall 1.2. *TRS-80 Data Communications Systems.* Project Manager. Clean Slate. PowerDOT.



87. Review Digest
What they're saying about TRS-80 products.

88. Calendar

266. C•Notes
Mighty Write, the *I Ching*, job estimate, grocery list, and Cram 100—print formatting, business, a game, and the *Book of Changes* for Model 100 buffs.

286. News
Texas Instruments' crash and the industry outlook. Microsoft joins Japan. Anti-copy lawsuit. Computer store survey. A networking standard. School micro update. Roger Moore. Free word processor.

302. Reload 80
UTerm and memory error messages.
Amee Eisenberg

304. Copernica Mathematica
Human and machine vision systems.
Bruce Powel Douglass

314. Fun House
Learn Spanish, states and provinces, and the times table.
Richard Ramella

316. Young Programmer's Contest
This should be even bigger than last year's.

324. The Gamer's Cafe
A Florida condo and the Temple of Apshai.
Rodney Gambicus
Charles C. Edwards

330. Feedback Loop
Questions, answers, and occasional opinions.
Terry Kepner

340. New Products
Olivetti paper guide. Manager DBMS. Standby power. Daisy M45 printer. Datalock for CP/M. Color Scribe. Printout basket. Xidex premium disks. The Buffer Box. MITE communications program. Clean your printwheel. Real Estate Analysis. Beeper T-shirts. SuperSoft C.

PUBLISHER/PRESIDENT
Wayne Green
EXECUTIVE VICE PRESIDENT
Sherry Smythe-Green
ASSISTANT TO PRESIDENT
Matt Smith
VICE PRESIDENT/GENERAL MANAGER
Debra Wetherbee
ASSISTANT PUBLISHER
Jeff DeTray
VICE PRESIDENT/FINANCE
Roger Murphy
ASSISTANT TO VP/FINANCE
Dominique Smith
CIRCULATION MANAGER
603-924-9471
Patricia Ferrante
BULK & NEWSSTAND SALES MANAGER
Ginnie Boudreau
ADVERTISING, 603-924-7138
Director of
Marketing & Sales: David Schissler
Sales Manager: Edward Borezo
Sales: Mary Hartwell
Ad Coordinator: Betty Butler

PRODUCTION
Manager: Nancy Salmon
Assistants: Michael Murphy, David Wozmak; Michael Ford, Marjorie Gillies, Alfred Huston, Kimberly Nadeau, Lynn Parsons, Anne Rocchio, Kenneth Sutcliffe, Karen Wozmak; Film Production: Donna Hartwell, Theresa Verville, Robert M. Villeneuve; Ad Coordinators: Patricia Bradley, Paula Ramsey; Assistant: Taylor Morris; Advertising Production: Jane Preston, Fiona Davies, Bruce Hedin, Scott Philbrick
PHOTOGRAPHY
Supervisor: Thomas Villeneuve; Sandra Dukette, Laurie Jennison, Sturdy Thomas
TYPESETTING
Supervisor: Sara Bedell; Darlene Bailey, Prem Gongaju, Lynn Haines, Cynthia Letourneau, Lindy Palmisano, Heidi Thomas, Sue Weller
DESIGN
Supervisor: Joyce Pillarella; Susan Donohoe, Howard Happ, Beth Krommes, Dion Owens, Dianne Ritson, Patrice Scribner, Susan Stevens, Suzanne Torsheya, Sarah Werninger, Donna Wohlfarth; Copywriters: Louis Marini, Gail Morrison, Dale Tietjen, Steve Tripp
DESIGN DIRECTOR
Christine Destrempes

The left bracket, [, replaces the up arrow used by Radio Shack to indicate exponentiation on our printouts. When entering programs published in *80 Micro*, you should make this change.

80 formats its program listings to run 64-characters wide, the way they look on your video screen. This accounts for the occasional wrap-around you will notice in our program listings. Don't let it throw you, particularly when entering assembly listings.

Article submissions from our readers are welcomed and encouraged. Inquiries should be addressed to: Submissions Editor, 80 Pine Street, Peterborough, NH 03458. Include an SASE for a copy of our writers' guidelines. Payment for accepted articles is made at a rate of approximately $50 per printed page; all rights are purchased. Authors of reviews should contact the Review Editor, 80 Pine Street, Peterborough, NH 03458.

Manuscripts are welcome at *80 Micro*. We will consider publication of any TRS-80 oriented material. Guidelines for budding authors are available. Please send a self-addressed envelope and ask for "How to Write for *80 Micro*." *80 Micro* is published monthly by 1001001 Inc., a subsidiary of Wayne Green Inc. Entire contents © copyright 1983 Wayne Green 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.

80 Micro (ISSN 0744-7868) is published 12 times a year by 1001001 Inc., 80 Pine St., Peterborough, NH 03458. Phone: 603-924-9471. Second class postage paid at Peterborough, NH, and additional mailing offices. Subscription rates in U.S. are $36 for one year, $55 for two years, and $75 for three years. In Canada and Mexico $45—one year only. U.S. funds drawn on a U.S. bank. Canadian distributor: Micron Distributors, 409 Queen St. West, Toronto, Ontario, Canada M5V 2A5. BC Canadian Distributor: Compulit, 1122 Fir St., Blaine, WA 98230. Foreign subscriptions (surface mail), $55—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 form 3579 to *80 Micro*, Subscription Services, P.O. Box 981, Farmingdale, NY 11737.

*TRS-80, Scripsit, and TRSDOS are trademarks of Tandy Corp.

Cover by Erick Ingraham

SIDE TRACKS

by Eric Maloney

Don't blame piracy

I've heard several software manufacturers claim recently that piracy is primarily responsible for TRS-80-related companies going out of business or moving to other machines. This may be true in isolated cases, but it's simply not fair to blame the TRS-80 consumer for the industry's current sense of malaise.

We recently included a question on our reader service card that asked people where they acquired most of their software. The results:

From software houses	45.6 percent
From magazines	28.7
Self-written	17.9
Friends, other programmers	6.0
Copy it	1.8

While these figures are open to a lot of interpretation, they seem to show that few people use piracy as the primary means of building their software libraries. Three out of four of the respondents get most of their programs from legitimate commercial outlets, either software houses or magazines.

Piracy is a convenient explanation for the slump in the TRS-80 software market over the last year. But let's not overlook other, far more important, factors.

To begin with, the TRS-80 market has matured to the point where software houses release few fresh, original packages. We've entered a period in which the major software manufacturers are concentrating on revising and improving proven winners. The market for such products is inherently more restricted than it would be for something new.

Second, most consumers have already bought most of the software they need. They've gotten comfortable with their data-base managers and word processors, and are not inclined to spend $150 on a new package.

Third, many TRS-80 users have moved beyond the novice stage, and can write software they previously might have bought.

Finally, the new Radio Shack computers are not designed to encourage a great deal of new and innovative third-party software. The Model 100, for instance, is pretty much a self-contained machine; Radio Shack and the various TRS-80 magazines will provide much of the supplemental software. The Model 4 is an updated Model III, at least until the CP/M market develops, and enhanced Model III packages will constitute much of its software.

In short, then, software manufacturers are selling less because people are buying less, not because pirates are eating up all of their sales.

In a way, I wish piracy were the cause of the software industry's woes. Such a concrete problem could be handled in concrete terms. But the reasons are much more complex. It will take more than better protection schemes and stricter piracy laws to rejuvenate the market.

Property Rights

Speaking of piracy, I got a phone call the other day from the librarian of a computer club out on the West Coast. He wanted to know whether *80 Micro*'s programs are in the public domain, and whether he could therefore add them to his club's library.

Such questions have been on the rise lately. They indicate the consumers' increasing awareness of the software piracy problem. But they also show that many computerists don't have a clear idea of what piracy is.

Put simply, the programs that appear in *80 Micro* are copyright-protected, either by the magazine or by the author. They can't be used by anyone other than the subscriber. You can copy our programs for your own use to your heart's content, but you can't swap them, sell them, give them away, put them on a computer bulletin board, or include them in a computer club library.

Many computerists have gotten the idea that the medium on which a program is recorded affects its copyright status. Not so. A program is copyrighted whether it's on a disk, in a ROM pack, or on a magazine page.

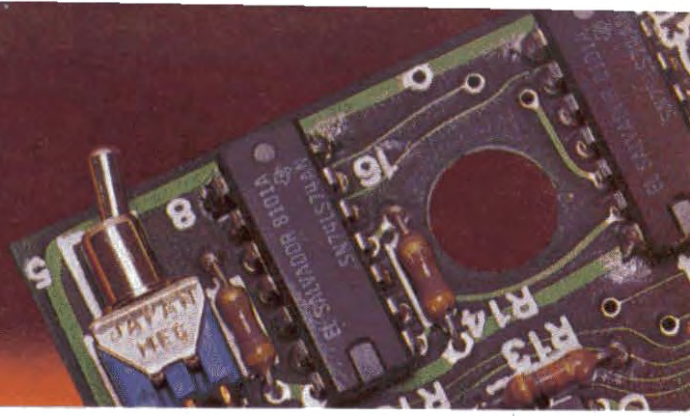
I don't believe for a minute that people deliberately or maliciously try to rip us off. Mostly, they just want to share programs they've found useful. But the programs belong to us and our readers, not to the public at large. ■

Glossary

Below is a glossary of acronyms frequently used in *80 Micro*.

ASCII	American Standard Code for Information Interchange. Character code that refers to the computer's internal recognition of letters, numbers, and symbols.
CP/M	Control Program/Monitor or Control Program for Microcomputers. A disk operating system produced by Digital Research.
CPU	Central Processing Unit. Computer module that retrieves, decodes, and executes instructions.
CRT	Cathode Ray Tube. The television tube used to display pictures or characters.
DIP	Dual In-line Package. A standard integrated circuit package with two rows of pins at 1/10-inch intervals.
DOS	Disk Operating System, such as DOSPLUS, NEWDOS80, TRSDOS, and LDOS.
EPROM	Erasable Programmable Read Only Memory. Usually refers to a PROM that can be reused several times. It's erased with ultraviolet light and then programmed with a special PROM programmer.
K	Kilobytes. 1K = 1024 bytes. Used in referring to computer storage capacity.
RAM	Random Access Memory. This is the primary storage area of a computer. The information in RAM is lost when power is disconnected.
ROM	Read Only Memory. This information cannot be changed and is not lost when the power is off.

THE SWITCH



SWITCH TO 5¼" 8" DOUBLE DENSITY

LNDoubler 5/8

FEATURES

- 5- and 8-inch* disk drives
- Single- & double-density
- Any size and density in any mix
- Read Model I, II* and III disks
- 5- or 8-inch* system disk
- Single & double sided disk drives
- DOS+ 3.3.9 included, with Disk BASIC.
- 6 month warranty
- Up to 3.75 megabytes online
- Easy installation – plug-in & run
- Analog phase lock loop data separation
- Precision write precompensation
- Regulated power supply
- Guaranteed operation at 4MHz
- All contacts gold plated
- Solder masked & silk screened
- Runs under DOS+ 3.3.9, TRSDOS 2.3, NEWDOS 2.1, NEWDOS/80 1.0, LDOS, NEWDOS/80 2.0, and ULTRADOS
- Reads 40- and 35-track disks on 80-track drives
- FD1791 controller + your FD1771
- Fits Model I expansion interfaces
- Fits LNW expansion interfaces
- Track configurations to 80-tracks
- 5 inch disk storage increased to:
  161,280 bytes – 35-track SS/DD
  322,560 bytes – 35-track DS/DD
  184,320 bytes – 40-track SS/DD
  368,640 bytes – 40-track DS/DD
  368,640 bytes – 80-track SS/DD
  737,280 bytes – 80-track DS/DD
- 8 inch disk storage increased to:
  591,360 bytes – 77-track SS/DD
  1,182,720 bytes – 77-track DS/DD

SS: single-sided DS: double-sided
SD: single-density DD: double-density

COMPLETE – The *LNDoubler 5/8*, switches your Model I or LNW-80 into the most versatile computer you can own. The LNDoubler's switch allows you to boot from 5- or 8-inch system disks, and it's accessible from outside the interface. The *LNDoubler 5/8* comes with a double-density disk operating system (DOS+ 3.3.9), complete with BASIC and utility programs . . . ready to run your software NOW!

VERSATILE – Whether you want single-sided, double-sided, single- or double-density, 5- or 8-inch operation, complete versatility is here today! Any combination of 5- and 8-inch disk storage is possible with the *LNDoubler 5/8*. Each of your present 40-track, single-sided 5-inch drives will store up to 184,320 bytes (formatted storage) – that's an 80% increase in storage capacity for only half the cost of just one disk drive. With three 8-inch double-density, double-sided drives your Model I will have 3.75 Megabytes of online storage – that's more storage than a Model II or Model III!

ADVANCED – The *LNDoubler 5/8* is the most technically advanced, tested and reliable double-density board you can buy. The *LNDoubler 5/8* has more features, more options and more software support than any other product of its kind.

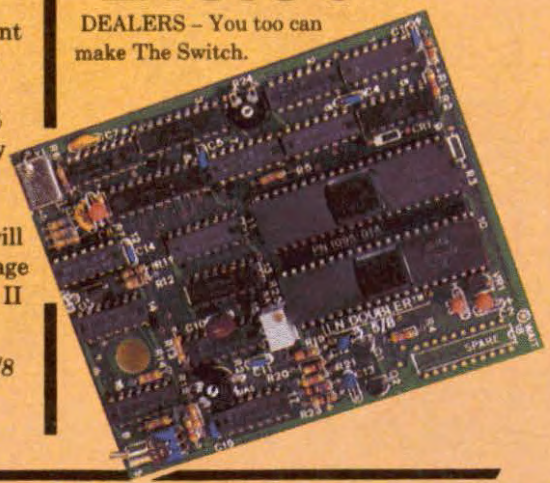
EASY TO INSTALL – The *LNDoubler 5/8* is easy to install. There are no traces to cut, no wiring to do, just a screwdriver and a few minutes of your time is all that is required. The instructions are fully illustrated for all interfaces. In minutes you will be 'up-and-running', and enjoying your computer as never before.

COMPARE – Compare features, compare quality, compare value, and make the **SWITCH** today!

Immediate delivery from stock – at your dealer **NOW** for only

$219.95

DEALERS – You too can make The Switch.



LNW RESEARCH CORPORATION

2620 WALNUT Tustin, CA. 92680 (714) 544-5744 (714) 641-8850

*8" drive operation requires special cable, 8" double-density requires 3.55MHz CPU speed-up modification or LNW-80 4MHz computer.

TRS-80 is a trademark of Tandy Corporation.

PROOF NOTES

The editors look at the issues

MANAGING EDITOR
Eric Maloney
SENIOR EDITOR (EDITORIAL)
Peter E. McKie
SENIOR EDITOR (PRODUCTION)
Deborah M. Sargent
NEWS EDITOR
Eric Grevstad
REVIEW EDITOR
Lynne M. Nadeau
NEW PRODUCTS EDITOR
S.F. Tomajczyk
ASSISTANT EDITORS
Amy Campbell
Susan Gubernat
Robert L. Mitchell
EDITORIAL INTERN
Justina Alsfeld
TECHNICAL EDITORS
Bradford N. Dixon
Amee Eisenberg (Load 80)
Mare-Anne Jarvela
Beverly Woodbury
PRODUCTION EDITOR
Susan Gross
LAYOUT EDITORS
Joan Ahern,
Bob Dukette, Phil Geraci,
Maurelle Godoy, Sue Hays,
Laura Landy, Judy Oliver
PROOFREADERS
Peter Bjornsen,
Harold Bjornsen,
Robin Florence, Ellen Hardsog
EDITORIAL ADMINISTRATION
Carole Macioci

Editorial:
Send all correspondence to *80 Micro*, Pine St., Peterborough, NH 03458.
Subscriptions:
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 Lori Eaton, 80 Pine St., Peterborough, NH 03458.
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 Ginnie Boudrieau, Bulk Sales Manager, *80 Micro*, Pine St., Peterborough, NH 03458. (800) 343-0728.

Science comes home

Magazine publishing is a service industry; the point is to determine reader interest and provide information on those subjects. We're 15 people in Peterborough, trying to second-guess 150,000 TRS-80 owners around the world.

Fortunately, we don't work alone. You tell us your interests by writing letters, filling out Reader Service cards, submitting articles, and answering surveys. We know, for instance, that you like science. Our last science issue, in November 1982, beat that year's games edition as a newsstand best-seller. Scientific articles attract fan mail, and science consistently does well in Reader Service polls.

Even though *80*'s readers tend to be more technically oriented than other magazines', your interest in science seems out of proportion: Most of you don't wear lab coats to work. Few of you need a tachistoscope for short-term memory experiments, and few are astronomers who have to keep track of the sun's altitude and azimuth.

The reason you appreciate scientific applications, we suspect, has to do with a broader interest: You appreciate the impact of microcomputers. The micro has done what Jacob Bronowski did in *The Ascent of Man* and Carl Sagan did in his *Cosmos* television series; it has promoted the democratization of science.

It's commonplace to observe that home computers have brought the computing power of the UNIVAC days into the familiar confines of the living room. But in admiring the increased number and accessibility of computers, we sometimes overlook the more important spread of computers' capabilities or applications.

Something like VisiCalc would have been secret Pentagon property not long ago. Children using Bank Street Writer will never know—or will take for granted—just how remarkable, sophisticated, and recent is the concept of word processing. Things that used to belong to men in lab coats are now available at your corner Radio Shack store.

Science, an arcane discipline to many people, is a prime candidate for micros' process of familiarization. Tachistoscopes used to be found only in universities' psychology labs; altitude and azimuth calculations were laboriously recorded in astronomers' libraries.

Your TRS-80 and the programs in this issue can bring this privileged information home, whether or not you're specifically in the market for it; you may not care about Hueckel's molecular orbital theories, but you might be intrigued by the logic behind Karl Sarnow's chemistry tutor (p. 100). "So that's it," you say. "With my micro to handle the details, I can see what those scientists do. It's not so baffling after all."

In fact, *80 Micro* readers are rather like scientists, in that both groups tend to make discoveries or complete projects and then rush to publish the results in their favorite journal. Science is devoted to the sharing of information among the largest possible audience; the micro not only transmits information, but helps people understand it. ■

—E.G.

MICRO DATA SUPPLIES

22295 Euclid Avenue Euclid, Ohio 44117

FOR ORDERS ONLY CALL 1-800-321-3552

IN OHIO and all other inquiries call (216) 481-4993

UP TO 40% OFF

TANDON

CLEARANCE • CLEARANCE • CLEARANCE • CLEARANCE • CLEARANCE

WAREHOUSE SALE!

TOLL FREE
1-800-321-3552

BARE DRIVES

This Month's Special OEM Version of Shugart SA455 (2S, 40/40) Slimline $219.00

Manufacturer	Model	No. of Heads	No. of Tracks	Full or Slimline	Price
Tandon*	5¼" TM100-1	1	40	Full	$179.00
Tandon*	5¼" TM100-2	2	40/40	Full	249.00
Tandon*	5¼" TM100-4	2	80/80	Full	329.00
MPI*	5¼" Model 51	1	40	Full	179.00
MPI*	5¼" Model 52	2	40/40	Full	239.00
MPI*	5¼" Mdl 501	1	40	Slimline	179.00
MPI*	5¼" Mdl 502	2	40/40	Slimline	239.00
MPI*	5¼" Mdl 902	2	80/80	Slimline	329.00
MPI**	8" Mdl 41	1	77	Slimline	399.00
MPI**	8" Mdl 42	2	77/77	Slimline	499.00

For TRS-80, Heath, Zenith, IBM and Others

* For complete Case and Power Supply add $64.95 ** For dual case and power supply add $99.95

MODEL III & IV
RS-232 Communication

DIRECT REPLACEMENT FOR RS-232, FULLY TESTED & BURNED IN, EASY INSTALLATION, 120 DAY WARRANTY.

RS-232..... 78.95

MODEL IV — 64K
MEMORY EXPANSION

GUARANTEED 1 FULL YEAR

SET OF 8

4164 RAM CHIPS 69.95

SPRINTER
DOUBLE YOUR SPEED

Speed-up cuts computer operation time in half, saves time and money. Fast4 MHz Z80B CPU included, installs in 15 minutes with no soldering or cutting.

SPRINTER III for MOD III $95.95
SPRINTER I for MOD I $95.95

PRINTER BUFFERS

QUADRAM MICROFAZER

Parallel to Parallel w/8K	$149.00
Parallel to Serial w/8K	179.00
Serial to Serial w/8K	179.00
Serial to Parllel w/8K	179.00
Each Add'l 8K Upgrade	10.00

All come with pause control and copy feature, and can be upgraded to 512K.

PRACTICAL PERIPHERALS

MPB/EPSON w/16K	$149.00
MPB/EPSON w/32K	189.00
In-Line Parallel or Serial w/32K	289.00
In-Line Parallel or Serial w/64K	339.00

WE ACCEPT
- Visa
- MasterCard
- Checks
- Money Order
- C.O.D.

ALL PRICES ARE FOR MAIL ORDER ONLY Prices, Specifications and Offerings subject to change without notice.

ADD $3.00 FOR SHIPPING & HANDLING $6.00 Extra for C.O.D. Orders Ohio Residents add 6.5% Sales Tax

MOST SCHOOLS AND GOVERNMENT PURCHASE ORDERS ACCEPTED

ISN'T IT TIME YOU SCORED . . .WITH SCOREPAC!™

Get a **SCORE** of diskettes in a sturdy, new **PAC** and **SAVE!**

LIMITED TIME OFFER

Buy **ANY** SCOREPAC™ at its regularly advertised price and you're entitled to purchase a 5¼" File Box for the added cost of only $17.95.*

*Limit 1 File Box per SCOREPAC™

SCOREPAC™ w/20 Paragon Plain Jane™ Diskettes
1S/DD **$38.95**

SCOREPAC™
w/20 Paragon Gold Diskettes
1S/DD **$46.95**

SCOREPAC™
w/20 Paragon Gold Diskettes
2S/DD **$56.95**

Verbatim.

PREMIUM DISKETTES AT AFFORDABLE PRICES

DATALIFE™
VERBATIM DATALIFE™ DISKETTES

Seven data-shielding improvements mean greater durability and longer data life.

VERBATIM DATALIFE DISKETTES
5¼-inch (box of 10)
MD525-01
1S/D Den

SPECIAL! $25.95

Soft-Sectored Diskettes

5¼" 2S/D Den (MD550-01)	$39.95
5¼" 2S/4 Den (MD557-01)	$51.50
8" 1S/D Den (FD34-8000)	$43.95

PARAGON
Gold magnetics DISKETTES

Diskettes in both Single AND Double Sided, Soft AND Hard Sectored, all with reinforcement hub rings. Individually 100% ERROR-FREE certified. Invest in GOLD!

Paragon Plain Jane™ (1S,SD)	$19.95
Paragon Plain Jane™ (1S,SD) Scorepac™	$38.95
Paragon Gold (1S,DD)	$23.95
Paragon Gold (1S,DD) 10 Sector	$23.95
Paragon Gold (1S,DD) Scorepac™	$46.95
Paragon Gold (2S,DD)	$29.95
Paragon Gold (2S,DD) Scorepac™	$56.95

See List of Advertisers on Page 323

INPUT

Speedin' It Up

You ran an informative article by Karl Andreassen on counting and graphing cipher letter frequencies (June 1983, p. 190). He included a good program but one section of it runs so slowly that it may be discouraging to readers interested in experimenting with decipherment.

Andreassen generates an A–Z alphabet as a string and then compares each letter of the cipher text to each letter of the string with a MID$ function. There's a faster way to count letter frequencies.

After generating 200 random letters, Program Listing 1 shows that the Andreassen double loop takes about 15 seconds to find the frequency of each letter, whereas a simple single loop (line 100) does it in five seconds.

The listing is written in Basic, but cassette-based programmers can try it by eliminating the references to TIME$ and timing the loops as the dots proceed across the screen.

Charles Leedham
P.O. Box 1063
Woodland Hills, CA 91365

```
10 'ANDREASSEN/LEEDHAM LETTER-FREQUENCY COUNTING LOOPS
20 CLS:CLEAR2000:DEFINTA-Z:DIMC$(1000),A$(26),B(26),D(26)
30 N=200
40 PRINT"GENERATING RANDOM LETTERS";:FORX=1TON:C$(X)=CHR$(RND(26
)+64):PRINT".";:NEXTX:PRINT""
50 PRINT"ANDREASSEN METHOD";:AN$=TIME$
60 FORX=1TO26:A$=A$+CHR$(X+64):NEXTX
70 FORI=1TON:PRINT".";:FORJ=1TO26
80 IFC$(I)=MID$(A$,J,1)THENB(J)=B(J)+1
90 NEXTJ,I:PRINT"":PRINTAN$:PRINTTIME$
100 PRINT:PRINT"LEEDHAM METHOD";:LE$=TIME$
110 FORX=1TON:L=ASC(C$(X))-64:D(L)=D(L)+1:PRINT".";:NEXT
120 PRINT"":PRINTLE$:PRINTTIME$
130 END
```

Program Listing 1. Deciphering made quicker.

```
                    00110 ;          DIREC/CMD
                    00120 ;          FROM 'TRSDOS READY'TYPE:
                    00130 ;          DIREC :D
                    00140 ;          WHERE D=DRIVE
                    00150 ;
                    00160 ;          FROM THE MOD III VERSION
                    00170 ;          BY CARL ANDERSON
                    00180 ;          80 MICRO 12/82 P.32
                    00190 ;
FFF0                00200 ;          ORG     0FFF0H
44A9                00210 ; DSPDIR   DEFL    44A9H
402D                00220 ; JP2DOS   DEFL    402DH
FFF0   3AE144       00230 ;          LD      A,(44DAH+7H)
FFF3   DD212B44     00240 ;          LD      IX,442BH
FFF7   DD7700       00250 ; LD     (IX),A
FFFA   CDA944       00260 ;          CALL    DSPDIR
FFFD   C32D40       00270 ;          JP      JP2DOS
FFF0                00280 ;          END     OFFFOH
00000   TOTAL ERRORS
DSPDIR   44A9 00210        00260
JP2DOS   402D 00220        00270
;FOR 32K USE 0BFF0H
;DISPLAY DIRECTORY CALL
;TRSDOS READY ADDRESS
;GET 7TH BYTE
;THESE TWO LINES PUT A
;INTO 442BH FOR DSPDIR
;DISPLAY DIRECTORY
;BACK TO TRSDOS
;FOR 32K USE 0BFF0H
```

Program Listing 2. Robot Reader in color.

StickSHIFT

This is a request to software authors—especially those who write games in Assembly language. Since the Model I/III/4 uses SHIFT@ to pause the execution of a Basic program, please stick to that convention to put a pause function in games instead of S (for stop) or P (for pause).

Also, please put a zero in 14308 decimal (37E4 hexadecimal (hex)) to select cassette drive 1 on the Model I for sound output.

Dave McGlumphy
4429 Paula Lane
Red Bank, TN 37415

CoCo Conversion

I was disappointed to learn that Charles Gillen's "Robot Reader" (June 1983, p. 302) doesn't run on my Color Computer. Program Listing 2 includes modifications so the program runs on a 16K Basic CoCo.

Ross Guberman
344 Weatherstone Lane
Marietta, GA 30067

Model 16 Program Flaws?

"Programming the Model 16" by Dan Keen and Dave Dischert (June 1983, p. 244) was badly flawed by inaccuracies and typographical errors.

The address registers are numbered A0–A7 and the data registers D0–D7, rather than as explained in the article.

In explaining the power of the instruction set compared to the Z80, the authors came up with a routine to move

MICRO DATA SUPPLIES

22295 Euclid Avenue Euclid, Ohio 44117

FOR ORDERS ONLY CALL 1-800-321-3552

IN OHIO and all other inquiries call (216) 481-4993

INTRODUCING AIDSPLUS™

FOR PEOPLE YOU HAVE THEIR OWN IDEAS ABOUT WHAT AN INFORMATION MANAGEMENT SOFTWARE PROGRAM SHOULD BE.

Ninety percent of the computer users in this country suffer anxiety, insecurity and sweaty palms at the mere thought of using a personal computer. Even though they know a personal computer can assist in innumerable ways and increase their productivity dramatically. Enter a remarkable new software program that makes a personal computer so easy to run that it can make you productive during your first encounter. All those horror stories you've heard about how long it takes to learn to use computer software or how the commands are all in code, etc.. You can now forget.

Now with Aidsplus™ you can experiment, recalculate and look at data in an endless variety of ways. As fast as your mind can think up new possibilities. With no lag between you and the computer. That's a new kind of power — That's greater than the sum of its programs. Power that makes Aidsplus™ such a remarkable new thinking tool for the professional as well as the beginner.

CHECKBOOK
LABELS/FORMS/MERGE
A/P A/R INV. BUSINESS
SCHEDULE
DATA SORT/INDEX

ALL INCLUDED FREE!

RUNS ON
TRSDOS • NEWDOS 80 • LDOS
AND MANY MORE!

With Aidsplus™, you can be using a personal computer in a very surprisingly short time. Even if you've never been near one before. Aidsplus™ instructs you right on the computer's screen in a friendly, helpful way, so you learn as you go along. Everything is in english, not code, so there's no new language to learn. And there's a special help key you can press to put instructions on the screen if you can't remember what to do next. As a result you will make better decisions. You make them faster and become much more effective. And yet, Aidsplus™ is so easy to use, you won't find a simpler software program anywhere. All in one fast, easy to use package. Aidsplus™ is an electronic filing cabinet that puts practically unlimited information at your fingertips instantly.

SPECIFY MODEL I, III or IV..... $99.95

SATISFACTION GUARANTEED!

Every AIDS™ module is guaranteed to out perform all other competitive systems at a fraction of their cost. If you are not satisfied with AIDS™ for any reason, you may return it within 30 days for a refund.

NEWDOS/80 Verson 2.0

FLOPPY DOCTOR INCLUDED

Model I and Model III

The hottest Disk Operating System is now available in its latest verson. This is the ONE from Apparat, Inc., the people whose systems have made the TRS-80 the reliable computer.

$139.95

NEWSCRIPT 7.0

NEWSCRIPT is the versatile TRS-80 word processing program. It supports "smart" printers like the Epson, Okidata, NEC, C Itoh, Spinwriter, centronics 739 and more

NEWSCRIPT . . . $109.95

GEAP/Dotwriter

GEAP lets you create words and drawings quickly and easily, right on the screen of your TRS-80

"DOTWRITER" uses high-resolution "dot graphics" to create fancy lettersets.

Special:
GEAP AND DOTWRITER $84.95

DATAGRAPH

Transform your VISI-CALC™ files into high-resolution custom graphs on your TRS-80™ computer and graphics printer. Super 3rd generation printer graphics program.

DATAGRAPH $74.95

Let your TRS-80™ Test Itself With

THE FLOPPY DOCTOR & MEMORY DIAGNOSTIC

DISK DRIVE & MEMORY DIAGNOSTIC PROGRAM

by David Stambaugh

A complete checkup for your MODEL I or MODEL III. THE FLOPPY DOCTOR-Version 3 completely checks every sector of single or double density 35-, 40-, 77-, or 80-track disk drives. Tests motor speed, head positioning, controller functions, status bits and provides complete error logging. THE MEMORY DIAGNOSTIC checks for proper write/read, refresh, executability and exclusivity of all address locations. Includes both diagnostics and complete instruction manual.

For MODEL I..... $24.95
For MODEL III $29.95

WE ACCEPT
- VISA
- MASTER CHARGE
- CHECKS
- MONEY ORDERS
- C.O.D.

ADD $3.00 FOR SHIPPING & HANDLING
$5.00 Extra for C.O.D. Orders
Ohio Residents add 6.5% Sales Tax

See List of Advertisers on Page 323

1 byte worthy of the Intel 8008 chip of late memory. Even an 8080 can load the accumulator directly from a memory address, and the Z80 does it like this:

```
LD      A, (source address)
LD      (destination of address), A
```

The HL or DE pairs can be loaded in the same way, giving a 2-byte, two-instruction move. A block move of any length can be implemented in four instructions using the LDIR instruction.

Of course the 68000 is more powerful, flexible, and faster than the Z80. But let's be accurate in our comparisons and fair to the Z80. For its day it was a good chip and for nonbusiness it's still a valid method of computing.

Peter H. Granzeau
315 Martha Lee Drive
Hampton, VA 23666

Authors' Answer

Mr. Granzeau is correct that the address registers are A0–A7 and the data registers are D0–D7. Somewhere between our typewritten page and the printed page, words were accidentally changed.

Regarding our Z80 comparison, there are certainly many ways to get the same result. We could pick up any issue of any magazine and rewrite every program in it a dozen different ways. However, we used a comparison which conformed to our Z80 programming practices. Your way, while the shortest and quickest method, is rigid. It moves one source to one destination. Ours is flexible in that you can move HL and DE to different places.

We did not intend to take away any pride from the Z80, which is a fantastic microprocessor, but wanted to present a simple layman's contrast between the two devices.

Dan Keen and Dave Dischert
139 Mimosa Drive
Rio Grande, NJ 08242

Tail Wagging the Dog

Kudos to Jake Commander for his musings on structured programming (February 1983, p. 37). That hot air balloon needed a pin stuck in it. Pascal is highly structured because it was designed that way, so it's easy to show that writing structured code with it produces better code. Such demonstrations are mere tautological, self-referential word games. As long as a Z80 calls or jumps to numbered addresses moving upstream and downstream in the code, the structuralist believes in a fiction.

Anyway, why should we let the tail (language) wag the dog (us)?

I'm writing this with the new Model 100 on my lap while sitting in an easy chair. The future is here.

Allan Stark
P.O. Box 02039
Detroit, MI 48202

Memory Map Memo

I am a new Model 100 owner and the article by John Berman (July 1983, p. 158) was very informative. I'm curious about the memory map on p. 163, particularly address 63897. Is "Suzuki Hayashki" a new Microsoft Basic command?

Bob Rosen
President
Spectrum Projects
93-15 86 Drive
Woodhaven, NY 11421

That's a good question. Berman says he has no idea what it means and that it's just an idiosyncracy of the machine that was in the directory. The memory map was written in Japan by Microsoft so it could be anything, including a copyright trap. Any guesses out there?—Eds.

Basic Dispute

I just finished reading the first article of the series, "Basic, Faster and Readable," by John Corbani (June 1983, p. 104).

I am an advocate of structured programming, and I see the need for clearer and more understandable programs. I agree with Mr. Corbani concerning the need to make Basic more readable, but he makes several statements that I feel must be corrected for the sake of proper Basic program structure.

Mr. Corbani states that TRS-80 Microsoft Basic does not require the use of an argument with a Next statement. This is correct, but failure to use an argument with each Next statement makes the program unnecessarily hard to understand, especially when you use complex program looping structures. Also, this makes programs harder to convert among systems because this isn't a standard feature in all interpreters.

Mr. Corbani explains that remark statements are important in programs to document major blocks of subroutines or code. An important aspect of any program is the proper documentation of the written code. I disagree that placing remark statements in Basic code immediately in front of executed line numbers results in no system overhead.

The Basic interpreter stores all programs in tokenized or prescanned format, leaving each of the characters following the remark token as 1 byte in the computer's memory. To execute any program, the interpreter must scan the entire program store looking for the appropriate line numbers to execute.

Remark statements written in a block of executable code require "skipping" to determine the location of the following line. Any remark statement added to a Basic program adds to the system overhead while executing the program. Remarks written using the single apostrophe in place of the remark token require 3 bytes of storage as opposed to the 2 stated by Mr. Corbani.

Mr. Corbani advocates the use of POKE statements to set the system cursor at location 4020 hex to the appropriate value versus the use of the Basic "PRINT @" statement. The simple statement he provides as an example,

```
POKE 16417, 60: POKE 16416, 0
```

requires 28 bytes of storage, two calls to the command interpreter and four calls to the ASCII-to-binary number conversion for each Basic execution versus the one call to the command interpreter, one call to the number conversion routine, and 11 bytes of memory required by the equivalent statement: PRINT@,; used in the program.

Mr. Corbani also incorrectly uses the CHR$ command in place of the STRING$ command to demonstrate screen positioning by cursor control characters. The correct statement should be:

```
PRINT CHR$(28);STRING$(2,26); STRING$;
```

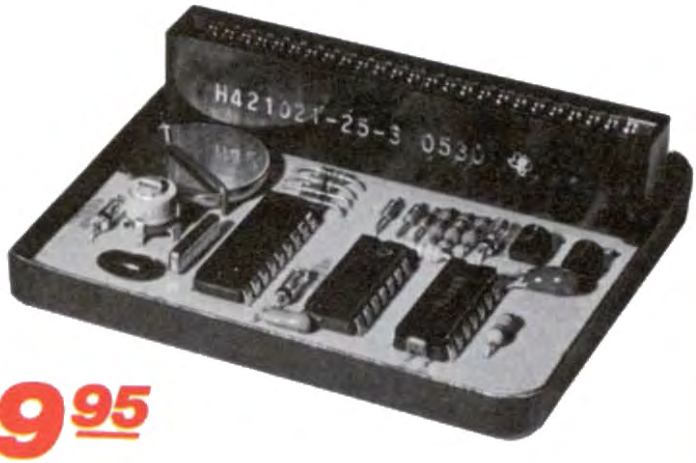
The technique he uses is valid but it's much faster to assign cursor movement strings to a string variable, such as

```
A$ = CHR$(28) + STRING$(2,26) + STRING$
(2,25): PRINT A$;
```

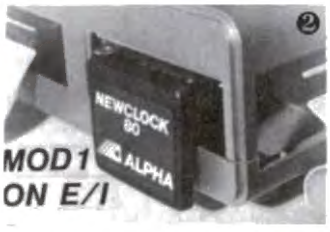
NEWCLOCK-80

THE RIGHT TIME AT THE RIGHT PRICE

MODEL I **MODEL III**



$59.95



Wouldn't it be nice if your computer could always boot up with the right time and date and then stay accurate. Newclock-80 will enhance your Model I or III system with powerful clock/calendar/timer functions.

Using LSI (large scale integration) and custom circuits, Newclock-80 provides MO/DATE/YR, HR:MN:SEC plus AM/PM and day of week and even takes care of leap years! It continues to keep time and date with quartz accuracy when the computer is turned off or experiences a power failure. A single battery lasts over 2 years.

Compatibility: Newclock-80 is compatible with any operating system, including DOSPLUS, NEWDOS, LDOS. With its fully decoded circuitry it will work with any other hardware you may own. Bus expanders are available.

Installation is very simple, no tools, no disassembly, no soldering. Just plug it in, that's all. There is no power supply or messy cable. Newclock-80 plugs into the rear of the keyboard ❸ or side of the Exp. Int. ❷. Model III Newclock fits the 50 pin card edge (underneath) ❶

The Software: Newclock-80 is as easy to use as it is to install. -"SET", a Basic program, is used only once to set the time and date and select 12 or 24 hour format. -"TIMESTR", also in Basic, patches your computer "TIME$" function to read Newclock-80. It also adds "TIME$" to keyboard-only systems, a short routine is simply "poked" into low memory.

Newclock-80 uses 12 ports (176 to 188): 6 for the time, 6 for the date. The data is conveniently stored in decimal form, no conversion is needed. You can read or modify any digit using simple Basic "INP" and "OUT" statements.

No risk trial. Order your Newclock-80 today, see how easy it is to install and operate then decide within 30 days if you want to keep it. If for any reason you are not delighted with its quality and performance, you may return it for a prompt and courteous refund.

Your unit will come complete ❹ with software on tape, detailed instructions, handy reference card, and a 90 day warranty. Specify Model I or III. Software is also available on disk: add $5. Lithium battery (not included) available from RADIO SHACK (#23-162) or add $1.50 to your order.

Thanks to outstanding engineering and efficient manufacturing, ALPHA Products is once again able to offer a great product at a surprising price. Order your Newclock-80 at no obligation today.

Toll Free Order Line

800-221-0916

Orders Only, NY & Info call (212) 296-5916. Hours: 9-5 E.S.T.

ALPHA Products

79-04 Jamaica Ave., Woodhaven, NY 11421 ⌐17 **(212) 296-5916**

ADD $2.50 PER ORDER FOR SHIPPING AND HANDLING.
WE ACCEPT VISA, MASTERCARD, CHECKS, M.O.
C.O.D. ADD $3.00 EXTRA.
NY RESIDENTS ADD SALES TAX.
OVERSEAS, FPO, APO: ADD 10%.
DEALER DISCOUNTS AVAILABLE.

```
0-40  No changes
50  G$=RIGHT(B$,4):IFG$="DED" or G$="DED." or G$="TED" or
G$="TED." THEN90
60  G$=RIGHT$(B$,3):IFG$="LE" or G$="LE." THEN90
70  IFG$="ED" or G$="ED." THENS=S-1:GOTO90
80  G$=RIGHT$(B$,2):IFG$="E" or G$="E." THENS=S-1
90  IFA$=D$ THENN=N+1:IFS>2 THENL=L+1
100 IFA$=C$ THENW=W+1:IFS>2 THENL=L+1
110 IFA$=C$ or A$=D$ THENT=T+S:S=0
120 IFA$=E$ or W>QANDA$=D$ THEN140ELSEA$="":GOTO20
130 REM
140 No change
150 Change TAB(20) to TAB(10)
160-260 Change ALL TAB(13) to TAB(5) and USINGF to
USING"###.#"
300-310 Change USINGF to USING"###.#"
320 PRINT"<ENTER> to TESTANOTHERSAMPLE"
330 Change E to E$
340 No change
350 REM
370 C$=CHR$(32)
380 D$=CHR$(46)
390 E$=CHR$(13)
400 REM
410-460 No changes
470 Print "PRESS ENTER"
480 IFINKEY$<>E$ THEN480
490-520 No changes
```

Program Listing 3. Scripsit patch.

If this positioning is used in the program, then all that's required is a simple PRINT A$; statement.

Corbani's use of the tab characters in the decimal range of 192–255 is incorrect. The cursor tab functions begin with zero spaces tabbed with a value of 192 and tab spaces for additional value. For example, the value of 202 (192 + 10) causes a tab over of 10 spaces.

I am glad to see an interest in the structuring and neat formatting of Basic programs to increase user comprehension.

Lt. Cmdr. J.B. Harrell III
Quarters 192-A
Portsmouth Naval Shipyard
Portsmouth, NH 03801

Corbani Responds

Constructive criticism does a lot of good, and I would like to comment on the subjects in the order presented.

Next: MBASIC is the standard Z80 Basic, and doesn't require the variable after Next. Use options only where readability is improved.

Remark statements: I agree, all code not necessary to the execution of a program is overhead. But a single remark statement at the beginning of a routine is better than five remark statements scattered throughout the routine.

Jumping over a remark statement saves one line of interpretation. Scanning is fast and interpretation is slow. Remark statements using a single quote add a leading colon in addition to the 2 bytes I mentioned. This can add 2 bytes to the program rather than the 1 byte I indicated. It depends on the context.

POKE: Harrell missed the point in the example. I was trying to show an alternate way to position the cursor. POKEing a variable into a DCB is faster than some other ways of changing location.

CHR$ vs STRING$: Guilty as charged. Sorry.

Composite strings are faster: agreed. I stressed that point in the article's last paragraph.

TAB (192–255): The typo gremlin got to Harrell too. I was referring to CHR$(192–255), but he is right about the count: 192 = 0 spaces and 255 = 63 spaces.

I hope other readers with constructive comments help out with other articles in the series.

John Corbani
2455 Calle Linares
Santa Barbara, CA 93109

AIDS III Improvement

I have used AIDS III (Version 1) for two years, and while it is an excellent program, its disadvantages are annoying. Although the sort routine is fast, the characters are processed slowly, the garbage collection process stops the cursor for periods of time, and loading a file from disk is also delayed by the process.

The preliminary Version 2 is now out and my response is WOW! Keyboard input is accepted at the fastest rate I can type, loading from disk and saving to disk are very fast and the sort is now literally instantaneous.

The machine-language Version 2 meets all of my objections to Version 1, and AIDS III users who have not ordered the update should do so.

Dick Richards
20245 Bedford Road
Battle Creek, MI 49017

Patching Scripsit

I enjoyed Carl Oppedahl's review on the Model I Radio Shack Double-Density Disk Kit (May 1983, p. 282), but there is a simpler 2-byte patch for Scripsit 1.0 that returns the computer to TRSDOS Ready:

PATCH SCRIPSIT/LC (R = 20, B = 230, F = 0000, C = 2D40)

Using the FILFIX utility, you can make another patch to Scripsit. Beginning at byte 63 hex of the first record, the code reads:

7C 21 FF 00 25 7E 2F 77 AE 20 F9 22

but should be changed to read:

7C 2A 49 40 00 00 00 00 00 00 00 22

This is a patch from Apparat which sets Scripsit's high memory address equal to the DOS HIGH$ stored at locations 4049–404A hex. It is needed since TRSDOS 2.7 double density (DD) uses a high memory keyboard and video driver.

I wrote Program Listing 3 to work under 2.7DD. It is a modified version of one you printed for the Model II in December 1982 (p. 130). Users of 2.7DD should check with Radio Shack about version 2.8.0. This is the latest version of the DOS and includes fixes

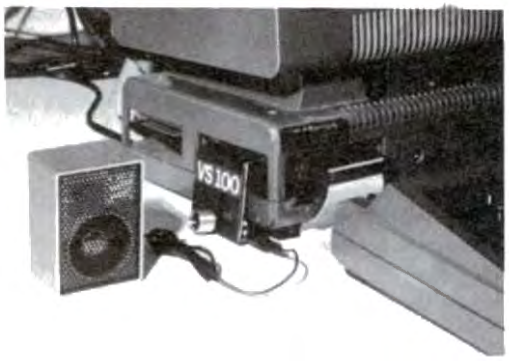
NOW IT'S TALKING

VS 100

VOICE SYNTHESIZER FOR MODEL I,III,IV and Coco

- ☑ Unlimited vocabulary.
- ☑ Automatic inflection.
- ☑ Proven VOTRAX technology.
- ☑ We use the famous VOTRAX SC01 phoneme synthesizer. 4 programable pitch level.
- ☑ Built in audio amplifier with volume control. (The Color Computer version speaks through the TV speaker)
- ☑ You can add voice to any basic program in minutes.
- ☑ Super efficient: one single line in Basic will produce a full sentence!
- ☑ Works with any speaker (or add $5.95 for handsome speaker module).
- ☑ Price breakthrough: same performance as units costing hundreds of dollars.
- ☑ Pronunciation dictionary included for hundreds of common words.
- ☑ Voice editor will help you create unlimited number of words, sound effects, etc..
- ☑ Hundreds of applications —now cost effective in education, robotics, speech therapy, monitoring, games, aid to handicapped, security, prompting.... .
- ☑ Fully assembled and tested, 90-Day warranty.
- ☑ Ready to plug in and talk.
- ☑ As usual our 15-day money back guaranty protects you.

$69.95



Order # C201 for MODEL I
C203 for MODEL III or IV
C205 for COLOR COMPUTER

Price includes SYNTHESIZER MODULE, POWER SUPPLY, INSTRUCTIONS, EDITING AND DEMO SOFTWARE. $69.95
SPEAKER MODULE (not needed for coco version) not included, add $5.95

▪▪▪▪▪▪▪▪SUPER CONTEST▪▪▪▪▪▪▪▪

WIN $1000 + ROYALTIES FOR THE BEST TALKING GAME
+ WIN $1000 FOR THE BEST "SERIOUS APPLICATION" SOFTWARE
Send S.A.S.E. For contest details.

REVIEWERS: This is truly a remarkable product at an incredible price. We need your help to review it in all the major computer publications. Please send us a note if you are interested.

TIMEX SINCLAIR USERS:
There is a version for you.

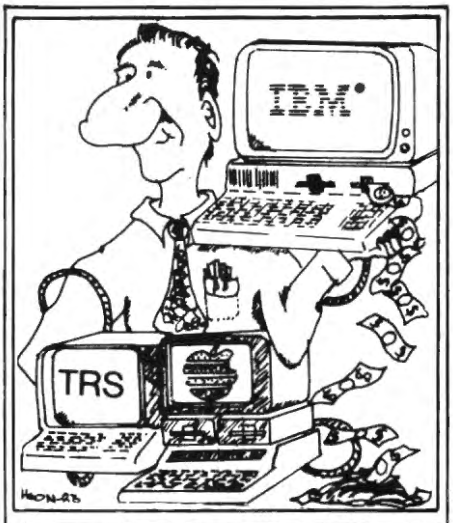
Toll Free Order Line
800·221·0916
Orders Only, NY & info call (212) 296-5916. Hours: 9-5 E.S.T.

Votrax is a registered trade mark of Votrax

CLUBS: Contact us at (212 296 5916) if you would like to arrange for a product presentation.

ALPHA Products
79-04 Jamaica Ave., Woodhaven, NY 11421 ☎ *(212) 296-5916*

ADD $2.50 PER ORDER FOR SHIPPING AND HANDLING.
WE ACCEPT VISA, MASTERCARD, CHECKS, M.O.
C.O.D. ADD $3.00 EXTRA.
NY RESIDENTS ADD SALES TAX.
OVERSEAS, FPO, APO: ADD 10%.
DEALER DISCOUNTS AVAILABLE.



FILE TRANSFER PROGRAMS

TRS ➞ IBM PC or XT

APPLE ➞ IBM PC or XT

Transfer your TRS Model I, II, III, 4, 12 or 16 files to the IBM PC or XT.

Transfer your Apple II, II+, or IIe files to the IBM PC or XT.

- No more retyping or wasted time
- Fast transfer-baud rates of 110-9600
- File concatenation supported
- Send files of any length
- Make $$$ - the IBM PC is new and software is scarce-take your "new" programs and sell them for $$$.
- Transfer ASCII files, random files, text files, data files, binary files, high level language programs (Basic, Pascal, Fortran, Cobol, etc.), electronic spread sheet data, word processor files, etc.; it all gets transferred!

The File Transfer Program comes complete with all instructions, hardware and software (for both machines)

FILE TRANSFER PROGRAM diskette
(Works with IBM DOS 1.1 or 2.0)

APPLE ____ $94.95

TRS ____ $89.95

(State TRS model when ordering)
Plus $2.00 shipping & handling
(CA residents add 6.5% State sales tax)

MC/VISA/COD/CHECK OK

Phone orders call
(408) 988-0164

PERSONAL COMPUTER PRODUCTS

176

1400 Coleman Avenue, Suite C-18,
Santa Clara, California 95050

IBM is a registered trademark of International Business Machine Corp.
Apple II, II+, and IIe are registered trademarks of Apple Computer Inc.

for some problems including one-drive copies using different density disks.

John M. Ruschmeyer
191 W. Sylvania Ave.
Neptune City, NJ 07753

Help Wanted

I represent a nonprofit, charitable organization that uses TRS-80 Model I equipment in virtually every aspect of its affairs. We would be grateful if anyone would consider contributing Model I equipment such as keyboards, expansion interfaces, drives, and printers. All contributions are tax-deductible.

If you would like more information, please call or write.

Robert Epstein
Executive Director
Cambridge Center for Behavioral Studies
11 Ware St.
Cambridge, MA 02138
617-495-9020

Zeroing In

If Pencil Plus users wish to send the graphics code for zero (which the TRS-80 tries to reject), there is a patch to the Pencil Plus module that does the trick. This takes care of Epson problems with underlines, scripts, and so on. Since many have already keyed it in, here is the change in Superzap format:

PENCIL07/SYS, Sector 7:

	CHANGE:	TO:
Byte A2:	FEFF 28F2	FE3F 20F2
Byte B2:	CD3B 00	32E8 37
	(Model III = D3F8 00)	

Dan Robinson
1625 Higgins Way
Pacifica, CA 94044

Load 80 Bulletin Board?

I own a Model 100 and in the past I subscribed to Load 80. I felt it was of good value, but dropped the service because I wasn't interested in most of the programs on the tape/disk and wasted some of the material.

I suggest that you offer software on an *80 Micro* bulletin board. The consumer could selectively download programs of interest and be billed at a fee for each program downloaded or based on connect time. The bulletin board could include other features such as Computer News.

The bulletin board could also serve as a way for authors to electronically submit articles and programs for consideration for publication. The Model 100 is a natural for communications and many owners would like a way to download programs individually rather than type them in.

David E. Clapp
1769 Kingsway Court
Cincinnati, OH 45230

Judging from the clicks, buzzes, and whirrs coming from Techville these days, the 80 Micro *Bulletin Board is well underway. We plan to make available programs for the whole TRS-80 lineup.*

In the meantime, CompuServe is putting our Load 80 programs onto Soft-Ex, their software exchange area.—Eds.

Novice Request

I would like to see an article that advises us Basic novices on how to use PEEK and POKE for the Model III. I have yet to see anything that helps me with this.

I have several programs that could be enhanced if I could figure out what the programmer is POKEing and PEEKing at.

If somebody decides to write about this, be sure to write from a beginner's viewpoint. I often find hints in the magazine from the letters and articles, but in many cases the authors assume everyone is on their level of expertise.

Jim Ewing
8907 Warner Ave., Suite 163
Huntington Beach, CA 92647

Logo Language

In "La Plume de Ma Tante" (July 1983, p. 78) Phillip Martel and Robert Nicholas assert that "Since Logo is a graphics language...you wouldn't use it for numeric computations."

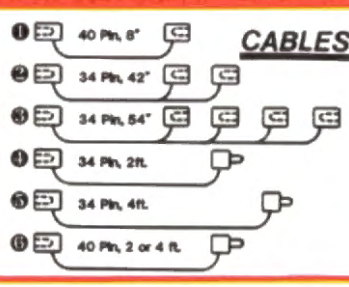
This comment applies to the Radio Shack Color Computer version of Logo, which (as noted by the authors) is not a full implementation of Logo and is mostly a graphics language. Molly Watt's article, "Logo on the CoCo" (July 1983, p. 220), describes Color

NOW MODEL I AND MODEL III!

Now Model III users can take advantage of the ALPHA I/O system too. Our new MOD III/I BUS CONVERTER allows most port based Model I accessories (such as our ANALOG-80, INTERFACER 2 and INTERFACER-80) to connect to the Model III bus. MOD III/I BUS CONVERTER, complete with all connectors, only $39.95.

PRINTSWITCH

Have 2 printers on line at all times and select printer 1 or 2 by means of a conveniently located switch. End the problem of constantly plugging and unplugging printer cables. PRINTSWITCH is a compact module that plugs onto the parellel printer port of your TRS-80 and provides an edge connector for each of your two printers. It works with any two types of printers: dot matrix, daisy wheel, plotters. TRS-80 converted selectrics, etc. Assembled, tested, ready to use with connector and instructions. For Model I or III (please specify). ONLY $59.00

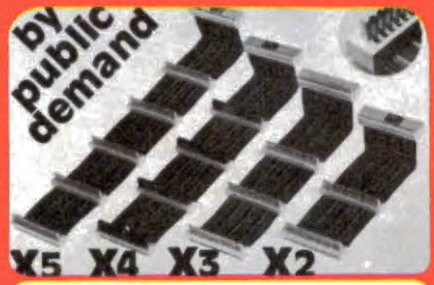


SUPERIOR QUALITY REPLACEMENT & EXTENSION CABLES

Highest quality cable and high force, gold plated contacts ensure the utmost in connection reliability.

- ❶ KEYBOARD TO EXPANSION INTERFACE $21
- ❷ DISK DRIVE CABLE FOR 1 OR 2 DRIVES ..... $32.
- ❸ DISK DRIVE CABLE FOR 3 OR 4 DRIVES ..... $45.
- ❹ DISK DRIVE CABLE EXTENDER ..... $22.
- ❺ PRINTER CABLE EXTENDER $24
- ❻ 40 PIN BUS EXTENDER — 2 ft. ..$22 4 ft. ..$24.

Custom cable configurations are also available. Call us.



YOU ASKED FOR IT: "EXPANDABUS" X1, X2, X3 AND X4.

CONNECT ALL YOUR TRS-80 DEVICES SIMULTANEOUSLY on the 40 pin TRS-80 bus. Any device that normally plugs into the keyboard edge connector will also plug into the "EXPANDABUS". The "X4" is shown with protective covers (included). The TRS-80 keyboard contains the bus drivers (74LS367) for up to 20 devices, more than you will ever need. Using the E/I, it plugs either between KB and E/I or in the Screen Printer port. Professional quality, gold plated contacts. Computer grade 40 conductor ribbon cable.
X2 $29 X3 $44 X4 $59 X5 $74
Custom configurations are also available, call us.

ANALOG-80: A WORLD OF NEW APPLICATIONS POSSIBLE.

8 DIGITAL MULTIMETERS PLUGGED INTO YOUR TRS-80!!! Measure Temperature, Voltage, Current, Light, Pressure, etc. Very easy to use: for example, let's read input channel #4: 10 OUT 0,4 'Selects input #4 and also starts the conversion 20 A = INP(0) 'Puts the result in variable 'A'. Voila! Specifications: Input range: 0-5V to 0-500V. Each channel can be set to a different scale.
Resolution: 20mV (on 5V range). Accuracy: 8 bits (.5%). Port Address: jumper selectable. Plugs into keyboard bus or E/I (screen printer port). Assembled and tested. 90 day warranty. Complete with power supply, connector, manual. $139

TIMEDATE 80: REAL-TIME CLOCK/CALENDAR MODULE

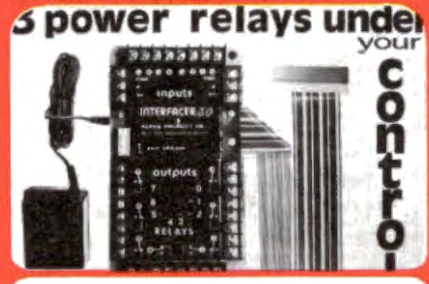
Keeps quartz accurate time for 3 years on 2 replaceable AAA batteries (not included). Gives MO/DATE/YR, DAY of WEEK, HR:MIN:SEC and AM/PM. Features INTELLIGENT CALENDAR and even provides for Leap Year. This compact module simply plugs into rear of Keyboard or side of Expansion Interface (may be shipped inside E/I). Includes cassette software for setting clock and patching to any DOS (including NEWDOS 80 2.0). Optional 'Y' connector allows for further expansion. For Model I. Fully assembled and tested. Complete with instructions and cassette. ONLY $95.00. 'Y' option, add $12.00.

DISK DRIVE EXTENDER CABLE, FREE YOUR MINI-DRIVES.

End the daisy-chain mess once and for all. Fits all mini-drives: Percom, Aerocomp, Shugart, Micropolis, MTI, Vista, Pertec, Siemens, BASF. East to install: just remove the drive cover, plug in the EXTENDER CABLE and replace the cover.

Now you can change and move your drives without disassembly. Keep the cover on and the dust out. High reliability gold plated contacts, computer grade 34 conductor cable. Tested and guaranteed.

Get one for each drive. ONLY $8.95



INTERFACER-80: the most powerful Sense/Control module

- 8 industrial grade relays: single pole, double throw, isolated contacts. 2 Amp. @ 125 Volts. TTL latched outputs are also accessible to drive external solid state relays.
- 8 convenient LEDs constantly display the relay states.
- Simple "OUT" commands (in basic) control the 8 relays.
- 8 optically-isolated inputs for easy direct interfacing to external switches, photocells, keypads, sensors, etc. Simple "INP" commands read the status of the 8 inputs. Selectable port address. Clean, compact enclosed design. Assembled, tested, 90 days warranty. Price includes power supply, cable, connector, superb user's manual. $159.

GREEN SCREEN WARNING

IBM and all the "biggies" are using green screen monitors. Its advantages are now widely advertised. We feel that every TRS-80 user should enjoy the benefits it provides. But **WARNING**: all Green Screens are not created equal. Here is what we found:

- Several are just a flat piece of standard colored Lucite. The green tint was not made for this purpose and is judged by many to be too dark. Increasing the brightness control will result in a fuzzy display.
- Some are simply a piece of thin plastic film taped onto a cardboard frame. The color is satisfactory but the wobbly film gives it a poor appearance.
- One "optical filter" is in fact plain acrylic sheeting.
- False claim: A few pretend to "reduce glare". In fact, their flat and shiny surfaces (both film and Lucite type) ADD their own reflections to the screen.
- A few laughs: One ad claims to "reduce screen contrast". Sorry gentleman but it's just the opposite. One of the Green Screen's major benefits is to increase the contrast between the text and the background.
- Drawbacks: Most are using adhesive strips to fasten their screen to the monitor. This method makes it awkward to remove for necessary periodical cleaning. All (except ours) are flat. Light pens will not work reliably because of the big gap between the screen and the tube.

Many companies have been manufacturing video filters for years. We are not the first (some think they are), but we have done our homework and we think we manufacture the best Green Screen. Here is why:

- It fits right onto the picture tube like a skin because it is the only **CURVED** screen **MOLDED** exactly to the picture tube curvature. It is Cut precisely to cover the exposed area of the picture tube. The fit is such that the static electricity is sufficient to keep it in place! We also include some invisible reusable tape for a more secure fastening.
- The filter material that we use is just right, not too dark nor too light. The result is a really eye pleasing display.

We are so sure that you will never take your Green screen off that we offer an unconditional money-back guaranty: try our Green Screen for 14 days. If for any reason you are not delighted with it, return it for a prompt refund.

A last word. We think that companies, like ours, who are selling mainly by mail should •list their street address•have a phone number (for questions and orders)•accept CODs: not every one likes to send checks to a PO box•offer the convenience of charging their purchase to major credit cards. How come we are the only green screen people doing it?

Order your **ALPHA GREEN SCREEN** today. $12.50

ALPHA Products

v-17

ADD $2.50 PER ORDER FOR SHIPPING AND HANDLING
ALL ORDERS SHIPPED FIRST CLASS MAIL
WE ACCEPT VISA, MASTER CHARGE, CHECKS, M.O.
COD, ADD $2.00 EXTRA
QUANTITY DISCOUNTS AVAILABLE
N.Y. RESIDENTS ADD SALES TAX

79-04 Jamaca Ave., Woodhaven, N.Y. 11421 ☎ Info and order: (212) 296•5916

MASTER HORSE HANDICAPPER™

OVER 3 YEARS IN THE MAKING
1st complete handicapping program that evaluates all variables

EVALUATES FROM RACING FORM!

Age	Gender	Post (Today)
Class	Jockey (Today)	Post (Last)
Condition	Jockey (Last)	Speed
Consistency	Length	Trainer
Earnings	Time of Year	Workouts

And gives you GRAPHIC REPRESENTATION of finish

ADAPTS TO ANY TRACK IN THE WORLD
Quickly and easily by changing date statements relating to local track records / jockeys and trainers.
COMPLETE INSTRUCTIONS INCLUDED

If you own a model I/III and also enjoy a day at the races, why not combine them and make a nice profit. With a $1.75 racing form and this program you can take the "luck" out of the track and be a "consistent" winner.
Note: Specify Mod I/III & Memory

Program:
A. Thoroughbred + Maiden 59.95/16K
B. Quarterhorse + Maiden 59.95/16K
C. Pace Handicap 39.95/16K
D. Thoroughbred/Pace 79.95/32K
E. All with One MENU 99.95/48K
This program can be suited to 16K-48K machines TAPE or DISK

OTHER GAMBLING PROGRAMS

	T	D
PRO-PIX — complete football prediction system	19.95	24.95
THE MEAN CRAPS MACHINE — When you beat this program, you're ready for Vegas. Specify Mod I/III	19.95	NA

PROFESSIONAL SYSTEMS

LNW II (96K) — COMPLETE SOFTWARE PACKAGE —

With/
Green Monitor
— 2 Tanden drives
— Cables, etc.
AND *ALL SOFTWARE*

retail $4109

(LNW Business Series)
General Ledger / Payroll
Accounts Payable / Accounts Receivable
Electric Spread Sheet™
Electric Pencil™ — WP program
Micro Term™ — modem program
Chart Ex — graphics pkg.
LNW Basic
DOS plus
3.4 Micro Soft Basic
CP/M 2.2
AND
MOST POWERFUL PROGRAMS AVAILABLE
MASTER PACE HANDICAPPER by Prof. Jones

Prof. Jones' Price **$2395** ready to plug in
For Whole System

PROFESSIONAL BUSINESS SOFTWARE		SALE PRICE
Micro Cash — retail bus.	~~149.95~~	129.95
Accounts receivable — inv.	~~149.95~~	129.95
M/Zal — editor/assembler	~~149.95~~	129.95
Maxi CRAS — check reg.	~~99.95~~	79.95
Maxi Mail — mail system	~~99.95~~	79.95
Maxi Stat — powerful stats.	~~199.95~~	149.95
DOS plus 3.5	~~149.95~~	129.95
New DOS 80	~~149.95~~	129.95
DOS plus 3.4 (Mod I)	~~149.95~~	99.95

Minimum 15% Discount on **Most Other Software**

System Expansion II	339.95	WE CARRY
LN Doubler 5/8	179.95	MANY
W/DOS + 3.4	199.95	ITEMS
Tanden Drives w/everything	249.95	NOT LISTED

Send check / money order / VISA / Mastercharge (include expiration date) to:
Prof. Jones
1114 N. 24th St.
Boise, ID 83702

FAST SHIPPING ~449
Or call and place order at (208) 342-6939

VISA MasterCard

TERMS: FREE SHIPPING ALL SOFTWARE.
Add $6.00 hardware / C.O.D. Add $6.00 / Add 3 weeks personal checks / Add 4.5% ID residents / Add $6.00 outside U.S.A. / Prices subject to change.

Logo's features and disadvantages in detail.

This is a more classic method of writing the factorial function, in Terapin Logo:

```
TO FACT :NUMBER
IF :NUMBER = 0 OUTPUT 1
OUPUT :NUMBER*FACT :NUMBER -
END
```

Logo is neither just a graphics language nor simply a language for children. Its interpretive, procedural approach to programming is easily grasped.

Since Logo is derived from Lisp, included is a Lisp program written in the same recursive style as the above Logo program:

```
(define (fact number)
(cond ((= number 0)1)
(else (* number(fact (- number 1))))))
```

Leigh L. Klotz Jr.
Software Research and Development
Terrapin Inc.
380 Green St.
Cambridge, MA 02139

Pascal-80 Cribbage

In preparing my article, "A Pascal Primer" (July 1983, p. 94), the emphasis was on the language Pascal, and I forgot to give instructions for Pascal-80 users to load, compile, and run the cribbage game in the article.

To ready the game for Pascal-80, you should enter the source code in segments and stop at any convenient point using the editor's Save command to write each segment to a disk file.

Once you create the source file, write a smaller source file containing the compiler. Include statements for each segment. For instance, using the file names above, this file should contain these statements:

```
($ CRIBBAGE/P1 )
($ CRIBBAGE/P2 )
($ CRIBBAGE/P3 )
($ CRIBBAGE/P4 )
($ CRIBBAGE/P5 )
```

You can save this in another file and then compile it using the Compile or Run commands.

To use the source code file contained on the Load-80 disk, you must use one of the utilities provided with the Pascal-80 system. The source code file I sent was written in ASCII character format to simplify printing. The Pascal-80 compiler requires a compressed file format. Use the following format to convert the file:

```
TEXT CRIB/PAS TO CRIB/SRC
```

When the file is converted to compressed format, enter the Include statement in the Pascal text buffer using the editor and use the Compile or Run commands to compile cribbage.

Lt. Cmdr. J.B. Harrell III
Quarters 192-A
Portsmouth Naval Shipyard
Portsmouth, NH 03801

Computer Rip-off

On May 11 someone stole my TRS-80 Model III, serial number 489, from my car while I was at a local computer club meeting. Anyone with information should contact the Sacramento, CA, Police Department, case number 83-26215, or contact me.

Henry Hoover
P.O. Box 479
Elk Grove, CA 95624

Comal Info

When is *80 Micro* going to tell people about Comal?

Robert G. Hoffman
5044 Allisonville Road #F
Indianapolis, IN 46205

Comal is the acronym for Common Algorythmic Language. It has been around for about 10 years but it's only become popular in the last five. Still, it's used mostly in Scandinavian countries and in Great Britain and has had very little exposure in this country.

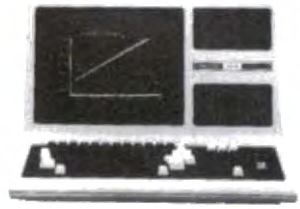
Comal is primarily used as a beginner's language taught to novice programmers in schools. Presently, it is not available for TRS-80 computers, but may be obtained and used on Commodore's CBM, PET, and Commodore 64 systems. Apple computers with the CP/M board also have a version available and Texas Instruments is contemplating making Comal available for their personal computers. More information on Comal can be obtained from the Comal User's Group, 5501 Groveland Terrace, Madison, WI 53716.—Eds.

From Computer Plus to YOU . . .

PLUS after PLUS after PLUS

Model 100 8K $679
Model 100 24K $835

Color Computer 16K $175
w/16K Ext. Basic $255
w/32K Ext. Basic $345



Model IV 16K $849
Model IV 64K
2 Disk & RS232 c $1699

CITOH Prowriter $375
CITOH Prowriter II $649

CoCo Drive 0 $329
CoCo Drive 1 $235

Silver Reed EXP500 $430
Silver Reed EXP550 $665

BUY DIRECT *Here are just a few of our fine offers . . . call TOLL FREE for full information.*

COMPUTERS	
Model 12 64K 1 Drive	$2699
Model 12 64K 2 Drive	3375
Model IV 16K	849
Model IV 64K 2 Disk & RS232	1699
Color Computer 16K	175
w/16K ext. basic	255
‡ w/32K ext. basic	345
Pocket Computer 2	165
Model 16B 1Dr 256K	4249
Model 16B 2Dr 256K	4915
Model 100 8K	679
Model 100 24K	835
MODEMS	
Lynx MI/MIII	235
Hayes Smartmodem II	235
Hayes Smartmodem 1200	565
Novation Smartcat 1200	459
Novation J-CAT	125
R.S. AC-3	129
R.S. Modem I	129
R.S. Modem II	199
R.S. DC-1200	565
PRINTERS	
Smith Corona TPI D.W.	545
Silver Reed EXP500 D.W.	430
Silver Reed EXP550 D.W.	665
Daisy Wheel II	1745
DWP210	629
DWP410	1045
CGP115	199
DMP100	315
DMP120	399
DMP200	599
DMP500	1539
DMP2100	1745
Gemini 10X	319
Gemini 15	435
CITOH Prowriter	375
CITOH Prowriter II	649
Okidata	CALL
Epson	CALL
DISK DRIVES	
R.S. Model IV Drive 0	515
Color Computer Drive 0	329
Color Computer Drive 1	235
Primary Hard Disk MII	3099
Primary Hard Disk MIII	1799
ETC.	
CCR-81 recorder	52
C.C. Joysticks (pair)	22
16K Ram Chips	25
64K Ram Chips	75
8K Par/Par Microfaser	135
Parallel printer cables are available for most computers.	
SOFTWARE	
Coco FHL Flex D.O.S.	69.95
R.S. Software 10% off list. Send for listing of brand name software.	

‡Color Computer 64K requires Drive 0 and FHL Flex D.O.S.

We have the lowest possible Fully Warranteed Prices AND a full complement of Radio Shack Software.

TOLL FREE
1-800-343-8124

computer plus

P.O. Box 1094
480 King Street
Littleton, MA 01460
617-486-3193

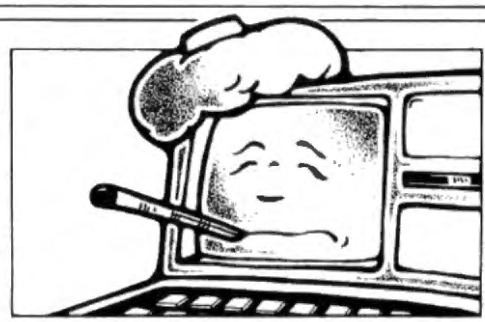
Write for your free catalog ↙ 18

Prices subject to change without notice.
Not responsible for typographical errors.
TRS-80 is a registered trademark of Tandy Corp.

AMERICAN EXPRESS · VISA · MasterCard

↙See List of Advertisers on Page 323

AID



Looking for answers

In Demand

I'm missing the January, May, August, October, and November 1980 issues of *80 Micro*. Does anyone have extra copies?

Paul C. Anacker
2991 Loma Vista Road
Ventura, CA 93003

Let's Be Friends

Does anyone want to be a pen pal? I'm 15, and I'd like to correspond with someone who has either a Model I or III.

Massato Otsuka
2012 Stillwood
Houston, TX 77080

Vidtex Help Wanted

Can someone tell me how to get Vidtex software to work through my Model I's cassette port?

E.W. Seidler
P.O. Box 21541
Denver, CO 80221

Needs Model II Program

I'm interested in finding a program that can be used on a Model II to generate CNC/NC tapes. Not only do I want to generate the tapes, I'd also like to interface with a tape-punching device. Can someone help?

Mark W. Pollock
Union Carbide Corp.
P.O. Box 6087
Cleveland, OH 44101

Pulling Duty

I'm interested in hearing from other law enforcement agencies or personnel who have a Model I pulling duty for their department.

David R. Tapp
Henderson Police Department
101 North Water St.
Henderson, KY 42420

Trouble Adapting

I'd like to contact anyone who uses Osborne/McGraw-Hill's General Ledger with a TRS-80 and CP/M. I'm having trouble adapting the control codes to make it work with the TRS-80.

Bob Boyer
1214 Polk St., Apt. 234
San Francisco, CA 94109

Graftrax Chip Wanted

I need Graftrax for my MX-80 in order to run SuperScripsit. If you have upgraded to Graftrax Plus and still have your old chip, I'd like to buy it.

George Tomlinson
411 East Rutgers Loop
Montgomery, AL 36109

Lost Without a Book

Can someone help me obtain *Model III ROM Commented*? Soft Sector Marketing has discontinued it and I can't find it anywhere!

Henry Greenebaum
2810 Arden Road
Louisville, KY 40220

Stringy Floppy Patch

I have a Model I with Exatron Stringy Floppy drives and Microsoft's EDTASM Plus. Does anyone know of a patch for the editor/assembler that allows the user to save files to the stringy floppy instead of the cassette normally used?

Michael Ellis
2812 Hood Road, Apt. 8
Huntsville, AL 35805

A Plea for Pascal

I'm interested in finding the cassette and documentation for People's Pascal I. Can anyone suggest a source, or be persuaded to sell their program to me?

C.W. DeLaughter
327 St. Andrews Lane
California, MD 20619

The Answer is...

NEWSCRIPT!™

THE WORD PROCESSOR FOR BUSINESSMEN AND PROFESSIONALS

With ongoing support directly from us

A FEW OF NEWSCRIPT's 200 STANDARD FEATURES:

- FORM LETTERS WITH MERGING OF NAMES AND ADDRESSES
- GIVES SUPERB APPEARANCE TO YOUR FINAL DOCUMENTS
- COMPREHENSIVE MANUAL WITH TUTORIAL AND EXAMPLES
- CENTERING, TOP/BOTTOM TITLES, INDENTS, PAGINATION
- UNDERLINING, BOLDFACE, DOUBLE-WIDTH, ITALICS†
- SUB/SUPER SCRIPTS, RIGHT-JUSTIFIED PROPORTIONAL†
- CREATES TABLE OF CONTENTS, SORTED INDEX
- "LEGAL" LINE NUMBERING
- SCREEN GRAPHICS, SPECIAL PRINTER SYMBOLS†
- SEARCH/REPLACE GLOBALLY OR WITHIN LINES, COLUMNS
- BLOCK MOVE, COPY, DELETE, INSERT, FILE MERGES
- AUTOSAVE, WHOOPS, DIRECTORY, KILL
- SUPPORT FOR **ALL** LISTED PRINTERS IS INCLUDED ** (**NO PATCHES INVOLVED**) **
- SUPPLIED READY-TO-RUN ON "TINY" DOSPLUS
- ALSO RUNS UNDER NEWDOS/80, LDOS, MULTIDOS, TRSDOS

NEWSCRIPT 7.1:	$124.95
Mailing Labels Option:	29.95
Special: NEWSCRIPT + LABELS:	139.95
Daisywheel Proportional Option:	49.95
"Pencil"/"Scripsit" File Convertor:	24.95
NEWSCRIPT Manual & Reference card only:	29.95
Electric Webster + Correction Feature:	149.50
Hyphenation Feature for Electric Webster:	49.95
Grammatical Feature for Electric Webster:	39.95
Dotwriter 3.0:	79.95
Dotwriter + Letter Utilities:	99.95
6.0 PLUS-MSS Model 4 utility pak	49.95

REQUIRED CONFIGURATION:

48K TRS-80, MAX-80, LNW, or compatible, with one or more disk drives. Specify Model I or Model III.

† some features work only if your printer has the mechanical capability.

** Daisy Wheel Proportional is an extra-cost option.

BUILT-IN SUPPORT FOR MOST POPULAR PRINTERS†, INCLUDING:

Anadex, Brother, Centronics, C.Itoh, Diablo, Epson, Gemini, Microline, NEC, Prowriter, Qume, Radio Shack (LP 1-8, DW2, DMP-410, DWP 200-2100), Smith Corona, Teletype, Typewriter, anything compatible with any of these, and many others, parallel and RS-232.

SPECIAL AVAILABLE OPTION: Right-justified proportional for Diablo, F-10, Qume, Spinwriter, etc. Requires "Daisywheel Proportional" Option plus NEWSCRIPT.

REVIEWERS AND USERS AGREE:

"NEWSCRIPT" is the best word procesor I have seen . . . unsurpassed in printer control . . . no other TRS-80 word processor can match its ability to format text . . . its editor is fast, easy, and powerful." *(80 MICRO, Oct. 1982)*

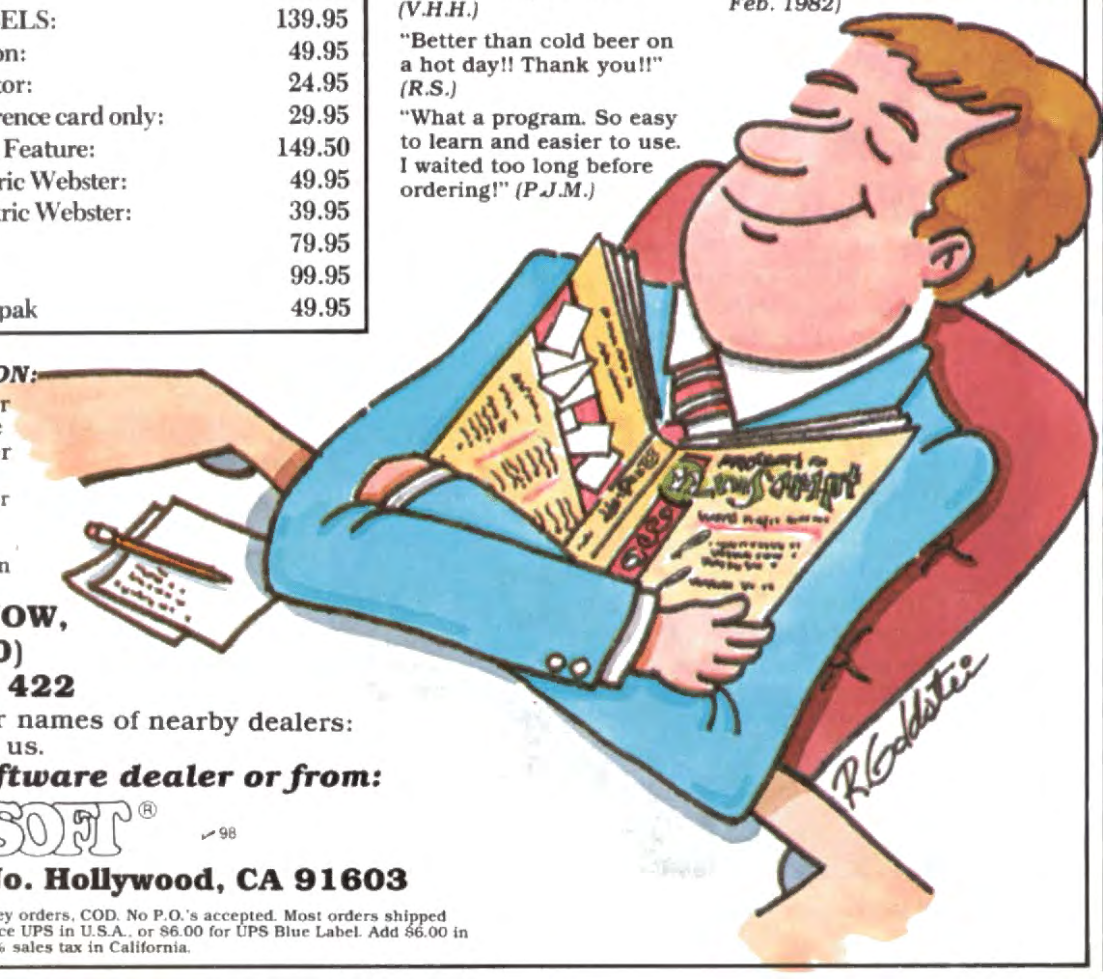
"Your phone information system and the prompt and courteous staff that you provide to help your clients . . . are worth the cost of the system." *(V.H.H.)*

"Better than cold beer on a hot day!! Thank you!!" *(R.S.)*

"What a program. So easy to learn and easier to use. I waited too long before ordering!" *(P.J.M.)*

". . . takes the TRS-80 to a new level of text handling . . . very user-friendly . . . superb documentation, adaptability to many printers and operating systems . . . a standard against which other TRS-80 word processing programs will be judged." *(SOFTSIDE, Dec. 1982)*

". . . ongoing support second to none, with superb documentation." *(80 U.S. Journal, Feb. 1982)*



TO ORDER, CALL NOW, TOLL-FREE: (800) 824-7888, Operator 422

For orders, information, or names of nearby dealers: (213) 764-3131, or write to us.

Order from your Software dealer or from:

PROSOFT® ~98

Dep't. C, Box 560 No. Hollywood, CA 91603

TERMS: VISA, Mastercard, checks, money orders, COD. No P.O.'s accepted. Most orders shipped within 24 hours. Please add $3.00 for surface UPS in U.S.A., or $6.00 for UPS Blue Label. Add $6.00 in Canada, $15.00 overseas air shipment, 6½% sales tax in California.

Patches and fixes

Stripping Problem

There is a correction to Stephen Mills' "Strip Blackjack" article (August 1983, p. 256). Under System Modifications (p. 257), the line change to provide multiple USR functions should be made to line 130 in Program Listing 2, not to line 30 as mentioned.—*Eds.*

Profile Corrections

There are several problems with the program listing in my "Profile File Transfer" article (July 1983, p. 290). To make the program operational, add K(32), J(32), DL(32), and LD(32) to the list of dimensioned variables in line 110, and then insert line 190 to read:

```
190 IF (CL + (NF - 1)*32)> = 700 -
(LEN(NM$(NF)) + 10)THENCL = 0:CLS
```

If the number of fields the program displays from both the old and new records exceeds the available screen space, only the "new" fields will remain on the screen.

Also, if the number of fields exceeds 20, I suggest you substitute LPRINTS for the PRINT@ commands found in lines 166 and 200, and skip the screen altogether. In line 200, however, change only the first two PRINT@ commands. The third remains as a screen prompt.

John Mabry, Ph.D.
Murdock Center
Butner, NC 27509

MICRO-DESIGN
If you don't know the number, you should.

UPGRADE $399.95 Complete
TRS 80, Model 4 system upgrade including the exceptional MDX-6 DISK CONTROLLER, One 40 track Disk Drive, Cables and Hardware.

MDX-5 $159.95 Fully Assembled MDX-5 System
For the Model 4 User who already has floppy disk this is the PHONE MODEM & SERIAL PORT for you!! $49.95 Bare board & Users Manual

Visa & Mastercard Accepted

MDX-2 $469.95 Fully Assembled System with case
Model I expansion system with PHONE MODEM, DISK CONTROLLER, EPROM, 32K memory and much more $74.95 Bare board & Users Manual

MDX-6 $129.95 Fully Assembled MDX-6 System
Micro-Designs stand alone FLOPPY DISK CONTROLLER BOARD for your Model 4. $49.95 Bare board & Users Manual

For Free Information Call (Toll-Free) or Write
6301 Manchaca Rd. Suite B. Austin Tx. 78745
1-800-531-5002 -426
Texas Res. 1-512-441-7890

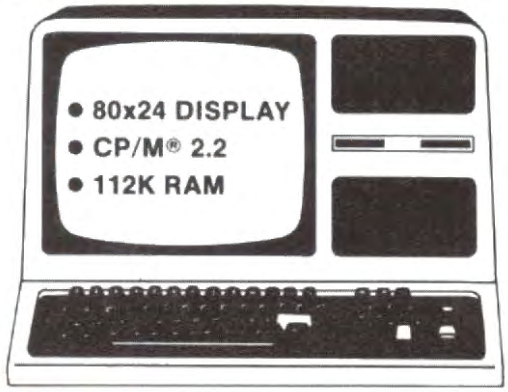
NEW

MODEL IV FEATURES ON YOUR MODELS I and III FOR ½ THE PRICE

but only with . . .

The HOLMES VID-80™

80 character video, which includes:



FEATURES:

- Easy plug-in installation inside case.
- Software patches available for many programs.
- Improved Graphic Resolution.
- 80x24 or 64x16 selectable modes.
- CP/M® 2.2, 112K RAM. (CP/M® 3.0 4th quarter '83)

ALL OF THESE FEATURES FOR a SPECIAL price of $499.00 (Model III) or $599.00 (Model I) Installed

(Includes VX-3 or VX-1, CP/M®, 64 K extended memory, Easy Installation Instructions, & MF-2 on Model I only)

VID 80 PURCHASE ALTERNATIVES INCLUDE:

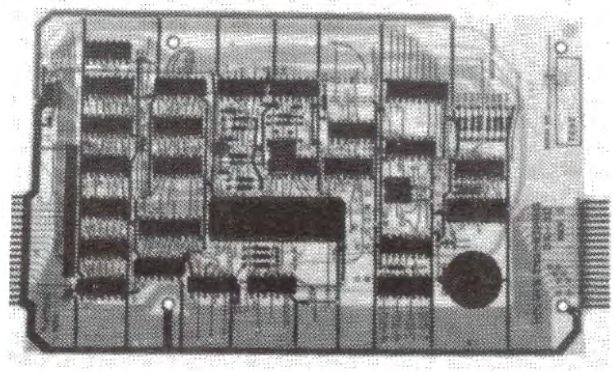
Model III VX-3 80x24 video only	$279.50
Model I VX-1 80x24 video only	$279.50
CP/M® 2.2 OP system (with VX-3 or VX-1 only)	$120.00
64K RAM Extended Memory	$125.00

NOTE: The VX-1 requires an MF-1 or MF-2 expansion Mainframe.

ORDERING INFORMATION:

- ONE YEAR WARRANTY ON ALL PRODUCTS
- Add shipping and handling
  - MF-1 or MF-2 $9.00 USA, $15.00 Canada & $30.00 Overseas
  - Other products add $5.00 U.S. & Canada all others add 15%
- Prices subject to change without notice
- Payment by cashiers check, money order, cash, Visa or Mastercharge. Personal checks subject to 3 week clearance

EXPAND and UPGRADE your Models I, III, and IV



with Holmes . . .

Disk Controllers/Adaptors for all TRS 80® Model Computers

Double Density Adaptor DX-1D (Model I)	$129.00
Disk Controller DX-2D (Model I requires MF-1)	$149.95
Disk Controller w/clock DX-3DC (Model III)	$189.95
Disk Controller w/o clock DX-3D (Model III)	$149.95
Disk Controller w/clock DX-4DC (Model IV)	$189.95

"DOUBLE YOUR SPEED"

CUT COMPUTER OPERATION TIME IN HALF

Sprinter II for Model I	$99.50
Sprinter III for Model III	$99.50
Sprinter KX 6MHz for Mod. III and IV	$147.50

MEMORY EXPANSION

Internal Installation

Model I - IM-2 (W/32K RAM)	$139.50
PMC-80/81 IM-2P (W/32K RAM)	$99.50

OTHER PERIPHERALS:

Expansion Mainframe-MF-1 (For 4 boards)	$150.00
Expansion Mainframe-MF-2 (For 2 boards)	$99.50
Prowriter (dot matrix printer)	$495.00
Starwriter (daisy wheel printer)	$1,495.00
Color coded diskettes (box 10) 96 TPI SSDD $29.95 DSDD	$37.95
Epson Printer Driver	$24.95
Drive O Package w/DX-3D, drive, power supply	$599.00
RS232 (RX-232)	$119.50
RS232 w/32K RAM (RX-232M)	$199.50
Expansion Interface-Mod I (Includes DX-2D, RS232 w/32K RAM, MF-1)	$429.00

About HOLMES ENGINEERING, INC.

— All Holmes Products come complete with easy to follow installation and trouble shooting guides and our technical group is available for support as required.

— Installation can be performed with out system modifications, soldering and little or no technical background.

— MORE DETAILED PRODUCT INFORMATION IS AVAILABLE UPON REQUEST. Send a self-addressed, stamped envelope or call today for a FREE full product brochure.

— QUALITY IS BUILT INTO HOLMES PRODUCTS FROM THE START - ALL BOARDS ARE PRE-TESTED AND PROPERLY BURNED IN

TRS80 is a registered trademark of Tandy Corp.; CP/M is a registered trademark of Digital Research Corp.

HOLMES
ENGINEERING, INC.
5175 Green Pine Drive
Murray, Utah 84107
(801) 261-5652

↙153

VISA

master charge

DISTRIBUTORS:

Bi Tech, N.Y. (800) 645-1165 Level IV Products, MI (800) 521-3305 Soft Sector Marketing, MI (800) 521-6504 Digital Distributing, TX (214) 330-1332 M&M Micro Mart, Quebec, Canada (514) 731-9486

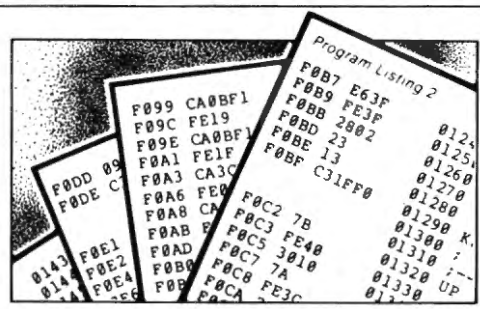
PLEASE CALL OR WRITE FOR AUTHORIZED DEALER NEAREST YOU.

DEALER INQUIRIES INVITED!

↙See List of Advertisers on Page 323

THE NEXT STEP

by Hardin Brothers



Restore patch revisited

Oops! It looks like I owe many Model III users an apology.

In my June column (p. 24), I presented a Basic patch that altered the Restore command so you could restore a specific line number. I included a stand-alone program as well as a patch to Model I NEWDOS80 2.0 and to TRSDOS 1.3 that automatically included the new command. Since I haven't heard any complaints from Model I users, I assume the NEWDOS patch works flawlessly (I have been using it myself for several months). But the TRSDOS patch has caused problems.

As I explained in June, I had only a limited amount of time to test the TRSDOS patch since I didn't have a Model III. Unfortunately, the patch loaded somewhere in the middle of Basic that only *looked* unused; it wasn't the free space that I had hoped. As many readers pointed out, every time they tried to load or save a program, their computer reset.

The "free space" was actually a buffer used by TRSDOS to hold sectors of Basic programs for loading or saving. I apologize to all those who had trouble. I hope a mistake of that magnitude won't happen again; I now have a Model 4, which can operate as a Model III, on which to try new programs.

To those who wrote to question or complain, I promised to present a repaired, workable solution to the problem. After much thought and correspondence with several people, I present the following new, improved Restore patch.

The Criteria

A software project should begin with a list of specifications and goals for the project. Here are mine:

- Restore should be altered so that RESTORE nnnnn will alter the Read/Data pointer to point at any line in Basic.
- The patch should load automatically and keep off the toes of any other program in memory. In other words, it should be transparent to you until a program calls for it.
- The patch should allow all normal entries to Basic, such as "BASIC," TRSDOS 1.3's "BASIC –M:44000 –F:2V," and NEWDOS's "BASIC 2."
- The patch should use as little memory as possible; however, it can use more memory if it returns the memory to the system before it initializes Basic.
- The patch should work with as many DOS systems as possible, not just with TRSDOS.

At first, I hoped to find another place inside TRSDOS 1.3 for the patch to reside. I thought about the hidden copyright notice, but the space isn't long enough to hold the entire patch. (If you've never seen the notice, from Disk Basic's READY prompt enter CMD"&"&.)

I also considered using a do-file to load first the patch and then Basic. But that would defeat the use of the –F: and –M: switches on entry to Basic. Also, as two readers pointed out, do-files under TRSDOS operate slowly and take up excess disk space.

The solution I'm presenting was suggested, in a somewhat different form, by Michael Callahan of Ardmore, OK. The idea is simple in concept, though its implementation raises some interesting points.

The Solution

Program Listing 1 shows the Restore patch in a form that meets most of my criteria. Assemble the program as BASICP/CMD (no other filespec will work). When you wish to go into Basic with the Restore patch operative, enter, from DOS READY, BASICP followed by any of the optional switches your DOS allows (BASIC * is a special case; I'll discuss it below). The patch loads, moves itself to high memory and protects itself there, then returns you to DOS. Instead of requiring you to type in BASIC again, the program does it for you, and Basic boots normally.

For example, in TRSDOS 1.3 you might enter

```
BASICP –F:2V
```

You will then see on the screen, in quick succession,

```
TRSDOS READY
BASIC –F:2V
```

followed by a screen clear and Basic's copyright and opening messages. The only difference between using the Restore patch and normal Basic is remembering to add the P (for patch) at the end of Basic.

How It Works

Listing 1 is written in four modules that each perform a specific function.

Program Listing 1. Revised Restore patch.

```
00100 ;************************************
00110 ;*                                  *
00120 ;*  RESTORE PATCH with automatic    *
00130 ;*   booting of Basic               *
00140 ;*                                  *
00150 ;*     Assemble as BASICP/CMD       *
00160 ;*                                  *
00170 ;************************************
00180 ;
00190 ;
00200 ;**********************************
00210 ;Module 1 -- Save Entry Command  *
00220 ;**********************************
```

Listing 1 continued

"THE RESULTS ARE IMPRESSIVE..."
—Dennis Kitsz, 80 Microcomputing: 12/82

Langley-St. Clair's* *Soft·View*™

Replacement CRT's

eliminates the strobe, flicker and fatigue from TRS-80's.™

Now you can upgrade your monitor with the new medium persistence green or amber phosphor tube.

State-of-the-art systems such as IBM™ and Apple III™ do not use the less costly "P4" B&W display tube because it is actually intended for TV viewing and its rapid strobes (60 times per second) cause irritating eye fatigue.

No amount of "green plastic" will solve this problem. But the new ***Soft·View*** CRT display tube from Langley-St. Clair will.

- Available in slow decay Green or medium decay "European Amber" (the standard in Europe)
- Made with Lead/Strontium impregnated glass that stops X-ray emission.
- Of high-contrast face glass that also stops most U.V. radiation.
- Available in frosted glass with extra Anti-Glare benefits.
- Easily installed...comes with pre-mounted hardware.
- Warranted for one full year against manufacturing defects or tube failure.
- The finest quality double-dark glass phosphor fields to produce dramatic contrast.
- Ideal for Word Processing and Programming, yet fast enough for Games and Graphics.

LSIS *Soft·View*™ CRT'S

☐ #GN42 Green Phosphor	$79.95
☐ #GN42G Green Phosphor w/Anti-Glare	$89.95
☐ #OR34 Amber Phosphor	$89.95
☐ #OR34G Amber Phosphor w/Anti-Glare	$99.95
also available:	
☐ #R22G Red Phosphor w/Anti-Glare	$139.95
☐ #B22G Blue Phosphor w/Anti-Glare	$139.95

Plus: $7.00 for packing and UPS Shipping
$17.00 for Overseas, Parcel Post or UPS Blue Label
Add Sales Tax where applicable.
(Inquire about the CRT's we have available for many other computer models)

For MasterCard and Visa Orders only, call
800/221-7070 (in N.Y. call 212/989-6876)

Langley-St. Clair Instrumentation Systems, Inc.
132 West 24th St., New York, N.Y. 10011

Actual unretouched photo.

462

* World's largest supplier of upgraded replacement CRT's.

Soft-View, IBM, Apple and TRS-80 and trademarks of LSIS, IBM, Apple Computer and Tandy Corp.

Listing 1 continued

```
00230 ;
00240          ORG     6000H           ;BASIC WILL OVERLAY THIS
00250 ;
00260 ;lst, backspace to "B" of "BASICP"
00270 ;
00280 BEGIN    LD      A,(HL)          ;GET CURRENT CHARACTER
00290          CP      'B'             ;ARE WE THERE?
00300          JR      Z,FOUND         ;GO IF YES
00310          DEC     HL              ;ELSE DECREMENT HL
00320          JR      BEGIN           ;AND LOOK AGAIN
00330 ;
00340 ;Now transfer entry command to buffer
00350 ;
00360 FOUND    LD      DE,BUFFER       ;DE==>CAPTURE BUFFER
00370 F10      LD      A,(HL)          ;GET CHARACTER
00380          CP      0DH             ;CARRIAGE RETURN?
00390          JR      Z,DONE          ;GO IF YES
00400          LD      (DE),A          ;ELSE SAVE IT
00410          INC     HL              ;BUMP BOTH
00420          INC     DE              ;  POINTERS
00430          JR      F10             ;AND LOOP
00440 ;
00450 DONE     LD      (DE),A          ;SAVE CAR. RET. CHAR.
00460 ;
00470 ;
00480 ;*****************************************
00490 ;Module 2 -- Relocate patch to high memory,
00500 ;  protect, and link patch to RST 10H vector
00510 ;*****************************************
00520 ;
00530 ;
00540 HIMEM    EQU     4411H           ;TOP OF MEM POINTER
00550 ;        This value is for MOD III Disk
00560 ;        Use 4049H for MOD I Disk
00570 ;        or 40B1H for Level II
00580 LENGTH   EQU     30H             ;SET TO PROGRAM LENGTH
00600 ;
00610          LD      HL,(HIMEM)      ;GET CURRENT HIMEM ADDR.
00615          DEC     HL              ;DROP ONE BYTE IN MEMORY
00620          LD      BC,LENGTH       ;BC=LENGTH PROGRAM
00630          XOR     A               ;RESET CARRY FLAG
00640          SBC     HL,BC           ;HL=PROGRAM DESTINATION
00650          PUSH    HL              ;TRANSFER IT TO
00660          POP     DE              ;  DE REGISTER
00670          LD      (4004H),HL      ;PATCH IN NEW START ADDR.
00680          DEC     HL              ;HL==> HIGHEST FREE ADDR.
00690          LD      (HIMEM),HL      ;SET NEW MEM. TOP
00750          LD      HL,START        ;HL==>START OF PROGRAM
00760          LDIR                    ;TRANSFER TO HIGH MEMORY
00770 ;
00780 ;
00790 ;*****************************************
00800 ;Module 3 -- Feed Entry Command Back to DOS
00810 ;   but without "P" on BASICP
00820 ;*****************************************
00830 ;
00840 ;
00850          LD      HL,(4016H)      ;CURRENT KB DRIVER ADDR.
00860          LD      (KB),HL         ;AND SAVE IT
00870          LD      HL,FEED         ;HL==>FEED ROUTINE
00880          LD      (4016H),HL      ;NEW KB DRIVER
00890          LD      HL,BUFFER       ;GET BUFFER ADDR.
00900          LD      (PTR),HL        ;SAVE AS POINTER
00910          JP      402DH           ;JUMP TO DOS
00920 ;
00930 ; Routine to feed command to DOS
00940 ;
00950 FEED     PUSH    HL              ;SAVE HL REGISTER
00960          LD      HL,(PTR)        ;GET POINTER
00970 FEED10   LD      A,(HL)          ;GET CURRENT CHAR.
00980          CP      0DH             ;CARRIAGE RETURN?
00990          JR      Z,QUIT          ;GO IF YES
01000          CP      'P'             ;IS IT A P?
01010          JR      NZ,FEED20       ;GO IF NOT
01020          INC     HL              ;ELSE BUMP PTR
01030          JR      FEED10          ;AND GET NEXT CHAR.
01040 FEED20   INC     HL              ;POINT TO NEXT CHAR.
01050          LD      (PTR),HL        ;SAVE POINTER
01060          POP     HL              ;GET ORIG. VALUE
01070          RET                     ;RETURN TO DOS
01080 ;                On return, character is in A register
01090 ;
01100 ;On last time through, tidy things up and return to DOS
```

Listing 1 continued

Module 4 is the Restore patch I presented in June, so I won't explain it here. The other three modules show some interesting programming ideas.

Module 1's purpose is to record the entry command (BASICP plus any optional switches) into a separate buffer in the program for later processing. Upon entering any /CMD program, the HL register pair points to the end of the first word of the entry command in a DOS command buffer. Your DOS manual may define the address of that buffer, or you can find it with Debug, but your program can pick up parameters from the entry command without even knowing where the buffer is. All you must do is use the value of HL as it passes to the program (or Push it on the stack for later use).

The logic in Module 1 backspaces HL until it points to the B at the beginning of Basic, then loads the entire command, up to the carriage return or [ENTER] byte (0D hexadecimal (hex)), to a buffer defined in line 1190. Note that the buffer is one screen line (64 characters) long and that there is no error-checking for a longer entry command. If that presents a problem on your system, either increase the buffer size or include the error-checking in Module 1.

Module 2 moves the patch to high memory, protects it there, and links it to the RST 10 hex vector at 4004 hex (I discussed that vector and its use in my July column (p. 24)). Different DOSes handle the necessary pointers differently—writing a routine that meets all requirements is difficult. You have to be aware of three pointers:

- DOS's HIMEM or MEMTOP pointer, stored at 4049 hex in most Model I DOSes and at 4411 hex in most Model III DOSes. This byte defines the highest unprotected byte available for a new program in NEWDOS, but the lowest currently protected byte in TRSDOS.
- 40B1 hex. This is Basic's pointer to the highest available byte and also to the top byte of the string variable storage area. NEWDOS sets this byte equal to HIMEM; TRSDOS sets it 1 byte less than HIMEM.
- 40A0 hex. Basic uses this byte to define the lower bounds of the variable string storage area. Unless your Basic program changes it with CLEAR, it sets the area 50 bytes lower than the pointer at 40B1 hex.

Plug in your best peripheral.

Disk drives. Modems. Printers. Software. Only one source keeps you up-to-date with every innovation for microcomputers. That source is *Microcomputing*: the multi-system journal for the technical computerist.

Microcomputing's columns and articles are informative, easy-to-understand, and practical. Learn how new developments affect you. Discover the ins-and-outs of Winchester disk drives. And consider unique applications in banking, medicine, education, and business. With every issue you also get:

- extensive software listings and conversions
- advanced programming techniques for added capabilities
- powerful utilities to upgrade your system
- easy-to-do hardware modifications
- software, hardware, and book reviews that'll save you money
- new product announcements
- buyer's guides to help you get the best deal
- and publisher Wayne Green's bold editorials.

And there's more. Monthly columns cover other exciting topics in-depth. Here are just a few:
"Overview"—reveals industry trends, highlights new technologies, and examines the market impact of various products.
"Intelligent Toaster"—learn to build computer-controlled devices that speak, listen, and manipulate their own environment.

Get all this and more every month. A subscription to *Microcomputing* is only $24.97 per year, and it's risk-free. If you aren't completely satisfied with your first issue, simply write "cancel" on the invoice and return it to us. You will owe us nothing, but please keep the first issue as our gift.

Subscribe today. Send in the coupon or attached card to: *Microcomputing*, PO Box 997, Farmingdale NY 11737. Or call us toll free:

1-800-258-5473

for even faster delivery. And if you include payment or charge it on your Mastercard, Visa, or American Express, you'll get a 13th issue FREE!

***Microcomputing* magazine. Plug it in today.**

YES! I want to plug into *Microcomputing*. Send me twelve issues for $24.97. I understand that with payment enclosed or credit card order I will receive a free issue making a total of 13 issues for $24.97.

☐Check enclosed ☐MC ☐Visa ☐AE ☐Bill me

Card# _____

Exp. date _____

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

Canada & Mexico $27.97, 1 year only, U.S. Funds drawn on U.S. bank.
Foreign surface $44.97, 1 year only, U.S. Funds drawn on U.S. bank.
Please allow 6–8 weeks for delivery.

MICROCOMPUTING®

PO Box 997, Farmingdale NY 11737

33AF8

Disk Basic, on entry, uses the HIMEM pointer to calculate the pointers at 40B1 hex and 40A0 hex. However, a Basic * command from DOS assumes that the program correctly set the pointers. To use the command BASICP *, you must first find out how your DOS handles the values in the pointers (enter Basic with protected memory and use Debug to check the values in the three locations). Then add code to Module 2 to set the pointers accordingly.

The rest of Module 2 merely relocates the patch program to high memory by knowing the patch's length and by performing an LDIR block move. This move-and-protect routine works for all relocatable programs. If you wish to perform a similar move-and-protect with a nonrelocatable program (one that includes CALLs or JPs to internal addresses), your program must calculate how far to move the routine and then add that offset to the absolute addresses before the LDIR instruction.

The third module is the most interesting. It is designed to feed the original command to DOS with the P at the end of BASICP removed. You write this module in two parts.

The first part of Module 3 finds the current keyboard driver's address and stores it at KB. Then, it replaces the keyboard driver address in the keyboard DCB with the address of the routine called Feed. Finally, it stores the address of the command buffer in the pointer PTR and returns to DOS. By changing the address of the keyboard driver at 4016 hex, each time DOS looks for a keystroke, the Feed routine provides that keystroke instead of the keyboard. (That is also how programs feed a do-file to the computer.)

The Feed routine first saves the HL register and then uses the value stored at PTR to find the next byte in the buffer to send back to DOS. Notice that the routine skips any byte of P that it finds and jumps down to the Quit routine when it encounters the 0D hex/carriage return byte. After it places the required byte in the A register (normal drivers always return values in the A register), the routine stores the HL pointer back to PTR and recovers the original value of HL from the stack. Control then returns to DOS to process the ersatz keystroke.

The Quit routine, before it returns control to DOS, links the normal keyboard driver back into the system. If it didn't, DOS would call up Disk Basic, but you'd be unable to type anything else into the system. When the 0D hex byte is received by DOS, it processes the command it has received, loading and executing Basic normally. Because Listing 1 is assembled at 6000 hex, Basic overwrites all of it and essentially disappears from memory, leaving only the patch protected in high memory to process RESTORE nnnnn commands.

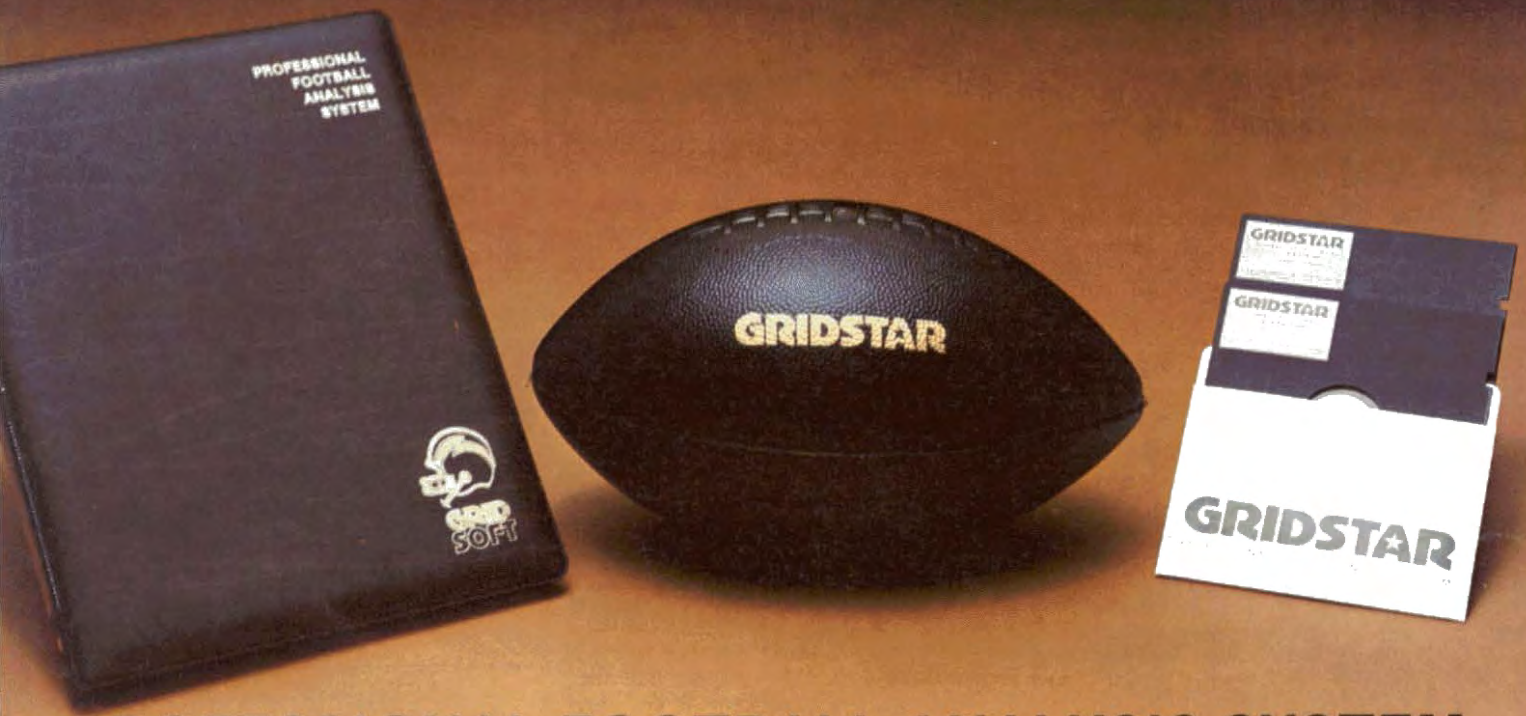
As I explained above, I have tested this program with TRSDOS and NEWDOS. I don't use LDOS or DOSPLUS, but it should work with either of those. No patch to the RST 10 hex vector is completely compatible with MULTIDOS, which resets the value at 4004 hex to 1D78 hex after Basic commands such as CMD"DIR" (it probably uses that vector itself during either CMD or DIR processing).

If you use a tape system, you can ignore Modules 1 and 3 but you must add the few required lines in Module 2 to calculate and reset the 40A0 hex and 40B1 hex pointers. Just add −50 to the new value you will store in HIMEM (40B1 hex), and load that at 40A0 hex. You will be able to assemble the program with any name you wish, and load it in using the system command. However, you must add a JP 1A19 hex instruction after the LDIR in order to return to Basic.

Listing 1 continued

```
01110 ;
01120 QUIT    LD      HL,(KB)          ;ADDR. OF ORIG KB DRIVER
01130         LD      (4016H),HL       ;SET IT BACK UP
01140         POP     HL               ;RESTORE HL REGISTER
01150         RET                      ;RETURN TO DOS
01160 ;
01170 KB      DEFS    2                ;STORAGE SPACE
01180 PTR     DEFS    2                ;
01190 BUFFER  DEFS    64               ;ONE FULL LINE
01200 ;
01210 ;
01220 ;************************************
01230 ;Module 4 -- Patch for RESTORE Command
01240 ;************************************
01250 ;
01260 ;
01270 EXIT    EQU     1D78H            ;NORMAL RST 10H ROUTINE
01280 ;
01290 START   EX      (SP),HL          ;GET TOP OF STACK
01300         LD      A,L              ;GET LSB OF STACK VALUE
01310         CP      5BH              ;  AND TEST IT
01320         JR      NZ,NO            ;GO IF NOT 5BH
01330         LD      A,H              ;GET MSB OF STACK VALUE
01340         CP      1DH              ;AND TEST IT ALSO
01350 NO      EX      (SP),HL          ;STACK & HL RESTORED
01360         JP      NZ,EXIT          ;GO IF NOT CORRECT CALLER
01370 ;
01380 ;Now test for RESTORE token
01390 ;
01400         CALL    1D78H            ;GET NEXT VALUE IN A
01410         CP      90H              ;RESTORE TOKEN?
01420         JR      Z,YES            ;GO IF TOKEN FOUND
01430         DEC     HL               ;ELSE CORRECT POINTER
01440         JP      EXIT             ;AND LET BASIC WORK
01450 ;
01460 ;RESTORE token found -- now check for line
01470 ;                      number following it
01480 ;
01490 YES     CALL    1D78H            ;IS NEXT VALUE NUMERIC?
01500         JR      C,YES2           ;GO IF IT IS
01510         JP      1D91H            ;ELSE TO NORMAL RESTORE
01520 ;
01530 ;RESTORE token followed by a numeral -- assume it is
01540 ;        a line number, otherwise UNDEFINED LINE# error
01550 ;
01560 YES2    CALL    1E5AH            ;GET LINE # IN DE
01570         PUSH    HL               ;SAVE POINTER
01580         CALL    1EC8H            ;GET LINE ADDR. IN HL
01590         DEC     HL               ;GO BACK ONE SPACE
01600         LD      (40FFH),HL       ;PUT INTO READ POINTER
01610         POP     HL               ;RECOVER POINTER
01620         DEC     HL               ;  AND CORRECT IT
01630         JP      EXIT             ;BACK TO BASIC
01640 ;
01650         END     BEGIN
```

FOR WINNERS ONLY



PROFESSIONAL FOOTBALL ANALYSIS SYSTEM

THE MOST COMPREHENSIVE SYSTEM — NOW AVAILABLE FOR 1983

At the controls of the most sophisticated football analysis software, your personal computer can make the upcoming football season the most exciting ever!

GRIDSTAR™, the professional football analysis system, is comprised of four main components:

★ PROFESSIONAL FOOTBALL DATA BASE — File comprised of 2184 regular season games, 1973 to 1983 inclusive.

★ DATA BASE MANAGER — Comprehensive utility to display, edit, and search your Data Base.

★ WEEKLY HANDICAPPER — This program handicaps a full week of games using the GRIDSTAR™ STRATEGY.

★ GRIDSTAR™ DEVELOPMENT PROGRAMS — All programs used to develop and test the GRIDSTAR™ STRATEGY.

Professional Football Data Base
At your disposal, a complete history of America's No. 1 Sport — 11 years of game data. Each 16-byte game record includes home and away teams, home and away scores, the closing line, day, week and date.

Data Base Manager
To keep your Data Base current for years to come, full EDIT FUNCTION allows you to change or add any game record. The sophisticated DISPLAY MODE lets you scroll up and down through your Data Base. The extensive SEARCH FUNCTION is a serious analytical tool. Set any combination of 20 search parameters and invoke a search for qualified games. Automatic won/loss analysis can be instantly displayed.

Weekly Handicapper Using the GRIDSTAR™ STRATEGY
This is your Sunday morning predictor program. The program applies the GRIDSTAR™ STRATEGY to each upcoming game and tells you which teams to bet. It will indicate 5 to 10 bets each week determined by the five analysis angles of the GRIDSTAR™ STRATEGY. Your only responsibility is to keep the Data Base current, by keying in the lines and scores each week.

The GRIDSTAR™ STRATEGY
Employing advanced statistical techniques, our development team has researched numerous methods of predicting winners against the spread. Of these, five approaches proved effective enough to be incorporated into the GRIDSTAR™ STRATEGY.

- POWER RATING ANALYSIS
- STREAK ANALYSIS
- POINTSPREAD ANALYSIS
- HEAD-TO-HEAD ANALYSIS
- MONDAY NIGHT ANALYSIS

Each of the above approaches, taken separately, has proven to be a consistent winner. But when combined into a comprehensive handicapping system, the GRIDSTAR™ STRATEGY, the results have been consistently spectacular, year after year. The following table presents the GRIDSTAR™ STRATEGY's record versus the spread over the last decade.

THE GRIDSTAR™ STRATEGY 10-YEAR PERFORMANCE VS. THE SPREAD

	Games	Win	Loss	Tie	Pct
1973	116	76	40	0	.655
1974	107	69	37	1	.650
1975	103	63	36	4	.631
1976	126	71	51	4	.580
1977	130	77	43	10	.631
1978	128	75	46	7	.613
1979	149	94	51	4	.644
1980	131	90	37	4	.702
1981	146	93	52	3	.639
1982	57	34	23	0	.596
TOTAL	1195	742	416	37	.636

Performance Absolutely Verifiable
All the programs used to develop the GRIDSTAR™ STRATEGY are included in the package. You can run these programs, verify the results, and trace the entire developmental process. The seven strategy development programs not only provide proof of performance, but can form the basis for further research.

Complete Documentation
The accompanying OPERATIONS MANUAL is extensive. Over 100 pages of text take you through the Data Base layout, operation of each program, and the fine points of computer sports analysis. Over 30 charts and illustrations highlight the presentation.

System Requirements
TRS-80* MOD. I or MOD. III, 48k, 1 Drive
IBM PC**, 64k, 1 Drive

Every program in the GRIDSTAR™ package is in BASIC, structured, modular, and fully commented. Easy to use, each program is user-friendly, menu-driven, with air tight error-trapping.

Complete Package $195.00

* Registered Trademark of Tandy Corporation
** Registered Trademark of IBM Corporation

✓ 358

GRIDSOFT
7777 Keele Street, Unit 8
Concord, Ontario, Canada
L4K 1Y7

ORDER BY MAIL or PHONE: (416) 738—1700

GridSoft Inc., 7777 Keele Street, Unit 8, Concord, Ontario, Canada L4K 1Y7
Yes! Rush me the complete **GRIDSTAR™** package at a cost of $195.00.
Please check program required: ☐ **IBM PC**** ☐ **TRS-80 MOD. I*** ☐ **TRS-80 MOD. III***
Dealer Inquiries Invited

Name _____

Address _____

City _____ State _____ Zip _____

Card Number _____ Expiry Date _____

Signature _____ ☐ Check ☐ Money Order ☐ Visa ☐ MasterCard

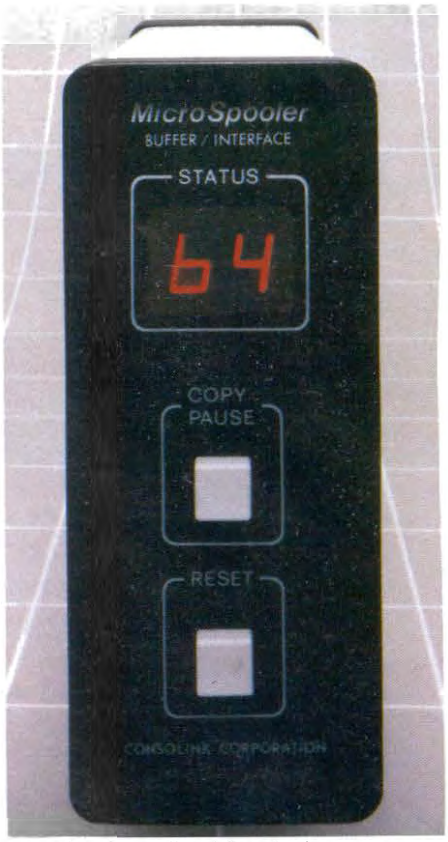
MicroSpooler®
Saves Time

MicroSpoolers mean an end to waiting. The MicroSpooler stores data and feeds it to your printer as fast as it can handle it. You don't lose valuable computer time waiting for the printer to do its job.

Easy to install. Easy to use. Easy on the budget. These stand-alone MicroSpoolers can be installed in-line between virtually any printer and any computer.

Features:

• 16K memory (user expandable to 32K or 64K) • Status readout • Internal power supply • Vertical mount configuration • Independently selectable baud rates and handshaking • Satisfaction guaranteed • Priced from $219.00



Send or call toll free for literature on our complete Spooler lines.

CONSOLINK
CORPORATION
Dept. 2-40
1840 Industrial Circle
Longmont, CO 80501
(303) 651-2014
800-525-6705

↙405

Other Mail

While I'm at it, I would like to answer and acknowledge some of the other mail I've received.

In addition to the Restore patch, Michael Callahan sent a technique for using TRSDOS 1.3 Debug to scroll through and modify any sector on a disk. His technique works on a Model III with dual drives.

First, format a new disk in drive 1 and then use the Purge command to delete all files on the disk (including system files). Next use FREE :1 to verify that the disk contains nothing except the directory on track 17 and the boot sector in the first gran of track zero. You should have 233 free grans of space on the disk.

Then, use Create to open a file on that disk with a logical record length of 256 and 699 records:

```
CREATE TEST:1 (LRL = 256, REC = 699)
```

Use another FREE :1 to verify that the entire disk is allocated to your new file.

Enter Debug, press the F key, and answer the prompt with the name of your newly created file (TEST:1 in the example above). Remove the disk from drive 1 and replace it with any disk you want to examine. You can scroll through the entire disk except for the boot sector and directory. Callahan reports that he used this technique to change DOS library commands to shorter abbreviations and to personalize the initial start-up display to one he liked better.

Several readers have asked how their programs can tell whether they are running on a Model I or Model III. If you use pointers such as the HIMEM or call the ROM routines that are different in the two models, you can still write a program that works on both if it can branch to separate routines for the different models at critical times.

The answer is to examine the ROMs of both machines, find the differences, and use a dissimilar byte as a test. My favorite test byte is located at 54 hex. This byte is a 01 hex on the Model I, and a 0BE hex on the Model III. The test looks like this:

```
LD   A,(54H) ;get the byte
DEC  A       ;A = A - 1
JR   Z,mod1  ; goto Mod. I routine on zero
             ; else do Mod. III routine
```

The test is especially easy because you can use a single-byte DEC instead of a CP to test the byte at 54 hex in ROM.

John DeRegnaucourt wrote to complain about the length of the screen-white routine I used in May (p. 28) for demonstration purposes. The routine I used is shown in Program Listing 2a.

Though it would not have served the purpose of demonstrating the multiple parameters techniques I was discussing in May, DeRegnaucourt insisted that his routine (Program Listing 2b) is better because it is shorter. His program is 2 bytes shorter than mine and would be the one to choose if memory conservation was a major programming concern.

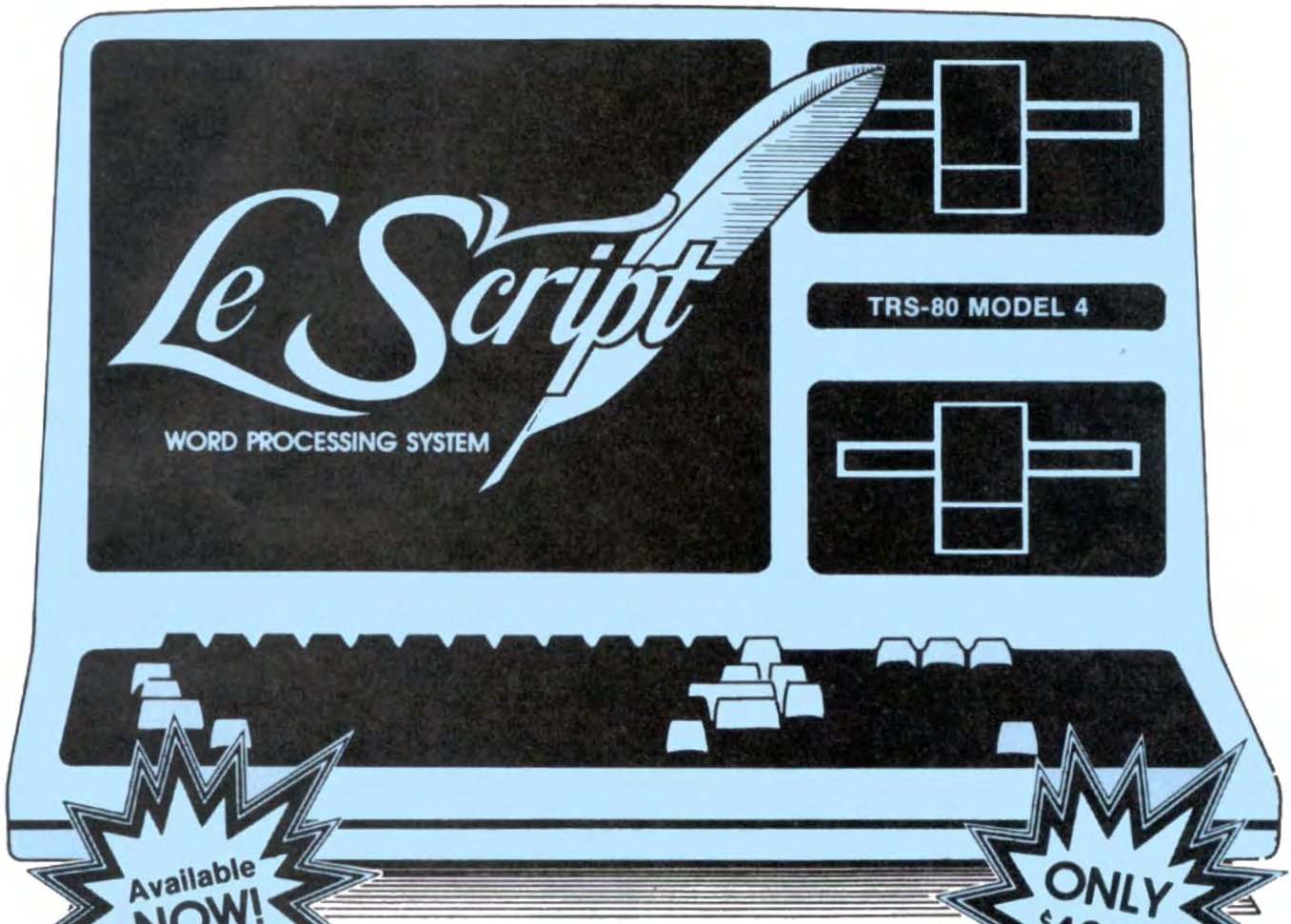
"You must consider criteria other than memory length when writing programs. . ."

You must consider criteria other than memory length when writing programs, though. For example, you may have need for the fastest program possible. If you check the time states (T states) required by each program, you'll find a startling difference. The routine in Listing 2a takes 21549 T states, or about .01 seconds on a Model III (ignoring interrupts). Listing 2b, on the other hand, requires 39951 T states, or nearly twice as much time. Often, a longer program runs faster than a shorter one. If timing is critical, calculate T states for your programs as you go along, and keep track of what types of instructions seem to take longer than they are worth.

What is the fastest and shortest screen-white subroutine possible? Program Listing 2c is 12 bytes long and takes 29718 T states, better than DeRegnaucourt's routine, but still slower than my original one. So, here is the first, official "Next Step" contest—come up with the shortest (less than 12 bytes) or fastest (less than 21549 T states) screen-white subroutine. Send it to me (not to *80 Micro*) by Oct. 10. The best entries will win a suitable prize.

Besides program length and speed, Assembly-language programming has two other important criteria. One is the

TRS-80 MODEL 4
Word Processing Program



Available NOW!

ONLY $129.95

80x24 DISPLAY

- Works with **TRSDOS 6.0**
- **90K TEXT BUFFER** when expanded memory is installed.
- Built-in **FORM LETTER** and **MAIL-MERGE** capabilities.
- Performs **PROPORTIONAL-SPACE** right-margin justification on over 60 different printers (all drivers included **FREE**).
- Same powerful editing features as **ZORLOF II,** with dozens more features added.
- Versions also available to run on **MODEL I, MODEL III, LNW-80, PMC-80,** and **MAX-80** (80x24 display).

FREE

- 30-Day Support to Register Owners
- Subscription to LeScript Newsletter

LeScript costs $200 less than competing products matching its capabilities.

VISA MasterCard

CALL 1-305-259-9397

ANITEK

ANITEK SOFTWARE PRODUCTS
P.O. BOX 361136
MELBOURNE, FL 32936

141

FREE SHIPPING WITHIN THE U.S.; OUTSIDE THE U.S. ADD $10.00 FOR SHIPPING. FLORIDA RESIDENTS ADD 5% SALES TAX. ALL ORDERS PREPAID BY CHECK, MONEY ORDER, CREDIT CARD OR C.O.D.

See List of Advertisers on Page 323

number of registers used. In some applications, the fewer registers a subroutine uses, the better—fewer Pushes and Pops are needed to restore the register before exiting from the routine.

If you're writing general purpose routines to add to several programs, you should include a list of registers each routine uses in the opening remarks. That way, you won't have to reread the entire routine a year later to see how it handles the DE or IX register pairs.

A fourth criterion, one which too many amateur programmers forget, is clarity of code, especially if you do not heavily comment your Assembly-language code. Will you be able to understand the purpose of each instruction a year after you wrote it? Would another programmer, charged with modifying your work, be able to? Though clarity is somewhat subjective, certainly some programs are easier to understand than others.

Of course, if your aim is to keep people with disassemblers from understanding what you wrote, you should make the code as convoluted as possible. I recently needed to disassemble one of my self-booting game disks. The boot sector of the disk was a remarkable collection of JPs, JRs, CALLs, overlapping code, and unused code—all designed, I'm sure, to keep the nosy, and the would-be pirates, from deciphering it.

One more set of letters needs to be answered this month. Some of you have written to complain that my programs on the Load 80 disks, as well as other /SRC files on those disks, will not work with your disk-based Series 1 Editor/As-

Program Listing 2. Three versions of the screen-white routine.

```
00100 ;************************************
00110 ;  LISTING 2A                       *
00120 ; 14-byte screen white-out          *
00130 ;  subroutine -- uses AF,BC,DE,HL   *
00140 ; requires 21549 T-states          *
00150 ;************************************
00160 ;
00170         ORG     7F00H
00180         LD      HL,3C00H        ;HL==> TOP OF SCREEN
00190         LD      DE,3C01H        ;DE==> 2ND SCREEN POS'N
00200         LD      BC,03FFH        ;BC=# OF SCREEN POS'NS -1
00210         LD      (HL),0BFH       ;WHITE TO 1ST POSITION
00220         LDIR                    ;WHITE TO ALL OTHERS
00230         RET                     ;RETURN TO CALLER
00235 ;
```

Listing 2 continued

StatPac™

Statistical Analysis Package

The NEW update is now available and is supported by the Authors!

Improved features include:

- 5-30 times faster
- multiple printing options
- better analyses printouts

plus All the benefits StatPac™ has become famous for!

StatPac (similar to mainframe SPSS*) is the one complete data manager and statistical analysis package you'll ever need.

Walonick Associates
5624 Girard Ave. So.
Minneapolis, MN 55419

(612) 866-9022

✓90

*SPSS is a trademark of SPSS, Inc.

If you've been playing the I-know-I-have-it-but-I-can't-find-it Hidden Disk game, here's a Push Button Solution

The **ARRANGER II**. It makes your computer do all the work in organizing and maintaining your disk program library. It's the only system with an 11,000 program, 255 program name per disk capacity. The flow of operation is smooth and logical... you're never left with a blank screen. **ARRANGER II** marks your disks by recording a name on each disk directory track. It stores/recalls all disk information using random access for highest speed; automatically recognizes 35, 40, or 80 track Single/Double sided, S/D density disks and all DOS for TRS80 models IV, III, I (d/den). **$49.95,** free shipping.

Triple-D Software
Box 642, Layton, Utah 84041 (801) 546-2833
VISA MASTERCARD AMERICAN EXPRESS ✓489

PRINTERS

C. ITOH

Prowriter

120 cps, 4 fonts (includes pro portional), 8 sizes, 160 x 144 dpi, friction & tractor feed. A worthy rival of Epson.
Prowriter **$399.88**
Prowriter 2 ..... **$719.88**

Starwriter

The **Starwriter** has 40 cps. true Diablo emulation, on 136 columns. **Printmaster** is the 55 cps version. Serial or parallel interface.
Starwriter **$1219.88**
Printmaster **$1679.88**

COMREX

ComRiter

Parallel **$869.88**
RS-232C **$1009.88**

DIABLO

620 & 630

620 ..... **$999.88**
630 ..... **$1929.88**

DTC

380Z

Parallel **$1119.88**
RS-232C **$1139.88**

EPSON

FX, RX & MX

RX-80 ..... **$399.88**
MX-80 F/T **$469.88**
MX-100 ..... **$664.88**
FX-80 ..... **$564.88**
FX-100 ..... **$CALL**

INFORUNNER

Riteman

Parallel **$349.88**

NEC

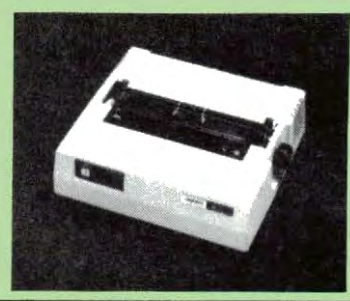
SpinWriter

3510 ..... **$1929.88**
3530 ..... **$1729.88**
3550 ..... **$2019.88**
7710 ..... **$2399.88**
7730 ..... **$2399.88**

Okidata Microline 92

$524.88 UPS DELIVERED

An exceptional printer (even *Creative Computing* thought so). The **Microline 92** has 80 columns, a 160 cps draft mode & a 40 cps correspondance mode, 10, 12 & 17 cpi, all with double widths, enhanced print (at 80 cps), subscripts, superscripts & backspacing. Full dot addressable graphic capability (72 X 72 dpi) included. Pin & friction feed standard, adjustable tractor optional ($59.88). RS-232C version has a 2K buffer & costs $634.88.



Microline 93 (Parallel) **$884.88**
Microline 93 (RS-232C) **$994.88**

OKIDATA

Microline Series

Microline 80 ..... **$339.88**
Microline 82A **$419.88**
82A/92 Tractor **$59.88**
82A/92 Roll Holder **$49.88**
82A Okigraph ROM **$49.88**
82A RS-232C Hi-speed Interface **$129.88**
Microline 83A **$679.88**
83A Okigraph ROM **$49.88**
83A RS-232C Hi-speed Interface **$129.88**
Microline 92 ..... **$524.88**
w/RS-232C **$634.88**
Microline 93 ..... **$884.88**
w/RS-232C **$994.88**
Microline 84
Parallel **$1024.88**
RS-232C **$1124.88**

MANNESMANN TALLY

MT-160 L

160 cps, 8 fonts (including a correspondance font), parallel & serial interfaces, friction/ tractor feed, plus a menu-driven installation for easy set-up from the control panel. This year's sleeper. The **MT-180 L** is the 136 column version.
MT-160 L **$389.88**
MT-180 L ..... $CALL

SMITH CORONA

TP-1

TP-1 ..... **$CALL**

SILVER REED

EXP-550

EXP-550 (Parallel) **$719.88**
w/(RS-232C) **$759.88**
EXP-500 (Parallel) **$459.88**

STAR MICRONICS

Gemini 10X/15

Gemini 10X ..... **$CALL**
Gemini 15 ..... **$CALL**

MODEMS

EMTROL

Lynx

The **Lynx** is a bus-converting modem, meaning you don't need a RS-232C interface to run it. It's a 0-300 baud modem, originate/ answer, that has auto dial/ answer, full/half duplex & comes complete with all hardware & software.
Lynx **$229.88**

US ROBOTICS

Password

300/1200 baud modem with auto-dial/answer, full & half duplex, LSI technol ogy. Cable included.
Password **$379.88**

DC HAYES

Smartmodem

300 or 300/1200 baud direct connect modems with auto dial & answer, full/half duplex. Comes complete with power supply & modular cable (RS-232C cable optional).
(300 baud) **$219.88**
(1200 baud) **$539.88**

NOVATION

SmartCat

Latest LSI technology. 0-300 or 1200 baud, auto-dial & auto answer, full/half duplex. Cable & power supply inclu ded. RS-232C cable optional.
(300 baud) **$199.88**
(1200 baud) **$499.88**
AutoCat
(300 baud) **$229.88**
(1200 baud) **$629.88**
Cat
D-Cat (300 baud) **$159.88**
J-Cat (300 baud) **$139.88**

SOFTWARE

STANDARD MICROSYSTEMS

Microterm

A terminal program should support all the "bells & whistles" on a modem. Microterm supports auto-dial/answer modems like the Lynx, DC Hayes Smartmodem or Novation Smart/ AutoCats. Features preprogrammed dial & transmit, direct file transfer, 34K capture buffer and certified 2400 baud operation rate. Specify Model I or Model III when ordering.
Microterm **$79.88**

STANDARD MICROSYSTEMS

DOSPlus 3.4

The preferred disk operating system for Model I or III. Features BASIC array sort, (multi-key, multi-array), active "DO", device routing, DOS command repeat, etc. Specify Model I or III, single or double track, 40 or 80 track drive.
(Mod I) **$59.88**
(Mod III) **$89.88**

PROSOFT

NewScript

Forget all those "evaluation" articles. **NewScript** is the best word processing software available, bar none. **NewScript** gives you proportional spacing, single and double width type, subscripts, superscripts, underlining, boldface, multiple pitches, full-screen editing, global search/replace, a customized "form" letter that creates its own mailing labels—exceptional performance. **NewScript** comes with detailed documentation and support from the authors. Specify Model I or III when ordering.
NewScript **$112.88**
NewScript Options
ScripSit-to-NewScript File Conversion Software ... **$27.88**
Proportional Module ... **$46.88**

CORNUCOPIA

Electric Webster

Electric Webster is a 50,000 word dictionary that features spell checking & a "browse" feature allowing you to choose spellings or to enter your own. Fully NewScript compatible.
Electric Webster **$134.88**

Information/Orders:
(603) 881-9855
Orders Only:
(800) 343-0726

No Hidden Charges:
We pay UPS ground shipping on all our orders, and we *never* charge extra for credit cards. We accept CODs up to $1000 & add a $10 fee per order. We have a $50 minimum order. Personal checks are cleared in 3 weeks.

All our equipment is shipped with full manufacturer's warranty. We sell only what we are authorized to sell to insure full warranty support, & we're authorized for warranty work on a number of printers. We also offer extended warranty plans for many printers.

Sorry, we cannot accept open POs or extend credit/terms at these prices. APO and foreign orders are n ot accepted.

We prepared this ad in June, & prices do change, so call to verify them.

AMERICAN EXPRESS®

HIGH TECHNOLOGY AT AFFORDABLE PRICES

THE BOTTOM LINE

MasterCard VISA

MILFORD, NH 03055-0423 □ TELEPHONE (603) 881-9855

Listing 2 continued

```
00240 ;************************************
00250 ;  LISTING 2B                       *
00260 ; 12-byte screen white-out          *
00270 ;  subroutine -- uses AF,HL         *
00280 ; Requires 39951 T-states           *
00290 ;************************************
00300 ;
00310         ORG     7F00H
00320         LD      HL,3C00H        ;HL==> TOP OF SCREEN
00330 LOOP2B  LD      (HL),0BFH       ;MAKE IT WHITE
00340         INC     HL              ;HL==> NEXT POS'N
00350         LD      A,H             ;GET MSB OF POS'N
00360         CP      40H             ;OFF SCREEN YET?
00370         JR      C,LOOP2B        ;RETURN IF NOT
00380         RET                     ;RETURN TO CALLER
00385 ;
00390 ;************************************
00400 ;   LISTING 2C                     *
00410 ; 12-byte screen white-out          *
00420 ;  subroutine -- Uses A,HL          *
00430 ; Requires 29718 T-states           *
00440 ;************************************
00450 ;
00460         LD      A,40H           ;FOR CHECKING HL
00470         LD      HL,3C00H        ;HL==>TOP OF SCREEN
00480 LOOP2C  LD      (HL),0BFH       ;MAKE THIS POS'N WHITE
00490         INC     HL              ;HL==> NEXT POSITION
00500         CP      H               ;DONE YET?
00510         JR      NZ,LOOP2C       ;GO BACK UNTIL H=40H
00520         RET                     ;RETURN WHEN DONE
00530 ;
00540         END
```

sembler from Radio Shack. You're right; they won't work, because the Series I EDTASM demands an unusual disk format for source files.

For a complete description of the problem, a Basic program that transforms the /SRC files into a format you can use, and information about getting a free copy of the program, see Reload 80, *80 Micro*, April 1983, p. 404 and August 1983, p. 340. And don't blame Load 80 for the incompatibility—its source code is the closest thing available to a universal disk format. Instead, ask Radio Shack why they chose to move away from a format that would allow easy interchange of source files between assemblers.

Send questions, comments, and contest entries to me at 280 N. Campus Ave., Upland, CA 91786. If you would like a reply, please enclose a stamped, self-addressed envelope. I can also be reached by e-mail on CompuServe at 72165,735. ■

40-50% Savings On Software

As a member of the Software of the Month Club, you'll receive:

- **SAVINGS:** high volume buying means low prices to members
- **SELECTIONS:** members to decide best sellers
- **NEWLETTERS:** tips & "how-to" by consultants
- **HARDWARE SPECIALS:** co-op savings

Membership registration fee $25.
Join now for only $5. (limited time)
$5 bonus coupon to first 50 new members from this ad

80M 9-83

Software of the Month Club, Inc.
953 Mission St., Mint Mall
San Francisco, CA 94103

SOFTWARE OF THE MONTH CLUB

↩29

Name _____
Address _____
City/State/Zip _____
Enclosed is $5. Please enroll me in the Club
☐ Check or Money Order ☐ VISA ☐ MASTERCARD
Exp. Date _____
Card # _____
Signature _____

Business Software

What you're looking for in Business Software . . . we got!!!

Reliability
Speed & Efficiency
Easy Data Entry
Competitively Priced

General Ledger $99.95
- Customize financial statements
- Almost unlimited storage capacity
- Income statement by department
- Req: 48K Mod 3 or 4, 2 drs & 80cptr.

Accounts Receivable ...$99.95
- Balance forward A/R
- 30/60/90 day aging
- Late charges & credit limits
- Req: 48K Mod 3 or 4, 2 drs & 80cptr.

Loan Amortization $24.95
- Print a loan repayment schedule
- Analyze using diff. int/prin/periods
- Req: 48K Mod 1, 3 or 4, 1 drive

Income Tax Package(s)...$39.95
- Price per package – 4 packages offered
- Save time, print all forms & schedules
- Too numerous to list all forms & sch.
- 48K Mod 1, 3, & 4, 1 dr & 48K Apple II†

Write or Call for FREE catalogue
R & S Software Co.
P. O. Box 81 - Hammond, IN - 46320
(312) 862-4531 ↩78

Turn Your Color Computer into *SUPER* Computer

Color Computerists

HOT CoCo. The exciting new montnly magazine for the TRS-80 Color Computer*. It promises to transform your low-end machine into a high-resolution superstar.

HOT CoCo is the brainchild of Wayne Green, the publisher of *80 Micro*. The information in **HOT CoCo** is first rate with monthly columns and reviews that focus on valuable money-saving techniques. Time savers too! Plus problem solving articles on:

- Utilities—patching, aiding, troubleshooting
- Graphics—graphs and patterns
- Hardware—interfacing and enhancing
- Games—fun and strategy
- Programming techniques and tutorials
- Coverage of home use, business, communications and education applications

And coming soon: A convenient monthly loader containing program listings from each issue.

Best of all, **HOT CoCo** is written by users just like you. The material is always up-to-date and useful. Hardware, software, books . . . what's new . . . what's best . . . what works.

All this is yours for the affordably low subscription rate of $24.97. With pre-payment (check or credit card), you'll receive a 13th issue FREE! Use the attached order form, the coupon below, or call toll free **1-800-258-5473.**

Turn *your* mild-mannered machine into a *SUPER* computer. Subscribe to **HOT CoCo** today.

YES! *I want a subscription to* **HOT CoCo** *at $24.97.*

I understand that with payment enclosed or credit card order, I will receive a FREE issue making a total of 13 issues for $24.97.

☐MC ☐VISA ☐AE ☐CHECK/MO ☐BILL ME

CARD#_____ EXP. DATE_____

SIGNATURE_____

NAME _____

ADDRESS _____

CITY _____ STATE_____ ZIP_____

Canada and 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.

HOT CoCo•Box 975•Farmingdale, NY 11737 **33AF8**

*TRS-80 Color Computer is a trademark of Radio Shack, a division of Tandy Corp.

HOT CoCo™

THE COLOR KEY

by Scott Norman

Advanced math on the Color Computer

Have you ever worked with software that you wish you had written yourself? I've recently used two such programs, both packages for handling advanced mathematical operations.

This Science issue gives me the opportunity to indulge a passion for math that I usually hide, out of respect for my lack of corresponding talent.

I've tried to minimize the mathematical jargon in this column, but I don't know how to discuss the topic without using the appropriate vocabulary. The Color Key isn't the place to explain all the mathematical concepts, so if your interests lie elsewhere you might find this month's column obscure.

Mathmenu

Computers don't do mathematics—just arithmetic, and a pared-down variety at that. (I'm ignoring the big-machine symbolic manipulators like MACSYM.)

Of course, machines do their computational thing so quickly and so accurately that they let you investigate topics that would be drudgery if you tackled them with pencil, paper, and a thirst for closed-form solutions.

Where does this leave the Color Computer user? Rather well off, judging by my subjects for this month: Mathmenu and Calculus Math Module. Both provide a number of useful mathematical tools and make good use of Extended Color Basic's graphics.

Mathmenu (Inter + Action, 113 Ward St., New Haven, CT 06519) is a collection of 15 programs available in two formats: a $44.95 cassette requiring 16K, and a $49.95 disk for 32K machines.

The disk edition offers one-keystroke selection of functions from a master menu, while cassette users have to position the tape to the routine they want. Outside of that and the occasional need for a PCLEAR 1 instruction for the smaller RAMs, the two are operationally identical.

The disk contains the Mathmenu driver program plus 17 Basic routines and two data files. The jobs they perform include finding the real and complex roots of quadratic equations, numerical differentiation and integration, matrix operations on two-dimensional arrays, least squares curve fitting, and evaluation and plotting of functions with one or two variables.

I personally need graphs to appreciate what is going on in most mathematical discussions, but I know how tough it is to draw them accurately.

I've often thought that a personal computer could give students a real feeling for analytical geometry, Fourier synthesis, and a host of other graphically oriented topics. This might help the practicing scientist or engineer, too—at least in the early stages of forming ideas.

Mathmenu's two graph programs work similarly; they require you to furnish a closed form for the function you want to plot, together with limits on the region of interest. The program handles only regions, including the origin of coordinates.

Take the 2D PLOT routine first. When you select the Enter New Equation menu option, Mathmenu prompts for the function you want graphed in the guise of line 10 of a Basic program. The independent and dependent variables are X and Y, respectively, and you can use all functions available under Extended Color Basic.

For example, you can specify an exponentially damped sine wave by:

```
10 Y = EXP(-X)*SIN(X)
```

After entering the equation, type GOTO 45 to return to Mathmenu's control.

Before you can get a graph, you must use 2D PLOT's Enter New Limits option. Specify an upper limit for the X axis (the point at which the right screen border cuts the axis), together with upper and lower plotting boundaries. These are the ends of the range over which the program evaluates and graphs the function itself.

Unless a Special Features command instructs otherwise, Mathmenu sets the upper limit of the Y axis equal to whatever you select for the X axis. You need to exercise a certain amount of care to keep the plot from running off-scale; you can't rely on the program to generate consistent results once that happens. You can erase the plot and make necessary corrections interactively.

Once you enter the equation and limits, a single keystroke calls up the actual plotting routine. The program moves fairly quickly, especially considering that it's written in Basic.

Once the graph is finished, you can return to 2D PLOT's menu and continue. You might want to enter a new equation and superimpose its graph on the old one. You can even change plotting boundaries before doing so. It's best to keep the same upper limit on the X axis, though.

Figure 1 is the result of this sort of exercise, obtained with the Radio Shack Screen Print routine. The two superimposed functions are the elementary curve Y = SIN(X), and the sum of this curve and its first five odd harmonics, each divided by its argument. That's the sum of six terms of the form:

$$(\mathrm{SIN}(2N-1)X)/(2N-1)$$

with N running from one to six.

The last expression is the general term in the Fourier analysis of a square wave.

2D PLOT could be a tremendous help to a student first learning the concept of adding up sinusoids to generate arbitrary functions. It's also one of the easiest ways I know to make mathematical experiments and get a feel for analytic functions.

The principal drawback is the lack of scales along the X and Y axes. Tick marks would be handy. On the plus side, 2D PLOT has options to save graphs to tape or disk for later recall, and is completely compatible with standard screen print software.

Shape your TRS-80 to communicate with any computer you want.

Omniterm is the most flexible, powerful terminal program you can buy. Omniterm lets you adapt your TRS-80 to communicate with 99.9% of the world's computers. Your company's mainframe, for example. Or any other personal computer, time-sharing computer, or communications service.

Omniterm overcomes incompatibilities in screen formats, baud rates, character sets, control codes and file transfer protocols. Seven complete translation tables let you change any character, for complete compatibility of all input and output devices. Omniterm is so flexible, users have even set up their ASCII-coded systems to communicate with EBCDIC-coded systems.

You can send all ASCII characters, even those that aren't on your keyboard. Reformat your screen to neatly accommodate any line length. Run your printer while you're sending or receiving data. And even review data that's scrolled off the top of the screen.

Omniterm's well-thought-out design makes it easy to use. You can get a status display of all functions while on line to tell you what's going on, and make any changes at the same time. You can create a special file of your settings to make it easier next time. You also get X/Y cursor control, single keystroke sign-on and auto-dialing. Even a phone directory. And lots more.

You don't have to be a computer expert to use Omniterm. Just spend a day with what the reviewers call "the best manual in the business." Then if you need help, just call, write, or contact us via CompuServe, Delphi, or Source.

Omniterm is the proven terminal program. The program thousands of people have used successfully. And the one the editors call the "top program available" (Byte, 80-Micro, Infoworld, etc.)

Omniterm comes complete with sample setting files, conversion utilities, a practical text editor, seven translation tables, and a 76-page manual with index.

Available at leading dealers, or prompt shipment on direct phone and mail orders. Order Omniterm, for a super-smart TRS-80 that's putty in your hands.

Only $95 for TRS-80 Models I, III or 4 (32K memory, one disk minimum). $175 for Models II, 12 or 16 (64K memory minimum). (In Mass., add 5% sales tax.) MasterCard, VISA, and C.O.D.

IBM PC version coming soon.

DEALER INQUIRIES INVITED.

Telephone: (617) 852-0233
CompuServe: 70310,267
Source: TCA818
Delphi: Lindbergh

NOW Version 1.60 with auto-dial and log-on direct from DOS!
Plus other new features.

Omniterm

Lindbergh Systems

49 Beechmont St., Worcester, MA 01609

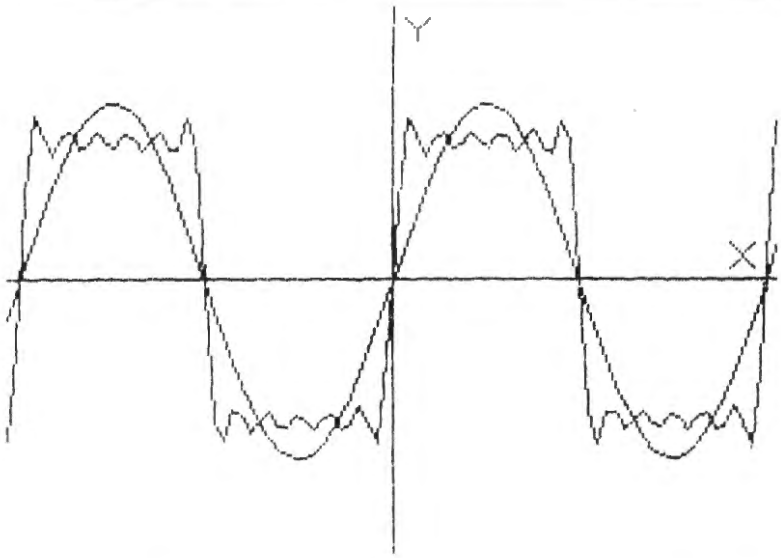


Figure 1. A sine wave and a Fourier synthesis of a square wave, plotted with Mathmenu's 2D PLOT routine.

The 3D PLOT routine works similarly to generate 45-degree oblique projections of functions with two independent variables, Y = F(X,Z). In this case, you can use program lines 10–14 to define the function.

It is tricky keeping everything on the screen, and you can expect to spend a little time playing with scale factors for the Y and Z axes before getting things right. I think the results are worth it, though.

Figure 2 shows an example: the hyperbolic paraboloid Y = X*X – Z*Z. Even though 3D PLOT lacks a hidden lines routine, the plot gives a good sense of this saddle-shaped surface's appearance.

I confess to spending a lot of time with the graphics routines, but I do use some of Mathmenu's other features. LSTSQRS, for instance, takes up to 100 pairs of data values and computes a best-fit curve, in the sense of minimizing the sum of the squared deviations. You must specify whether you're using a linear, quadratic, or cubic expression.

MATRIXOP remedies Color Basic's lack of matrix handling routines. It handles matrices up to eight by eight in size, and carries out the elementary operations as well as computing the inverse, transpose, and determinant. You can use it to find the solutions to systems of up to eight linear equations in eight unknowns.

A companion routine, VECTOROP, handles monadic or dyadic operations on vectors with up to 20 components. Besides finding sums, differences, normal lengths, and unit vectors, it computes dot and cross products and finds the equation of the plane defined by two noncollinear three-element vectors.

NUMDIFN and NUMINTEG perform numerical differentiation and integration of analytic functions. In each case, you enter the function of interest as line 10 of a Basic program, using the DEF FN command:

```
10 DEF FN F(X) = EXP(-X)*SIN(X)
```

in the case of the damped sine wave. You reenter the actual Mathmenu routines by following this with GOTO 100.

NUMDIFN asks for the point X at which it is to evaluate the derivative, and does so by a finite difference method:

$$dF/dX = (F(X + h) - F(X))/h$$

where h = 0.00001*X.

NUMINTEG uses Simpson's rule, an old standby for this sort of work. It's at its best over small ranges of X, and a little experimentation with the number of subintervals chosen might be necessary, but it's nice to have.

Those are my favorites among Mathmenu's offerings. What I should stress is how easy the program is to run.

Author David Hamel must have spent a lot of time on the screen displays; I found it easy to do almost everything I wanted without cracking the manual. I don't recommend that, but the Mathmenu documentation is necessary only for the matrix operations and graphing routines. The menus and Help screens take care of almost everything else.

Calculus Math Module

My second goody is narrower, but deeper. Calculus Math Module (Calcsoft, P.O. Box 401, St. Ann, MI 63074)

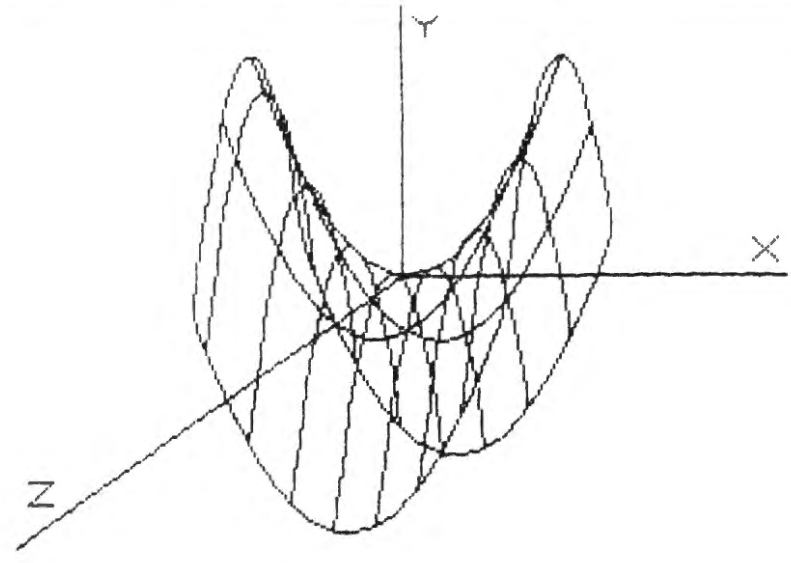


*Figure 2. The hyperbolic paraboloid Y = X*X – Z*Z, plotted with the 3D PLOT routine.*

How many companies offer toll free TOTAL SUPPORT on all hardware & software?

There is only one number to call:

1-800-237-8977

In Florida call 1-813-786-1259

Business Applications Software with **TOTAL SUPPORT**...specializing in: **IBM,™ APPLE,™ TRS-80™ and XEROX™**

The Systems Group

2340 State Route 580/Suite 234
Clearwater, Florida 33575
Telex 701484

There is only one catalog to have: our new, **free** 100 pages of the best in hardware and software. Send for your copy today!

IBM is a trademark of IBM Corporation
APPLE is a trademark of Apple Computer Inc.
TRS-80 is a trademark of The Radio Shack Division of Tandy Corporation
XEROX is a trademark of Xerox Corporation

concentrates on graphing, differentiating, integrating, and finding the extrema of piecewise continuous functions of one variable.

Calcsoft is actually two products: the Function Graphing Module for 16K computers, and the Calculus Math Module that incorporates the first module, adds the calculus capability, and requires 32K.

The programs are available only on cassette (unplug your disk controller, if you have one), and cost $19.95 and $34.95, respectively.

The Function Graphing Module features five types of automatic scaling routines to optimize the size of a graph, including a total autoscaling option that requires you to enter only the function's definition and the choice of X interval.

It handles up to four predefined functions—nine, when combined with the Calculus Module—and finds the value of any one of them for any independent variable setting. It also approximates the zeros of a function. To do the other tricks I'll talk about, you'll need the Calculus Math Module.

Assuming that you eventually want a printout, you must first load your screen print routine relocated to high memory. Unfortunately, my old Radio Shack routine is for a 16K computer and doesn't take to relocation, so I don't have printouts from the Calculus Math Module in this column.

You can now load the main program, which uses the Sugar Software Auto-Run Loader to autoexecute. Next use DEF FN statements to define the functions you want graphed.

The modules include a Basic routine with lines 161–164 or 161–169 set aside for this purpose. Using the Edit command, break into the appropriate line and enter an expression you'll want to work with. Be careful, because the Calcsoft programs won't let you edit the functions later.

One handy feature: Calcsoft principals S. M. Handley and C. L. Siebert have given you the ability to enter pi for the constant 3.14159... in functions. Unfortunately, this doesn't work when you specify the range over which you want a function graphed.

Once you are set up, a Run command engages the module. You specify the number of functions defined, and receive the first of many lists of available options.

You call numerous options, not all of which are active at any given time, by single letters or other keyboard symbols. At this early stage, you can only terminate the program or select a major mode of operation: plot a graph, find minima and maxima, find a function's values or zeros, or find the area under a curve by Romberg integration (the Romberg method has certain advantages over Simpson's rule).

Normal procedure, at least for us graphics freaks, is to get a plot on the screen first. Plotting has its own options, including the autoscaling mode. After you specify the function and interval of interest, this mode positions the origin, selects scale factors for the X and F(X) axes, and sets the size of the steps in which the function will be evaluated.

You give up little by letting this routine do your dirty work. Once you examine the graph, you can always go back and expand the scale, change the graphed interval, or call for more or fewer plotted points. Tick marks appear on both axes, although you have to flip back to a text screen to see what they represent. It's possible to get a printout of the text and graphics screens with one command, however.

"You give up little by letting this routine do your dirty work."

Once the graph is available, you can specify search intervals in which the program finds either a zero, a maximum, or a minimum of the function under study. A little savvy is necessary, though. If you want to find the value of X for which F(X) = 0, be sure that the interval you specify includes a zero crossing; that's why you have to examine the graph first.

You must also specify a tolerance, in this case the limit which F(X) can differ from zero before the routine declares X to be a zero of the function. Values like 1E-9 are commonly used.

In the same vein, before using the Calculus Math Module to find a maximum or minimum you should check to see that one exists within the search interval.

It's possible to flag a zero or extremum with a vertical line on the graph. You can also draw a line between a function and the horizontal axis at any value of the independent variable.

The Calculus Math Module's Romberg integration routine is a rather powerful tool for the student, scientist, or engineer. In addition to straightforward definite integrals, it handles piecewise continuous functions or those that approach infinity at one end of the integration range.

The trick is to use a suboption that lets you keep a running total of successive integrations of a given function, taken over different intervals. This lets you remove infinities or other embarrassments from the region to be integrated.

You can start by leaving a generous margin around such points, and later add integrals taken over successively narrower regions to sneak up on the singularities. This only works if the integral does indeed converge.

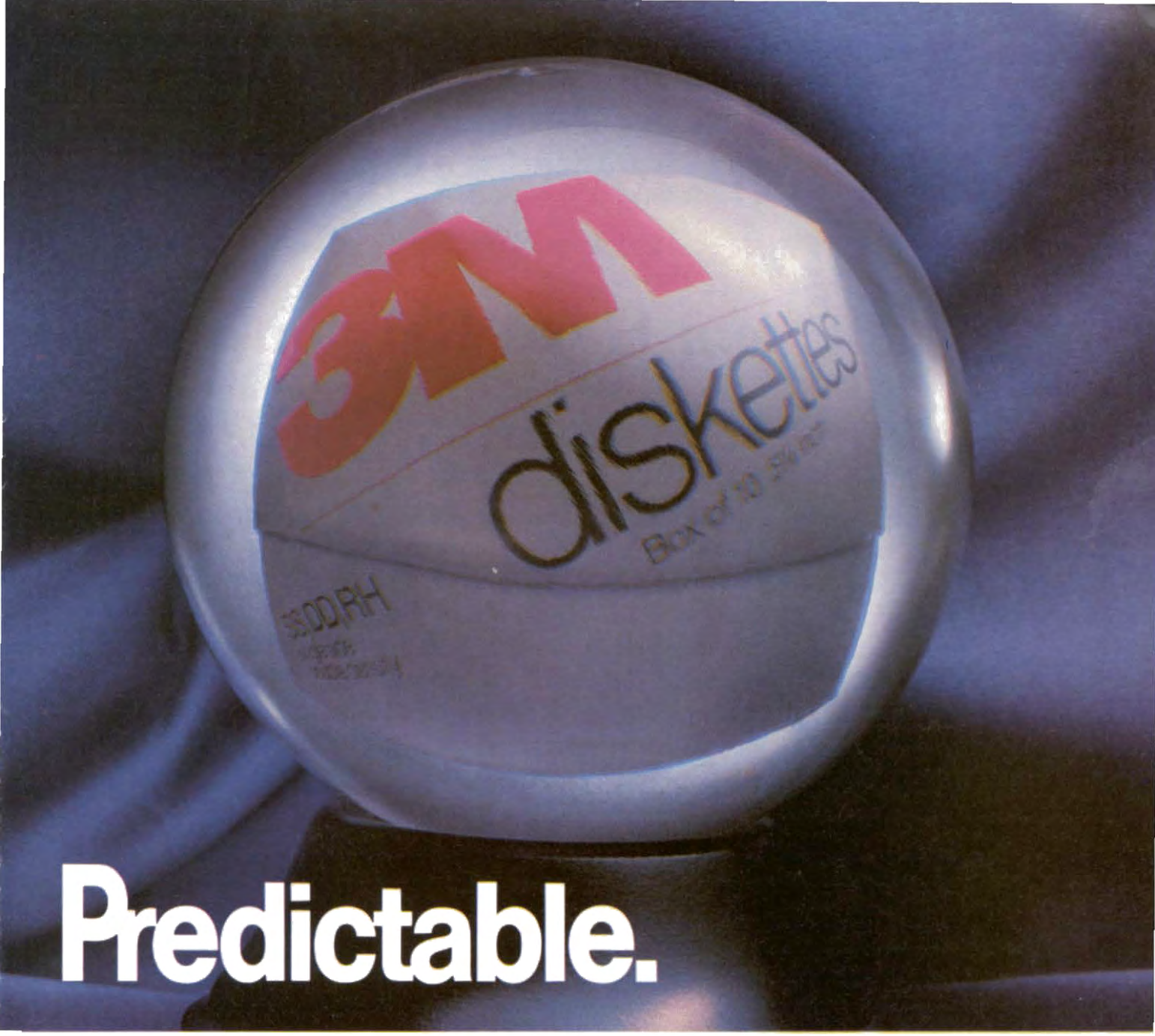
The Calcsoft documentation contains many useful examples: finding the area bounded by two intersecting functions, solving problems in mechanics, maximizing the profit of a hypothetical business, and so on. Another nice touch is the stiff paper reference card for the various options.

My only regret is that the Calculus Math Module isn't available on disk. A 32K machine with the disk controller installed might not have enough room, but that doesn't keep me from hoping. As it is, the program runs from five to 45 on the tape counter of my CTR-80A, a fairly long loading time—especially if I have to quit and define new functions in the middle of a session.

Outside of that, I enjoy the Calculus Math Module. I like Mathmenu, too. One of these days I'm going to spruce up the axes by breaking into those Basic plotting routines and adding high-resolution numerals and tick marks. Then I'll be even happier.

It's nice to see the Color Computer applied to real math. I can hardly wait to tell my grandchildren how I used to multiply numbers by rubbing two notched sticks together. ■

Scott Norman welcomes reader response to The Color Key. Write c/o 80 Micro, 80 Pine St., Peterborough, NH 03458.



A flawless future is in sight with 3M diskettes.

When it comes to keeping track of precious data, predictable means reliable. Being able to count on every diskette, every time. At 3M, reliability is built into every diskette. We've been in the computer media business for over 30 years. And we've never settled in. We're constantly improving and perfecting our product line, from computer tape and data cartridges to floppy disks.

3M diskettes are made at 3M. That way, we have complete control over the entire manufacturing process. And you can have complete confidence in the reliability of every 3M diskette you buy.

Look in the Yellow Pages under Computer Supplies and Parts for the 3M distributor nearest you. In Canada, write 3M Canada, Inc., London, Ontario. If it's worth remembering, it's worth 3M diskettes.

3M hears you...

3M

DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES

PRICE BREAKTHROUGH

Drive a Hard Bargain™

Super Sale on Hard Drives

We have rewritten the book on Hard Drives. Our hard drives are the fastest (D M A available soon) the most versatile (Newdos,[A] Dosplus,[B] and Ldos[C] drivers), the most adaptable, (runs on the Model I and Model III using the same adapter), but, we must admit, it is the lowest (in cost that is) starting at **$1,295.00** for a 12 meg. (unformatted) primary and **$695.00** for a secondary system. All systems come complete with power supply, case, cables and Instapatch™ software drivers for fast-trouble-free installation and operation.

Specifications:

*Self Test - **Automatic** Diagnostics*
*Error Correction - **ECC***
*Access Time Track-to-Track **3ms***
Average Access Time 72ms
*Capacity **5-20 Megabyte** Formatted*
Daisy Chain up to 40 Megabytes

Warranty — one full year. Call for more details.

TOLL FREE ORDERING
1-800-343-8841

GENERAL AND TECHNICAL
1-617-872-9090

Dealer inquiries invited.

SOFTWARE SUPPORT, INC.

One Edgell Road, Framingham, MA 01701 (617) 872-9090
Hours: Mon. thru Fri 10 am to 6 pm (E.S.T.) Sat. 10 am to 5 pm

327

Canada
MICRO R.G.S. INC.
751 CARRE VICTORIA SUITE 405
MONTREAL QUEBEC CANADA H2Y 2J3
Regular **Tel. (514) 845-1534**
Canadian Toll Free 800-361-5155

TERMS:
M.C./Visa/Amex and personal checks accepted at no extra charge.
C.O.D., please add $3.00.
Shipping: Please call for amount.

A ™Apparat Inc.
B ™Microsystems Software Inc.
C ™Logical Systems Inc.

© Copyright 1983

DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES

DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES

PRICE BREAKTHROUGH

Super Sale on New Disk Drives

Starting at **$199.95** **complete!!**
with Power Supply and Case.

Tandon — Siemens — Remex — MPI — Teac — Shugart
single sided 40 track — dual sided 40 track
single sided 80 track — dual sided 80 track
for
RADIO SHACK[1] — HEATH/ZENITH[2] — APPLE[3]/FRANKLIN[4]
IBM/PC-TEXAS INSTRUMENTS[5] & MOST OTHER COMPUTERS
Drive a Hard Bargain!!™

8 M.B. - 12M.B. with Power Supply Case, Cables & Software
Complete Systems . . . . . from $1,295.00

Amazing Special!-dual sided 40TK or 80TK drive with Power Supply and Case
and Our Special Warranty - Starting at $Call

TOLL FREE ORDERING **GENERAL AND TECHNICAL**
1-800-343-8841 **1-617-872-9090**

Model I/III/IV **Drives** (0 1 2 3)	*starting at* ***$175.00***
Color Computer Drives (0 1 2 3)	*starting at* ***$Call***
Apple/Franklin Compatible Add-On Drives	$229.95
Apple/Franklin Compatible Drives with Controller	$279.95
Model I/III/IV Memory Upgrade	*starting at* *$Call*
Printers — Daisywheel/Dot Matrix	$Call
Diskettes	**Quantity** Priced from $17.00
Cases and Power Supplies — (Single-Dual-**1/2 Height**)	starting at $49.95
Printer **Buffers** 8K to 512K	starting at $143.95
Percom Double Density Controller (Model I)	$Call
Holmes Model I/III Speed-up Mod-VID/80	*starting at* $90.00
Gold Fingered **Edge Card Extenders**	*starting at* $13.00
Cables — Printer/Disk Drive	*starting at* $25.00
DOSPLUS	***$Special prices***
Repair Services Now Offered for Disk Drives — *Fast Turn-a-Round*	$Call

One Year Warranty Available on all Drives!

SOFTWARE SUPPORT, INC.

One Edgell Road, Framingham, MA 01701 (617) 872-9090 ↙327
Hours: Mon. thru Fri 10 am to 6 pm (E.S.T.) Sat. 10 am to 5 pm

Dealer inquiries invited.

TERMS:
M.C./Visa/Amex and personal checks accepted at no extra charge.
C.O.D., please add $3.00.
Shipping: Please call for amount.

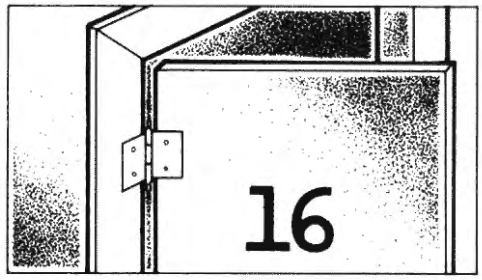
Canada
MICRO R.G.S. INC.
751, CARRE VICTORIA, SUITE 405
MONTREAL, QUEBEC, CANADA, H2Y 2J3
Regular **Tel. (514) 845-1534**
Canadian Toll Free 800-361-5155

1 ™TANDY CORPORATION
2 ™ZENITH DATA SYSTEMS
3 ™APPLE COMPUTER CORP.
4 ™FRANKLIN COMPUTER, INC.
5 ™IBM CORPORATION
6 ™TEXAS INSTRUMENTS
© Copyright 1983

DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES

SUITE 16

by Dan Keen and Dave Dischert



It's all in the oscillator

You probably already know that the Model 16 offers more computing power and runs programs faster than any 8-bit micro. But why is this so? And what applications are people finding for these powerful machines?

There's no question that the 16-bit machines, the Models II, 12, and 16, offer more computing power than any other TRS-80 on the market. The MC68000 seems to be one of the best 16-bit microprocessors.

The Model 16 Advantage

You might think that a 16-bit computer executes programs in half the time it takes a Z80-based, 8-bit machine. Although the instruction set for the MC68000 contains opcodes that perform tasks requiring several lines of Z80 programming to accomplish, the most influential factor in operating speed is the frequency of the master oscillator.

Typically, the frequency of the oscillator is very high—higher than the frequency used to run the system's components. Several stages of electronic circuits are employed to divide that rate in half or even in quarters. Thus, a 24-megahertz (MHz) oscillator, as used in the Model 16, has its signal divided in half and the resulting waveform is again divided. The end product is a pulse of 6 MHz used as the operating frequency that controls the machine. This signal is called the clock.

The oscillator is designed to run at this high frequency for accuracy and stability. If the master oscillator drifts off center, the resulting change is not as great a deviation as if the oscillator's output is scaled down to a lower frequency through divider circuitry. This technique is standard practice in electronics. It's employed in devices like citizens band radios and electronic music synthesizers.

Table 1 lists the clock speed for Radio Shack computers. These figures indicate the frequency delivered to the integrated circuits, not the main oscillator.

Reader Applications

Because of this increase in speed and power, users are finding applications for the Model 16 that are either impossible or less convenient to run on 8-bit processors. We have heard from many *80 Micro* readers and how they use their Model 16s.

One reader uses his computer to organize a mailing list of 75,000 names for his mail-order jewelry business. Another upgraded his Model II to a II/16 and plans to use it as a training device for 68000 Assembly-language programming.

Several authors have written in praise of their systems as word processors. The machine's double-sided drive capabilities are handy for book authors who require a vast amount of storage for text.

One Model 16 owner created and is marketing a CP/M software package for the construction industry. IBM is marketing one module of his system for its machines.

We heard from one person who bought a Model 16 as a personal computer, although it's not intended for that purpose.

The real advantage to the Model 16 is its multi-user and multi-tasking abilities. We are sure to see more systems take advantage of this application. One firm just bought a Model 16 to make it the hub of a data system. By placing the company's Model II in a branch office, employees can access data on a hard disk connected to the 16 located in the central office.

This is a sample of some of the applications we have heard about. We didn't intend to sound like a commercial for the Model 16, but owners are very enthusiastic. ■

Model	Clock Frequency
Color Computer	0.895 MHz
Model I	1.774 MHz
Model II	2 MHz
Model III	2.02752 MHz
Model 12	4 MHz (Z80 board)
Model 16	6 MHz (MC68000 board)

Table 1. Clock frequencies.

Assembly-Language Corner

The disk operating system of a computer is a series of machine-language programs and short routines that determine how the microprocessor communicates with floppy and hard disks, the video display, the keyboard, printers, and modems. Some of these machine-language programs perform disk functions such as making backups, copying a file from one drive to another, and killing a disk file.

You can access these routines from Assembly-language programs and put them to work, reducing your programming time.

On the Model 16, these built-in routines are called supervisor routines or supervisor calls. By setting up an area of RAM as a buffer or supervisor block, you can put certain values in that block that let you execute any of the routines.

Your Model 16 owner's manual lists all available supervisor calls and shows you how the supervisor block area is set up for each routine.

To establish this supervisor buffer

If You Do A Lot Of Editing Of Your BASIC Programs, Then This Is The Editor For You!!!

The Full Screen Text Editor for BASIC, we were the first to give the TRS-80 this indispensable ability. What ability? The ability to edit your BASIC program with the ease of word processing. It is a type of word processor specifically designed to handle BASIC programs instead of letters and documents.

■ **The capability to change, insert and delete a character or characters:**

Simply position the cursor over the character that you wish to change and type in the new one. Another handy feature is Insert Mode, this is used to add text in the middle of a program line.

■ **Extend a line or insert new lines:**

Extending a line is as simple as two keystrokes, instantly the cursor jumps to the end of the program line and the editor is placed in the insert mode.

■ **Delete, copy or move statements:**

All you have to do is mark the line or block of lines and then tell the editor where to move or copy them.

■ **Global Search and/or change any specified string:**

Have you ever needed to change a lot of PRINT statements to LPRINTs?

■ **Macro key facility:**

Macro keys can cut your programming time in half. You can define each of the 26 letter keys (A-Z) to represent BASIC keywords, or any letter or number combination up to 6 characters per key.

■ **Renumber commands:**

Whats so special about this renumber facility? Not only can it renumber selected portions of your program, it also checks all GOTO, GOSUB, THEN and ELSE statements and updates them as needed!

You may have seen other Editor programs advertized that give you one, maybe two of these features. You may have also seen some of these features sold as separate utility programs.

Only CAU offers a complete editing system, not just a word processor patched up to handle line numbers.

You can order the BASIC Editor directly from Computer Applications Unlimited or ask your local computer store.

Cat# 1210-20 for TRS-80 Mod 1 & 3 **only $29.95**

The Editor is supplied on tape with complete instructions to move it to disk. If you wish us to send the editor on disk please add $5.00 and ask for a DISK DUMP.

Add $2.00 for shipping in the U.S. and Canada, $10.00 outside USA
N.Y. State Residents add applicable Sales Tax.
Dealer Inquiries Invited.

Computer Applications Unlimited
P.O. Box 214, Dept FSBE, Rye, N.Y. 10580
(800) 354-5400 (toll free, orders only)
(914) 937-6286 (questions & NY state residents)

VISA MasterCard

COMPUTER APPLICATIONS UNLIMITED™
a div. of CAU, Inc.

120

TRS-80 is a TM of Tandy Corp.

See List of Advertisers on Page 323

area, use a label to define the first memory location in the block. To be consistent with the owner's manual, use the label SVC BLOCK.

The buffer area is defined and filled with zeros by using the pseudo-opcode RDATAB 32,0. This is repeat data for 32 bytes. The supervisor block must be 32 bytes long, although not every call uses all 32 addresses. Use the buffer to select the desired routine and to pass values to and from the routine.

So far you have:

```
SVC BLOCK
        RDATAB 32,0
```

Place values within the block by using the move or store mnemonics.

Identify every byte position within the block by assigning each with a number that shows how many bytes a particular location is from the first buffer location. These are referred to as offset numbers. The first byte in the block has a byte offset of zero. The second byte in the block is identified as byte offset one, the third as byte offset two, and so on. An SVC BLOCK contains 32 addresses. The byte offset numbers range from zero to 31.

Figure 1 graphically depicts a typical SVC BLOCK buffer. The byte offset positions are shown across the top.

Each supervisor call has its own machine-identifiable number. Place this number in the first two positions in the buffer.

During typical programming, load the buffer area starting address into a register like A0. You can then move values into the various byte offset positions within the block. Use the Move command to load a number directly into a position. The @ symbol placed in front of a register indicates an indirect addressing mode. A number preceding the @ symbol identifies the byte offset position.

Let's assume you have established a buffer area (SVC BLOCK) and want to store its memory location in register A0. Handle this with:

```
LDA   .A0,SVC BLOCK
```

Use the Move command to place numbers within that block. Move a zero into the seventh byte (byte offset six) of the SVC BLOCK.

```
MOVB  6@A0,#0
```

To load a register-stored value into the SVC BLOCK, you must use the store opcode. Take the number currently stored in register A2 and move it into byte offset six of the supervisor buffer area. Again, assume that address register A0 points to the memory location of the buffer:

"...the SVC BLOCK returns the ASCII value of the key selected or points to a memory address where a line of text is stored."

```
STW   .A2,6@A0
```

Note the W tagged onto the store mnemonic. This indicates 2 bytes, or a word, is to be acted upon. If the number in A2 requires only 1 byte of storage, the upper byte in the block is filled with a zero.

Byte positions in the SVC BLOCK have a meaning for each supervisor routine. However, the first three words of the buffer have the same meaning regardless of the supervisor routine called. The first 2 bytes always contain the TRSDOS-identifying SVC call number. Offset four and five must always contain a zero. You must set up these items and other parameters before calling or jumping to an SVC routine.

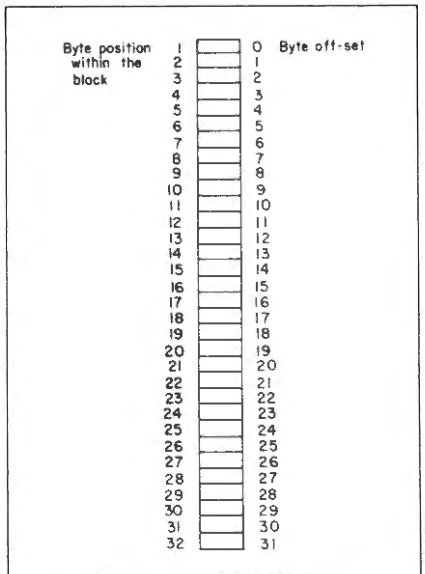


Figure 1. SVC BLOCK layout.

If an error occurs during the routine, byte offset two and three contain a TRSDOS error code upon return.

Put this together and you have a simple program that calls supervisor routine number 264 which returns execution to the TRSDOS READY mode. Once the supervisor block is set up with the proper entry conditions, the instruction BRK #0 calls the SVC routine.

```
BEGIN     LDA     .A0,SVC BLOCK
          MOVW    @A0,#264
          BRK     #0
SVC
BLOCK
          RDATAB  32,0
          END     BEGIN
```

As mentioned, zeros must always be placed in the fourth and fifth byte offsets prior to calling the SVC routine. Use the instruction RDATAB 32,0 to automatically put zeros in the entire block. It is not necessary to use an instruction to move zeros into those areas.

Remember to put an end statement in your program. Failure to do so often makes your program fail, even though this omission doesn't generate an error message by the assembler or the linker.

In this program it is simple to set up the SVC BLOCK. However, this becomes more involved when you place many parameters into the buffer before calling a routine. Many times you need to get information out of the buffer after a routine is called. For example, the keyboard calls retrieve data from the keyboard. In such cases, the SVC BLOCK either returns the ASCII value of the key selected or points to a memory address where a line of text is stored. Naturally, this involves a little more programming.

In future columns, we'll discuss keyboard and disk calls, which require more complex setups. ■

MSA — Making excellence affordable . . .

NEWBASIC 2.0 Only $39.95

Adds over 40 commands to Disk BASIC

"Of all the software packages I've purchased since I bought my TRS-80* in Dec. '78, this is the best." — R. Hunter, Roswell, NM

Like most of our customers, Mr. Hunter's very excited about NEWBASIC. *So are we!* We think it's **one of the best software buys** available for your TRS-80* Model I/III computer. But you don't have to take our word for it:

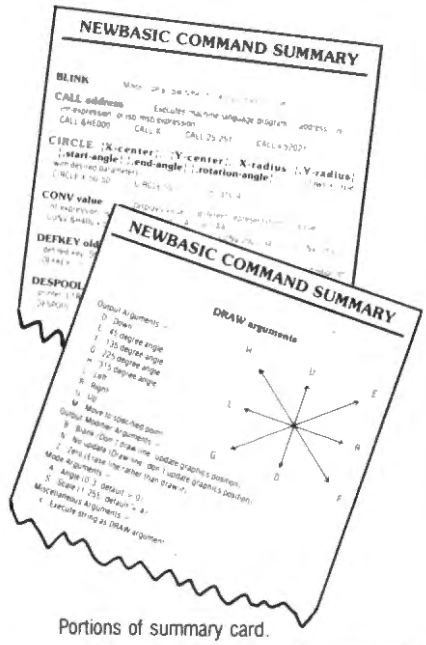
"NEWBASIC is a very useful tool for anyone programming in BASIC . . . At $39.95, NEWBASIC 2.0 offers a lot for the money." — Basic Computing; July, 1983

"Why weren't some of NEWBASIC's commands part of standard (Disk) BASIC?"
— R. Haley; Castro Valley, CA

"NEWBASIC 2.0 is easy and fun to work with. Within hours we were creating stunning high speed graphics and interesting sound effects. I'd recommend NEWBASIC to anyone."
— J. Ryan; Mt. Vernon, IL

Why not buy NEWBASIC today? Then you, too, can start enjoying some of the advantages of programming with NEWBASIC:

- Customize NEWBASIC—include only those commands you need.
- Over a dozen easy-to-use and powerful **graphics** commands (e.g., DRAW, LINE, CIRCLE, PAINT).
- Produce **sound** for music & effects.
- RS-232 initialization & I/O.
- Pre-defined *and* definable keys.
- Disk-based spooler/despooler.
- Execute strings, label lines, 2-byte PEEK/POKE, restore to any DATA line, block memory move, set hi-mem, and **much**, much more.
- 70 page manual, summary card.



Portions of summary card.

NEW!!!

The Collector $24.95

Improved Garbage Collector

What's "garbage collection"? It's a software term describing what happens when strings no longer in use are removed, making room for new strings. If you've ever used a BASIC program with a lot of strings, you've probably noticed the mysterious "keyboard lockup" that occurs when the ROM does its garbage collection. If you have, The Collector's for you!!

The Collector **practically eliminates garbage collection delays.** It's very easy to use, and it only needs 500 bytes for itself, plus 2 bytes for each active string in your program. Use it with almost any BASIC program, without changing a thing! The Collector can be used with most other machine language programs, too—including NEWBASIC & The Analyst.

Why wait any longer? Just look what The Collector could be doing for you now:

	Duration (Secs)		
# strings	**ROM**	**The Collector**	**Improvement**
250	**12.3**	**0.8**	**93.5%**
500	**46.3**	**1.6**	**96.5%**
1000	**180.0**	**3.2**	**98.2%**

(Typical garbage collection delays.)

NEW!!!

The Analyst $24.95

Helps speed up BASIC programs!

Speeds Up Most Programs 15-50%

The Analyst can help you speed up almost any BASIC program from 15-50%! And it's remarkably easy to use. After activating The Analyst, you just run your programs, and The Analyst analyzes them as they run.

Easy To Use

The Analyst tells you what variables your program uses most often. With this information, you then add 1 or 2 simple lines to your program. These changes enable the ROM to access the most frequent variables first, speeding up your program!

Versatile

Use The Analyst to speed up commercial software, as well as your own. The Analyst also gives you other useful information. For example, The Analyst can tell you what lines your program executes most often. And our manual can help you alter those lines to make them more efficient.

Get The Analyst and speed up that sort or that game! Shouldn't you be getting the most from your programs? With The Analyst's help, you can!

NEWBASIC 2.0 (Model I/III disk, 48K) . . . **$39.95** ($42.95 in CA)
The Collector (Model I/III disk) . . . **$24.95** ($26.45 in CA)
The Analyst (Model I/III disk) . . . **$24.95** ($26.45 in CA)

Some DOS's may require 2 drives for installation. Compatible with most DOS's. Not copy protected.

Terms: Check, money order, Visa, M/C, and C.O.D. (+$2.00). Add $2.50 shipping in US & Canada, $5.00 elsewhere (US funds only). We ship next business day.

Modular Software Associates
209 18th Street
Huntington Beach, CA 92648
(714) 960-0126

↙58

Phone for the name of the dealer nearest you, or order directly from us.
Phone orders (Visa, M/C, & C.O.D. only) accepted 24-hours (manned 8-5, M-F).

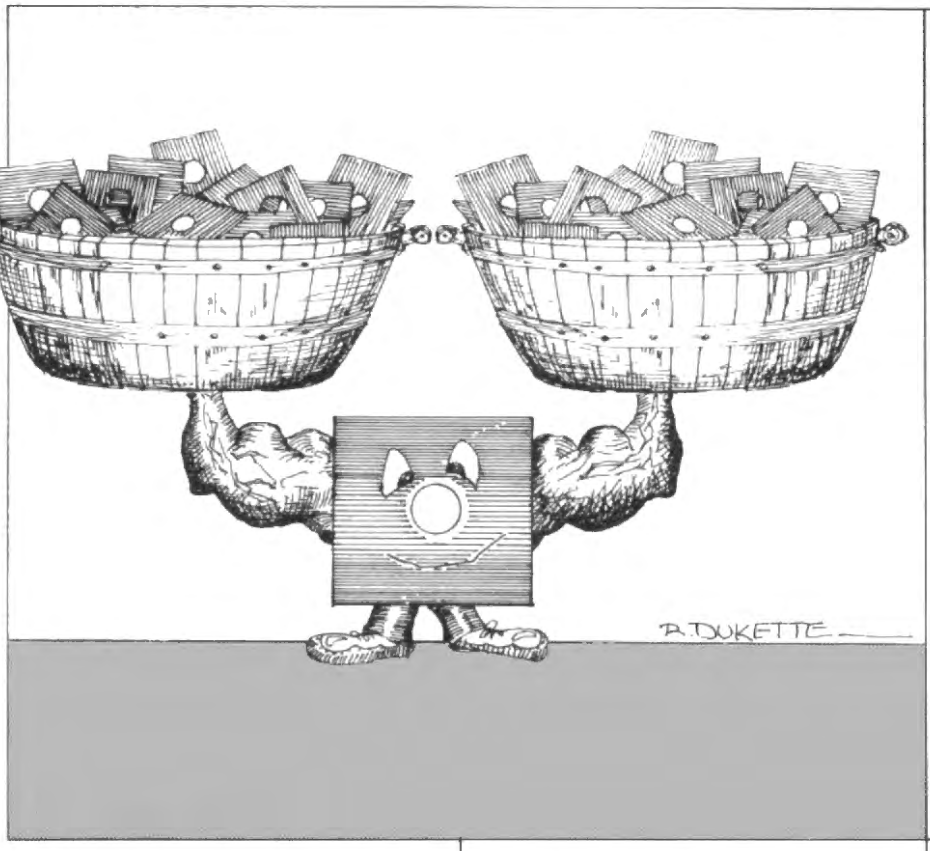
DEALER INQUIRIES INVITED.

*TRS-80 is a trademark of The Radio Shack Division of Tandy Corporation.

↙See List of Advertisers on Page 323

REVIEWS

edited by Lynne M. Nadeau



Review Contents

Library Support Option 48
TRS-80 Pascal 2.0 52
Computer Art 52
Wormy and Company 53
MicroRef 58
MT160 Printer 58
Typitall 1.2 62
TRS-80 Data Communications 68
Project Manager 70
Clean Slate 73
ALE/EDM 76
BASICally Speaking 80
Power DOT 80
Review Digest 81

Our reviewers use a five-star rating system. One star represents the low end of this spectrum, while five stars represent the spectacular and high end of the spectrum.

★ ★ ★ ★ ★

Library Support Option (LSO)
XYZT Computer Dimensions Inc.
2 Penn Plaza, Suite 1500
New York, NY 10121
Models I and III
$75

by R. Walter Steur

Library Support Option (LSO) is an excellent piece of software that takes advantage of a new data storage technique to increase disk memory capacity. By packing many small files into one large file called a library, LSO reduces wasted disk space and increases a disk's storage capability.

This file-handling utility uses only one normal directory entry and for each library file and dynamically allocates and deallocates files so that file manipulation is invisible to the user.

The LSO program comes on a non-system disk that you can back up. You would normally include it on the system disk of each program with which you'll use it. It appears to be compatible with all TRS-80 DOSes. The distribution disk contains a standard version of LSO/CMD, a special hard disk version, and several LSO utility programs.

Overview

The LSO program contains its own relocating loader module that discards itself after it moves the operating LSO module into high memory. LSO occupies about 4K. The program intercepts all input/output (I/O) calls except Rename, which is not a vectored call.

Two utilities, LDIR and LNAME, replace DIR and Rename, respectively. These are part of the LSO utility set. As a result of I/O call interception, all DOS library commands work with the packed files as they normally would. In other words, you can use Copy, Kill, Load, List, and so on on a packed file just as on a normal file.

LSO defines a library as a file containing smaller files, or members. Just as a disk holds a number of files and a directory to reference them, a library file holds several files and its own directory. A library file shows up in the disk directory as a regular file, but DOSes treat its members as regular files.

Suppose I decide to group some files with the /BAS extension in a library. This involves creating a file named BAS/LIB and copying the desired files into it.

Now when LSO intercepts an I/O call for a file with the /BAS extension, it first looks for a library file with the file extension name. If such a library file exists, LSO searches its directory for the required member and opens the member file.

If I give the command LIST "MYPROG/BAS" from Basic, LSO picks up the I/O call and searches the directory of library BAS/LIB. The program isn't there so LSO passes the request back to DOS, which processes the call as usual.

You can have packed and unpacked files on the same disk. An example of this is the LSO distribution disk. The disk directory shows a couple of files with the CMD extension plus a file named CMD/LIB. The latter contains the standard utility programs for LSO, including the LDIR utility that displays a directory of the library to which it belongs.

In creating library files, you can specify the file size up to a maximum of 255 sectors, and the directory size up to 255 entries with the LCREATE command (LCREATE/CMD utility). If you find at some future time that the specified size is too small, you can increase it to a maximum of 255 sectors by using the LXTEND command (LXTEND/CMD utility). You can't change the directory size, however.

When it comes to superior performance, we study our lines very carefully.

Superior printer performance is not a fluke. It evolves from analyzing printed line after printed line. Taking the time to test and retest. After 30 years of manufacturing precision parts, we know that there are no shortcuts.

And so we took the Gemini-10X and methodically put it through its 120 cps pace. We achieved a print head life of over 100 million characters with an extremely precise dot alignment creating each crisp character.

So far so good.

Next, sophisticated performance demanded versatility. A wide choice of character sets, a buffer expandable to 8K, and the ability to interface with all popular personal computers. We added macro instruction, giving Gemini-10X the capability to perform up to 16 operations with one command. We included as standard a paper feed system that has a friction and fully adjustable tractor feed. Then we even built in the dexterity to print graphics and text on the same line.

Done.

And, of course, staying the best means constant reviewing and fine-tuning. Keeping the Gemini easy to find, easy to afford and so reliable it can be warranted for up to twice as long as its major competitors.

Only the most careful engineering has built the new hard-working Gemini-10X. You'll applaud its performance.

star™
MICRONICS·INC

THE POWER BEHIND THE PRINTED WORD.

Computer Peripherals Division
2803 N.W. 12th Street, Dallas/Ft. Worth Airport, TX 75261

506

The final utility, LSET/CMD, sets and resets (turns on and off) two additional options. The first is the Permanent Open option that opens all resident library files until you reboot the system.

When you activate LSO, you can specify the number of files that can be open at the same time. The default is five files and each open library file requires 40 bytes. This option reduces file access time.

The second option is the Compress option. This compresses every string of characters repeated four or more times to a 3-byte group on a write to file. On a read, decompression takes place automatically.

This is primarily for use with text files. It has rather limited value since most word processing programs incorporate their own compression techniques.

The LDIR/CMD utility provides an informative display of the library directory. The first line shows an error indicator if errors exist in the directory, flags if you set either or both of the library options, library name, library size in sectors, number of available sectors, number of permissible directory entries, and number of entries still free. The names of the library members are listed alphabetically.

The LSO documentation is 17 pages of sparse, terse, clear information with letter-quality printing in a loose-leaf notebook. A technical section describes the library file organization and control blocks.

A helpful table suggests file/directory sizes depending on the number and average size of the intended member files. It's based on single-density granule size and should be refigured for those using double-density systems. For example, a 20-sector library file takes up exactly 4 grans in single density; in double density, the allocated 4 grans contain 24 sectors in most DOSes.

LSO is so easy to use that extensive documentation is unnecessary. However, the latest version of the manual has a couple of omissions. XYZT rewrote the manual after correcting some minor DOS incompatibilities. But the revision omits mention of specifying the number of permissible open files, the default value, or memory requirements.

Also, the manual doesn't mention the hard disk version of LSO or its use. Occasionally the English grammar is a little unusual but this doesn't diminish the clarity of the information. I understand that the omissions, as well as some typographical errors, will be corrected shortly.

Features and Benefits

LSO works so automatically and transparently that I doubt I'd be aware of its operation except for the ampersand that flashes in the upper right corner of the monitor during I/O to let you know it's working.

"I haven't found the perfect program yet, but including my observations on the documentation, the imperfections in LSO are minor."

The standard LSO program is compatible as is with many hard disk systems, including DOSPLUS 4.0. The special hard disk version is apparently required only with those systems like DOSPLUS 3.5 that use a configurable drivespec table. The LSOHARD/CMD program contains a similar table that you can configure to the system requirements.

Only the size of the disk directory limits the total number of library files. With DOSPLUS 3.5, LSO allows 128 directory entries for a double-sided, double-density, 40- or 80-track disk. With 720K of storage available on 80-track disks, the directory space doesn't go very far.

LSO allocates space in the library files on the basis of sectors rather than grans. You can store small files much more efficiently in a library file than in a regular file. This is particularly true of those files that are only a few hundred bytes long, such as utility /CMD files, do-files, or Job Control Language (XYZT's ICL) files.

XYZT first conceived LSO as support for their Interactive Control Language (ICL) program. ICL procedures are typically small files for which a full granule is allocated in normal disk processing.

My experience illustrates the value of the program. The system disk I use for scripting/formatting text with the G.E.A.P. Dotprint program contains a large number of letterset files ranging in size from five sectors to 55 sectors.

By loading these into libraries, I saved about 15K of storage space after subtracting the LSO storage requirement. This is on a 40-track double-sided disk. The space savings and the added convenience are considerable.

No two library files on the same disk can have the same name. You can use a bit of creativity in naming files, such as the extension /TXA for the first 255 text files, and /TXB for the next 255.

Varying one character in the extension and using the alphabet and single-digit numbers results in 36 library files with a possible 9,180 directory entries.

You create the libraries, load LSO, and everything else is automatic—no set of new commands to learn and simple command syntax for what is new. You can load LSO with a do-file or with the Auto command so even these functions are automatic.

You can force LSO to process a file as a conventional file by adding a pound sign to the beginning of the file name. Some DOSes reject this, but it works nicely with DOSPLUS 3.5, probably because that DOS has expanded legal file name characters. Most application programs and Basic permit this technique.

I haven't found the perfect program yet, but including my observations on the documentation, the imperfections in LSO are minor. First is the maximum library file size of 255 sectors, or 64K bytes.

The huge, changing data files are just what the large capacity floppy and hard disk systems are best suited for and these files can coexist with libraries containing the small files they handle best. You should use LSO to expand your file-handling capabilities rather than as a substitute system.

The other limitation, the inability to obtain a library directory display from Basic, is due to the way DOS systems are structured and it's doubtful anyone can overcome this.

The LSO program is excellent software. Like any good investment, the longer you use it the more it's worth.

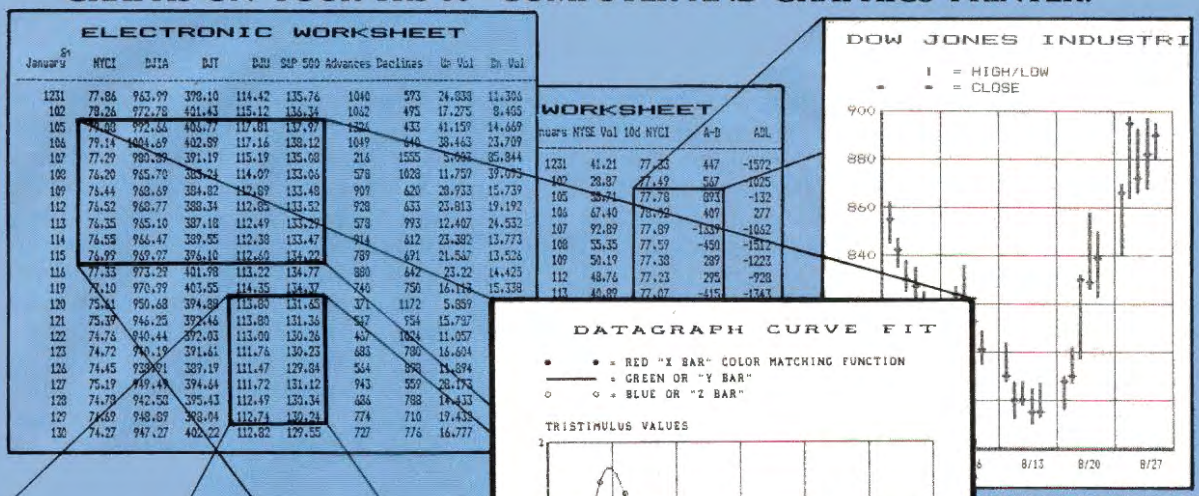
The price is fair, and for large-capacity floppy and hard disk system users it appears downright inexpensive. If you've ever seen DIRECTORY FULL when you have plenty of disk space, LSO is for you. ■

DATAGRAPH*

T.M.

PRINTER GRAPHICS PROGRAM

TRANSFORM YOUR VISICALC™ FILES INTO HIGH-RESOLUTION CUSTOM GRAPHS ON YOUR TRS-80™ COMPUTER AND GRAPHICS PRINTER.



NOW WITH ENHANCED FEATURES:

- CURVE FITTING ROUTINE
- MULTIPLE GRID LABELS
- NEGATIVE BAR GRAPHS
- OPTIONAL PIE CHARTS

DATAGRAPH: $79.95

PIE CHART OPTION: $34.95

Available in COLOR On IDS Prism™ Printer: COLOR PLOT Version $89.95

* HIGH RESOLUTION - 60 x 72 data Points/inch. * LARGE DATA CAPACITY - 1000 Input Data Points per graph. * SELECTABLE GRAPH SIZES - From 1" sq. to 7" x 24" * STANDARD DATA SOURCE - Plots Data from VISICALC or USERS OWN PROGRAMS using the DIF™ Standard Format. * GRAPH FEATURE SELECTION - Fill out Pre-formated Form on VISICALC screen or in users own program. * MINIMAL ENTRY REQUIREMENTS - Enter only name of Datafile and location therein of data to be plotted. * MULTIPLE FUNCTION GRAPHS - Plots over 10 Data Sets per graph. * DATA SYMBOLS - Plots data with user composed symbol shapes. * DATA INTERPOLATION - connects data points with user composed line shapes. * LINE/SYMBOL LIBRARY - Plots each Data Set with different line/symbol shape chosen from 12 line library. * CUSTOM LINES AND SYMBOLS - Has interactive screen-graphics program for composing symbol shapes. * AUTO SCALING - Selects scale values for ease of graph interpretation. User adjustable Mantissa Table. * GRID SELECTION - Prints selectable number of vertical and horizontal grid lines. * CALENDAR SCALE - Optionally prints names of month on horizontal scale. * CURVE SELECTION - Can Mix Scatter, Line, Curve-Fit, Stairstep, Bargraphs, Pie Charts. * OPTIONAL MIN/MAX VALUES - Extends graph beyond the values of the Data Sets. * DATA SET DESCRIPTIONS - Prints text descriptions of each Data Set in graph legend. * TEXT ENTRYS - Prints graph title, axis labels, and date on graph. * USER FRIENDLY - Checks validity of input data and displays cause of errors. * COMPLETE DOCUMENTATION - Comprehensive 75 page Users Manual with examples covering data preparation, graph feature entry, composing lines and symbols, and technical notes.

USER REQUIREMENTS

COMPUTER
- TRS-80 MODEL I 48K
- TRS-80 MODEL III 48K
- LNW80 48K

DOS
- TRSDOS 1.3, 2.3
- NEWDOS, NEWDOS/80
- DOSPLUS 3.4, LDOS 5.1

DISK DRIVES
- SINGLE DRIVE (NOT TRSDOS)
- DUAL DRIVE (PREFERRED)

GRAPHICS PRINTER:
- MX-80 GRAFTRAX, OR GT +
- MX-100, FX 80/100
- LP VIII, DMP 200-2100, 120
- NEC 8023 A-C, C.ITOH 8510
- IDS 460/560, 480, 80/132
- OKIDATA 82/83 (OKIGRAPH)
- OKIDATA 92/93

TO ORDER: Send check, purchase order, or request for COD shipment. Specify Computer and Printer Type. Include $2.50 for postage and handling. Calif. residents add 6% tax.

526

MICRO SOFTWARE SYSTEMS • MICROPLOT, INC.

DEALER INQUIRIES WELCOME

1815 SMOKEWOOD AVE. • FULLERTON, CA 92631 • (714) 526-8435

TRADEMARKS: DATAGRAPH (MICRO SOFTWARE SYSTEMS); VISICALC (VISICORP); TRS-80 (TANDY CORP); DIF (SOFTWARE ARTS INC.); PRISM (INTEGRAL DATA SYSTEMS)

VISA/MASTERCARD ACCEPTED

★★★★½

TRS-80 Pascal 2.0
Tandy/Radio Shack
One Tandy Center
Fort Worth, TX 76102
Catalog #26-2211
Models I and III
$249.95

by David Dalton

Tandy's heavy-duty, full-feature Pascal is ideal for several types of users. Professionals will find it powerful enough to create working programs. Colleges can use it to teach Pascal on TRS-80s. Hackers who have the time can learn Pascal for their personal use.

TRS-80 Pascal was written by Alcor Systems and licensed to Tandy. It comes with three single-density disks for the Model I and two double-density disks for the Model III. The user's manual is just under 350 pages long and includes a quick-reference card.

Most of the manual is written for those with a working knowledge of Pascal. But for neophyte Pascal programmers, there's a 24-page beginners' section and an excellent 62-page tutorial.

The Program

Both Model III disks contain TRS-DOS 1.3. The Model I disks have no operating system.

On the Model III, the programs run under NEWDOS80 and DOSPLUS without modification. Pascal includes patches for Model III LDOS.

You must patch the Model I version for NEWDOS80, and the patches are on the disks.

The program also includes a text editor, ED/CMD, so you can write program files. The editor's buffer has room for about 13,000 characters, but you can load the text in blocks so the true limit on a file's length is equal to the amount of free space on a single disk. A 14-page section in the manual describes how to use the editor.

My only complaint about the editor is the way it scrolls. It's very smooth when scrolling toward the bottom of a file, but it jerks when scrolling toward the top. However, you do have an assortment of quick-cursor commands.

Pascal/CMD is the main compiler. It's fast and it gives an excellent report on any errors encountered while compiling.

The documentation says that this nonoverlayed compiler should handle a typical 1,000-line program. For longer programs, the overlayed compiler has enough space for a typical 4,000-line program. However, the overlayed compiler runs more slowly.

You can run the object code, or p-code, produced by the compiler as is, using the Run/CMD utility, or convert it to a true command file (/CMD) using the LINKLOAD/CMD utility. LINKLOAD also lets you link together and execute separately compiled programs.

You can sell command files produced by this program without paying any royalty to Tandy or Alcor, though you must give them credit. Your friends can run your Pascal programs as command files even if they don't own Pascal, and your programs earn more status if they have the /CMD extension rather than a Basic extension.

Pascal contains several utilities for streamlining your programs. A p-code optimizer, Optimize/CMD, checks the p-code to find places where it can be compressed. The documentation says that the typical reduction in program length is 10–30 percent. The code generator, CODEGEN/CMD, increases execution speed by translating p-code instructions to machine-code instructions.

The disk files contain a good number of ready-made procedures for random file in/out, TRS-80 graphics, error recovery, file status, port in/out, Assembly language subroutines, and more. Disks also provide many special functions for string manipulation.

Evaluation

This is not merely an academic Pascal or a Pascal primer. It's meant to do the job and it's much faster than Basic.

For comparison, I wrote a Basic program that converts text files to upload to a mainframe, and I wrote a similar Pascal program. The job required that the text be tested byte by byte so certain translations are made as required by the mainframe. The text file for my test was seven NEWDOS80 granules long.

The fastest Basic I could write required seven minutes, 31 seconds to rewrite the text file. My Pascal program did the job in one minute, 17 seconds. When I converted Pascal to a command file, the runtime was the same.

The documentation seems complete, though it's a bit dry. In addition to the sections I've already mentioned, it contains a 34-page system section describing all 26 files on the program disks, an advanced development section to help you write faster or very long programs, an excellent 120-page Pascal language reference manual, and an inadequate index stretched over eight pages.

If you're lazy or want an inexpensive Pascal, this package isn't for you. But if you're serious about Pascal programming on your TRS-80, this is your ticket. ■

★★★½

Computer Art and Animation for the TRS-80
David L. Heiserman
Prentice-Hall Inc.
Englewood Cliffs, NJ 07632
Hardcover, 246 pp.
$17.95

by Richard Ramella

The serious student of computer graphics gets a bargain with this book. He can learn a great deal about using TRS-80 graphics, especially if he's willing to do a lot of work in conjunction with the text.

In early chapters, the author explains the TRS-80 Level II graphics and alpha-numeric sets, and PRINT@ and POKE positioning. Then he gets down to the business of putting pictures on the screen. First come some still life examples, then graphics in motion.

Along the way, Heiserman includes much meaty material: how to print black graphics on a white background, composition, string packing, and animations.

Heiserman makes the point that TRS-80 Level II graphics are, by definition, low resolution. The viewer needs a bit of imagination to accept images as what they represent.

The book's examples are well done, carefully thought out, and often humorous. Keying in some of the many graphics programs both instructs and entertains you. They include a dog and

cat, a flickering candle, and a dancing country girl reminiscent of Grand Ole Opry comedienne Minnie Pearl.

Heiserman uses the TRS-80 graphics set, CHR$ graphics 128 to 191, to create his images. To see these building blocks, try this program (not included in the book):

```
100 FOR X = 128 to 191:
    PRINT CHR$(X;" ");:
    NEXT
110 GOTO 110
```

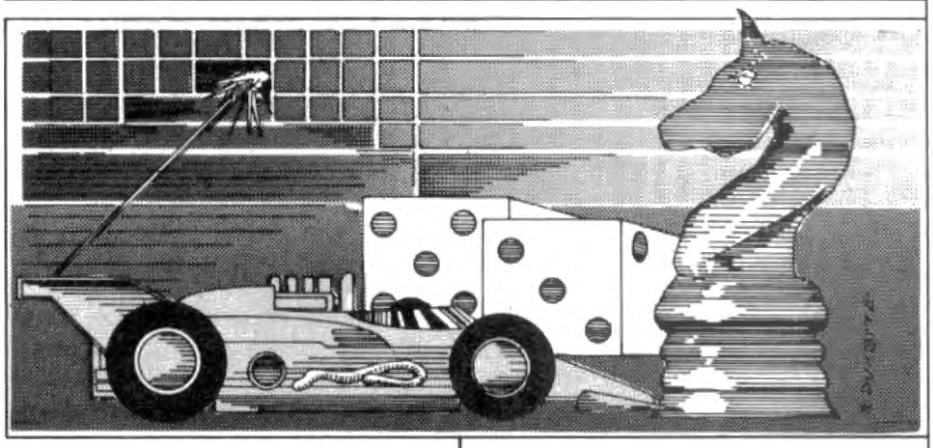
As an adjunct to programs with so many number variables in data lines, Heiserman explains the importance of running checksums of data lines. This technique helps the user keying in programs. For example:

```
100 DATA 12,2,19
110 FOR X = 1 TO 3
120 READ A(X)
130 N = N + A(X)
140 NEXT X
150 IF N<>33 THEN PRINT
    "CHECKSUM ERROR": END
```

In this short test, you know the total of all the data entries is 33. If the total of the entries as typed in doesn't agree, you have an error in the data lines. This is just a sampling of the useful knowledge in *Computer Art and Animation*.

What distinguishes this book from others that use examples is Heiserman's many useful and playful programs that reflect a sense of craftsmanship. In addition to the cartoonish figures, he offers a Russian character set, a playing card set, a missile shoot game, ideas on perspective animation, and routines involving multiple characters.

This book is for the programmer who already knows Basic and is ready for a big jump into graphics. I recommend it as a hearty helping of useful ideas. ■



★ ★ ★

Wormy, Racer, Quest for Adventure, Chess, Othello, The Wrath of Ken, Computer Casino, Meteors, Galactic Invaders, Bustout
Kuzel Computer Services
8654 W. Berwyn Ave. #3S
Chicago, IL 60656
Models II, 12, and 16
Each game costs $19.95 on disk
$5 discount per game for orders of two or more

by Mare-Anne Jarvela
***80 Micro* staff**

Believe it or not, games for the Models II, 12, and 16 do exist; I received a disk with 10 games to review. The graphics capability on the Model II is limited, so you should keep that in mind when playing these games.

The game that's the biggest hit with our staff is Wormy. Wormy, which starts out as a cursor, is a hungry worm that grows longer and longer as it eats its way around the screen. Wormy eats numbers and asterisks (bonus points) that flash on the screen.

You have a time limit in which to eat the targets. The longer Wormy becomes, the harder it is to reach the targets in time. Move your worm around the screen as you please, but you must be careful not to run Wormy into itself or a wall. If you make a complete turn, Wormy dies.

The more targets you eat, the higher your score. If you miss a target, the program subtracts points from your score.

Continued on p. 58

Scotch DISKETTES

$20.95 for one box when purchased in 5 box lots.

$22.50 for single box purchase (5¼" single sided, single density)

$19.95 Scotch Head Cleaning Kits 5¼" and 8" Kits —

DISKETTE-JUNCTION stocks a complete line of 3M magnetic media including 96TPI Quad Density. Call now to order the Scotch diskette for your equipment.

TOLL FREE
800-321-5134
Ohio Residents Call
216-676-5640

DISKETTE JUNCTION
5918 Smith Rd.
Cleveland, Ohio 44142

WE ACCEPT
VISA • MASTER CARD
CHECKS • MONEY ORDERS • C.O.D.

- Add $3.00 for shipping & handling.
- $2.00 EXTRA for U.S. Mail delivery.
- $3.00 EXTRA for C.O.D.
- Ohio residents add 6.5% sales tax.

Authorized Distributor
Information Processing Products 3M

The PRODUCER

The Professional Program Writer.

59

What has your computer done for you lately? You bought it to be a powerful and time saving tool. But if lack of good software keeps you frustrated and makes your computer an expensive and idle gadget, The PRODUCER is here to solve your problem.

Now you can design and produce professional quality programs that meet your exact specifications and you don't even need to understand programming at all.

THE PRODUCER IS A SOFTWARE PACKAGE THAT WRITES PROGRAMS FOR YOU.

Even though you have no knowledge about how to write programs, you can now create impressive, sophisticated and functional software to manage your data. You answer simple English questions, draw your screen on your monitor exactly like you want it, and The PRODUCER writes the entire BASIC program by itself.

THE PRODUCER WAS DESIGNED FOR MICRO COMPUTER OWNERS WHO CAN'T FIND THE SOFTWARE PROGRAM TO DO WHAT THEY WANT IT TO DO.

You may never need to buy another computer program to store and retrieve information, perform calculations on your data and get displayed and printed reports. The PRODUCER can create customized software of truly professional quality.

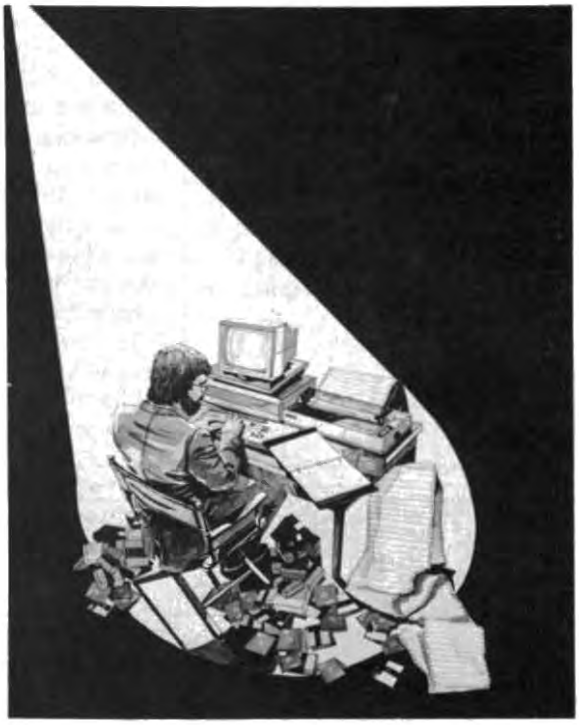
The PRODUCER makes the micro computer a useful tool to the novice and saves many hours of programming time for the experienced computer professional.

IF YOU ARE A NOVICE

The PRODUCER can make you feel like a pro. The Basic code is written for you. You push buttons, answer questions and watch the program develop in this remarkable process.

IF YOU ARE A PROFESSIONAL PROGRAMMER

The PRODUCER can be the time-saver you need to increase your productivity and make your job easier. The PRODUCER provides many of the advanced features found on products that cost many thousands of dollars more. You'll be proud to show your clients the professional quality programs created by The PRODUCER.



Listen to what one of our users wrote recently:

The PRODUCER has proven to be the greatest. I used to spend 70% of my time writing programs to create, maintain, sort, and list data. No More. Days and weeks of programming are now reduced to minutes and hours. The PRODUCER has increased the productivity of my custom software firm by 400%. This product is in a class reserved for the best. A. Copelle, Northbrook, Illinois.

HOW DO I LEARN TO USE THE PRODUCER

In each TRS-80 version, we have provided a systematic guided tour of The PRODUCER program generator process. For the Model I and III, an audio cassette tape tutorial is part of your package. One of your fellow PRODUCER owners talks to you as you go through the step-by-step lessons. The tapes not only teach you the operating process, they enable you to actually create a program of your own design while you learn.

We have provided over 200 pages of thorough documentation in The PRODUCER Reference Manual, but we encourage you not to read the manual until after you have completed the tutorial. We've had many rave reviews from our users, like this one from S.R. Foster of Pensacola, Florida:

The tutorial was an excellent starter. It enabled me to get on with it without days and days of reading. Very helpful.

WHAT DO YOU GET WITH THE PRODUCER?

You will be impressed with the professionalism of the PRODUCER package:

DISKETTE(s) containing PRODUCER Program Development System.

REFERENCE MANUAL of over 200 pages of extensive, easy to read, well organized material. Attractive hardback 3-ring binder. Color keyed index tabs separate the chapters. Comprehensive alphabetical Index refers to specific chapter subsections.

QUICK REFERENCE CARD

REGISTRATION CARD

TUTORIAL SESSION including audio cassettes and detailed follow-along outline, written and produced by fellow PRODUCER user.

FREE HOME INVENTORY MANAGEMENT PROGRAM ($59.95 value as a sample) allowing you to use a finished program immediately.

ONE YEAR SUBSCRIPTION to the PRODUCER newsletter.

TOLL FREE NUMBER for technical assistance, available only to registered PRODUCER owners.

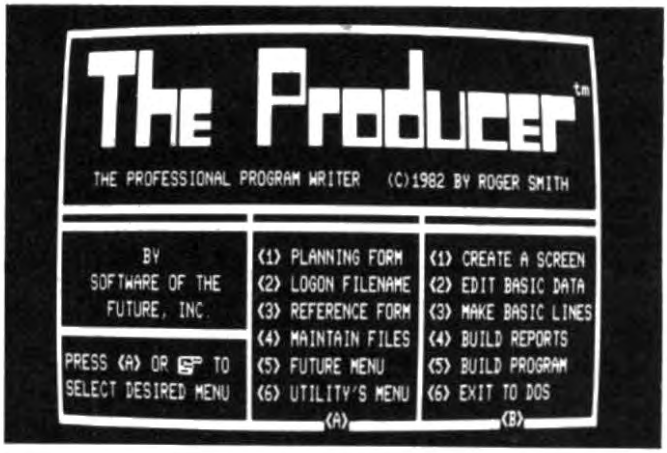
Pictured are the components of the Model III version of The PRODUCER. Other versions may vary slightly.

The PRODUCER

59

HOW THE PRODUCER WORKS

We think you will be impressed with the ease of operation and the amazing versatility of features you get with the PRODUCER. Here is a step by step overview of the program writing process. The screen shown is an unretouched photo of the Master Menu from which each of these steps is selected.



☐ Planning Your Program

The PRODUCER provides a helpful planning form you can print on your own printer. It helps you organize your thoughts to create a tailor made program to meet your needs.

☐ Creating The Screen

Visible on your monitor will be the screen where information will be entered, edited and displayed. There are six simple steps to follow in creating your screen.

1. Draw Your Screen

Using the arrow keys construct the screen in any configuration you desire. With single keystrokes enter large graphic letters and borders. Edit at will until you are satisfied.

2. Define Message Areas

Select an area of your screen where The PRODUCER messages to you will appear.

3. Define Input Fields

The PRODUCER will ask you questions about the areas where you will enter the data. You specify the length of each area or field, as well as acceptable characters in each field.

4. Define Display Fields

Locate the display fields anywhere you want on your screen. These show the results of the calculations you want made on your data.

5. Define Custom Prompts

You select an area where help messages to yourself can be displayed.

6. Save Your Results

Assign a working name for your program and save it to disk.

☐ Editing Basic Data

1. Edit any part of The PRODUCER program you have created -- screen field names, lengths, prompt areas, etc.
2. Type in any help message you want as a custom prompt to help you operate the program.
3. Easily create calculations for your program using actual field names. You can use the contents of any numeric field and all math operations including logical operators.

☐ Making Basic Code

Press a key, sit back and watch The PRODUCER do all the work of creating BASIC code for your program. You can see the program lines appear on your screen. Complete error checking is done for you.

☐ Building Reports

Virtually any report is available to you thru our NEW free form report generator. It works with any size paper. You are allowed up to 100 calculations within the report. You can specify exact position of any text information to any position on your paper (even preprinted forms, checks, etc.). An amazingly versatile tool.

☐ Building The Program

Put the finishing touches on your program by selecting cursor type, size, flashing speed, auto messages, custom logos, etc. After your selections have been made, press a key and your entire finished program is created in less than 5 minutes. That's all there is to this remarkably simple program generation process.

Continued

The PRODUCER

TECHNICAL INFORMATION

The PRODUCER provides many advanced features which allow you to do "magic" with the programs you create.

The SCREEN GENERATOR

*Use the full screen (all lines and column positions)
*Create a professional well organized screen with graphics
*Save up to 9 separate screens in memory at one time and get instant access to each
*Move the cursor to any location on the screen
*Replicate bars/lines/graphics to define certain screen areas
*Access an instantly available Help Menu of all Screen Editor commands
*Insert and delete any character with a single keystroke
*Clear or erase selected areas of any screen
*Insert and delete whole lines on the screen
*Center any text on the screen
*Move any rectangular block of text anywhere on the screen (block move)
*Create titles with a single keystroke large graphic letter alphabet
*Move portions of screens between different screens (cut and paste)
*Save any number of screens to disk at any time
*Recall any screen from disk any time
*Create BASIC lines to re-create any screen

FILE and RECORD HANDLING

*Rapidly access records with BTREE File structure
*Search for a record with only the first few letters of the name or key (partial key) (Example: locate PRODUCER by typing PR)
*Recall and edit duplicate and multiple keys (Example: Several last names may be the same on a file and you can find and edit them individually
*Fully edit any part of a previously entered record
*Recover unused space automatically upon deletion of a record
*Enter data very fast with the special batch mode
*Recall immediately any record after it's been entered, eliminating time consuming sorting and indexing
*Rapidly access any record anytime (2-4 seconds average)
*Globally search and replace data in certain fields in selected record range
*Automatically rebuild any file to meet new specifications. No need to re-enter data when a file needs to be restructured.
*Balance any BTREE file automatically to reorganize and speed up file access time
*Recover from power failure and easily rebuild files that have been damaged. Avoid laborious re-entry of long data files

SCREEN ORIENTED INPUT and EDITING of DATA

*Insert and delete characters at any position in any field. No "back to start" retyping of data
*Move forward or back to previously entered fields to edit using the arrow keys. Totally non-destructive cursor. Does not require re-entering of each data field
*Move within any field using the arrow keys
*Move instantly to any field with Control G command
*Exit from input/edit mode at any point allowing immediate escape from data entry mode. Allows partial information to be entered for each record without the annoying, time consuming need to press ENTER for each blank field not used at the time of entry
*Duplicate field information from a previous record with one keystroke. No need to re-enter duplicate information, addresses, etc. on consecutive records
*View a custom prompt, your own custom reminder or help message for each field with 1 keystroke
*Verify each character typed automatically
*Enter data as fast as you want, even if you are a speed typist
*View visible display of automatic field length restrictions
*View prompts for each field showing number of characters allowed

PRINTED REPORTS

*Create up to 9 separate reports at a time in a finished program
*Generate any number of reports you want (no limit)
*Select reports by name from a report menu in the program
*Select from six different automatic report formats including custom mailing labels
*Instantly print reports by key with no time consuming sort necessary
*Sort and print any other (non key) field with the fast machine language sort
*Sort only records that meet your search criteria
*Sort on more than one field if desired
*Use any restrictions or search criteria to determine which records will be included in a report
*Use any number of multiple search criteriea (including logical) (Example: You can search for all the males who are single, and drive a car that are over 24 years old but less than 35 years old
*Send any special command to your printer before or after any report
*Specify any line length needed and any page length desired
*Select single line or multiple lines per record, even one page per record
*Total any fields during the report (running totals)

FREEFORM REPORT GENERATOR

*Specify column and row of every heading and field
*Allow up to 100 of interfield calculations, even string calculations
*Include any text anywhere on the screen
*Keep sub-totals on any field and print at any time in any format
*Format any numeric fields anyway you wish
*Print reports on pre-printed forms, checks, etc.
*Create form letters with merged field data, with no word processing necessary
*Put any field anywhere on the page. No limitations

ADVANCED CALCULATIONS

*Globally recalculate any field in any or all records. (Example: If file is a list of gold assets and the spot price changes, each separate asset may be recalculated with a new value for the spot price)
*Use all math operations including exponentiation and trigonometry
*Use logical calculations such as And, Or, Not, etc.
*Use any level of parenthesis in calculation formulas
*Save results in any field and display results in any field
*Store temporary results in several extra memory slots
*Pass calculation results between records
*Determine the exact order of calculations
*Display or save results at your option in the finished record

OTHER ADVANCED FEATURES

*Edit any part of any program without starting over or redefining the entire program
*Create screen and input modules only (for professional programmers)
*Create Calculate-only programs with the easy desk-top super calculator program
*Design custom logos for your program
*Control cursor type, size, flash speed, etc.
*Design custom prompts or help info for any field

YOU ALSO GET

*FREE 1 year SUBSCRIPTION to PRODUCER Newsletter
*TOLL FREE assistance number for all registered users
*REFERENCE MANUAL of over 200 pages
*FREE audio TUTORIAL

The PRODUCER

WHAT ARE PRODUCER USERS SAYING?

We continue to receive testimonials from satisfied users almost every day. Here's a sampling of the feedback we are receiving:

VALUE

VERY impressive! No matter how much I use the PRODUCER, there is no doubt I got my money's worth. It is clear the program, packaging and tutorial are developed with lots of thought....Very user friendly! Congratulations!
R. N. Forbes, Los Altos Hills, California

The PRODUCER package I received was excellent. The finest software package I have ever purchased. Far beyond my expectations.
S. R. Foster, Pensacola, Florida

I think the PRODUCER will save me so much time that it will give me the time to do the more important tasks that my business calls for and the money I'll save from not having to buy canned programs that are overpriced. Now with the PRODUCER I can write a program overnight to do almost anything I want it to do and with written reports to boot. Talk about saving time and money. I feel the PRODUCER will pay for itself with my first three programs.
S. Tornatore, Canastota, New York

The PRODUCER is a very impressive software package. It is well worth the money. While other micro owners are printing mailing labels, I am now selling them programs to use. I now have more time to spend enjoying my computer.
V. E. Ryberg, Bloomington, Illinois

I'm in love with the PRODUCER. It's one of my favorite programs.
R. Selsback, Burlingame, California

It was very complete and professionally done. The packaging and program seem to have been thought out before assembly and sale. The 'value' of the deal, everything included was the best I've seen to date.
G. Slusher, Martin, Kentucky

Very professional packaging. It gave the feeling of getting your money's worth before even running the program...Very easy to use and leaves very few questions unanswered...As you can see, I like the PRODUCER and was impressed with how trouble free it is.
A. C. Vincent, Napa, California

Excellent. Above and beyond other software.
R. Hapgood, Henrietta, Texas

VERSATILITY

The PRODUCER is the best all purpose program generator I have used. (We have tried almost all of them.) The generated code is bug free, well commented and efficient.
R. A. Copella, Northbrook, Ilinois

I bought the PRODUCER to save time. I feel capable of being able to write almost all programs I need. The PRODUCER generated programs will save a lot of time writing basic code and debugging. Using the PRODUCER I can write a good database type program using math calculation in about three hours. I don't have to tell you how long it would take writing the same program from scratch.
S. Tornatore, Canastota, New York

A special thanks to Roger and all of you. You've made my computing life easier and better. My 10 year old can't wait to get his hands on the PRODUCER.
J. D. Konkler, Columbus, Ohio

DOCUMENTATION

The Reference Manual is a work of art. Not only is it attractive and easy to use, it is so well organized, documented and logically written that the manual is a rarity in the software market place.
S. R. Foster, Pensacola, Florida

One of the best I've seen. We write about 20 volumes of material per year. Take it from a 'pro', it's good!
J. Crespi, Sherman Oaks, California

The PRODUCER Reference Manual is professionally written to provide ready acess to easily understood answers to questions which arise during use of the PRODUCER.
R. A. Copella, Northbrook, Illinois

The Reference Manual is supreme and superior to anything I have worked with.

R. A. Neuman, Okemos, Michigan

Very well laid out and organized. One of the best I've seen.
J. D. Konkler, Columbus, Ohio

QUALITY

Thank you for an excellent program. I agree that The PRODUCER will change the entire concept of program creation in the future. But for now, you stand as the best data-base-management-system I can buy.
E. Sung, Vancouver, B.C.

Your system really is Software of the Future. Your staff has insight others of us only dream of. Congratulations on a product of extraordinary design.
S. R. Foster, Pensacola, Florida

This is an excellent program. At this point I am totally pleased. This is by far my number one software and I will use it anywhere and everywhere I possibly can both personal and business. Once again congratulations to all of the people involved.
R. A. Neuman, Okemos, Michigan

Comparison shopping indicates the PRODUCER's superiority to all others. And I already own most of the others.
R. A. Copella, Northbrook, Ilinois

Glad to see you take an interest in what some of us hackers are up against. I think the PRODUCER will make the software hackers upgrade their products to this high level quality of the PRODUCER. I'm sure you realize that there is a lot of garbage on the market.
D. J. Smith, Lombard, Ilinois

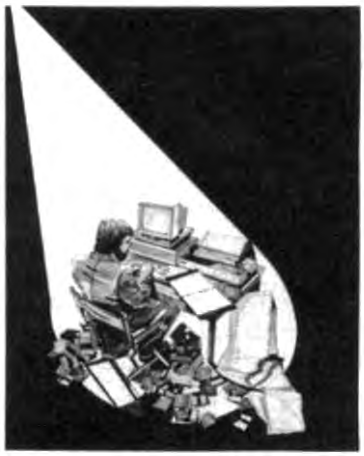
I was impressed by the professional appearance of your program. Other software I have received were on copy paper and stapled into a booklet with very vague instructions.
W. J. Mahaffey, Absecon, N. J.

USE

The program is almost idiot proof.
J. Crespi, Sherman Oaks, California

It is a very friendly friend and we will be working together for some time to come.
R. A. Neuman, Okemos, Michigan

Very easy to use and leaves very few questions unanswered.
A. C. Vincent, Napa, California



The PRODUCER

MODEL I version $149.95
MODEL III version $149.95

Available FALL/83 for
MODEL II $299.95
MODELIV $199.95
MODEL 12 ..... $299.95
MODEL 16 ..... $299.95
MODEL 16 XENIX $499.95
IBM - PC $299.95

PRODUCER SOFTWARE
Box 1245
Arlington, Texas
76004-1245
Texas 817-274-6998
800-433-5355

Continued from p. 53

As the game progresses, Wormy becomes more difficult to maneuver. If your worm grows to occupy 256 spaces, be ready for a surprise.

The game has a range of speeds. The targets are worth less at the slower speeds. At the highest speed, the keyboard doesn't respond fast enough for proper play. I find medium speed the best. The game is simple but entertaining, and it improves your reflexes.

Chess and Othello are for the player who doesn't have a human opponent. The chess game plays well and is a good learning tool. The chess pieces are represented by letters (K is a king, P is a pawn). You have two levels of play: quick (computer thinks for 30 seconds) and long (computer thinks for three minutes). The game lets you castle. Othello has good documentation, and it's possible to beat the computer.

If you're a gambler and can't go to Las Vegas maybe Computer Casino is for you. Blackjack and Slot Machine look like the real thing and you have $1,000 to start with, but where's the rattle of coins, the excitement? If you don't have anybody to gamble with, the computer is a good substitute.

The Quest is a different kind of adventure game. The program draws a random map on the screen with villages, forests, lakes, and various beasts. The map changes every time you play. You are in the middle of the screen with some food, water, and gold coins. The map scrolls across the screen as you press the arrow keys.

Your mission is to recruit an army, spies, and thieves. You have to kill beasts and find the magical keys to the castle.

When I tried the game, I died of thirst or starved to death before I had a chance to look for the keys. Luckily, some sealed envelopes with clues were included with the disk. After opening them, I was able to go a little further.

The graphics are poor, but probably the best available on a Model II. If you like adventures that are a little different, this is a good game.

My reaction was the same to Galactic Invaders, Meteors, and Bustout. If the games had repeat key functions to help you move across the screen, they wouldn't be bad. If you play Bustout at the fastest speed, you can't get from one side to the next to hit the ball.

The Wrath of Ken is an adventure graphics game that takes place in outer space. You're in a starship with a mission to destroy enemy ships. I found it extremely hard to hit the ships. The game seems limited and not very exciting.

The Racer game isn't bad. It's fast and you go from an easy track to harder ones. You have to pass slower cars and stay alert so you don't run into walls. You need quick reflexes for this game.

Not many games are available for the Models II, 12, and 16, and this package isn't bad. I had a lot of fun playing these games. Wormy takes the prize as the best game and some of the others are almost as good. ■

★★★★

MicroRef
Educational Systems Inc.
1000 Skokie Blvd.
Wilmette, IL 60091
$12.95

by Dan Robinson

Learning to use WordStar is rather like learning to walk: It's a slow process, you stumble many times, and now and then you fall flat on your face.

MicroRef's Quick Reference Guide to WordStar helps you keep a sure-footed pace through this complex word processing program starting with your first step.

The spiral-bound 4½- by 8½-inch guide is printed on durable plastic-coated stock. Its thumb tabs take you quickly to 46 sections of illustrated, two-color instructions. Keystrokes appear in reverse print and examples of required input are in boldface.

WordStar has many keystroke commands, and MicroRef covers them all.

Rather than simply listing WordStar's commands, MicroRef provides a detailed background of their function and operation. For the user already familiar with WordStar, a complete command summary appears in the back of the booklet.

MicroRef sections include Menus, Files, Editing, Block Operations, Formatting, Headings and Footings, Special Effects, and Printing. In addition, the pamphlet includes a glossary and an index.

"For the user already familiar with WordStar, a complete command summary appears in the back..."

Anyone who has waded through the huge MicroPro WordStar Operating Manual or the equally corpulent WordStar Training Guide will appreciate MicroRef's 48 pages of concise, detailed instructions.

The one-sheet reference cards don't provide the detail that MicroRef does, and they often force even an experienced user back to the books to check a seldom used command.

If you've been limping along through WordStar, the MicroRef Quick Reference Guide is an invaluable crutch. ■

★★★★★

MT160 Dot-Matrix Printer
Mannesmann Tally
8301 South 180th St.
Kent, WA 98032
MT160I $845
MT160L $990

by Terry Kepner

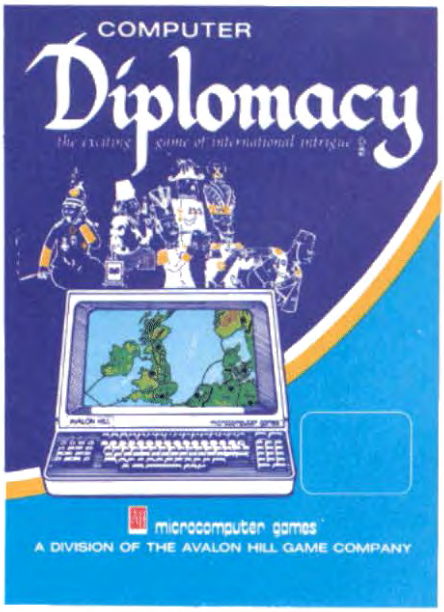
If you want a high-quality, solidly built, versatile, fast printer for your computer system, consider the Mannesmann Tally MT160.

Physical Description

The MT160 is a small printer, only 13.7 inches wide (10-inch-wide paper maximum) by 6.2 inches high by 9.6 inches deep. Its footprint, the space occupied on a desk, is about the same as the Epson MX printer. In that small space, Mannesmann Tally has packed an incredible number of features at a bargain price.

The MT160 is built of heavy gauge metal and weighs 18 pounds. Only the platen paper holder, the exterior case, and a few other miscellaneous parts are plastic. The cast metal design makes the printer rugged (a desirable quality for office use) and stable.

Installing the optional tractor feed, a



Computer Classic

Boardgame Classic now available on TRS-80®!

Computer Diplomacy is **the** computer version of the classic boardgame of persuasion, compromise and betrayal. Against a backdrop of Imperial Europe, **Computer Diplomacy** uses a minimum of game mechanics and a maximum of intimidation (and back stabbing) to create a game of exciting international intrigue where each player tries to arrange the deals and alliances that will lead him to ultimate victory. The result is a game of pure diplomacy, a balance between the trust needed to deal and the profitable stab in the back that leaves the betrayer friendless.

The player is free to scroll the map. Provinces and seas are shown by three letter codes. Supply centers are marked by asterisks (*).

Initials of a power within a province signifies ownership. Symbols indicate a fleet (▌▐) or army (▟▙).

For years, the board game version of Diplomacy has been regarded as a true classic in the world of gaming. Even professional diplomats, including no less a celebrity than Henry Kissinger, have enjoyed its accuracy and intensity. However, for years it has also been noticed that the game had one flaw: by far the best version of the game required seven players, a sometimes hard-to-get number.

But now there is Computer Diplomacy where six or less players can compete and the computer resolves the moves of the other nations. Admittedly the computer isn't always as devious as a human, but it is treacherous enough to make play vastly more enjoyable for six or less players. In fact, it's fun for a single player to take one nation and try to conquer the map (though this certainly cannot be termed "diplomacy").

Of course, **Computer Diplomacy** also has all of the amenities you expect in a computer game: a detailed scrolling map that displays the location and type of all units, various status reports and even a built-in clock that times each "diplomacy period". The computer also takes care of game mechanics: you simply enter your moves and the computer swiftly resolves all conflicts, prompts you when to take the action and explains why a move failed.

So, if Diplomacy is a classic, what is **Computer Diplomacy?**!

We'll be humble and just say it's still a classic — but not just for seven anymore.

Computer Diplomacy is available on diskette for your TRS-80 with 48K memory at $30.00. Diskette soon to be available for the IBM-PC®

® Trademarks of Tandy Corporation and International Business Machines.

QUALITY

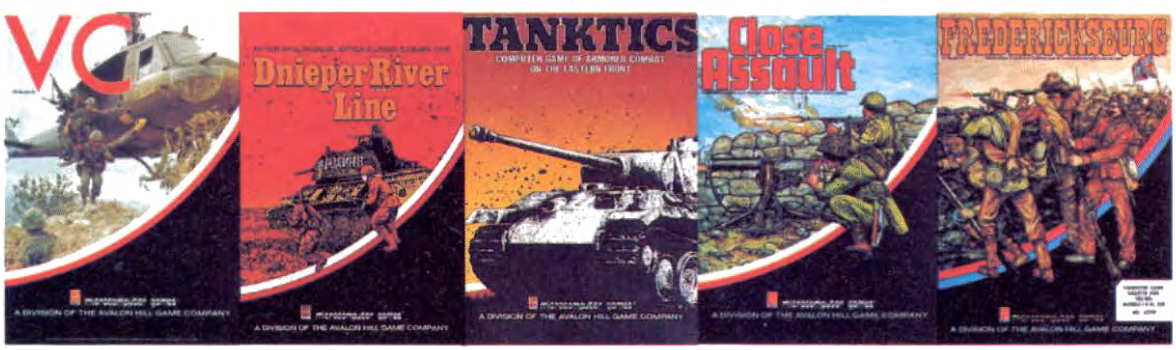
microcomputer games®

A DIVISION OF

The Avalon Hill Game Company

4517 Harford Road • Baltimore, MD 21214 • (301) 254-5300 ⌐88

THESE GAMES ARE ALSO AVAILABLE FOR THE TRS-80:
For additional information call Toll-Free:
1 (800) 638-9292.
Ask for Oper. D.



⌐See List of Advertisers on Page 323

unidirectional model, is easy; it snaps into place. The nylon ribbon, rated for two million characters, is equally simple to install: Remove the cover, position the ribbon cartridge, put the ribbon guide in front of the print head, and you're finished.

Features

This printer is one of the few I've found with a switch to select the voltage at which the printer operates. You can set the printer to accept either 120V, 220V, or 240V power supplies. The default setting is 120V ac. If you opt for 220V operation, you have to replace the 1.25 amp fuse with a .6 amp fuse, which is included with the unit.

After selecting the power supply voltage, choose the communication protocol for your system, either RS-232 or parallel. Both connectors are clearly labeled on the back of the printer. Plug your computer's printer cable into the appropriate connector.

Next, load in roll, cut sheet, or tractor-feed paper. When you use multipart forms with roll paper, you can have one original and two copies. Tractor-feed forms provide one original and up to three copies.

A knob just in front and below the manual paper advance knob controls the striking distance between the print head and the platen. You can turn this knob while the printer operates to adjust the density of the print without going off line and blindly guessing the setting you need.

The MT160 has a cooling fan that always runs while the printer is on. Its hum is barely audible.

You choose from a variety of print styles, options, and modes. The printer is factory-set to print 10 characters per inch (cpi), draft quality, six lines per vertical inch, 66 lines per page, USA character set, parallel interface, and the ANSII code set.

You don't have to open the printer case and play with DIP (dual in-line package), switches, jumpers, or shunts to change these settings. Change them from the printer's front panel or from your computer. The MT160's front panel consists of a six-key membrane keypad. The keys are labeled On/Off Line, Test, Yes, No, LF (line feed), and FF (form feed). Test, Yes, No, LF, and FF operate only when the printer is off line.

Line feed and form feed are useful in aligning your paper, and you use the Yes and No buttons in printer parameter selection. The test key puts the printer into a self-test mode that prints the ASCII character set.

To determine your printer's current default settings, press the No button while you're off line. This prints the settings on paper. To change the settings, press the Yes button and hold it while pressing the No button. This starts the parameter setting program. Answer the prompts by pressing the Yes or No button.

Your responses are stored automatically and printed on paper as a file record. You only set the parameters once, since your responses are stored in an EAROM (electrically alterable read-only memory). The EAROM isn't affected, so change the settings as often as you like.

"The front panel doesn't control all the printer parameters; in fact, you have more printing choices available through software control than through the front panel."

The options available with the MT160 are truly incredible. You can opt for a form length of 4, 5, 6, 8, 8½, 11, 12, or 14 inches. You can print either six or eight lines per vertical inch, and the cpi options range through 10, 12, 16.7, and 20 cpi, 10 and 12 cpi correspondence-quality, and proportional correspondence-quality print styles. The normal print fonts run at 160 characters per second (cps), the correspondence fonts at 40 cps.

Print head operation is bidirectional, with logic-seeking accelerated tabbing. The printer supports the full 96-character US ASCII set, plus 32 international characters. You use a modified sans serif font for correspondence-quality printing. The draft-quality print font uses a 7- by 9-dot matrix, and the correspondence font uses a 20- by 18-dot matrix. You can replace the print head itself.

When using the 10 cpi mode, you get 80 characters or columns per line. Twelve cpi gives you 96 columns, 16.7 cpi has 132 columns, and 20 cpi fits 160 characters per line.

Customize the printer to your computer system by specifying if a carriage return implies a line feed, if the printer should line feed when it reaches the end of a line, if the printer should automatically print data whenever it receives a line feed, and if a line feed implies a carriage return.

If you set the printer to require a line feed before it actually line feeds the paper, you can use the carriage return command to return to the beginning of a line for boldface and overstrike printing.

The seven available character sets are: USA, United Kingdom, Norwegian/Danish, Swedish/Finnish, German, French, and Spanish. These characters are in addition to the standard 96 ASCII characters. If you need to differentiate between a zero and an O, you can also have the printer slash the zeros.

The MT160 uses the standard ASCII codes with some alterations. You can choose from standard ANSII, Daisy printer codes (MT160L only), or Epson printer codes. You can also use any software designed for the standard Epson printer with the MT160, including graphics.

Use the last set of options to select the communications mode of your printer: parallel or serial. The parallel port is standard 8-bit Centronics compatible. The RS-232 port supports 150, 300, 600, 1200, 2400, 4800, and 9600 baud rates, with 7 or 8 data bits per word, 1 or 2 stop bits, and even, odd, or no-parity checking.

You control whether the busy signal is high or low, and whether the protocol is EXON/XOFF or ETX/ACK. You can select the communications options only from the front panel.

The front panel doesn't control all the printer parameters; in fact, you have more printing choices available through software control than through the front panel. You can control character density, both normal (10, 12, 16.7, and 20 cpi) and double width (5, 6, 8.3, and 10 cpi).

Also available are underlining, superscripting, subscripting, automatic line

The Computer Times

★ ★ ★ ★
FOUR STAR EDITION

business

section
D

VR DATA CORPORATION ANNOUNCES:

THE PRICE WAR IS OVER !!

HARD DISK III* 5 MEG WINCHESTER 995.

		5+5 Meg System	1590.00
15 Meg System	1449.00	10 Meg System	1249.00
15+15 Meg System	2299.00	10+10 Meg System	1999.00

*Hard Disk III includes up to 2 full height Winchester disk drives, heavy duty enclosure, disk controller, field proven power supply, I/O adaptor, and applicable cabling.

*Hard Disk III is available directly from the factory only.

HARD DISK III & HD-505 ADAPTOR MODULES:

IBM-XT* IBM-PC
APPLE II* APPLE IIe*
XEROX 820* XEROX 820-II*
FRANKLIN* LNW-80
TRS-80 MOD I LNW-II
TRS-80 MOD III TRS-80 MOD 4

150.

OTHERS TO BE ANNOUNCED
*AVAILABLE 3RD QUARTER 1983

NEW

HD-505 WINCHESTER

Compact, High Density, Low Profile, Low Power, Sub-Mini Disk System

SAVE $90 on 5+5 Meg (Fixed/Removable) Package

Packages includes:

HD-505F (Master) Fixed 5 meg	1395.00
HD-505R (Slave) Removable 5 meg	1095.00
Adaptor Module	150.00
Disk Cartridge for HD-505R	FREE!!!
TOTAL	2490.00

The NEW HD-505 Winchester Systems are available through quality Computer Stores everywhere. If yours doesn't have the HD-505 from VR DATA, tell them to get it.

MASTER unit includes: enclosure, switching power supply, disk drive, controller, host adaptor, applicable cabling. SLAVE unit includes: enclosure, switching power supply, disk drive, applicable cabling.

Call Toll Free • 800-345-8102

MasterCard VISA® AMERICAN EXPRESS®

Published prices reflect cash discount. All prices are subject to change without notice. TRS-80 and TRSDOS are trademarks of Tandy Corp. Disk III and HD-505 are trademarks of VR DATA CORP.
8:30 am-7pm EST Mon-Fri., Sat 10am-3pm
CABLE "VRDATA" TELEX 845-124

All VR DATA products are tested, burned-in, and re-tested. We're so proud of our quality control that we offer an optional unconditional extended warranty covering full costs of parts and labor on all VR DATA products.

VR data

(215) 461-5300
777 Henderson Blvd.,
Folcroft, PA 19032

VR DATA—WEST
Watonga, OK
1-405-623-8664

✓ 10

✓See List of Advertisers on Page 323

centering, automatic right margin justification, setting and clearing the left and right margins, setting the forms length from zero to 255 lines, setting and clearing horizontal and vertical paper tabs (up to 16 of each), language selection, and graphics mode selection.

The graphics selection has two different modes, 50 dots per inch and 100 dots per inch, with reverse field option (not printing selected locations instead of printing). Standard-density graphics print at the equivalent of 160 cps, double-density at 80 cps, and double-density high-quality at 40 cps.

The format for graphics is standard: Send an escape character, % and 3, then two numbers (zero to 255) to specify the number of graphics bytes you want processed. Each graphics byte is a column of eight dots, and top is the high bit. When the number of data bytes specified is reached, printing automatically begins.

Operation

Loading in paper is easy, similar to many other printers. At first, the paper occasionally became misaligned with my printer and slipped sideways out of the tractor feed mechanism. Making sure I had the paper directly below the printer eliminated that problem.

The only other operational difficulty I had was trying to back up the paper with the manual paper adjustment knob. Whenever I tried to reverse the paper a few lines, the tractor feed mechanism came off the printer's right side (the side with the manual adjustment knob). It's irritating, but no real problem.

I tried the MT160 with my Model I, my Model 100, and my Color Computer, and it worked perfectly with each. I've gone through two boxes of paper (3,500 pages each) without any service troubles.

The draft style, while not the best, is certainly good enough for most needs. For those who want fancy print for manuscripts, the correspondence mode is wonderful: Even if your word processor (such as a Model 100 Text) doesn't support proportionally spaced text, the justification mode of the MT160 provides excellent margin-to-margin printed text with the proportional spacing mode enabled.

The MT160's only flaw is its documentation, a 5- by 8-inch booklet. The set-up instructions, the parameter menu procedures, and technical specifications for the RS-232 and parallel ports are clearly diagramed. But the computer control procedures and instructions aren't as good. The instructions on the dot-addressable graphics are short, only two pages long, and the differences between the various modes aren't illustrated.

The manual doesn't include any examples of dot-graphics programs and their results. Similarly, the control codes for the various print options, such as underlining, automatic centering, and margin controls, don't have examples.

To make things more difficult, the booklet lacks an index. This makes it hard to find specific commands. The appendix of control codes included is incomplete. If you don't carefully examine the booklet, you might miss some of the codes and assume that the appendix lists them all.

Because of its rugged design, I feel this printer will need few repairs, especially since the owner can replace the part most prone to wear, the print head. The printer has a 90-day warranty, except the print head which is warranted for 100 million characters or 12 months, whichever comes first.

The MT160 is a solid and versatile printer, capable of emulating the Epson printers' dot-addressable graphics, while giving a faster performance. It costs more than the Epson, but it has more features. Its attributes more than make up for the failings of the documentation.

And there are two MT160 printers to choose from: the MT160I with a roll paper holder and parallel interface, for $845; and the MT160L with tractor feed and parallel and serial ports, for $990. ■

★ ★ ★ ★

Typitall 1.2
Howe Software
14 Lexington Road
New City, NY 10956
Models I and III
32K or 48K disk system
$129.95

by William D. Allen

Typitall is a new word processor from Howe Software that's one of the best I've used. It's so simple that a beginner can use it with little training. If you're already familiar with Scripsit, you'll probably be able to use Typitall immediately.

On the other hand, Typitall is so versatile that two months wasn't enough time to thoroughly test all its features. I discovered some minor bugs in the program, but I've been very favorably impressed by it. The more I use it, the more I like it.

Howe Software describes Typitall as "The Scripsit-compatible word processor." In many ways Typitall does act like a vastly enhanced Scripsit. For example, the ways in which you can move the cursor are greatly improved and you have 11 user-definable command keys. Also, both Scripsit and Typitall come with a serial printer driver.

However, Scripsit has one feature that Typitall doesn't. Disk Scripsit can load files created by tape Scripsit, but Typitall can't load files from tape.

In general, Typitall uses the same commands as Scripsit with many additions. However, not all commands do the same thing in Typitall as they do in Scripsit.

"<Break> P,S <Enter>" is the command to print with a serial printer in Scripsit. In Typitall the same command means print the text on the screen, so you can examine the text format before you print it.

Typitall reads and generates files with the same format as Scripsit. Scripsit files load into Typitall with no conversion, and Scripsit can also read the files Typitall generates. Scripsit files contain control codes that give indigestion to most other word processors.

However, limits exist to the compatibility between Scripsit and Typitall. Typitall is somewhat longer: Its text buffer is 468 bytes smaller than Scripsit's in a 48K machine.

More important for compatibility, many commands are at different addresses in the two programs. Some software that uses commands from within Scripsit won't work that way with Typitall.

Two such programs are the integrated versions of the Electric Webster spelling checker from Cornucopia and the Epson MX-80 printer driver, Maxprint, from Peggytronics.

Because the files Typitall creates are in the same format as Scripsit files, you can use Electric Webster to correct their spelling, but you can't do it from within Typitall. You have to save the text to disk and use Electric Webster by itself.

With Maxprint, you can still get proportional justification from your Epson MX-80, but you generally have to leave Typitall. Peggytronics and Cornucopia indicated a desire to support Typitall, so by the time you read this, the necessary patches might be available.

Scripsit patches simply aren't compatible with Typitall. You can't use Scriptr or Scriplus to modify this word processor.

I did most of my testing with MULTIDOS 1.6. With some help from other TRS-80 owners, I've run short tests with DOSPLUS 3.4, NEWDOS80 version 2, TRSDOS 2.3, and TRSDOS 1.3. I didn't have any problems.

When you use it with NEWDOS80, Typitall has an additional feature. You can use DOS commands directly from the word processor itself. With other DOSes, you can exit from Typitall, execute a DOS command, and then reenter. Your text buffer is still intact if you didn't overwrite it.

The text buffer starts about 8000 hexadecimal (hex). Some procedures, such as Copy, might write over this area if the file you're copying is large enough.

Getting a directory listing shouldn't cause a problem. It's easy enough for you to make a few tests, but these tests can be misleading. If you're ever in doubt, save your text first.

Basic Editing

Typitall has an excellent range of cursor movement commands. You can move the cursor backward and forward a word at a time, as well as line by line and letter by letter. You can also move the cursor to the bottom or top of the screen.

Repeating the command causes the text to scroll backward or forward a screen at a time. The long list of cursor movement commands takes up almost a page in the command summary.

You can manipulate any text you've already typed into the computer as a unit. After you mark the beginning and end with block markers, you can move, delete, or copy the text as one piece.

You can mark individual blocks for identification using any character except the four that Typitall has reserved. In theory, you could have about 50 blocks in your text at the same time.

You insert text four ways. Type it over text already on the screen if the cursor is in the overtype mode.

If the cursor is in the insert mode, the program inserts any text you type at the cursor position. To do this, the buffer and the display must expand one letter at a time and rearrange the text for each letter you type. This makes the CPU do a lot of work for each letter, so you might find that what you see on the screen lags behind what you type.

The program apparently has a type-ahead buffer because I didn't lose anything I typed. Despite the speed limitation, this is a nice feature because it allows you to line up text on the screen or quickly insert a word.

In another method of text insertion, the program makes extra space in its buffer for a whole line of text. It inserts a string of blanks into that newly created space and prints them on the screen. You type over the blanks.

If you need more space, the program adds another line of blanks when you try to type past the right edge of the screen. When you finish, delete the excess blanks.

As a fourth option, you can insert material from other places in your text using the block-move feature.

Deleting text is a pleasure with Typitall because the user-definable keys let you delete words and sentences with a single keystroke. You can also delete text in blocks.

Typitall can load ASCII files, and it saves text to disk as an ASCII file. However, when you load an ASCII file, Typitall doesn't correctly interpret the control characters. Instead of generating a line feed, a byte with a value of 0A is printed as a graphics block.

When Typitall saves text in ASCII, some special control characters accompany the text. Typitall marks the opening of a block with a hex byte of 17. In ASCII, that's the code for ETB, End Transmission Block.

More troublesome is the byte that marks the end of a block, 1B hex. That's the ASCII escape code. You can deal with this by finding and deleting

Langley-St.Clair Gets Mail

From unsolicited letters of testimonial

Gentlemen:

I don't often write letters of unbounded praise but the receipt of your amber CRT for my TRS-80 Model III has caused me to take pen (rather, computer) in hand....

The instructions were very detailed, well-written and delightful to read just by themselves. I've never seen clearer instructions for anything else and the touches of humor (which I presume were intentional!) made the CRT replacement a pleasure....

Well, I won't bore you with any more praise except to say I'm glad Radio Shack sold so many TRS-80's so that products like yours could be produced. It's nice to know we TRS-80 owners don't have to be totally at the mercy of Radio Shack to upgrade our pet computers.

D.K.
Tecumseh, MI

Dear Systems:

I received yesterday (you were very prompt) my amber CRT for my TRS-80 Model III and installed it this morning. I use my III mainly for word processing; this letter is a test run.

I am very pleased with the appearance of the screen. Your instructions for adjusting the display were excellent. The little program was great for centering the display. This is better than new....

Enough. Thanks for a fine product. What else do you make?

G.H.
Madison, WI

LSIS's NEW SOFT-VIEW REPLACEMENT CRT

FOR THE FULL STORY SEE PAGE 25

Langley-St.Clair Instrumentation Systems, Inc. #462
132 West 24th St., NY, NY 10011
1-800-221-7070

The Phone Line
Hwy. 11 South Trenton, GA
1-404-657-5104

RADIO SHACK:
(All equip is 100% pure RS)

Model 100, 8k ram	$ 650
Model 100, 24K ram	$ 850
Model 12, 2-drive	$3399
Model 4, 64K, 2-drive	$1699
THIS MONTH'S SPECIAL! 5 MEG HARD DRIVE	$1658
DMP-2100 printer w/cable	$1799
DMP-210 printer w/cable new new new	$ 750

All Radio Shack Software 10% Off
Call for other
LOW, LOW RS prices not listed.

Miscellaneous
All Eagles list come with "Spellbinder", "Ultracalc", CP/M & CBasic

Eagle IIE, 2-drive w/390k per drive	$1995
Eagle IIIE, 2-drive w/780k per drive	$2999
Eagle IVE, 780k floppy, 10 meg hard	$3999
Complete line of Eagle — Call for others —	
Televideo 803, 64k, 2-drive	$2495
ProWriter 8510 printer w/cable	$ 450
ProWriter 1550 printer w/cable	$ 799
Okidata ML-92P printer w/cable	$ 599
Okidata ML-80P printer w/cable	$ 399
Okidata ML-82PS printer w/cable	$ 499
64k CoCo ram, set of 8	$ 79
SuperPro keyboard	$ 69
FHL Flex system	$ 69
CoCo Drive #0 (R.S.) w/controller	$ 350
Box 10 Verbatim 5¼" diskettes	$ 29
Box 10 Verbatim 8" diskettes	$ 49
QUANTITY PRICING AVAILABLE ON DISKETTES	CALL!
5¼" flip file, holds 50	$ 25
8" flip file, holds 50	$ 35
5¼" flip-pak, holds 10	$ 5
8" flip-pak, holds 10	$ 6
Disk drive head cleaner kit	$ 12
9½" x 11" paper, 1250 shts, disaperf	$ 29
14⅞" x 11" green bar, 1500 shts	$ 33
ProWriter Ribbons	$ 6
J-Cat Direct Connect Modem	$ 125

Complete line of accessories —
CALL, CALL, CALL
(Prices subject to change.)
We accept American Express VISA MasterCard (Add 3%)

Send for more information and price list!

Name _____

Address _____

City, State, Zip _____

509

The Phone Line
Hwy. 11 South Trenton, GA
1-404-657-5104

the offending bytes. It's an inconvenience, but not a disaster.

Features

One of Typitall's tab commands lets you right-justify columns of numeric data anywhere across the page. Typitall has all the features you need to set, delete, and use tabs as you would on a typewriter. The position of all the current tab settings appears at the bottom of the screen.

Typitall includes commands for finding text strings, and for wild card and case-independent searches. You also have the option of replacing text with something else. You can specify a null string as a replacement. This gives you an easy way to find and delete rather than replace.

You can repeat other commands up to 255 times by using the Repeat command. For example, you'd use the command to move the cursor up one paragraph along with the Repeat command to move the cursor a specified number of paragraphs.

Typitall lets you deal with text fields wider than the 64 characters your TRS-80 normally displays. According to the manual, you can work with fields up to 240 characters wide, although I never went past 80.

Typitall has a Window command that lets you view the text by horizontal scrolling. If you want to deal with text in an 80-column format, you can see the whole width by moving the window left and right. This is essentially the same as vertical scrolling.

Horizontal scrolling also occurs when you reach the end of a line. I wasn't expecting it the first time it happened, and I thought the program had a bug. With no warning, the entire left column of my text disappeared.

As it comes, Typitall has a text width of 64 characters, so a great deal of one-column horizontal scrolling takes place. I reset the text width (the window value) to 63, which solved the problem.

Ten printable ASCII characters aren't on the TRS-80 keyboard. Typitall lets you generate these characters by using the control key with the 10 numeric keys.

Different printers treat these characters differently. Some print what you see on your monitor screen. Others print different characters, and some treat some of these characters as control codes.

Typitall has 11 user-definable keys. Seven of them are preprogrammed. For example, inserting more than one letter of text requires only one command. In this case the command is control-I, nicely mnemonic.

One feature I like in a word processor is the ability to delete entire words and sentences with a single keystroke. Although Typitall doesn't have this feature, I added it by programming two of the user-definable keys.

Once you've done this, you can save the new version of the program to disk so every time you load the program you'll still have the new features.

One of Typitall's files lets you customize the program with 37 options including screen width, printer defaults (19), cursor parameters, key repeat speed, and so on.

The status line at the bottom of the screen shows a lot of useful information: the position of the cursor in terms of line number and column, the current line's length, the text's width, the entire document's length, and the amount of memory left. Above the status line is another line indicating the tabs.

Another useful feature is the Transform command. It changes the case of all letters in a word from the position of the cursor to the word's end.

A Hyphenation command makes it relatively easy to hyphenate text for better justification. Typitall also has an easy way to remove all the hyphens if you want to reformat the text. In the test I ran, the program removed only the new hyphens; hyphenated words remained that way.

Printing Text

With Typitall, it's possible to view your text formatted before you print it. This saves me about 50 percent of the paper I'd normally use as well as a great deal of time.

You can view the material two different ways. One uses the monitor to show the text printed across the screen exactly as it appears on the paper. Since the screen is only 64 characters wide, this method has limited usefulness for some people.

In a second way of displaying formatted text, Typitall replaces each letter with a small graphics block. This allows a simulated text display that's 128 char-

acters wide. You can't read it, but you can get a good idea of what the text will look like.

Another command places the cursor at the beginning of the last page. This is useful for quickly testing the format values of a long document. The first time you try the command, it doesn't appear to work.

Before the cursor appears at the correct place in the text, you must display all the text in the graphics format. Then the real text reappears with the cursor in the correct place.

You can save formatted text to disk as well as print it. You can send a formatted text file from the disk to the printer.

You control the text format by setting the printer defaults with Typitall's customization program or by inserting printer commands in the text. This second option lets you vary the margins, line spacing, and so on in different parts of the text.

The customization process also lets you set up Typitall for many different printers by declaring a specific hex value for the printer's cancel, back space, and set-up codes.

You also have the option of controlling whether or not the computer sends a line feed with each carriage return. (Some printers need a line feed with the carriage return; some automatically supply one.) The choice of an offset value for graphics characters is something else you might need, depending on your printer.

Typitall supports headers and footers with automatic page numbering. This is the only part of the program that gave me trouble. The bugs in the header and page numbering commands are described in the section on problems.

The manual gives you some help in developing your own printer driver if you want to do so. This includes basic information about what the program must do, relevant addresses, and a listing of a skeleton printer driver. The skeleton driver isn't complete and won't work as listed; it's for guidance.

You need some skill as an Assembly-language programmer to use the material. Nonetheless, it's nice to see an author trying to make it easy for others to enhance his program.

Documentation

The documentation I received with Typitall came in two packages. The manual itself is 90 pages in a three-ring binder. Some of the explanations could be better, but the necessary material is there.

The manual doesn't have a general index, but it includes a command summary with page numbers listed for the commands. The summary uses non-standard notation for commands. For example, the down-arrow key is referred to as DWARW. This is more likely to bother old hands than neophytes.

You also receive 11 sheets of paper in a plastic envelope. The label reads "Reference Card," but these are more accurately described by the subtitle, "Summary of Typitall Word Processing System Instructions." If you have any experience with a word processor, these sheets contain all the information you'll need to get started.

The program disk also contains a number of help screens that you can call up. I've never found help screens as useful as referring to written documentation.

In this case, the screens were helpful to me mostly because they also appear in the back of the manual. However, if you like the screens, an included program lets you edit them to better meet your needs.

Problems

The first problem is that if a header block is too long, it won't print out correctly. According to the manual, the header "may not consist of more than 16 lines of text." In my experience, the allowable length is less than a line of text and three line feeds.

Also, although the manual shows a way to suppress the headers or page numbering, I couldn't get it to work. Since normally you don't want a header or page number on the first page, you have to treat the text as two files: the first page in one file and everything else in the other.

Every word processor I've used has had at least one minor bug. I can live with Typitall's but I do find them annoying.

If you like Scripsit, you'll probably love Typitall. Even if you don't like Scripsit, you should at least look at Typitall before buying another word processor. It's one of the two best for the TRS-80. ■

Continued on p. 68

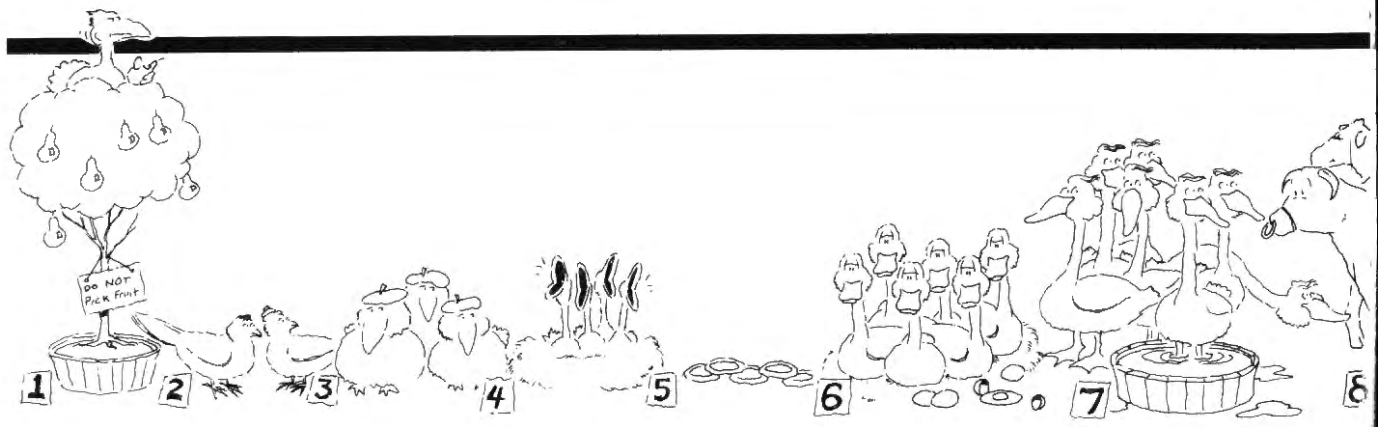
ADD
CHANGE
DELETE
SORT
SELECT
SAVE
PRINT
COMPUTE
REPORT
MERGE

$20.00

Why would SofTrends offer its award-winning AIDS-III data management system to the general public at a tiny fraction of its original price? The same version featured in the two-part series, "Inside AIDS-III" (80-MICRO, March & April, 1983)? Simple. To acquaint you with the best, little software-publisher in the business. To order, call (216) 289-2002 and use your VISA/Master Card. Or send your check or money-order for $20 (shipping included!) to SofTrends, Inc., 26111 Brush Ave., Euclid, OH 44132. Sorry, no C.O.D.'s or P.O.'s accepted for this special offer.

492

SOFTRENDS



Stretch the Twelve Days of

Give a gift subscription to **80 Micro** today and relax . . . you can't find a better gift for active computerists. Every issue gathers together the latest programs and projects for Radio Shack's personal computers, business computers, and portables. Your favorite computerist will be busy year round with:

Powerful Utilities—save time and effort and do more computing than ever before. Recent issues have included ways to improve Electric Pencil*, a program-to-program data transfer, and a cassette operating system.

Programming Techniques—learn how to program and spend less on software. Pick up a second language for special applications. Get faster results with machine-language subroutines . . . the monthly column "The Next Step" shows how.

Hi-res Graphics—make better business presentations with fancy printouts. Illustrate games with eye-catching details. Create unique 3-D art. It's all possible with articles on advanced graphics techniques.

Business Applications—increase office efficiency. Learn the business models' different capabilities. And keep abreast of developments for the Model 100* with reviews, applications, and utilities in "C•Notes."

Exciting Games—enjoy arcade games, adventure games, and simulations. Use the program listings to add features to other games. Or record high scores in "The Gamer's Cafe."

Two-way Communication—get definitive answers to technical questions in "Feedback Loop." Respond to articles, editorials, and news with "Input." Or submit an article for publication. **80 Micro** is a forum for ideas, not a one-way street.

"News" & "Remarks"—discover the latest industry trends and how they'll affect consumers. Learn about new services or novel applications. And get the inside story with publisher Wayne Green's outspoken editorials.

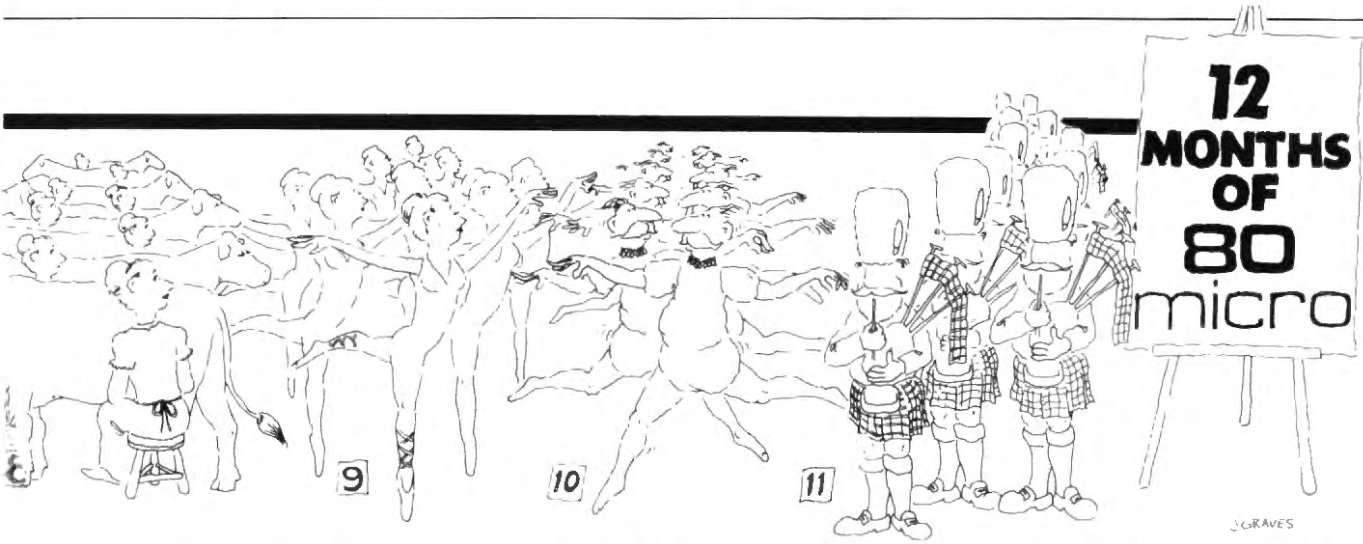
Home and Hobby—break the ice at a party with a singing computer. Or make electronics projects easier with a circuit-board scanner. Whatever the subject, there's always something of use in **80 Micro.**

Buyer's Guides—comparison-shop from home and save hundreds of dollars. Get all the facts on graphics software, printers, utilities, disk drives & disks, and more.

Candid Reviews—use "Reviews" and "Review Digest" to find out a product's strengths and weaknesses *before* it leaves the store.

80micro®

the magazine for TRS-80 users*



Christmas into Twelve Months

Know all about the latest releases with "New Products." Now every purchase can be a sound investment.

Hardware Projects—get quality equipment and hours of fun in the shop. Build a Model II* capacitance meter. Diagnose acoustic couplers. Or repair digital circuits. Customize any system to meet specific needs.

In-depth Series—become a local expert in any field. Learn computer cryptology, or how to use data files. Give the Model I/III* color capability. Discover APL, Assembly, Lisp . . . and more.

Give a gift subscription to **80 Micro** today and relax. Why hassle with holiday crowds and pushy salesmen when you can avoid the last-minute rush? Christmas shopping has never been easier.

Just fill out the coupon or the attached card and return it now to **80 Micro** Subscription Department, P.O. Box 981, Farmingdale NY 11737. A full-year subscription is only $35.97. That's a savings of 27% off the newsstand price . . . and convenient home delivery is FREE.

Give **80 Micro**. Your favorite computerist will thank you again and again and again.

** Electric Pencil is a registered trademark of Michael Shrayer.*
** TRS-80, Model-100, Model II, and Model I/III are registered trademarks of Radio Shack, a division of Tandy Corp.*

Dear Santa, I want to give a year's subscription to 80 MICRO for the Holidays (12 issues for $35.97).

☐ Check enclosed
☐ MC ☐ VISA ☐ AE ☐ BILL ME

CARD # _____

Expire Date _____

Signature _____

My Name _____

Address _____

City _____ State _____ Zip _____

Please enter a one year gift subscription to:

Name _____

Address _____

City _____ State _____ Zip _____

U.S. $35.97, 1 year only.
Canada & Mexico $44.97, 1 year only U.S. funds drawn on U.S. bank.
Foreign Surface $54.97, 1 year only U.S. funds drawn on U.S. bank.
Foreign airmail please inquire.
All gift subscriptions begin with January 1984 issue.

80micro
the magazine for TRS-80 users

PO Box 981
Farmingdale, NY 11737

63AB8

Continued from p. 65

★★★

TRS-80 Data Communications Systems
Frank J. Derfler, Jr.
Prentice-Hall Inc.
Englewood Cliffs, NJ 07362
$12.95

by Alan Neibauer

TRS-80 Data Communications Systems is an attempt at a comprehensive manual for TRS-80 users interested in communications. Its author, Frank J. Derfler, Jr., is also the author of a data communications textbook and a magazine column on the subject.

Consequently, the book is technically complete. However, in a few areas, *TRS-80 Data Communications Systems* falls short of the guidebook many novice networkers need, and might not serve as their first reading in the area.

Some of my criticisms disappear for a more advanced audience. Those with Assembly-language programming experience and some technical knowledge might find the first few chapters extremely useful. The second section of the book, largely reviews of communications hardware and software, has some pitfalls for beginners and experts.

The book's first chapters discuss communications basics, including important definitions and theory. The first chapter reviews the role of data communications in today's world, while the second outlines the fundamentals of serial data and coding methods.

Chapter 3 focuses in detail on the Model I serial port. The chapter is technically impeccable, but somewhat too technical for a beginner. It thoroughly discusses the functions of the serial port and its configuration by both software and the sense switches. It is a far more complete review of the serial port than in most popular books.

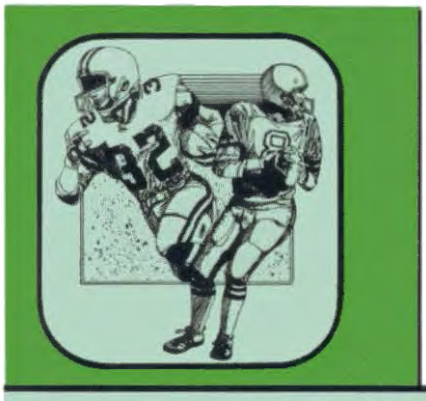
While the discussion clearly refers to the Model I, it contains no cross-references for the Model III user. It's impossible to determine whether any of the material could apply to the Model III.

Chapter 3 concludes with a short Assembly-language terminal program—a nice gift assuming that the reader knows how to program it into the computer. No instructions help you to enter the code using an assembler or debugger, or show you how to use the program.

Chapters 4–11 are reviews of communications hardware and software. Chapter 4 covers various types of modems, while Chapter 5 reviews terminals. Both are good discussions for the beginner. The author wisely defines *full duplex* and *half duplex* early in Chapter 4 so reviews of communications standards make sense.

Chapter 6, "Using the TRS-80 as a Terminal," should have been the heart of the book. The novice would be interested in complete reviews of hardware and software, particularly Radio Shack modems and the Vidtex package sold to communicate with CompuServe.

The review of Radio Shack's Modem I and Modem II is just a photo caption. The chapter covers only the Lynx and Microconnection modems in detail and omits reviews of specific acoustic mo-



PIK'EM
1983

67%
ACCURATE
AGAINST POINTSPREAD
1982 SEASON
INCLUDING
AN OUTSTANDING
13 OF 15
PLAY-OFF GAMES

ORDERS CALL COLLECT
PHONE LINES OPEN 24 HOURS

VISA C.O.D. MasterCard

NAME _____
ADDRESS _____
CITY _____ ST _____ ZIP ____
PIK'EM 29⁹⁵ ☐ STAT SER 35⁰⁰ ☐
MI ☐ MIII ☐ APPLE ☐ IBMPC ☐
VISA ☐ MC ☐ PAY ENC ☐
CARD EXPIRES

A COMPLETE PRO FOOTBALL PREDICTION PROGRAM
FOR THE 1983 NFL SEASON—INCLUDING PLAY-OFFS
★ ★ ★ ★ ★
*20 MIN DATA INPUT PER WEEK WILL GIVE YOU
THE EDGE

$29.95

INCLUDES: DISC
DOCUMENTATION

TRS-80 MODEL I / III
IBM PC
APPLE
REQUIRES 32K

*STATISTICS NEEDED TO RUN THIS PROGRAM ARE AVAILABLE IN LOCAL NEWSPAPERS
OR:
MARATHON WILL FURNISH ALL NECESSARY STATS IN AN EASY TO READ ONE PAGE FORMAT FOR 19 WEEKS.

STATS ONLY $35⁰⁰

— FEATURES —
- DISPLAYS PREDICTED SCORES 219 GAMES
- DISPLAYS ACCUMULATED STATS/TEAM
- DISPLAYS AVERAGE STATS/TEAM
- HARDCOPY PRED — STATS — AVE
- AUTOMATIC OPPONENT INPUT
- AUTO STORE DATA — NO 'SAVE'
- UPDATEABLE FOR 1984

IF PROGRAM IS BOUGHT AFTER SEASON STARTS — ALL PREVIOUS STATS NECESSARY TO UPDATE WILL BE INCLUDED — NO CHARGE.

OTHER PROGRAMS
• PIK'EM 1984 FOR USFL •
• HOME BUDGET PLANNER •
• LETTER WRITER •

Marathon Software Dept M
P. O. Box 1349
Jacksonville, Texas 75766
Phone (214) 586-8212 241

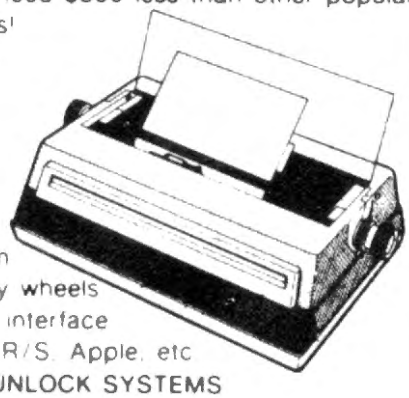
DAISY WHEEL

New Smith Corona TP-1

True letter quality printer for less than the cost of an office typewriter! Priced $500 less than other popular daisy wheel printers!

SALE PRICE:

$459



FEATURES:

- ★ Friction feed
- ★ 15 cps 120 wpm
- ★ Changeable daisy wheels
- ★ Parallel or **serial** interface
- ★ Compatible with R/S, Apple, etc

SUNLOCK SYSTEMS
4217 Carolina Ave
Richmond, Va 23222

456

ADDITIONAL PRINTER SPECIALS

Epson		Okidata		Gemini		C.Itoh	
RX80	$329	82A	$399	10	$319	8510AP	$399
80FT	429	83A	639	10S	409	1550P	699
FX80	559	92	499	15	469	F10-40	1149
FX100	739	93	849	15S	559	F10-55	1595

WE WILL MEET ANY ADVERTISED COST IN-STOCK

TO ORDER CALL TOLL FREE 800-368-9191

In Virginia call 804-321-9191

We accept MasterCard, Visa and CODs

VERSADBM

TRS-80 Models I, III, IV

VERSATILE DATABASE MANAGER SYSTEM!
COMPLETELY USER-DEFINEABLE!
MULTI-DRIVE CAPABILITY! VERY USER FRIENDLY!

SPECIAL FEATURES:	* SINGLE KEY COMMANDS AT MOST PROMPTS ! * SINGLE KEY REPEAT ENTRY OF DATA ! * ON SCREEN EDITING AND UPDATING OF ALL DATA ! * COMPLETE ERROR TRAPPING FOR EASY DATA ENTRY ! * COMPLETE DATA STATUS UPDATE FOR INSTANT VIEWING ! * WRITTEN IN BASIC FOR EASY MODIFICATION ! * DATA FILES CAN SPAN UP TO 8 DRIVES 5" 8" HARD DRIVES !
DATA:	* NUMBER OF FIELDS—1 TO 18 FIELDS ! * LENGTH OF FIELDS—1 TO 40 CHARACTERS ! * TYPE OF FIELD DATA—ALPHA OR NUMERIC ! * FIELD TITLES USER-DEFINABLE—1 TO 18 CHARACTERS !
REPORTS AND LABELS:	* USE AS MANY OR AS FEW FIELDS AS DESIRED ! * DEFINE PRINT POSITIONS FOR ALL FIELDS ! * START AND END PRINTING WITH ANY RECORD YOU DESIRE ! * SELECT BY ANY OF SEVEN SELECTION CODES ! * SELECT RECORDS BY ANY OR ALL FIELDS ! * SORT BY ANY FIELD !
CAPACITIES:	DEPENDING ON SYSTEM CONFIGURATION- 100 BYTE RECORDS MODEL I, 4 DRIVES = 3000 RECORDS ! MODEL III, 2 DRIVES = 3000 RECORDS ! 5 MEG HARD DRIVES = 50000 RECORDS EACH !
HARDWARE REQUIREMENTS:	TRS-80 MODELS I, III, IV—48K, 1 TO 8 DRIVES 132 CHARACTER OR COMPRESSED PRINT PRINTER !

INTRODUCTORY PRICE ONLY $39.95

ONE OF THE BEST DATABASE MANAGERS FOR TRS-80'S AVAILABLE TODAY !

TRS-80 tm Tandy Corp

ORDER NOW !

SHIPPED U P S WITHIN 24 HOURS OF RECEIPT OF ORDER !
MONEY ORDER—CASH—CHECK (TWO WEEK DELAY)
C O D 'S, ADD $5.00 CA RESIDENTS ADD 6% SALES TAX

TREESOFT SOFTWARE COMPANY
6529 PEMBA DRIVE
SAN JOSE, CA 95119
(408) 224-8609

22

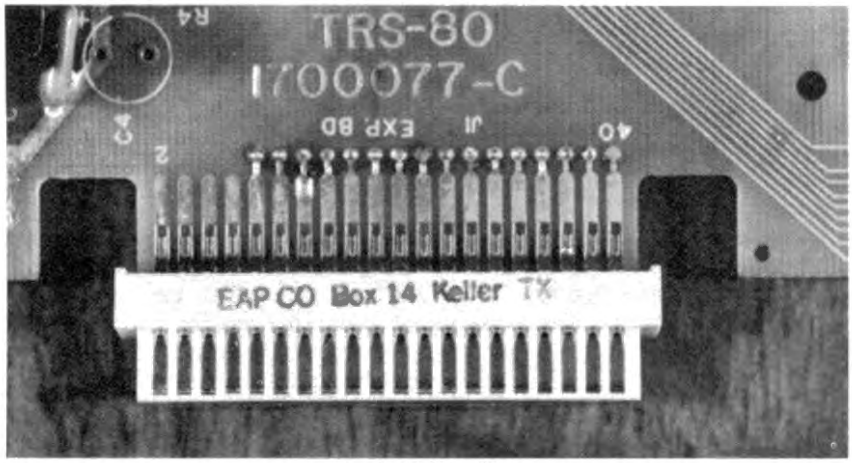
Gold Plug - 80

TRS - 80 MOD I, MOD III, COCO

Ahhhh, instant relief! At last there is a permanent cure for contact oxidation on Model I edge connectors. Many TRS-80 users are familiar with the symptoms: untimely resets, spontaneous reboots, or the inability to get the computer started at all without a frustrating session with a pink eraser.

The Gold Plug 80 is a well made device consisting of an edge-card plug with gold plated contacts, available with either 34 or 40 contacts. The rear of the plug has terminal tabs which fit exactly over the existing foil fingers on the TRS-80's connectors. After installation, the original plugs have been extended about a half inch, meaning that the plastic door covers no longer fit. This did not trouble me, but you should take it into consideration. E.A.P.'s advertising leaflet, by the way, cautions you about the doors, which is refreshing. They also have the excellent policy of permitting you to return any plugs ordered for a refund if after seeing them you are unwilling to undertake the installation.

An excellent set of instructions accompany the plugs, and they are shipped promptly. I ordered mine by mail on a Monday and received my set of plugs by first class mail on Tuesday of the next week.



The Gold Plug 80

Installation

Installation requires a soldering iron (I use a 40-watt Weller), Rosin-core solder, a Phillips screwdriver, and your last Pink Pearl. The keyboard and Expansion Interface have to be disassembled to get at the connectors, which are then cleaned—the eraser's last fling. The Gold Plug 80 is fitted over the existing plug with the contacts centered, and then soldered to the board. I have some soldering experience, but it proved to be an easy, safe job. The contact is heated, a very small amount of solder applied, and then you go on to the next contact. It took about an hour to do all six plugs.

GOLD PLUG 80 Mod I (6)	$ 54.95
Keyboard/EI (mod I)	18.95
Individual connectors	9.95
COCO Disk Module (2)	18.95
Disk Drives (all R.S.)	9.95
Gold Disk Cable 2 Drive	29.95
Four Drive Cable	39.95
GOLD PLUG 80 Mod III (6)	54.95
Internal 2 Drive Cable	29.95
Mod III Expansion port	10.95
USA shipping $1.45	Can/Mex $4.
Foreign $7.	TEXAS 5% TAX

GOLD PLUG 80-E.A.P. COMPANY 216
P.O. Box 14 Keller, TX 76248 (817) 498-4242

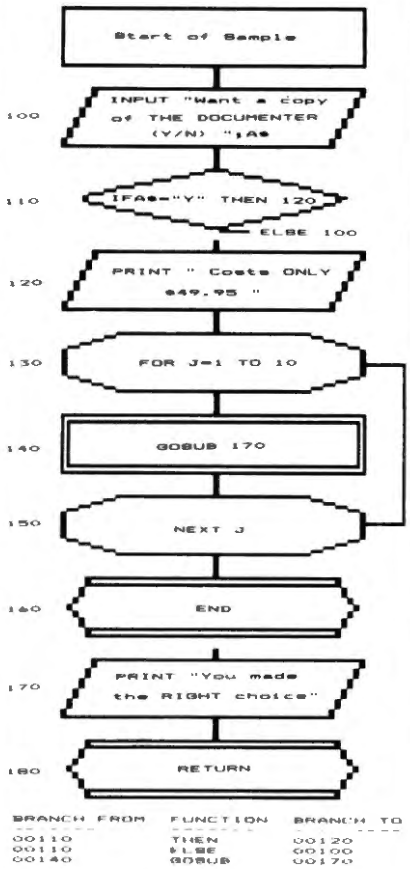
E.A.P. CO.
P.O. BOX 14
KELLER, TEXAS 76248
(817) 498-4242 MC/VISA

See List of Advertisers on Page 323

ADVERTISEMENT

Reprinted by permission of *80 Micro*, copyright 1982.

GET THE
DOCUMENTER
A MACRO UTILITY FOR YOUR MICRO



Have your computer produce its own flowchart with **THE DOCUMENTER.** Program logic is graphically displayed to your screen or printer. Uses include flowcharting basic, debugging programs, and a learning aid. Sorted Branch maps are also produced. Particular versions have worked on all "work-alike" equipment and operating systems.

If documentation is a problem for you,
BUY THE DOCUMENTER.

All version **$49.95** plus **$2.05** for shipping and handling. (Ga. res. add 4% sales tax.)

- ☐ Apple II/II+/IIe, APPLEDOS
- ☐ CP/M, Del. on 8 in. SSSD Disk
- ☐ IBM PC, DOS
- ☐ TRS-80 I/III/IV Disk
- ☐ TRS-80 I/III/IV Tape
- ☐ TRS-80 II/12/16

Memory Size _____

Name _____

Address _____

City _____ ST _____ Zip ____

☐ Master Charge ☐ Visa

Account No. _____

Expiration
Bank No _____ Date _____

Signature _____

PSONUT Software ✓542
P.O. Box 490, Dept. 102
Lilburn, Georgia 30247 — (404) 469-0056
Dealer Inquiries Invited

dems. It discusses software in a little more detail, but the novice would still be unprepared to make a wise purchase decision after reading the chapter.

Chapter 6 doesn't discuss relative buffer sizes, specific commands available, or whether software supports upper- and lowercase on unmodified Model I's. It also neglects the features of Radio Shack's own terminal program, sold with the Vidtex package.

This key chapter contains no discussion of communication problems, and no troubleshooting section outlining possible glitches in hardware, software, or phone lines. A few hints on testing the serial port or understanding garbled transmissions would be useful, as would a discussion of communication between computers.

Finally, the chapter doesn't cover much of the available software for the Color Computer. This might not be the author's fault, however. Production schedules are sometimes long and most available CoCo software might be too new to have made the publisher's deadline.

Chapter 7 is a brief discussion of Model II communications, mentioning only the TRSDOS terminal program and Microstuf's Crosstalk at any length. The chapter will be a disappointment to any Model II, 12, or 16 user looking for help making software decisions.

Chapters 8, 9, and 10 discuss message systems, communications for the deaf, and large-scale networks, respectively. The author gives only brief overviews of the topics.

Chapter 8 includes a more detailed example of an electronic message system, including commands and control codes. The author states that there's "no formal standard," but demonstrates a "typical" series of commands. While the discussion is meant only as an example, I'd like to know from which system the author took the example.

The book concludes with a chapter on the future, a useful appendix of supplier addresses, and a nice glossary.

While *TRS-80 Data Communications Systems* contains a good deal of useful technical information, the author doesn't seem to have defined the audience he's trying to serve.

The novice might find the early chapters difficult to understand and the concluding chapters incomplete. The experienced user might enjoy the technical discussions but already have knowledge beyond the brief reviews that follow. ■

★★

Project Manager
Tandy/Radio Shack
One Tandy Center
Fort Worth, TX 76102
Catalog #26-1580
Models I and III
48K, two disk drives
$99.95

by Jeff Kreinbring

Project Manager is part of Radio Shack's manager series of software that's designed to help you plan and implement a project so that it gets done in the most efficient manner possible.

It asks you to list all the tasks associated with a particular project, pinpoints priority tasks for timely project completion, and suggests ways to coordinate those tasks. It also promises to increase your productivity by helping you manage your time and personnel.

While the program's intentions are good, it falls flat in clearly defining its goals and illustrating ways to implement them. The concepts the program tries to cover are nebulous and will confuse people who lack project planning experience.

The package comes in the usual brown padded binder with a 74-page manual, planning worksheets, and a registration card. It includes four disks, a program and data disk each for the Models I and III. Radio Shack recommends that you use a printer with graphics capabilities.

The Program

You boot the system with the Project Manager disk in drive zero. You can't insert the data disk in drive 1 until you receive the prompt to do so. Pressing the enter key displays the highest-priority project level for the data disk. The top level is essentially an index that shows a formatted record for each project on the disk.

You enter tasks for a project by positioning the screen pointer on the project record and pressing the enter key. This

MULTI-USER SOFTWARE

PACKAGES AVAILABLE FOR **TRS-80 MODEL 16**

$500.
per package

Available for TRS-80 Model 12 & Model 11 Single user

- General Ledger
- Accounts Payable
- Accounts Receivable
- Payroll
- Inventory / Invoicing
- Job Costing

1-214-341-9874

THE PROGRAMMER & ASSOCIATES INC.
10802 Forest Lane, Suite 110
Dallas, Texas 75243

↙248

CONVERT MOD III BASIC TO MOD 4

Good News! The Model 4 is twice as fast as the Model III.

Bad News! Model III disk BASIC programs only run at half speed on the Model 4.

Best News! **"CONV3TO4"** will automate many of the changes required to convert Model III BASIC programs to Model 4 BASIC. Your Model III BASIC programs will run twice as fast as they do now, and your manual conversion efforts will be vastly reduced.

In minutes this powerful utility can insert all required spaces, recalculate PRINT@ addresses, adjust TAB ( ) addresses, insert correct exponentiation symbols, and flag and list unresolved line numbers.

Other options enable your programs to run even faster - remove REM's, comments, down arrows, and unnecessary spaces.

Or, format your programs and make them easier to read and debug - insert down arrows and indent between multiple instructions, IF, THEN, and ELSE statements.

I agree. It's foolish to run my Model III disk BASIC programs at half speed on the Model 4. Send me **"CONV3TO4"** today! Enclosed is my check/money order for $49.95 plus $2.00 for shipping/handling (N.J. res. add 6% sales tax)

NAME: _____

_____

STREET: _____

CITY: _____ STATE _____ ZIP _____

EDUCATIONAL MICRO SYSTEMS, INC.
P.O. Box 471, Chester, New Jersey 07930
201-879-5982

↙85

TWO PRINTERS?

TWOPRINT™; the Smartest Buy for Making the Most of Both of Your Printers!

$99.95

(Option available for 3 or more printers — call for details)

- Hard select of desired printer with toggle switch. Software select mode via CHR$(1) or CHR$(2)
- A red or green light indicates selected printer
- "Centronics" compatible
- TWOPRINT fits the following: MOD I, II, III, IV, 12 & 16 (Please specify as some require changes to your cables)
- Requires purchase of Radio Shack P/N (270-1552 UL Approved) Battery Eliminator

BUY THE BEST!* HARDWARE CLOCK

TRSWATCH I, III & IV™

From the original creator of the TCHRON & TIMEDATE 80.

*WE DELIVER . . . for over TWO YEARS!

- A Precision, Highly Stable Clock. Time Proven for over 2 years
- Includes factory supported Software on Disk or Tape, a $39.95 value!
- Fully enclosed — Cable prevents breakage when MOD III/IV is tipped up
- For LNW, Hard Disks, MOD I, MOD III, or MOD IV (specify)
- Requires 2 AAA cells for 3 yr. life
- Applications Program Support is growing. Full support by "TBBS" V1.2

$99.90

Check or Money Order
Visa or MasterCard accepted

California residents add 6½% Sales Tax

CALIFORNIA WORD EXCHANGE
802 E. Lime • Monrovia, CA 91016
(213) 443-5866

↙64

AVAILABLE FOR IMMEDIATE SHIPMENT

— DEALERS PLEASE CALL —

moves you to the first task level.

Here you enter the major tasks of that project, specifying a title for each one, a description, the anticipated duration, preceding and succeeding tasks, resource codes, and a code that lets you interface the Time Manager program (if applicable). The three sample projects included on the data disk give you an idea of the scope of tasks assigned on this level.

You create project tasks by progressing downward through the many levels in an inverted tree structure. From any one task on the first level (task 1A), pressing the enter key moves you to the level below where you can enter more specific tasks under 1A (1A1, 1A2, and so on). The program claims to allow as many as 64 levels below the project level, if you care to go that far.

The manual shows how to set up a task structure with a top-level project: constructing a house. Level 1 tasks under that project include lot clearing, carpentry, finishing, and masonry. The masonry task lists subtasks on level 2 as footers and foundation block.

Further subtasks on level 3 include excavate, mix concrete, and pour concrete. You can further break down each of these to whatever level of detail you desire.

At each level in the project structure, single keystroke commands prompt you to define a task, then edit individual task elements. After you input the data for each task, Project Manager calculates the task and project duration, slack time, and total resource use based on the resulting task relationships.

It also graphically represents the program's results by generating critical path, Gantt, PERT (program evaluation and review technique), time, task, and resource charts.

If something changes during the project, edit individual task elements and let the program compute a new critical path. Since you can replicate and use again any part of a project or an entire project, project modeling is possible.

Single keystroke commands display the charts and graphs as the critical path is computed. The charts show the task title, description, and duration. To print the charts from the screen, use the print and plot commands.

Critique

Project Manager is a complex and ambitious program. It performs as advertised, but I doubt that busy managers will go through the gyrations the program requires to achieve results.

I found the program to be agonizingly slow. Every action requires disk access, even moving between tasks on the same level. Each additional task within a level adds additional time for access. Project Manager is especially hard on your disk drives.

I was disappointed at the amateur quality of screen displays. Task data and the command menu prompts tend to run together, and no effort is made to use graphics characters for spacing or lowercase letters for field labels. I expected more polish for a program of this price.

The screen size severely limits the output data charts. The screen formatted output is inadequate for the program; printer formatted output is obviously necessary.

If one screen can't accommodate an entire chart for that task level, the print command gives successive screen prints to complete the chart, each on an 8½- by 11-inch page. Hardly professional looking or easy to read.

Project Manager prints only the first 15 characters of a task description, so the charts are always cryptic if you don't plan for this. The plot command substitutes graphic blocks for asterisks on some of the charts, but I couldn't get this to work on the screen or my printer. No one chart can give you a summary of key dates, durations, and resources for all tasks.

The program is difficult to use because changes to task elements that change the critical path on one level don't automatically generate task duration/critical path changes on higher levels. A change near the bottom of a large structure requires you to spend time progressing upward to recalculate each critical path before the effect on the total project is clear.

The rigidity and detail necessary for each task input to get any meaningful output would discourage the most pa-

Can your VisiCalc® Sort?

Sort the rows or columns of a VisiCalc spread sheet.

Date	Contribution	
2/05/83	$225.00	Jones,
2/09/83	$450.00	Billings, J.
2/11/83	$1,500.00	Mares, P.
2/15/83	$390.00	Davis, N.
2/19/83	$2,000.00	Franks, B.
2/23/83	$945.00	Howard, R.

ORIGINAL

It can with VIS\Bridge/SORT™ from Solutions, Inc.

The sorted spread sheet still contains all the formulas and values from the unsorted original. Use up to 4 additional keys to break ties or specify secondary sorts. Each key may be alpha or numeric and either ascending or descending.

Date	Contribution	
2/19/83	$2,000.00	Fra
2/11/83	$1,500.00	Mares,
2/23/83	$945.00	Howard, R.
2/09/83	$450.00	Billings, J.
2/15/83	$390.00	Davis, N.
2/05/83	$225.00	Jones, R.

SORTED BY $ AMOUNT

VIS\Bridge/SORT is available for the Apple® II + and III, the IBM PC™ and the TRS-80® I, II/12/16, and III. $89 plus $4 shipping and handling from Solutions, Inc. Order 802 229 0368. 97 College St., Box 989, Montpelier, VT 05602. Mastercard and Visa. Dealer inquiries welcomed. Also available: VIS\Bridge/REPORT™ for $79 and VIS\Bridge/DJ™ for $445.

276

VIS Bridge products are trademarks of Solutions, Inc. VisiCalc is a trademark of ... TRS-80 is a trademark of Tandy Corp. IBM PC™ is a trademark of IBM Corp. Apple® is a trademark of Apple Computer, Inc.

tient and methodical project manager. It certainly discouraged me.

The documentation is the best part of this package. The manual has no index, but the table of contents is adequate. The glossary of key terminology for the critical path method is helpful.

The manual is well illustrated with sample screens that lead you through the tasks supplied on the disk. The text makes constant mention of a reference card included, but I didn't have one with my manual, or in the manual I perused before buying the program at Radio Shack.

I'm left with the feeling that I'd indeed need a project plan if I again attempted to use Project Manager. ■

★★

Clean Slate
Advanced Operating Systems
450 St. John Road, Suite 792
Michigan City, IN 46360
Models I and III
One disk
$79.95

by Dan Robinson

Clean Slate is a word processor that you'll either love or hate.

Two main features set Clean Slate apart from other word processing programs. First is that each page of the document is written separately to disk as it's completed. Second, Clean Slate tries to display text on your screen as nearly as possible to the appearance of the printed page.

The Program

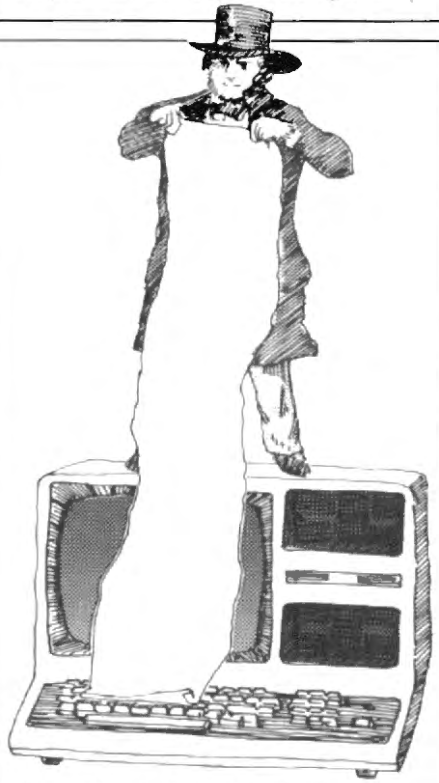
If you live in an area where you're often groping for a candle, you'll appreciate that all but the page you're currently typing is safely written to disk. A power outage won't affect the stored material.

On the other hand, without a speedy Winchester hard disk, you'll find yourself waiting 10 to 15 seconds for Clean Slate to write each file to disk and read the next one while moving from page to page. This delay is rather bruising to the thought process.

When a page is full, the program won't accept any more characters. You must back up and chop a bit off your text or decide to extend the page beyond its normal length. Then you have to write the page to disk before you can continue.

If you decide to add a line to your first page, you have a big job ahead of you. You must take the last line of each page out of limbo and add it to the next.

A display tailored to the printed page is a plus if you have tricky formats filled



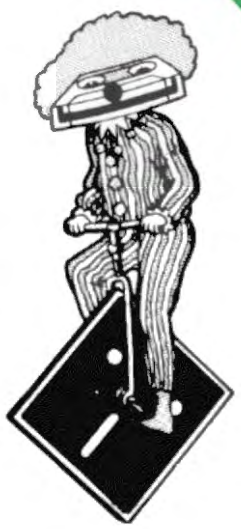
with tables or indented outlines. Top, bottom, left, and right margins appear as they will on paper in a what-you-see-is-what-you-get approach.

The program uses windowing to present long lines of text on the TRS-80's 64-character screen. Scroll sideways to bring the rest of the text into view.

You can set both horizontal and vertical tabs to display columnar data just the way you want it. If you intend to right-justify the text as it's printed, the program automatically adds spaces to the display. To reduce clutter, Clean Slate doesn't display graphics markers to show carriage returns and form feeds, although graphics tokens for items like boldface and underline do appear.

One of Clean Slate's best features using a formatted screen is that you can create two-column text. You can format the data into narrow width, then move the last half as a block alongside the first.

There's a price to pay for the for-



COMPUTING IS EXCITING . . .

Get the Greatest Software Deal on Earth! A subscription to **CLOAD** gets you a tape or disk full of quality programs delivered by First Class Mail every month! Write for more information or, better yet, try a Back Issue. At $6.00 for 6 to 8 programs on tape ($11.00 on disk), you'll see just how good and inexpensive **CLOAD** software can be.

The Bottom Line:	**Tape**	**Disk**
1 year (12 issues)	$50.00	$95.00
6 months (6 issues)	$30.00	$55.00
Back Issues	$ 6.00	$11.00
Good Games #1	$12.00	$22.00
Good Games #2	$12.00	$22.00
Adventures #1	$12.00	$22.00

Calif. residents add 6% to single issues. First Class postage to N. Amer. included. Overseas add $10 to subscriptions and $1 to single issues. Sent AO rate. Most back issues from Oct. 1978 for tape and Oct. 1982 for disk available: ask for list. (Level I issues also available)

CLOAD MAGAZINE INC.

103

PO Box 1448 Santa Barbara, CA 93102
(805) 962-6271

SERIAL PORT EXPANDER AND MORE

BTA's MODEL 524 MULTIPORT CONTROLLER is a code activated one to four serial port expander — but that's not all since it has separate and independent UARTS, buffers and handshaking each port can operate with a different configuration, i.e. different baud rates, stop bits, etc. These features also permit two or more devices to communicate with the 524 simultaneously.

Full duplex with EIA RS-232 protocol

Baud rates up to 19,200

Expansion to 16 ports by cascading

Peripheral ports may be configured by user software

One year warranty

- **MODEL 524 . . . . . $249.00**
- **MODEL 524A $279.00**
  same as model 524 except has 256 byte rx/tx buffers per port
- **MODEL 524 D $269.00**
  same as model 524, plus continuous polling of each peripheral device for data transfer requests. The device is automatically connected when its 'turn comes up . ON, BUSY and OFF messages are sent to the peripheral device.
- Other models available — Contact us or your dealer for additional information.

BAY TECHNICAL ASSOCIATES, inc.
HIGHWAY 603, P.O. BOX 387
BAY ST. LOUIS, MISSISSIPPI 39520
(601) 467-8231

243

matted screen—none of it is automatic. If you want right justification or you change the line length, you must command reformatting one line at a time.

If you add a word to a formatted page, you have to march through each line of text to set things right. Since all Clean Slate's keys repeat, this isn't as tough as it sounds, but it's still a bigger chore than if you could use a single command.

You need to watch out for a few bear traps when Clean Slate adds spaces in the justification process and then removes some of them during a reformat. The program is written to insert two spaces between sentences and ensure that they are there when the sentence ends with a period. However, sentence endings such as a question mark require manual spacing.

Otherwise, Clean Slate is a word processor with all the standard features and a few extras. The clear key, used in conjunction with letter keys and their shifted counterparts, provides a wide range of commands.

The arrow keys move the cursor up, down, left, and right. When the cursor reaches the right margin, it windows the text of a long line into view. Control-left or right arrow also moves the screen window. A shift-left or right arrow tabs forward or backward, or moves one word if you've set no tabs.

A shift-up or down arrow moves to a vertical tab position. If you've set none, they move the cursor to the beginning or end of the page—whether any text is there or not. A control-up or down arrow saves the current page to disk and loads the previous or next one.

Clean Slate uses wraparound, so you don't have to be conscious of a line's end. Specify a Hot Field width to cause a flashing message when a word exceeding a specified length reaches the right margin. Then you can choose to hyphenate the word to keep an even margin or let it carry over to the next line.

Overtyping is the normal correction method, and a standard combination of control-D deletes a character. Insertions are a bit different: Control-I inserts a single space at the cursor location. You can also insert text by using control-E to split the line. Make the insertion, then use control-M to merge the lines together again.

You can insert or erase entire lines or pages. Clean Slate lets you append a text file to the current page, or write the page you're working on as an external file for another document to use. You can mark blocks of text and then insert them at another location on the page, delete them, or overwrite them with blanks.

You can also center text. If your printer supports it, Clean Slate can backspace to overstrike letters and create hybrid characters.

Features

Clean Slate has a string search function with an optional replace. You can set the match to ignore upper/lowercase differences, and you might decide to have a Yes/No prompt at each replace. Like other Clean Slate functions, search/replace is confined to the current page.

An unusual feature of Clean Slate is its glossary function. You can define keys as a string of characters or control functions, and enter them with control-G and the programmed key. The program saves these glossary key records in another file together with header/footer information and loads them into the current page as called.

You can write one header and one footer per document and store them for later use, but you must reset the page length to account for them.

The top line of the display is reserved for Clean Slate prompt messages. Normally, this location shows the page and line numbers and the character location of the cursor. You can also toggle it to show a ruler (in inches), or a line that displays the margins and tabs. The top of the screen also contains prompts, abbreviated menus, and error messages.

Clean Slate can redefine control keys or the entire keyboard if you happen to favor the Dvorak over the QWERTY arrangement. The program supports keyboard input during printing and has a limited form-letter capability.

Clean Slate devotes much of its code and control functions to modem operation so you can send and receive your text files over phone lines, edit them, and then print them.

Documentation

Clean Slate has documentation to spare. The main, spiral-bound volume contains 382 pages of instructions for the program and includes the Clean

RIBBONS

TOLL FREE
800-327-9294

"Everything Your Computer Needs"

PRINTER	RIBBONS EZ RELOAD	CARTRIDGES
RADIO SHACK PRINTERS Daisy Wheel II Black Brown/Blue/Red LP I-2-4 LP 3 & 5 LP 6 & 8 (DMP 400) DMP 200 DMP 500 EPSON/BM MX 70/80/80/F/T MX 100 OKIDATA 80-82-83 CENTRONICS 700/730/737/739/779 ZIP PACK CITOH 8510	10 For $24.95 6 For 24.95 4 For 18.95 3 For 13.95 3 For 13.95 3 For 13.95 3 For 13.95 3 For 16.95 3 For 18.95 4 For 18.95 3 For 13.95	3 for $29.95 Re-Loading 6 for $29.95 (DW II only) Non-Reloadable N/A EPSON BRAND 16.95 ea 21.95 ea 4 For 13.95 ↙ 190

↙ 190

Creative Computer

1236 E. Colonial Drive
Orlando, FL 32803 USA

Department 80
(305) 894-0789 (Florida)

Write For Free Catalog

Over 1000 items in Diskettes, Paper, Labels, Ribbons, Checks, Storage Boxes, Furniture, Binders and Hardware. Florida plus 5% tax.

Add $2 For Shipping On Orders Less Than $30

Most orders out in 24 hours with VISA, M/C, Money Order, AMEX, Cashier Check, Bank Wire and C.O.D. Personal check allow 10-14 days. Mail order only. Prices subject to change.

COPYCAT

Disk backup utility

Now you can have a solution to the problem of protected software backup.

COPYCAT© is the most powerful disk backup utility yet designed for the TRS-80 Computers. It will automatically make a fast, exact copy of your master disk regardless of protection schemes used including CRC errors, dual density tracks, mixed sector lengths and irregular I.D. pack.

COPYCAT© is intended for your personal use only in making backup copies for your valuable protected software.

COPYCAT© runs on a 48K, 2 disk drive TRS-80 models I,III or 4. Specify model number when ordering.

All orders are processed within 24 hrs.
Non-certified checks require (2) weeks for bank clearance

COPYCAT© $34.95

Add $2.00 for postage and handling.
California residents add 6% sales tax

OMNISOFT RESEARCH
2170 W. Broadway, #501A
Anaheim, CA 92804
(714) 772-5000
Dealers inquiries welcome

↙ 36

PRO-fessional Software

for LDOS/TRSDOS 6.x

PRO-CESS A maintenance tool for "CMD" files. Allows you to append 2 or more files, reorganize, and offset. Extract LIB members. $40

PRO-CREATE Z-80 assembler/editor supporting nested macros, conditionals, and includes. PRO-CREATEs a powerful tool that is easy to use. $100

PRO-CURE Transfer files directly to DOS 6.0 from selected CP/M media. PRO-CURE supports Omikron, IBM, Kaypro, and Osborn formats. $50

PRO-DUCE Disassemble directly from disk files or memory. The disk file source output generates 100% labels and handles data. $40

PRO-GENY A 4-function utility package that is loaded with power: DOCONFIG; MEMDIR; PARMDIR; and SWAP. A must for JCL users. $40

PRO-HELP An on-line quick reference card at your fingertips. Screens for DOS and BASIC. Create your own custom HELP files, too. $25

PRO-LC This is the LC C-language compiler now compatible with DOS 6.0. LC includes the PRO-CREATE macro-assembler package. $150

PRO-PaDS A utility to build and maintain your own partitioned data sets. Collect many small files into one and save disk space. $40

PRO-ZGRAPH A block-graphics screen editor which is used to create graphic images for BASIC, assembler programs, or printing. $50

U.S. Shipping: PRO-LC, $5; PRO-CREATE, $4; All others $2. COD add $1.50. VISA/MC/CHOICE.

MISOSYS
P.O. Box 4848 - Dept M
Alexandria, Virginia 22303-0848
703-960-2998

LDOS is a trademark of Logical Systems, Inc.
TRSDOS is a trademark of Tandy Corp.

↙See List of Advertisers on Page 323

Slate source code. The second volume is a 103-page abbreviation of the first in a three-ring binder.

The books are tough on a beginner, referencing some functions prior to their explanation or introducing advanced features early in the text. The main volume is indexed as a reference source, but some items are curiously missing. For example, there's no listing for insert or delete.

Clean Slate comes with a pared-down version of DOSPLUS on the disk for use by Model I owners; you can convert the program with Model III TRSDOS. A configuration program is included to specify the type of disk operating systems you intend to use, control codes recognized by your printer, and parameters for your RS-232 communications network.

You can change other specifications during Clean Slate operation. You can alter margins, tabs, line spacing, and the like, and save them to disk as the new defaults.

Clean Slate still lacks several features. It's missing proportional justification, conditional hyphens, custom printer fonts, or the advanced graphics found in some other word processors.

Its page orientation doesn't have the flexibility of a file-oriented word processor, and it doesn't lend itself readily to auxiliary programs, such as spelling and grammar checkers.

Still, if the lights go out . . . ■

★ ★ ★

ALE Editor and Assembler
$49.95

EDM Macro Editor
$149.95

The Alternate Source
704 North Pennsylvania Ave.
Lansing, MI 48906
Models I (with upper/lowercase modification) and III
48K RAM, two disk drives

by Carl Oppedahl

EDM and ALE are representative of a modern wave of editors for personal computer users. Each does almost anything you can imagine in an editor, with a keyboard scanning routine quick enough to provide a true type-ahead buffer, and the ability to edit disk files too large to fit into RAM all at once.

Both can read and write almost any file structure, and share a powerful macro editing instruction set. They are DOS-friendly to allow graceful transition from the editor to the DOS (so you can remedy a disk space full error, for example) and from the DOS back to the precise editor function underway before the error arose.

Macro Editing

Some advanced editors let you store a series of editing commands for repeated execution. You can repeatedly invoke the stored command string, called a macro, with a single keystroke to accomplish a task like correcting all a word's misspellings.

EDM and ALE represent the macro editing concept taken to its logical extreme. Within a given macro instruction string you can have commands to open and close files, conditional jumps, requests for keyboard input, wildcard string searches, subroutine calls, the equivalent of PEEKs and POKEs, and the routing of output to the printer.

You can store up to 26 macros in single-keystroke buffers, and load the macros to and from disk files. If you like to design your own disk file data bases, you'll find that modification or reformatting with EDM or ALE and a properly written macro or two often does the work of a day's coding in Basic or Assembly language.

EDM handles a wide range of file types as input and output, including CMD, BAS, and word processing files. You can display files as ASCII, compressed Basic, hexadecimal dump, and other formats.

EDM converts from one file type to another in RAM, and has an in-memory, four-function calculator. These and EDM's other bells and whistles occur through editor macros.

SUPERSCRIPSIT PRINTER DRIVERS
With an ALPS printer driver (software), you can attach your printer to the SuperSCRIPSIT word processor. Over 65 printers now supported. Call, write, or circle reader number for latest Product Review Sheet.
Epson MX-80 and MX-100 (Graftrax-Plus) / FX-80 C.Itoh Prowriter (8510) / F-10 / FP-1500-25 Qume Sprint V / IDS Prism / Microprism Olympia ESW 102,103,3000 / ES 101,105 NEC 8023 / Spinwriter 5530,7730,3530 Diablo 630,1610,1620 / DTC 380Z
$59
Okidata Microline 82, 83, 84, 92, 93, 8452 Smith-Corona TP-1 / Gemini 10,15 / AJ 831 Bytewriter / Olivetti ET121 / Brother HR-1 R. S. Line Printer V / DW1 / Man.Tally 160 Adler 1010,1030 / Royal 5010,5030 / Cumres CW-1
$49
Serial Interface Program for Serial Printers $19 Can be used for applications other than SCRIPSIT
Mail / Phone Orders Accepted
ALPS
23 Angus Road
Warren, New Jersey 07060
201 - 647-7230
VISA
374

TRS-80 III / IV
★ BOOKKEEPER ★
Perfect For Small Business
TIME DOME Has Preloaded File
★ SCRIPSIT-MAILER ★
LETTERS - ENVELOPES - LABELS
made by Scripsit
★ SERVICE-BILLER ★
Bill By Rate Chart
From To Date
★ BOOKKEEPING ★ MACHINE
Printed LEDGERS STATEMENTS
1400 Accounts Receivable
$34.50 EACH PROGRAM
(714) 774-9383
H. A. K. WORKSHOP
9791 ORANGE AVE.
ANAHEIM, CA 92804
287

DISKETTES
$15.95/BOX OF 10*
*5.25" SINGLE SIDED, SINGLE DENSITY
MANUFACTURED BY ONE OF THE WORLD'S LARGEST PRODUCERS
ALL DISKETTES ARE SOFT SECTORS
EACH DISKETTE IS CERTIFIED ERROR FREE
5.25" SSDD $18.95/BOX OF 10
5.25" DSDD $22.95/BOX OF 10
TWO BOX MINIMUM ORDER
PLEASE ADD $1.50/BOX SHIPPING & HANDLING
DEALER AND CLUB INQUIRES INVITED
(312) 490-9239
SHEPHERD MARKETING
P.O. BOX 941339
SCHAUMBURG, IL 60194
VISA
IL RES PLEASE ADD 6% SALES TAX
34

COMPUTERS ARE CREATING JOBS FOR NRI-TRAINED PEOPLE.

IF YOU'RE SERIOUS ABOUT MAKING MONEY IN MICROCOMPUTERS, NRI IS SERIOUS ABOUT SHOWING YOU HOW.

The U.S. Department of Labor projects job openings for qualified computer technicians will soon double. International Resource Development, Inc., estimates a 600% increase in these jobs in a decade. And most of these will be new jobs, created by the expanding role of computers.

NEVER HAS THERE BEEN A FASTER-GROWING FIELD OF TECHNOLOGY.

Many people are afraid of losing their jobs to computers, but thousands of jobs will be created for those who are prepared to meet the challenge.

With NRI training, you'll be prepared. You can have a profitable, exciting future as an expert who can handle the operational, programming and technical aspects of all kinds of microcomputers and microprocessors.

Your NRI course will include the new TRS-80 Model 4 with Disk Drive or the TRS-80 Color Computer with NRI Computer Access Card...plus a professional LCD multimeter, NRI Discovery Lab and hundreds of demonstrations and experiments. It's all yours to keep.

LEARN IN YOUR SPARE TIME.

NRI trains you in your own home, at your convenience...no classroom schedules to meet, no need to quit your job. As a class of one with complete course materials and the backing of a staff of professional electronics instructors, you'll get extraordinary hands-on training on the latest, most popular microcomputer: the new TRS-80™ Model 4 with Disk Drive. Designed to perform diverse personal and business functions and accept more software, the TRS-80 is yours to keep.

LEARN HOW TO USE, PROGRAM AND SERVICE STATE-OF-THE-ART MICRO-COMPUTERS.

Through your carefully designed NRI course, you'll get a wealth of practical experience. You'll build circuits... from the simplest to the most advanced...with your NRI Discovery Lab.® You'll use a professional 4-function LCD digital multimeter for analysis and troubleshooting. With NRI training you'll explore your computer's registers, memory and input-output ports. You'll even write programs to control the circuits you've designed and built. You'll perform hundreds of challenging experiments, always backed by a full-time faculty ready to help you personally.

When your NRI training is complete, you'll be a computer technician, ready for your first job — servicing, testing or programming all types of microcomputers — in a rewarding and challenging new career.

THE CATALOG IS FREE. THE TRAINING IS PRICELESS.

Send the coupon today for your FREE 104-page catalog. It's a valuable guide to opportunities and training in the high-tech revolution. You'll see how easily you become part of the growing high-tech world of microcomputers.

If the coupon has been removed, please write to us today.

TRS-80 is a trademark of the Radio Shack division of Tandy Corp.

All career courses approved under GI bill. ☐ Check for details.

NRI School of Electronics
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016

We'll give you tomorrow.
The catalog is free.
The training is priceless.

Please check for one free catalog only.
- ☐ Industrial Electronics
- ☐ Computer Electronics including Microcomputers
- ☐ Color TV, Audio, and Video System Servicing
- ☐ Electronics Design Technology
- ☐ Digital Electronics
- ☐ Communications Electronics • FCC Licenses • Mobile • CB • Aircraft • Marine
- ☐ Basic Electronics
- ☐ Small Engine Servicing
- ☐ Appliance Servicing
- ☐ Automotive Servicing
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Heating, Refrigeration & Solar Technology
- ☐ Building Construction

Name (Please Print) Age

Street

City/State/Zip

Accredited by the Accrediting Commission of the National Home Study Council #179-103

ALE is a Z80 editor/assembler based on a somewhat stripped-down version of EDM. Assembly of source code in disk files or in RAM occurs using macro editing instructions tailored to that purpose.

Assembly takes place on screen so you can repair errors on the spot, with assembly continuing from that point.

When you use ALE for assembly of source code from disk, all the source code doesn't have to originate in a single disk file. It's possible to bring material in from several disk files.

ALE can't perform the function most people associate with the term *linker*. It can't bring together assembled modules containing global references, but instead requires that source code modules be assembled all in one activity.

The term *macro* can also lead to confusion about ALE. It's not what some programmers call a macro assembler, as it doesn't handle assembly macros—blocks of source code replicated into referenced locations of a program at assembly time. As used in ALE, macro refers to the editor macros written in ALE/EDM editor macro language.

One nice feature of the ALE linker is that it takes its commands from a disk file containing assembly commands that the user writes in a simple job control language (JCL). This is handy if you're working on a project that involves repeated reassembly of a program made up of many parts.

After making changes to the source code of one or two subroutines, you can reassemble the whole without retyping or merging the various file names.

User Customization

Most commercial software is marketed as Z80 object code (such as a CMD file) that's nearly impossible to modify. ALE and EDM, however, have easy-to-change internal registers and flags controlling nearly every facet of operation, from repeat-key timing to screen line protection.

You can change these parameters manually or with user-defined macros. The assembler macros of ALE and the file handling macros of EDM use them heavily.

Provisions for user-defined printer drivers are helpful for those using non-Radio Shack printers.

When you run ALE or EDM for the first time, it asks which DOS and model computer you're using. ALE also asks which of several assembler source code formats you've used before. The program stores your responses to disk, so it can take proper advantage of the DOS in use.

If the DOS you use isn't on the opening menu, it's hard to know how to proceed. For example, TRSDOS 2.7DD isn't provided for. The Alternate Source has a goal of supporting users on all DOSes.

According to the documentation, the editors presently work with TRSDOS 2.3 and 2.3B, and NEWDOS 3.0 on the Model I; TRSDOS 1.6 on the Model III; and LDOS 5.1, MULTIDOS 1.6, DOSPLUS 3.4, and NEWDOS80 2 on the Models I and III.

Documentation

The manual for EDM, the macro editor, contains some 200 pages, and the manual for ALE, the editor/assembler, totals 150 pages, each without a single illustration or chart to relieve the single-spaced text.

Each was printed on a 7 by 9 dot-matrix printer in emphasized mode—the characters take a bit of getting used to. ALE and EDM are new products, though, and I prefer their complete, relatively error free dot-matrix manuals to the usually error-ridden and skimpy typeset manuals I've seen in some other new products.

Each manual has a good index and table of contents. I found just a few omissions. The ALE manual should have a listing for ASMFILE and a listing for DOS errors.

The ALE text at page 4-3 and the EDM text at page 4-1 need a line explaining that the error codes referred to in on screen error messages aren't TRSDOS Disk Basic codes, but TRSDOS input/output (I/O) machine language call error codes.

The text of the manuals is a bit dense, and is written at the level of a sophisticated Assembly-language or systems programmer. My first reading of the two manuals took about 15 hours—I was reading them more closely than would most new users. To get started using one of the programs, you really need to read only the first few chapters.

The manuals explain the hundreds of keyboard commands, macro editing commands, and storage registers through liberal use of examples that you can type in and follow.

Operational Complaints

Whenever an error arises in EDM or ALE, an error message appears and you have the option of exiting to DOS, of aborting the process with a return to the editor, or of retrying the operation. The former is handy if you must kill a file or two to free up disk space, while the latter is useful if an intermittent problem, such as a hash index table or gran allocation table error, arises.

However, when the editors encounter a DOS error, they have the disturbing habit of clearing the screen before printing the error message. Unless you've been watching the screen without interruption, it's difficult to figure out what the offending disk operation was. Often it's not enough to know the error number.

It would be better if the editor displayed the last line executed, or the file name and operation (read, write, open, close) causing the error.

After several days of use I couldn't get my printer, an Epson, to work properly with ALE, although I had no trouble with EDM. Since the two programs use the same routines for printer control, I suspect the problem lies in my copy of ALE.

ALE and EDM do their own keyboard scanning, which allows the luxury of a full type-ahead buffer and autorepeat keyboard. The programs trap most keyboard entries you might regret (such as clear buffer), and require a second, confirming entry before proceeding.

During almost any sequence, pressing the break key aborts the process with no harm done. However, I occasionally found that pushing the break key caused a jump to the MEM SIZE? prompt—surely one of the most frustrating responses for a Model I user.

For the serious user who is willing to study the manuals, EDM and ALE are very good values as editors. With a good bit of practice, they're not too difficult to use. They are potent, versatile, and thoroughly documented. ■

DOT WRITER 3.0

More than a word processor! Typeset your text using any of our type styles (over 60) or create your own. TRS80 I/III. Epson, C.Itoh or compatible printers. Use your DOS and your editor. All new instruction manuals. Easy to use - best results! Now only $79.95. Additional type styles $29.95 per disk. Utility pack $39.95. Read the reviews, they tell the real story! Call or write for more info! This ad was typeset with Dot Writer!

RCM COMPUTERS ✓273

221 HIRSHFIELD DR
WILLIAMSVILLE, NY 14221
716-634-3026

MasterCard VISA

WORD PROCESSING ON YOUR TRS-80 BECOMES CHILD'S PLAY

USING SCRIPSIT
by
William James Haga

USING SCRIPSIT is a complete and easy-to-use guide to SCRIPSIT—one of the most powerful word processing packages available for the TRS-80 Model I or III. USING SCRIPSIT is for the first-time user *and* the expert, presenting procedures at every level of difficulty in simple-to-follow steps and exercises.
$21.95 ✓305

Look for these WEPCO products at your local computer dealer or bookstore. For more information or to order direct, call **415-595-2350** and ask for Wendy Moore (MasterCard and Visa orders only).

Wadsworth Electronic Publishing Company

6 Davis Drive, Belmont, California, 94002

TRS-80 is a registered trademark of the Tandy Corporation

NEW PRINTERS ADDED! FIND YOURS BELOW. Good This Month

RIBBON SALE

PRICES SLASHED!

Exact Replacements

RADIO SHACK · CENTRONICS · COMMODORE · EPSON · ANADEX · BASE 2 · IBM · C. ITOH · IDS · DATA ROYAL · OTHERS

PRINTER MAKE, MODEL NUMBER (Contact us if your printer is not listed. We can probably RELOAD your old cartridges!)	RIBBON SIZE inches by yards	INSERTS EZ-LOAD™ DROP IN, NO WINDING! EXACT REPLACEMENTS made in our shop. Cartridges not included			RELOADS You SEND your used CARTRIDGES to us. We put OUR NEW INSERTS in them		NEW CARTRIDGES (from the various manufacturers. Subject to availability.*)			SILVER DOLLAR WIND to LOAD WHY DO WE SELL THESE?		
ANADEX 9000 Series	½ x 10	$18/3	$66/12	$360/72	$ 8/1	$ 7 ea./2 or more	•		•			
BASE 2	½ x 20	$15/3	$54/12	$288/72	$ 7/1	$ 6 ea./2 or more	$30/2	$87/ 6	$168/12			
C. ITOH Prowriter 1550-8510	½ x 15	$15/3	$54/12	$288/72	$ 7/1	$ 6 ea./2 or more	$16/2	$48/ 6	$ 96/12			
NEC 8023	½ x 15	$15/3	$54/12	$288/72	$ 7/1	$ 6 ea./2 or more	$16/2	$48/ 6	$ 96/12			
RADIO SHACK	DWP-410	↓	↓	↓		↓	$18/3	$72/12	$432/72			
DAISY WHEEL II												
CARBON FILM (1419)	½ x 145	$24/6	$42/12	$234/72	$ 5 ea. 3-11	$ 4 ea. 12 or more	$18/3	$60/12	$348/72			
COLORS RED GREEN BLUE BROWN	½ x 120	$30/6	$52/12	$288/72	$ 6 ea. 3-11	$ 5 ea. 12 or more	$21/3	$72/12	$420/72			
LONG-LIFE FABRIC (1449)	½ x 25 Not Ez-load	$21/3	$78/12	$510/72	$ 8/1	$ 7 ea./2 or more	$20/2	$58/ 6	$112/12			
LP I-II-IV 700 Zip-Pack (1413) 730-737-739-779	9/16 x 16	$12/3	$45/12	$252/72	----------		----------					
DMP-200, 120 (26-1483)	½ x 20	$15/3	$54/12	$288/72	$ 7/1	$ 6 ea./2 or more	$27/2	$81/ 6	$162/12			
DMP-500 (26-1482)	½ x 20	$15/3	$54/12	$288/72	$ 7/1	$ 6 ea./2 or more	$24/2	$72/ 6	$144/12			
DMP-2100 (26-1442)	½ x 20	$18/3	$66/12	$360/72	$ 8/1	$ 7 ea./2 or more	$27/2	$81/ 6	$162/12			
LP III-V (26-1414)	½ x 15	$15/3	$54/12	$288/72	$ 7/1	$ 6 ea./2 or more	$15/2	$42/ 6	$ 78/12	$12/3	$44/12	$252/72
LP VI-VIII DMP-400 (26-1418)	9/16 x 14	$15/3	$54/12	$288/72	$ 7/1	$ 6 ea./2 or more	$15/2	$42/ 6	$ 78/12	$11/3	$40/12	$228/72
LP VII DMP-100 (26-1424)	(Make 1,000)	----------			----------		$16/2	$48/ 6	$ 96/12	----------		
EPSON MX 70-80 IBM	½ x 20	$15/3	$54/12	$288/72	$ 7/1	$ 6 ea./2 or more	$14/2	$36/ 6	$ 66/12	$12/3	$44/12	$252/72
MX 100	½ x 30	$18/3	$66/12	$360/72	$ 8/1	$ 7 ea./2 or more	$24/2	$69/ 6	$132/12	$15/3	$54/12	$288/72
CENTRONICS 352/352/6000 Series	½ x Roll	----------			$14/1	$13 ea./2 or more						
COMMODORE 8023P	½ x 17	$15/3	$54/12	$288/72	$ 7/1	$ 6 ea./2 or more						

SILVER DOLLAR — WHY DO WE SELL THESE?

This is the type ribbon you get if you order from our fellow advertisers. We sell them for less since we make them ourselves. Do you really like the mess and inconvenience of unwinding and dumping this type ribbon into a wastebasket or out on a newspaper and/or winding it into your cartridge? We don't know why these are being sold. Computers should simplify your life, not make it more complex just to save a few pennies. You are welcome to order these if you cannot afford our EZ LOAD™ INSERTS, RELOADS or NEW CARTRIDGES. But BEWARE! You now know how to avoid disappointment. One more caution: be sure to check the length of any ribbon BEFORE you buy it. For instance, an MX-100 ribbon should be 30 yards long, not 20 as in the MX-80.

WORRIED ABOUT ORDERING BY MAIL? Relax. We've been in business for many years and can please the smallest and largest account. You receive some of the finest ribbons available made of our own exclusive IMAGE PLUS + ™ fabric and carbon film. Our ribbons fit your printer exactly. COMPARE, but BEWARE! We order all our competitor's products and are amazed at what we get. Have you ever received a new fabric ribbon you had to unwind and dump out on the table before you could use it? We have. Or carbon film inserts that had no end-of-ribbon sensor? Or, cartridges with only HALF enough ribbon WITHOUT a Mobius Loop? (No bargain at ANY price!) We use the latest state-of-the-art production equipment and are blessed with a fine, dedicated staff. We guarantee everything we make, period. Our ribbons are made fresh daily and our goal is to ship your order within 24 hours. Write for our brochure, price list, and newsletter, INK SPOTS™.

Bob Case, President

SEND CHECK, MONEY ORDER, or COD TO

BCCOMPCO ✓152

800 South 17 Box 246
SUMMERSVILLE, MO 65571

CALL FOR LESS ON SATURDAY! 8:30 to 5:00 (CT)

(417) 932-4196

VISA

WE PAY UPS SHIPPING on PREPAID ORDERS. PLEASE INCLUDE STREET ADDRESS for UPS DELIVERY. FOREIGN ADD 15% U.S. FUNDS.

COST PLUS 10%

RADIO SHACK COMPUTERS · SOFTWARE · SUPPLIES · ACCESSORIES

Call Bob Case or write for our COST PLUS 10% FLYER !!!

✓See List of Advertisers on Page 323

★ ★ ★

BASICally Speaking: A Young Person's Introduction to Computing
Frances Lieberman Cohen
Reston Publishing Co.
Reston, VA
$12.95

by Mary Gasiorowski

Frances Cohen's *BASICally Speaking: A Young Person's Introduction to Computing* is more than just another book on computer programming.

In addition to providing a discussion of Basic programming and some program examples, *BASICally Speaking* includes a comprehensive history of computers, outlines the developments that led to current computer technology, and considers the future of computing.

BASICally Speaking covers the history of computing from the abacus to Pascal's calculating machines to present-day microcomputers.

The book explores the inside of a computer, computer memory, computer languages, computer operation, and programming and flowcharting. It provides substantive explanation of topics such as ROM and RAM, direct mode versus program mode, and variables.

Each chapter closes with review questions, and answers appear in an appendix at the back of the book. Other appendices cover binary numbers, powers of two, scientific notation, comparison symbols, and computer-related activities. The book also includes an extensive glossary, bibliography, and index.

BASICally Speaking is not restricted to any one computer system, a fact that has its advantages and disadvantages. The programs are written in Basic for the TRS-80, Commodore, Apple, and Atari computers. With minor modifications, the programs presented should work with any computer system, including time-sharing terminals.

Because the book deals with computers generally, it doesn't answer questions about specific computer systems. The examples given in *BASICally Speaking* might not address your computer.

For example, Cohen states that the command PRINT 2×4 won't produce the correct answer for all microcomputers. She suggests that some computers' results include a question mark or zero.

However, several micros interpret 2×4 as the number 2 and the variable ×4 (which has a value of zero). Thus the computer returns 20 as the result (it looks as if the computer has its multiplication tables wrong). But *BASICally Speaking* never considers this possibility, so an inexperienced user might misinterpret such an answer as a computer malfunction.

Another possible problem for novices is Cohen's confusing references to input and output in programming examples. Cohen uses input to mean the instructions you type into the computer, and output for the answer that appears on the screen. But you might interpret output to mean that you have to type what's specified as output to get it on the screen, rather than have the computer generate then display the output illustrated.

Cohen should have made her definitions more clear: Input is what you type into the computer, output is how the computer responds.

"This book doesn't require access to a computer; the programs are printed along with their output..."

This book doesn't require access to a computer; the programs are printed along with their output, so it's possible to read through the examples.

BASICally Speaking might be useful in a classroom with limited computer time, but it contains language difficult for younger children to understand. However, it is appropriate for middle and junior high school students. The book would benefit, though, from more illustrations and diagrams to explain topics covered.

Overall, *BASICally Speaking* is a good book for a class in computer literacy or a family reading it at home. It provides background for a better understanding of computers and it introduces programming in a pleasant manner. But if you own a computer, you might also want to get a system-specific book. ■

★ ★ ★

PowerDOT
Powersoft
11500 Stemmons Fwy., Suite 125
Dallas, TX 75229
Models I and III
$49.95

by Richard Green

PowerDOT serves as an interface between the low resolution graphics of the TRS-80 and high resolution printers like the C. Itoh or Epson.

PowerDOT consists of two parts: one to draw on the screen, a second to print out what you've drawn. Each part is a separate program. Entry into PowerDOT is through a program called PDOT1.

When you run PDOT1, the program presents a command menu consisting of seven options. To create new graphics or edit old graphics, select the Initialize File option.

The program then requests a file name. If the file name already exists on the disk, PowerDOT enters that file into memory, and redisplays the command menu. If the file name doesn't exist on disk, you have the option of starting a new file with the name or returning to the command menu.

When you create new graphics you must carefully specify their width. You can produce your graphics as TRS-80 graphics characters or dot-specified drawings.

The maximum width for character graphics can't exceed the maximum number of characters the printer can put on one line. The maximum width for dot graphics is half the maximum number of dots the printer can put on one line. For example, if you're using an Epson MX-80 with Graftrax, the maximum width of a graphics display is 480 dots, half the 960-dot maximum the MX-80 can print on a line.

Once you specify the width, the program returns to the command menu. To begin constructing the graphics, select The Dot Editor from the menu.

PDOT2 prints the formatted graphics. When you call PDOT2, it requests the name of the graphics file you want to print. You can choose to print the graphics at the left, right, or center of the page.

The screen clears, then presents a six-

Continued on p. 84

ONLY $599.00
(Including 2 Diskettes)

THE NEW AMDISK-III
MODEL III ADD-ON DRIVE

The AMDISK-III Micro-floppy disk system is an engineering breakthrough in disk size, storage capacity, media protection and user convenience. It's fully compatible with your TRS-80 Model-III*.® Enjoy a full 736 KByte† (formatted) storage capability and the extra convenience of the new 3″ hard-plastic encased diskettes. They fit into a shirt pocket and are easy to mail, too.

The AMDISK-III drive system is ruggedly constructed for years of trouble-free operation and is backed with our 90 day warranty on parts and labor.

Just circle the reader service number to receive full technical details.

*TRS-80 and TRS-DOS are registered trademarks of Tandy Corporation.
†Requires recording on both sides.

DEALER INQUIRIES INVITED

2201 Lively Blvd. • Elk Grove Village, IL 60007
(312) 364-1180 TLX: 25-4786

AMDEK CORP.

REGIONAL OFFICES: Calif. (714) 662-3949 • Texas (817) 498-2334

Amdek . . . your guide to innovative computing!

110

WE'RE GIVING MAIL ORDER A GOOD NAME . . .

You no longer have to sacrifice quality products, personal service, or fast delivery for rock-bottom prices. With **MICRO DATA SUPPLIES,** you can have it all. And it's only a phone call away: (216) 481-1600. Looking forward to your call.

Russ Knotts • President

We sincerely thank our thousands of past customers who have made this claim possible.

NEWDOS/80 Version 2.0

FLOPPY DOCTOR INCLUDED

Model I and Model III

The hottest Disk Operating System is now available in its latest version. This is the ONE from Apparat, Inc., the people whose systems have made the TRS-80 the reliable computer.

$139.95

THE FLOPPY DOCTOR

By Dave Stambaugh

FLOPPY DISK/MEMORY DIAGNOSTIC programs are designed to thoroughly check out the two most trouble prone sections of the TRS-80, the disk system (controller and drives) and the memory arrays.

MODEL I $24.95
MODEL III $29.95

BOOKS

OTHER MYSTERIES
TRS-80 DISK $19.95
Microsoft Basic Decoded $24.95
The Custom TRS-80 ..... $28.95
Basic Faster & Better $29.95
How To Do It On The TRS-80 ..... $28.95
TRSDOS 2.3 Decoded $28.95
The Custom Apple $28.95
Machine Language Disk I/O $29.95
CP/M Primer $15.95

LABLMAKER

The most useful program you'll ever own. Prints Marking Labels on standard 1" x 3½" labels. Sixteen print formats to choose from including the Hi Visibility Jumbo Print Type. TRS-80 Model I & III, 48K, 1 Drive, Epson MX-80 type printer (Or equivalent).

LABLMAKER KIT — w/400 5/16" x 3½" labels $29.95

CASSLABEL Kit — w/200 cassette labels & 200 5/16" x 3½" labels $34.95

DISKIT III™

MODEL III & IV DISK UPGRADE

FREE

Floppy Doctor with the purchase of any DISKIT III $30.00 VALUE!

Features
- Gold Plated Edge Connectors
- Switching Power Supply
- Supports 5" or 8" Drives
- 40 80 Track Supported
- Single Dual Head Supported
- Metal Disk Drive Brackets
- All Hardware and Cables
- 1 Hour or Less for Installation
- 100% Compatible
- No Soldering Needed
- 180 Days Warranty on Controller

DISKIT III w/o Drives $219.00
DISKIT III w/one Tandon 100-1 40 Track Drive. $429.00
DISKIT III w/two Tandon 100-1 40 Track Drive. $629.00
DISKIT III w/two Tandon 100-2 40/40 Dual Drive. $789.00

PRINTERS New Lower Prices

GEMINI 10x by Star Micronics $319.00
GEMINI 15 by Star Micronics $479.00
NEW! EPSON RX 80 ..... $359.00
PHOWRITER 8510 ..... $399.00
NEC 8023. ..... $399.00

PRINTER ACCESSORIES

Graftrax Plus $65.95
MX-80 Ribbons 7.95
MX-100 Ribbons 18.95
Epson Service Manual 34.95

PRINTER CABLES

TRS-80 Model I & III
10 ft. Parallel $24.95
10 ft. Parallel cable extensions 24.95

ELECTRIC PENCIL Version II

Model I and Model III

An expanded version of the critically acclaimed original word processing system! Includes all features of Version I plus many new extensions.

Disk Version $79.95
Tape Version $69.95

ELECTRIC WEBSTER

"Cadillac" of Spelling Checkers 80 Micro 9/82

- 50,000 WORD DICTIONARY
- FAST and ACCURATE - No other Spelling Checker comes close!
- INTEGRATED - Proofs and corrects from within most popular word processing programs!
- SMART - Finds and displays correct spelling!
- HYPHENATES automatically - inserts discretionary hyphens with 100% accuracy (optional).
- COMPLETE - One step proofing system.

Electric Webster w/correcting feature $129.95
Hyphenation feature $49.95
Grammatical feature $39.95
COMPLETE SYSTEM all Four Programs $199.00

NEWSCRIPT 7.0

NEWSCRIPT is the versatile TRS-80 word processing program. It supports "smart" printers like the Epson, Okidata, NEC, C.Itoh, Spinwriter, Centronics 739 and more.

NEWSCRIPT $109.95

THE HOME ACCOUNTANT

The #1 best selling program for home and small business accounting is now available for TRS-80 Model 3. Handles up to 99 accounts, five checkbooks, multiple income accounts, and can split transactions to any number of accounts. Prints net worth statements, income statements, as well as custom designed reports. Displays a bar chart and trend for any selected category. It is easy to use and yet provides all the power you'll need. (By Continental Software, requires Model 3, 2 drives, 48K.) $62.95

MICRO DATA SUPPLIES

MICRO DATA SUPPLIES

A SUBSIDIARY OF THE COMPUTER WAREHOUSE, INC. OF OHIO

22295 EUCLID AVE. EUCLID, OHIO 44117

Verbatim

PREMIUM DISKETTES AT AFFORDABLE PRICES

VERBATIM DATALIFE™ DISKETTES
5¼-inch (box of 10)
MD525-01
1S/DDen

SPECIAL! $25.95

Soft-Sectored Diskettes

5 ¼" 2S/D Den (MD550-01) $39.95
5 ¼" 2S/4 Den (MD557-01) $51.50
8" 1S/D Den (FD34-8000) $43.95

DYSAN
THE MOST EXPENSIVE DISKETTE YOU CAN BUY . . . *BUT WORTH IT!*

DYSAN 5 ¼" 1S/D Den $35.95
DYSAN 5 ¼" 2S/D Den $44.95

SUPPLIES

5¼" File Box for 75 diskettes $19.95
AVERY TABULABLES
5,000 3½ x 15/16 ..... $15.95
FAN FOLD PAPER (Prices F.O.B.S.P.)
9½ x 11 18 lb. WHITE 3,000 ct. $29.95
14⅞ x 11 18 lb. WHITE 3,000 ct. $39.95
Head Cleaning Kit $17.95

*** THIS MONTH'S SPECIAL ***
Head Cleaning Kit w/10 Bulk Diskettes $34.95

DISK DRIVE CABLES

Disk Drive Cable for 1 Drive $18.95
Disk Drive Cable for 2 Drives $24.95
Disk Drive Cable for 4 Drives $29.95
All Cables Are 5 Ft. Long

DISK DRIVES

Complete with Chassis & Power Supply:

Fully assembled silver chassis with external card edge connector for easy cable installation. With MDS 120 days warranty.

COMPLETE

TM100-1 40 Trk $239.00
TM100-2 40/40 Trk $319.00
TM100-4 80/80 Trk $389.00
MOD. III COMPLETE CASE & POWER SUPPLY
SIEMANS FDD100-8 SS/DD 8 in $469.00

BARE DRIVES

TM100-1 40 Trk $179.00
TM100-2 40/40 Trk $239.00
TM100-4 80/80 Trk $319.00
SIEMANS FDD100-8 SS/DD 8 in $249.00
TM84B-1 SS/DD 8" 77 Trk Thinline . $369.00
TM84B-2 DD/DD 8" 77 Trk Thinline $479.00

SUPER WABASH SALE!

Bulk Diskettes* with envelopes

5¼" SOFT SECTORS	8" SOFT OR 32 SECTORS
SINGLE SIDE SINGLE DENSITY W/HUB RING 100% CERTIFIED 1 YEAR WARRANTY **$1.59***	SINGLE SIDE SINGLE DENSITY 100% CERTIFIED 1 YEAR WARRANTEE **$1.69***
5¼" SOFT SECTORS	8" SOFT OR 32 SECTORS
SINGLE SIDE DOUBLE DENSITY W/HUB RING 100% CERTIFIED 1 YEAR WARRANTEE **$1.89***	SINGLE SIDE DOUBLE DENSITY 100% CERTIFIED 1 YEAR WARRANTEE **$2.29***
5¼" SOFT SECTORS	8" SOFT OR 32 SECTORS
DOUBLE SIDE DOUBLE DENSITY W/HUB RING 100% CERTIFIED 1 YEAR WARRANTEE **$2.79***	DOUBLE SIDE DOUBLE DENSITY 100% CERTIFIED 1 YEAR WARRANTEE **$3.09***

*Now Get High Quality at a Low Price Manufactured by a Major Disc Company For MDS Without Their Name on Diskettes.
*Minimum order 20 diskettes with Tyvek envelope and storage shipping box
*Quantity discounts - 100 deduct 3% 1000 deduct 5%, 10,000 deduct 10%

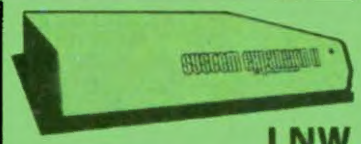
MODEMS

Hayes Micromodem II (APPLE) $299.00
Hayes Smart Modem (RS-232) $239.00
SIGNALMAN DIRECT CONNECT (RS232) 300 Baud $94.95

U.S. ROBOTICS Inc.
Auto Dial 212A, 300/1200 Baud Modem 529.00
Auto Link 212A, 300/1200 Baud Modem $499.00
Micro Link 1200, 1200 Baud Modem 429.00
Auto Link 300, 300 Baud Modem .. $219.00

Practical Periphials MICROBUFFER

MBP-16K Parallel $149.00
MICROBUFFER IN-LINE For Most Printers
32K Parallel $289.00
64K Parallel $339.00
32K Serial $289.00
64K Serial $339.00
64K Memory Expansion Modules $169.00



LNW TRS-80 Mod. I Expansion

$349.00

- RS232c serial I/O
- Parallel printer port
- Gold-plated connectors
- Floppy disk controller
- Full 32k 200ns RAM
- Real time clock
- 6 month warranty
- Heavy steel case
- Thousands of users
- Works with any DOS 100%

SPRINTER

Double Your Speed

Speed-up cuts computer operation time in half, saves time and money. Fast 4 MHz Z80B CPU included, installs in 15 minutes with no soldering or cutting.

SPRINTER III for MOD III $95.95
SPRINTER I for MOD I $95.95

MODEL I DOUBLE DENSITY PACKAGE

Everything you need to convert your TRS-80 Model I to run double density. Complete with software hardware, and instructions, installs in minutes with no soldering, wiring or cutting.

Dosplus V 3.4 w/LNDOUBLER 5/8 .. $199.00
LNDOUBLER 5/8 Board w/o dos ... $169.00

16 K RAM SPECIAL

4116, 200ns. Guaranteed one full year $17.95

ELECTRONIC PROTECTION DEVICES

The PLUM 3-way EMI-RFI AC Power Line Noise Filter (wall outlet) $44.95
The LEMON - 6-way Surge Suppressor for AC Power Lines (wall outlet) $54.95
The LIME - same as LEMON w/5ft. cord and on-off switch $79.95
The PEACH - 6-way Surge Suppressor, EMI-RFI Line Filter (wall outlet) $89.95
The ORANGE - same as LIME w/EMI-RFI Filtering PLUM & LIME Combined $129.95

ULTRA TERM

Supports both manual and auto dial modems. Exclusive Ultra Term direct to disk file transfer mode, allows unattended operation at the receiving computer. Line printer support with a 1K print buffer. Half & full duplex support. Universal ASCII format file transfer with a 33K buffer and a full featured host program $49.95

Call (216) 481-1600
MONDAY thru SATURDAY
DEALER INQUIRIES WELCOME

WE ACCEPT
- Visa
- MasterCard
- Checks
- Money Order
- C O D

ALL PRICES ARE FOR MAIL ORDER ONLY
Prices Specifications and Offerings subject to change without notice

ADD $3.00 FOR SHIPPING & HANDLING
$6.00 Extra for C O D Orders
Ohio Residents add 6.5% Sales Tax

MAIL ORDER PRICES ONLY

Free U.P.S. on all prepaid orders over $100.00 in U.S.A.

24K MODEL 100

All work & no play makes Jack a dull boy.

HAVE FUN WITH YOUR MODEL 100!

Model 100 Games #1 - 4 games for your relaxation and enjoyment.

BLOCKADE - Your "snake" grows longer as you hit the randomly appearing targets on the screen! A one or two player real-time game.

REVERSI - Outflank your opponent! Play against the computer or another human.

FRANKENSTEIN ADVENTURE - Find all of the necessary equipment to awaken the monster.

ALEXIS ADVENTURE - Sail the seas and traverse the islands to recapture your kingdom.

All four games on tape for only $24.95 (MasterCard/Visa accepted. Calif. residents add 6% tax. Overseas add $1 shipping. Dealer inquiries invited.)

SILVERWARE

- a lot of software for a little silver

PO Box 21101 -102
Santa Barbara, CA 93121 (805) 966-1449

Continued from p. 80

option menu. The two block graphics modes print graphics that are essentially the same, except for the darkness of the lines. The same is true of the two dot graphics options: Dot Graphics and Dot Graphics (Bold).

The other two options, however, radically change the printout's appearance. Dot Graphics (High-Res) shortens the printout by approximately half, but leaves the height unchanged. Dot Graphics (Ultra-Res) reduces both height and width by approximately half, producing a printout ¼ as large as that produced by the Dot Graphics option.

PowerDOT is a disk-based program. When you start a new file and determine the graphic's width, the program allocates disk space in blocks. Each block equals 16 lines of screen display times the graphic's width. The smallest block you can define is 16 lines long by 64 characters wide.

"Because of the TRS-80's low resolution, the drawing on the screen only approximates the finished graphics. Diagonal lines have a staircase appearance."

For each line, the program stores each unit of width as a single byte of memory. For example, if you prepare a graphics display 80 characters wide, each block of the graphics is 1,280 bytes long: 16 lines long times a width of 80 characters.

The width of dot graphics is more confusing to determine. The program translates each character space across the screen into two or more dots. If you want to produce graphics 16 lines high by 80 dots wide, specify a width of 40.

Thus, a dot graphics display 8½ inches wide requires blocks of 8,192 bytes each. To completely fill an 8½- by 11-inch piece of paper requires 15 such blocks: a total of 122K of disk space.

Using PowerDOT

When you select the dot editor, the screen clears and a small, blinking cursor (called a pixel in the user's manual) appears in the center. As this pixel moves, it leaves a lighted line behind it.

You control the cursor's movement with the numeric keys. The 5 key is the reference key and has no effect on the cursor's movement.

The eight keys surrounding the 5 key move the cursor in a direction analogous to the position of the key relative to the 5. Pressing the 8 key moves the cursor vertically up the screen. Pressing the 1 key moves the cursor diagonally down and left.

Four other keys modify the operation of the number keys. Holding the clear key while moving the cursor erases any line over which the cursor moves. Holding the P key moves the cursor without drawing or erasing a line.

Holding the M key while moving the cursor with the 1, 7, 9, or 3 moves the cursor at an angle approximately 150 degrees less than the angle the key makes otherwise. Holding the N key increases the resulting angle by approximately 150 degrees.

You can also draw lines using the program's AutoDraw routine. Position the cursor anywhere on the screen and press the S key. Then place the cursor anywhere else in the display you're formatting and press the D key. A line appears between point S and point D. Lines drawn with AutoDraw can span several blocks of memory, joining points that don't appear simultaneously on the screen.

Because of the TRS-80's low resolution, the drawing on the screen only approximates the finished graphics. Diagonal lines have a staircase appearance. The finished printout also has staircase diagonals, but the effect is scarcely noticeable.

The program displays only a portion of a large graphic on the screen at one time. When preparing graphics for the dot graphic mode, each screen prints 2 1/8 inches wide and 3/4 inches high. If you use PowerDOT to draw a letterhead 1 1/2 inches high by the width of a piece of stationery, only 1/8 of the graphic appears on the screen.

Drawing with PowerDOT is much like drawing with an Etch-a-Sketch. Straight lines are fairly easy, but curves can be infuriating!

Also, you must have a good idea of what you are trying to draw before you

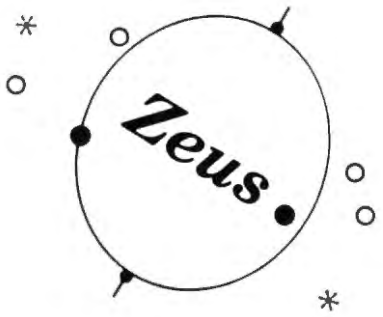
ZEUS
Editor Assembler

ZEUS Features Include . . .

1. **Built in hex and decimal calculator.** (Throw your TI away !)
2. **Partition EDTASM format source text on load.** (Get to a 90K disassem!)
3. **Automatic syntax check on line entry.** (Never enter a bad OPCODE !)
4. **Forward and reverse scrolling.** (One keystroke to see 'BEFORE' !)
5. **Conditional assembly.** (Combine DISK/LII, MODI/MODIII Source Text !)
6. **Include source text from disk file.** (Assemble a 90K source file !)

Works with DOSPLUS, NEWDOS/80, MULTIDOS, LDOS & TRSDOS model I/III Single/Double Density.
(Special order TRSDOS 2.7 DD)

Comes with its own DOS which will operate in single density on the Model I, III, & 4.
(But will READ/WRITE to most double density diskettes.)



Introductory Price

Only **$79.95**

Add $3.00 shipping/handling (foreign orders add $15.00). Michigan residents add 4% sales tax. COD add $1.50. Model I orders specify single, double or P density. Personal checks take two weeks to clear. VISA & MasterCard accepted.

Cosmopolitan Electronics Corporation
5700 PLYMOUTH ROAD
ANN ARBOR, MICHIGAN 48105

Technical Line: (313) 668-6660

Toll-Free Orders: 800-392-3785

begin. Corrections tend to create more problems that must be corrected. To avoid a situation of diminishing returns, keep corrections to a minimum.

Large drawings that don't fit on a single screen present special problems. It's difficult to keep the parts aligned.

The only way you can create large drawings with any degree of accuracy is to manually draw the design on paper, then overlay a grid that approximates the screen dimensions in scale. Draw each screen according to this layout.

Printing the finished graphics display is a separate process from drawing it. You must save the graphics to disk. Printing occurs directly from the disk, so the maximum drawing size is limited only by disk space.

Printing files with PowerDOT presents several problems. First, the six different printing modes produce very different results from the same graphics file. Also, because of size restrictions, you can't print all graphics in all modes. For example, a graphics display prepared for the Ultra-Res print mode might be too large for any other mode.

To illustrate the six printing modes, I made a simple grid that filled one full screen, then printed it in each of the modes.

"Corrections tend to create more problems that must be corrected. To avoid a situation of diminishing returns, keep corrections to a minimum."

The two block graphic printer modes produce graphics that span an 8½-inch page. The four dot graphic modes produce three different size displays.

Documentation

PowerDOT comes with a user's manual only 17 pages long. It doesn't make any attempt at a tutorial, nor does it have any examples on how to use the program.

The manual is a simple description of the function of the various keys and options that control drawing, disk operations, and printing. The few attempts made at explanation are vague and confusing. Unfortunately, the manual contains several typographical errors, misspellings, and nonsense statements.

Powersoft doesn't supply a list of printers with which PowerDOT works. On p. 3 of the manual, the Epson MX series and the C. Itoh Prowriter 8510A are specifically mentioned. A statement indicates that PowerDOT works on a "...variety of printers..." but names no others.

I tried PowerDOT only with an Epson MX-80. It worked without any change in the printer's set-up.

Given the rudimentary documentation and lack of a tutorial, you might expect strong support from Powersoft. This is not the case. On p. 2 of the manual, a statement of disclaimer clearly says that the publisher is not responsible. If you buy PowerDOT, you must see that it works.

Disclaimers of this type are fairly standard in the software business, but this manual goes a little beyond the disclaimer. Page 15 says not to call with questions.

I decided to test this attitude, and called Powersoft with a list of questions. They really mean don't call. I was politely, but firmly told that my problems couldn't be answered by phone. If I'd send my questions by mail, accompanied by a self-addressed stamped envelope, an effort would be made to answer.

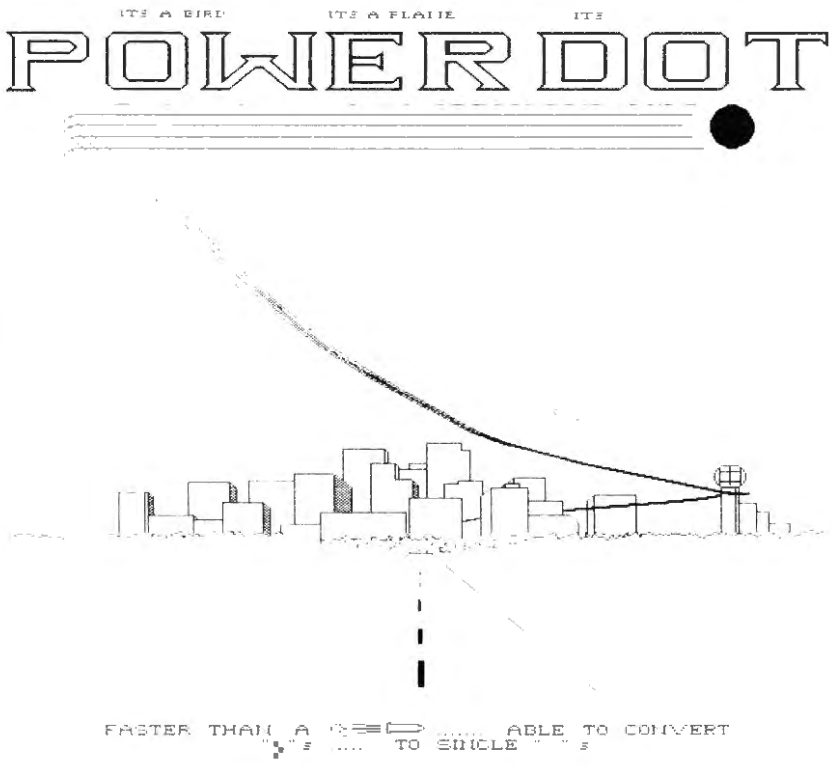


Figure 1. PowerDOT produces detailed graphics.

Conclusions

You can obtain elaborate results with PowerDOT. The program comes with two complete graphics on the distribution disk. One of these is a full-page drawing reproduced here as Fig. 1.

PowerDOT is not particularly easy to use. It lacks any routine to help you draw curves and circles. The manner of moving the cursor varies with different program modes.

Because the documentation is so skimpy, you have to invest in trial-and-error attempts to learn to use the program efficiently. If you have problems with PowerDOT, you're on your own. Little, if any, support is forthcoming from the program's publishers.

If, however, you need to use your dot-matrix printer to produce graphics, PowerDOT is infinitely better than attempting to code hundreds or thousands of data values for a Basic program to POKE. ■

REVIEW DIGEST

OptionVue-A, Star Value Software, 12218 Scribe Drive, Austin, TX 78759, Models I and III, $189.

"OptionVue-A is, in many ways, not an advanced program. It lets you analyze one stock/option combination at a time. You cannot save work in progress, and you cannot easily print the results...

"For what it does, OptionVue-A is useful. ...The ease of use and the documentation are good..." *InfoWorld*, July 18, p. 41.

MC-10 Computer, Tandy/Radio Shack, One Tandy Center, Fort Worth, TX 76102, $119.95.

"The MC-10 seems to be directed toward individuals who are entering the microcomputer arena for the first time. You can use the machine to learn elementary programming techniques and familiarize yourself with some of the hardware. But the lack of expansion capability makes your education incomplete. In the event you decide that computing isn't your forte, you will not have invested a large sum of money for the experience." *Basic Computing*, August, p. 93.

Monty Plays Scrabble, Ritam Corporation, P.O. Box 921, Fairfield, IA 52556, Models I and III, 32K RAM, $34.95.

"For a relatively modest price, Monty Plays Scrabble is a fascinating exercise in programming that should give its owners more than their money's worth of fun. Nevertheless, I'd still take on an interesting flesh-and-blood opponent over Monty any day." *Popular Computing*, September, p. 182.

Subroutine Sandwich, Dr. John P. Grillo and Dr. J.D. Robertson, John Wiley & Sons Inc., New York, NY, 251 pp., $12.95.

"The authors have written some 36 BASIC subroutines that can be incorporated easily into your own programs. ...Using these routines, it's a simple matter, I've found, to write programs for handling the generation of form letters and reminder notes.

"...While *Subroutine Sandwich* cannot qualify as a full-course programming dinner, it does provide enough nourishment to keep you going for a long time." *Personal Computing*, August, p. 141.

The Bread Board System, Ebert Personal Computers Inc., 4122 South Parker Road, Aurora, CO 80014, Models I, III, and 4, 48K RAM, $199.95.

"TBBS is a communications monitor for the TRS-80 computer. ... With this program, users can create custom communications software... through a creative set of system-control menus and need never write a line of computer code.

"There are few corporate- and home-computer users who could not benefit from being the center of their own computer utility. In TBBS, I have seen the programmer's art raised to a new plateau of excellence." *InfoWorld*, Aug. 1, p. 36.

The Basic Answer, Logical Systems Inc., P.O. Box 23956, Milwaukee, WI 53223, Models I and III, $69.

"TBA is...really a translator. It translates code written in structured, easy-to-read (and debug) BASIC into a Level II or Disk BASIC-runable program.

"New users may feel that TBA is somewhat restrictive. That's true, but it teaches good programming practice and it is not all that hard to get used to. If you're thinking about learning assembly language programming, the label concept and structured programming techniques are an absolute must." *Basic Computing*, August, p. 89.

Cyberchess, Cyber Enterprises, 17517-K Fabrica Way, P.O. Box 2066, Cerritos, CA 90701, Models I and III, 32K RAM, $29.95.

"Cyberchess is intended to help you improve your chess playing ability. ...I did not always agree with the moves of the game or the opinion of the person who analyzed them, but I often gained a new perspective or tactic that I had completely overlooked. This alone makes the program well worth the investment." *InfoWorld*, Aug. 1, p. 31.

Grammatik, Aspen Software Co., P.O. Box 339, Tijeras, NM 87059, Models I, II, and III, $75.

"...Grammatik checks your document for archaic and outdated words; capitalization errors; unbalanced parentheses, quotes, and brackets; and double words ("the the") and subtler redundancies ("join together").

"...Grammatik may not turn you into Norman Mailer overnight, but it will rid your business letters of bonehead grammatical errors." *Popular Computing*, September, p. 196.

CALENDAR

October

3–6 IEEE Computer Society, Silver Spring, MD. **8th Data Communications Symposium** Cape Cod, MA.

5–6 DeNardi Enterprises, Los Altos, CA. **Compusource '83** Red Lion Inn, San Jose, CA.

6–8 Kengore Corp., Franklin Park, NJ. **NJ Business Computer Show** Holiday Inn North, NJ Turnpike.

7 Creative Learning Association, Charleston, IL. **Compucon '83** Martin Luther King University Union, Charleston, IL.

7–9 **Great Southern Computer and Electronics Show** Expo Center, Orlando, FL.

7–10 Institutes for Human Resources Inc., New Smyrna Beach, FL. **The Electronic Village Expo 83-84** Tupperware Convention Center, Orlando, FL.

10–12 CEPA Inc., Rockville, MD. **Micros in Engineering, Planning, and Architecture** The Saint Paul, St. Paul, MN.

10–13 Info Inc., New York, NY. **Information Management Exposition & Conference** New York Coliseum, NY.

11–12 Morgan Grampian Expositions, New York, NY. **CADCON '83** Park Plaza Hotel, Boston, MA.

15–16 Kengore Corp., Franklin Park, NJ. **NJ Microcomputer Show & Fleamarket** Meadowlands Hilton Hotel, Secaucus, NJ.

16–18 Texas Association for Educational Data Systems, Austin, TX. **TAEDS 1983 Convention** Hilton Hotel, Austin, TX.

18–19 Architecture Technology Corp., Minneapolis, MN. **Conference on Local Computer Networks** Hilton Inn, Minneapolis, MN.

18–20 IEEE Computer Society, Silver Spring, MD. **EdCompCon '83: Applying Technology to Education** Red Lion Inn, San Jose, CA.

19–21 Raging Bear Productions, Corte Madera, CA. **National Software Show** Trade Show Center, San Francisco, CA.

22 Plymouth State College, Plymouth, NH. **Conference on Computers and Education** PSC campus.

23–26 George Washington University Medical Center, Washington, DC. **7th Annual Symposium on Computer Applications in Medical Care** Convention Center, Baltimore, MD.

24–25 University of Oregon, Eugene, OR. **Pacific Northwest Computer Graphics Conference** Eugene Conference Center.

24–26 American Institute of Aeronautics and Astronautics, Orlando, FL. **Computers in Aerospace Conference** Hartford, CT.

24–26 Association for Computing Machinery, New York, NY. **ACM '83** Sheraton Centre, New York, NY.

November

1–4 American Production & Inventory Control Society, Falls Church, VA. **26th Annual International Conference** Hilton Hotel, New Orleans, LA.

5–7 San Diego Computer Society, San Diego, CA. **San Diego Computer Fair** Scottish Rite Center, San Diego, CA.

7–9 IEEE Computer Society, Silver Spring, MD. **24th Annual Symposium on Foundations of Computer Science** Tucson Marriott, Tucson, AZ.

17–19 Northeast Expositions Inc., Chestnut Hill, MA. **Northeast Computer Show and Software Exposition** Hynes Auditorium, Boston, MA.

18–19 Oklahoma State University, Stillwater, OK. **Microcomputers in Education Conference** OSU campus.

29–Dec 2 The Interface Group, Needham, MA. **Comdex/Fall '83** Las Vegas, NV.

December

12–14 IEEE Computer Society, Silver Spring, MD. **Computer Networking Symposium** Sheraton Inn, Silver Spring, MD.

ESSJAY

CUT YOUR PAPERWORK
TO shreads with SIMPLEX
FORMS PROCESSORS

** MULTI-PURPOSE CHECK WRITER **
uses most Multi-purpose checks for Payroll, Accounts Receivable and Cash Disbursement checks. Each type followed by SESSION REPORT for further bookkeeping procedures
Specify Model I or III Tape or Disk $39.95

** MULTI-PURPOSE FORM PROCESSOR **
Uses most multi purpose printed 8 ½ X 11 forms or PLAIN PAPER. Your choice
Processes INVOICES, STATEMENTS, PURCHASE ORDERS, MEMOS
Specify as above only $49.95

** SPECIAL — COMBO PACK of BOTH **
Specify as above only $79.97

ALSO many single SIMPLEX PROCESSORS
NEW programs soon — CONTRACTOR CERTIFIED PAYROLL, REG PAYROLL, PAYABLES, RECEIVABLES

ADD $3.00 SHIPPING AND HANDLING
Tenn. Residents add 6% percent tax

VISA MasterCard DEALERS INVITED -48

ESSJAY P.O. Box 566
Dyersburg, TN 38024 -- Phone 901-285-1800

Coming Next Month

If you're wondering about the future of data input, the handwriting's on the wall in black and white. Bar codes, those funny stripes on canned goods and *80 Micro*'s cover, will soon be used for everything from taking inventory to loading programs.

The November issue starts with a bar code tutorial, and goes on to Model I/III/4 programs that convert keyboard input into UPC, Codabar, 2 of 5, or 3 of 9 codes on an Epson printer. For desktop owners who want to keep pace with the Model 100, there'll be a look at bar code readers that use the RS-232 interface, and a project to build one from the cassette port.

Besides bar codes, there's a screen dump routine that handles graphics as well as text—all 256 characters in the Model III's repertoire—and a files and directory sorting program. You can expect a look at the Model I tape editor/assembler, too.

Finally, hardware hackers will feel more secure about their homes (with a monitoring and security interface) and about their Model IIIs, which show no signs of life if the screen's clear and the disks aren't spinning. After building an LED pilot light, you'll never again leave the machine on all night by mistake. ■

13 TIMES FASTER THAN dBASE II™

SUPER™

If you bought your computer to save time, then you need SUPER, the most powerful database system you can use. Power is a combination of speed, ease of use and versatility. SUPER has them all.

FAST – To demonstrate SUPER's speed, ISA retained a professional dBASE programmer to benchmark SUPER vs. the acknowledged leader. A simple mailing list application was chosen to minimize dBASE programming cost. The results:

Task	SUPER Time	dBASE II Time
Set up/Program	5:20 min.	12:18:00 hrs.
Input 100 records	50:29 min.	1:27:50 hrs.
Sort & Print Labels	6:41 min.	4:18 min.
Totals	1:02:30 hrs.	13:50:08 hrs.

Notice that SUPER was faster at every task where *your time* is involved—and saving your time is probably the whole reason you bought a computer.

EASY TO USE – SUPER won because of its ease of use. Since it is menu-driven, office personnel can easily learn to use SUPER to set up their own applications, speeding and simplifying dozens of tasks without the need of programmer support.

VERSATILE – SUPER, unlike other business programs, doesn't dictate how to run your business. With SUPER the computer does what *you* want, when *you* want, the way *you* want it. *SUPER may* **be the only business program you'll ever need**. It can handle customer files, payables, receivables, depreciation, appointments, cost accounting, time charges, commissions, inventory, manufacturing control, and even matrix accounting systems!

SUPER PERFORMANCE AT A SUPER PRICE – That SUPER beats the $700 dBASE program may surprise you, but in terms of price vs. performance SUPER has no competitors. Among its features are: production input, data compression, multiple databases on line, transaction posting, file reformating, stored arithmetic files, flexible report formats, hierarchical sort and multi-disk files for up to 131, 068 records. It can select by ranges, sub-strings, and field comparisons. It interfaces to word processors such as WordStar™, SuperSCRIPTSIT™, Model II/16 SCRIPTSIT™, and NEWSCRIPT™. In fact SUPER has so many features that it takes a six-page product description to cover them all. Write or call and we'll send you one.

SUPER is available for TRS-80™ Models I & III under NEWDOS™, LDOS™, and DOSPLUS; for TRS-80 Models II, III and 16 under TRSDOS™; and CP/M™ systems.

NOW $199*

Manual (Price applicable to purchase)
Now available for IBM-PC

Manual (Price applicable to purchase) $ 25.00
Now available for IBM-PC

*$15.00 Formatting charge for non-standard CPM disk format

OTHER SOFTWARE

- ManageMint™: A PERT/CPM project management system compatible with SUPER. It includes scheduling, resource and financial management modules.
- Sales Planning and Data Extraction System: Improves hit rates while cutting costs.
- Small, economical program packages for accounting, business and office applications as well as utilities.

Write for Catalogue

ISA

Institute For Scientific Analysis, Inc.

351

SOFTWARE FOR HARD USE™

Dept. M-3 Institute for Scientific Analysis, Inc.
P.O. Box 7186 Wilmington, DE 19803 (215) 358-3735

MasterCard VISA

ORDERS ONLY (800) 441-7680 EXT. 500

Trade mark owners: dBASEII: Ashton-Tate SCRIPTSIT, SuperSCRIPTSIT, TRSDOS, and TRS-80: Tandy Corp NEWDOS/80: Apparat, Inc WordStar: MicroPro Intl Corp NEWSCRIPT: PROSOFT LDOS: Logical Systems, Inc CP/M: Digital Research

Ephemeris for Comets and Minor Planets

by James H. Fox

Many amateur astronomers have the equipment to track comets and minor planets after they have passed beyond the range of the positions published in astronomy magazines. Computing positions to create ephemerides is what this program is all about.

Some asteroids and comets follow elliptically shaped orbits, and are called periodic because they return to the same point in their orbit after an elapsed period of time. The orbits of these periodic comets and minor planets may be altered by gravitational attraction of the major planets. When such perturbation occurs, the periodic body is not at the position predicted by the last known orbital parameters. To recover or find objects that have had their orbits perturbed, amateur astronomers need some method of defining an area of the sky in which to search. The program provides one method.

Orbital motions are described by a set of differential equations relating two of Newton's physical laws—the Law of Gravitation and the Law of Motion. Solution of these equations requires six constants of integration, known as the elements of the orbit.

Compute the projected positions of comets and minor planets using these orbit parameters.

Orbital Elements

The elements can come in many forms, but the most common are the osculating elements. The eccentricity, e, and the semi-major axis, a, determine the shape and size of the orbit. The inclination (i), argument of the perihelion (ω), and longitude of the ascending node (Ω) determine the spatial orientation of the orbit. The sixth element, perihelion date (T), fixes the object's position in the orbit. Figure 1 shows the relationship of the elements.

Certain other elements may also be given. The perihelion distance (q), rather than the semi-major axis (which is infinite), is used for parabolic orbits. A time (T_o), and the corresponding mean anomaly (M_o) may be given instead of the perihelion date. The period (P) and the mean daily motion (n°) may also be given.

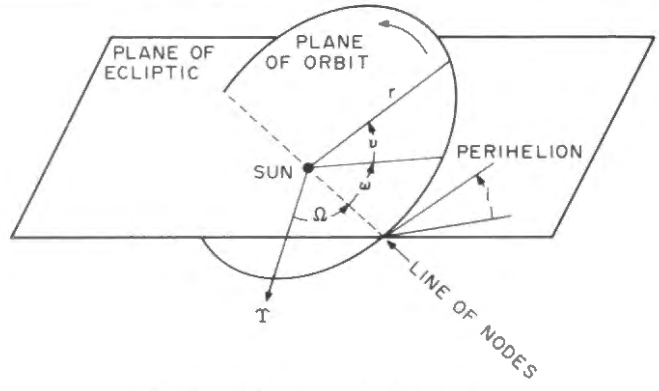


Figure 1. Relationship of orbital elements.

Conic Sections

The solutions to the differential equations of motion are equations of conic sections. Just which conic section a particular orbit follows is determined by its eccentricity, e:

circle	$e = 0$
ellipse	$0 < e < 1$
parabola	$e = 1$
hyperbola	$e > 1$

Hyperbolic orbits are very rare because of the high energies required to achieve them. I won't consider such orbits here. Since circular orbits are merely a special case of elliptical orbits and since they seldom occur in nature, I won't discuss them separately.

The Key Box

Models I and III
32K RAM
Disk Basic
Printer

OPEN NEW HORIZONS FOR YOUR TRS-80 . . .
LDOS 5.1

OPEN NEW HORIZONS FOR YOUR TRS-80 . . .

LDOS 5.1

The powerful and sophisticated Disk Operating System for your TRS-80® Model I, III or 4 (Model 4 in the Model III mode).

LDOS 5.1 — $129.00 plus $5.00 Shipping and Handling

✲smal-LDOS, $59.00 plus $4.00 Shipping and Handling

✲the LDOS Sub-set

Prices and Specifications are subject to change without notice.
Although not required, LSI recommends two or more drives when using LDOS or smal-LDOS.
Dealer inquiries welcome. LDOS and smal-LDOS are products of LSI. TRS-80 is a trademark of Tandy Corp.

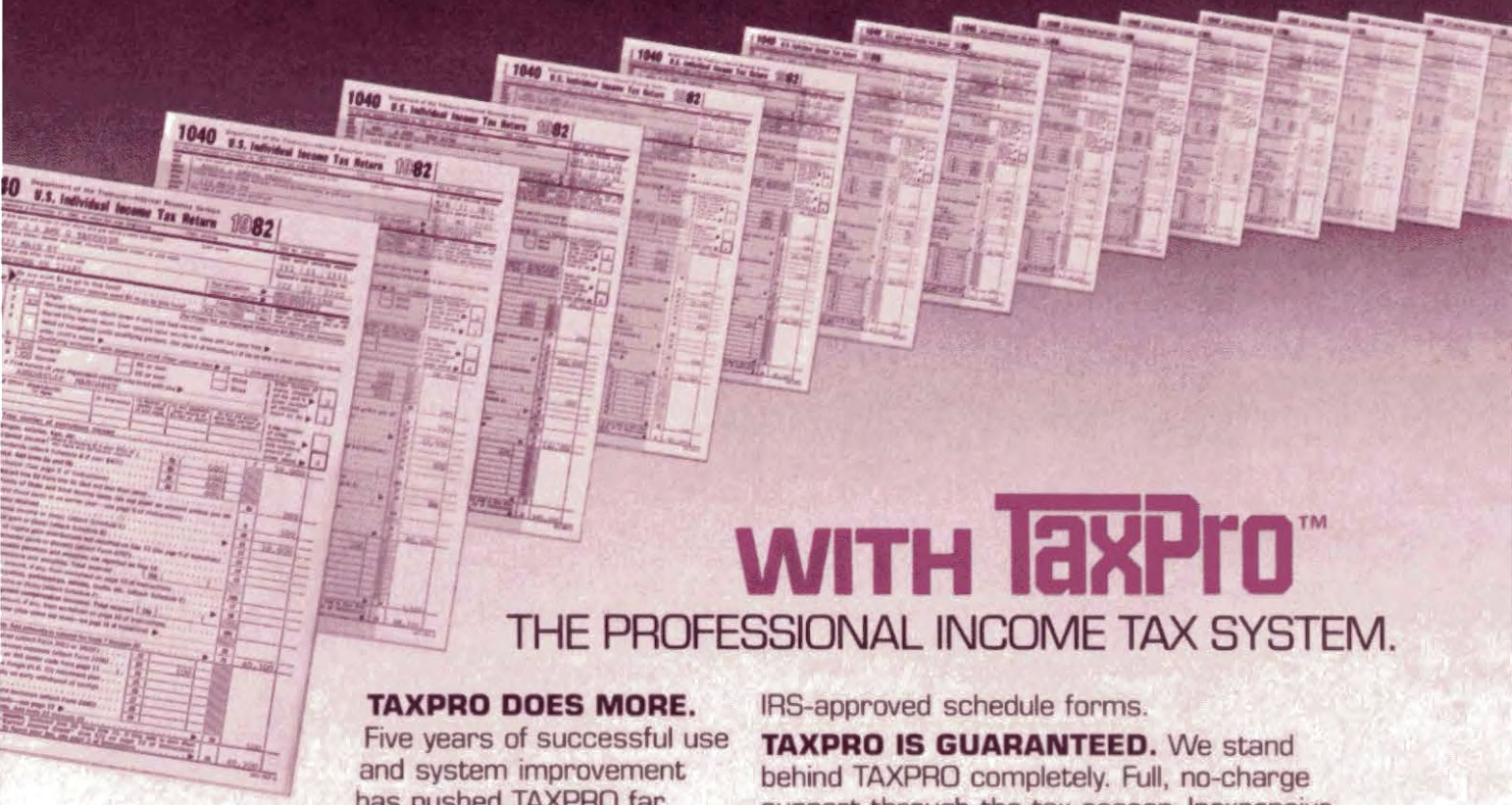
LOGICAL SYSTEMS INC.

Logical Systems, Inc. 8970 N. 55th P.O. Box 23956 Milwaukee, WI 53223 (414) 355-5454

✓251

Art by Mark Paternostro

INCOME TAX OFFICES:
MULTIPLY YOUR OUTPUT.



WITH TaxPro™
THE PROFESSIONAL INCOME TAX SYSTEM.

TAXPRO DOES MORE. Five years of successful use and system improvement has pushed TAXPRO far beyond Form 1040 and its supplemental schedules. This versatile system also totals W-2s, computes FICA overpayment, calculates tax alternatives . . . even prepares client billing.

TAXPRO IS INTELLIGENT. It analyzes the client's tax picture, suggests the best route to go. Determines eligibility for special forms such as minimum/maximum tax, income averaging, to name a few.

TAXPRO IS EASY. Because it follows the tax forms line by line. Taxes are automatically figured, entered everywhere they apply. Change any entry, and all relevant data is automatically revised. Produces a printout that exactly fits 1040 and IRS-approved schedule forms.

TAXPRO IS GUARANTEED. We stand behind TAXPRO completely. Full, no-charge support through the tax season. Inexpensive, yearly system updates. Over 5 million returns prepared with no reported errors.

TAXPRO BUILDS PROFITS. The door is open to higher profits than you have ever enjoyed. Double, triple, or quadruple your output; pay for TAXPRO **and** the computer in one tax season.

If you do income tax returns, you need TAXPRO, the truly professional, computerized income tax preparation system.

Look into it today.
Contract Services Associates,
706 South Euclid,
Anaheim,
California 92802,
(714) 635-4055.

45-PAGE DESCRIPTIVE SYSTEM MANUAL: $7.50

CSA CONTRACT SERVICES ASSOCIATES

Improving the bottom line.

Elliptical Orbits

An ellipse is the most common shape for an orbit to assume. Double stars, planets, most comets, and other bodies in stable orbits travel in ellipses.

Kepler developed the equations for elliptical orbits. To do so, he used an auxiliary circle, circumscribed around the ellipse, and having a radius equal to the ellipse's semi-major axis. (Refer to Fig. 2). He then defined three angles. The true anomaly (ν) is the true polar

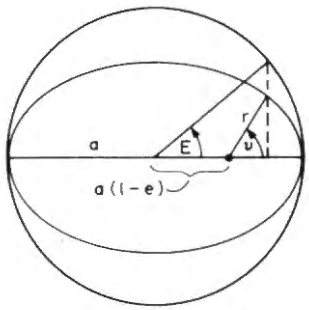


Figure 2. Auxiliary circle.

angle of the orbiting object as seen from the focus of the ellipse and measured from the perihelion. The eccentric anomaly (E) is the angle, measured from the perihelion of the object, as projected onto the auxiliary circle and as seen from the center of that circle. The mean anomaly (M) is the angle, measured from the perihelion, which the object would have if it moved along the auxiliary circle with uniform motion. Note that for a circular orbit (e = 0), a is the constant radius of the orbit and the mean, eccentric, and true anomalies coincide.

You can find the mean anomaly (M) at any time (t) by:

$$(1)\quad M = \frac{360}{P}(t - T) \text{ degrees}$$
$$= \frac{2\pi}{P}(t - T) \text{ radians}$$

P is the orbital period and T is the time of perihelion passage.

Kepler's Equation relates the mean anomaly to the eccentric anomaly (E) by:

$$(2)\quad E = M + e^\circ \sin E$$

All angles are in degrees and $e^\circ = 57.29578\ e$. Since Kepler's Equation is transcendental, you cannot solve it explicitly. Instead, find an approximate solution by iteration. One of the easiest iteration schemes to apply is:

$$(3)\quad E_{i+1} = M + e^\circ \sin E_i + \ldots \text{ letting } E_1 = M$$

Continue the iteration until successive approximations agree within the desired error limits. The approximation equation may be truncated to include only the first two terms if e is small enough. If you fail to include higher order terms, you'll only slow the rate of convergence.

As the eccentricity approaches one, the elliptical orbit gets more elongated and the rate of convergence of the iteration scheme specified by equation 3 slows significantly. An alternate method for nearly parabolic orbits is incorporated in the program below if the eccentricity is greater than 0.75. The method is not detailed here, but you can find further information in A.D. Dubyago's *The Determination of Orbits.*

"An ellipse is the most common shape for an orbit to assume. Double stars, planets, and other bodies travel in ellipses."

Once you've determined the eccentric anomaly, find the true anomaly by:

$$(4)\quad \tan 0.5\nu = \sqrt{\frac{1+e}{1-e}} \tan 0.5\ E$$

Note that the two anomalies, E and ν, lie in the same quadrant, so the inverse tangent can be determined uniquely.

Computing Ephemerides

Given the orbital elements:

T_o—date of perihelion passage
i—orbit inclination to the ecliptic
ω—argument of the perihelion
Ω—longitude of the ascending node
a—semi-major axis (in AU) for elliptical orbits
q—perihelion distance (in AU) for parabolic orbits
e—eccentricity
M_o—mean anomaly at time T_o if T_o is some date other than the date of perihelion passage ($M_o = 0$ at perihelion)

Compute the auxiliary quantities:

$$(5)$$
$$\alpha_1 = \sin\Omega \sin\omega \quad \beta_1 = \cos\Omega \sin\omega \quad \gamma_1 = \sin i \sin\omega$$
$$\alpha_2 = \sin\Omega \cos\omega \quad \beta_2 = \cos\Omega \cos\omega \quad \gamma_2 = \sin i \cos\omega$$

Compute the Gaussian Constants for the orbit. Note that the values are dependent only on i, ω, Ω, and ϵ (inclination of the ecliptic to the Earth's equatorial plane, $\epsilon = 23^\circ\ 26'\ 44.8''$ in 1950) and need be computed only once for a given orbit.

$$(6)\quad P_x = \beta_2 - \alpha_1 \cos i$$
$$P_y = (\beta_2 + \alpha_1 \cos i)\cos\epsilon - \gamma_1 \sin\epsilon$$
$$P_z = (\beta_2 + \alpha_1 \cos i)\sin\epsilon + \gamma_1 \cos\epsilon$$
$$Q_x = -\beta_1 - \alpha_2 \cos i$$
$$Q_y = (-\beta_1 + \alpha_2 \cos i)\cos\epsilon - \gamma_2 \sin\epsilon$$
$$Q_z = (-\beta_1 + \alpha_2 \cos i)\sin\epsilon + \gamma_2 \cos\epsilon$$

If the orbit is elliptical ($0 < e < 1$), continue with equation 7. If the orbit is parabolic ($e = 1$), skip to equation 11.

Ephemeris for Elliptic Orbit

For each date and time of the desired ephemeris, calculate the mean anomaly, M.

$$(7)\quad M = M_o + n^\circ (t - T_o)$$
T = date of ephemeris
n° = mean daily motion (degrees per day)
$$= \frac{0.9856076686}{a^{3/2}}$$
$$= \frac{360}{P \text{ (days)}}$$

By carrying out this and succeeding calculations using fictitious values for M_o, the resulting ephemeris shows the projected shape of the orbit in the sky instead of a single point. This projected shape gives the observer an estimate of the necessary search area if he is trying to recover a lost periodic object. Such an ephemeris is called a search ephemeris.

For each calculated value of M, compute the eccentric anomaly, E, from Kepler's Equation using equation 3 until the relative error is less than 0.01 percent. The relative error can be calculated by:

$$(8)\quad \left|\frac{E_{i+1} - E_i}{E_i}\right| < 0.0001$$

Once computation of E has converged to the desired accuracy, compute the solar rectangular coordinates for each value of E computed.

$$(9)\quad x = a\,P_x(\cos E - e) + a\sqrt{1-e^2}\,Q_x \sin E$$
$$y = a\,P_y(\cos E - e) + a\sqrt{1-e^2}\,Q_y \sin E$$
$$z = a\,P_z(\cos E - e) + a\sqrt{1-e^2}\,Q_z \sin E$$

$$(10)\quad r = (x^2 + y^2 + z^2)^{1/2}$$
distance from the sun (AU)

Skip to equation 16 to compute right ascension and declination from the solar rectangular coordinates.

Program Listing. Orbit Computation/BAS.

```
0 CLEAR1000:GOTO300      'COPYRIGHT 1982 BY J.H. FOX, AFTON MN
1 PRINT@975,"(HIT ANY KEY TO CONTINUE)";
2 Q$=INKEY$:IFQ$=""THEN2ELSERETURN
4 IF(PEEK(14312)AND240)<>48THENPRINTTAB(10)"*** PRINTER NOT READ
Y ***":Q%=0:RETURNELSEQ%=-1:RETURN
6 POKE16414,141:POKE16415,5:RETURN      'DCB=PRINTER
7 POKE16414,88:POKE16415,4:RETURN       'DCB=VIDEO
13 PRINT@64*(Q-1),;:RETURN
14 PRINT@64*(Q-1),CHR$(31):GOSUB13:RETURN      'ERASE LINE Q TO
END
300 DEFFNMD(I,J)=I-INT(I/J)*J           'I MOD J
302 DEFFNFR(X)=X-FIX(X)                   'FRACTION PART OF X
303 DEFFNRD(X)=X*PI/180                 'DEGREES => RADIANS
304 DEFFNDG(X)=X*180/PI                 'RADIANS => DEGREES
306 DEFFNMN(X)=FIX(FNFR(X)*60)          'MIN PART OF DD.DDDD
307 DEFFNSC(X)=FNFR(FNFR(X)*60)*60      'SEC PART OF DD.DDDD
308 DEFFNAT(X,Y)=ATN(Y/X)-PI*(X<0)+2*PI*(X>0)*(Y<0)     'ARCTAN(Y
/X) IN PROPER QUADRANT
309 DEFFNAS(X)=ATN(X/SQR(1-X*X))        'ARCSIN(X)
312 DEFFNR(X,Y,Z)=SQR(X*X+Y*Y+Z*Z)      'RADIUS VECTOR
315 GOTO1000
500 '           PARABOLIC ORBIT  EP = 1
510 M=MJ+(T(I)-T0)/A[1.5:C=.0364912*M:CS=SQR(C*C/4+1):C1=C/2-CS:
C2=C/2+CS:J1=SGN(C1):C1=ABS(C1):J2=SGN(C2):C2=ABS(C2)
520 S=J1*C1[(1/3)+J2*C2[(1/3)
530 PA=A*(1-S*S):QA=2*A*S:RETURN
600 '           ELLIPTICAL ORBIT  0 <= EP <= 0.75
610 N0=.985608/A[1.5:N0=FNRD(N0):
620 M=M0+MJ+N0*(T(I)-T0):E1=M
630 E=M+EP*SIN(E1):IFABS(1-E/E1)<.0001THEN640ELSEE1=E:GOTO630
640 PA=A*(COS(E)-EP):QA=A*SQR(1-EP*EP)*SIN(E):RETURN
700 '           NEARLY PARABOLIC ORBIT  .75 < EP < 1
710 E=(1-EP)/(1+EP):F=1-(.399375-.108601*E)*E
720 D=1-(.0284851-(.0186341-.001917*E)*E)*E
730 C=F*SQR((1+EP)/2)/A[1.5:B=EP*D:M=C*(T(I)-T0)+MJ
740 T1=.0364912*M:T3=SQR(T1*T1/4+1):X0=T1/2-T3:J1=SGN(X0):X0=ABS
(X0)
750 T2=J1*X0[(1/3)+(T1/2+T3)[(1/3):N=B*T2*T2:S=1+.431919*N
760 P=N+E:IFP<.22THENH=1
770 IFP>=.22THENH=1-3E-6*(P-.21)
780 T3=T2*S*H:T4=T3*T3*E+1
790 PA=A*(1-T3*T3)/T4:QA=2*A*T3/T4:RETURN
1000 DEFINTI-K:PI=3.14159:CLS
1050 PRINTCHR$(23):PRINT:PRINT:PRINT"   SEARCH EPHEMERIDES
":PRINT:PRINT:PRINT:PRINT"   BY J.H. FOX":FORI=1TO2000:NEXT:CLS
1150 CLS:INPUT"ENTER NAME OF OBJECT .....";A$
1160 PRINT@128,"ENTER ELEMENTS:"
1170 INPUT"     INCLINATION ..............";U:U=FNRD(U)
1180 INPUT"     ARGUMENT OF PERIHELION ....";V:V=FNRD(V)
1190 INPUT"     LONG. OF ASCENDING NODE ...";W:W=FNRD(W)
1200 INPUT"     REFERENCE DATE (JD) .......";T0
1210 INPUT"     ECCENTRICITY .............";EP
1220 IF(EP<0OREP>1)THENPRINT"
ORBIT NOT DEFINED FOR NEGATIVE ECCENTRICITY.
EPHEMERIS NOT AVAILABLE FOR HYPERBOLIC ORBIT.":STOP
1230 JP=3                       'NEARLY PARABOLIC
1240 IFEP=1THENJP=1             'PARABOLIC
1250 IFEP=<.75THENJP=2          'ELLIPTIC
1260 ONJPGOTO1270,1300,1270
1270 PRINT"  *** PARABOLIC OR NEAR PARABOLIC ORBIT ***"
1280 INPUT"     PERIHELION DISTANCE .......";A:GOTO1330
1300 PRINT"  *** ELLIPTICAL ORBIT ***"
1310 INPUT"     SEMI-MAJOR AXIS ..........";A
1320 PRINT"     MEAN ANOMALY IN DEGREES AT REFERENCE"
1321 INPUT"       DATE (=0 AT PERIHELION) ";M0:M0=FNRD(M0)
1330 CLS:K=1                    'ENTER SOLAR COORDINATES
1340 PRINT"FOR EACH DATE OF DESIRED EPHEMERIS, ENTER A 8 CHARACT
ER STRING
FOR THE DATE (EG, 10/15/82), THE JULIAN DATE AND THE (EPOCH
1950) X,Y,Z COORDINATES OF THE SUN FOR THAT DATE (AVAIL. FROM"
1341 PRINT"ASTRONOMICAL ALMANAC, SECTION 'C').  A MAXIMUM OF 10
DATES ARE
ALLOWED.  IF FEWER THAN 10 DATES ARE REQUIRED, ENTER 'DONE'
PLUS 4 ZEROS (SEPARATED BY COMMAS) AFTER THE LAST DATE - EG,
? DONE,0,0,0,0":PRINT
1350 INPUTD$(K),T(K),X(K),Y(K),Z(K)
1360 IFLEFT$(D$(K),4)="DONE"THENK=K-1:GOTO1400
1370 IFK=10THEN1400ELSEK=K+1:GOTO1350
1400 CLS:PRINT@138,"SELECT YOUR CHOICE BY NUMBER:"
1401 PRINT@266,"<1>     SINGLE POSITION EPHEMERIS"
1402 PRINT@394,"<2>     ORBIT PROJECTION EPHEMERIS"
1410 GOSUB2:JC=VAL(Q$):IFJC<1ORJC>2THEN1410
1420 CLS:PRINT@458,"OUTPUT TO SCREEN <S> OR PRINTER <P>"
```

Listing continued

Ephemeris for Parabolic Orbit

For a parabolic orbit, no value is given for a (which is infinite) or e (which is always 1 for a parabola). Instead, the perihelion distance (q) is used to compute the mean anomaly (M) for each date (t) of desired ephemeris.

$$(11) \qquad M = \frac{t - T_o}{q^{3/2}}$$

For each calculated value of M, compute σ. (Note: $\sigma = \tan 0.5\nu$, where ν is the true anomaly. However, the value of ν itself is never required in further calculations, so σ is computed here, instead.)

$$(12) \qquad \frac{1}{3}\sigma^3 + \sigma = \frac{k\,M}{2} \qquad k = \text{Gaussian constant} = 0.01720209895$$

This equation may be solved for σ by iteration or by the following special form of the cubic equation for the real root σ:

$$(13) \qquad \sigma = \sqrt[3]{\frac{c}{2} - \left(\frac{c^2}{4} + 1\right)^{1/2}} + \sqrt[3]{\frac{c}{2} + \left(\frac{c^2}{4} + 1\right)^{1/2}}$$

$$c = \frac{3\,k\,M}{2}$$

Once the values of σ have been determined, compute the solar rectangular coordinates for each value of σ.

$$(14) \qquad \begin{aligned} x &= q\,P_x\,(1 - \sigma^2) + 2\,q\,Q_x\sigma \\ y &= q\,P_y\,(1 - \sigma^2) + 2\,q\,Q_y\sigma \\ z &= q\,P_z\,(1 - \sigma^2) + 2\,q\,Q_z\sigma \end{aligned}$$

$$(15) \qquad r = (x^2 + y^2 + z^2)^{1/2}$$

distance from the sun (AU)

This is the same as equation 10.

Determine Equatorial Coordinates

From the solar rectangular coordinates, compute the geocentric rectangular coordinates:

$$(16) \qquad \begin{aligned} \xi &= x + X \\ \eta &= y + Y \\ \zeta &= z + Z \end{aligned}$$

$$(17) \qquad \Delta = (\xi^2 + \eta^2 + \zeta^2)^{1/2}$$

distance from the Earth (AU)

X, Y, and Z are the geocentric rectangular coordinates of the sun and are

VIDEO INSTRUCTION TAPES!

STEP BY STEP INSTRUCTIONS

PICTURES ARE WORTH
THOUSANDS OF WORDS AND SAVE
HOURS OF FRUSTRATION

Use your VCR side by side with your computer to learn disk operating systems, how to program, and how to use programs. Your VCR along with your computer serve as your personal tutor. Pause your VCR to review and learn at your own pace.

VHS or BETA FORMAT

SPECIAL SALE WHILE SUPPLY LAST

Verbatim Datalife Diskettes
5 Year Warranty 5¼ In
Double Density Diskettes In
Plastic Storage Box

ONLY $25.00 BOX OF TEN

MASTERCARD — VISA and C.O.D. Orders accepted add $3.00 per order for shipping and handling. Telephone orders taken 9:00 a.m. - 6:00 p.m. Central Time.
Specify either VHS or BETA Tape Format

C.O.D. Orders add $3.00

DEALER INQUIRIES WELCOME

TO ORDER PHONE
OR WRITE

TAPES NOW AVAILABLE

CAT #	TOPIC	APPROX RUN TIME
DOS-1	TRSDOS 1.3 MOD 3	1 HR 30 MIN
DOS-6	TRSDOS 6.0 MOD 4	1 HR 45 MIN
DOS-3	NEWDOS 80 2.0	1 HR 45 MIN
DOS-2	DOSPLUS 3.5	1 HR 45 MIN
DOS-5	LDOS	1 HR 45 MIN
DOS-4	MULTIDOS	1 HR 45 MIN
EW-1	VISICALC	1 HR 30 MIN
WP-1	LAZY WRITER	1 HR 45 MIN
WP-2	SUPERSCRIPSIT	1 HR 45 MIN
WP-3	SCRIPSIT	1 HR 30 MIN
DB-1	PROFILE III PLUS	1 HR 45 MIN
DIO-3	TRSDOS 1.3 DISK I/O	1 HR 45 MIN
DIO-4	TRSDOS 6.0 DISK I/O	1 HR 45 MIN

The DIO-3 and DIO-4 Video Tapes include disk basic commands with examples. Also teaches both random and sequential disk read and write.

TAPE ABOVE ONLY $39.95 EACH

CAT #	TOPIC	APPROX RUN TIME
BP-1	LEARNING MODEL 3 BASIC	3 HR
BP-2	LEARNING MODEL I BASIC	3 HR
BP-3	LEARNING C-64 BASIC	2 HR
BP-4	LEARNING VIC-20 BASIC	2 HR
DIO-1	COMMODORE 64 DISK I/O	1 HR 45 MIN
DIO-2	VIC 20 DISK I/O	1 HR 45 MIN

TAPES ABOVE ONLY $49.95 EACH

LYNN COMPUTER SERVICE

6831 West 157th Street Tinley Park, Illinois 60477
(312) 429-1915

115

master charge THE INTERBANK CARD

BANKAMERICARD VISA

VISICALC IS A TRADEMARK OF PERSONEL SOFTWARE INC. LAZY WRITER IS A TRADEMARK OF ALPHA BIT COMMUNICATION SCRIPSIT, SUPERSCRIPSIT, PROFILE III PLUS AND TRSDOS ARE TRADEMARKS OF TANDY CORP. LDOS IS A TRADEMARK OF LOGICAL SYSTEMS INC. NEWDOS80 IS A TRADEMARK OF APPARAT INC. DOS PLUS IS A TRADEMARK OF MICRO SYSTEMS SOFTWARE INC. MULTIDOS IS A TRADEMARK OF COSMOPOLITAN INC. VIC 20 AND COMMODORE 64 ARE TRADEMARKS OF COMMODORE BUSINESS MACHINES, INC.

See List of Advertisers on Page 323

Listing continued

```
1430 JS=-1:GOSUB2:IFQ$="S"THEN1500
1440 IFQ$><"P"THEN1430
1450 JS=0:GOSUB4
1460 IFQ%THEN1500
1470 FORI=1TO1000:NEXT:GOTO1420
1500 CLS:PRINT@458,"COMPUTING GAUSIAN CONSTANTS"
1510 A1=SIN(W)*SIN(V):B1=COS(W)*SIN(V):C1=SIN(U)*SIN(V)
1520 A2=SIN(W)*COS(V):B2=COS(W)*COS(V):C2=SIN(U)*COS(V)
1530 D1=A2+B1*COS(U):D2=-A1+B2*COS(U)
1540 PX=B2-A1*COS(U):PY=D1*.917437-C1*.397881:PZ=D1*.397881+C1*.
917437
1550 QX=-B1-A2*COS(U):QY=D2*.917437-C2*.397881:QZ=D2*.397881+C2*
.917437
1560 IFNOTJSTHENCLS:PRINT@458,"COMPUTING EPHEMERIDES":GOSUB6
1570 IFJSTHENCLS
1600 PRINTTAB(20)"EPHEMERIS FOR ";A$
1610 PRINTTAB(6)"  DATE       RT ASC     DECLINATION   R(EARTH)
R(SUN)"
1611 PRINTTAB(18)"HR MIN     DEG MIN          (AU)          (AU)"
1620 B$="      %       %     ## ##.#    ### ##.#      ##.####     ##.
####"
1621 C$="                    ## ##.#    ### ##.#"
1700 FORI=1TOK:IFJC=1THENJL=0:JU=0ELSEJL=-2:JU=2
1710 PRINT" "
1720 FORJ=JLTOJU:MJ=J*.0872665:ONJPGOSUB500,600,700
1730 X=PA*PX+QA*QX:Y=PA*PY+QA*QY:Z=PA*PZ+QA*QZ:R=FNR(X,Y,Z)
1740 XI=X+X(I):ETA=Y+Y(I):ZETA=Z+Z(I):D=FNR(XI,ETA,ZETA)
1750 DC=FNAS(ZETA/D):DC=FNDG(DC):RA=FNAT(XI,ETA):RA=FNDG(RA)/15
1760 ID=SGN(DC):DC=ABS(DC):DG=ID*FIX(DC):DM=FNMN(DC)+FNSC(DC)/60

1770 HR=FIX(RA):MN=FNMN(RA)+FNSC(RA)/60
1780 IFJ=0THENPRINTUSINGB$;D$(I),HR,MN,DG,DM,D,R
                ELSEPRINTUSINGC$;HR,MN,DG,DM
1790 NEXTJ
1800 IF(JSANDJC=2ANDFNMD(I,2)=0)THENGOSUB1:Q=4:GOSUB14
1810 NEXTI:GOSUB7:GOSUB1:CLS:STOP
```

Model II/12/16 Conversion

```
DELETE THE FOLLOWING LINES:

6-14, 1460-1470

EDIT THE FOLLOWING LINES:

1 IFJS=0THENRETURNELSEPRINT:PRINTTAB(25)"(HIT ANY KEY TO CONTINU
E)"
2 Q$=INKEY$:IFQ$=""THEN2ELSEPRINTCHR$(11);:PRINTCHR$(23):RETURN
4 SYSTEM"DUAL ON":RETURN
510 M=MJ+(T(I)-T0)/A^1.5:C=.0364912*M:CS=SQR(C*C/4+1):C1=C/2-CS:
C2=C/2+CS:J1=SGN(C1):C1=ABS(C1):J2=SGN(C2):C2=ABS(C2)
520 S=J1*C1^(1/3)+J2*C2^(1/3)
610 N0=.985608/A^1.5:N0=FNRD(N0):
730 C=F*SQR((1+EP)/2)/A^1.5:B=EP*D:M=C*(T(I)-T0)+MJ
750 T2=J1*X0^(1/3)+(T1/2+T3)^(1/3):N=B*T2*T2:S=1+.431919*N
1050 PRINTCHR$(31):PRINT:PRINT:PRINT"          SEARCH EPHEM
ERIDES":PRINT:PRINT:PRINT:PRINT"          BY J.H. FOX":FORI=1T
O2000:NEXT:PRINT CHR$(30)
1160 PRINT:PRINT"ENTER ELEMENTS:"
1220 IF(EP<0OREP>1)THENPRINT:PRINT"ORBIT NOT DEFINED FOR NEGATIV
E ECCENTRICITY.":PRINT"EPHEMERIS NOT AVAILABLE FOR HYPERBOLIC OR
BIT.":STOP
1340 PRINT"FOR EACH DATE OF DESIRED EPHEMERIS, ENTER AN 8 CHARAC
TER STRING FOR THE":PRINT"DATE (EG, 10/15/82), THE JULIAN DATE A
ND THE (EPOCH 1950) X,Y,Z":PRINT"COORDINATES OF THE SUN FOR THAT
 DATE (AVAIL. FROM ASTRONOMICAL ALMANAC,"
1341 PRINT"SECTION 'C'). A MAXIMUM OF 10 DATES ARE ALLOWED.  IF
FEWER THAN 10 DATES":PRINT"ARE REQUIRED, ENTER 'DONE' PLUS 4 ZER
OS (SEPARATED BY COMMAS) AFTER THE LAST":PRINT"DATE - EG, ? DONE
,0,0,0,0":PRINT
1400 CLS:PRINT@180,"SELECT YOUR CHOICE BY NUMBER:"
1401 PRINT@340,"<1>     SINGLE POSITION EPHEMERIS"
1402 PRINT@500,"<2>     ORBIT PROJECTION EPHEMEPIS"
1420 CLS:PRINT@420,"OUTPUT TO SCREEN <S> OR PRINTER <P>"
1500 CLS:PRINT@420,"COMPUTING GAUSIAN CONSTANTS"
1560 IFNOTJSTHENCLS:PRINT@420,"COMPUTING EPHEMERIDES"
1620 B$="      \       \    ## ##.#    ### ##.#      ##.####     ##.
####"
1780 IFJ=0THENPRINTUSINGB$;D$(I),HR,MN,DG,DM,D,R ELSEPRINTUSINGC
$;HR,MN,DG,DM
1800 IF(JSANDJC=2ANDFNMD(I,2)=0)THENGOSUB1:Q=4
```

tabulated in the *Astronomical Almanac* for each day of the year. The *Astronomical Almanac* is available from the U.S. Government Printing Office. Each date of the desired ephemeris requires one set of rectangular coordinates.

For each set of rectangular coordinates, compute right ascension (α) and declination (δ) from:

(18) $\delta = \sin^{-1}(\zeta/\Delta)$ degrees

(19) $\alpha = \tan^{-1}(\eta/\xi)$ degrees

Remember, α must be converted to hours by α (hours) = α (degrees)/15.

The inverse tangent on all computers returns a value between $-90°$ and $+90°$. If ξ is negative, add 180° to the calculated value of $\tan^{-1}$; if ξ is positive but η is negative, add 360° to the calculated value. For other combinations, the calculated value is correct. This correction is performed in the program by a function subroutine at line 308.

"Although the program is written in single-precision arithmetic, you can convert it to double-precision if you want more accuracy."

The Program

The program runs under Disk Basic on a TRS-80 Model I computer. It should work as well on the Model III, but I have not tried it on that model. Although the program is written in single-precision arithmetic, it could be converted to double-precision if more accuracy is desired.

Subroutines occupy the initial program lines. This minimizes the time required for the interpreter to search for subroutine line numbers. Program comments describe most of the subroutines' functions. Lines 500–700 compute the mean anomaly for parabolic, elliptical, or nearly parabolic orbits.

Lines 1150–1330 prompt the user for the orbital elements, checking along the way for the orbit shape based on the eccentricity. The reference date (line 1200) and the ephemeris dates (line 1350) are

LAST NIGHT, 39 MUSICIANS HAD A COMPUSERVE CONFERENCE, SO DID 31 M.D.S, 49 SPORTS FANS AND 640 APPLE POLISHERS, AND NO ONE HAD TO LEAVE HOME.

The Electronic Forum, Cheaper than Long Distance and Much More Rewarding.

Every night on the CompuServe Information Service, professional and social groups discuss a wide range of subjects. From what's new in medical technology to what's nouvelle in continental cuisine.

And every day more computer owners who share a common interest are discovering this exciting new way to exchange ideas and even transfer hard copy data.

And besides electronic forums, they leave messages for each other on our national bulletin board, "talk" informally on our CB simulator, and communicate via CompuServe's electronic mail.

But best of all, in most cases, CompuServe subscribers get all of these state of the art communications options, plus a world of on-line information and entertainment for the cost of a local phone call plus connect time.

To become part of this flexible communications network, all you need is a computer, a modem and CompuServe. CompuServe connects with almost any personal computer, terminal, or communicating word processor.

To receive an illustrated guide to CompuServe and learn how you can subscribe, contact or call:

CompuServe

Consumer Information Service, P.O. Box 20212
5000 Arlington Centre Blvd., Columbus, OH 43220

800-848-8199

In Ohio call 614 457 0802

235

An H&R Block Company

See List of Advertisers on Page 323

entered as Julian dates. This date is the number of elapsed days since January 1, 4713 B.C., and makes direct arithmetic operations on dates easy. Fortunately, the Julian date for any day of the year can be found in the *Astronomical Almanac* along with the solar X, Y, Z coordinates.

However, to stay within the restrictions of single-precision arithmetic, enter no more than the six most significant figures. For example, 20 December 1982 is JD 2,445,323 and it would be entered as 5323. Note that fewer than six significant figures can be used if they span the time frame of the desired ephemeris.

At lines 1400–1410, choose between computing a single position or an orbit projection for each date of ephemeris. A projection is provided by artificially introducing an offset of −10, −5, 0, +5, +10 degrees to the mean anomaly on each date. This is accomplished by the variable MJ computed in line 1720 and used in subroutine lines 510, 620, or 730, as appropriate.

Input data and the resulting output for two comets are provided in Tables 1 and 2. The first provides single-position ephemerides for an elliptical orbit, while the second computes an orbit projection for a nearly parabolic orbit. Note that the comet's distance to the Earth and sun are only provided for the orbital point having zero offset in Table 2. ■

Contact James H. Fox at 14601 55th St. S., Afton, MN 55001.

Periodic Comet Gehrels III (1975_o)

i = 1.1012 degrees e = 0.15186
ω = 231.487 degrees a = 4.03740 AU
Ω = 242.552 degrees T_o = 23.27 Apr 1977 = 2443256.27 JD

Date (1977)	JD	X	Y	Z
Oct 4	2443420.5	−.984238	−.163636	−.0709512
Oct 14	2443430.5	−.936385	−.315255	−.136691
Oct 24	2443440.5	−.860598	−.457430	−.198340

Ephemeris for P/Gehrels III (1975_o)

Date	RT ASC Hr	RT ASC Min	Declination Deg	Declination Min	R(Earth) (AU)	R(Sun) (AU)
10-04-77	10	13.0	10	5.3	4.1983	3.4747
10-14-77	10	24.5	8	58.1	4.1058	3.4809
10-24-77	10	35.4	7	52.4	4.0011	3.4874

Table 1. Elliptical orbit.

Comet Swift-Tuttle (1962 III)

i = 113.560 degrees e = 0.960427
ω = 152.766 degrees q = 0.962638 AU
Ω = 138.685 degrees T_o = 17.0 Sep 1981 = 2444864.5 JD

Date (1981)	JD	X	Y	Z
Aug 1	2444817.5	.636351	−.727709	−.315842
Aug 11	2444827.5	.759150	−.620586	−.269395
Aug 21	2444837.5	.860641	−.495848	−.215304

Ephemeris for Comet Swift-Tuttle (1962 III)

Date	RT ASC Hr	RT ASC Min	Declination Deg	Declination Min	R(Earth) (AU)	R(Sun) (AU)
	21	17.2	36	1.6		
	21	17.2	35	56.3		
08-01-81	21	17.2	35	51.1	1.6034	1.3080
	21	17.2	35	45.8		
	21	17.2	35	40.5		
	21	40.2	27	2.0		
	21	40.2	26	57.4		
08-11-81	21	40.2	26	52.8	1.7033	1.1744
	21	40.1	26	48.2		
	21	40.1	26	43.6		
	21	58.3	19	48.1		
	21	58.3	19	43.9		
08-21-81	21	58.3	19	39.8	1.7932	1.0743
	21	58.2	19	35.7		
	21	58.2	19	31.6		

Table 2. Nearly parabolic orbit.

THE RESULTS ARE IN!!!

"... Your Word Machine Program is the best bargain I've found in my two years of personal computing."
"My secretary prefers the Word Machine to Newscript because it's faster and easier to use..."
"... a slick package ... a great manual."

Make Your Second Word Processor Pel-Tek's Word Machine Version 2.0

A full featured line oriented word processor in machine language ... now better than ever with these features
- Block graphics (for printers that support it)
- Imbedded form controls • Help screen
- Lower case support for unmodified Mod I s
- Variable margins, line length, page length, line spacing
- Access to D O S with warm start re-entry
- Scroll up/down text • Save/load disk files
- Insert/delete characters/lines • String search
- Set up to fifteen tab stops
- Center text • Imbed codes 0-255 in line
- Insert another file into text • word-wrapping
- Edit any ASCII file (up to 80 char. lines)
- 23000 char. buffer for 48K version
- Pause for keyboard entries during printout
- Print multiple copies of text
- Printer independent • Simplified commands
- Twenty-four page typeset manual with command summary sheet (manual FREE with S A S E)

For Mod I/III 32/48K Disk only **$20.00**

PEL-TEK
P.O. Box 1026 • Southampton, PA 18966
TOLL FREE ORDER LINE 800-523-2445
In Pennsylvania Call (215) 947-2334

• Check or Money Order • Visa, MasterCard accepted
• Add $2.00 per order for postage and handling
• PA residents add 6% sales tax

324

THE REST OF 80

IT HAD TO GO SOMEWHERE

There's no reason to deprive you of solid microcomputing information just because it wouldn't fit between the covers of *80 Micro*. But even *80*, as thick as it is, can hold just so much. Here's the answer—**The Rest of 80**—31 of the best tutorials and utilities, hand-picked from the overflowing files at *80 Micro*. These never-before-published articles for the Model I and Model III were just too good to let them get away.

SOMETHING FOR EVERYONE

Whatever your programming skills, **The Rest of 80** can help you learn more and save time and effort. Here are just a few of the chapters you'll find:

An Unlistable, Unbreakable Program
Adding Commands to BASIC
Programming in Tiny Pascal
Line Drawing
Automatic Master Disk Directory
Faster Loading for the Model I
ASCII Converter
A Better LDOS KSM
And more on BASIC, Pascal, and assembly language!

Every program is of the same high quality you wait for every month in *80 Micro*. Now try **The Rest of 80**—a welcome addition to your computer library.

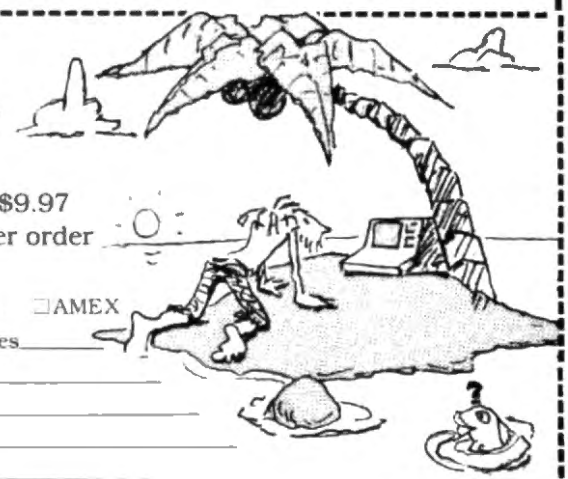
ISBN 0-88006-062-X, softcover with spiral binding, 7 × 9, approx. 300 pp. BK7392 $9.97

Call **TOLL-FREE 1-800-258-5473** for credit card orders. Or mail your order with payment or complete credit card information. Include $1.50 per order for shipping and handling. Send to: Wayne Green Inc., Attn: Book Sales, Peterborough, NH 03458.

A WAYNE GREEN PUBLICATION

WG BOOKS

I'D BE LOST WITHOUT IT!



Send me ____ copies of **THE REST OF 80**. Enclosed is $9.97 (BK7392) per copy plus $1.50 per order shipping and handling.

☐ MasterCard Bank #_____ ☐ VISA ☐ AMEX

Card #_____ Expires_____

Signature _____

Name _____

Address _____

City _____

State_____ Zip_____

33AB8R

Photocopy of coupon is acceptable for ordering.

Molecular Matters

by Karl Sarnow

The Hueckel Molecular Orbital Theory of pi electron systems demystifies the arrangement of protons, neutrons, and electrons in atoms.

How can a teacher demonstrate the modern molecular orbital theories of chemistry without diving into mathematical theories like matrix diagonalization? Use your Model III and this program for an overview of the construction of molecules; this article explains the simplifications that lead to the Hueckel Molecular Orbital (HMO) theory of pi electron systems.

Basic Chemistry

All matter is composed of molecules. All molecules are made from atoms. All atoms are made up of protons (positively charged), neutrons (no charge), and electrons (negatively charged). Protons and neutrons unite to form a positively charged drop, the nucleus of an atom.

To form a neutral atom, the number of electrons must equal the number of protons. These electrons orbit the nucleus of the atom, but unlike planets around the sun, electrons might travel in different planes. The electrons prefer areas of space around the nucleus called orbitals. Because chemical reactions of atoms and molecules are all performed by the electrons in the orbitals, atoms with different numbers of electrons show different chemical behaviors.

In the simplest neutral atoms, the whole atom consists of only one proton in the nucleus and one electron outside in the orbital. This is a hydrogen atom. Figure 1 shows some hydrogen atom orbitals.

In all other atoms, the orbitals are assumed to be hydrogen-like atomic orbitals. The mathematical function describing the probability of finding an electron somewhere around the nucleus is assumed to be the same as that for hydrogen.

Normally, the electron of the hydrogen atom is in the 1s orbital, and the atom is in its ground state.

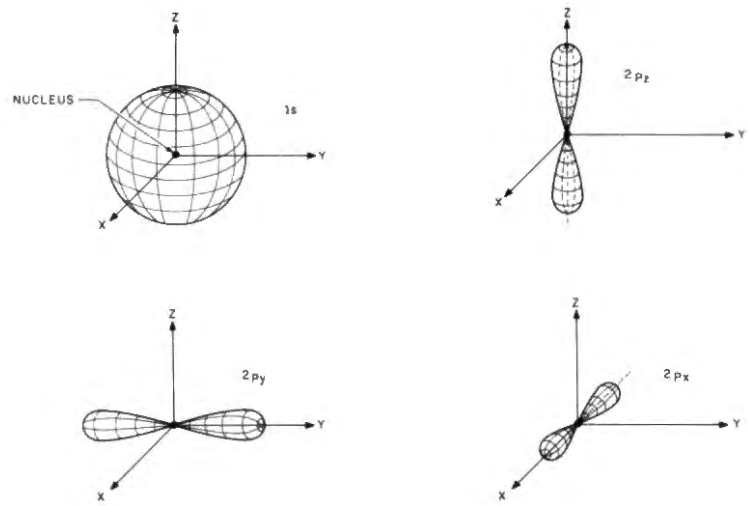


Figure 1. Some orbitals of the hydrogen atom.

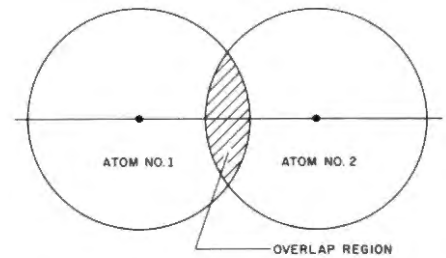


Figure 2. Overlap of 1s orbitals in two hydrogen atoms.

The Key Box

Models I and III
16K RAM (Cassette Basic)
32K RAM (Disk Basic)
Printer

If two hydrogen atoms are close enough together, the orbital of atom 1 overlaps the orbital of atom 2 (see Fig. 2). In the overlap region electrons from both atom 1 and atom 2 can be found, forming a negatively charged region. Both positively charged nuclei are attracted to this overlap region, forming a localized or Sigma (σ) bond. In this type of bond, the bonding electrons are most probably located between the two nuclei.

Let's look at the orbitals of the carbon atom (C) as it is used in most unsaturated organic compounds (compounds with a chemical double bond). The three σ orbitals in Fig. 3 are in the X-Y plane and form Sigma bonds as explained above. These three σ orbitals form the skeleton of a planar organic molecule. Perpendicular to this plane of σ bonds exists a fourth orbital, the p_Z orbital called π in Fig. 3. This orbital produces the double bond in organic unsaturated compounds.

The Pi Electron Cloud

Let's consider the double bond formed by the π orbital. Figure 4 shows the ethylene molecule, in which all atoms are in the X-Y plane. Perpendicular to this plane are the two p_Z orbitals of C1 and C2. Because these two orbitals overlap, the p_Z electron of C1 can jump into the p_Z orbital of C2 and vice versa. This means the probability of

"The hydrogen atom is the simplest atom, but carbon is the most abundant element."

The hydrogen atom is the simplest atom, but carbon is the most abundant element. It is of such importance that chemistry is divided into two parts: chemistry of the carbon atom (organic chemistry) and chemistry of the other elements (inorganic chemistry).

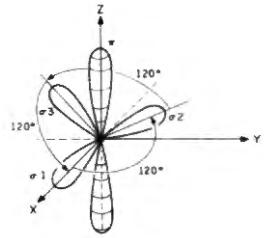


Figure 3. Three sigma sp_2 hybrid orbitals of the carbon atom.

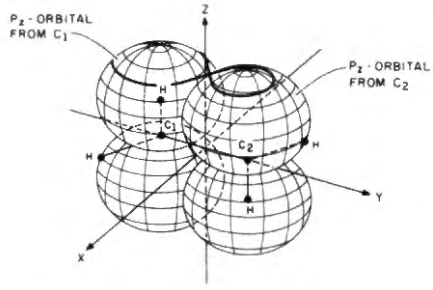


Figure 4. Pi electron cloud resulting from p_Z-p_Z overlap in ethylene.

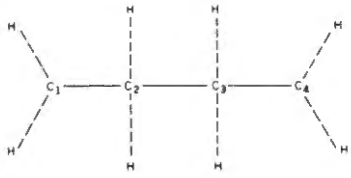


Figure 5. Structure of butadiene.

```
Input file from disk (y/n)? N
Name of Molecule? Butadiene
Number of Pi-centers? 4
From now on, I,J are the atomic centers for which the bond
shall be input.
h and k are heteroatom parameters.  Often used values are:
k hetero:
k(C-C)=1        k(C-O)=0.8      k(C=O)=1.414     k(C-N)=0.8
k(C=N)=1
h hetero:
h(=O)=1         h(>O)=2         h(>N)=0.5        h(-N)=1.5
Atom No. I,J,H (STOP <=0)? 1,2,1
Atom No. I,J,H (STOP <=0)? 2,3,1
Atom No. I,J,H (STOP <=0)? 3,4,1
Atom No. I,J,H (STOP <=0)? 0,0,0


Number of rotations:  6    Pivot-Element:  0.000
Do you want to store the result on disk (y/n)? N

How many pure double bonds? 2
Pure double bond between atoms (I,J)? 1,2
Pure double bond between atoms (I,J)? 3,4

Calculation of the Bond Order matrix.
Occupation of MO no.  1 ? 2
Occupation of MO no.  2 ? 2
Occupation of MO no.  3 ? 0
Occupation of MO no.  4 ? 0
```

Figure 6. Input data for butadiene.

Program Listing. HMO/BAS

```
1 '*****************************************************************
2 '*                          HMO/BAS                              *
3 '*                            by                                 *
4 '*                       Dr. Karl Sarnow                         *
5 '*                       Salzwedeler Hof 9                       *
6 '*                       3000 Hannover 1                         *
7 '*                        West Germany                           *
8 '*****************************************************************

10 DEFINT I,J,N:CLEAR 2000:I=0:J=0:I1=0:J1=0:N=0
20 DIM H(20,20),C(20,20),TM(20,20),B(20,20),E(20,20),NB(20),P(20
,20),NO(20),BM(20,20),NE(20),S(20,20),EP(20),SS(20),ST(20)
30 CLS:B(0,0)=0:H(0,0)=0:E(0,0)=0:TM(0,0)=0
40 A=-11.26:B=-2.5
50 EN=0
60 INPUT"Input file from disk (y/n)";X$
70 IF X$="y" OR X$="Y" THEN 1850
80 INPUT"Name of Molecule";N$
90 INPUT"Number of PI-centers";N
100 PRINT"From now on, I,J are the atomic centers for which the
bond "
110 PRINT"shall be input."
120 PRINT"h and k are heteroatom parameters. Often used values a
re:"
```

Listing continued

Listing continued

```
130 PRINT"k hetero:"
140 PRINT"k(C-C)=1","k(C-O)=0.8","k(C=O)=1.414","k(C-N)=0.8","k(
C=N)=1"
150 PRINT"h hetero:"
160 PRINT"h(=O)=1","h(>O)=2","h(>N)=0.5","h(-N)=1.5"
170 INPUT"Atom No. I,J,H (STOP <=0)";I,J,B1
180 IF I<=0 OR J<=0 THEN GOTO 210
190 IF I<>J THEN H(I,J)=B1*B:H(J,I)=H(I,J) :BM(J,I)=1:BM(I,J)=1E
LSE H(I,J)=A+B1*B:IF B1=0.5 OR B1=2 THEN NE(I)=2 ELSE NE(I)=1
200 GOTO 170
210 POKE16449,0:POKE16450,0:POKE16451,0:FOR I=1 TO N :IF H(I,I)=
0 THEN H(I,I)=A:NE(I)=1
220 NEXT I
230 FORI=1 TO N:EN=EN+H(I,I)*NE(I):NG=NG+NE(I):NEXT I:EN=EN/NG
240 'Construction of H-matrix finished.
250 FOR I=1 TO N
260 FOR J=1 TO N
270 S(I,J)=H(I,J)
280 IF I=J THEN C(I,J)=1 ELSE C(I,J)=0
290 NEXTJ,I
300 R=0
310 'Search for PIVOT element in H-matrix.
320 FOR I=1 TO N
330 FOR J=I TO N
340 B(I,J)=0:E(I,J)=0:B(J,I)=0:E(J,I)=0
350 NEXTJ,I
360 P=0
370 FOR I=1 TO N
380 FOR J=0 TO I-1
390 IF ABS(H(I,J))>P THEN P=ABS(H(I,J)):CI=I:CJ=J
400 NEXTJ,I
410 'PIVOT element is found.
420 PRINT@960,USING"Number of rotations: ##      PIVOT-Element: #
#.###";R;P;
430 IF P<0.1 THEN GOTO 810 :'Convergence criterium
440 'Rotate H-matrix.
450 IF H(CI,CI)<>H(CJ,CJ) THEN T=2*H(CI,CJ)/(H(CI,CI)-H(CJ,CJ)):
K=1/SQR(1+T*T):CM=SQR((1+K)/2):S=SGN(T)*SQR((1-K)/2) ELSE CM=1/S
QR(2):S=SGN(H(CI,CJ))/SQR(2)
460 'TM is the transformation matrix.
470 FOR I=1 TO N
480 TM(I,I)=1
490 FOR J=0 TO I-1
500 TM(I,J)=0:TM(J,I)=0
510 NEXT J,I
520 TM(CI,CI)=CM:TM(CI,CJ)=S:TM(CJ,CI)=S:TM(CJ,CJ)=-1*CM
540 'Construction of the EIGENVECTOR-matrix.
550 FOR I=1 TO N
560 FOR J=1 TO N
570 FOR I1=1 TO N
580 B(I,J)=B(I,J)+C(I,I1)*TM(I1,J)
590 NEXTI1,J,I
600 FOR I=1 TO N
610 FOR J=I TO N
620 C(I,J)=B(I,J):C(J,I)=B(J,I):B(J,I)=0:B(I,J)=0
630 NEXTJ,I
640 'Do the rotation.
650 FOR I=1 TO N
660 FOR J=1 TO N
670 FOR I1=1 TO N
680 B(I,J)=B(I,J)+TM(I,I1)*H(I1,J)
690 NEXTI1,J,I
700 FOR I=1 TO N
710 FOR J=1 TO N
720 FOR I1=1 TO N
730 E(I,J)=E(I,J)+B(I,I1)*TM(I1,J)
740 NEXTI1,J,I
750 FOR I=1 TO N
760 FOR J=I TO N
770 H(I,J)=E(I,J):H(J,I)=E(J,I)
780 NEXTJ,I
790 R=R+1
800 GOTO 310
810 PRINT:HO=PEEK(16451):MI=PEEK(16450):SE=PEEK(16449):INPUT"Do
you want to store the result on disk (y/n)";X$
820 IF X$="y" OR X$="Y" THEN GOSUB 1770
830 LPRINTCHR$(29);"HMO-Calculation for ";N$:LPRINT" "
840 LPRINT"ENERGYEIGENVALUES (IN eV) AND EIGENVECTORS"
850 S$="###."+STRING$(INT(-0.43429*LOG(P+0.000001)+0.9),"#"):IF
LEN(S$)<9 THEN S$=STRING$(9-LEN(S$),"#")+S$
860 S1$=STRING$(LEN(S$),"#"):S2$=STRING$(LEN(S$)-9," ")+"  C ##
##"
870 FOR I=1 TO N
880 EM=-999
890 FOR I1=1 TO N
900 IF EM<H(I1,I1) THEN EM=H(I1,I1):I2=I1
910 NEXTI1
920 H(I2,I2)=-1000:NO(I)=I2
```

Listing continued

finding an orbital electron is distributed (delocalized) over C1 and C2.

If you now imagine a molecule in which the p_Z orbitals are queued up on a line, there suddenly exists a large room in which the electrons of the p_Z orbitals can move freely. The only limitation for these electrons is stated by the Pauli principle: No two atomic particles with exactly the same attributes (as expressed in their quantum numbers) can share the same space. In the p_Z orbital chain this means that up to two electrons (one spin up, one spin down) can exist together in the same space. These two electrons form a pi molecular orbital (π-MO).

"The complexity of large molecules makes it impossible to compute the MOs exactly."

HMO Theory

The extreme complexity of large molecules makes it impossible to compute the MOs exactly. Even the best programs running on large mainframes use some simplifications to make computation easier.

The simplest method of calculating π molecular orbitals is the Hueckel Molecular Orbital method (HMO method), which neglects everything except electrons in the p_Z orbitals. (This certainly leads to some inaccuracy in the results, but the HMO theory allows a basic understanding of the chemical behavior of molecules.) The following principles apply:

- We look at only the π-MOs. The σ skeleton of the molecule is neglected.
- We need -11.26 eV of energy (called α in standard HMO theory) to remove an electron from the p_Z orbital of carbon. The presence of neighboring atoms does not affect this amount.
- The bond energy for two neighboring p_Z orbitals is -2.5 eV (called β in standard HMO theory). The theory neglects all bond energies between non-neighboring orbitals.

Using the Program

Type in the Program Listing, and input sample data for a simple molecule, butadiene. Because this is a new calculation, answer the question "Input file from disk?" with N.

According to the first principle of

HMO, we only care for the pi bonds in the molecule. (The pi bonds are indicated by solid lines in Fig. 5. The dashed lines, sigma bonds, are omitted.) Therefore, we must consider pi bonds between atoms 1–2, 2–3, and 3–4. Input a pi bond between atoms 1 and 2 as 1,2,1.

Figure 6 shows the input for butadiene. Here I and J are the atom numbers between which a pi bond exists. The program computes the bond energy by the equation k*(−2.5 eV); for a carbon–carbon bond, k equals one.

According to the second principle, the energy required to remove the p_z electron is −11.6 eV. The program automatically assumes this value for each carbon atom of the pi system. After ending input with 0,0,0, your TRS-80 represents the structure of the molecule

"Each MO is filled from bottom to top."

in a Hamilton operator, or energy matrix (see Fig. 7). We now have to diagonalize this energy matrix—we have to find a transformation matrix which sets all non-diagonal elements of the energy matrix to zero. We find this transformation matrix by the Jacobi diagonalization procedure.

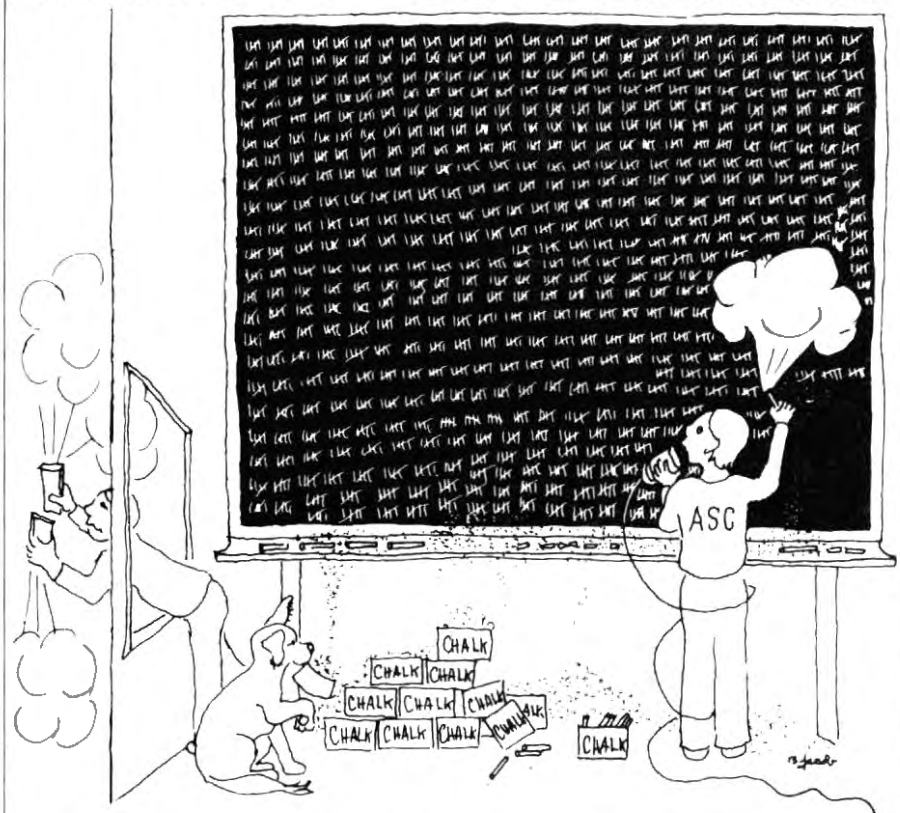
After diagonalization, the diagonal elements are the energy eigenvalues, the values of energy for the possible π-MOs of this molecule. The transformation matrix represents the eigenvectors of the π-MO system (the square root of the probability of finding an electron in a specific π-MO at a specific atom). Figure 8a shows the result of the HMO calculation of butadiene.

E(1) is the energy eigenvalue of the π-MO with the lowest level of energy. In this MO the energy is 4.045 eV less than the center energy, which equals α* number of carbon atoms. Each electron in this MO bonds the molecule together with this amount of energy, and the first MO is called a bonding MO.

E(2) = −1.545 eV means that each electron in this MO contributes only 1.545 eV to the stabilization of the molecule.

E(3) = +1.545 eV means that MO 3 is antibonding. We have to supply energy to an electron of the separate carbon atom if we want to bring it into MO 3. MO 4 occupies the highest level of energy, where E(4) = +4.045 eV above the

15K MEMBERS AND GROWING



American Software Club has been selling software for the APPLE, ATARI, IBM, TRS-80 and CP/M Computers (DEC, Eagle, Vector 4, Northstar, Xerox 820, Superbrain, Heath/Zenith, NEC, Televideo, Altos, Columbia, Osborne, Sanyo) since 1981. Computerists don't just *join* ASC—they *stay* with us.

Chalk it up to. . .
Having 600 products in stock and our "lowest price" guarantee.

Chalk it up to. . .
Our free bi-monthly Compendium magazine which gives comprehensive product descriptions, club news, and services.

Chalk it up to. . .
Our toll free technical support and order lines. ASC doesn't just *sell* software—we *support* it!

Chalk it up to. . .
Speedy shipping. Because we know waiting can be frustrating, ASC has been shipping more than 60% of orders in under 6 hours.

But don't just take our word for it. Join now, and take advantage of our *free* one year membership offer. With absolutely no purchase obligation, you have nothing to lose and everything to gain.

Wondering if there are strings attached? The only one is in the cartoon . . .

For a One-Year Trial Membership with no fee or obligation, fill out the coupon or call our Toll Free Number:

1-800-431-2061

(NY Residents call 914-762-5644) ⌐540

American Software Club, Inc.
Millwood, New York 10546

Please begin my free one-year trial membership as outlined above

Name _____

Address _____

City/State/Zip _____

Outside the US Please enclose $15.00 (US) for a one year membership

My computer is:
☐ APPLE
☐ ATARI
☐ IBM PC
☐ TRS-80 (Mods 1, 2, 3, 4)
☐ CP/M (8" or 5¼")

Listing continued

```
930 LPRINT"E(";N+1-I;")=";EM-EN;"eV":EP(N+1-I)=EM-EN
940 FOR J=1 TON
950 LPRINTUSINGS2$;J;N+1-I;
960 NEXTJ:LPRINT" ":FOR J=1 TO N:LPRINTUSINGS$;C(J,I2);:NEXT J:L
PRINT" ":LPRINT" ":NEXTI
970 LPRINT"Center energy: ";EN*NG;" eV",
980 LPRINT"Number of rotations: ";R,"PIVOT-element: ";P
990 LPRINT" "
1000 LPRINT" ":LPRINT" "
1010 FOR I=1 TO N
1020 IF02*I<=NG THEN NC(I)=2 ELSE NB(I)=0
1030 NEXT I
1040 ER=0
1050 FOR I=1 TO N
1060 ER=NB(I)*EP(I)+ER
1070 NEXT I
1080 LPRINT"Ground state HUECKEL-energy = ";ER+EN*NG;" eV",,
1090 EH=0
1100 PRINT:INPUT"How many pure double bonds";NB
1110 FOR I=1 TO NB
1120 INPUT"Pure double bond between atoms (I,J)";I1,J1
1130 EH=EH+S(I1,J1)*2
1140 NEXTI
1150 ER=ER-EH
1160 LPRINT"RESONANCEENERGY = ";ER;" eV","PER ELECTRON = ";ER/N
G;" eV"
1165 LPRINTUSING"Computing time:  ## Hours,  ## Minutes,  ## Sec
onds";HO,MI,SE
1170 LPRINTSTRING$(131,"*")
1180 FOR I=1 TO 2:LPRINT" ":NEXT I
1190 PRINT:PRINT"Calculation of the BOND ORDER matrix."
1200 FOR I=1 TO N
1210 PRINT"Occupation of MO no. ";I?:INPUTNB(I)
1220 NEXTI
1230 LPRINT"Occupation of MO's"
1240 FORI=1 TO N:LPRINTUSINGS1$;I;:NEXT I:LPRINT" "
1250 FOR I=1 TO N:LPRINTUSINGS1$;NB(I);:NEXT I:LPRINT" ":LPRINT"
 ":LPRINT" "
1260 FOR I=1 TO N:FOR J=1 TO N:P(I,J)=0:NEXT J,I
1270 FOR I=1 TO N
1280 FOR J=1 TO N
1290 FOR I1=1 TO N
1300 P(I,J)=NB(n+1-I1)*C(I,NO(I1))*C(J,NO(I1))+P(I,J)
1310 NEXTI1
1320 NEXTJ,I
1330 LPRINT"Bond order matrix":LPRINT" ":LPRINT"  ";
1340 FOR I=1 TO N:LPRINTUSINGS1$;I;:NEXTI
1350 LPRINT" "
1360 FOR I=1 TO N
1370 LPRINTUSING"##";I;
1380 FOR J=1 TO I
1390 LPRINTUSINGSGET;P(I,J);
1400 NEXTJ:LPRINT" ":NEXTI
1410 FOR I=1 TO 2:LPRINT" ":NEXTI
1420 ER=0
1430 FOR I=1 TO N
1440 ER=NB(I)*EP(I)+ER
1450 NEXT I
1460 LPRINT"HUECKEL-energy = ";ER+EN*NG;" eV":LPRINT" ":LPRINT"
"
1470 LPRINT"FREE VALENCES:":FOR I=1 TO N:LPRINTUSINGS1$;I;:NEXT
I:LPRINT" "
1480 FOR I=1 TO N
1522 FOR I1=1 TO N
1500 NR=BM(I1,I)*P(I1,I)+NR
1510 NEXT I1
1520 LPRINTUSINGS$;SQR(3)-NR;
1530 NR=0
1540 NEXT I
1550 FOR I=1 TO 2:LPRINT" ":NEXT I
1560 I1=0
1570 FOR I=1 TO N
1580 IF NB(I)=1 THEN I1=I1+1:NX(I1)=I
1590 NEXT I
1600 IF I1=8 THEN 1170
1610 FOR I=1OUTTO 2:LPRINT" ":NEXT I
1620 FOR I=1 TO N
1630 SS(I)=C(I,NO(NX(1)))[2
1640 NEXT I
1650 IF I1=1 THEN LPRINT"Spin density for ";N$;"- ion":FOR I=1 T
O N:LPRINTUSINGS1$;I;:NEXT I:LPRINT" ":FOR I=1OTO N:LPRINTUSINGS
$;SS(i);:NEXT I:LPRINT" ":GOTO 1170
1660 FOR I=1 TO N
1670 ST(I)=SS(INAME+C(I,NO(NX(2)))[2
1680 SS(I)=SS(I)-C(I,NO(NX82)))[2
1690 NEXT I
1700 LPRINT"Spin density for ";N$;" singlet state"
```

Listing continued

center energy.

The Eigenvector

The line under the energy eigenvalue E( ) represents the eigenvector C of the corresponding MO. If, for example, you square C11 of the eigenvector of E(1), you have the probability of finding an electron in MO 1 at atom 1 (13.82 percent).

If you do the same for C21–C41, the other eigenvectors of MO 1, and add all probabilities, you obtain 100 percent. So the eigenvector allows you to compute the distribution of electrons in the π-MOs over a molecule.

The Resonance Energy

The resonance energy is calculated from the ground state Hueckel energy of the molecule, which is defined as the sum of the energies of all occupied orbitals:

$$E = \sum_k N_k * E(k) = -11.26 * \sum_r B_{\pi r} + -2.5 * \sum_{i \neq j} B_{ij}$$

$B_{\pi r}$ and B_{ij} are bond order elements.

If the two double bonds in butadiene were isolated, we would expect $E = 4*(-11.26)$ eV $+ 4*(-2.5)$ eV $= -55.04$ eV. According to the equation above and Fig. 8b, $E = -56.220$ eV. The difference of -1.180 eV, called the resonance energy of the molecule, describes the stabilization by the interaction of the electrons in the pi electron system of the molecule. Each electron makes the molecule more stable by -0.295 eV.

Occupation of MOs by Electrons

Each MO, occupied by at most two electrons, is filled from bottom to top. In this case only four electrons exist, one from each carbon atom. MOs 1 and 2 are each filled with two electrons. This occupation leads to the minimum energy the molecule can have, called the ground state. Energizing the molecule causes one, two, or more electrons to occupy an MO of higher energy, yielding an excited state of the molecule.

Bond Order Matrix

The bond order matrix is symmetric

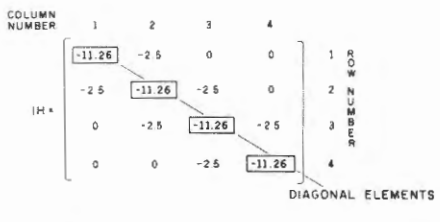


Figure 7. Energy matrix for butadiene.

—element B_{ij} is identical to element B_{ji}. Therefore the bond order matrix is printed out in triangular form.

Figure 8b shows the bond order matrix for the ground state of butadiene. The matrix is computed by the formula:

$$B_{ij} = \sum_k N_k * C_{ik} * C_{jk}$$

B_{ij} is the bond order matrix element, N_k is the occupation of the kth MO (or the number of electrons in that MO), and $\sum_k$ is the summation of all occupied MOs. The diagonal elements of the bond order matrix B_{ii} give the total pi electron density (or the mean number of electrons at atom i). In Fig. 8b we see one pi electron at each carbon atom in the ground state of butadiene. The off-diagonal elements of the bond order matrix (B_{ij}, $i<>j$) indicate the strength of the pi bond between the atoms i and j. $B_{ij}=1$ signifies a pure double bond between these atoms; $B_{ij}=0$ implies no double bond between these atoms.

The double bond between atoms 1 and 2 and atoms 3 and 4 in butadiene is not as pure as one would deduce from the structure formula ($B_{12}=B_{34}=0.894$). On the other hand, a weak double bond exists between atoms 2 and 3 ($B_{23}=0.447$) where one would expect no double bond from the structure formula of butadiene.

Free Valences

The bond order matrix computes the free valence of an atom in a molecule by the equation:

$$F_i = SQR(3) - \sum_j B_{ij}$$

where SQR(3) is the theoretical limit of valence and $\sum_j B_{ij}$ is the sum of all bond orders from atom i to all neighboring atoms j. The greater the free valence, the greater the reactivity with radicals at atom i in the molecule.

Spin Density

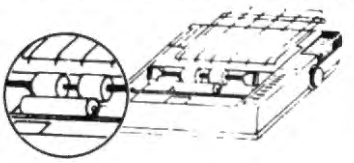
Two electrons identical in all physical properties may display different spin. This is why two electrons can occupy one orbital. One of these would have spin up, the other spin down. Imagine one electron rotating left, the other rotating right. The spin of both electrons is compensated if two electrons occupy the same orbital, resulting in spin density zero. The spin density is therefore the probability of finding an unmatched electron at an atom in the

GOOD NEWS FOR EPSON MX-80 and RX-80 OWNERS

MICRO-GRIP FRICTION FEED

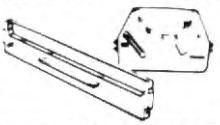
Add inexpensive friction feed to your MX-80 or RX-80. Easily installed with screwdriver, no soldering. Does not disturb tractor feed. Also fits printers based on Epson design such as IBM PC, Commodore and H-P Dot Matrix printers.

Wt. 1 lb. ONLY $39.95/ea.



CARTRIDGE RIBBONS FOR . . .

EPSON MX 70/80	$5.00/ea.	RS LP III, V	$5.85/ea.
EPSON MX 100	9.75/ea.	RS LP VI, VIII	7.00/ea.
RS Daisy Wheel II M/S	5.75/ea.	RS DMP 400	5.50/ea.
RS LP I, IV (Zip Pack)	2.75/ea.	DIABLO Hytype II M/S	4.50/ea.
RS LP I, III, IV (Cart.)	5.85/ea.	OKIDATA 84	5.00/ea.



PRESSURE SENSITIVE LABELS

ONE ACROSS 3-1/2" x 15/16"
ONLY $2.70/M
Order in increments of 5,000

COMPUTER PAPER
MINI PACKS

9-1/2" x 11" Blank, 20 lb. 1 pt., 1000/ctn.
(Extra fine perforations r. & l.) ONLY $16.25/ctn.
14-7/8" x 11" 1/2" Green Bar, 15 lb. 1 pt., 1500/ctn.
ONLY $25.00/ctn.

STANDARD PACKAGING

9-1/2" x 11" Blank, 15 lb. 1 pt. 3300/ctn. ONLY $26.00/ctn.
14-7/8" x 11" 1/2" Green Bar, 15 lb. 1 pt., 3500/ctn.
ONLY $40.00/ctn.

ALL COMPUTER SUPPLIES AT DISCOUNT PRICES

TERMS AND CONDITIONS

We require a minimum order of $10.00, not including shipping charges. Prices effective 7/1/83 and subject to change without notice. To keep prices competitive we operate on cash basis. Credit extended to Federal agencies, but all other institutions and individuals send payment with order; our prices DO NOT include shipping. No C.O.D. orders accepted. We ship via UPS or motor freight. Include street address; we don't ship to P.O. boxes. Freight charges added to credit card purchases. No merchandise returned without prior written authorization from us. Merchandise ordered in error or not wanted is subject to 25% restocking charge and limited to merchandise cited. Only. Mass. residents add 5% sales tax.

Send for our Free Brochure of Computer Supplies. Ask for Catalog No. DP-50.

BILL COLE ENTERPRISES, INC.
P.O. BOX 60 • DEPT. 80 WOLLASTON, MA 02170-0060 617-963-5510
For Credit Card Orders ONLY! Call Toll Free 1-800-225-8249

180

MIKROKOLOR

TRS-80* MODEL 100 COLOR GRAPHICS

High resolution color graphics for graphs, charts, games, animation, business applications, teaching, scientific display. Allows full sized color text and graphics as featured in 80 Micro magazine, May & June 1983.

Display on any sized Color Monitor or Color TV with modulator.

256 x 192 Color Graphics - 15 colors plus transparent.
3 dimensional Sprite planes - Simultaneous display of planes.
4 Modes of operation available:
1. - TEXT: 24 lines - 40 characters per line, 6 x 8 matrix, 256 user defineable characters.
2. - MULTICOLOR: 64 x 48 Color Graphics.
3. - GRAPHICS 1: 256 x 192 Color Graphics, 24 lines - 32 characters, 8 x 8 matrix, 2 colors per character.
4. - GRAPHICS 2: Same as Graphics 1 except 16 colors per character.

SPRITES: Active in all but text mode, 32 prioritized 3-D planes, 15 colors plus transparent, easily provides animated graphics with simultaneous display of all sprites. Composite Video Output (NTSC). Comes with sample programs and instructions. No hardware modifications necessary, plugs into expansion socket. Uses Texas Instruments TMS9918A Video Display Processor. On board RAM uses no system memory space.

User manual only - $5.00. Money Order, COD, checks or credit card. Personal checks must clear. COD add $2.00. Visa, Mastercard add 4%. Calif. residents add 6% sales tax. DEALER INQUIRIES INVITED.

$235.00 Assembled and tested.
$195.00 Kit, with instructions

*TRS-80 Trademark of Radio Shack/Tandy Corp.

ANDREASEN'S ELECTRONICS RESEARCH & DEVELOPMENT, Inc.
Technical Assistance: Box 5686, Vandenberg, Ca. 93437
To Order: 1548 Monterey St, San Luis Obispo, Ca. 93401 ph (805) 541-6398

172

Complete Business Software Package

TRS-80 MOD. II/12/16
FLOPPY OR HARD DISK

ISSI
INTERNATIONAL SOFTWARE SALES INC.

- General Ledger
- Accounts Payable
- Accounts Receivable
- Inventory
- Payroll w/Job Costing
- Practice Management
- Structural Engineering
- Reviewed In April 80 MICRO

Software Modules All Interactive

P.O. BOX 223 - DEPT. A
NEWTONVILLE, N. Y. 12128

470

(518) 271-6825

Listing continued

```
1710 FOR I=1 TO N:LPRINTUSINGS1$;I;:NEXT I:LPRINT" "
1720 FOR I=1 TO N:LPRINTUSINGS$;SS(I);:NEXT I:LPRINT" "
1762 LPRINT" ":LPRINT"Spin density for ";N$;" triplet stavu"
1740 FOR I=1 TO N:LPRINTUSINGS1$;I;:NEXT I:LPRINT" "
1750 FOR I=1 TO N:LPRINTUSINGS$;ST(I);:NEXT I:LPRINT" ":LPRINT"
"
1760 GOTO 1170
1770 OPEN "O",1,N$
1780 PRINT#1,P;EN;CHR$(34);N$;CHR$(34);N;NG;R;HO;MI;SE
1790 FOR I=1 TO N
1800 FOR J=1 TO N
1810 PRINT#1,H(I,J);C(I,J);P(I,J=;S(I,J);BM(I,J)
1820 NEXT J,I
1830 CLOSE
1840 RETURN
1850 INPUT"Filename";X$
1860 OPEN "I",1,X$
1870 INPUT#1,P,EN,N$,N,NG,R,HO,MI,SE
1880 FOR I=1 TO N
1890 FOR J=1 TO N
1900 INPUT#1,H(I,J),C(I,J),P(I,J),S(I,J),BM(I,J)
1910 NEXT J,I
1920 CLOSE
1930 GOTO 830
```

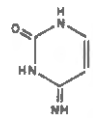
Example Molecule		h_{hetero}	k_{hetero}
Furane		h(>O)=2	k(C–O)=0.8
Chinone		h(=O)=1	k(C=O)=1.414
Pyrrole		h(>N)=0.5	k(C–N)=0.8
Cytosine		h(=N)=1.5	k(C=N)=1

Table 1. Heteroatom parameters h and k.

```
HMO Calculation for Butadiene

Energy Eigenvalues (in eV) and Eigenvectors
E(4)=4.04509 eV
  C 1 4      C  2 4       C  3  4    C  4  4
-0.371748   0.601501    -0.601501   0.371748

E(3)=1.54508 eV
  C 1 3      C  2 3       C  3  3    C  4  3
 0.601501 -0.371748    -0.371748   0.601501

E(2)=-1.54509 eV
  C 1 2      C  2 2       C  3  2    C  4  2
-0.601501 -0.371748     0.371748   0.601501

E(1)=-4.04509 eV
  C 1 1      C  2 1       C  3  1    C  4  1
-0.371748 -0.601501    -0.601501 -0.371748

Center energy: -45.04 eV  Number of rotations: 6
Pivot element: 7.15256E-07

Ground state Hueckel energy = -56.2204 eV
Resonance energy = -1.18035 eV;  per electron = -.295087 eV
Computing time:  0 Hours,  1 Minutes,  6 Seconds
```

Figure 8a. HMO calculation for butadiene.

molecule.

In several cases, where only one electron occupies one or two orbitals, a spin density other than zero is expected at the atoms of the molecule. The first case applies in radical ions that have an extra electron (negatively charged) or one missing electron (positively charged). In this case one unpaired electron occupies one MO. If this is orbital k, then the spin density at atom i is $\rho_i = C_{ik}!2$ (the eigenvector element i of orbital k multiplied by itself).

The second case applies when the molecule is energized, allowing one electron to jump into a higher molecular orbital (see Fig. 8c). We now have two orbitals with unmatched electrons. The resulting spin density at each center is the difference of the probability of finding the two unpaired electrons in the different MOs at the same atom:

$$\rho_i = C_{ik}!2 - C_{ij}!2$$

where the two singly occupied orbitals are k and j. A negative sign of ρ_i simply means that the spin of the unpaired electron in MO j overcompensates for the spin of the electron in MO k and vice versa. Even though ρ_i can be different from zero, the overall spin of the molecule is zero as it is in the ground state (such states are called singlet states).

However, if a molecule is excited the spin of the excited electron may flip. We now have two singly occupied MOs with electrons of parallel spin (these are called triplet states). Because the unpaired electrons have parallel spin, the spin density of both electrons is simply added:

$$\rho_i = C_{ik}!2 + C_{ij}!2$$

Figure 9 shows the occupation of butadiene's MOs by electrons in the ground state of the neutral molecule, in the ground state of a cationic molecule, in an excited singlet state of the molecule, and in an excited triplet state of the molecule.

Heteroatoms

All the above theory only counts for carbon–carbon bonds in pure hydrocarbons (molecules containing only hydrogen and carbon). But nearly all organic compounds of chemical or biological interest contain a heteroatom—oxygen or nitrogen, for example. The energy to remove an electron from an atomic orbital in a heteroatom like oxygen is different than that for carbon. HMO

theory compensates for this by introducing a factor labeled h:

$$\alpha_{hetero} = -11.26\ eV + h_{hetero} * (-2.5\ eV)$$

It is clear as well that the bond energy between a neighboring heteroatom and carbon atom differs from −2.5 eV. For heteroatoms we set:

$$\beta_{hetero} = k_{hetero} * (-2.5\ eV)$$

The heteroatom parameters h and k are found empirically. Commonly used values are listed in Table 1 and at the beginning of the program. (See Fig. 10 for a furane example.)■

Here are some suggestions for further reading:

General HMO Theory:

A. Streitwieser Jr., *Molecular Orbital Theory for Organic Chemists*, Wiley & Sons Inc., NY, 1961.

E. Heilbronner, H. Bock, *Das HMO-Modell und seine Anwendung, Vol. I, II, III*, Verlag Chemie, Weinheim/Bergstr., 1968–1970 (in German).

H. Greenwood, *Computing Methods in Quantum Organic Chemistry*, Wiley Interscience, London, 1972.

Mathematical Problems of Matrices:

F. Ayres Jr., *Theory and Problems of Matrices*, Schaum Publishing Corp., NY, 1962.

Write to Karl Sarnow at 3000 Hannover 1, West Germany.

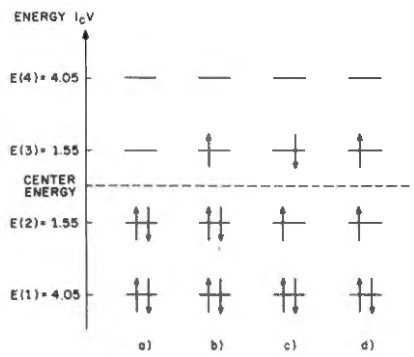


Figure 9. Occupation of the MOs of butadiene: a. Neutral ground state molecule. b. Cationic (−) ground state molecule. c. Neutral excited singlet state molecule. d. Neutral excited triplet state molecule.

```
Occupation of MO's
          1         2         3         4
          2         2         0         0

Bond order matrix
             1         2         3         4
1  1.000000
2  0.894427 1.000000
3  0.000000 0.447214 1.000000
4 -0.447214 0.000000 0.894427 1.000000

Hueckel energy = -56.2204 eV

Free Valences:
          1         2         3         4
 0.837624  0.390410  0.390410  0.837624
```

Figure 8b. Ground state occupation.

```
Occupation of MO's
          1         2         3         4
          2         1         1         0

Bond order matrix

          1         2         3         4
1 1.000000
2 0.447214 1.000000
3 0.000000 0.723607 1.000000
4 0.276393 0.000000 0.447214 1.000000

Hueckel energy = -53.1302 eV

Free Valences:
          1         2         3         4
 1.284840  0.561230  0.561230  1.284840


Spin density for Butadiene singlet state
          1         2         3         4
 0.000000  0.000000  0.000000  0.000000


Spin density for Butadiene triplet state
          1         2         3         4
 0.723607  0.276393  0.276393  0.723607
```

Figure 8c. First excited state.

```
Input file from disk (y/n)? N
Name of Molecule? Furane
Number of Pi centers? 5
From now on, I,J are the atomic centers for which the bond
shall be input.
h and k are heteroatom parameters.  Often used values are:
k hetero:
k(C-C)=1        k(C-O)=0.8      k(C=O)=1.414     k(C-N)=0.8
k(C=N)=1
h hetero:
h(=O)=1         h(>O)=2         h(>N)=0.5        h(-N)=1.5
Atom No. I,J,H (STOP <=0)? 1,1,2
Atom No. I,J,H (STOP <=0)? 1,2,0.8
Atom No. I,J,H (STOP <=0)? 2,3,1
Atom No. I,J,H (STOP <=0)? 3,4,1
Atom No. I,J,H (STOP <=0)? 4,5,1*
Atom No. I,J,H (STOP <=0)? 5,1,0.8
Atom No. I,J,H (STOP <=0)? 0,0,0
```

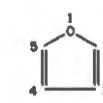


Figure 10. Initial input for furane calculations.

DiskCount™ Data

WHERE
QUALITY PROGRAMS
MEET COMPETITIVE PRICES

2701-C W. 15th • SUITE 324 • PLANO, TX 75075 • (214) 680-8268

HARVEST SALE

All MOD III programs specified in this ad will run on the Model 4 (in the MOD III mode).

ULTRATERM
by United Software
OVER 15% OFF
The Ultimate Communications Package at a Very Reasonable Price
Retail 59.95
Special Sale 49.95
This communications package is one of the most versatile available. It includes a full featured intelligent terminal program, host program, direct file transfer function, and hex conversion utilities for bulletin board downloading plus. ● Support for virtually all manual and auto dial modems. ● Exclusive Ultra Term direct disk file transfer function allows full control from the transmitting computer and unattended operation at the receiving computer. ● Split screen feature lets you type outgoing messages on the bottom half of the screen while incoming messages are displayed on the top of the screen. ● Full Line printer support. ● Universal ASCII format file transmission and reception with memory input buffer buffer supports delays between characters, delays between lines, and prompt controlled transmission for compatability with virtually all systems. A counter continuously displays the amount of free memory remaining whenever the buffer is in use. ● Full featured host program that supports PRINT and PRINT graphics from basic and automatically verifies and protects itself in the top of memory is included. ● Auto Dial phone numbers stored in program with single Key Auto Dial
MOD I or MOD III

POWERDRIVER $29.95
By Powersoft
NEW PRINTER DRIVERS
This new generation of custom printer drivers allows you to utilize all of SUPERSCRIPSIT'S features with your EPSON (Graftrax Required), PROWRITER and C.ITOH F-10 STARWRITER printers. You can now utilize all of the printers custom features such as compressed, expanded and proportional print, underlining, bold-face, super-scripting, and sub-scripting. All drivers can be called from within SUPERSCRIPSIT at "document open time." Order by printer designation as follows:

POWERDRIVER E	EPSON MX70/80/100
POWERDRIVER P	C.ITOH PROWRITER
POWERDRIVER S	C.ITOH STARWRITER

MOD I or MOD III

SUPER UTILITY PLUS VERSION 3.0
By Powersoft
30% SAVINGS
SU+ 3.0 79.95
Inside SU+ 19.95
Retail 99.90
SALE ... 69.95
NEW SUPER UTILITY + VERSION 3.0
Includes Operators Manual and 2nd Backup Disk
The Book Inside SU + 3.0 Included FREE
A 19.95 Value at no extra charge
Experience a legend with the program voted as the outstanding utility of 1982.
MOD I or MOD III Protected Media

THE HOME ACCOUNTANT™
By Continental Software
An Outstanding Financial Planner
ONLY 79.95
● Maintains up to 100 budget categories ● Keeps track of up to five checkbooks ● Prints checks if desired ● Prints a personal balance statement, income and expense summary ● Prints net worth statement ● Provides fast bank reconciliation ● Allows link extensions on multiple diskettes ● One program handles cash checkbooks, credit cards and other liabilities and expenses ● Unlimited annual transactions, fiscal or calendar year ● Transactions may be "split" among different budget categories ● Flags transactions for tax purposes ● Maintains transaction history ● Provides an 80 column printout for any category by date or graph.
The program itself does not allow everything you'd ask of a personal finance package. Popular Computing, November 1982
MOD III

INFOSCAN
By The Small Systems Center
Retail 49.95
Special 44.95
NEW ITEM
MOD I/III MINIMUM 48K 1 Drive

THE MASTER MECHANICS SET FOR LDOS By Powersoft
NOW 34.99
A 39.95 VALUE
9 UTILITY PROGRAMS TO ENHANCE YOUR LDOS LIBRARY

PMOD/CMD	DISK MODIFICATION UTILITY
PCHECK/CMD	DIRECTORY CHECK UTILITY
PFIX/CMD	DIRECTORY REPAIR UTILITY
PVU/CMD	SECTOR VERIFICATION UTILITY
PCLEAR/CMD	DISK CLEANUP UTILITY
PSS/CMD	FILE SECTOR STATUS
PREFORM/CMD	REFORMAT WITHOUT ERASE
PMAP/CMD	DISKETTE AND FILE MAP
PASSGO/CMD	PASSWORD REMOVAL

MOD I or MOD III

THE TEST GENERATOR
By Big G Software
ONLY 34.95
ATTENTION EDUCATORS AND STUDENTS
STUDENTS
This program is an ideal study aid for home computer use. A student types in review questions, vocabulary words, verses etc., and the computer asks the questions. The student has two chances to answer correctly, the file computer gives a score and shows questions answered incorrectly. The student then has the option to recycle incorrect answers.
TEACHERS
Type in up to 100 questions and answers to compose a test. The test may be printed in Multiple Choice, Matching, True False or Short Answer. Questions may be printed in order or at random. Answers may be grouped by question, and questions by answers. An answer key is automatically printed for each test. Tests may be duplicated using single sheet masters etc.
MOD III

SuperDirectory
By Computer Shack
Manufacturer's Suggested List 49.95
DiskCount Data Special 44.95
SAVE 10%
● Build a Complete Library of All Your Programs
● Automatic Density Recognition
● Automatic Track Count Recognition
● Automatic DOS Recognition
● The Best Directory On the Market
READS ALL DOS SYSTEMS
A great new directory program with its own operating system written by Vernon Hester. This program will read any DOS there is (even compatability between MOD I and MOD III with double installed. The MOD I program can read most MOD III disks and the MOD III program can read most MOD I disks. 80 track double density is also supported.

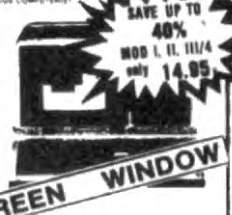
NEWSCRIPT
By Prosoft
10% OFF
Manufacturer's Suggested List 124.95
DiskCount Data Special 112.39
THE WORD PROCESSOR FOR BUSINESSMEN AND PROFESSIONALS
A FEW OF NEWSCRIPT'S STANDARD FEATURES
● Form Letter with merging of names and addresses ● Comprehensive manual with hundreds of examples ● Centering, right/left/full titles, indents, pagination ● Underlining, boldface, double-width, italics ● Sub script, super script, proportional print ● Advanced printer graphics, special symbols ● Search and replace globally or within a range ● Block move, copy, delete, insert from other file ● Based on IBM's EDX/AM and SCRIPT systems ● Suggest ready to run on TRS-80DS/DS ● Easily transferred to NEWDOS, NEWDOS/80, LDOS, TRSDOS ● Includes handy Quick Reference Card and confirmation printout
SPECIFY MOD I or III

THE TOOLBOX for LDOS
by Powersoft
Previously 99.95
Reduced to 69.95
SAVE 15%
SPECIAL 59.50 SALE

PCHECK/CMD	PCOMPARE/CMD
PFIX/CMD	PCLEAR/CMD
PREFORM/CMD	PSS/CMD
PVU/CMD	PMAP/CMD
PERASE/CMD	PMX/FLT MX80
PMOVE/CMD	PHELP/CMD
PDIRT/CMD	PBOOT/CMD
PASSGO/CMD	PFILT/FLT
PUN/CMD	DVORAK/FLT
PEX/CMD	DVORAK/JCL
PMOD/CMD	CODE/JCL
PFIND/CMD	DECODE/JCL

MOD I or MOD III

POWERDOT
By Powersoft
20% OFF
Retail 49.95
Special 39.95
HI-RES GRAPHICS
A brand new concept, POWERDOT allows you to create hi-resolution screen prints on EPSON (GRAFTRAX & GRAFTRAX+) C.ITOH PROWRITER printers without any hardware additions or modifications to your TRS-80. You can draw directly on your screen which is a "picture window" of a much larger drawing area and move the window to other areas of the drawing. Your only limitations are imagination and disk space. The completed drawing is dumped to the above printers by reducing and transforming the complete graphic pixels to single hi-res dots. Use the same disk for booting on MOD I or MOD III. Designers, architects, engineers and artists will love this unique drawing program.
MOD I or MOD III

EYE EASE GREEN CRT SCREEN FOR
TRS-80 MODEL III
A MUST FOR THE SERIOUS COMPUTERIST
SAVE UP TO 40% MOD I, II, III/4 only 14.95


$24.95
REDUCES EYE FATIGUE
SHATTERPROOF
ENHANCES IMAGE
PREFERRED BY COMPUTER PROFESSIONALS EVERYWHERE
OPTICOM

POWERMAIL
By Powersoft
SAVE 25%
Powermail is a highly sophisticated mass mailing system designed to run under all of the popular DOS's currently available for the Mod I or Mod III. The program is written entirely in machine language for maximum operation speed, and occupies only 4K of the available RAM in your computer. There are no slow periods when Powermail is running. New features have been added to the program that others have always lacked. You now have the ability to keep track of mailings using the 24 "flags" that are incorporated into the Powermail program. The Powermail system will handle a file up to 8 megabytes, or 65535 names, whichever is smaller. The program will also sort the entire maximum file size and open up to 168 files simultaneously during the process. Author Kim Watt
MOD I or MOD III

TALLYMASTER
By Prosoft
Manufacturer's Suggested List 79.95
DiskCount Data Special
ONLY 74.95
TALLYMASTER can help you find out it's the big picture. Financial management tool designed for people responsible for budgets and sales. Revenues and expenses can be placed in up to 700 categories and grouped and totalled into higher categories. Results are displayed immediately and can be printed and stored on disk. TALLYMASTER is easy to learn and easy to use. It's menu driven and the built in HELP command displays information on any of 21 specific topics. Features include sorting in four ways, selection of ranges of categories to be changed or reported, merging of several files, and multi-column printed reports. Arithmetic functions even allow simple sales projections. TALLYMASTER was designed to fill the gap between a bookkeeper's detailed journals and the "CALC" programs. It was designed to help the person running a business (or a household) gain better control over the finances of that business.
MOD I/III

LC COMPILER AND EDAS By Misosys
SAVE OVER $60
LC Compiler Retail $100
EDAS Retail $100
SPECIAL BUY BOTH FOR $139.99
Now program in the "C" language compiler subset for LDOS. LC generates Z-80 EDAS IV source code as output. Compiled programs run on both MOD I and MOD III. Save $60.00 with the best LDOS editor assembler package on the market. Over 200 pages of documentation. Requires 2 drives and 48K.
FOR LDOS MOD I/III

SAVE 10%
10% SAVINGS ON ALL SNAPP-WARE
SEE SNAPP-WARE AD IN THIS ISSUE FOR PROGRAM DETAILS.

M-ZAL RELEASE 2
By Computer Applications Unlimited

Suggested Retail 149.95
Special 129.95

SAVE $20.00

M-ZAL™ the Modular Z-80™ Assembler Language for the TRS-80™ A complete development system for assembly language programmers. M-ZAL is a disk based package which gives you the ability to easily develop sophisticated machine language programs. On your TRS-80 and for your TRS-80. The package consists of Three programs: TXEDIT™ a full screen general purpose text editor, ASMBLR™ a menu driven Z-80 assembler, and LINKER™ the object module linker. With them, you can tackle your grandest projects without fear. The modular concept makes it easy. It lets you break your programming ideas down into small manageable pieces called "modules." You code and assemble each module independently. Then use LINKER to relocate and link all the cross references. The result is a composite Z-80 program that's up and running sooner because it debugs faster. M-ZAL creates programs in both tape loadable "SYSTEM" format and system evident "CMD" files.

SPECIFY MOD I or MOD III

POWERMAIL PLUS
By Powersoft

Retail 150.00
Special 112.50

SAVE 25%

Features Over the Original PowerMAIL

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 other FLAG numbers, or the actual FLAG descriptions. The final print mode is what we call THE SALESMAN'S NOTEBOOK™. It prints out the whole list, or whatever parts you specify, with all info including full flag descriptions in each record. Then the word "Notes:" is printed with several lines of blank space for making those notes in the field.

MOD I/III or 11/12/16

MACRO-MON THE SHADOW
By Jake Commander

BELOW DEALER COST

A HUGE DISKCOUNT DATA BUY PASSES THESE UNBELIEVABLE SAVINGS ON TO YOU.

Formerly Manufactured by

ADVANCED OPERATING SYSTEMS

Now a DiskCount Data exclusive

The industry's standard and the finest break point disassembler and machine language monitor available. The package includes a rich, padded easel binder and complete 2 color documentation. Now single step through your CMD files, view & change assembly op-codes, memory, etc. Used by Kim Watt for the editing of SuperUtility+.

MOD III Disk	69.95	**Now Only**	**34.99**
MOD I Disk	64.95	**Now Only**	**32.99**
MOD I Tape	59.95	**Now Only**	**29.99**

Quantities Limited & Subject to Prior Sale

SPECIAL OFFER

Any order of $100 or more from this Ad will receive one choice of the following absolutely

FREE

Green Window (specify Model)
Inside Super Utility+ 2.2z
Macro-Mon The Shadow
(specify Model)

●

Any order over $200 will receive the following 2 programs free.

Macro-Mon The Shadow
and
DOSPLUS 3.3 or 3.4

(Specify Model numbers on both.)

Note: Orders of LDOS or MULTIDOS do not qualify as DOSPLUS is already included at no charge.

LOAN AMORTIZATION
By Big G Software

ONLY 29.95

User enters principal, interest rate, and term of loan, and computer calculates monthly or annual level payment amount. An amortization schedule may be printed on request. Amortization schedule includes interest in current payment, principal in current payment, interest paid to date, principal paid to date, ending balance, and calendar year totals for interest and principal paid.

MOD III

SYSTEM DIAGNOSTIC
By Howe Software

ONLY $99.95

Complete diagnostic tests for components of your TRS-80. Separate tests for ● ROM ● RAM ● VIDEO DISPLAY ● KEYBOARD ● LINE PRINTER ● CASSETTE RECORDER ● RS-232-C INTERFACE ● DISK DRIVES ● DISK CONTROLLER ● INDIVIDUAL TESTS AND CONTINUOUS SYSTEM TESTS.

MOD I or MOD III

INFOEX-80 2.0
By United Software

BE YOUR OWN SYSOP

ONLY $99.95

One of the Finest Bulletin Board Communication Networks

Your computer becomes a mini-communications network. INFOEX-80 2.0 allows a person to exchange messages or information via the telephone. Access can be completely public, private to authorized users, or limited to certain individuals. INFOEX-80 2.0 can route messages to another terminal across the country via a rapid electronic message. INFOEX-80 2.0 provides some of the most advanced and latest convenient features ever incorporated in a microcomputer bulletin board system including:

Users may send private messages that may be read only by the addressee. Multi-level system security allows up to seventy-four levels of security for both the message base and the upload/download database. INFOEX-80 2.0 remembers each regular user and stores all vital information, security access level, last message he/she/it has read, etc.

Individual user passwords.

Individuals may upload or transfer data and/or programs files to INFOEX-80 2.0. These programs may then be downloaded to other INFOEX-80 2.0 users.

SPECIFY MOD I or MOD III

DOSPLUS 3.5
By MicroSystems Software

Retail 149.95
Now only 120.00

SAVE $30.00

The latest revision of an excellent operating system, DOSPLUS 3.5 packs even more featuers than its predecessors. Review the current ads for its benefits. Available for MOD I single or double density and the MOD III. Now compatible with most other systems.

SPECIFY MOD I or MOD III

CP/M 2.2
TRS-80 Model 4

NEW MODEL VERSION

ONLY...199.95

Run CP/M on your Model 4. Requires only the 64K Mod 4 to operate. Most CPM applications Software was developed on 2.2. Why wait for the R/S version of CP/M+ requiring 128K to operate. Save hundreds by not adding memory. Run the most popular, most compatible CP/M... the industry standard...CP/M 2.2. Allows you to read most other diskette formats i.e. Osborne®, Kaypro®, Xerox®, etc.

SALE

OPERATING SYSTEMS

Two Systems for the price of one!

SAVE OVER $100

SAVE ON OPERATING SYSTEMS

BUY LDOS 5.1 at $129

or

MULTIDOS 1.6 at $99

and you receive

DOSPLUS 3.3 or 3.4

FREE

3.3 MOD I or III
3.4 MOD I or III
(specify)

Quantities Limited & Subject to Prior Sale

More Specials

PROGRAM NAME	RETAIL	SPECIAL
BASIC/S SYSTEM MOD I/MOD III	49.95	39.95
MAKE 80 MOD I or III	19.95	14.95
MICROTERM MOD I or MOD III	79.95	69.95
POWER TERM MOD I/MOD III	29.95	24.95
SCRIPLUS 3.0 MOD I/MOD III	39.95	29.95
STDO III MOD I/MOD III	150.00	124.95
DOSPLUS II MOD II	249.95	199.95
MICROCASH MOD III	199.95	149.95

BOOKS

SUPER UTILITY MANUAL 3.0	14.95	11.95
INSIDE SUPER UTILITY + 3.0	19.95	17.95
THE CUSTOM TRS-80	29.95	26.95
HOW TO DO IT TRS-80	29.95	26.95
TRS-80 Disk & Other Mysteries	22.50	19.95
TRSDOS 2.3 Decoded	29.95	26.95
MICROSOFT BASIC DECODER	29.95	26.95
BASIC FASTER & BETTER	29.95	26.95
MACHINE LANGUAGE DISK I/O	29.95	26.95

SOFTWARE AUTHORS

DiskCount Data may be interested in marketing your program. Send evaluation copies to address below, Attn: Software Evaluation Dept. We are interested in high quality programs.

DiskCount Data ™

214-680-8268

Phone Your Order In Today Or Mail To
DISKCOUNT DATA
2701 C.W. 15th St. Suite 324
Plano, TX 75075
Office Hours Mon-Fri 10A.M. to 9P.M. C.S.T.

Send Cash, Check or Money Order.
Please add $3.00 for postage and handling additional $1.50 for C.O.D.'s.
Foreign orders welcome, please specify air or surface. All shipping charges assumed by purchaser.
When ordering by mail, please specify computer model number (I, II or III), drive configuration, and memory size.

AND

Cheerfully Accepted

Super Utility Plus 3.1a— The Jaws of Life

by William D. Allen

Powersoft has done it again! The new version of Super Utility Plus has more features, better documentation, and more raw power.

★★★★★

Super Utility Plus 3.1a
Powersoft
Suite 125
11500 Stemmons Fwy., Suite 125
Dallas, TX 75229
Models I and III
48K Disk
Model 4 run as a Model III
$79.95
MAX-80, 48K Disk
$99.95

This article is more than a review of the current version of Super Utility Plus (SU+). I'll also take a look at SU+ from a nonhacker's viewpoint, compare the current version of SU+ with the previous version, inform you about the support available to users, and correct some mistakes in the SU+ manual.

As you read, you might decide you need something like SU+, but don't think you could learn to use it. If so, write to Powersoft. They're considering a companion product that would be less powerful but easier to use, a user's disk utility as opposed to a hacker's utility.

Five Stars?

I give Super Utility Plus a five-star rating because it's the jaws of life for TRS-80 disk systems. Since I often don't use Super Utility Plus for weeks at a time, it might seem strange to rate it so highly. Perhaps it's even stranger to give such a high rating to a program that is sometimes exasperating to use.

The first reason for the high rating is that a previous version of SU+ won first place as *80 Micro*'s 1982 Utility Program of the Year. On the whole, this version is even better, especially on the Model III. SU+ lives up to its name—it is a super utility.

Some people dismiss the award's importance because they feel that SU+ is useful only to software hackers. Actually, nonhackers can find the program useful too.

That brings me to my second reason for giving SU+ a five-star rating. This program is like a fire engine. You don't need it every day, but when you do nothing else will do the job.

The bad news is that you might find SU+ confusing to use. If that worries you, remember that the documentation and other support are much better for this version.

In General

SU+'s zap utilities let you do almost anything to one or more disk sectors, including reading, writing, modifying, verifying, searching, and copying them. You can do this to the sectors, the data, and—to some extent—the address marks.

You can eliminate files from a disk in many different ways, either as individual files or as categories of files. You can remove all passwords from a directory, zero unused entries in the directory or granules on the disk, change the disk's name, and change file parameters including name and password.

You can format a disk for almost any DOS if your computer has the necessary hardware. (SU+ works with a standard Model I, but to work with all DOSes you need an installed double density modification.)

You can extend the number of tracks on a disk, a handy feature for going from 35 to 40 tracks. You can also reformat a disk while preserving the old data. This feature has saved many a disk that had one or more soft errors.

SU+ has two back-up commands. One does a straightforward back-up. The other backs up some protected disks.

The repair utilities automatically repair GAT (gran allocation table) and HIT (hash index table) sectors along with TRSDOS boot sectors. It also recovers killed files, unless TRSDOS killed them.

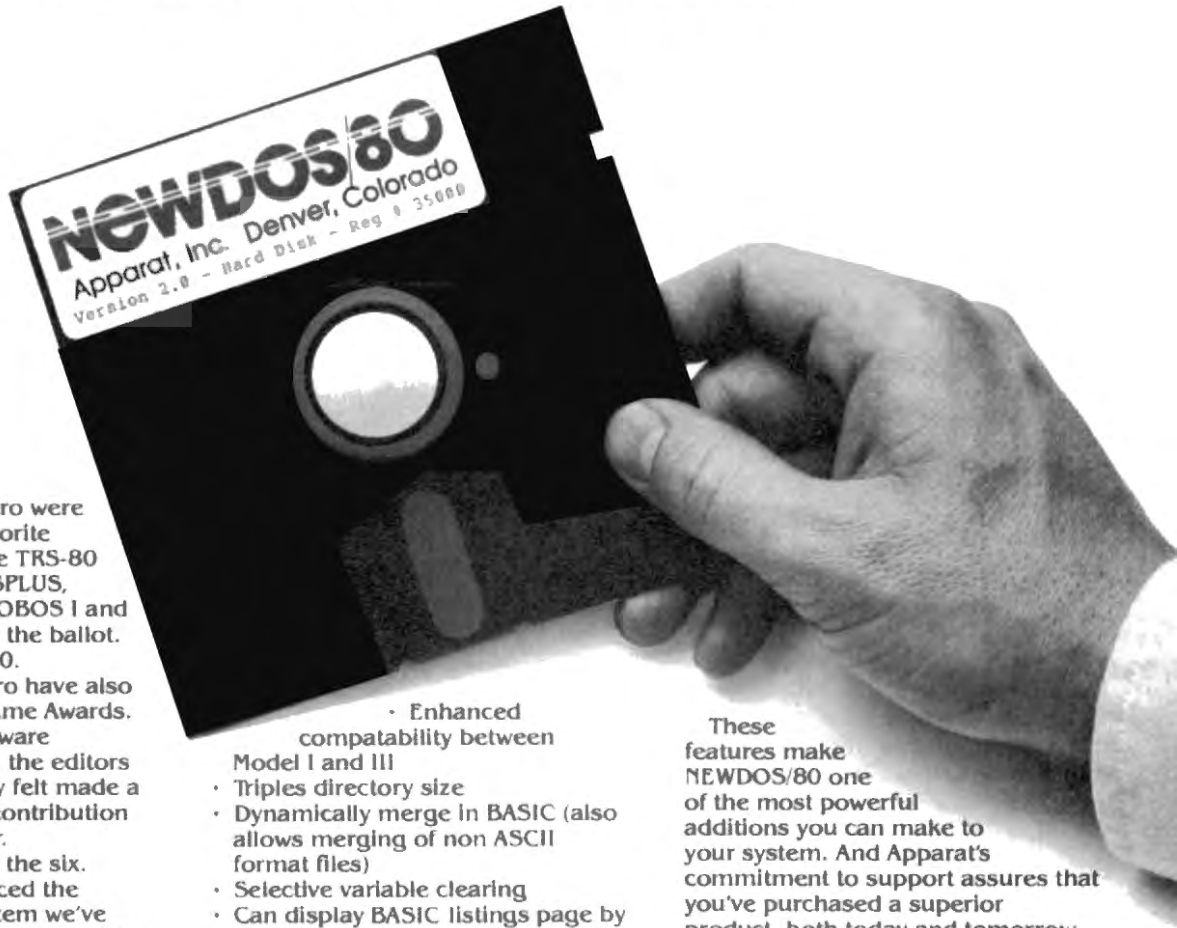
It checks a directory for many types of errors, changes a directory's address marks, moves the directory to a different track, clears the unused entries from a directory, and even displays the directory.

The tape utilities read a tape, let you examine and modify the contents, write a new tape, and verify a copy. SU+ also has a tape copy utility that copies most protected tapes.

The 15 memory utilities do almost anything you can think of to the computer's memory. Some involve transferring data between disks and memory.

The file utilities are the ones I find most useful. You can display the sectors of a file to locate and modify them.

IF YOU'RE GOING TO BE PICKY ABOUT AN OPERATING SYSTEM SEE WHICH WAS PICKED BEST.



The readers of 80 Micro were asked to select their favorite operating system for the TRS-80 Model I&III. LDOS, DOSPLUS, TRSDOS, MULTIDOS, WOBOS I and NEWDOS/80 were all on the ballot. They picked NEWDOS/80.

The editors of 80 Micro have also awarded their Hall of Fame Awards. From among every software package on the market, the editors picked only six that they felt made a lasting and significant contribution to the TRS-80 computer. NEWDOS/80 was one of the six.

Since we first introduced the NEWDOS operating system we've been stating its features, capabilities and advantages. Thank you 80 Micro readers and NEWDOS/30 users for supporting us.

Version 2.0 . . .
High Performance DOS

NEWDOS/80 Version 2.0 is our highest performance system yet. The versatility and sophistication of Version 2.0 includes features like:

- Double density support on the Model I
- Enhanced compatability between Model I and III
- Triples directory size
- Dynamically merge in BASIC (also allows merging of non ASCII format files)
- Selective variable clearing
- Can display BASIC listings page by page
- Automatic repeat function key
- Routing for peripheral handling
- Enhanced disassembler
- Command chaining
- Superzap to scan files
- Fast sort function in BASIC

Hard Disk Support Now Available

- Support for Apparat's and Radio Shack's Model III hard disk (optional-available upon request for additional $60)

These features make NEWDOS/80 one of the most powerful additions you can make to your system. And Apparat's commitment to support assures that you've purchased a superior product, both today and tomorrow. At just $149.00 it could be the best investment you will make for your TRS-80.

For more information see your local computer store or contact Apparat, Inc., 4401 S. Tamarac Parkway, Denver, CO 80237, 303/741-1778.

TRS-80 and TRSDOS are registered trademarks of Tandy Corp., LDOS – Logical Systems, DOSPLUS – Micro Systems Software, MULTIDOS – Cosmopolitan Electronics, WOBOS I – Western Operations, NEWDOS/80 – Apparat.

Apparat, Inc. ↙40

↙See List of Advertisers on Page 323

Once you locate the sectors, you can use the zap utility's sector copy routine.

You can also make some repairs by finding out what file contains a particular sector. You can compare and copy files, or get a map of the free space on a disk. You can also encode and decode hash codes and passwords.

Dennis Brent, president of Powersoft, says that the new version of SU+ has been almost entirely rewritten. Most of that isn't obvious to the user. For a review of the early version, see *80 Micro*, January 1982, p. 366.

This new version is generally an improvement that offers several nice enhancements. It also has a few bugs and problems. Most of the bugs should be eliminated by the time you read this. The problems are, to some extent, inherent in the program.

Each SU+ disk contains two versions of the program, one for the Model I and another for the Model III. (The Model III version also boots and runs on the Model 4.) Powersoft has developed and debugged the Model III version better than the Model I version, but none of the bugs and problems I found were fatal.

For me, the most annoying problem occurs when you ask SU+ to compare two files. Even when the files are identical, SU+ almost always gives you a list of disk sectors that don't match.

The reason is that SU+ compares every sector in every granule assigned to the file. A file usually has a few unused sectors, past the point where the file ends, that contain random garbage.

SU+ compares these sectors like the rest, and produces a number of erroneous mismatches. Until you find out where the file ends on the disk, you don't know whether the two files are different.

Another problem occurs when you use SU+ to display the sectors of a disk's directory. The directory sectors are much easier to read in the Model III version because of a space in front of the file names. In the Model I version, one of the noncharacter symbols appears in that place, making it more difficult to read the file names.

Features

Experienced users will appreciate a big change with this SU+—a DOS specifier system that's easy to use.

Each previous version of Super Utility has supported current versions of the popular TRS-80 DOSes. SU+ 3.1 supports current versions of the following Models I and III DOSes: DBLDOS, DOSPLUS, LDOS, MULTIDOS, NEWDOS/21, NEWDOS/80 2.0, and the various forms of TRSDOS including 2.7 for the Model I, and 6.0.

SU+ has limited support for double-sided use of DOSPLUS, LDOS, and MULTIDOS. SU+ version 2.2z supported all these in a single-sided mode except TRSDOS 2.7 and Model III MULTIDOS. Model I MULTIDOS was supported indirectly.

This DOS support lets you work between different disk operating systems. That might be handy if you work with someone who uses a different DOS. You can transfer a file from one DOS's disk to another DOS's disk. You can even format a disk for a DOS you don't have.

In the past, it's been difficult to start using a different DOS. You had to tell SU+ what the new DOS was by using an exasperating DOS specifier process. At last SU+ has a DOS specifier system that works for the nonhacker.

SU+ 3.1 has other new features such as limited automatic DOS and density recognition. These features help people working with mystery disks. I personally have found them interesting but not too useful.

On the other hand, perhaps I have been spoiled by using MULTIDOS. When it comes to disks whose density and format are unknown, MULTIDOS works almost flawlessly, whereas SU+ seems to have problems determining a disk's operating system as well as whether it's single or double density.

When Powersoft released the first version of Super Utility, disk operating systems didn't have all the features they have now. Some of these new features reduce the need for SU+. At one time, Super Utility was a virtual necessity even for such chores as moving files from one disk to another.

As DOSes have become more sophisticated, many things I used to do with SU+ I now do with DOS utilities. That doesn't mean I no longer use SU+, just that I don't use it as often. In fact, SU+ is faster for certain operations, such as purging old files from a disk.

Repairs

Super Utility Plus automatically repairs a bad GAT or HIT sector in the directory. (Automatic GAT and HIT repair are features that MULTIDOS and DOSPLUS also offer.) Often that's all you need to fix a crashed directory, but not always.

SU+ offers one more easy repair option that rewrites the directory's data address marks (DAMs). MULTIDOS also changes the DAMs on a directory. DAMs are identifying marks hidden in the formatting. DOSes use them to determine where a disk locates its directory.

If you work with more than one operating system, this SU+ feature might be a necessity because some operating systems like TRSDOS are picky about reading directories with the wrong address marks.

Super Utility Plus also offers an automatic boot repair for TRSDOS disks.

"This new version is generally an improvement that offers several nice enhancements."

You can repair boots of other operating systems by copying the boot from a good disk.

If one of the low-numbered system files is bad, the disk won't appear to boot. In that case, you have to put good copies of those files onto the disk also.

SU+ isn't limited to rewriting the data address marks on a directory. It reads them from or writes them to any disk sector. Different DOSes use these address marks differently.

Often a disk is damaged when an alien DOS writes to it because the DAMs are changed. You can repair this damage fairly easily by checking the DAMs and rewriting them if necessary.

Different DOSes

One of SU+'s strengths is that it works between different DOSes. The most obvious task is transferring files from one disk to another when you use different DOSes. SU+ also handles transfers between disks written in different densities, provided your computer has the necessary hardware.

However, passing files between TRSDOS 1.3 and other DOSes is not always successful. The most important reason for this problem is the way TRSDOS 1.3 handles its directory. TRSDOS 1.3 keeps track of where a file ends differently from most DOSes.

When you use SU+ to transfer a file from any other DOS to TRSDOS 1.3, the file generally appears to gain a sector. From TRSDOS 1.3 to another DOS, the file generally appears to lose a sector. Actually, the file SU+ copies is all there; the directory entry is wrong.

SU+ doesn't correct the directory entry because that requires too much

code. The program doesn't have enough room left for that feature.

To overcome this problem, you can use a procedure for patching a TRSDOS 1.3 directory that appears in Appendix B of the SU+ manual. The procedure is clearly written but does contain some inaccuracies.

I don't want to describe the whole procedure, but you should know how to correct a mistake you make while typing in the correction. Just use the arrow keys to reposition the cursor and type over the mistake.

As a general rule, you must use the command +14 to position the cursor. Also, you must subtract one from the entry, not add one.

Unless you are very good, you should practice on a copy of the disk, not the original. That way, when you make a mistake, you can call Powersoft and get help because you still have the original disk with no additional damage.

Unfortunately, the SU+ manual doesn't tell you how to patch the disk directory when you're going the other way. If you copy a Basic program from TRSDOS 1.3, it won't load and execute correctly with another operating system because the file appears shorter than it is.

The program loads without the end marker the Basic interpreter expects to find. The Basic interpreter doesn't know where the program ends. Also, lines are missing from the program. When you try to list it, you get the first part, then a lot of garbage.

In this case, you must adapt the TRSDOS instructions to the other DOS. You need to add one to the sector count for the file and you need to know the directory's location. Other than that, you should use the instructions in the SU+ manual even though they are for TRSDOS 1.3

Another common problem occurs when you use a Model III to make a copy of some Model I disks. The disk appears to be copied correctly. The copy even checks as identical to the original disk when you use SU+'s Compare Sectors command. However, when you put the copy into a Model I disk drive, you find that TRSDOS 2.3 can't read the directory.

The fault lies with the Model III hardware. The floppy disk controller (FDC) in the Model I reads and writes four different kinds of DAMs. The Model III can't write two of these at all.

Also, the FDC can't correctly recognize the DAMs. In fact, it misreads them. Because the problem is in the hardware, SU+ can't do anything about this.

If a Model I is available, however, SU+ can write the correct address marks if you use the Read-Protect directory command. MULTIDOS can also correct the data address marks on a Model I directory.

Documentation and Support

The current version of SU+ comes with fairly extensive documentation. However, it's not generally tutorial, although it contains some examples. Unfortunately, the examples haven't been fully debugged.

The manual has some other mistakes. At the beginning of the Repair Utilities chapter, the manual advises you to "use FORMAT WITHOUT ERASE on the disk to make sure it is readable."

"SU+ is now much easier to learn to use and it looks like the support will increase."

That's a potential disaster. You should use the Verify Sectors command because that can't destroy anything unreadable. Destruction is possible if you use the Format Without Erase command.

Despite these problems, the new documentation makes the program much more usable. The documentation is fairly clear, and Powersoft is planning further improvements and additions. These are relatively easy to make because the documentation comes in a loose-leaf binder.

Several books published by Powersoft support SU+. These are available separately from the program.

The novice to intermediate user can read *Inside Super Utility Plus* by Paul Wiener. The advanced user can refer to the *SU+ Technical Manual* by Kim Watt, which includes some DOS notes by Pete Carr. For version 3.1, this now comes as a set of pages that go into the documentation binder.

When you call Powersoft to ask about Super Utility Plus, you usually talk to Renato Reyes. I have found him to be generally knowledgeable, helpful, patient, and courteous.

Good support is one of the reasons for SU+'s high cost. Powersoft could market the program for less if they didn't provide support.

You receive two copies of SU+, each on a disk that you can't copy by ordinary means. This inability to back up SU+ has been a sore point with many users.

In the past the company offered an extra copy for $10 to registered owners. They also promised very quick turnaround on replacing damaged copies. Unfortunately, the one time I had to return a disk, it took a month to get a replacement copy.

To Buy or Not to Buy

Anyone who depends on his TRS-80 should have access to SU+. The problem is that the program is not trivial to learn.

If you're a hacker, you should buy it and learn everything you can from it. If you're not a hacker, but would like to learn about the TRS-80 disk system, you should also buy a copy. SU+ is now much easier to learn to use, and it looks like the support will increase.

Experimenting with all the features of SU+ teaches you a great deal about the TRS-80. Also, when you need to use SU+, you'll know how to get the most the program has to offer.

If you are not a hacker and not interested in your machine, you probably won't get much from merely owning SU+. You also might need its features the most.

Last, those using TRSDOS 6.0 on the Model 4 should definitely buy SU+. TRSDOS 6.0 has no utility packages at this time. If that situation doesn't change, SU+ is almost a necessity.

SU+'s Future?

It seems to me that the Model 4 will prove too much of a temptation to Powersoft for them to let SU+ alone. The Model 4 in its standard disk configuration has 16K more memory than the Models I and III. You can also add a second 64K of memory at Radio Shack.

What can you do with 64K or, even better, 128K of memory? One complaint from SU+ users is that they can't copy files from double-sided, double-density, 80-track disks, because SU+'s copy routine requires the combined directories to be stored in the computer.

A 48K machine doesn't have enough memory to store all those directory sectors, let alone copy the files. However, the standard 64K on the Model 4 makes that possible for a future version of SU+. ■

Contact William Allen at P.O. Box 5155, North College Station, Lubbock, TX 79417.

What's Up and When

by Adron D. Lilly Jr.

Even the most casual skywatcher can become a celestial authority by using this Model III program to stay in sync with all the stars.

Want to know which constellations are visible at a certain time on a certain night? This Model III program keeps you and your telescope in sync with the daily rotation of celestial objects (see Program Listing).

This program originally listed celestial objects on the meridian (that part of the sky visible to you) that could be viewed with a small telescope. It has since been expanded to let you choose an hour of interest and, within that hour, to locate celestial objects in the sky in order of right ascension.

About 90 percent of the objects listed are from tables found in John Mallas's and Everd Kreimer's book *The Messier Album* (Cambridge: Sky Publishing Corporation, 1978) and Robert Burnham Jr.'s book *Burnham's Celestial Handbook*, Volumes I, II, and III (New York: Dover Publications Inc., 1978). The rest are from various astronomy magazines.

```
LOCAL TIME IS:     20: 9:50
SIDEREAL TIME IS:   8: 0: 6        DATE:  7/ 5/82
RIGHT ASCENSION    DECLINATION     OBJECT  (R.A. AND DEC. EPOCH 1950)
=============================================================================
  1.    8 11.30       -5 38        M-48, GAL. CLUS. IN HYDRA
  2.    8 37.20      +20 10        M-44, BEEHIVE IN CANCER
  3.    8 37.50      +19 52        PRAESEPE CLUSTER
  4.    8 48.50      +12  0        M-67, GAL. CLUS. IN CANCER
  5.    8 49.60      +33 38        NGC-2683, SIPRAL GALAXY IN LYNX
```

Figure 1. Sidereal time listings and celestial objects that you can view.

```
                                    LOCAL TIME IS: 20:11:03
                                 SIDEREAL TIME IS:  8: 0: 6
                                    TODAY'S DATE:  7/ 5/82

          ENTER HOUR TO LIST =...  8

                          <0> TYPES 1 THRU 9
<1> SINGLE STARS     <2> DOUBLE STARS     <3> RESERVED
<4> DOUBLE-DOUBLE    <5> MULTIPLE STARS   <6> NEBULA
<7> DOUBLE CLUSTER   <8> GLOBULAR CLUST   <9> GALAXY

          WHAT TYPE.=.............0
```

Figure 2. List of celestial objects from which you can choose to view.

Personalization

After loading the program, call up line 1090 and substitute the coordinates of your west longitude for the value of L. You'll have to convert any fraction of a degree of longitude (minutes and seconds) to a decimal fraction. If you round your longitude to the nearest degree the error you introduce won't be over two minutes.

Change TZ in line 1190 so it reflects the value given for your time zone.

Running the Program

Now give your system the current time and date. Using this information, the program determines and displays the sidereal time so you can select an hour of interest. The program sends this information to the printer, along with column headings for data that it will print (see Fig. 1).

The program won't update calculated time unless you press the break key and run the program again.

If, for example, the sidereal time is given as 17:30:00, any object with a

The Key Box

Model III
32K RAM
Disk Basic
Printer

Program Listing. Sidereal/BAS.

```
1000 CLS: ' Sidereal/Bas by Adron Lilly, Albuquerque, NM
1010 CLEAR1000:DEFINTE,H,I,J,N,O,P-R:DEFSNGA-D,K,L,M,T,X-Z
1020 DIMA1(50),B1(50),C1(50),D1(50),E1$(50)
1030 DEFFNA4$(A5,A6,A7$)=MID$(A7$,A5*A6+1,A6)
1040 A$="   LOCAL TIME IS:     ##:##:##"
1050 B$="   SIDEREAL TIME IS: ##:##:##       DATE: ##/##/##"
1060 C$="TODAY'S DATE: ##/##/##"
1070 D$="SIDEREAL TIME IS: ##:##:##"
1080 G$="  ###.   ## ##.##      +## ##        %
                %"
1090 L=106.667 ' LONGITUDE--Albuquerque, New Mexico
1100 POKE16419,32 ' Substitutes "space" for cursor character
1110 PRINT@512,"DOES COMPUTER HAVE CORRECT LOCAL STANDARD TIME ENT
ERED?  (Y/N)";:I$=INKEY$:IFI$=""GOTO1110
1120 IFI$<>"Y"THENCLS:PRINTCHR$(23):PRINT@448,"  THIS PROGRAM NEED
S LOCAL TIME (NOT DAYLIGHT TIME) TO DETERMINESIDEREAL TIME FOR YOU
R LOCATION.  PRESS <D> TO RETURN TO DOS TO SET THE TIME OR PRESS <
R> TO RUN":LINEINPUTI$:IFI$="D"THENCLS:CMD"S"
1130 CLS:S=PEEK(16919):MT=PEEK(16920):H=PEEK(16921):YR=PEEK(16922)
:D=PEEK(16923):M=PEEK(16924) ' Reads time/date information
1140 YR=VAL(RIGHT$(STR$(YR),1))'Gets one digit year from string
1150 K=VAL(FNA4$(YR-1,8,"6.6383226.6224086.6064936.5905796.640374"
)) 'WILL SUPPLY VALUE FOR K THRU YEAR 1986
1160 E=VAL(FNA4$(M-1,3,"000031059090120151182212243273304334"))
   'Supplies number of days in current year thru last day of
  previous month.
1170 YR=PEEK(16922):IFYR=84ANDM=>3THENE=E+1 'Leap yr. adds day
1180 MT=MT/60:N=E+D
1190 TZ=7      ' TIME ZONE, EASTERN STD TIME ZONE=5
                          CENTRAL STD TIME ZONE=6
                          MTN STD TIME ZONE    =7
                          PACIFIC STD TIME ZONE=8
1200 T=H+MT+TZ:IFT>24THENT=T-24
1210 Z1=MT*60:C=K+(0.0657*N)+(1.0027*T)-(L/15)
1220 IFC>24THENC=C-24
1230 X=CINT(C):Y=C-X:Z=Y*60:A3=CINT(Z):A2=Z-A3:Z2=A2*60
1240 LPRINTUSINGA$;H;Z1;S
1250 LPRINTUSINGB$;X;Z;Z2;M;D;YR
1260 LPRINTTAB(3)"RIGHT ASCENSION";TAB(21)"DECLINATION";
1270 LPRINTTAB(35)"OBJECT";TAB(43)"(R.A. AND DEC. EPOCH 1950)"
1280 LPRINTSTRING$(80,CHR$(61))
1290 PRINTTAB(38)"LOCAL TIME IS:"
1300 CMD"R" ' Turns time display on
1310 PRINTTAB(35)USINGD$;X;Z;Z2
1320 PRINTTAB(39)USINGC$;M;D;YR
1330 PRINT@270,STRING$(32,32):PRINT@270,"ENTER HOUR TO LIST =";:PR
INTCHR$(21);CHR$(244);CHR$(245);CHR$(246);CHR$(21);" ";:LINEINPUTP
$:P=VAL(P$):IFP$=""GOTO1330
1340 IFINSTR("0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
 21 22 23",P$)THEN1350 ELSEGOSUB1800 :GOTO1330  'Checks for an int
eger between 0 and 23
1350 PRINT:PRINTTAB(27)"<0> TYPES 1 THRU 9"
1360 PRINTTAB(07)"<1> SINGLE STARS";
1370 PRINTTAB(27)"<2> DOUBLE STARS";
1380 PRINTTAB(47)"<3> RESERVED"
1390 PRINTTAB(07)"<4> DOUBLE-DOUBLE";
1400 PRINTTAB(27)"<5> MULTIPLE STARS";
1410 PRINTTAB(47)"<6> NEBULA         ";
1420 PRINTTAB(07)"<7> DBL CLUSTER";
1430 PRINTTAB(27)"<8> GLOBULAR CLUS";
1440 PRINTTAB(47)"<9> GALAXY         "
1450 PRINT@718,"WHAT TYPE.........=";:PRINTCHR$(21);CHR$(244);CHR
$(245);CHR$(246);CHR$(21);" ";:LINEINPUTP2$:P2=VAL(P2$):IFP2$=""GO
TO1450  'Prints right pointing hand in menu
1460 IFINSTR("0 1 2 3 4 5 6 7 8 9",P2$)THEN1470 ELSEGOSUB1790 :GOT
O1450  'Checks for an integer between 0 and 9
1470 PRINT@270,STRING$(22,32):PRINT@718,STRING$(27,32)
1480 PRINT@270,"SEARCHING HOUR";P;"FOR TYPE";P2
1490 I=0:J=0:M=0:K=0:RESTORE
1500 READA,B,C,D,E$:IFA=25GOTO1570  'Reads data list and checks fo
r end of list (i.e., A=25)
1510 IFA<>PGOTO1500  '"A" has to be hour selected
1520 IFP2=0GOTO1540 '"0" equals all categories selected
1530 IFP2<>VAL(E$)GOTO1500  'Must equal category you selected
1540 A=A*60:A1(I)=A:B1(I)=B:C1(I)=C:D1(I)=D:E1$(I)=E$ 'Items are r
ead into five arrays for later sorting
1550 PRINT@781,STRING$(50,32):PRINT@781,MID$(E$,2,(LEN(E$))) 'Prin
ts items on lower part of screen
1560 I=I+1:GOTO1500  'Increments counter and repeats sequence
1570 IFI=0GOTO1810 ELSEK=I:R=R+1:PRINT@775,STRING$(50,32):PRINT@77
7,"ITEMS AT HOUR";P;"ARE BEING SORTED FOR PRINTING":IFR>1THENLPRIN
T
1580 M=I 'Start of Shell-Metzner sort routine. For more
1590 M=INT(M/2) 'information see "Programming Techniques
1600 IFM=0GOTO1740  'for Level II Basic" by Wm. Barden, Jr.
1610 FORS=0TOM-1
1620 I=S:J=S+M:S1=0
1630 IF(A1(I)+B1(I))<=(A1(J)+B1(J))GOTO1680
1640 S1=1
```

Listing continued

right ascension of 17 hours and 30 minutes appears on the meridian. Those objects with an earlier time are to the west and those with later hours are to the east.

Program Operation

After you answer the What Hour? query with an integer between zero and 23, the program displays a menu with 10 selections (see Fig. 2). The number you choose from the menu is compared to the first number in the string in each of the data statements for the hour you input earlier. If there's a match, the program transfers that data statement into four numeric and one string arrays.

The data in line 3870 ends the program read and starts sorting the numeric and string arrays. When the sort is complete, the program prints the arrays using the format established for G$ in line 1080.

As the program locates the objects within your chosen hour and category, it prints them below the menu with the current item replacing the previous one. This display indicates the program is running as it takes several seconds to read all the data.

SOFTWARE FROM SON

MAZE A PHRASE WORD GAME
A real brain teaser. Compete with others by choosing a letter to build words and score points to solve the popular mystery phrase. Can be played with an unlimited number of phrases or words. It will provide hours of fun, challenge and education for the whole family. (2 to 9 players)
$16.95 TAPE $20.95 DISK $7.95 LLIST

DOT TO DOT CHALLENGE GAME
Just connect the dots to score as many boxes as you can to win. Points awarded and different grid sizes make it as challenging as you want. A game of skill and fun for ages 8 to adult.
$9.95 TAPE $12.95 DISK $4.95 LLIST

STAIR CONSTRUCTION PLANNING AIDE
Two-for-one special. Take a step up and build your own stair plans by using the Stair Construction Planning Aid. Designs standard or spiral type stairs. Saves time and money. Great for either the do-it-yourselfer or the construction trade professional.
$9.95 TAPE $12.95 DISK $4.95 LLIST

Send check, money order, or COD accepted.
Dealer Inquiry welcome.
Minimum Systems Required: Model I Level II, III, IV or COCO - 16K RAM.
Post paid in North America. Outside North America add 15% for air mail. Wisconsin residents add 4% tax.

SON SOFT
905 North 21st Street, Superior, WI 54880
Phone 1-715-394-7853

292

Add or Delete Your Own Bodies

The program allows you to add or delete objects without changing any of the program parameters. The one exception is if you exceed 50 objects in any hour. Then you must change the dimension statement in line 1020 to reflect the new total.

You may use menu item 3 to insert a category of special interest. Be sure to follow the established data format and precede the last item in a data statement with a category number as this is one of the two sorting keys.

Modifications

This program runs under TRSDOS 1.3 and LDOS 5.1.2.

To modify it for NEWDOS80 2, change line 1300 to 'CMD"CLOCK, Y" ', delete lines 1580–1720 inclusive, and remove the apostrophe from line 1730. These changes remove the Shell-Metzner sort routine and substitute a machine-language sort. Both TRSDOS and LDOS have a fast sort routine, but they handle only single arrays. ■

Write to Adron D. Lilly Jr. at 924 Tramway Lane, Albuquerque, NM 87122.

TIRED?

of typing **DIR: 1, COPY "FILENAME": 1 TO "FILENAME": 0, PURGE "FILENAME": 0, LIST "FILENAME": 1, LOAD "FILENAME" (F = 3), PDRIVE** = . . . and on and on and on!

Then you are ready for **DOSTAMER**. Imagine over 140 commands that YOU define, executed with ONLY ONE OR TWO KEYSTROKES! Instant sorted directories with 1 key. Load Basic, protect memory, run your program with 2 keystrokes. List a file to the screen or the printer, print a directory, copy a file from one disk to another, copy the entire disk, and for Newdos 80 owners, change a PDRIVE with 2 keystrokes.

Your DOS has a lot of great features. The trouble is, you have to remember all those commands. With **DOSTAMER** those commands are 1 or 2 keystrokes away. Nothing to remember and nothing to forget, just use it!

DOSTAMER is configured for each DOS, that is, we use the SPECIAL features in YOUR DOS for the GREATEST utility you'll ever want. Once you use **DOSTAMER** you'll wonder how you got along without it. Now available for NEWDOS80, DOSPLUS, MULTI-DOS and LDOS for $49.95 complete with the easiest instructions you'll find. By the way, **DOSTAMER** is written in FAST Z 80 machine code.

SPECIAL
INTRODUCTORY OFFER
$39.95
DEALER INQUIRIES INVITED

C D C ✓167
Serious Software for the 80's
13715 Vanowen Street, Van Nuys, CA 91405 (213) 997-9692
Toll Free Order (800) 692-5235

Listing continued

```
1650 A=A1(I):B=B1(I):C=C1(I):D=D1(I):E$=E1$(I)
1660 A1(I)=A1(J):B1(I)=B1(J):C1(I)=C1(J):D1(I)=D1(J):E1$(I)=E1$(J)
1670 A1(J)=A:B1(J)=B:C1(J)=C:D1(J)=D:E1$(J)=E$
1680 I=J:J=J+M:IFJ<KGOTO1630
1690 IFS1=0GOTO1710
1700 GOTO1620
1710 NEXTS
1720 GOTO1590
1730 'CMD"O",I,A1(0),B1(0),C1(0),D1(0),E1$(0) Delete the remark sy
mbol and this sentence to use NEWDOS80's sort routine
1740 FORJ=0TOK-1 'Loop to print sorted array
1750 O=O+1
1760 LPRINTUSINGG$;O;A1(J)/60;B1(J);C1(J);D1(J);MID$(E1$(J),2,(LEN
(E1$(J))))
1770 NEXTJ
1780 PRINT@775,STRING$(50,32):GOTO1330
1790 PRINT@718,"INPUT AN INTEGER BETWEEN 0 AND 9":FORQ=0TO500:NEXT
Q:PRINT@718,STRING$(40,32):RETURN
1800 PRINT@270,"INPUT AN INTEGER BETWEEN 0 AND 23":FORQ=0TO500:NEX
TQ:PRINT@270,STRING$(40,32):RETURN
1810 PRINT@782,"NO TYPE";P2;"ITEMS FOUND AT";P;"HOUR(S)":FORJ=1TO5
00:NEXTJ:GOTO1330
1820 DATA05,31.5,+21,59,"6 M-1, CRAB  NEB. IN TAURUS"
1830 DATA21,30.9,-01,03,"8 M-2, GLOB. CLUS. IN AQUARIUS"
1840 DATA13,39.9,+28,38,"8 M-3, GLOB. CLUS. IN CANES VENATICI"
1850 DATA16,20.6,-26,24,"8 M-4, GLOB. CLUS. IN SCORPIUS"
1860 DATA15,16.0,+02,16,"8 M-5, GLOB. CLUS. IN SERPENS"
1870 DATA17,36.7,-32,11,"8 M-6, GAL. CLUS. IN SCORPIUS"
1880 DATA17,50.6,-34,48,"8 M-7, GAL. CLUS. IN SCORPIUS"
1890 DATA18,00.7,-24,23,"6 M-8, LAGOON NEB. IN SAGITTARIUS"
1900 DATA17,16.2,-18,28,"8 M-9, GLOB. CLUS. IN OPHIUCHUS"
1910 DATA16,54.5,-04,02,"8 M-10, GLOB. CLUS. IN OPHIUCHUS"
1920 DATA18,48.4,-06,20,"8 M-11, GAL. CLUS. IN SCUTUM"
1930 DATA16,44.6,-01,52,"8 M-12, GLOB. CLUS. IN OPHIUCHUS"
1940 DATA16,39.9,+36,33,"8 M-13, GLOB. CLUS. IN HERCULES"
1950 DATA17,35.0,-03,13,"8 M-14, GLOB. CLUS. IN OPHIUCHUS"
1960 DATA21,27.6,+11,57,"8 M-15, GLOB. CLUS. IN PEGASUS"
1970 DATA18,16.0,-13,48,"6 M-16, EAGLE NEB, IN SERPENS"
1980 DATA18,17.9,-16,12,"6 M-17, SWAN NEBULA IN SAGITTARIUS"
1990 DATA18,17.0,-17,09,"8 M-18, GAL. CLUS. IN SAGITTARIUS"
2000 DATA16,59.5,-26,11,"8 M-19, GLOB. CLUS. IN OPHIUCHUS"
2010 DATA17,59.6,-23,02,"6 M-20, TRIFID, SAGITTARIUS"
2020 DATA18,01.6,-22,30,"9 M-21, GAL. CLUS. IN SAGITTARIUS"
2030 DATA18,33.3,-23,58,"8 M-22, GLOB. CLUS. IN SAGITTARIUS"
2040 DATA17,53.9,-19,01,"8 M-23, GAL. CLUS. IN SAGITTARIUS"
2050 DATA18,14.0,-18,30,"5 M-24, MILKY WAY IN SAGITTARIUS"
2060 DATA18,28.8,-19,17,"8 M-25, GAL. CLUS. IN SAGITTARIUS"
2070 DATA18,42.5,-09,27,"8 M-26, GAL. CLUS. IN SCUTUM"
2080 DATA19,57.5,+22,35,"6 M-27, DUMBBELL IN VULPECULA"
2090 DATA18,21.5,-24,54,"8 M-28, GLOB. CLUS. IN SAGITTARIUS"
2100 DATA20,22.1,+38,22,"8 M-29, GAL. CLUS. IN CYGNUS"
2110 DATA21,37.5,-23,25,"8 M-30, GLOB. CLUS. IN CAPRICORNUS"
2120 DATA00,40.0,+41,00,"9 M-31, GALAXY IN ANDROMEDA"
2130 DATA00,40.0,+40,36,"9 M-32, GALAXY IN ANDROMEDA"
2140 DATA01,31.1,+30,24,"9 M-33, GALAXY IN TRIANGULUM"
2150 DATA02,38.8,+42,34,"8 M-34, GAL. CLUS. IN PERSEUS"
2160 DATA06,05.8,+24,21,"8 M-35, GAL. CLUS. IN GEMINI"
2170 DATA05,32.8,+34,06,"8 M-36, GAL. CLUS. IN AURIGA"
2180 DATA05,49.1,+32,32,"8 M-37, GAL. CLUS. IN AURIGA"
2190 DATA05,25.3,+35,48,"8 M-38, GAL. CLUS. IN AURIGA"
2200 DATA21,30.4,+48,13,"8 M-39, GAL. CLUS. IN CYGNUS"
2210 DATA06,44.9,-20,41,"8 M-41, GAL. CLUS. IN CANIS MAJOR"
2220 DATA12,20.0,+58,22,"2 M-40, DOUBLE STAR IN URSA MAJOR"
2230 DATA05,32.9,-05,25,"6 M-42, NEBULAE IN ORION"
2240 DATA05,33.1,-05,18,"6 M-43, NEBULAE IN ORION"
2250 DATA08,37.2,+20,10,"8 M-44, BEEHIVE IN CANCER"
2260 DATA03,44.5,+23,57,"5 M-45, PLEIADES IN TAURUS"
2270 DATA07,39.6,-14,42,"8 M-46, GAL. CLUS. IN PUPPIS"
2280 DATA07,34.3,-14,22,"8 M-47, GAL. CLUS. IN PUPPIS"
2290 DATA08,11.3,-05,38,"8 M-48, GAL. CLUS. IN HYDRA"
2300 DATA12,27.3,+08,16,"9 M-49, GALAXY IN VIRGO"
2310 DATA07,00.6,-08,16,"8 M-50, GAL. CLUS. IN MONOCEROS"
2320 DATA13,27.8,+47,27,"9 M-51, WHIRLPOOL IN CANES VENATICI"
2330 DATA23,22.0,+61,19,"8 M-52, GAL. CLUS. IN CASSIOPEIA"
2340 DATA13,10.5,+18,26,"8 M-53, GLOB. CLUS. IN COMA BERENICES"
2350 DATA18,52.0,-30,32,"8 M-54, GLOB. CLUS. IN SAGITTARIUS"
2360 DATA19,36.9,-31,03,"8 M-55, GLOB. CLUS. IN SAGITTARIUS"
2370 DATA19,14.6,+30,05,"8 M-56, GLOB. CLUS. IN LYRA"
2380 DATA18,51.8,+32,58,"6 M-57, RING NEBULA IN LYRA"
2390 DATA12,35.1,+12,05,"9 M-58, GALAXY IN VIRGO"
2400 DATA12,39.5,+11,55,"9 M-59, GALAXY IN VIRGO"
2410 DATA12,41.1,+11,49,"9 M-60, GALAXY IN VIRGO"
2420 DATA12,19.4,+04,45,"9 M-61, GALAXY IN VIRGO"
2430 DATA16,58.1,-30,03,"8 M-62, GLOB. CLUS. IN OPHIUCHUS"
2440 DATA13,13.5,+42,17,"9 M-63, GALAXY IN CANES VENATICI"
2450 DATA12,54.3,+21,57,"6 M-64, BLACKEYE IN COMA BERENICES"
2460 DATA11,16.3,+13,23,"9 M-65, GALAXY IN LEO"
2470 DATA11,17.6,+13,17,"9 M-66, GALAXY IN LEO"
2480 DATA08,48.5,+12,00,"9 M-67, GAL. CLUS. IN CANCER"
```

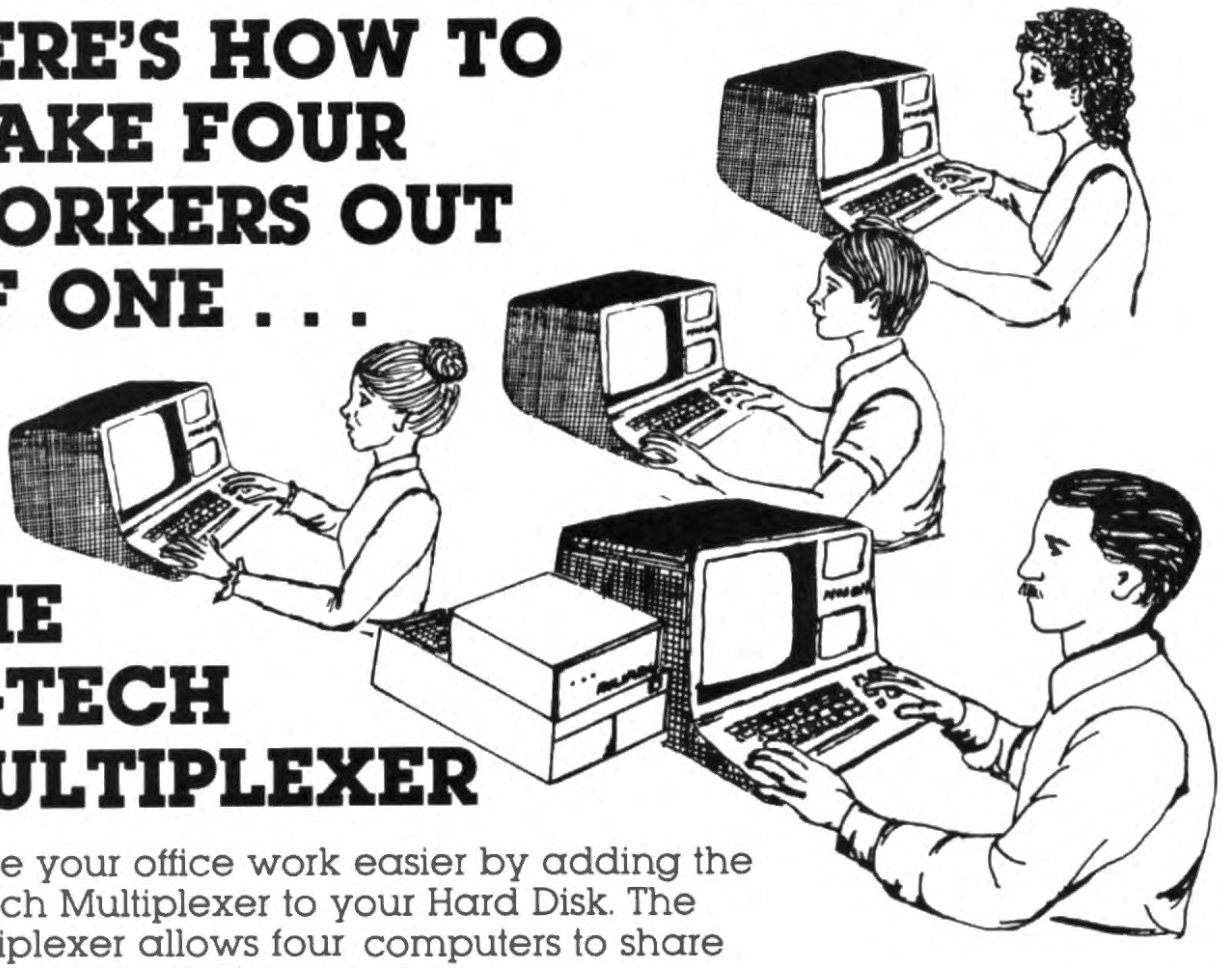
Listing continued

THE COMPUTER CONNECTION

BT ENTERPRISES

WORK SMART!

HERE'S HOW TO MAKE FOUR WORKERS OUT OF ONE . . .



THE BI-TECH MULTIPLEXER

Make your office work easier by adding the Bi-Tech Multiplexer to your Hard Disk. The Multiplexer allows four computers to share the same Hard Disk Data Base.
Bi-Tech's State-of-the-Art Hard Drives are available in 10-, 15- and 20-megabyte formatted capacities and now introducing the first truly reliable 5-megabyte removable cartridge drive. So get it together and let your hard drive work for you and your office.

Four computer system with Hard Drive and Multiplexer as low as **$8950**

*The Bi-Tech Multiplexer is a high-speed parallel device
Hard Drives and Multiplexers available for most computers

BT ENTERPRISES

B·T· Enterprises Dept. 1-J 300
10B Carlough Road
Bohemia, N·Y· 11716
B·T Enterprises is a division of Bi-Tech Enterprises Inc
(516) 567-8155 (voice) (516) 588-5836 (modem)

Orders Only
800-645-1165
N·Y· call (516) 567-8155

Dealer Inquires Welcome
Prices subject to change
N·Y·S Residents add tax

American Express Carte Blanche
Diners Club MasterCard & Visa

TRS-80 MODEL III ASSEMBLY LANGUAGE

A complete course in assembly language, written for the **beginner**. Basic concepts, the Z-80 instruction set, complete Model III ROM and RAM information, programming examples, the disk controller, the TRSDOS 1.3 disk operating system, RS-232-C interface.

With the book you can also purchase **Monitor #5**, a comprehensive machine language monitor (specify Model 1 or 3).

Book only **$16.95**
Book and Monitor #5 on disk..... **$29.95**

SYSTEM DIAGNOSTIC

Complete diagnostic tests for every component of your TRS-80 Model 1 or 3. Tests for ROM, RAM, Video Display, Keyboard, Line Printer, Cassette Recorder, Disk Drives, RS-232-C Interface. Individual or continuous testing modes. Models 1 or 3 only.

System Diagnostic **$99.95**

SMART TERMINAL

The *intelligent* terminal program, with automatic transmission and storage of data, true BREAK key, cassette and disk files compatible with SCRIPSIT™ and Electric Pencil™. Same program supports both cassette and disk systems.

Model 1 or 3 version **$74.95**
Model 2/12 (CP/M) Version **$79.95**

TYPITALL

The SCRIPSIT™ Compatible Word Processor

TYPITALL is a new word processing program which is upward compatible with SCRIPSIT™ for the Model 1 and 3 TRS-80. TYPITALL includes features like these: assign any sequence of keystrokes to a single control key. See the formatted text on the screen before printing. Send the formatted text to a disk file for later printing. Merge data from a file while printing. Send any control or graphic character to the printer. Use the same version on the Model 1 or 3. Reenter the program with all text intact if you accidentally exit without saving text.

TYPITALL (disk only) **$129.95**

SMALL BUSINESS ACCOUNTING

Based on Dome Bookkeeping Record #612, this program keeps track of income, expenses, and payroll (not included in cassette version) for a small business.

Model 1/3/4 disk version **$59.95**
Model 1/3/4 cassette version **$29.95**
Model 2/12 or IBM/PC version **$69.95**

HOME BUDGET

Analyzes your income and expenses, computes monthly and year-to-date summaries including tax deductions.

Model 1/3/4 disk version **$49.95**
Model 1/3/4 cassette version **$29.95**
Model 2/12 or IBM/PC version **$59.95**

24-hour TOLL-FREE Order number:
Outside California call:
(800) 428-7825, ext 169
Inside California call:
(800) 428-7824, ext 169

Visa, Master Card, or COD Orders only. For information call:
(914) 634-1821 ↵175
9-5 Eastern time only.

Add $3.00 postage & handling.
New York residents add sales tax.

Howe Software

14 Lexington Rd. New City, NY 10956

*TRS-80 is a trademark of Tandy Corp.

Listing continued

```
2490 DATA12,36.8,-26,29,"8 M-68, GLOB. CLUS. IN HYDRA"
2500 DATA18,28.1,-32,23,"8 M-69, GLOB. CLUS. IN SAGITTARIUS"
2510 DATA18,40.0,-32,21,"8 M-70, GLOB. CLUS. IN SAGITTARIUS"
2520 DATA19,51.5,+18,39,"8 M-71, GLOB. CLUS. IN SAGITTARIUS"
2530 DATA20,50.7,-12,44,"8 M-72, GLOB. CLUS. IN AQUARIUS"
2540 DATA20,56.2,-12,50,"5 M-73, ASTERISM IN AQUARIUS"
2550 DATA01,34.0,+15,32,"9 M-74, GALAXY IN PISCES"
2560 DATA20,03.2,-22,04,"8 M-75, GLOB. CLUS. IN SAGITTARIUS"
2570 DATA01,39.1,+51,19,"6 M-76, DUMBBELL, PLANETARY IN PERSEUS"
2580 DATA02,40.1,-.01,14,"9 M-77, GALAXY IN CETUS"
2590 DATA05,44.2,+00,02,"6 M-78, DIFFUSE NEB. IN ORION"
2600 DATA05,22.2,-24,34,"8 M-79, GLOB. CLUS. IN LEPUS"
2610 DATA16,14.1,-22,52,"8 M-80, GLOB. CLUS. IN SCORPIUS"
2620 DATA09,51.5,+69,18,"9 M-81, GALAXY IN URSA MAJOR"
2630 DATA09,51.9,+69,56,"9 M-82, GALAXY IN URSA MAJOR"
2640 DATA13,34.3,-29,37,"9 M-83, GALAXY IN HYDRA"
2650 DATA12,22.6,+13,10,"9 M-84, GALAXY IN VIRGO"
2660 DATA12,22.8,+18,28,"9 M-85, GALAXY IN COMA BERENICES"
2670 DATA12,23.7,+13,13,"9 M-86, GALAXY IN VIRGO"
2680 DATA12,28.3,+12,40,"9 M-87, GALAXY IN VIRGO"
2690 DATA12,29.5,+14,42,"9 M-88, PINWHEEL, IN COMA BERENICES"
2700 DATA12,33.1,+12,50,"9 M-89, GALAXY IN VIRGO"
2710 DATA12,34.3,+13,26,"9 M-90, GALAXY IN VIRGO"
2720 DATA17,15.6,+43,12,"8 M-92, GLOB. CLUS. IN HERCULES"
2730 DATA07,42.5,-23,45,"9 M-93, GAL. CLUS. IN PUPPIS"
2740 DATA12,48.6,+41,23,"9 M-94, GALAXY IN CANES VENATICI"
2750 DATA10,41.3,+11,58,"9 M-95, GALAXY IN LEO"
2760 DATA10,44.2,+12,05,"9 M-96, GALAXY IN LEO"

2770 DATA11,11.9,+55,18,"6 M-97, OWL NEB, PLANETARY IN URSA MAJOR"
2780 DATA12,11.3,+15,11,"9 M-98, GALAXY IN COMA BERENICES"
2790 DATA12,16.3,+14,42,"9 M-99, GALAXY IN COMA BERENICES"
2800 DATA12,20.4,+16,06,"9 M-100, GALAXY IN COMA BERENICES"
2810 DATA14,01.4,+54,35,"9 M-101, GALAXY IN URSA MAJOR"
2820 DATA01,29.9,+60,26,"9 M-103, GAL. CLUS. IN CASSIOPEIA"
2830 DATA12,37.3,-11,21,"9 M-104, SOMBRERO, IN VIRGO"
2840 DATA10,45.2,+12,51,"9 M-105, GALAXY IN LEO"

2850 DATA12,16.5,+47,35,"9 M-106, GALAXY IN CANES VENATICI"
2860 DATA16,29.7,-12,57,"8 M-107, GLOB. CLUS. IN OPHIUCHUS"
2870 DATA11,08.7,+55,57,"9 M-108, GALAXY IN URSA MAJOR"
2880 DATA11,55.0,+53,39,"9 M-109, GALAXY IN URSA MAJOR"
2890 DATA00,44.6,-12,09,"6 PLANETARY NEB IN CETUS, MAG 8.5"
2900 DATA17,42.8,+72,11,"2 PSI DRACONIS, DOUBLE STAR"
2910 DATA02,00.8,+42,06,"2 GAMMA ANDROMEDAE, DOUBLE STAR"
2920 DATA02,18.0,+56,54,"7 PERSEUS, DOUBLE CLUSTER"
2930 DATA02,24.9,+67,11,"5 IOTA CASSIOPEIAE, TRIPLE STAR"
2940 DATA02,47.0,+55,41,"2 ETA PERSEI, DOUBLE STAR"

2950 DATA04,57.3,-14,53,"1 R LEPORIS, CRIMSON STAR"
2960 DATA07,31.4,+32,00,"2 CASTOR, DBL, IN GEMINI, 1.8'"
2970 DATA08,37.5,+19,52,"8 PRAESEPE CLUSTER"
2980 DATA10,17.2,+20,06,"2 GAMMA LEONIS, DOUBLE STAR"
2990 DATA13,21.9,+55,11,"2 MIZAR, DBL, IN URSA MAJOR, 14.4'"
3000 DATA12,53.7,+38,35,"2 COR CAROLI, DOUBLE STAR"
3010 DATA12,39.1,-01,11,"2 GAMMA VIRGINIS, DOUBLE STAR"
3020 DATA17,31.2,+55,13,"2 NU DRACONIS, DOUBLE STAR"

3030 DATA13,23.8,-47,03,"8 OMEGA CENTAURI, GLOBULAR CLUSTER"
3040 DATA14,42.8,+27,17,"2 EPSILON BOOTIS, DOUBLE STAR"
3050 DATA15,37.5,+36,48,"2 ZETA CORONAE BOREALIS, DOUBLE STAR"
3060 DATA17,12.4,+14,27,"7 ALPHA HERCULIS, DOUBLE CLUSTER"
3070 DATA18,42.7,+39,37,"4 EPSILON LYRAE, DOUBLE-DOUBLE"
3080 DATA16,23.6,-26,19,"2 ANTARES, DBL, IN SCORPIUS, 3.0'"
3090 DATA20,15.3,-12,42,"4 ALPHA CAPRICORNI, DOUBLE-DOUBLE"

3100 DATA06,42.9,-16,39,"2 SIRIUS, DBL, IN CANIS MAJOR, 3-11.5'"
3110 DATA14,13.4,+19,27,"1 ARCTURUS, MAGNITUDE -0.06"
3120 DATA18,35.2,+38,44,"1 VEGA, MAGNITUDE 0.04"
3130 DATA05,13.0,+45,57,"1 CAPELLA, MAGNITUDE 0.05"
3140 DATA00,39.4,+85,03,"5 NGC-0188, 'OLDEST GAL STR CLUS' IN CEPH
EUS"

3150 DATA20,57.0,+44,08,"6 NGC-7000 N. AMER. NEB IN CYGNUS"
3160 DATA21,01.4,-11,34,"6 NGC-7009, SATURN NEB IN AQUARIUS"
3170 DATA22,27.0,-21,06,"6 NGC-7293, HELIX NEB IN AQUARIUS"
3180 DATA20,54.3,+31,30,"6 NGC-6960, VEIL NEB IN CYGNUS"
3190 DATA12,33.9,+26,16,"9 NGC-4565, GALAXY IN COMA BERENICES"
3200 DATA16,45.6,+47,37,"8 NGC-6229, GLOBULAR CLUSTER IN HERCULES"
3210 DATA17,01.4,-24,32,"8 NGC-6284, GLOBULAR CLUSTER IN OPHIUCHUS
"

3220 DATA17,02.1,-22,39,"8 NGC-6287, GLOBULAR CLUSTER IN OPIUCHUS"
3230 DATA17,58.8,+66,38,"6 NGC-6543, PLANETARY MAG 8, IN DRACO"
3240 DATA17,20.7,-17,46,"8 NGC-6356, GLOBULAR CLUSTER IN OPHIUCHUS
"

3250 DATA18,50.3,-08,46,"8 NGC-6712, GLOBULAR CLUSTER IN SCUTUM"
3260 DATA20,31.7,+07,14,"8 NGC-6934, GLOBULAR CLUSTER IN DELPHINUS
"
```

Listing continued

Listing continued

```
3270 DATA00,50.3,+56,19,"6 NGC-0281, DIFFUSE GALACTIC NEB"
3280 DATA01,43.0,+61,01,"5 NGC-0663, COMPRESSED CLUSTER IN CASSIOP
EIA"
3290 DATA00,54.4,+60,49,"6 NGC-0059, DIFFUSE GALACTIC NEB"
3300 DATA05,36.2,-07,06,"6 NGC-1430, DIFFUSE GALACTIC NEB IN ORION
"
3310 DATA05,39.3,-01,52,"6 NGC-2024, DIFFUSE GALACTIC NEB IN ORION
"
3320 DATA06,38.2,+09,57,"6 NGC-2264, CONE NEB, IN MONOCEROS"
3330 DATA21,01.2,+67,58,"6 NGC-7023, DIFFUSE GALACTIC NEB IN CEPHE
US"
3340 DATA06,29.7,+04,54,"6 NGC-2237, ROSETTE NEBULA IN MONOCEROS"
3350 DATA00,10.3,+72,14,"6 NGC-0040, PLANETARY IN CEPHEUS"
3360 DATA04,11.9,-12,52,"6 NGC-1535, PLANETARY NEBULAE IN ERIDANUS
"
3370 DATA05,52.6,+46,06,"6 I.2149, PLANETARY NEBULAE"
3380 DATA07,26.2,+21,01,"6 NGC-2392, ESKIMO, PLANETARY NEB IN GEMI
NI"
3390 DATA07,39.5,-14,36,"6 NGC-2438, PLANETARY NEBULAE"
3400 DATA10,22.3,-18,23,"6 NGC-3242, PLANETARY NEBULAE IN HYDRA"
3410 DATA12,21.9,-18,29,"6 NGC-4361, PLANETARY NEBULAE IN CORVUS"
3420 DATA14,03.0,+28,46,"5 NGC-5466, COMPRESSED CLUSTER IN BOOTES"
3430 DATA16,42.4,+23,54,"6 NGC-6210, PLANETARY NEBULAE IN HERCULES
"
3440 DATA18,09.6,+06,51,"6 NGC-6572, PLANETARY NEBULAE IN OPHIUCHU
S"
3450 DATA19,28.9,+09,58,"6 NGC-6803, PLANETARY NEBULAE IN AQUILA"
3460 DATA19,41.1,-14,17,"6 NGC-6818, PLANETARY NEBULAE IN SAGITTAR
IUS"
3470 DATA19,43.5,+50,25,"6 NGC-6826, PLANETARY NEBULAE IN CYGNUS"
3480 DATA20,12.7,+12,35,"6 NGC-6891, PLANETARY NEBULAE IN DELPHINU
S"
3490 DATA16,29.7,-12,57,"8 NGC-6171, GLOBULAR IN OPHIUCHUS"
3500 DATA21,05.2,+42,02,"6 NGC-7027, PLANETARY NEBULAE, IN CYGNUS"
3510 DATA23,03.2,+59,59,"6 NGC-1470, PLANETARY NEBULAE IN CEPHEUS"
3520 DATA23,23.5,+42,15,"6 NGC-7662, PLANETARY NEBULAE IN ANDROMED
A"
3530 DATA00,37.6,+41,25,"9 NGC-0205, SPIRAL GALAXY IN ANDROMEDA"
3540 DATA00,45.1,-25,34,"9 NGC-0253, SPIRAL GALAXY IN SCULPTOR"
3550 DATA02,44.3,-30,29,"9 NGC-1097, BARRED SPIRAL IN FORNAX"
3560 DATA11,17.7,+13,53,"9 NGC-3628, SPIRAL GAL IN LEO"
3570 DATA07,32.0,+65,43,"9 NGC-2403, SPIRAL GALAXY IN CAMELOPARDAL
IS"
3580 DATA08,49.6,+33,38,"9 NGC-2683, SPIRAL GALAXY IN LYNX"
3590 DATA09,18.6,+51,12,"9 NGC-2841, BARRED SPIRAL IN URSA MAJOR"
3600 DATA09,29.3,+21,44,"9 NGC-2903, SPIRAL GALAXY IN LEO"
3610 DATA10,02.8,-07,28,"9 NGC-3115, ELLIPTICAL GALAXY IN SEXTANS"
3620 DATA10,35.7,+53,46,"9 NGC-3310, BARRED SPIRAL GALAXY"
3630 DATA11,03.2,+00,14,"9 NGC-3521, SPIRAL GALAXY IN LEO"
3640 DATA11,46.1,+49,00,"9 NGC-3893, SPIRAL GALAXY IN URSA MAJOR"
3650 DATA12,13.1,+36,36,"9 NGC-4214, BARRED SPIRAL IN CANES VENATI
CI"
3660 DATA12,15.0,+38,05,"9 NGC-4244, SPIRAL GALAXY IN CANES VENATI
CI"
3670 DATA13,08.5,+37,19,"9 NGC-5005, GALAXY IN CANES VENATICI"
3680 DATA12,39.8,+32,49,"9 NGC-4631, SPIRAL GALAXY IN CANES VENATI
CI"
3690 DATA12,48.0,+25,46,"9 NGC-4725, SPIRAL GALAXY IN COMA BERENIC
ES"
3700 DATA13,35.1,+09,08,"9 NGC-5248, SPIRAL GALAXY IN BOOTES"
3710 DATA19,42.1,-14,53,"9 NGC-6822, IRREGULAR GALAXY IN SAGITTARI
US"
3720 DATA22,35.0,+34,10,"9 NGC-7331, SPIRAL GALAXY IN PEGASUS"
3730 DATA23,55.3,-32,51,"9 NGC-7793, SPIRAL GALAXY IN SCULPTOR"
3740 DATA01,51.0,+19,03,"2 GAMMA ARIES, WHT & YEL DBL."
3750 DATA05,12.1,-08,15,"1 BETA ORIONIS, 'RIGEL' MAG 0.14"
3760 DATA07,36.7,+05,21,"1 ALPHA CANIS MINORIS, 'PROCYON' MAG 0.38
"
3770 DATA19,48.3,+08,44,"1 ALPHA AQUILAE, 'ALTAIR' MAG 0.77"
3780 DATA05,52.5,+07,24,"1 ALPHA ORIONIS, 'BETELGEUSE' MAG VARIABL
E"
3790 DATA04,33.0,+16,25,"1 ALPHA TAURI, 'ALDEBARAN' MAG 0.86"
3800 DATA13,22.6,-10,54,"1 ALPHA VIRGINIS, 'SPICA' MAG 0.91"
3810 DATA16,26.3,-26,19,"1 ALPHA SCORPII, 'ANTARES' MAG 0.92"
3820 DATA07,42.3,+28,09,"1 BETA GEMINORUM, 'POLLUX' MAG 1.16"
3830 DATA10,05.7,+12,13,"1 ALPHA LEONIS, 'REGULUS' MAG 1.36"
3840 DATA07,31.4,+32,00,"1 ALPHA GEMINORUM, 'CASTOR' MAG 1.58"
3850 DATA04,13.0,-07,44,"1 40 ERIDANI B, WHT DWF IN ERIDANUS"
3860 DATA06,43.0,-16,39,"1 SIRIUS B, WHT DWF IN CANIS MAJOR"
3870 DATA25,0,0,0,"0"
```


PASCAL
$ 14.77!

Now you can try Pascal without spending a fortune! The Pascal 80 Trial Version is a reduced version of Pascal 80, and does not include pointer variables or disk files, and does not allow you to save your programs. But it does let you program in Pascal, list your programs to a printer, and even comes with a coupon worth $10 off the regular price of Pascal 80. This version of Pascal comes on a diskette that will boot on a Model I or Model III TRS-80.

Here is what you get:

VARIABLE TYPES: real, integer, char, boolean, arrays, sets, records, and user de fined types.
CONSTANTS: minint, pi, true, false, and user defined constants.
OPERATORS: + − * / div mod comparison/set operators and or not.
FUNCTIONS: abs sqr sqrt sin cos arctan exp In ord pred succ chr odd round trune.
PROCEDURES: read readln write writeln
STRUCTURES: if..then..else case for..do while..do repeat..until goto

Send $14.77 by check or money order to:

Pascal 80 Trial Version
New Classics Software
239 Fox Hill Road
Denville, NJ 07834

Sorry, no credit card orders at this price! See our other ad for information on our regular version of Pascal 80.

NEW CLASSICS SOFTWARE

255

See List of Advertisers on Page 323

Meet the MC68000

by John Edward Crew

To tap the power of the Motorola MC68000 microprocessor resident in the Model 16, you have to program in Assembly language. This synopsis of some of the 68000's features should give you a head start.

The 68000 includes a 24-bit address bus giving 16-megabyte direct addressing range, a 16-bit data bus, 32-bit registers, a 6 MHz clock rate, memory-mapped I/O, an 8-byte instruction prefetch memory for faster execution, 56 powerful instruction types with most having several different addressing modes, 14 addressing modes, and five data types. It also has some privileged instructions reserved for the operating system, provisions for use in multiprocessor systems with direct memory access devices, 255 vectored exception handling capability, seven interrupt priority levels, and hardware compatibility with 6800 series support circuits. The 68000 is similar to an IBM 360 series CPU.

Operating States

The MC68000 has two operating states: supervisor and user. You can use a few special instructions only in the supervisor state. The operating system runs in the supervisor state, while application programs run in the user state. The two states allow the operating system to control memory allocation, and prevent you from accessing locations outside your assigned space. Memory protection is especially important when the computer is running more than one program at a time. A system crash would affect all users; the more users there are, the more crashes, and the more work lost.

Assembly-language programmers take note: Here's a discussion of the Motorola MC68000.

Memory management units (MMUs) are required for full memory protection. They check every memory reference to see if it is in the allowed region. If a 68000 computer doesn't have any MMUs, you can get around the operating system's memory protection by writing machine-language programs.

You can use a special trace mode with a debug program to single step through a machine-language program. You can trace while in either the supervisor or user state, but you can only enter it from the supervisor state by turning on a special bit in the status register.

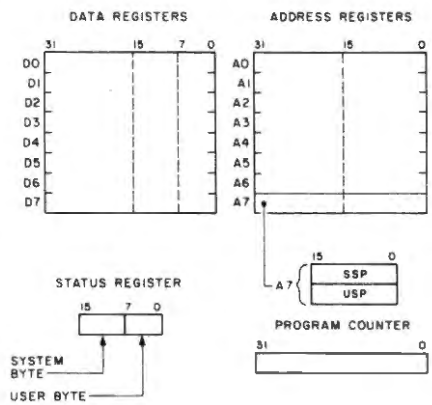


Figure 1. Conceptual model of MC68000's registers.

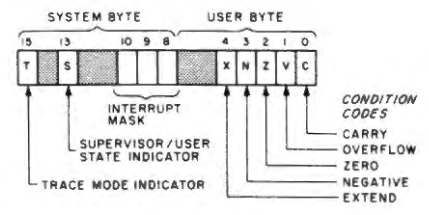


Figure 2. Status register's contents.

Registers

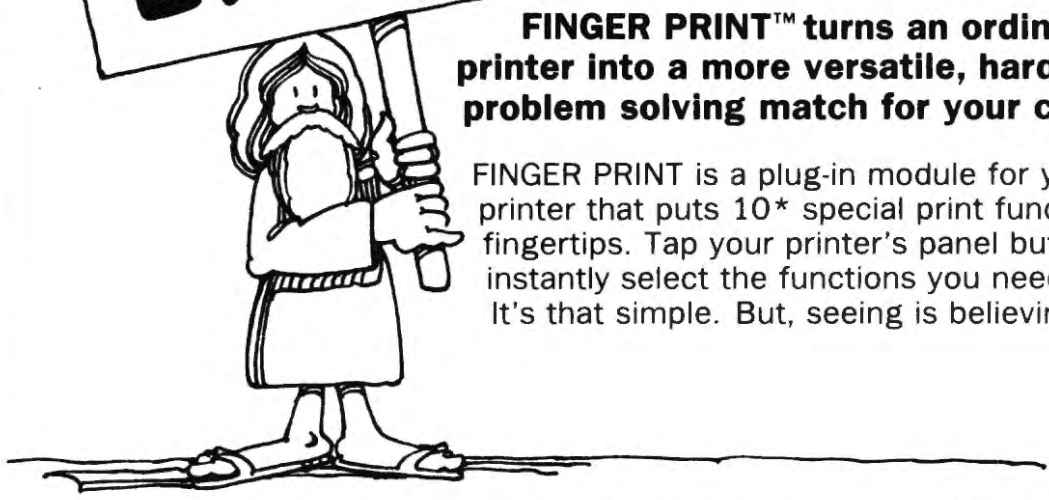
Figure 1 is the programmer's conceptual model of the 68000's many registers. Registers can't be used in pairs as the Z80's can, but they are more than large enough for addresses. There are eight data registers (named D0–D7), eight address registers (named A0–A7 with A7 specially used for stack pointers), and the program counter (PC), all 32 bits wide. They can hold positive numbers up to about 8.6 billion. The status register (SR) is 16 bits wide; the high byte is called the system byte and the low byte the user byte or the condition code register.

Figure 2 shows the contents of the status register. The system stack pointer and the user stack pointer each use half of A7. In the supervisor state, the system stack pointer is used. On the other hand, the user stack pointer is used in the user state. I believe the user and system stacks must be in the first 64K block of memory because the user stack pointer and system stack pointer are 16 bits wide.

The distinction between data and address registers is in their usage. Data registers can hold byte, word (2 bytes), or long word (4 bytes) data. If a 1- or

NO MORE LAZY EPSONS!

Now Available for MX & FX/RX Models, too!



FINGER PRINT™ turns an ordinary Epson printer into a more versatile, harder working, problem solving match for your computer!

FINGER PRINT is a plug-in module for your Epson printer that puts 10* special print functions at your fingertips. Tap your printer's panel buttons to instantly select the functions you need. It's that simple. But, seeing is believing...

Want to use compressed to get more columns on your spreadsheet? You got it!

Need a double-wide heading? Easy!

Want to emphasize print on your final draft? No sweat!

Tired of printing on the perforation?

With automatic perforation skipover, it doesn't happen!

Want to use italics to make a paragraph stand out? Simple!

Need Fine Print for a contract or footnotes on a report? With Fingerprint just tap the buttons!

Even combinations like double emphasized italics are no problem!

That's just a sample of how FINGER PRINT turns your Epson MX 80/100 or IBM PC printer into a hard working printer...and FINGER PRINT has Buffer Clear and Left Margin Control, too!

FINGER PRINT will not interfere with normal printer operation...and installs easily, without soldering. It comes with complete operating/installation instructions, control panel reference label, and it's WARRANTED FOR 1 FULL YEAR.

*For Graftrax-Plus equipped printers. Italics and Fine Print cannot be selected on non-Graftrax-Plus models.

$59.95 Look for FINGER PRINT at your local computer dealer. For the name of a dealer near you, or additional information, call (213) 914-5831. To order directly, call toll free: 800-835-2246, Ext. 441. MC/Visa/COD orders accepted (include $1.50 s/h...CA residents add sales tax).

FINGER PRINT™

DRESSELHAUS COMPUTER PRODUCTS

We make technology easy to live with.

837 E. Alosta Ave., Glendora, CA 91740

We welcome dealer inquiries

353

See List of Advertisers on Page 323

2-byte data is moved into or out of a data register, only the lower part is used and the higher bits are unaffected. Address registers can't be used for byte data. When an address register is loaded, it is first completely cleared. An address register may only be used as source of a word or long word number. You can get into trouble if you forget these and other differences between data and address registers.

Exceptions

Motorola uses the word "exception" to include interrupts caused by external devices, errors, and by the TRAP and TRAPV instructions. The word "interrupt" only refers to external devices requesting the CPU's attention. Memory locations 0–1023 contain the table of starting addresses of exception-handling routines (called the "exception vector table"). The first entry is used after reset and is 8 bytes long. The other 254 entries are 4 bytes long. Some entries are specially used, which leaves 192 to the user. Interrupts have one of seven levels of priority. If you want more levels of priority, you have to use external circuitry. Level 7 has the highest priority and is unmaskable (every time it occurs, the appropriate exception-handling routine is done).

The 68000 automatically checks for some error conditions (divide-by-zero, illegal instruction, word access from odd address, and others). When it finds an error, the processor goes to the appropriate exception-handling routine that would typically be programmed to print an error message. This error-checking is done during execution of any machine-language program and can't be shut off.

Instructions

Instructions are one to five words long and must start on even-numbered addresses. To save memory, Motorola made some powerful instructions that replace several simpler instructions. Motorola made the instruction set small so programmers could easily learn and remember it. Most instructions offer several different addressing modes. The instruction format and variations are consistent to simplify learning them.

To simplify modular-structured programming, Motorola provided the MOVEM (move multiple registers), LINK, and UNLK (unlink) instructions. LINK and UNLK maintain linked lists of data storage blocks. It's easier to write relocatable programs for the 68000 than for the Z80. Some very useful instructions are multiply, divide, and CHK (check register against bounds).

You can do extended precision addition and subtraction easily. Unlike in the Z80, data in registers can be rotated or shifted 1–8 bits if the shift count is in the instruction, or 0–63 if the shift count is held in a register. The conditional branch instructions are far more powerful than the Z80's. Some of the 14 conditions are greater than, greater or equal, equal, less than, less or equal, and carry.

Data Types

The 68000 has instructions to manipulate five data types: bit, byte (8 bits), word (16 bits), long word (32 bits), and BCD (4 bits per binary coded decimal digit). There are two BCD arithmetic instructions: ABCD (add BCD numbers) and SBCD (subtract BCD numbers). This is easier for the programmer than with the way the Z80 does BCD arithmetic. Because the registers are 32 bits long and many instructions have 32-bit operands, the 68000 is often called a 16/32-bit microprocessor. If the data bus were 32 bits wide, the 68000 would be a 32-bit microprocessor.

Addressing Modes

Much of the 68000's power is due to the wide variety of addressing modes. The 14 modes have six basic types: register direct, register indirect (this is the most powerful type and even allows indexing), absolute (one- or two-word address), immediate (data in instruction or following words), program counter relative (allows relocatability), and implied (USP, SSP, program counter, or status register suggested by instruction). The second and fifth types are the most powerful. Table 1 shows the different types and the effective address calculation. The computer calculates the effective address during execution of the instruction.

Register Indirect Addressing

The A0–A6 registers can be used like stack pointer registers, using the postincrement and predecrement types of addressing. Indexed with offset addressing is useful for arrays. For indexed addressing, the content of an address register (called the base register) is added to the content of the index register (a data or address register) and an 8-bit offset (also called displacement) given in the instruction.

After 2 years of extensive research and development
XYZT Computer Dimensions, Inc is proud to announce ...

NICE™

the NEW INTERACTIVE COMPUTING ENVIRONMENT

NICE is nothing less than a comprehensive integration of all computing facilities – including DOS, numerous utilities, application programs, even games combined with menus, database, screens, libraries, reports – an interactive environment friendly to the first time user and the sophisticated systems intergrater alike. If you know what a turbo-charger can do for an auto engine, that is what NICE does for a computer. Clearly, it is the most exciting news to come along in software for the microcomputer

DO YOU KNOW HOW TO BOOT YOUR SYSTEM? THEN YOU KNOW HOW TO TURN YOUR COMPUTER INTO THE MOST POWERFUL USER FRIENDLY BUSINESS MACHINE!!

NICE makes development and using software – EASY. Based on a new concept this state-of-the-art software gives you the interactive power until now found only on mainframes, but at micro prices. Put a powerful menu-driven command structure at your fingertips! Run word-processors, spell-checkers, spread-sheet programs, utilities, application programs without remembering command sequence or constantly checking the manuals. Everything you need is on the screen. Create your own applications and add them to the system – use menus, relational files, customized screens, special forms. In a matter of hours, you zip through the programming projects you usually expected to take months. All thanks to a modular, consistently designed system.

IS YOUR WORDPROCESSOR WORKING? THEN THOSE SCREENS OUGHT TO BE IN YOUR SYSTEM !

Using a computer should not be difficult – no more complicated than driving a car. With NICE you are no longer required to know all of the intricate internal operations of the computer. Creation of all types of screens, menus, inquires and reports or customized forms is as simple as writing a letter – type it on your word-processor, save it to disk, and it is ready for use. You don't have to be a programmer – just a computer user.

It's NICE for you!

NICE system consists of:

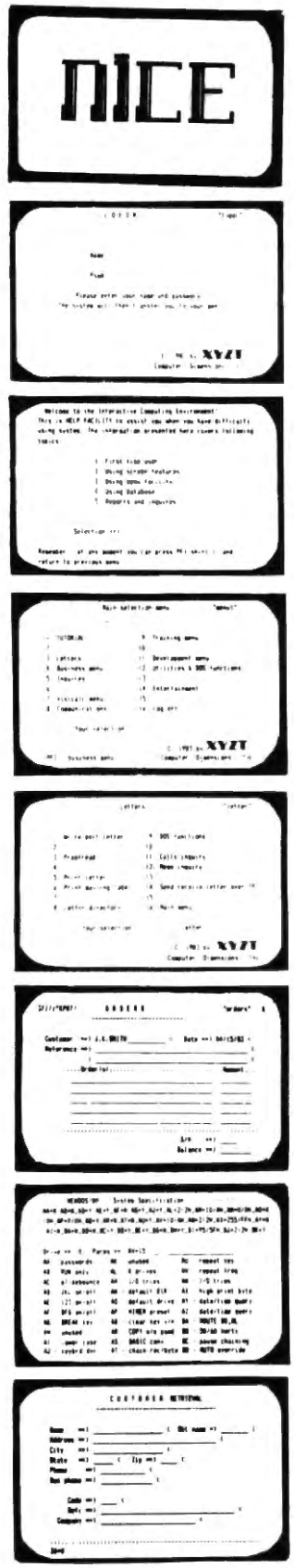
Interactive Control & Programming Language (ICPL) ..... $150.
Menu and Screen management facilities (MSF) ..... $75.
Database facility (DBF) ..... $75.
Forms and Report Writer (FRW) ..... $75.
Library Support Option (LSO) ..... $75.
Minimal NICE configuration — ICPL+MSF+LSO.

Minimal hardware requirements — 2 disk TRS-80® mod I/III. System is compatible with NEWDOS/80®-LDOS®-DOSPLUS®-MULTIDOS® floppy or hard disk.

Check, M.O., C.O.D., VISA,
MC plus $4.00 s/h.
Foreign orders — extra $10.00

XYZT Computer Dimensions, Inc. ↙158
2 Penn Plaza, Suite 1500
New York, N.Y. 10121
(212) 244-3100
Order by Mail or Check Your Local Dealer

DEALER INQUIRIES WELCOME!



↙See List of Advertisers on Page 323

Awesome!

USCF rated 1793/5*

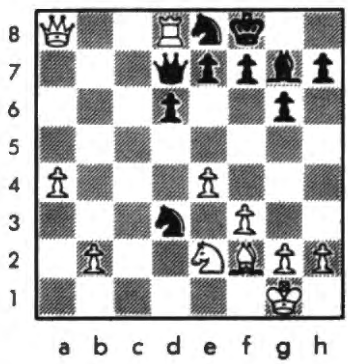
SFINKS 4.0

with user friendly features

Second Kissimmee Open Rd 2

White: Sfinks 4.0 **Black:** Human 1830

	White	Black		White	Black
1.	e2-e4	c7-c5	17.	d4-e2	d7-e5
2.	g1-f3	d7-d6	18.	d3-c2	e5-c4
3.	d2-d4	c5-d4	19.	e3-f2	b5-b4
4.	f1-b5+	c8-d7	20.	c2-b3	a6-a5
5.	b5-d7+	d8-d7	21.	d1-d4!	b7-b5
6.	f3-d4	g8-f6	22.	c3-b4	a5-b4
7.	b1-c3	g7-g6	23.	a1-c1!	c4-b6
8.	e1-g1	f8-g7	24.	c1-c8+	b6-c8
9.	c1-e3	e8-g8	25.	b3-c4	b5-d7
10.	d1-d3	a7-a6	26.	c4-b4	c8-a7
11.	c3-d5	b7-b5?	27.	b4-b8+	f6-e8
12.	d5-b6	d7-b7	28.	d4-c4	a7-c6
13.	b6-a8	b7-a8	29.	b8-a8	c6-e5
14.	f2-f3	b8-d7	30.	c4-c8	g8-f8
15.	f1-d1	f8-c8	31.	a2-a4	e5-d3
16.	c2-c3	a8-b7	32.	c8-d8!	resigns



SFINKS 4.0 CHESS, 48 K, disk only. Only $49.95. Please specify Model I, III or IV.

SFINKS 3.0 CHESS, 32K, disk or tape. Only $34.95. Please specify Model I (E.I.), III or IV.

SFINKS CHESS TUTOR, 32K disk only. Only $19.95. Please specify Model I, III or IV.

To order, please see your dealer or send check plus $2.00 shipping to:

WILLIAM FINK
Suite 24-B, 1105 N. Main St.
Gainesville, FL 32601
or call (904) 377-4847

MasterCard VISA

226

Florida residents add 5% sales tax.
*On Model 3 w/speedup by Holmes Eng.

Register Indirect

Type	Effective address calculation
1. Regular	EA = (An)
2. Postincrement	EA = (An), An←An + N
3. Predecrement	An←An − N, EA = (An)
4. With offset	EA = (An) + d_{16}
5. Indexed with offset	EA = (An) + (Xn) + d_8

PC Relative

Type	Effective address calculation
1. With offset	EA = (PC) + d_{16}
2. With index and offset	EA = (PC) + (Xn) + d_8

EA = Effective address
An = Address register
Xn = Index register (data or address register)
N = 1 for byte, 2 for word, 4 for long word.
This adjusts the address register by the length of the data.
( ) = Contents of
← Means replaces (i.e., assignment symbol)
d_8 = 8-bit displacement
d_{16} = 16-bit displacement

Table 1. Register indirect and PC relative addressing.

The index register usually holds the array subscript, which can be incremented or decremented by other instructions, and the base register holds the address of the beginning of the array. Separating the base address from the array subscript allows a program to work on an array anywhere in memory as long as the base address is first properly set.

PC Relative Addressing

Many instructions can use the type of addressing which allows relocation. To load the address of a memory location within 32K bytes of the current address, use "LEA d(PC),An" with d = a signed 16-bit number (−32768 to 32767) and n = the number of an address register (0–6). When you enter a program module, you should first save the registers using MOVEM, and then load the base address using the LEA (load effective address) instruction. Motorola apparently expects programmers to keep machine-language programs under 64K in length because instructions that use an offset in address calculations are limited to a 16-bit offset.

Compatibility

The 68000 can use the 6800 series support chips such as the 6849 dual density floppy disk controller, 6845 CRT controller, and more. If you're familiar with the Radio Shack Color Computer's hardware, you have a good start at understanding 68000 systems.

Although not directly compatible with a 6800 series processor, such as the 6809E, software can be translated directly. The 68000's instruction set is supposed to be a superset of (expanded from) the 6800's.

The Future

The power of the 68000 simplifies Assembly-language programming and thus encourages programmers to support it. Motorola used microprogramming for many of the 68000's capabilities. (Microprogramming means programming a simple computer to act like a more complex computer.) Microprogramming isn't noticeable to the user except in execution speed. If the computer used circuitry instead of microprograms to execute instructions, execution would be faster.

Motorola left room to implement more instructions using microprogramming and will probably release more powerful versions of the MC68000. Versions with higher clock rates are under development. The 68000 doesn't have block move or search instructions like the Z80, but that isn't much of a problem, since those are easily done using a few instructions. Hopefully, Motorola will make a version of the 68000 that doesn't require instructions and data to start at even-numbered addresses. ■

John Edward Crew (1106 Karin Drive, Normal, IL 61761) studies physics at Illinois State University.

★ FREE SHIPPING ★
WITHIN CONTINENTAL 48 STATES

MICRO IMAGES INDUSTRIES INC.

ARE YOU A DREAMER?
IMAGINE THIS . . .

You place your order and it arrives when expected. "What do you know, they did ship that day!" You open your package and SURPRISE, it's what you ordered, not last year's version six times removed. "Wait a minute, I must have paid full retail to get this kind of service. H'mm, that's not it. These prices are among the lowest. What's the catch? I've got it! They charged me large shipping and handling charges. No, not that either. It says here 'Free shipping within the Continental 48 States via UPS ground.' Only the differential is charged for UPS Blue or 1st Class. Now I've got it, it's only a dream!!!"

TRY US!

At Micro Images your dreams become reality! How do we do it? Simple, we tell the truth. If the item you order is not in stock — we tell you. If we can't ship that day — we tell you. Which version? We tell you. Why are we telling you this? The answer is easy. This is what we do best and what separates us from the competition, AND WE WANT YOU TO KNOW.

COPYART II
MDL I or III
Specify Printer **$129.95**

MAXI MANAGER
Manager with Utility - **$119.95**
Maxi Utility Only - **$44.95**

SUPERUTILITY +
Mod I/III - Ver. 3.0 — **$59.95**
SEE NEW BOOK BELOW

Data-Writer
New Version Mod I or III
$124.95

MAXI CRAS
Mod I/III - **$84.95**

LDOS 5.1
MDL I or III — **$109.95**

GEAP - $69.95
Includes Dotwriter 3.0
Add'l Fonts - **$27.95** ea.

NEW SCRIPT - 7.1 - **$109.95**
with Mailing Label Opt. . . **$119.95**
Mailing Label Opt. Only. . . **$27.95**

ZORLOF II
Mdl I or III
$64.95

MAXI STAT
Model I/III
$179.95

MULTIDOS . **$89.95**
NEW VERSION 1.6
Specify Mdl I or III Single or Dbl Density

DOSPLUS
Version 3.5S/3.5D/3.5III **$119.95**
Version II For Model II. **$199.95**

MICROTERM - Mdl I or III . . . **$69.95**

MZAL - Ver. 2 Mdl I or III **$119.95**
TZAL - Mdl III - Tape Only **$44.95**
Basic Editor - Mdl I/III Tape to Dk **$27.95**

MICROSOFT - Model I Only
Fortran 80 or A.L.D.S. **$89.95**
Basic Compiler **$179.95**
Editor/Assembler + Tape **$27.95** Disk **$45.95**

PROSOFT UTILITIES
TRASHMAN - Mdl I/III **$34.95**
FASTER - Mdl I/III **$26.95**
RPM - Mdl I/III **$21.95**

TALLYMASTER Mdl I or III . . . **$69.95**

ELECTRIC WEBSTER w/Corr . . . $129.95
LAZYWRITER Mdl I/III. **$149.95**
ANY LAZY OPTION . . . . . **10% OFF**

BOOKS
How To Do It on the TRS 80 — IJG. . . **$27.95**
Machine Lang. Disk I/O — IJG **$27.95**
TRSDOS 2.3 Decoded — IJG. **$27.95**
Disk + Other Mysteries — IJG. **$20.95**
Basic Decoded — IJG **$27.95**
Custom TRS-80 — IJG. **$27.95**
Basic Faster & Better — IJG **$27.95**
Mdl II/16 Visicalc — W.C. Brown **$16.95**
Mdl I/III Visicalc — W.C. Brown **$16.95**
Copyright Kit. **$11.95**
Inside Superutility Plus **$17.95**

FREE RIBBONS
with all orders over $100 - mention this ad and ask for your free ribbon reload or cartridge. Offer includes all reloads or cartridges except MX100 or Centronic cartridges. Offer good thru October 31, 1983.

LNW-Doubler 5/8 **$199.95**
Includes Dosplus 3.4D

★ ★ PRINTER STANDS ★ ★

SPACE AGE		NO FRILLS	
MX80 No Frills	Clear **13.50**	Bronze **15.95**	
MX80 Space Age	Clear **27.50**	Bronze **29.95**	
Microline 82A Space Age w/slot	Clear **27.50**	Bronze **29.95**	
Microline 83A Space Age w/slot	Clear **34.95**	Bronze **39.95**	
NEC 8023A Space Age	Clear **27.50**	Bronze **29.95**	
MX100 Space Age	Clear **34.95**	Bronze **39.95**	

FLIP N FILE 5¼" **$26.95**

MICRO SPOOLER
16 K. . . **$179.95** 64K. . . **$269.95**

MICROBUFFER Parallel or Serial (Epson) **$149.95**

SPECIAL — $1,795.00
NEW LNW 80 - MODEL II
Includes Dosplus, Acctg & Comm. Pkg., CPM 2.2. and much more!

SYSTEM EXPANSION II. — $349.95

RIBBONS

ZIP BOX RELOADS	½ Dz.	Dz.
Epson MX 70/80-20 Yds. . . .	24.00	42.00
Epson MX 100-30 Yds	30.00	52.00
NEC/Prowriter-14 Yds	21.00	36.00
Centronics 730/737/739/779 or LP-I/II/IV 16 Yds	18.00	32.00

All ZIP BOXES are individually sealed black nylon and require no rewinding. Epson Reloads also available in red, blue, brown, green & purple. Any mix allowed.

CARTRIDGES	Each	Dozen
Epson MX70/80	7.00	70.00
Epson MX100.	12.00	125.00
Prowriter 8510 & NEC 8023A .	7.50	80.00
RS LP III/V.	6.50	70.00
RS LP VI/VIII.	6.50	65.00
RS DSY WH II or DWP 410 . . .	6.50	70.00
RS DSY WH II - Nylon	6.50	70.00
MICRLNE 80/82A/83A/92	N/A	30.00
MICRLNE 84 ½ x40 yds	5.50	60.00
Diablo Hytype II - Multi Strike. .	6.50	65.00
Qume - Multi Strike.	5.00	50.00
NEC Spin - Hy Yld - Multi Strike .	7.00	70.00
Centronic 703/04/53.	11.00	120.00

Minimum order 3 cartridges - any mix. For smaller quantities add $1.50 per order. All our reloads and cartridges are manufactured by one of the oldest and most reputable ribbon Mfg's. in the country.

★ ★ ★ ★ ★ ★ QUALITY GUARANTEED ★ ★ ★ ★ ★ ★

GAME SALE!

	Tape	Disk
Double Feature.		31.95
Stratos or Rearguard	19.95	19.95
Cyborg or Jovian	17.95	21.95
Early Games.	26.95	26.95
Zaxxon - Color 32k		33.95
Sea Dragon or Eliminator. . .	17.95	19.95
Forbidden Planet or City		33.95
Outhouse or Fortress II	14.50	16.95

TO ORDER CALL OR WRITE TO:

MICRO IMAGES
INDUSTRIES INC.
146-03 25th Road
Flushing, N.Y. 11354
(212) 445-7124

✓157

CALL:
Mon-Thur.
10 AM-9 PM
Fri. & Sat.
10 AM-5 PM

ORDERING INFORMATION

No credit cards at these low prices. Add $2.00 on all COD orders. Certified Ck/MO/COD shipped immediately. Please allow 2 weeks for personal checks. For extra fast service phone in your COD order. Free shipping within Continental 48 states via UPS ground. For Canada, Hawaii, Alaska, applicable shipping and insurance charges apply. Prices subject to change without notice. New York State residents please add appropriate sales tax.

The items listed above are a cross-section of our product line. We carry the full line of most companies listed in this ad, plus much more. **SEND FOR YOUR FREE CATALOG.**

Using the Model III I/O Bus

by James N. Cameron

The Model III's I/O bus is easier to use than the system expansion port of the Model I. This article will help you understand it.

The redesigned Model III I/O bus is a significant improvement over the system expansion port of the Model I. The analog to digital (A/D) converter and output port circuit given here, combined with the real-time clock, give real-time control of processes and events, using the analog input to sense the environment, and the output ports to control it.

The Model I required an expansion interface for external memory, the RS-232, disk drives, and a printer. This is all contained within the Model III's case. Thus, the only function left for an additional "expansion" connector is external I/O. Since the I/O bus has no other function, the result is a much-improved, more efficient system. The best news is that all signal lines are fully buffered, freeing the I/O bus from the noise and reliability problems that plagued the Model I.

The I/O Bus

Table 1 gives the pin assignments for the I/O bus. Note that the connector is a 50-pin edge card, on 0.100-inch spacing, with 25 pins (odd numbers devoted to signals, and the even-numbered pins all connected to ground.

I was annoyed at first when I couldn't use my old Model I interface connectors, but this design change has undoubtedly served two purposes: There is no chance of accidentally connecting any Model I interface to a Model III (it would only lead to grief, since all the pins are different). It also allows each signal to be brought out in a ribbon cable as, in effect, one of a grounded pair. This is because odd- and even-numbered leads alternate in the ribbon cable, so the even-numbered grounds act as shielding, and reduce the noise and cross-talk problems that plagued Model

Pin	Abbreviation	Explanation
1	DB0	Bidirectionally buffered data lines
3	DB1	
5	DB2	
7	DB3	
9	DB4	
11	DB5	
13	DB6	
15	DB7	
17	A0	Buffered address lines
19	A1	
21	A2	
23	A3	
25	A4	
27	A5	
29	A6	
31	A7	
33	$\overline{\text{IN}}$	Input strobe line
35	$\overline{\text{OUT}}$	Output strobe line
37	$\overline{\text{RESET}}$	System reset (output)
39	$\overline{\text{IOBUSINT}}$	External interrupt line (input)
41	$\overline{\text{IOBUSWAIT}}$	External wait signal (input)
43	EXTIOSEL	External input enable (see text)
45	(n.c.)	
47	$\overline{\text{M1}}$	Standard Z80 signals
49	$\overline{\text{IORQ}}$	Standard Z80 signals

Table 1. The I/O bus pin assignments. All even-numbered pins are grounded.

The Key Box

Model III
16K RAM
Cassette or Disk Basic

My wonderful upgrade offer:

If you bought my accounting software a while back, it's good news.

If you didn't, it's a good reason to buy it now.

You're probably growing. My software keeps growing too.

I've tinkered with it right along, improving it constantly. My accounting systems now work for CP/M, TRSDOS and MS/DOS (the IBM PC). It's a natural outgrowth of my support. Talk to a few thousand users on the phone, and you get a few new ideas.

Early on, I resolved that none of my customers would suffer if they bought a system before I improved it. So I've made this offer ever since I started over four years ago:

No matter when you bought, I'll upgrade any of my accounting systems to its latest capability on the same machine for $25. If you've upgraded your machine, I'll give you a replacement system for either $25 or the difference between what you paid for your software originally and the price of the new software. If you've gone from a TRS-80 Model I to a Model II/16 or an IBM PC, say, you get a full credit for whatever you paid me for your Model I systems. Just send me your old disks and I'll send you the new ones.

It's this simple. If you ever buy any of my software, you'll never lose your investment.

I wish the whole world were that simple.

Taranto
& ASSOCIATES, INC

✓70

Model I, Model III and Model 4 systems: Accounts Payable, Accounts Receivable, General Ledger, Inventory Control, Invoicing, Payroll.

Model II, Model II/12/16, CP/M and IBM PC systems: General Ledger, Accounts Payable/Purchase Order, Accounts Receivable (Open Item or Balance Forward), Payroll/Job Costing, Inventory Control.

Post Office Box 6216, 121 Paul Drive, San Rafael CA 94903. Outside California, toll free (800) 227-2868. In California, (415) 472-2670.

CP/M is a trademark of Digital Research Corporation. TRS-80 and TRSDOS are trademarks of Tandy Corporation. MS/DOS is a trademark of Microsoft Corporation.

✓See List of Advertisers on Page 323

I users with long interface cables. I have used cables of up to 6 feet on the Model III with no problems, whereas in some Model I's, 6 inches caused problems.

Using the Bus

The new I/O bus is easy to use, once you understand its structure and the signals to make it work. Unfortunately, Radio Shack does not make it as easy as they should. First, there is almost nothing about the I/O bus in the standard manuals that come with the machine. To learn anything about the I/O bus, you must buy the service manual for the Model III, and then you must decipher the cryptic text section (only about two pages) that describes the bus.

The first 16 signals (pins 1–31) are self-explanatory in function, but the data lines and the address lines are buffered differently (see Table 1). The address lines A0–A7 are buffered out only, as you would expect, by a 74LS244 tri-state buffer. The term "tri-state" means that instead of the usual two logic states, high and low, it also has a third that might be called "off." Any circuit looking at it in this state would see a high-impedance barrier. The address buffers are turned on for an external circuit to decode them by an internal control line, ENEXTIO, that is brought from an internal port. The ENEXTIO signal is derived from bit 4 of port 0EC hexadecimal (hex). To enable the buffers, execute the following instruction: OUT 236,16 or OUT &HEC, 16.

This step is also necessary for any transmission of data by way of the data lines DB0–DB7, since those lines are also brought out by a tri-state buffer controlled partly by this same port bit. What the manual does not say is that you must repeat this program instruction just prior to each in or out instruction.

If you look at the address decoding and cassette interface schematics in the service manual, it's evident that this port (0EC hex) is also used for several other system signals, and so apparently after executing one I/O command, other numbers are written to this port which cause bit 4 (ENEXTIO) to go low again, which in turn requires another OUT236,16 instruction to set it high again before the next I/O program step.

Data Lines

The data lines are buffered in a somewhat more complex manner. The chip used is a 74LS367, a bidirectional tri-state buffer, and the signals from both ENEXTIO and the external signal $\overline{\text{EXTIOSEL}}$ are used to control it. With a high signal from ENEXTIO, the data buffer turns on, with the buffer lines directed outwards; that is, for an output operation. When $\overline{\text{EXTIOSEL}}$ is brought low, the data line buffers switch direction to carry out an input operation. The $\overline{\text{EXTIOSEL}}$ line is an input line, and you must make provision for generating this signal externally in any interface you design.

When only one input port is connected externally, this can be done simply by NANDing together the $\overline{\text{IN}}$ line (pin 33) and the port address line. When several are connected, the same scheme may be used, but you must use open collector NAND gates with a pull-up resistor to the +5V supply. The circuit in Fig. 2 illustrates one way to do this.

Other Bus Signals

Of the remaining eight lines, five are buffered output lines, and three are input lines. The three input lines are $\overline{\text{EXTIOSEL}}$, which has been described; $\overline{\text{IOBUSWAIT}}$, which can be used for slow device synchronization; and $\overline{\text{INT}}$, which connects directly to the Z80 interrupt pin. Use the $\overline{\text{IOBUSWAIT}}$ pin with caution, since the dynamic memory chips in the TRS-80 require a periodic refresh signal that is inhibited during the Z80 wait cycle. After a maximum of 2 milliseconds, total amnesia may result, and the manual recommends no more than 500 microseconds.

Although the interface to be described does not employ the interrupt features, a brief description may be useful. For an external interrupt to be recognized, you must provide not only the interrupt signal on the I/O bus, but also a high bit 3 written to the internal port E0. This sets the ENIOBUSINT signal internally, which is gated with the external interrupt ($\overline{\text{INT}}$) to provide the actual interrupt signal to the Z80. There is also a mode in which the status of the interrupt signal from the I/O bus may be tested, but the actual interrupt to the Z80 is inhibited.

To use this mode, the ENIOBUSINT signal is not set high, and the port E0 is accessed as an input port. The interrupt status is in bit 3. When an interrupt to the Z80 is generated by enabling ENIOBUSINT and taking $\overline{\text{INT}}$ low externally, the Z80 sends program control to the interrupt handling routine whose starting address is stored in RAM memory locations 403E and 403F. The alternate (inhibited) mode is useful for conditional interrupts, or for use of the $\overline{\text{INT}}$ line as a status flag or other handshaking signal.

The five remaining buffered output lines are $\overline{\text{IN}}$, $\overline{\text{OUT}}$, $\overline{\text{RESET}}$, $\overline{\text{M1}}$, and $\overline{\text{IORQ}}$. I won't discuss the last two, but information on these signals may be found in any manual on the Z80. The system $\overline{\text{RESET}}$ can be used to reset any external device synchronously with the main CPU, and the $\overline{\text{IN}}$ and $\overline{\text{OUT}}$ signals are the input and output strobes generated in the same way as they were for the Model I.

The designers of the Model III reserved ports for system use: Only ports 0–127 are available, since ports 80 hex through 0FF hex (128 through 255 decimal) are reserved for system use. The system-reserved port addresses are only partially decoded, so that each port actually uses four port addresses. You shouldn't need more than 128 input and 128 output ports (the same address may be used for both an input and a separate output device), but if necessary, you could apply some fixes to free up more. Such modification requires extensive surgery on the main circuit board, however, and would not make your local Tandy repairman too happy.

Application to an External Interface

The result of this buffering and switching scheme is that you can have some rather noisy interfaces connected, but the TRS-80 only recognizes them when their port address is written to the address lines, the ENEXTIO is enabled by writing a 16 to port 0EC hex, and the appropriate $\overline{\text{IN}}$ or $\overline{\text{OUT}}$ line is strobed.

After getting all this figured out, I proceeded to build the interface shown in Fig. 1. It is actually a dual function interface: It has a 12-bit analog-to-digital converter for measuring the output of a laboratory meter, and five separate output lines for controlling a series of valves. The circuit could easily be adapted for any application where a sensor is measured, and other equipment controlled, such as in a greenhouse where temperature is monitored, and the output lines are used to control fans, louvers, heaters, and so on.

In my application the A/D converter accepts the output from an ammonia electrode and pH meter, and the valves are switched to control an experimental apparatus that measures the ammonia excretion rate of aquatic animals. Under program control, the electrode is calibrated from two standard reservoirs, then the aquarium is sampled continuously, with data collected, analyzed, and printed out in graph form for one-hour periods.

MICRO MAINFRAME PRESENTS HIGH PERFORMANCE AT LOW PRICES

MODEL-III/IV DISK UPGRADE RUN 8" DISK DRIVES

Why settle for only 5" disk drives for your Mod-IV* or Mod-III* when you can use 8" disk drives as well and still pay less than you would for a Radio Shack controller. Radio Shack says they will not support 8" disk operation on the Model-III* or Mod-IV*. In order to use 8" disk drives, you need the Micro Mainframe FDC-3C (Rev. A) controller and a cable you can build yourself from instructions we supply.

There are thousands of free programs available that work only under the CPM operating system. Our FDC-3CK# REV. A floppy disk controller is ready to install in your computer system and is easily installed using a screwdriver. No SOLDERING IS REQUIRED. The **FDC-3C#** controller (Rev. A only) works with ***ALL*** operating systems that support 8" operation, including **CPM, DOSPLUS, AND NEWDOS80.** Our **FDC-3CK** (REV. A) disk upgrade includes **EVERYTHING** you need to upgrade your Mod-III* or Mod-IV* to disk operation (except the floppy disk drive) for one low price. **SEE MARCH, 1983 *80 MICRO* FOR CONSTRUCTION DETAILS AND BIOS FOR CPM FOR THE MOD-III.** Each FDC-3C controller is **FACTORY ASSEMBLED AND RIGOROUSLY TESTED, HAS GOLD PLATED CARD EDGE CONNECTORS FOR RELIABILITY, AND COMES WITH A 180 DAY LIMITED WARRANTY.**

MMF WILL FACTORY UPGRADE YOUR EARLY **FDC-3C TO** REV. A VERSION FOR $25.00 OR SEND A SELF ADDRESSED, STAMPED ENVELOPE FOR FREE INFORMATION ON HOW TO DO IT YOURSELF.

DISK DRIVE IS NOT INCLUDED WITH THE FDC-3CK!

FDC-3CK DISK UPGRADE $199.95
FACTORY REV. A UPGRADE ..... $ 25.00

64K MEMORY UPGRADE FOR MODEL-IV

Increase the power of your Model-IV* by installing our premium quality memory upgrade kit. The kit comes complete with **PRIME TESTED, GUARANTEED 200 NS Memory Chips with detailed installation instructions.**

Don't be fooled by others who may provide cheap, untested, or slow memory chips. Insist upon genuine **MICRO MAINFRAME** quality tested parts.

MUG-4 MEMORY UPGRADE $119.95

LOW COST MOD-III MEMORY

Mod-III* owners, we have the memory upgrade you have been asking for!! Our memory upgrade kit includes 8 PRIME, TESTED, GUARANTEED 200 NS, 4116 Memory Chips, complete with detailed installation instructions for an incredibly low price.

MUG-3 MEMORY UPGRADE .... $ 16.95/16K

SO YOU WANT A HARD DISK BUT CAN'T AFFORD THE HIGH PRICE? MMF PROVIDES A LOW COST ALTERNATIVE

It is easy to assemble your own Hard disk using Micro Mainframe's parts, knowhow and engineering. Start your own systems house and assemble hard disk systems using Micro Mainframe's hard disk kits and software drivers or build one for your own use. Cash in on this expanding new market. We can provide any portion of your product from cases and power supplies to finished subsystems and software drivers. Call or write for further details on this exciting plan to help you start your own business. Micro Mainframe has developed more types of hard disk systems than any other manufacturer. Let us help you build your own products.

For example, purchase our assembled **MHDK** hard disk starter kit for as little as $879.95. You get a painted, steel case, switching power supply, a four port **DMX-1A** multiplexer (allows you to run 4 CPU's on one hard drive), and one host adapter of your choice. You need only add a hard disk drive, XEBEC controller, cables, DOSPLUS 3.5, and our DPD3.5 driver and you are up and running. Add one host adapter and cable for each additional system that you desire to run.

NOTE: DOES NOT INCLUDE HARD DISK DRIVE, CONTROLLER OR CABLES.

MHDK HARD DISK STARTER KIT $879.95
SAME WITHOUT DMX-1A $579.95

HARD TO GET COMPONENTS? CHECK WITH MICRO MAINFRAME

Everyone knows that components are becoming more difficult to find as the huge demand from manufacturers drys up the supplies. Now, Micro Mainframe can help you get those hard to get parts, and at reasonable prices. No order is too large for us to handle; we supply parts for other manufacturers as well our own needs. Check our prices on some of the hard to get parts listed below or send for a complete list of parts available.

IF YOU DON'T SEE A PART LISTED, PLEASE CALL OR WRITE. IF WE DON'T HAVE IT, WE CAN PROBABLY GET IT. WE HAVE STOCK ON MOST 74LS PARTS. SPECIAL ORDERS REQUIRE LARGER QUANTITIES!

WD1793 ..... $22.95
WD2793 ..... $31.95
WD9216 ..... $10.50
Z80A ..... $ 7.95
74LS245 ..... $ 1.45
74LS244 ..... $ 1.45
74LS273 ..... $ 1.25

10 MEGABYTE HALF HIGH HARD DISK DRIVE

This is the ideal hard drive to use with our hard disk kit **(MHDK)** listed above. Two of these half height Winchester drives will fit into the MHDK case along with a XEBEC controller, power supply, and our **DMX-1A** multiplexer. Includes power indicator and select indicator for positive indication of disk status.

M10OD $995.00

HARD DISK HOST ADAPTERS FOR MOD-1*, MOD-II*, MOD-III*, MOD-IV*, OR IBM-PC

Convert to hard disk the easy way with Micro Mainframe host adapters. MMF host adapters conform to the SASI bus definition and work in conjunction with our **DMX-1A SASI-NET#** Multiplexer. Our new lower prices make it possible to put together a hard disk at a fraction of the cost charged by others.

HOST ADAPTERS $150.00

SHARE YOUR HARD DISK BETWEEN SEVERAL COMPUTERS WITH OUR SASI-NET# MULTIPLEXER

Convert your computer system into a mainframe-like environment with our **SASI-NET# MULTIPLEXER.** Each of your computers thinks that it is the only computer on the system, but in reality, you are using a multi-processor environment like the big computer systems. No other manufacturer offers this kind of capability at such an affordable price.

DMX-1A MULTIPLEXER CARD $295.00

DOSPLUS 3.5 DRIVERS FOR MMF HOST ADAPTERS

Micro Mainframe has drivers for your copy of DOSPLUS 3.5 to convert it to hard disk operation. They are easy to install in your system and give it the full power of this exciting new version of DOSPLUS.

DPD3.5 DRIVER ..... $ 79.95

HAVING TROUBLE WITH SOMEONE ELSES DATA SEPARATOR?

Correct your data separation problems by installing one of our DS-1A Data Separators. Works with most Model-III disk controllers and gives you 8" drive capability for no extra charge. Also works with Mod-I doublers to correct deficient data separation.

DS-1A Data Separator ..... $ 39.95

ORDERING INFORMATION

Micro Mainframe does not accept credit cards. Orders may be prepaid or we will ship COD. All orders over $500.00 require a 10% deposit upon placement. **Non-Certified funds will be held a minimum of 3 weeks to allow them to clear.** Returned or refused items are subject to a 15% restocking charge.

DEALER INQUIRIES SOLICITED ON YOUR LETTERHEAD ONLY

Phone orders are accepted between 8:30 AM and 5:00 PM Pacific Time.

MICRO MAINFRAME

11325 Sunrise Gold Circle, Building A
Rancho Cordova, CA 95670
(916) 635-3997

-60

#Micro Mainframe Trademark
*Tandy Trademark

The first step in the interface design is to generate the proper completely decoded port address signals. This is done by the 74LS04 hex inverter (U1, Fig. 1), 74LS30 8-input NAND gate (U2), and the 74LS138 3-to-8 line decoder (U3). By inverting each of the high address lines (A3–A7), the output of the 'LS138 provides addresses 00 hex to 07 hex. The three unused input lines of the 'LS30 must be tied either to the +5V supply or to another input, so that the output goes low to the $\overline{EN}$ lines of the 'LS138 when A3–A7 are all low. The high enable line of the 'LS138 (EN) is connected to the output of the NANDed $\overline{IN}$ and $\overline{OUT}$ lines (pins 33 and 35).

Thus, any one of the eight decoded output lines of the 'LS138 goes low only when its address is stable on the eight address lines, and either the input or output strobes go low. The output lines of the 'LS138 are active low. This interface, incidentally, could provide eight input port addresses and eight separate output port addresses by simply adding another 'LS138 and connecting the $\overline{IN}$ to the low enable ($\overline{EN}$) of one and the $\overline{OUT}$ to the other. In that case, the high enable lines should be tied high, and the output of U2 connected to the second $\overline{EN}$ pin of each 'LS138.

The NAND connected to the $\overline{IN}$ and $\overline{OUT}$ lines is an open-collector type, so it must be tied by a pull-up resistor to the positive supply. A different NAND gate, such as a 74LS00, could just as well be used, but the open-collector type is needed to generate the $\overline{EXTIOSEL}$ signal, as explained, and it is just as easy to use another one of the four gates on the chip for this purpose. As this interface is connected, port 6 is an output port, and port 7 is an input port. The port 7 lines from the 'LS138 are connected to the chip-select pin (1) of the input port (U6, an Intel 8212), and inverted and NANDed with the $\overline{IN}$ line. As shown in Fig. 1, only when both $\overline{IN}$ and the port 7 enable lines are low is the $\overline{EXTIOSEL}$ line pulled low. Any number of similar input devices could be connected to other output enable lines from the decoder in the future, and the parallel connection of the open-collector NANDs would act like an OR function to generate the $\overline{EXTIOSEL}$ low signal when any input device is selected.

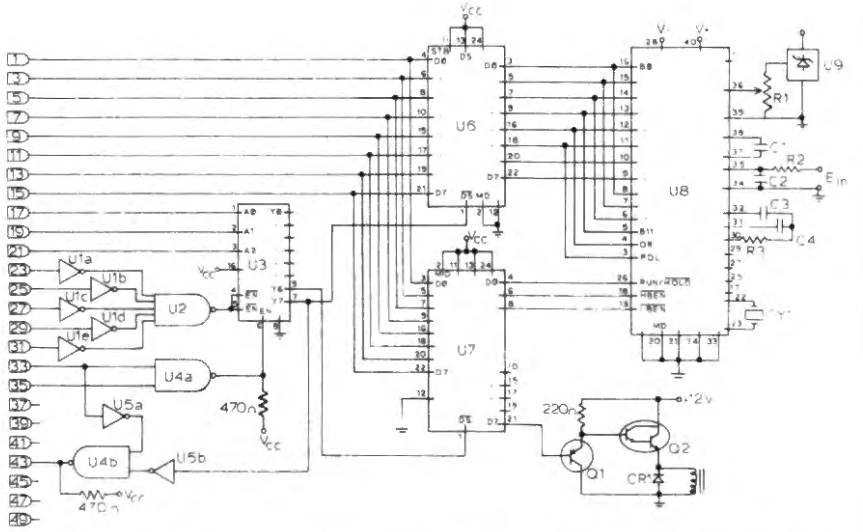


Figure 1. Schematic diagram of the Model III Interface described in the text. Only one of four identical output circuits is shown at the lower right. V_{cc} and V+ are 5V dc, V- is -5V dc, both regulated. Q1 is a 2N3904, Q2 an ECG253 Darlington, and CR1 is a 1N914. Other components described in text.

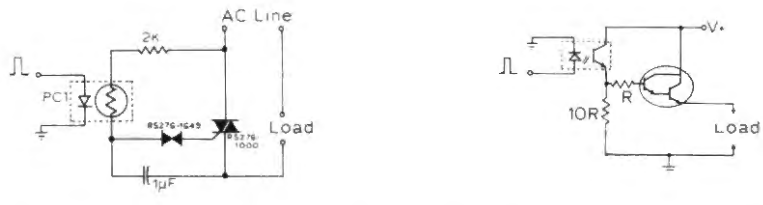


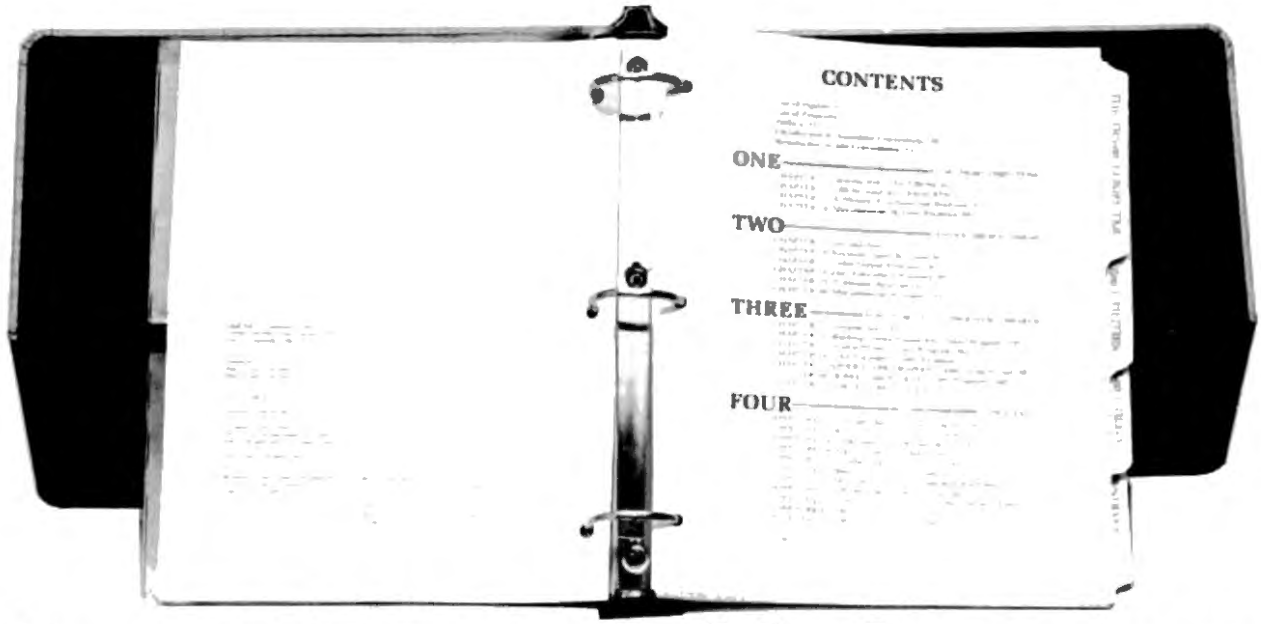
Figure 2. Two alternate output control circuits recommended for use with 115V ac equipment (top) or high voltage/high current dc outputs (bottom). The use of an opto-isolator provides protection from surges and spikes on the higher voltage line. Separate grounds must be used in the bottom circuit! PC1 can be a Clairex CLM3006A lamp/photocell combination, or one can be made from an LED and a Radio Shack #276-116 photocell by wrapping them face-to-face in opaque electrical tape.

The Ports

The ports themselves are both constructed with Intel 8212s, one connected in input port mode, and the other as an output port. When the input port (U6) is enabled, data present on its input pins is latched and presented on the output data bus. When not enabled, the outputs are tri-stated. The other (U7), in output mode, maintains the last data "word" written to it in latched form on its output pins, and when strobed, latches a new data "word" from its input to its output lines. The input and output modes are selected with the mode (MD) and strobe (STB) lines by tying them either to ground or +5V. The chip also offers a choice of high or low enable; in this application, the low enable lines ($\overline{DS}$) are used, and the high enable lines (DS) tied high. Three bits of the output port are used to control the A/D converter, leaving five more free to control external devices. Each line is turned on (high) by sending a data "word" with the appropriate bit high, so that writing a 2 to port 7 would make only bit 1 high, and a 161 (128+32+1) would make bits 0, 4, and 7 high.

The A/D Converter

The A/D converter chip is an Intersil 7109, which is a 12-bit device designed for 8-bit data buses. The data output lines are like the tri-state buffers in the I/O bus, and are turned on by the control lines $\overline{HBEN}$ and $\overline{LBEN}$ (pins 18 and 19). These control signals are obtained under software control from two output lines of the output port 7, as well as a third control signal connected to the RUN/$\overline{HOLD}$ pin (26) of U8. When this pin is tied high, the converter runs at a rate of about 33 conversions/sec, but when it is pulled low, the conversion in progress is completed and held. The software-controlled sequence, then, is to set the RUN/$\overline{HOLD}$



Every Z80 assembly-language programmer needs this book.

Programming in assembly language requires good tools. *TRS-80/Z80 Assembly Language Library*, a complete reference book on TRS-80 Model I assembly language, is the best tool you can find. In over 300 pages, 45 figures, and 75 program listings, author Craig A. Lindley explains the details of Model I hardware and software and shows you how to write programs that squeeze every bit of performance out of your computer. This book will teach you:

- how to use ROM and DOS routines in your own programs
- how to perform disk input/output
- how to access the video display and keyboard
- how to write easy-to-use programs
- how to perform arithmetic operations
- how to use the undocumented Z80 instructions

You'll also learn about disk operating systems, device handling, base conversion, parameter passing, and more.

TRS-80/Z80 Assembly Language Library contains a library of ready-to-run utility programs that are worth many times the book's cost. Included with the book are two Model I TRSDOS-compatible disks* containing utilities for printer formatting and spooling, single-key entry of strings, disk editing, base conversion, password encoding and decoding, and more. You get more than 15 valuable utilities, and the source code files are included, so you can examine, modify, and learn from every program.

Many of the programs also run on the Model III, and those that do not require only minor modification. One of the book's four sections is dedicated to routines and programs that run on any Z80-based system. No matter what Z80 computer you program, this book has something for you.

It's a book that's designed to be used. The text is set in large type, and the book is bound in an 8½- × 11-inch easel-backed binder that stands up next to your computer. So there's no squinting at tiny type and fighting to keep the book open.

The whole package—book, disks, and binder—is yours by mail for the introductory price of only $29.97. And if you charge it, you can even call toll-free to order. Reserve your copy now, because after October 31, the price will be $34.97.

TRS-80/Z80 Assembly Language Library. It's the assembly-language book for the '80s.

*Disks do not contain a disk operating system; two disk drives or a disk copy utility are required to transfer the files.

Call **Toll-Free 1-800-258-5473** for credit card orders or send $29.97 plus $4.50 shipping and handling to Wayne Green Books, Retail Sales, Peterborough NH 03458. Dealer inquiries invited.

I need *TRS-80/Z80 Assembly Language Library*.

Send me _____ copies of *TRS-80/Z80 Assembly Language Library* (BK7395-01) @ $29.97 each. I have enclosed $4.50 per system for shipping and handling.

☐ MasterCard ☐ VISA ☐ AmEx ☐ payment enclosed

Card # _____ Expires _____

InterBank# _____ Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

33AB6L

TRS-80/Z80 Assembly Language Library is a Wayne Green publication.
TRS-80, TRSDOS, Model I, Model III are registered trademarks of the Radio Shack Division of Tandy Corporation.
Z80 is a registered trademark of Zilog.

high, wait a few milliseconds, set it low, wait about 33 ms, then read the low bits by writing a zero to the LBEN, and finally read the high bits by writing a zero to the HBEN.

The high and low bits are then put together under program control. The Program Listing shows the complete data acquisition sequence, and Table 2 lists the parts needed to complete the analog circuitry associated with the 7109 converter. As given in the Listing, RUN/HOLD is connected to bit 1, HBEN to bit 2, and LBEN to bit 3 of port 7.

In most A/D converter applications, there is a trade-off between resolution and speed. In this particular interface, I needed the high resolution of the 12-bit converter, but speed was not important, which dictated the choice of the Intersil 7109. This is a quad slope type converter, which is stable and accurate, but relatively slow (30+ ms). Other types may have conversion times down in the microsecond range, but the price usually rises in direct proportion to speed. Also, if a fast converter is used, and high sampling rates are desired, the software must be written in Assembly language, rather than in "slow" Basic like that given in the Listing.

For simpler conversion tasks where 12-bit (1 part in 4096) resolution is not needed, either 8-bit (1 part in 256) or 10-bit (1 part in 1024) converters could easily be substituted. For the 8-bit chips, the control sequence would be easier and would take one or two less lines from the output port. For even higher resolution, a moderately priced chip pair is available from Intersil (8068A/7104-16) that provides 16 bits of data out plus the overrange and polarity signals. These 18 bits are split into three groups (8/8/2) with one more control line (MBEN) added for the middle bits.

Part	Description
U9	AD590JH, Analog Devices 2.5V Precision Reference*
R1	20K, 15-turn cermet trimmer
R2	1M, 5 percent carbon
R3	220K, 5 percent carbon
C1	4.7 μF, 25V electrolytic
C2	0.01 F, 100V polystyrene
C3	0.15 F, 100V polystyrene
C4	0.33 F, 100V polystyrene
CY1	3.58 MHz TV crystal

*Not required; internal reference may be used.

Table 2. Analog and discrete components required for the Intersil 7109 analog-to-digital converter circuit shown in Fig. 1.

```
700 REM         Sample listing for A/D Converter
720 REM         control.  This can be called as a subroutine
730 REM         from another program. The PRINT statement
740 REM         in line 1100 may be omitted, so that the
750 REM         routine simply returns the voltage value
760 REM         as N1.
770 REM
780 REM
1000 OUT236,16:OUT6,2
        'Start conversion
1010 FORX=1TO40:NEXTX           'Wait
1020 OUT236,16:OUT6,4           'Enable hi bits
1030 OUT236,16:X=INP(7)         'Read hi bits
1040 OUT236,16:OUT6,8           'Enable lo bits
1050 OUT236,16:Y=INP(7)         'Read lo bits
1060 X=X-192                    'Subtract blank DB7 and DB6
1070 IF X>=32 THEN 1074 ELSE 1078  'Test sign bit
1074 X=X-32:S=1:GOTO 1080           'Positive if hi
1078 S=-1
1080 IF X>=16 THEN GOTO 2000    'Overrange escape
1090 N1=(((X*256)+Y)*S)/1000    'Put hi and lo together
1100 PRINT N1;" VOLTS"
1110 RETURN
2000 PRINT "SIGNAL OUT OF RANGE."
2010 STOP
```

Program Listing. A/D converter program.

Output Control Circuitry

The rest of the lines of the output port 6 are free, five in all, and I have used four of them to control some simple dc solenoid valves. The valves operate on a minimum of 12V dc, so I used a couple of transistors for level shifting and current amplification (they take a 1 amp current pulse). These output lines, and simple modifications of the circuitry shown in Fig. 1, could easily be used to operate relays to control 115V ac equipment, but in that case I recommend an opto-isolator coupling as additional circuit protection. A sample circuit for relay control is shown in Fig. 2.

The power supplies required for this interface are regulated +5V and −5V. Only about 100 mA are needed for the +5, and a few mA for the −5, so you can construct them simply with a small center tap transformer, a bridge rectifier, some filter capacitors, and the 7805 and 7905 voltage regulators. In my circuit, I used the unregulated +12V dc from the transformer to power the solenoid valves.

Once deciphered, the new Model III's I/O bus is easy to use, and opens up a wide range of powerful applications. ■

Write to James N. Cameron at P.O. Box 742, Port Aransas, TX 78373.

Save $50 on the best in word processing and mail lists

"LAZY WRITER has long been highly regarded...the bet supported word processor for the TRS-80."
- 80 Micro/August, 1983

"POSTMAN is capable of maintaining and manipulating large mailing lists easily, quickly, and reliably...the system is designed so well that learning is simple."
- 80 Micro/June, 1983

LAZYMERGE merges Postman files with Lazy Writer text to create form letters

Postman ....reg $79.95 sale price.....$64.95
Lazy Writer....$175
LazyMerge.....$44.95

ALPHABIT COMMUNICATIONS, INC.
13349 MICHIGAN AVE
DEARBORN, MI 48126
(313) 581-2896
224

ACCOUNTING SOFTWARE

for Portable, Personal and Desktop Computers

Available for these popular 8-bit and 16-bit microcomputer formats:

All CP/M® 8" Computers (SD)
All IBM PC Compatibles
TRS-80 Model 2 (with CP/M)
TRS-80 Model 4 (with CP/M)
Apple II (with CP/M)
Apple IIe (with CP/M)
Franklin ACE (with CP/M)
Morrow Micro Decision
Northstar Advantage
Corona PC & Portable
Corona Portable
COMPAQ Portable
Hyperion Portable
Seequa Chameleon
TI Professional
Columbia MPC
Osborne Executive
Osborne I (SD)
Osborne I (DD)
DEC VT-180
CompuPro
Xerox 820
IBM PC
IBM XT
KayPro II
KayPro 10

Call about other formats

SATISFACTION GUARANTEED or Your Money Back

Complete Package of Software, Training Aids, Manuals, and Users' Newsletter

ONLY $395 CP/M format

$495 IBM format

"...for several years the defacto standard for microcomputer software, and still a good example of some of the better thought-out software on the market." —Interface Age

Desktop Accountant™

FULL-FEATURE, FULLY-INTEGRATED ACCOUNTING SYSTEM

Everything you need to keep the books...at a price you can afford!

Your Bookkeeper, Accountant, and Banker will love you for installing this fine system!

Check these features:

This remarkably-valued Accounting System will manage your company's business records and **automate your entire bookkeeping process**—from the posting of individual transactions to producing up-to-the-minute Income Statements, Balance Sheets, and other important management reports. Desktop Accountant™ gives you a "Big Company," professional image with **printed** invoices, statements, and checks. It is **user-friendly, completely menu-driven,** offers **system-prompted data entry,** and is compatible with both floppy and hard disks. Feature-for-feature, and dollar-for-dollar it is **the best software value on the market!** But don't let the **low price** fool you. Desktop Accountant™ is **not a "cheap" accounting system, only inexpensive.** That's because original development costs were recovered years ago allowing us to sell **an excellent product** in high volume at low prices and still earn a fair profit. This **high-quality, reliable software** was designed and written in 1975 for small-to-medium sized businesses. Since then, **it has successfully proven itself in well over 10,000 companies** in all 50 states and in 13 foreign countries. It is also used and recommended by **hundreds** of bookkeepers, accountants and CPA's, including the regional offices of several famous "Big Eight" accounting firms! No other Accounting System offers you so many features, benefits, and valuable extra services. You can pay more but you can't buy more! Desktop Accountant™ is backed by our 30-day, no-risk, **money-back guarantee** of 100% customer satisfaction! Call for **free literature** or order now with complete confidence.

Read What Users Say...

"Two hours after receiving the Desktop Accountant I was up and running live data, and generated an entire month's work and financial statements the following day."
—J.C. Bartels, President
(accounting firm) Gonzales, Texas

"To get anything better we would have had to spend multiple thousands of dollars. I think it's a dynamite package for the money."
—Bob Cox, V.P. General Mgr.
(manufacturing company) San Antonio, Texas *LETTERS ON FILE*

Here's what you get:

1. A professional-quality, full-feature, fully-integrated accounting system. **2.** Six-to-fourteen diskettes (depending on your system's disk storage capacity). **3.** Four easy-to-follow, self-teaching User's Manuals (over 540 pages!) that are **highly rated by satisfied users. 4.** An exclusive, new **audio cassette tape** with **step-by-step instructions** for quick installation and start-up. **5.** "Read Me First" a unique 40-page system guide and start-up aid. **6. Complete sample data and sample reports** for practice and training ...a big help to new users. **7. FREE 1-year subscription to Users' Newsletter,** "Debits and Credits." It's full of tips, ideas, news, and useful suggestions from us and other users. Recent issues have run over 20 pages long! **8. FREE complete Source Code** in popular MBASIC so you can easily customize *any* program to suit your special needs. **9.** Telephone "Hot Line" service for helpful Installation support, Start-up support, Technical support, and Training support. The quality of our cheerful customer support has been acclaimed **"excellent," "first-rate,"** and **"very courteous and professional"** by our users. **10.** Access to our growing network of **Experienced User Consultants**™ in both the U.S. and Canada. These qualified, knowledgeable businesspeople themselves own this fine software and are available to assist you with almost any aspect of installation, training, operation—or even customization, if desired. You'll receive the latest **Directory** of these helpful Consultants.

Look who's using it:

Here is a sample (taken from our customer files) of the wide variety of businesses successfully using this time-tested, solidly-established, user-proven software:

• Bookkeeping services • CPA/Accounting firms • Construction companies • Wholesale Florists • Retail Florists • Printers • Insurance Agencies • Shopping Centers • Machine Shops • Engineering firms • Software Companies • Computer retailers • Publishers • Financial services companies • investors • Appliance service firms • Dairies • Boilerworks • University Business School • Catholic Diocese • Baptist Ministeries • Sail Maker • Convalescent Hospital • Car Wash • Public Library • Cement Plant • Industrial products manufacturing companies • Mortuary • Coal Company • TV/Film producers and distributors • General Store (in Alaska!) • Health services organization • Government Agencies • Record and Tape stores • Trade Association • Graphics firms • Office products companies • Real Estate firms • Oil Products distributor • Instrument Company • Hydraulic Products company • Outdoor Expeditions company • Many types of schools • Chiropractors • Physicians • Landscapers • Law firms • Restaurants • Plumbing Companies • Railroad • Farmers • Banks • Consultants • and many, many, more!!

Call for ***FREE LITERATURE****, including sample reports, comparison chart, user letters, etc.*
Not sold in stores • Order today by Mail or Phone • Phone Orders Filled Promptly

Orders, Questions, and Literature Requests CALL NOW, TOLL-FREE

MasterCard VISA ☎ **1-800-832-2244**
In California call 1-800-732-2311
Technical Support Hotline (8 AM to 5 PM, Mon.–Fri.): (415) 680-8378

Please mention Ad #120-V

✓486

Send Orders To: 1280-C Newell Avenue, Suite 147-V, Walnut Creek, California 94596

• When ordering please mention or include the Ad number appearing near our telephone number • Orders shipped within 48 hours via UPS • Add $5.00 for faster 2-day Rush Air Service • California residents add 6½% Sales Tax • Payment by VISA/MasterCard/COD/MO/Cashier's Check • All Brand Names are manufacturers' registered Trade Marks • No sales to Dealers • Foreign orders please call or write before ordering • ©1983 Rocky Mountain Software Systems.

A Complete System!

includes all four standard general accounting programs:

GENERAL LEDGER is completely integrated to automatically post end-of-month transactions from A/R, A/P and Payroll. It **prints 13 detailed reports** for the entire company, and optional **Income Statements for up to 99 departments.** It produces up-to-the-minute **comparative financial statements** with current, year-to-date, budget, and last year (month and YTD), showing **both dollar amounts and percentages,** and presents everything you, your bookkeeper, and your accountant need to know about the company • G/L **automatically reconciles all accounts,** and maintains extensive, **detailed audit trails** showing the source of each G/L entry for quick, easy, tracing • Trial Balance includes all transactions • **Flexible Chart of Accounts** • True double-entry bookkeeping • Master File capacity: 400 Accounts • Monthly Transactions capacity: 1,000 with 200K diskette; 3,500 with 500K diskette; 7,000 per Megabyte with a Hard Disk.

ACCOUNTS RECEIVABLE provides **instant, on-line customer account information (both current and aged),** with complete, timely invoicing, including open-item (or balance forward) and statement capabilities. It makes the entire billing process fast, easy, and efficient. It quickly identifies your overdue accounts, **helps speed collections,** helps control your cash flow, and assists you in making better financial decisions. Both detailed and summary **customer activity and aging reports** are instantly available • Preprinted forms available for **invoices and statements** • **Detailed audit trail** • Maintains comprehensive customer data files • **Produces 8 reports and documents** • Includes automatic periodic customer/client billing option which is ideal for service businesses • **Itemized monthly transactions** • Master File capacity: 400 Customers • Monthly Transactions capacity: 800 with 200K diskette; 3,500 with 500K diskette; 7,000 per Megabyte with a Hard Disk.

ACCOUNTS PAYABLE maintains complete vendor/voucher history and includes **check-writing** capabilities. **Current and aged payable reports** are available upon command. It prepares an extremely useful **cash flow/cash requirements report** that greatly improves management control of your most valuable resource—cash! It prints checks (on commercially available forms on which **your company name, address and logo can be imprinted**) with comprehensive check stubs that your vendors will appreciate • **Produces 11 reports and documents** • Automatic pay selection program allows payment by due date or by discount date • **Manual and automatic checkwriting** • Check register • **Detailed audit trail** • Itemized monthly transactions • Master File capacity: 400 Vendors • Monthly Transactions capacity: 800 with 200K diskette; 3,500 with 500K diskette; 7,000 per Megabyte with a Hard Disk.

PAYROLL is a complete, **easy-to-use** professional-quality payroll system. Be the office hero each week when the checks come out on time! This program **calculates payroll for every type of employee** (hourly, salaried, and commissioned) and **prints payroll checks** (with popular, comprehensive check stubs) with an absolute **minimum** of input. **Your company name and logo** can appear on these, too. • Stores and reports comprehensive employee and payroll information. • Maintains monthly, quarterly, and yearly totals for reporting purposes in **multiple states**(!) • Offers **user-maintainable Federal, State, and local tax tables**(!). • W-2 printing • 941 Reporting • **Produces 10 reports and documents** • Master File capacity: 400 employees. An **outstanding** Payroll package!

Produces 42 Reports & Documents:

General Ledger 1. Chart of Accounts 2. Chart of Accounts with summary dollar amounts 3. Chart of Accounts with prior year comparisons 4. Daily Transactions Report 5. Itemized Monthly Transactions 6. Balance Sheet 7. Balance Sheet with prior year comparison 8. Income Statement 9. Income Statement with prior year comparison 10. Departmental Income Statement(s) 11. Departmental Income Statement(s) with prior year comparison 12. Detail report for individual accounts 13. Trial Balance Statement

Accounts Receivable 1. Daily Transactions Report 2. Invoices (with or without preprinted forms) 3. Statements (with or without pre-printed forms) 4. Summary Aging Report 5. Detailed Aging Report 6. Itemized Monthly Transactions 7. Detailed Customer Activity Report 8. Summary Customer Account Report

Accounts Payable 1. Daily Voucher Report 2. Daily Credit Report 3. Checks with Detailed stubs 4. Check Register 5. General Ledger Transfer Report 6. Cash Requirements Report 7. Transaction Register 8. Open Voucher Report 9. Aged Payables Report 10. Detailed Vendor Activity Report 11. Summary Vendor Account Report

Payroll 1. Federal Tax Tables 2. State Tax Tables 3. Payroll checks with stubs 4. Payroll Check Register 5. Monthly Payroll Summary 6. Quarterly Payroll Summary 7. General Ledger Transfer Report 8. Detailed Employee File Listing 9. Produces 941 Worksheet 10. Prints annual W-2 Forms

System Requirements: Either CP/M® or MS-DOS (PC-DOS) • Microsoft BASIC • 64K RAM • Two disk drives or hard disk • 132 column wide carriage printer, *or* an 8½"x11" printer with compressed print mode (an Epson MX-80 or similar printer)

100% SATISFACTION GUARANTEE

No-Risk, 30-day Money-Back Guarantee

Order Desktop Accountant and evaluate it yourself for 30 days. Test the performance of each program using our comprehensive *Sample Data Files* to enter and process data, query accounts, print checks and reports, and more. Review the five User's Manuals, hear the Training Tape, read the users' Newsletter, even call our Technical Support Group with your questions. ***You must be completely satisfied*** with Desktop Accountant or you may return it in good condition *with the Sealed Master Disk UNOPENED* (it installs your live data) for a prompt, courteous, complete refund!

ROCKY MOUNTAIN SOFTWARE SYSTEMS
Specialists in Accounting Software

✓See List of Advertisers on Page 323

-COMPUTER SHACK-

SYSTEM II

The ultimate in business programing. A suite of programs written in machine language consisting of Stock Control, Sales Ledger, General Ledger, and Purchase Ledger. The sales ledger issues invoices in addition to statements.

All of the four parts of System II will integrate or may be used on their own. For instance, if the Sales Ledger and Stock Control are used as an integrated system, then issuing an invoice selling two widgets, will deduct those two widgets from stock.

Operator usage, particularly input technique, is made so simple that no training is needed. The operator and machine interaction is plainer - on one simple level - The ultimate in user friendliness.

Function changes are not made through a menu. In other words to change direction you do not have to go back to square one. The same or similar commands are used throughout the suite. If you do not know what to do, you can ask a built in utility to tell you what is available.

For a complete brochure on System II write or call today. Works on the Model I/III or 4.

FAMILY TREE

Track down your pedigree with the fast and easy methods provided by FAMILY TREE, the exciting genealogy program. You may be surprised and enchanted by the interesting people you find at the roots of your own family.

It will store seperate data for each particular relative, along with that persons mother and father, their sex, date of birth, Place of birth, date of marriage, place of marriage, date of death and place of death. With all of this information the computer can create many different reports such as; a list of descendents or ancestors children, siblings or even an entire family chart.

MODEL I/III tape or disk (32K) $29.95

CHECK WRITER

This easy to use powerful utility, will take the tedium out of the time consuming task of writing checks, keeping records, and balancing your account. With 99 categories of expenses, sort in seconds on check #, amount, budget #, payee or date.

Great for businesses or home use. The printer program is written in basic for easy modification, while data entry and sorting are done through machine language subroutines.

DISK ONLY $49.95

PASCAL

The ever popular programing language is brought to the TRS-80 complete in all standards.

We sell Pascal for $49.95. As you will notice, this price is considerably lower than the competition. This is a very good version of Pascal. At this low price we hope to sell twice as many as the competition!

MODEL I/III ..... DISK $49.95

SUPER SCRATCH PAD

SCRATCH PAD is the perfect combination of a data base manager and a word processor. Each screen becomes a page that you can easily flip through, each page has a title (one that you type in) that appears in the master menu, each title along with it's respective page can be sorted. There are 10 Macro Keys that can be defined for any letter, word, or sentence that you like. And talk about editing, SCRATCH PAD gives you screen editing features just like a full blown word processor. Its all machine language, menu drive - VERY easy to use.

DISK ONLY special intro price only $39.95 ($49.95 after October 1)

CYCLE INVOICE SYSTEM

Once each customer is entered, the system takes over, handling billing, recording payments, printing invoices, and all in all, making your life a lot easier. First of all, each customer can be billed weekly, bi-weekly, monthly, quarterly, semi-annual or on an annual schedule. Different invoice cycles can be mixed within the same file. A regular invoice amount is entered for each of these customers. Of course, an invoice adjustment amount can also be entered to allow for overdue charges, sur-charges, delinquent amounts, or credits.

This system is ideal for garbage routes, window washers, land lords, etc.

DISK ONLY $149.00

SUPERDIRECTORY

SUPER DIRECTORY the fastest, most efficient library catalog utility on the market. SUPERDIRECTORY will sort your complete disk file in a matter of seconds on filespec, disk number, or remarks. It has super fast string search, Reads any normal dos and density, and many many more features.

MANUAL AND DISK $49.95

DISKS ONLY $1.79

We buy thousands of bulk disks each month for our own duplication and sales. We would like to offer these disks to you at tremendous savings. these are Super Quality disks guaranteed for life. If they ever go bad send them back and we will replace them FREE. Try some, if you don't like them return them.

100 DISKS TYVEK SLEEVES $179.95
10 DISKS TYVEK SLEEVES $19.95
10 DISKS WITH COLORED PLASTIC SLEEVES $21.95
10 FLIPPY DISKS (use both sides in a normal drive) ... $29.95

THREE TO FOUR

Take advantage of the higher speed of the Model 4 basic with this new utility that will take a basic program written on the Model III and convert it to work on the Model 4. This program adds all the spaces around the reserved words but will not adjust any peeks and pokes.

DISK ONLY $24.95

COMPUTER SHACK

1691 Eason ● Pontiac, Michigan 48054 ✓453

Info: **(313) 673-8700** ● Orders: **CALL TOLL FREE (800) 392-8881**

Master Charge and VISA OK. Please add $3.00 for shipping in the U.S.A. - $5.00 for Canada or Mexico - Proper postage outside of U.S. - Canada - Mexico.
Dealers: We are distributors for all items in this ad. Write for our catalog and price list.
CU 124

-COMPUTER SHACK-

From Computer Shack, the industry leader in computer games, comes 11 great new games. All of these games will run on Models I/III and 4. Almost every order shipped within 24 hours!

JUMBO

You're in the cockpit of a Jumbo 747, preparing for a spectacular flight! As the one and only pilot, all controls will be in your hands.

Written by a professional programer in conjuction with a B.O.A.C. pilot, JUMBO is most definitely the best flight simulation on the market. It's well done control and indicator board will allow you to feel the plane in motion.

So whether in the past you've flown or not (in the pilot's seat), you'll most definitely find JUMBO an adventure as well as a brilliant educational tool! (not protected).

MODEL I/III ..... TAPE OR DISK **$29.95**

LIBERATOR

Adventure, excitement, action, danger and even beautiful girls! Liberators got it all! This fantastic arcade game will get your heart pumpin and your mind moving!

1982's most popular arcade game, Donkey Kong, comes to life on your TRS-80 screen through the magic of John Cranes LIBERATOR! And if you thought Donkey Kong was fun, wait until you experience LIBERATOR's five seperate screens (more than the arcade version) each utilizing the best sound and graphics possible!

MODEL I/III ..... TAPE **$19.95**/DISK **$24.95**

ASSUALT

Strap yourself into the dimly lit ATV (All Terrain Vehicle), check the motor, the laser's, and visibility. Now prepare yourself for an underground trip that you won't soon forget...If you live! Assault is an original arcade game designed for the TRS-80 by Bill Dunlevy. It has some of the quickest and fastest graphics ever seen on a Model I/III. The game itself has spiders, little monsters, big monsters, underground caverns, bags of gold and more. It has over 20 different screens.

MODEL I/III ..... TAPE **$19.95**/DISK $24.95

CYBORG

As a competitor in the famous Cyborg arena, you have access to five power sleds! You must now use these sleds to travel through the mazes and collect the signal modules. Of course there is nothing that pleases a crowd more than a little violence, so the makers of the arena have also installed guardian robots within its limits! Using your shield, you must destroy them while trying desperately to complete your task. Cyborg has a total of five different levels, each much more challenging than the one before. Now CYBORG comes unprotected.

MODEL I/III ..... TAPE **$22.95**/DISK **$25.95**

CLASH

Once again, one of the markets most creative programers, Bill Dunlevy has created CLASH, a fantastic new arcade simulation! Mounted upon your great white winged stallion, prepare yourself for a clash within the arena. This day, you will be competing against famous riders from all over the planet. As the tournament begins, there is a frenzie of flapping wings and bucking horses, but finally all riders are airborn and the contest has begun. With a firm grasp on the reins, manuever your horse above the others and then descend upon them. You must dismount the other riders, before their skill prevails and they dismount you.

MODEL I/III ..... TAPE **$19.95**/DISK **$24.95**

DIG OUT

UH OH! The wackiest game to ever hit an arcade is now invading your computer! As the game begins, you'll find yourself amidst tons of rock and earth. You must dig your way through the surrounding tunnels and hunt down the deadly monsters. But watch out!!! As the hunter, you just might become the hunted. The monsters are strangly powerful, their touch can destroy and their eggs can obliterate. Besides all this, the underground is their natual habitat. DIG-OUT is truly another COMPUTER SHACK classic. In each of its fifteen different levels, DIG-OUT combines the best sound, fantastic graphics, and above all, exciting action.

MODEL I/III ..... TAPE **$19.95**/DISK **$21.95**

CONVOY

From the creators of DEMON SEED comes a great new game that promises to keep you on the edge of your seat...CONVOY!!

A convoy of trucks has been assigned to move food rations for the troops in the field, but what about the enemy? You must protect the convoy, utilizing the fire power of the armies new super tank, from enemy fighter planes and helicopters seeking to block and destroy the convoy. As planes come rocketing down, destroy their bombs and send them to the ground in flames.

MODEL I/III ..... TAPE **$22.95**/DISK **$25.95**

FURY

Written by the twice acclaimed Doug Frayer (co-author of Cyborg and Jovian), FURY combines strategy and quick nerves with its three totally different screens. Fury takes you beyond the traditional computer arcade space fight. Allowing one or two players, sound and graphics are used to their utmost and the disk version even talks!

MODEL I/III ..... TAPE **$22.95**/DISK **$25.95**

MOON ROVER

Moon Rover is an exciting game played on the moons surface. In your Rover you must shoot down enemy aircraft jump over wide metiorite holes and rescue your countrymen from certain death. Moon Rover has super graphics and with its many levels of play will never get boring. Moon Rover should become one of your favorite games.

MODEL I/III ..... TAPE **$22.95**/DISK **$25.95**

STRONGHOLD

Ken Olson and Larry Chow

In Stronghold you have four cities that have built mobile energy shields that'll repel the bombs bouncing around the planet. With all the skill you can muster, protect your city by moving your two shields and stopping the bombs from hitting your city.

One or two player action with sound and split second graphics that'll amaze the eye and ear. Thats STRONGHOLD, try it you'll enjoy it!

MODEL I/III ..... TAPE **$22.95**/DISK **$25.95**

GAUNTLET

One of my favorite games. Operating a super tank you must destroy the enemy. Every building is a barricade every street a battlefield, can you even hope to defeat the hordes of alien tanks? Very fast graphics and exciting sound make this game a must for any arcade game player.

MODEL I/III ..... TAPE **$19.95**/DISK **$24.95**

COMPUTER SHACK

109

1691 Eason ● Pontiac, Michigan 48054

Info: **(313) 673-8700** ● Orders: **CALL TOLL FREE (800) 392-8881**

Master Charge and VISA OK. Please add $3.00 for shipping in the U.S.A. - $5.00 for Canada or Mexico - Proper postage outside of U.S. - Canada - Mexico.
Dealers: We are distributors for all items in this ad. Write for our catalog and price list.
CU 124

Life with the Model II

David G. Faske

If you're tired of sorting your mailing lists and can't look at another utility, this Model II Life simulation may be just the thing for you.

John Conway, a mathematician at Cambridge University, England, developed Life. It simulates an ecological system and illustrates the rise, fall, and changes of a society of living organisms as they interact with each other and their environment. The program starts with a simple population of organisms and observes their fate as the laws of ecology are applied to births, deaths, and survivors. Over time, the population exhibits one of three fates: it dies out from over- or underpopulation, it becomes stable, or it oscillates in a repeating pattern.

Use your computer to examine the population cycles of a community of living organisms.

Rules

Life starts with a blank screen and an-invisible grid 24 blocks high by 40 blocks wide. Place any configuration of occupants (each represented by the letter O) within the playing area. Occupied spaces are designated by an O, and empty spaces remain blank. Each space touches exactly eight others, but occupants die if they touch fewer than two or more than three occupied spaces. If three occupied spaces touch an empty space, a new occupant is born to fill that space. Births and deaths are evaluated simultaneously.

By positioning occupants at the start of the game, you establish the initial conditions (generation 0, see Fig. 1). Life then determines all births and deaths and displays the resulting generations, creating fascinating patterns. Figure 2 illustrates an example of this process through new generations.

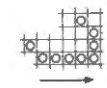
Supervisor Calls

This program takes advantage of the supervisor calls (SVCs) available with the Model II's TRSDOS 2.0a. Below is a brief explanation of the SVCs I used.

KBCHAR is a routine that accepts characters from the keyboard. It returns to the program immediately,

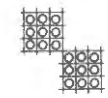
The Key Box

Model II
64K RAM
Assembly Language
Editor/Assembler



The Spaceship. This pattern travels across the screen in the indicated direction.

The Glider. This pattern also moves, but at a slower speed than the Spaceship.



The Figure Eight. This configuration oscillates with a period of 8 generations.

The Pulsar. This pattern evolves into a Pulsar with a period of 3 generations.

Traffic Lights. This pattern will evolve into four blinkers, each with a period of 2 generations. See Fig. 2 for complete details.

Figure 1. Five different initial generations and their fates.

either with or without a character. If a character is available from the keyboard, the program sets the Z flag and puts the ASCII code in register B.

KBINIT clears the keyboard buffer.

SETBRK lets you change the break key processing routine. The computer removes the old routine's address and replaces it with the address of the new routine.

VDCHAR and VDGRAF are video display routines. They display any ASCII character in addition to various control characters recognized by TRSDOS.

VDCHAR displays a single character at the current cursor position in the scroll mode. VDGRAF displays an entire buffer of characters in the graphics mode at a specific row and column number.

VDREAD reads data from the video display. It also determines the current cursor position for other routines.

VIDRAM dumps the entire video display into a RAM buffer. It can also dump the contents of a buffer to the display.

BINDEC converts a binary integer into the ASCII code of its decimal equivalent.

LOOKUP accepts a 1-byte key as an argument, and searches a table of 3-byte entries for a match. This routine compares only the first byte of each entry. The other 2 bytes are data.

If a match is found, the routine returns with the Z flag set and the data in register pair HL. If the 2 bytes are an address, you can immediately execute a JP (HL) instruction to perform another routine.

The Model II owner's manual has a much more detailed explanation of each SVC, including parameter lists and arguments.

Program Overview

In machine-language programs, TRSDOS loads register pair DE with the address of your program's highest memory location. I used this address to initialize the stack pointer (SP register).

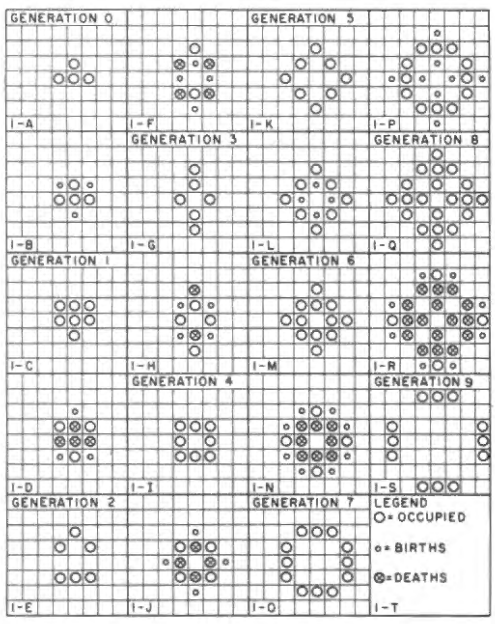
The main program comprises two parts. The first part displays the results of each generation at maximum speed without pause between generations. It evaluates and displays about 10 generations per second.

The second part of the main program waits for your prompt before it evaluates and displays the next generation. This lets you single-step through the generations at your leisure to closely examine any changes. You can freely choose between the two modes of operation.

Several other commands are available while the main program runs. They are assigned the functions described below and are invoked by pressing the specified key(s).

The break key clears the screen, sets the 80-column display mode, restores the original system cursor, and jumps to TRSDOS READY.

The escape key selects the continuous mode of operation.



Generation 0 Intermediate generation 0

Generation 1 Intermediate generation 1

Generation 2 Intermediate generation 2

Generation 3 Intermediate generation 3

Generation 4 Intermediate generation 4

Generation 5 Intermediate generation 5

Generation 6 Intermediate generation 6

Generation 7 Intermediate generation 7

Generation 8 Intermediate generation 8

Generation 9 Intermediate generation 9

Figure 2. The course of a population through nine generations (generation zero appears in the upper left corner).

MICROSETTE

Buy Direct and Save

- 5¼ SS and DS Diskettes
- Soft Sector Format Only

MICROSETTE CASSETTES

- Error-Free Computer Grade
- Industry Leader Since 1977

For Tandy, Apple, Osborne, IBM, Atari, Texas Instruments, Commodore, Timex, Kaypro, Sinclair and Many Others.

CASSETTES

Item	10 Pack	Qty	50 Pack	Qty	Total
C-10	$ 7.50		$32.50		
C-20	9.00		39.00		
C-60	11.00		50.00		
C-90	15.00		70.00		

DISKETTES 5¼-inch

SSDD	$25.00		$100.00		
DSDD	35.00		150.00		
			Subtotal		
			Shipping & Handling		N/C
			Calif. Cust. add Sales Tax		
			Total		

☐ Shipping Address Enclosed

☐ Check Enclosed

☐ Visa ☐ MasterCard

Card # _____

Exp. Date _____

Signature _____

MICROSETTE CO.

475 Ellis St. Dept. 2
Mountain View, CA 94043
(415) 968-1604

312

TIME SAVING — MONEY SAVING
PRINTER BUFFER

SPOOL-Z-Q

Spool-Z-Q accepts characters at computer speed and feeds them to your printer at its much slower speed. This eliminates the time you waste waiting for your printer to finish before you can use your computer.

FEATURES

Spool-Z-Q is perfect for use with all parallel (Centronics standard) printers including Radio Shack printers. Spool-Z-Q is stand-alone, it doesn't steal power from the computer or printer. The many advanced features include automatic internal space character compression, copy and self-test functions, and a special "Pause-on-Formfeed" mode.

SIZES AND EXPANSION

Spool-Z-Q comes in 32K, 64K, and 128K character sizes. Any Spool-Z-Q can be user expanded to 64 or 128K by just plugging in chips — the sockets are already installed. There are no jumpers to fool with either, Spool-Z-Q knows how much memory is installed without being told.

15 DAY TRIAL PERIOD

You may try Spool-Z-Q with your system and, if you aren't completely satisfied, return it within 15 days for a no-hassle full refund.

FACTORY DIRECT PRICES
(Shipping included)
32K — $219
64K — $249
128K — $309
Cable to printer — $27

JVB ELECTRONICS
1601 Fulton Ave., Suite 1
Sacramento, CA 95825
(916) 483-0709 ↩121

California residents include 6% sales tax. We accept Master Card, Visa, AMEX, and C.O.D.

POWER LINE PROBLEMS?

SPIKE-SPIKER® ...THE SOLUTION

Protects, organizes, controls computers & sensitive electronic equipment. Helps prevent software "glitches", unexplained memory loss, and equipment damage. Filter models attenuate conducted RF interference. 120V, 15 Amps. Other models available. Ask for free literature.

DELUXE POWER CONSOLE
$79.95
Transient absorber, dual 5-stage filter. 8 individually switched sockets, fused, main switch, & lite.

QUAD-II $59.95
Transient absorber. Dual 3 stage filter. 4 sockets, lite.

QUAD-I $49.95
Transient absorber, 4 sockets.

MINI-II $44.95
Transient absorber, 3 stage filter, 2 sockets.

MINI-I $34.95
Transient absorber, 2 sockets.

KAGLO® ↩485
6584 Ruch Rd., Dept. 80
Bethlehem, PA 18017

215-837-0700
Out of State Order Toll Free
800-523-9685

DEALER INQUIRIES INVITED • CODs add $3.00 + Ship.

The zero key invokes the single-step operation. The program evaluates and displays a subsequent generation when you press any key (except one of the control keys defined in this section) while in this mode.

The F1 key clears the screen and calls the screen editor subroutine. The F2 key freezes the current generation and calls the screen editor. This way, you can revert to generation zero or modify the current generation to a configuration of your choosing. Some patterns are so delicate that the addition or removal of one occupant disrupts and destroys the pattern.

Control-K resets the counter to zero and enables the counter display routine. Pressing control-I disables the counter without resetting it. Control-J enables the display without resetting the counter.

Program Listing. Model II Life.

```
00100   TITLE           MACHINE  LANGUAGE  LIFE
00200
00300   .COMMENT*       This is a high-speed machine language version of
00400                   the game LIFE.
00500
00600                   Program  by
00700
00800                   Dave  Faske
00900                   705 Kitterman Road
01000                   Port St. Lucie, FL 33450
01100
01200           *
01300   ;===============================================================
01400           GLOBAL          SETUP,  FATE,   LOAD0,  MOVEIT, CONVRT
01500           GLOBAL          SETBRK, CRSR,   NOCRSR, CPL40,  CPL80
01600           GLOBAL          GETCHR, VIDRAM, RAMVID, LOOKUP, NEWBRK
01700           GLOBAL          SETUP1, DSPLY,  COUNTR, KNTINT, KNTOFF, KNTON
01800   ;===============================================================
01900   ;       MAIN PROGRAM
02000   START:  LD      (STACK),SP      ;Save Stack Pointer
02100           EX      DE,HL           ;Get top of memory into HL
02200           LD      SP,HL           ;Initialize the Stack Pointer
02300           CALL    SETBRK          ;Set new <BREAK> key handling routine
02400           CALL    DSPLY           ;Display title of program, etc.
02500   START1: CALL    LOAD0           ;Load array with value 0
02600           CALL    SETUP           ;Get the initial display into RAM
02700           LD      A,(CHCODE)      ;Get last keyboard char. into A
02800           CP      '@'             ;Check for single-step request
02900           JR      Z,STEP          ;If true then jump to STEP
03000   REPEAT: CALL    MOVEIT          ;Transfer it to array
03100           CALL    CONVRT          ;Convert array from ASCII to Integer
03200           CALL    FATE            ;Start the LIFE cycles
03300           CALL    RAMVID          ;Display the new generation
03400           CALL    COUNTR          ;Increment and display counter
03500                                   ;While the program is running, the only
03600                                   ;keyboard input that is accepted
03700                                   ;is <BREAK>,<@>,<F1>,<F2>,<^K>,<^I>, or
03800                                   ;<^J>
03900           LD      A,4             ;KBCHAR SVC code
04000           RST     8               ;try and get a character
04100           JR      NZ,REPEAT       ;REPEAT if no character was there
04200                                   ;Else do this
04300           LD      A,B             ;Load the chaacter into A register
04400           CP      1               ;Was <F1> pressed?
04500           JP      Z,START1        ;Restart if true
04600           CP      2               ;Was <F2> pressed?
04700           JR      Z,DOTHIS        ;Jump if true
04800           CP      '@'             ;Single-step request?
04900           JR      Z,STEP          ;Jump if true
05000                                   ;^ = <CTRL> key
05100           CP      0BH             ;0BH = <^K>: Initialize counter
05200           CALL    Z,KNTINT        ;Call KNTINT if true
05300           CP      9               ;9 = <^I>: Turn counter display OFF
05400           CALL    Z,KNTOFF        ;Call KNTOFF if true
05500           CP      0AH             ;0AH = <^J>: Turn counter display ON
05600           CALL    Z,KNTON         ;Call KNTON if true
05700           JR      REPEAT          ;Ignore any other characters
05800   DOTHIS: CALL    RAMVID          ;Display screen without counter display
05900           CALL    SETUP1          ;Slightly different from SETUP
06000           LD      A,(CHCODE)      ;Get last keyboard character into A
06100           CP      '@'             ;Check for single-step request
06200           JR      NZ,REPEAT       ;Continue with MAIN PROGRAM if not 0
06300                                   ;This is the single-step routine
06400   STEP:   CALL    MOVEIT          ;This causes the program to
06500                                   ;single-step one cycle at a time
06600           CALL    CONVRT          ;When any key except <ESC> is pressed
06700           CALL    FATE
06800           CALL    RAMVID
06900           CALL    COUNTR          ;Call counter display routine
07000   STEP2:  CALL    GETCHR          ;Get a character from the keyboard
07100                                   ;This routine loops until a key is hit
07200           LD      A,B             ;Put character in A
07300           CP      27              ;Check for <ESC> key
07400           JR      Z,REPEAT        ;Go to full-speed mode if true
07500           CP      1               ;Check for <F1> key
07600           JR      Z,START1        ;Restart if true
07700           CP      2               ;Check for <F2> key
07800           JR      Z,DOTHIS        ;Modify screen with this routine
07900           CP      0BH             ;Check for <^K>
08000           CALL    Z,KNTINT        ;Initialize counter and display if true
08100           CP      0FFH            ;Was the subroutine called?
08200           JR      Z,STEP2         ;Continue here if true
08300           CP      9               ;Check for <^I>
08400           CALL    Z,KNTOFF        ;Turn off counter display if true
08500           CP      0FFH
08600           JR      Z,STEP2
```

Listing continued

LIVE WIRES FROM THE UTILITY COMPANY!

INSTANT ASSEMBLER 2.1

The Instant Assembler is a powerful assembly language development system for the TRS-80, and our new version is better than ever. If you are already an assembly language programmer, its unique design will greatly increase your productivity. If you are just getting started, there is no better assembler to help you learn machine language programming. Some of its unique features are immediate assembly, which detects syntax errors as source is entered, and a compact source format that allows you to write programs nearly three times as large as other assemblers in the same amount of memory. It produces relocatable code modules that can be saved on disk or tape and linked together in memory for large or modular assemblies. It will also assemble to disk, tape, or directly to memory for immediate debugging with the built-in debugger. You can quickly switch from assembler to debugger without losing your source. The built-in debugger will step though your programs one instruction at a time, showing each disassembled instruction and its effect on the registers and memory. It can even use the symbols in your source code when stepping or disassembling. Our new version will load or save both conventional source files and its own condensed source format.

The Instant Assembler package includes six separate programs. The assembler itself includes the editor and built-in debugger. The **Linking Loader** is included in several versions for different memory sizes. A stand-alone version of the debugger (**MicroMind**) is also included. **MicroMind** can be relocated in memory and has commands to single-step, set breakpoints, display or alter registers or memory, find bytes or words, disassemble to screen or printer, convert between hex and decimal numbers, and write SYSTEM tapes. The Instant Assembler comes with a comprehensive 65 page instruction manual with many examples.

Specify Model I or Model III. TAPE INTASM 2.1 ..... $39.95 on tape
Specify Model I or Model III. DISK INTASM 2.1 ..... $49.95 on disk

INSIDE LEVEL II

The Programmers Guide to the TRS-80 ROMS

INSIDE LEVEL II is a comprehensive reference guide to the Model I and Model III ROMs which allows the machine language or Basic programmer to easily utilize the sophisticated routines they contain. Concisely explains set-ups, calling sequences, and variable passage for number conversion, arithmetic operations, and mathematical functions, as well as keyboard, tape, and video routines. Part II presents an entirely new composite program structure which loads under the SYSTEM command and executes in both Basic and machine code with the speed and efficiency of a compiler. In addition, the 18 chapters include a large body of other information useful to the programmer including tape formats, RAM useage, relocation of Basic programs, USR call expansion, creating SYSTEM tapes of your own programs, interfacing of Basic variables directly with machine code, and special precautions for disk systems. **INSIDE LEVEL II** was reviewed in the April 1982 issue of 80 Micro which said "The book has no flaws, it is a perfect gem." Byte Magazine said "I recommend this book to serious machine language programmers."

Includes updates for Model III. INSIDE LEVEL II $15.95

DEMON DEBUGGER

DEMON (for DEbugger and MONitor) is a new and sophisticated tool with which you can explore and debug machine language programs. It has two modes of operation. In the STEP mode, it "emulates" the operation of the Z-80 and allows you to step through any machine language program one instruction at a time, showing you the address, hexadecimal value, Zilog mnemonic, register contents, and step count for each instruction. This ability is extremely useful not only in debugging your own programs, but also for examining how other people's programs work. It will even follow program flow right into the ROMs. DEMON leaves the video screen unaltered so that the program you are stepping through can perform its display functions unobstructed. STEP mode commands include step (trace), step to a branch, run in step mode at a variable rate, run for a specified number of steps, change flags or registers, execute a CALL or RST, set breakpoints in RAM or ROM, and break when a number in a defined range appears in any double register. Commands in the MONITOR mode (all of which are available from the STEP mode) include hex arithmetic, hex to decimal conversion, block move, fill memory, find bytes, jump to address, disassemble to screen or printer, load memory from disk or tape, write memory to disk or tape, full screen memory edit in hex or ASCII, and relocate other programs or itself. DEMON also includes a labelling disassembler with EDTASM format output to either disk or tape. This will generate source code from programs in memory which can then be altered and reassembled with your assembler. Screen displays may be routed to your line printer for hard copy. Includes a comprehensive 40 page manual with many examples.

Specify Model I or Model III. DEMON ..... $29.95 on tape or disk

DUPLICATE SYSTEM TAPES WITH CLONE

Make duplicate copies of almost any tape including Basic, SYSTEM, data lists, assembler source, or "custom loaders". The file name, load address, entry point, and every byte (in ASCII format) are displayed on the video screen. Model III version allows changing tape speed so you can make 1500 baud copies of 500 baud programs like SCRIPSIT.

Specify Model I or Model III. CLONE ..... $16.95 on tape, $21.95 on disk

DISK INDEX VERSION 3

Our excellent disk indexing program has now been entirely rewritten in machine language. **DISK INDEX** will assemble a master index of your entire program library by automatically reading the program names and free space from each disk. The index may then be alphabetized or searched for any disk, program, or extension. It will alphabetize 2400 programs in less than 50 seconds and will find any program out of 2400 in less than 3 seconds. Disks or programs may be added or deleted manually, and the whole index or any selected part may be printed on paper in several different formats. The index itself may also be stored on disk for future access and update. A 48K machine will hold up to 255 disks and over 2400 programs in each index, and you may build as many indexes as you need. There is no limit to the number of filenames it can read on any one disk. It will run on either a Model I or Model III and catalog disks for either machine regardless of which one is running it, though Model I owners must have double density to catalog Model III disks. It will automatically recognize any DOS and disk density. **DISK INDEX** works with any operating system written for the Model I or Model III except CP/M, and is extremely fast and easy to use.

Specify Model I or Model III. DISK INDEX VERSION 3 ..... $29.95 on disk

TELCOM

Mumford Micro offers two telecommunications programs. **TELCOM I** has most of the features needed to communicate with bulletin boards, time share systems, or for file transfers between two disk-based micros over modems or direct wire. It is menu driven and extremely simple to use. Functions include transmit a disk file, receive a disk file, save received data on disk, examine and modify UART parameters, 8 programmable log-on messages, automatic checksum verification of accurate transmission and reception, and many more user conveniences. Supports line printers, lowercase characters, Xon/Xoff protocol, and programmable character keys.

TELCOM II is an expanded version of this program for the most demanding telecommunications applications. It maintains the same ease of operation and all the features of our original program, but includes many enhancements. The terminal mode now has a help menu and a large spooler for simultaneous printer output at high baud rates. You can load disk files into the memory buffer from within the terminal mode, type into the buffer, transmit the buffer with a single command, and send files a line at a time. You can even view the buffer or data that has already scrolled off the screen. **TELCOM II** has 10 different 40 character programmable messages that can each be sent with a single command for auto log-on or auto dialing, and the messages can include control codes and delays. It also has 5 different character translation tables for filtering and compatibility with different systems.

TELCOM II also includes an error correction file transfer mode which is compatible with the LYNC program available on CP/M systems and the IBM PC. **TELCOM II** will exchange disk files with any computer running this protocol (including another TRS-80 running TELCOM II), and will automatically detect and correct errors in transmission. Files can be sent to or fetched from an unattended computer. The extreme ease of use TELCOM I is known for has not been compromised. Reconfiguration of the programmable features is done internally from clear menus for fast, easy operation. Both versions of TELCOM come with complete instruction manuals, which are available separately for $5 to help you decide which program is best suited to your needs.

Specify Model I or Model III. TELCOM I ..... $39.95 on disk
Specify Model I or Model III. TELCOM II ..... $69.95 on disk

8748 ASSEMBLER

Assemble programs for the complete Intel MCS-48 family of microcontrollers including the 8741, 8742, 8748, and 8749 on your Model I, III, or IV. Assembles from a source file written on your text editor directly to an object file on disk. It supports the standard Intel mnemonics and features conditional assembly and listing, complete expression evaluation, ten significant characters for symbols, a complete range of pseudo-ops, and informative error messages. It comes with a comprehensive instruction manual which includes the instruction set for each component and sample listings for arithmetic and I/O subroutines. We also offer plans, schematic, and software to help you build your own inexpensive 8748 programmer. The 8748 is a readily available single chip computer that contains RAM, EPROM, clock oscillator, a counter/timer, and 27 I/O lines in a single 40 pin package. A complete computer controller can be built with this one chip, a crystal, three capacitors, and a five volt power supply.

Specify Model I or Model III. CASM48 ..... $74.95 on disk
Plans and software for an 8748 programmer ..... $19.95 on disk

4 SPEEDS FOR YOUR MODEL I

The SK-2 clock modification allows CPU speeds to be switched between normal, an increase of 50%, or a 50% reduction; selectable at any time without interrupting execution or crashing the program. Instructions are also given for a 100% increase to 3.54 MHz. The SK-2 may be configured by the user to change speed with a toggle switch or on software command. It will automatically return to normal speed any time a disk is active, requires no change to the operating system, and has provisions for adding an LED to indicate when the computer is not at normal speed. It mounts inside the keyboard unit with only 4 necessary connections for the switch option (switch not included), and is easily removed if the computer ever needs service. The SK-2 comes fully assembled with socketed IC's and illustrated instructions.

Model I only. SK-2 ..... $24.95

MUMFORD MICRO SYSTEMS

ORDERING: Complete satisfaction is guaranteed or a full refund will be made. Include $2.00 for postage and handling. California residents add 6% sales tax. Visa, Mastercharge and COD orders accepted. **SPECIFY MODEL I OR MODEL III.** Dealer inquiries invited.

Box 400-E Summerland, California 93067 (805) 969-4557

Quality software since 1978

See List of Advertisers on Page 323

Listing continued

```
08700           CP      0AH             ;Check for <^J>
08800           CALL    Z,KNTON         ;Turn counter display on if true
08900           CP      0FFH
09000           JR      Z,STEP2
09100           JR      STEP            ;Ignore any other characters
09200   ;=======================================================================
09300   ;=======================================================================
09400   .COMMENT*       SETUP  SUBROUTINE
09500                   This subroutine provides screen editing functions.
09600                   Control passes to this routine whenever you decide
09700                   to make changes in the LIFE enviroment.
09800           *
09900   SETUP:  CALL    CPL40           ;Clear the screen and set 40 cpl mode
10000           CALL    KNTINT          ;Initialize counter and display routine
10100   SETUP1: CALL    CRSR            ;Set style and mode of the cursor
10200           LD      A,MOVEFR        ;MOVEBK, MOVEFR = cursor codes
10300           LD      (CHCODE+1),A    ;Initialize cursor codes for
10400           LD      A,MOVEBK        ;FORWARD motion
10500           LD      (CHCODE+2),A
10600   KLKY:   LD      A,1             ;KBINIT SVC code
10700           RST     8               ;Clear all previous keystrokes
10800   CHAR:   CALL    GETCHR          ;Get a character from the keyboard
10900                                   ;The character will be in B register
11000           LD      A,B             ;Get character into A
11100           LD      (CHCODE),A      ;And save character at CHCODE
11200           CP      27              ;27 is <ESC> key:  This starts LIFE
11300           JR      Z,GOBACK        ;Return to MAIN PROGRAM if true
11400           CP      '0'             ;<0> requests single-step routine
11500           JR      Z,GOBACK        ;Return to MAIN PROGRAM if true
11600           CP      1               ;Check for <F1> key: Restart if true
11700           JR      Z,SETUP         ;<F1> will clear screen and restart
11800           CP      2               ;Check for <F2> key
11900           JR      Z,CHAR          ;Ignore it
12000   LKUP:   CALL    LOOKUP          ;Keyboard character is in B register
12100                                   ;LOOKUP will jump to correct routine
12200                                   ;for that character
12300           JR      KLKY            ;Continue with subroutine
12400   GOBACK: CALL    VIDRAM          ;Dump video display into RAM buffer
12500           CALL    NOCRSR          ;Turn off the cursor
12600           RET
12700   ;=======================================================================
12800   .COMMENT*       FATE  SUBROUTINE
12900                   This subroutine accumulates a sum for every cell
13000                   on the screen, and then either kills it, lets it live,
13100                   or causes a new cell to be filled.
13200           *
13300   FATE:   LD      D,40            ;Initialize counters
13400           LD      E,24
```

Listing continued

The counter display uses five spaces in the upper right corner of the video display. It doesn't affect the evaluation of any generation although it may conceal a portion of the Life display. Use control-I to reveal the hidden pattern.

Subroutines

Life uses subroutines extensively. A short subroutine is easier to debug than a long, complicated program, and you can easily add new or modified subroutines. Below are explanations of the subroutines called from the main program.

Setup is the screen editor subroutine. The number zero exits to the program's single-step mode. Pressing the escape key invokes the full-speed mode. Hitting the break key returns the program to TRSDOS READY.

The F1 key clears the screen so you can restart. Setup ignores the F2 key. Control-K, control-I, and control-J affect the counter and the counter display.

The numeral keys 1–9 relocate the cursor to one of nine screen locations. The four arrow keys position the cursor. Control-F, control-R, control-U, and control-D insert cursor control codes into a buffer that determines where the cursor is positioned after a

ALPHA/100

P.O. Box 112
161 N. Main Street,
Lake Elsinore,
Ca. 92330
714/674-6630 ~487

YES! Send me:
☐ BAR CODE READER $129.95
☐ LEATHER CASE $109.95
☐ CHECK / MO Include 6% State Tax / Ca. Res.
☐ VISA ☐ MC $3.00 for Shipping & Handling.

NAME _____ SIGNATURE _____
ADDRESS _____ CARD # _____
_____ ZIP _____ PHONE ( ) _____

character is displayed.

Control-F positions the cursor to the right of a character. Control-R moves the cursor to the left of a character. Control-U positions the cursor above the character, and control-D puts it below the character. The backspace key provides a destructive backspace corresponding to the current cursor codes in effect. The space bar provides a destructive forward space.

The enter key centers the cursor on the screen and resets the cursor codes for forward motion. Pressing any other key causes an O to be displayed at the current cursor position. I used an O to designate an occupant, but you can easily change this character. You can also add new functions and control keys. The Lookup subroutine and service calls make it easy to insert new code.

The Lookup subroutine is based on the SVC of the same name. The program passes one character to this routine as an argument. The program then searches a table for a matching character. If it finds a match, the program loads 2 bytes of data into register pair HL. The data is the address of a routine associated with the search argument.

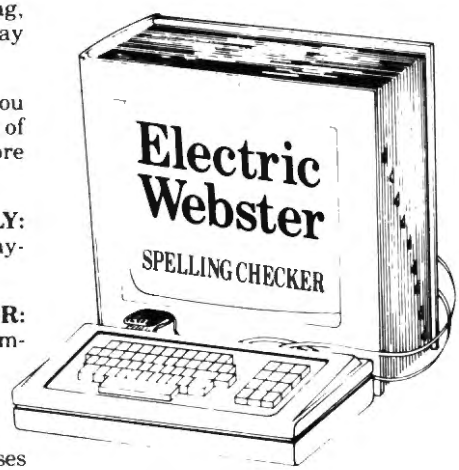
If the program doesn't find the

Listing continued

```
13500            LD      IX,ARRAY+43     ;IX gets address of ARRAY offset by 43
13600            LD      HL,RAMBUF       ;HL gets address of RAMBUF
13700  ACCUM:    XOR     A               ;Zero accumulator
13800            ADD     A,(IX-43)       ;Begin addition processing
13900            ADD     A,(IX-42)
14000            ADD     A,(IX-41)
14100            ADD     A,(IX-1)
14200            ADD     A,(IX+1)
14300            ADD     A,(IX+41)
14400            ADD     A,(IX+42)
14500            ADD     A,(IX+43)
14600            CP      3               ;Check for births
14700            JR      Z,LIVE          ;If true, there will be an occupant
14800            CP      2               ;Check for two neighbors
14900            JR      Z,NODIFF        ;No changes made if true
15000  DIE:      LD      (HL),' '        ;Fill corresponding RAMBUF with a blank
15100            JR      NODIFF          ;Go to count processor
15200  LIVE:     LD      (HL),'O'        ;Fill corresponding RAMBUF with an 'O'
15300  NODIFF:   INC     HL              ;Increment RAMBUF pointer
15400            INC     IX              ;Increment ARRAY pointer
15500            DEC     D               ;Decrement counter
15600            JR      NZ,ACCUM        ;Process ARRAY until done
15700            INC     IX              ;Skip 2 elements of this buffer
15800            INC     IX
15900            LD      D,40            ;Reset counter
16000            DEC     E               ;Decrement counter: When this counter
16100                                    ;goes to zero, we're done
16200            JR      NZ,ACCUM        ;Loop until done
16300            RET
16400  ;=================================================================
16500  .COMMENT*         LOAD0  SUBROUTINE
16600                    This subroutine initializes an array with value 0
16700            *
16800  LOAD0:    LD      D,0             ;Register D has the value to be loaded
16900            LD      HL,ARRAY        ;HL has the address to be loaded
17000            LD      BC,1092         ;BC has the number of bytes to load
17100  HERE1:    LD      (HL),D          ;Load value 0 into current address
17200            INC     HL              ;Bump address
17300            DEC     BC              ;Decrement byte counter
17400            LD      A,B             ;See if we're done
17500            OR      C               ;We're not done until B = C = 0
17600            JR      NZ,HERE1        ;Loop to HERE1 until done
17700            RET                     ;Then return
17800  ;=================================================================
17900  .COMMENT*         MOVEIT  SUBROUTINE
18000                    This subroutine transfers data from one area of
18100                    RAM to another.  Data is moved and loaded in a
18200                    special pattern.
```

Listing continued

- **DISPLAYS CORRECT SPELLINGS:** If you don't know the correct spelling, 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:** into 11 different word processing programs: Wordstar, Spellbinder, Newscript, Lazy Writer, Super-Scripsit, Scripsit, Electric Pencil, Copy Art, Superscript, Zorlof, and Magic Wand (specify). Begins proofing at the stroke of a key; returns you to word processing automatically.



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

VOTED #1: If this sounds too good to believe, you don't need to take our word for it. Take the word of the thousands of *80 Micro* readers who voted Electric Webster the #1 spelling checker (1/83). Take the word of the scores of professional software reviewers who have raved about Electric Webster. Or, ask your local computer or software dealer for a demonstration, and see for yourself!

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." *CINTUG, Cincinnati's Users Group Mag., 4/83*

"In my opinion, the perfect combination is Correcting Electric Webster with the hyphenation and grammar add-ons. To my surprise, it fills every reasonable expectation. It is fast, easy to use and accurate." *Desktop Computing, 12/82*

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

LOW PRICES:

TRS-80 Electric Webster	$ 89.95
w/Correcting Feature	$149.95
Hyphenation	$ 49.95
Grammar & Style Checker	$ 49.95
CP/M or MS/DOS	
Electric Webster (includes Correcting Feature and Hyphenation Option)	$209.95
Grammar & Style Checker	$ 49.95

CORNUCOPIA SOFTWARE

Post Office Box 6111 Albany, California 94706

• (415) 524-8098 • ↵45

↵See List of Advertisers on Page 323

Listing continued

```
18300           *
18400 MOVEIT:   LD      A,24            ;Number of rows to be loaded
18500           LD      HL,RAMBUF       ;Sending address
18600           LD      DE,ARRAY+43     ;Receiving address
18700 DOITNW:   LD      BC,40           ;Number of bytes to copy
18800           LDIR                    ;Move it now
18900           INC     DE              ;Skip next 2 elements of ARRAY
19000           INC     DE
19100           DEC     A               ;Decrement row counter
19200           JR      NZ,DOITNW       ;Loop to DOITNW until done
19300           RET                     ;Return if finished
19400 ;=========================================================================
19500 .COMMENT*          CONVRT  SUBROUTINE
19600                    This subroutine converts an array of mixed ASCII codes
19700                    into an array of integers.
19800           *
19900 CONVRT:   LD      BC,1092         ;BC = Number of bytes to convert
20000           LD      HL,ARRAY        ;HL = Address of current byte
20100 LOOP1:    LD      A,(HL)          ;A = Current value being converted
20200           CP      ' '             ;Compare it with ASCII 'blank'
20300           JR      Z,LOOP3         ;Jump to LOOP3 if true
20400           CP      0               ;Compare it with 0
20500           JR      Z,LOOP2         ;Jump to LOOP2 if true
20600           LD      (HL),1          ;If not 'blank' or 0, make it a 1
20700 LOOP2:    DEC     BC              ;Decrement byte counter
20800           INC     HL              ;Bump current address
20900           LD      A,B             ;Not done until B = C = 0
21000           OR      C
21100           JR      NZ,LOOP1        ;Loop until done
21200           RET                     ;Then return
21300 LOOP3:    LD      (HL),0          ;Load current address with 0
21400           JR      LOOP2           ;Go to counter routine
21500 ;=========================================================================
21600 .COMMENT*          SETBRK  SUBROUTINE
21700                    This subroutine sets up a new <BREAK> key
21800                    processing routine.
21900           *
22000 SETBRK:   LD      A,(06B1H)       ;Get current cursor style and mode
22100           LD      (CURSOR),A      ;and save it here
22200           LD      HL,0            ;Zero removes current <BREAK> processor
22300           LD      A,3             ;SETBRK SVC code
22400           RST     8               ;The removed address is in HL
22500           LD      HL,NEWBRK       ;Load HL with new <BREAK> address
22600           LD      A,3             ;SETBRK SVC code
22700           RST     8               ;New routine is now enabled
22800           RET
22900 ;=========================================================================
23000 .COMMENT*          NEWBRK  SUBROUTINE
23100                    This is the new <BREAK> routine.  This routine restores
23200                    the original cursor to the system, restores the
23300                    SP register, clears the screen and resets
23400                    80 column mode before returning to TRSDOS READY.
23500           *
23600 NEWBRK:   LD      A,(CURSOR)      ;Get original cursor back
23700           LD      (06B1H),A       ;Restore it to the system
23800           LD      A,10            ;Install new cursor in Register 10
23900           OUT     (0FCH),A        ;of the CRTC board
24000           LD      A,(CURSOR)      ;Get back the original cursor
24100           OUT     (0FDH),A        ;Send it to the video controller
24200           CALL    CPL80           ;Clear the screen and set 80 cpl mode
24300           LD      HL,(STACK)      ;Get back original stack pointer
24400           LD      SP,HL           ;and restore it
24500           RST     0               ;Return to 'TRSDOS READY'
24600 ;=========================================================================
24700 .COMMENT*          CRSR  SUBROUTINE
24800                    This subroutine changes the current cursor style
24900                    and mode.  The new cursor will be a full block cursor
25000                    with a twice normal blink rate.
25100           *
25200 CRSR:     LD      A,10            ;Register 10 of CRTC board will
25300           OUT     (0FCH),A        ;get the new cursor code
25400           LD      A,40H           ;Code for new cursor
25500           OUT     (0FDH),A        ;Send it to the video controller
25600           LD      (06B1H),A       ;Put it in the system also
25700           RET
25800 ;=========================================================================
25900 .COMMENT*          NOCRSR  SUBROUTINE
26000                    This subroutine turns the cursor OFF.
26100           *
26200 NOCRSR:   LD      A,10            ;Register 10 of the CRTC board will
26300           OUT     (0FCH),A        ;get the new cursor code
26400           LD      A,20H           ;Code to turn cursor off
26500           OUT     (0FDH),A        ;Send it to video controller
26600           LD      (06B1H),A       ;Send it to the system also
26700           RET
26800 ;=========================================================================
26900 .COMMENT*          CPL40  SUBROUTINE
27000                    This routine clears the screen and sets 40 column mode.
27100           *
27200 CPL40:    LD      B,1FH           ;Clear the screen, set 40 column mode
27300           LD      A,8             ;VDCHAR SVC code
27400           RST     8
27500           RET
27600 ;=========================================================================
27700 .COMMENT*          CPL80   SUBROUTINE
27800                    This routine clears the screen and sets 80 column mode.
27900           *
28000 CPL80:    LD      B,1EH           ;Clear the screen, set 80 column mode
28100           LD      A,8             ;VDCHAR SVC code
28200           RST     8
28300           RET
28400 ;=========================================================================
28500 .COMMENT*          GETCHR  SUBROUTINE
28600                    This routine is designed to get a character from
28700                    the keyboard.  GETCHR will not return until a
28800                    character is available.
28900           *
29000 GETCHR:   LD      A,4             ;KBCHAR SVC code
29100           RST     8               ;Z flag indicates a character is in B
29200           JR      NZ,GETCHR       ;Loop until a character is available
```

Listing continued

search character in the table, control passes to the default routine, Print. This routine displays an O at the current cursor position. The routines FORWRD, REVRSE, Up, and Down insert cursor control codes in the display buffer CHCODE.

Routines 1–9 load the B and C registers, and row and column numbers position the cursor. The Locate routine then uses these numbers and the VDGRAF SVC to move the cursor to the requested location. Pressing the enter key centers the cursor and resets the codes in CHCODE. BKSP and Space provide the destructive backspace and space functions. The Arrow routine converts the arrow key codes into graphics mode cursor control codes.

You can easily add new function codes and routines to the Lookup subroutine. Insert the ASCII code of your new control character to Table followed by the address of your new routine. Insert the new routine anywhere, or append it to the existing program. For instance, you might want to add a routine that produces a specific pattern at the touch of a button, or randomly generates populations on the screen.

The LOADO subroutine initializes the array that evaluates each generation of Life.

The MOVEIT subroutine transfers data from the video buffer into the working array.

The CONVRT subroutine converts ASCII codes in the working array into integer values of zero or 1. These values are used to accumulate the totals that determine the fate of any occupied spaces in addition to births in empty spaces.

Subroutine SETBRK defines a new break key processing routine. It saves the system cursor at address Cursor and installs the address of NEWBRK as the Life exit routine. This routine restores the system cursor, clears the screen, sets the 80-column display mode, and jumps to TRSDOS READY.

The Fate subroutine evaluates each generation and determines births and deaths according to the rules of Life. Index register IX accesses the values in the working array. These values correspond to the occupied and empty spaces on the display. The program accumulates a total for each location in the display. This total determines the fate of that location.

The CRSR and NOCRSR subroutines control the type of cursor display and whether the cursor is on or off.

The CPL40 and CPL80 subroutines clear the screen and set either the 40- or

Listing continued

```
29300           RET                     ;Character will be in B register
29400   ;=======================================================================
29500   .COMMENT*       VIDRAM  SUBROUTINE
29600                   This routine is designed to dump the video display into
29700                   a buffer in RAM.
29800           *
29900   VIDRAM: LD      B,0FFH          ;Function code: Dump video to RAM
30000           LD      HL,RAMBUF       ;HL = Address of the buffer
30100           LD      A,94            ;VIDRAM SVC code
30200           RST     8
30300           RET
30400   ;=======================================================================
30500   .COMMENT*       RAMVID  SUBROUTINE
30600                   This routine is designed to dump a RAM buffer to
30700                   the video display.
30800           *
30900   RAMVID: LD      B,0             ;Function code: Dump RAM to video
31000           LD      HL,RAMBUF       ;HL = Buffer address
31100           LD      A,94            ;VIDRAM SVC code
31200           RST     8
31300           RET
31400   ;=======================================================================
31500   .COMMENT*       LOOKUP  SUBROUTINE
31600                   This subroutine finds a given value in a table
31700                   and loads the corresponding address into HL.
31800                   If the given value isn't found, the routine
31900                   displays an 'O'.
32000           *
32100   LOOKUP: LD      HL,TABLE        ;HL = Address of the table
32200           LD      A,28            ;LOOKUP SVC code
32300                                   ;B register has the search key
32400           RST     8               ;Do it now
32500           JR      NZ,PRINT        ;Key wasn't in the table?
32600           JP      (HL)            ;SUCESS!! Jump to subroutine address
32700   PRINT:  LD      D,0             ;Buffer length = 0
32800           LD      A,11            ;VDREAD SVC code: Get cursor location
32900           RST     8               ;Row and column are in B and C
33000           LD      HL,CHCODE       ;HL = Buffer address
33100           LD      (HL),'O'        ;Put an 'O' there
33200           LD      D,3             ;Buffer length = 3
33300           LD      A,10            ;VDGRAF SVC code
33400           RST     8               ;Put an 'O' on the screen
33500           RET                     ;Return for another character
33600
33700   .COMMENT*       SUBROUTINES for "LOOKUP"
33800                   These are the routines that LOOKUP will jump to.
33900                   The first four insert cursor control codes into
34000                   a buffer.  The control codes are used to provide
34100                   cursor motion in the SETUP routine.
34200           *
34300   FORWRD: LD      HL,CHCODE+1     ;HL = Buffer address
34400           LD      (HL),MOVEFR     ;Load buffer with a control code
34500           INC     HL              ;Bump buffer address
34600           LD      (HL),MOVEBK     ;Another control code:
34700           RET                     ;cancels the first one
34800   REVRSE: LD      HL,CHCODE+1     ;HL = Buffer address
34900           LD      (HL),MOVEBK     ;Buffer gets a control code
35000           INC     HL              ;Bump address
35100           LD      (HL),MOVEBK     ;Buffer gets another control code:
35200           RET                     ;This causes the cursor to back up
35300   UP:     LD      HL,CHCODE+1     ;HL = Buffer address
35400           LD      (HL),MOVEUP     ;Buffer loaded with a control code
35500           INC     HL              ;Bump current address
35600           LD      (HL),MOVEBK     ;Buffer gets its second control code:
35700           RET                     ;This causes the cursor to move up
35800   DOWN:   LD      HL,CHCODE+1     ;HL = Buffer address
35900           LD      (HL),MOVEDN     ;First control code loaded
36000           INC     HL              ;Bump current address
36100           LD      (HL),MOVEBK     ;Buffer gets second code
36200           RET                     ;This causes the cursor to move down
36300   ;               The next nine assign cursor motion functions to the
36400   ;               numeric keys.  This allows the cursor to be positioned
36500   ;               in one of nine locations by pressing a single key.
36600   ONE:    LD      B,23            ;Row number for cursor position
36700           LD      C,0             ;Column number for cursor position
36800           JR      LOCATE          ;Cursor routine is here
36900   TWO:    LD      B,23
37000           LD      C,19
37100           JR      LOCATE
37200   THREE:  LD      B,23
37300           LD      C,39
37400           JR      LOCATE
37500   FOUR:   LD      B,11
37600           LD      C,0
37700           JR      LOCATE
37800   FIVE:   LD      B,11
37900           LD      C,19
38000           JR      LOCATE
38100   SIX:    LD      B,11
38200           LD      C,39
38300           JR      LOCATE
38400   SEVEN:  LD      B,0
38500           LD      C,0
38600           JR      LOCATE
38700   EIGHT:  LD      B,0
38800           LD      C,19
38900           JR      LOCATE
39000   NINE:   LD      B,0
39100           LD      C,39
39200   ;               Now the given row and column co-ordinates are used
39300   ;               to position the cursor at the desired location.
39400   LOCATE: LD      D,0             ;Buffer length is zero
39500           LD      A,10            ;VDGRAF SVC code
39600           RST     8               ;This positions the cursor at the
39700           RET                     ;specified row and column
39800   ;               This routine centers the cursor and restores
39900   ;               normal cursor motion.
40000   ENTER:  LD      HL,CHCODE+1     ;HL = Buffer address
40100           LD      (HL),MOVEFR     ;Code to move cursor forward
40200           INC     HL              ;Bump buffer address
```

Listing continued

FOR TRS-80 MODELS 1, 3 & 4
IBM PC, XT, AND COMPAQ

WHICH ONE?

Which microcomputer word processor lets you create and edit without typing, but *won't* slow down your creative process? Knows when to capitalize the first letter while replacing one phrase with another? Can outdent as well as indent? Will do typesetting at your command, even with proportional characters, right justification and tabbed columns? Lets you use the same (extra-capacity) data disks on IBM PC *and* TRS-80? And eases your learning with common-sense keystrokes, Help menus, good examples and a professionally authored manual?

Hint: it can integrate to communicate from home to office, and will interface with a database for form letters, data tables, and more!

It's the professional's word processor for your IBM PC, Compaq, or TRS-80 Model 1, 3 or 4:

FORTHWRITE
in
MMSFORTH

With an unusually powerful set of tools and an unusually easy way of helping you to use them.

All necessary software (FORTHWRITE and the MMSFORTH System), under Personal License for $425 (IBM PC). Or with FORTHCOM telecommunications module and the DATAHANDLER-PLUS files management system, for $550 complete. Corporate Site (multiple users) License is available.

May we tell you more?

MILLER MICROCOMPUTER SERVICES
61 Lake Shore Road, Natick, MA 01760
(617) 653-6136

137

See List of Advertisers on Page 323

Listing continued

```
40300           LD      (HL),MOVEBK     ;Code to move the cursor back
40400           JR      FIVE            ;Now center the cursor
40500   ;               This routines provides a destructive <BACK SPACE> key
40600   ;               with respect to the current cursor motion codes.
40700   BKSP:   LD      HL,(CHCODE+1)   ;Get cursor control codes into HL
40800           PUSH    HL              ;Save them in the Stack
40900           LD      A,(CHCODE+1)    ;Get first control character
41000           XOR     00000001B       ;Complement bit 0: Reverse direction
41100                                   ;of cursor motion
41200           LD      (CHCODE),A      ;Put it in the buffer: New order
41300           LD      A,' '           ;Load A register with a 'blank'
41400           LD      (CHCODE+1),A    ;Put it in the buffer
41500           LD      A,MOVEBK        ;Cursor control code: Back up
41600           LD      (CHCODE+2),A    ;Make it the 3rd buffer character
41700                                   ;Now get the current cursor location
41800           LD      D,0             ;Buffer length = 0
41900           LD      A,11            ;VDREAD SVC code
42000           RST     8               ;On return, B = row, C = col.
42100                                   ;Overstrike character with a 'blank'
42200           LD      HL,CHCODE       ;HL = Address of buffer to be displayed
42300           LD      D,3             ;Display 3 characters
42400           LD      A,10            ;VDGRAF SVC code
42500           RST     8
42600           POP     HL              ;Get original codes back from the Stack
42700           LD      (CHCODE+1),HL   ;Restore them to the buffer
42800           RET                     ;Return to the calling routine
42900   ;               This routine assigns cursor control to the arrow keys.
43000   ARROW:  LD      A,(CHCODE)      ;Get character back into A register
43100           ADD     A,0E0H          ;Convert the ASCII code
43200           LD      (CHCODE),A      ;Put the new chaacter in the buffer
43300           LD      D,0             ;Buffer length = 0
43400           LD      A,11            ;VDREAD SVC code
43500           RST     8               ;Current cursor position is returned
43600                                   ;in registers B and C
43700           LD      HL,CHCODE       ;HL = Buffer address
43800           LD      D,1             ;Buffer length = 1
43900           LD      A,10            ;VDGRAF SVC code
44000           RST     8               ;Perform the requested movement
44100           RET
44200   ;               This routine prints a 'blank' at the current location.
44300   SPACE:  LD      D,0             ;Buffer length = 0
44400           LD      A,11            ;VDREAD SVC code
44500           RST     8               ;Cursor position returned in B and C
44600           LD      HL,CHCODE       ;HL = Buffer address
44700           LD      (HL),' '        ;Put a 'blank' there
44800           LD      D,3             ;Use the cursor codes too
44900           LD      A,10            ;VDGRAF SVC code:  Display a 'blank'
45000           RST     8
45100           RET
45200   ;=======================================================================
45300   .COMMENT*       This is a one shot routine called once at the
45400                   beginning of the program.
45500                   Change this routine to install your own title graphics
45600                   in this program.
45700           *
45800   DSPLY:  CALL    CPL40           ;Clear the screen, set 40 column mode
45900           LD      B,10            ;B has the row number
46000           LD      C,15            ;C has the column number
46100           LD      D,LEN1          ;D has the length of the message
46200           LD      HL,MESS1        ;HL has the address of the message
46300           LD      A,10            ;VDGRAF SVC code
46400           RST 8
46500           LD      B,12            ;Row is in B
46600           LD      C,14            ;Column is in C
46700           LD      D,LEN2          ;D has the length of the message
46800           LD      HL,MESS2        ;HL points to the message
46900           LD      A,10            ;VDGRAF SVC code
47000           RST     8
47100           LD      B,13            ;B has row number
47200           LD      C,14            ;C has column number
47300           LD      D,LEN3          ;D has the length of the message
47400           LD      HL,MESS3        ;HL points to the message
47500           LD      A,10            ;VDGRAF SVC code
47600           RST 8
47700           LD      B,24            ;Last row
47800           LD      C,19            ;Center column
47900           LD      D,0             ;Buffer length is 0
48000           LD      A,10            ;VDGRAF SVC code
48100           RST     8
48200           CALL    GETCHR          ;Wait for keyboard before returning
48300           RET
48400   ;=======================================================================
48500   .COMMENT*       These routines provide a counter to keep track of the
48600                   number of cycles that the enviroment has gone through.
48700           KNTINT  resets the counter to zero and turns it on.
48800           KNTON   turns the counter on but doesn't reset it.
48900           KNTOFF  turns the counter off but doesn't reset it.
49000           COUNTR  is the routine that increments and displays the count.
49100                   The RESET1 byte of the routine is switched between
49200                   NOP and RET, depending whether the counter is turned
49300                   on or off.
49400           *
49500   KNTINT: LD      HL,CNTINT       ;Set accumulator to 0
49600           LD      (HL),0
49700           INC     HL
49800           LD      (HL),0
49900           LD      HL,RESET1       ;HL points to display routine
50000           LD      (HL),0          ;RESET1 byte equal to Z80 code 'NOP'
50100           LD      A,0FFH          ;Load A register with flag
50200           RET
50300   ;=======================================================================
50400   KNTON:  LD      HL,RESET1       ;HL points to counting routine
50500           LD      (HL),0          ;RESET1 byte equal to Z80 code 'NOP'
50600           LD      A,0FFH          ;Load A register with flag
50700           RET                     ;Nothing else is changed
50800   ;=======================================================================
50900   KNTOFF: LD      HL,RESET1       ;HL points to counting routine
51000           LD      (HL),0C9H       ;Set RESET1 byte equal to 'RET' code
51100                                   ;This will cause the routine to return
51200                                   ;immedialtely every time it is called
51300           CALL    RAMVID          ;Restore screen without counter display
```

Listing continued

80-column display modes.

Subroutine GETCHR uses the KB-CHAR SVC to retrieve a character from the keyboard. This subroutine doesn't return without a character.

The VIDRAM and the RAMVID subroutines use the same SVC. VIDRAM dumps the contents of the display into a designated buffer in RAM. RAMVID does the opposite.

Life calls the subroutine DSPLY once near the beginning of the main program. You can make this subroutine more elaborate if you want to customize the Life marquee.

Subroutine COUNTR accumulates and displays the total number of generations produced since you last set the counter. Three other subroutines control and modify this subroutine. KNTINT resets the count to zero and turns on the display function. KNTON and KNTOFF turn the display on or off, but do not reset the counter.

The byte at address RESET1 determines whether or not the counter is displayed. KNTINT and KNTON both set this byte to value zero, the Z80 code for NOP. KNTOFF sets this byte to value C9 hexadecimal. The value of this byte determines whether the count is displayed or if the routine returns immediately after incrementing the count. The Z80 code for RET is C9.

Data

Life's data section defines the value of the mnemonic codes used throughout the program. The table used in the Lookup subroutine is located here at address Table. RAMBUF is the buffer that holds the data dumped from the video display. It also holds the new data for each generation. Array is the working array used to hold the integer value the Fate subroutine uses. The screen editor routine uses Buffer CHCODE and contains the character and cursor codes the program displays. The COUNTR subroutine uses CNTASC and CNTINT. The messages displayed by the DSPLY subroutine are also stored here.

Conclusion

By experimenting with this program, you can create a great number and variety of patterns as births and deaths alter populations before your eyes. What started as John Conway's scientific simulation is now a fascinating glimpse at Life. ■

David G. Faske can be reached at 705 Kitterman Road, Port St. Lucie, FL 33452.

It's Simple. . . **CALL AND SAVE MONEY**

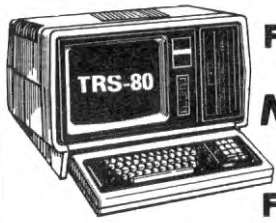
1-800-841-0860
CONVENIENT ORDER ENTRY

TELEMARKETING WORKS FOR YOU!

TRS-80 COMPUTERS

BUSINESS

MODEL 16 TRS-80



From $3998
26-6004

MODEL 12 TRS-80

From $2639
26-4004

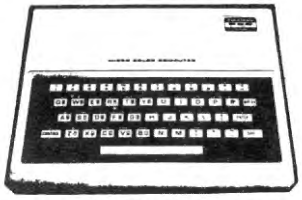
DESK TOP

MODEL 4 TRS-80 COMPUTER

From $809
26-1067

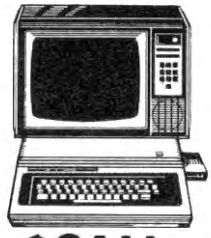
HOME

TRS-80 MC-10 MICRO COLOR



$99

TRS-80 COLOR COMPUTER



$CALL

PERSONAL

MODEL 100 PORTABLE TRS-80

From $677
26-3801

ALL PRODUCTS WE SELL ARE BRAND NEW AND COVERED BY THE MANUFACTURER'S SPECIFIC WARRANTIES. COPIES AVAILABLE UPON REQUEST.
WE DO NOT SELL ANY USED, RECONDITIONED, FOREIGN OR INFERIOR MODIFIED EQUIPMENT.
PRICES AND PRODUCTS SUBJECT TO CHANGE WITHOUT NOTICE.

WE CARRY THE COMPLETE TRS-80 COMPUTER PRODUCT LINE
• PURE RADIO SHACK EQUIPMENT •

FREE
UPON REQUEST
•DISCOUNT PRICE LIST & INFORMATION KIT

Since 1978

- REPUTATION BACKED BY YEARS OF EXPERIENCE.
- PIONEER IN DIRECT TO CONSUMER SALES OF MICRO COMPUTERS AND ELECTRONICS
- MILLIONS OF DOLLARS IN SALES OVER THE YEARS
- TENS OF THOUSANDS OF CUSTOMERS
- HONEST
- RELIABLE
- LARGE INVENTORY
- NAME BRAND PRODUCTS

Man's Best Friend

Micro Management Systems, Inc.
2803 Thomasville Road East
Cairo, Georgia 31728
TELEMARKET DEPT. NO. 4
Ga & Info 912-377-7120

✓96

DISCOUNT PRICES

BUY DIRECT

✓See List of Advertisers on Page 323

ANALYTICAL PROCESSES CORPORATION

BUSINESS SOFTWARE

for

IBM-PC, OSBORNE, XEROX
NORTHSTAR, RADIO SHACK
EPSON QX-10, CPM & MS-DOS

All Prices Include Full Support and Source Code

$ TAX/PACK $

TAX/PACK for practitioners is complete, coordinated, and includes most-used forms and schedules. Prints all schedules, no masks, no data field entered more than once. All data passed automatically between schedules and 1040. Fully supported all year. Partial or full system. Can be used for single or multiple returns. Extremely flexible. Computing taxes for over five years.

$995.00

MORE !
TRIED & TRUE APPLICATIONS

- MAIL LIST MANAGER
- MEMBERSHIP LIST MANAGER
- UTILITY BILLING
- REAL ESTATE APPRAISAL
- PETROLEUM DISTRIBUTORS
- RETAIL INVENTORY & BILLING

Send Check, M.O., or VISA/MC Number and Expiration Date TODAY to:

ANALYTICAL PROCESSES CORP.
635 Main Street - P.O. Box 1313
Montrose, Colorado 81402

406

For More Information Call:
(303) 249-1400

We Are Unique . . . Try Us . . . Find Out

Listing continued

```
51400           LD      A,0FFH          ;Load A register with a flag value
51500           RET
51600   ;=======================================================================
51700   COUNTR: LD      HL,(CNTINT)     ;HL holds contents of hex accumulator
51800           INC     HL              ;Increment count
51900           LD      (CNTINT),HL     ;Restore new value
52000   RESET1: NOP                     ;This code will be either
52100                                   ;NOP = 00 or RET = 0C9H
52200           EX      DE,HL           ;Get value into DE for next routine
52300           LD      HL,CNTASC       ;HL points to 5 byte buffer for ASCII
52400           LD      B,0             ;B = 0 is function code for SVC
52500           LD      A,21            ;BINDEC SVC: convert HEX=>Decimal ASCII
52600           RST     8               ;ASCII will be in CNTASC
52700           LD      B,5             ;Going to check 5 characters maximum
52800           LD      HL,CNTASC       ;HL points to ASCII buffer
52900   LOOPC1: LD      A,(HL)          ;Get value into A for comparison
53000           CP      '0'             ;See if it's a '0'
53100           JR      NZ,LOOPC2       ;Quit with first non-'0' character
53200           LD      (HL),' '        ;Otherwise put a 'blank' there
53300           INC     HL              ;Bump address
53400           DJNZ    LOOPC1          ;Loop until done
53500   LOOPC2: LD      D,5             ;Maximum of 5 characters in the buffer
53600           LD      B,0             ;Row number for display
53700           LD      C,35            ;Column number for display
53800           LD      HL,CNTASC       ;HL points to buffer of ASCII codes
53900           LD      A,10            ;VDGRAF SVC code
54000           RST     8
54100           RET
54200   ;=======================================================================
54300   ;=======================================================================
54400   .COMMENT*       DATA SECTION
54500
54600                   This includes the buffers and arrays used in this
54700                   program as well as the LOOKUP table.
54800
54900           *
55000           DSEG
55100   RAMBUF: DEFS    960
55200   ARRAY:  DEFS    1092
55300   CHCODE: DEFB    20H, 0FDH, 0FCH
55400   CURSOR: DEFS    1
55500   STACK:  DEFW    0
55600
55700           MOVEFR  EQU     0FDH    ;Forward cursor motion code
55800           MOVEBK  EQU     0FCH    ;Reverse cursor motion code
55900           MOVEUP  EQU     0FEH    ;Upward cursor motion code
56000           MOVEDN  EQU     0FFH    ;Downward cursor motion code
56100
56200   ;               This is the LOOKUP table
56300
56400   TABLE:  DEFB    '1'
56500           DEFW    ONE
56600           DEFB    '2'
56700           DEFW    TWO
56800           DEFB    '3'
56900           DEFW    THREE
57000           DEFB    '4'
57100           DEFW    FOUR
57200           DEFB    '5'
57300           DEFW    FIVE
57400           DEFB    '6'
57500           DEFW    SIX
57600           DEFB    '7'
57700           DEFW    SEVEN
57800           DEFB    '8'
57900           DEFW    EIGHT
58000           DEFB    '9'
58100           DEFW    NINE
58200           DEFB    0DH     ;<ENTER> key
58300           DEFW    ENTER
58400           DEFB    08H     ;<BACK SPACE> key
58500           DEFW    BKSP
58600           DEFB    1CH     ;<LEFT ARROW> key
58700           DEFW    ARROW
58800           DEFB    1DH     ;<RIGHT ARROW> key
58900           DEFW    ARROW
59000           DEFB    1EH     ;<UP ARROW> key
59100           DEFW    ARROW
59200           DEFB    1FH     ;<DOWN ARROW> key
59300           DEFW    ARROW
59400           DEFB    04H     ;<CTRL><D> key
59500           DEFW    DOWN
59600           DEFB    06H     ;<CTRL><F> key
59700           DEFW    FORWRD
59800           DEFB    12H     ;<CTRL><R> key
59900           DEFW    REVRSE
60000           DEFB    15H     ;<CTRL><U> key
60100           DEFW    UP
60200           DEFB    20H     ;<SPACE BAR> key
60300           DEFW    SPACE
60400           DEFB    0BH     ;<CTRL><K> key
60500           DEFW    KNTINT
60600           DEFB    9       ;<CTRL><I> key
60700           DEFW    KNTOFF
60800           DEFB    0AH     ;<CTRL><J> key
60900           DEFW    KNTON
61000           DEFB    0FFH    ;END OF LOOKUP TABLE
61100
61200   MESS1:  DEFM    0FAH,' L I F E '
61300   MESS2:  DEFM    'Program  by'
61400   MESS3:  DEFM    'Dave  Faske'
61500
61600           L       EQU     $
61700
61800           LEN1    EQU     MESS2-MESS1
61900           LEN2    EQU     MESS3-MESS2
62000           LEN3    EQU     L-MESS3
62100
62200   CNTINT: DEFW    0               ;Accumulator for binary count
62300   CNTASC: DEFS    5               ;5 byte buffer for ASCII conversions
62400
62500           END     START           ;Program begins at START
```

RUN BASIC PROGRAMS AT SUPER SPEED WITH ZBASIC 2.2.

THE WORLDS FASTEST TRS-80 BASIC COMPILER from SIMUTEK

BELIEVE IT OR NOT WE'VE ADDED MORE NEW FEATURES to the ONLY INTERACTIVE BASIC COMPILER for the TRS-80!

1. *Speed increases of 10-100 times are typical after compilation.*
2. *Compiled code can be RELOCATED to run anywhere in memory. Code is even ROMable!*
3. *ZBASIC 2.2 NOW SUPPORTS BOTH RANDOM and SEQUENTIAL DISK I/O.*
4. *ZBASIC 2.2 is now a super tool for business programmers: RANDOM ACCESS FILES, and PRINT USING statements are supported as well as a HIGH PRECISION MATH package (with no rounding problems).*
5. *Special BUILT-IN MACHINE LANGUAGE COMMANDS to increase program operation by as much as 1000 times! Special commands are implemented for fast memory searching (CPDR, CPIR), block memory moves (LDIR, LDDR), inputting and printing HEX numbers, inserting MACHINE LANGUAGE into COMPILED CODE, disabling and enabling interrupts, inverting memory, 16 bit PEEKs and POKEs, and stack control, debug and much more.*
6. *ZBASIC 2.2 compiles the ENTIRE PROGRAM into Z-80 machine language. (Not 8080 code or a combination of BASIC and machine language like some other compilers.) Clumsy LINKING LOADERS, and RUNTIME MODULES are not needed; ZBASIC 2.2 creates a ready to run MACHINE LANGUAGE program.*
7. *NO ROYALTIES imposed on registered ZBASIC owners.*
8. *Typical COMPILATION TIME is TWO SECONDS for a 4K program.*
9. *Use TRS-80 Basic to write ZBASIC programs!*
10. *Compile some existing programs with only minor changes. (BASIC programming experience is required.)*
11. *Fully compatible with both the Model I and the Model III. Mod I compiled programs work on a MODEL III, and vice-versa. ZBASIC works with NEWDOS-80, NEWDOS+, DOSPLUS, LDOS, MULTIDOS, ULTRADOS, TRSDOS etc. (Not TRSDOS Mod I double density)*
12. *BUILT-IN and much improved MUSIC and SOUND EFFECTS commands.*
13. *Improved CHAINING for disk users.*
14. *TIME$ now available on DISK version. (Mod I only)*
15. *ZBASIC 2.2 now has an INPUT @ command (similar to PRINT @).*
16. *The TAB function will now tab 255 columns on a printer. (BASIC cannot tab past column 64.)*
17. *NEWDOS 80 2.0 USERS can use the CMD "dos command" function! (DOSPLUS may use name "dos command")*
18. *NEW and EASIER to use USR COMMANDS.*
19. *New math functions to calculate XOR and INTEGER REMAINDERS of a DIVISION.*
20. *Logical STRING COMPARISONS are now supported.*
21. *The disk commands INSTR, MID$ ASSIGNMENT are now supported on both DISK AND TAPE ZBASIC.*
22. *DEFSTR is now supported.*
23. *Eight disk files may be opened simultaneously; random, sequential or mixed.*
24. *LINE INPUT#, is now supported.*
25. *Invoke the compiler by simply hitting these two keys: ":-"*
26. *NEW 60+ PAGE MANUAL WITH DESCRIPTIONS AND EXAMPLE.*
27. *ZBASIC 2.2 Comes with CMDFILE/CMD program from MISOSYS, to allow appending or merging compiled programs and machine language programs from tape or disk.*

ZBASIC 2.2 DOES NOT SUPPORT THESE BASIC COMMANDS:

1. ATN, EXP, COS, SIN, LOG, TAN, and exponentiation. (However, subroutines are included in the manual for these functions.)
2. ERROR, ON ERROR GOTO, ERL, ERR RESUME.
3. No direct commands like AUTO, EDIT, LIST, LLIST ETC, although these commands may be used when writing programs.
4. Others NOT supported: CDBL, CINT, CSNG, DEFFN, FIX, FRE.
5. Normal CASSETTE I/O. (ZBASIC supports it's own SPECIAL CASSETTE I/O statements.)
6. SOME BASIC COMMANDS MAY DIFFER IN ZBASIC. For instance, END jumps to DOS READY, STOP jumps to BASIC READY etc.
7. MEMORY REQUIREMENTS: to approximate the largest BASIC program that can be compiled in your machine (at one time), enter BASIC and type: PRINT (MEM-6500)/2. Remember, you can merge compiled programs together to fill memory.

ZBASIC 2.2 SPEED COMPARISON DEMO

To help give you an idea how fast compiled programs are, we have included this demo program:

ZBASIC 2.2 DEMO PROGRAM

Time to compile and run complete program	**: 0 MIN. 2 SEC.**
BASIC Execution speed MOD 1, LEVEL II	**: 7 MIN. 34 SEC.**
ZBASIC Execution speed MOD 1, LEVEL II	**:0 MIN. 18 SEC.**
BASIC Program size (WITHOUT VARIABLES)	**: 895 BYTES**
ZBASIC Program size (WITHOUT VARIABLES)	**: 2733 BYTES**

(Remember that the ZBASIC program includes an 1879 byte subroutine package.) Program shown exactly as compiled and run in BASIC and ZBASIC.

```
10 '========== ZBASIC 2.2 EXAMPLE PROGRAM AND TIME TEST========
20 CLS:CLEAR100:DEFINT A-X:DEFSTR Z:DIM AA(64,24),Z(50):RANDOM
30 AA=100:BB=-1000:CC=3:DD=-3:EE=-9999:ST$="START TIME "+TIME$
40 FOR I=1TO127STEP2 :FOR J=47TO1STEP-3:XX=POINT(I,J):SET(I,J)
50 XX=(I-J)/CC*(7+I+J) :XX=ABS(INT(RND(I*J)-AA)+7) :RESET(I,J)
60 XX=PEEK(I+J) :POKE15360+I+J,J :OUT255,J AND (3*J):XX=INP(I)
70 AB$=STR$(I+J) :BA$=LEFT$(AB$,2) :AA(I/2,J/2)=VAL(BA$)+AA*3
80 BA$=BA$+RIGHT$(BA$,RND(3)) :XX=INSTR(1,BA$,"9"):XX=SQR(I*J)
90 BA$=MID$(BA$,2,2) :MID$(BA$,1,1)=Z :IF XX THEN 100 ELSE CLS
100 IF LEN(BA$)>3 OR SGN(XX)=1 AND ASC(BA$)=32 THEN PRINT"+++";
110 IFPOS(0)>62 THEN TRON:TROFF:PRINT ELSE XX=NOT(RND(99))+100
120 A$=INKEY$:IF A$="Y" OR A$="y" AND I>120 THEN PRINT"TRUE.."
130 RESTORE :READA,C,Z(J),D:GOSUB170:GOSUB170:GOSUB170:GOTO210
140 NEXT :PRINT"*";:NEXTI:CLS:PRINT@512,ST$,"STOP TIME ";TIME$
150 STOP'============== END OF MAIN TEST LOOP ================
160 DATA 12345,-1,"TEST",-9999
170 ON RND(6) GOTO 180,190,200,180,190,200
180 RETURN
190 RETURN
200 RETURN
210 ON RND(9) GOSUB 180,190,200,180,190,200,180,190,200
220 GOTO140
```

NOTICE ZBASIC 2.0 OWNERS: you can upgrade your ZBASIC 2.0 for no charge. Just send us your original diskette/cassette and $15.00 with your registered serial number and copy of your invoice. We will send your ZBASIC 2.2 and updates to your manual.

VISA, MASTERCARD, AMERICAN EXPRESS, C.O.D. ORDERS CALL:

800 528-1149 order line

ZBASIC 2.2 DISK VERSION AND MANUAL	89.95
ZBASIC 2.2 TAPE VERSION AND MANUAL	79.95
ZBASIC 2.2 DISK & TAPE VERSION AND MANUAL	99.99
MANUAL ONLY...(APPLIES TO PURCHASE)	25.00

SIMUTEK COMPUTER PRODUCTS INC.

TECHNICAL QUESTIONS PLEASE CALL (602) 323-9391
4897 E. SPEEDWAY, TUCSON, ARIZONA 85712 ✓12

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

✓See List of Advertisers on Page 323

Physically Astronomycal

by Sam Conviser

Skygazers will be left starry-eyed as they use their Color Computers to learn more about physics and the celestial bodies above.

By combining physics and the discoveries of astronomy, computer programs can calculate anything from a person's weight on Pluto to the aging rate of a person traveling at the speed of light. Or, they can display stars and constellations as they appear in the night sky.

These three Extended Basic Color Computer programs are for the amateur and professional astronomer alike. □

Time Travel

Can we travel to the distant galaxies and set foot on a never-before-seen world? To reach even the nearest star, Proxima Centauri, would take about 40,000 years with current technology. The solution is to develop vehicles that travel as close to the speed of light as possible.

Einstein figured, and modern science has proven, that the closer to the speed of light that you travel, the less you age in relation to someone on Earth. Program Listing 1 computes the difference in time passage between you in a space ship traveling at the speed of light and someone left home on Earth. You can use the time frames of years, days, or hours and velocities of miles per hour (mph) or miles per second (mps).

The Program

Listing 1 is designed to support one mathematical equation (see Table 1). T represents time passage as observed on Earth, t represents your time passed in your light ship, V is your velocity, and C is the speed of light in a vacuum or 186E3 mps (see Table 2).

Listing 1 is easily understood. Safeguards are included to check for improper entries. A value out-of-bounds or a word misspelled prevents the program from continuing to the next prompt or computation.

Running the Program

Now you are ready to run the program. Enter Listing 1 and type RUN. After the introduction, press the enter key and input the time reference, spelling the entire word (hours, days, or years) and press the enter key again. Choose your velocity reference by typing MPS or MPH and pressing enter.

Now enter the values you wish to compute and enter velocity, comma, time passed (Example—185E3,10). Press the enter key and the program computes the data. The display shows you the amount of time that passes on Earth, and your time passed and at

Lines	Description
10–40	Set up titles and introduction
45–59	Choose time measurement
60–78	Choose velocity measurement
90–115	Input data on time and velocity
116–117	These lines check for velocities faster than the speed of light. The value my computer would accept without giving me an error was 185.92445E3 mps. If you can get closer I'd be interested in the value.
121–126	Data is sent to subroutines that put it into standard units. I changed all data to mph and hours for computation.
160–170	Computes data
171–172	Resets data to chosen units
180–220	Answer display
230–358	Subroutines for unit conversions

Table 1. Time travel line descriptions.

A$	Time reference (hours, days, years)
B$	Velocity Reference (mps, mph)
V	Your velocity
T	Earth time passed
t	Your time passed
X	Value of sqr (1 – V2/C2)
Y	Value of T/X
M	Original value of T
Z	% speed of light

Table 2. Time travel variable list.

The Key Box

Color Computer
16K RAM
Extended Basic

what percentage the speed of light you are traveling.

A fascinating part of this program is apparent as you get closer to the speed of light. Carry out your decimal places as far as you can to see the effect. Try the examples in Table 3 to test your program.

Further Reading

I recommend that you read the following books to get a better understanding of the time dilation concept: *Cosmos* by Dr. Carl Sagan, Random House, pp. 198–199, 200–202, 206–210, and *Conceptual Physics* by Paul G. Hewitt, Little, Brown and Co., Chapter 31. ■

Seasonal Star Systems

Seasonal Star Systems is a four-part series of programs using high-resolution graphics (see Program Listings 2–5). These programs are designed with the amateur astronomer in mind to help him identify stars and constellations.

You can choose a star cluster like The Big Dipper or Virgo or choose to look at an individual star like Polaris or Vega. Either way, you'll always see the entire seasonal sky as an arrow points to your target object. I'll later show you how to add your favorite astronomical sights.

Since all four programs run almost the same, with the only variation being line numbers and number of star choices, I will use Program Listing 2 for all examples and references.

The program, line for line, is very straightforward. (See Table 4).

When deciding how to enter star location data, I read across from left to right. This way, when viewing a sky, the computer sweeps across the screen and leaves the stars behind. In line 920, read both x and y coordinates at the same time. You'll need to keep this pairing system in mind if you want to change the star locations or add your own astronomical sights.

Enter the program and run it. Choose a cluster or individual star. Next, choose the object you want to view and press enter. You should see the evening sky as it appears on a clear night in midseason. The center of your screen is directly overhead as long as you are in the Northern Hemisphere. The top of the screen is north, bottom is south, right is east, and left is west. You can use a star chart to check for stars out of place.

If you do a run and get a blank screen or dots bunched at the sides of your screen, look for one number out of place or missing in the data statements.

If the entire screen is blank or all the stars are bunched to one side, your error is in the beginning of the data statements. If half the screen has stars and the other half is blank or has misplaced stars, then your problem is in the middle of your data statements, and so on.

The procedure to add your own sights to the star charts is simple. As mentioned before, each pixel representing a star has its own coordinates. To add other stars, follow these simple steps. First add the object's name to star or cluster lists and be sure to update all references to the number of items in the lists. Then add arrow draw statements so the program points to the added object.

Travel Time Passed	Velocity	Earth Time Passed	% Speed of Light
10 years	93E3 mps	11.549 years	50
10 days	175E3 mps	29.61 days	94.08
10 hours	200E3 mph	10.0000004 days	.0299

Table 3. Examples of time travel data.

10–20	Clear screen, set up highest resolution graphics (PMODE 4)
25–110	Introduction
120–136	System or individual star viewing selector
150–195	Star choices
200–250	Draw section for pointing arrow in individual star mode
399–521	Star cluster choices
530–740	Draw section for pointing arrow in Systems mode
900–940	Read data and set specific pixels to represent seasonal night sky. Note: The 256 × 192 worksheet was used to position stars
950–980	Star location data

Table 4. Seasonal star line description (for summer season).

REMSOFT, INC.

Let Your TRS-80® Teach You ASSEMBLY LANGUAGE

Tired of buying book after book on assembly language programming and still not knowing your **POP** from your **PUSH**?

REMSOFT proudly announces a more efficient way, using your own TRS-80® to learn the fundamentals of assembly language programming . . .at YOUR pace and YOUR convenience.

Our unique package, "**INTRODUCTION TO TRS-80® ASSEMBLY PROGRAMMING**, will provide you with the following:

- Ten 40 minute lessons on audio cassettes
- A driver program to make your TRS-80® video monitor serve as a blackboard for the instructor.
- A display program for each lesson to provide illustration and reinforcement for what you are hearing.
- Step-by-step dissection of complete and useful routines to test memory and to gain direct control over the keyboard, video monitor, and printer.
- How to access and use powerful routines in your Level II or Model III Basic ROM

AVAILABLE FOR MODEL 1 & 3

REMASSEM (tape) **$74.95**
REMASSEM (disc) **$79.95**

LEARN TRS-80® ASSEMBLY LANGUAGE DISK I/O

Your disk system and you can really step out with **REMSOFT'S** Educational Module, **REMDISK-1**, a "short course" revealing the details of DISK I/O PROGRAMMING using assembly language. Intended for the student with experience and assembly language. COURSE INCLUDES:

- Two 45-minute lessons on audio cassette
- A driver program to make your TRS-80® video monitor serve as a blackboard for the instructor.
- A display program for each lesson to provide illustration and reinforcement for what you are hearing.
- A booklet of comprehensive, fully commented program listings illustrating sequential file I/O random-access file I/O and track and sector I/O.
- A diskette with machine readable source codes for all programs discussed in both Radio Shack EDTASM and Macro formats.
- Routines to convert from one assembler format to the other.

Presently available for Model 1 only

REMDISK-1 only $29.95

Dealer inquiries invited

These courses were developed and recorded by Joseph E. Willis and are based on the successful series of courses he has taught at Meta Technologies Corporation, the Radio Shack computer Center, and other locations in Northern Ohio.

VISA

REMSOFT, INC.
571 E. 185 St.
Euclid, Ohio 44119
(216) 531-1338

master charge

SHIPPING CHARGES:
$2.50 WITHIN UNITED STATES
$5.00 CANADA AND MEXICO
OTHER FOREIGN ORDERS ADD 20%
OHIO RESIDENTS ADD 6½% SALES TAX

TRS-80® IS A TRADEMARK OF TANDY CORP.

129

¡¡Viva el Scripsit español!!

Vive la différence!

Turn your TRS-80* into a bilingual word processor! English/Spanish or English/French with our hard/soft kit.

Use your Scripsit* or Super-Scripsit* program in Spanish or French:

- Full foreign keyboard
- All accented characters on screen and printer
- All program/user interaction in Spanish or French

Our bilingual hardware kit maintains full compatibility with all existing software. Comes with complete instructions. Software adds on to your regular program.

Models II, 12, 16..... $350.00

Models III, 4 ..... $250.00

SOCATRA

SOCATRA Inc.
4255 avenue de Courtrai
Montréal, Québec
Canada H3S 1B8
(514) 735-7079

*Trademarks of Radio-Shack
A division of Tandy Corp.

↙104

CALC "HELPER"

FOR THE TRS-80® MODEL III

- Enters most VisiCalc® commands with one keystroke.
- Helps inexperienced users of VisiCalc learn quickly.
- Helps experienced users work faster.
- Does not alter program on disk or require knowledge of any passwords.
- Uses only a few hundred bytes of VisiCalc® memory.

$29.95

MasterCard & Visa accepted
Wisconsin residents add 5% sales tax
Indicate DOS used and VisiCalc version

The Business Software Team
639 Brookridge Street
Green Bay, WI 54301 ↙236

Next, upgrade the For...Next loop (line 910) to read the additional data. Add one for each new pair of coordinates.

When drawing an arrow to point out your object, be sure it doesn't draw over an already existing object. You're now ready to add any new objects you may want to view some night. You can also use the program with a complete star chart to catalogue sightings and to record the best time to view the objects during any particular season. ■

Personal Planetary Weights

Want to lose a quick 10 pounds? Take a voyage to Venus. Want to gain some weight? Take a journey to Jupiter.

This program shows you what you would weigh on other planets by comparing the gravity force there to that on Earth (see Program Listing 6).

One day I was browsing through a used book store and I came upon an astronomy book. I looked through it and found a chart comparing the gravities of the planets in our solar system. The table used Earth's gravity as its basis and the other planets' gravities were given in relation to Earth.

For instance, Venus, just a little smaller than Earth, has a gravity ratio of .88 when compared to Earth. Jupiter, many times larger than Earth, has a gravity of 2.65 times that of Earth.

After I saw these figures, I wrote this program. It multiplies your weight on Earth by a planet's gravitational relationship to Earth, and so determines your weight on that planet. ■

Write to Sam Conviser at 1714 Robinhood, Durham, NC 27701.

Program Listing 1. Time travel.

```
10 CLS:PRINT@67,"time dialation calculation"
20 PRINT@132,"CALCULATE THE DIFFERENCE IN TIME PASSAGE BETWEEN
YOU MOVING AT RELATIVISTIC SPEEDS AND A PERSON ON EARTH."
25 PRINT@353,"COPYRIGHT 1982 BY SAM CONVISER"
30 PRINT@449,"PRESS enter"
40 INPUT A$
45 CLS:PRINT@100,"ARE YOU MEASURING TIME AS
50 PRINT@164,"YEARS,DAYS OR HOURS?"
54 PRINT@449,"CHOOSE AND PRESS enter"
55 INPUT A$
56 IFA$="YEARS"THEN60
57 IFA$="DAYS"THEN60
58 IFA$="HOURS"THEN60
59 GOTO 45
60 CLS:PRINT@98,"ARE YOU MEASURING VELOCITY AS"
65 PRINT@164,"MILES PER HOUR(ENTER MPH)
70 PRINT@228,"MILES PER SECOND(ENTER MPS)
72 PRINT@449,"PRESS enter"
75 INPUTB$
76 IFB$="MPS"THEN90
77 IFB$="MPH"THEN90
78 GOTO60
90 CLS:PRINT@72,"INPUT YOUR DATA"
100 PRINT@228,"1.VELOCITY OF TRAVELER("B$")          2.TIME PAST(
"A$")"
110 PRINT@449,"PRESS enter"
115 INPUTV,T:IFV<=0THEN90
116 IFB$="MPS" AND V>185.92445E3 THEN90
117 IFB$="MPH" AND V>6.69E8 THEN90
121 IFA$="YEARS"ANDB$="MPH"THEN300
122 IFA$="YEARS"ANDB$="MPS"THEN310
123 IFA$="DAYS"ANDB$="MPH"THEN320
124 IFA$="DAYS"ANDB$="MPS"THEN330
125 IFA$="HOURS"ANDB$="MPH"THEN340
126 IFA$="HOURS"ANDB$="MPS"THEN350
160 X=SQR((1-(V^2/4.48E17)))
170 Y=T/X
171 IFA$="YEARS"THENY=Y/365/24
172 IFA$="DAYS"THENY=Y/24
180 CLS:PRINT@65,"YOUR TIME PAST WAS"M;A$
190 PRINT@131,"EARTH TIME PAST IS"
191 PRINT@195,Y;A$
200 Z=((V/60^2)/186E3)*100
210 PRINT@284,"          TRAVELERS VELOCITY IS            "Z"%"
211 PRINT@348,"           THE SPEED OF LIGHT"
220 PRINT@449,"PRESS enter"
230 INPUT A$:GOTO45
300 U=V
301 M=T
304 T=T*365*24
306 GOTO160
```


Listing 1 continued

Expensive Expansion

EXPENSIVE – The *LNW System Expansion II* comes with a full 32K of 200ns RAM and built-in RS232c 20 MA current loop serial interface. That's for starters. Next, consider our heavy gauge steel case, power indicator lamp, gold-plated connectors, FR-2 glass epoxy circuit board with solder mask and silk screen legends. Then there is the parallel printer port, screen printer port, real time clock, and extra heavy duty onboard power supply with over current protection, over voltage protection and thermal shutdown. If that's not enough then there is the floppy disk controller, guaranteed operation at a 4MHz CPU speed and our 6 month warranty. Every one of these features is *STANDARD*. This is true system expansion. You get every 'expensive' feature without spending more.

CHEAP – Our price is $399.95. Any way you compare, features or price, LNW's *System Expansion II* is the clear winner. The LNW System has been field tested for over two years with thousands of users. It works with any DOS, is 100% TRS-80 Model I compatible and it works 'right out of the box'. If there is any doubt in your mind as to whether you should buy ours or the 'other guys', just ask an LNW owner!

WE ARE #1 – Number one in price, features, reliability, performance and delivery. LNW is committed to 'expensive' features and quality at reasonable prices. LNW is committed to support, thorough documentation, and reliability.

This has made us the number one manufacturer of system expansion units and accessories for the Model I computer.

EXPANSION OPTION – 8-inch drive capability is as easy as plugging in the *LNDoubler 5/8* option*. Now you can have any combination of single- or double-density, single- or double-sided, 8"* and/or 5" disks on-line! 8-inch disk storage increased to 591,360 bytes – 77-track single-sided, double-density or 1,182,720 bytes – 77-track double-density, double-sided.

The *LNDoubler's* unique 5/8 switch allows you to boot from 5- or 8-inch system disks and it's accessible from outside the interface. The $219.95 *LNDoubler 5/8* comes with a double-density disk operating system (DOS+ 3.3.9), *complete* with BASIC and utility programs... ready to run your software.

Each of your present 40-track, single-sided 5-inch drives will store up to 184,320 bytes (formatted storage) – that's an 80% increase in storage capacity for only half the cost of just one disk drive. With three 8-inch double-density, double-sided drives your Model I will have 3.75 Megabytes of online storage – that's more storage than a Model II or Model III!

LNW Research Corp.

2620 WALNUT Tustin, CA. 92680
(714) 641-8850 (714) 544-5744

✓32

*8" drive operation requires special cable. 8" double-density requires 3.55MHz CPU speed-up modification or LNW-80 4MHz computer

Listing 1 continued

```
310 U=V
312 M=T
314 V=V*60^2
316 T=T*365*24
318 GOTO160
320 U=V
322 M=T
325 C=C*24
326 T=T*24
328 GOTO160
330 U=V
332 M=T
334 V=V*60^2
336 T=T*24
338 GOTO160
340 U=V
342 M=T
348 GOTO160
350 U=V
352 M=T
354 V=V*60^2
358 GOTO160
```

Program Listing 2. Seasonal star systems—summer.

```
10 PMODE4,1
15 PCLS
20 SCREEN1,1
25 CLS:PRINT@70,"seasonal star systems"
50 PRINT@233,"summer season"
100 PRINT@450,"PRESS enter"
110 INPUTA$
120 PCLS:CLS:PRINT@67,"DO YOU WANT TO LOOK AT A...
125 PRINT@160,"1.STAR SYSTEM  2.INDIVIDUAL STAR"
130 PRINT@449,"CHOOSE(1-2) THEN PRESS enter"
135 INPUTC:IFC=1THEN399
136 IF C<1 OR C>2 THEN 120
150 CLS:PRINT@42,"which star?"
155 PRINT@132,"1.POLARIS     6.REGULUS"
160 PRINT@164,"2.MIZAR       7.ALTAR"
165 PRINT@196,"3.ARCTURUS    8.ANTARES"
170 PRINT@228,"4.SPICA       9.DELTA"
175 PRINT@260,"5.VEGA       10.DENEB"
180 PRINT@449,"CHOOSE (1-10) THEN PRESS enter"
190 INPUTN
195 IF N<1 OR N>10 THEN150
200 IFN=1THENDRAW"BM118,30D8H2"
205 IFN=2THENDRAW"BM132,88R8H2"
210 IFN=3THENDRAW"BM128,122R8H2"
215 IFN=4THENDRAW"BM178,150U8F2"
220 IFN=5THENDRAW"BM86,74L8F2"
225 IFN=6THENDRAW"BM238,98U8F2"
230 IFN=7THENDRAW"BM48,76F8L2"
235 IFN=8THENDRAW"BM96,162H8D2"
240 IFN=9THENDRAW"BM70,58D8H2"
245 IFN=10THENDRAW"BM60,42D8E2"
250 GO TO 900
399 PCLS:CLS:PRINT@42,"which system?"
400 PRINT@68,"1.CASSIOPEIA   12.LYRA"
410 PRINT@100,"2.PEGASUS      13.CYGNUS"
420 PRINT@132,"3.CEPHEUS      14.AQUILA"
430 PRINT@164,"4.CAPRICORN    15.OPHIUCHUS"
440 PRINT@196,"5.SAGITTARIUS  16.LUPUS"
450 PRINT@228,"6.SCORPIO      17.LIBRA"
460 PRINT@260,"7.HYDRA        18.CENTAURUS"
470 PRINT@292,"8.CORVUS       19.LEO"
480 PRINT@324,"9.BIG DIPPER   20.CANCER"
490 PRINT@356,"10.L. DIPPER   21.VIRGO"
500 PRINT@388,"11.HERCULES    22.BOOTES"
510 PRINT@449,"CHOOSE (1-22) THEN PRESS enter"
520 INPUT T:CLS:SCREEN0,0
521 IFT<=0THEN399
530 IFT=1THENDRAW"BM60,20R8G2"
540 IFT=2THENDRAW"BM14,12D8E2"
550 IFT=3THENDRAW"BM114,26G8U2"
560 IFT=4THENDRAW"BM12,92D8E2"
570 IFT=5THENDRAW"BM32,172U8F2"
580 IFT=6THENDRAW"BM112,160L8F2"
590 IFT=7THENDRAW"BM200,176H8D2"
600 IFT=8THENDRAW"BM216,170U8G2"
610 IFT=9THENDRAW"BM184,80L8F2"
620 IFT=10THENDRAW"BM140,40G8U2"
630 IFT=11THENDRAW"BM108,116H8D2"
640 IFT=12THENDRAW"BM76,84H4D2"
650 IFT=13THENDRAW"BM60,44D8E2"
660 IFT=14THENDRAW"BM44,112E8D2"
670 IFT=15THENDRAW"BM112,120L8F2"
680 IFT=16THENDRAW"BM100,188E8D2"
690 IFT=17THENDRAW"BM120,146R8G2"
700 IFT=18THENDRAW"BM172,190H8R2"
710 IFT=19THENDRAW"BM228,108U8F2"
720 IFT=20THENDRAW"BM240,20D8E2"
730 IFT=21THENDRAW"BM208,128L8F2"
740 IFT=22THENDRAW"BM120,128E8D2"
900 CLS:SCREEN1,0
910 FORX=1TO128
920 READA,B
930 PSET(A,B,1)
940 NEXTX:FORR=1TO13000:NEXTR
945 RESTORE:PRINT@225,"PRESS enter TO RETURN CHART...  PRESS (X)
 AND enter TO RETURN   TO SELECTION PAGE":INPUTW$:IFW$="X"THEN12
0
946 GO TO 900
950 DATA 10,118,14,34,14,114,20,142,22,146,24,140,28,142,34,138,
38,144,38,150,44,144,50,94,52,70,56,88,58,86,60,62,60,68,60,92,6
2,76,62,98,64,86,64,164,66,170,68,78,68,116,68,168,70,74,70,164,
70,174,72,110,74,24,76,30,76,104,76,174,78,52,78,96,80,24
960 DATA 80,86,80,114,80,128,80,160,80,166,80,172,82,18,82,92,82
,154,84,46,84,152,86,142,86,150,92,20,86,58,88,92,88,122,90,86,9
0,146,88,100,92,150,94,54,98,44,98,68,100,74,102,82,102,88,106,8
4,106,88,108,70,108,174,112,78,114,172,116,82,118,56,118
970 DATA 60,118,66,122,64,120,86,122,70,122,176,126,68,126,82,12
6,184,130,76,132,106,134,70,134,112,138,66,140,106,140,116,140,1
40,142,114,140,182,146,122,148,148,148,172,144,88,148,84,144,94,
154,70,152,80,160,80,162,74,164,172,166,100,168,94,172
980 DATA 128,174,116,176,164,178,122,178,136,184,126,192,160,208
,144,210,154,216,144,202,98,220,150,222,74,206,90,224,66,226,78,
210,94,228,64,232,76,238,80,240,32,118,54,70,132,64,140
```

Program Listing 3. Seasonal star systems—fall.

```
10 PMODE4,1
15 PCLS
20 SCREEN1,1
25 CLS:PRINT@38,"seasonal star systems"
50 PRINT@235,"fall season"
51 PRINT@321,"COPYRIGHT 1982 BY SAM CONVISER"
100 PRINT@449,"PRESS enter"
110 INPUT A$
115 PCLS:CLS:PRINT@67,"DO YOU WANT TO LOOK AT A..."
120 PRINT@256,"1.STAR SYSTEM  2.INDIVIDUAL STAR"
122 PRINT@449,"CHOOSE (1-2) THEN PRESS enter"
```

Listing 3 continued

EXTRAORDINARY VALUES

DISK III

Internal floppy disk subsystem for Model III & 4 (includes controller, power supply, cabling, bracket and all associated mounting hardware).

DISK III KIT — Without drive		$299.95
DISK III KIT — With 1 drive (ss, dd)		449.00
DISK III KIT — With 2 drives (ss, dd)		699.00
EXTERNAL FLOPPY DISK DRIVES (ss,dd)		229.00
80 Track or 2 sides	add. per dr	100.00
80 Track and 2 sides	add. per dr	200.00
EXTERNAL Power supply & enclosure only		54.95
VR-RS232C		80.00

Model III & 4 — Direct replacement for 26-1148

HARD DISK

(5 MEG FIXED)	$995.00
5+5 MEG FIXED	1590.00
10 MEG FIXED	1249.00
10+10 MEG FIXED	1999.00
15 MEG FIXED	1449.00
15+15 MEG FIXED	2299.00

MODEL 4

$1649.00

Model 4 — 64K, 2 drive, VR-RS232C Equivalent to 26-1069	$1649.00
16K to 64K RAM upgrade kit	96.00
64K to 128K RAM upgrade (includes PAL)	110.00
PAL only for 64K to 128K upgrade	34.95

ADAPTOR MODULES for: TRS-80 Mod I, III, 4, LNW-80, -II, IBM-PC, -XT, XEROX 820, -II Coming soon adaptors for Apple-II, IIe, Franklin	$ 150.00
Under desk mounting bracket	34.95
Boot ROM for Model III, 4	34.95
Extended Warranty (to 1 year)	150.00

SPECIAL BUYS ON COD & PREPAID ORDERS ONLY:

EPSON FX80, MX80, MX100	CALL	PAPER 9½ x 11 FANFOLD	29.95	DOS-PLUS OPERATING SYSTEM	149.95
C ITOH F10	1395.00	PAPER 14⅞ x 11 GREENBAR	34.95	VERBATIM 525-01	26.90
C ITOH TRACTOR	225.00	PRINTER CABLES	25.00	DC HAYES SMARTMODEM 300	229.00
MX80 RIBBON	9.95	OKIDATA MICROLINE 82A	429.00	DC HAYES SMARTMODEM 1200	569.00
MX100 RIBBON	19.95	OKIDATA MICROLINE 83A	699.00	LNW RESEARCH (FULL LINE)	CALL
C ITOH & DIABLO RIBBONS	7.50	PERCOM DOUBLER II	169.00		
EPSON GRAPHTRAX	75.00	PERCOM DATA SEPARATOR	29.95		

Call Toll Free • 800-345-8102

Published prices reflect cash discount. All prices are subject to change without notice. TRS-80 and TRSDOS are trademarks of Tandy Corp
Telephone Hours: 8:30am—7pm MON-FRI., SAT 10-3 EST
CABLE "VRDATA" TELEX 845-124

MasterCard VISA AMERICAN EXPRESS

VR data

(215) 461-5300
777 Henderson Blvd.,
Folcroft, PA 19032

VR DATA — WEST
WATONGA, OK
1-405-623-8664

See List of Advertisers on Page 323

Listing 3 continued

```
125 INPUTQ:IF Q=1 THEN 600
126 IFQ<=0 ORQ>2THEN115
130 CLS:PRINT@10,"which star?"
135 PRINT@68,"1.CAPELLA      9.MIZAR,ALCOR"
140 PRINT@100,"2.POLARIS     10.HYADES"
145 PRINT@132,"3.ALDEBARAN   11.PLEIADES(CL)"
150 PRINT@164,"4.ALGOL       12.DENAB"
155 PRINT@196,"5.VEGA        13.ALTAIR
160 PRINT@228,"6.MARKAB      14.SCHEAT"
165 PRINT@260,"7.ALPHERATZ   15.ALGENIB"
170 PRINT@292,"8.MIRA        16.FOMALHAUT"
175 PRINT@449,"CHOOSE (1-16)THEN PRESS enter"
180 INPUT Z
181 IF Z<=0 ORZ>16THEN115
200 IFZ=1THENDRAW"BM60,32G8U2"
205 IFZ=2THENDRAW"BM136,44R8H2"
210 IFZ=3THENDRAW"BM4,72E6D2"
220 IFZ=4THENDRAW"BM70,72U8G2"
225 IFZ=5THENDRAW"BM184,80D8H2"
230 IFZ=6THENDRAW"BM128,106L8F2"
235 IFZ=7THENDRAW"BM92,76D8E2"
240 IFZ=8THENDRAW"BM28,126R8G2"
245 IFZ=9THENDRAW"BM200,10D8E2"
250 IFZ=10THENDRAW"BM18,86U8G2"
255 IFZ=11THENDRAW"BM40,80U8G2"
260 IFZ=12THENDRAW"BM168,88D8E2"
265 IFZ=13THENDRAW"BM172,120R8G2"
270 IFZ=14THENDRAW"BM124,96L8F2"
275 IFZ=15THENDRAW"BM86,118U8G2"
276 IFZ=16THENDRAW"BM114,170U8G2"
280 GOTO1000
600 CLS:PRINT@41,"which system?"
610 PRINT@68,"1.AURIGA        12.BIG DIPPER"
620 PRINT@100,"2.BOOTES        13.TAURUS"
630 PRINT@132,"3.L. DIPPER     14.ARIES"
640 PRINT@164,"4.PERSEUS       15.CETUS"
650 PRINT@196,"5.ERIDANUS      16.GRUS"
660 PRINT@228,"6.PISCIS        17.AQUARIUS"
670 PRINT@260,"7.ANDROMEDA     18.LYRA"
680 PRINT@292,"8.CASSIOPEIA    19.CEPHEUS"
690 PRINT@324,"9.CAPRICORN     20.AQUILA"
700 PRINT@356,"10.SAGITTARIUS 21.OPHIUCHUS"
710 PRINT@388,"11.HERCULES     22.DRACO"
720 PRINT@449,"CHOOSE (1-22) THEN PRESS ENTER"
725 INPUT T:IF T<=0ORT>22THEN600
730 IFT=1THENDRAW"BM40,16D8E2"
740 IFT=2THENDRAW"BM232,12D8E2"
750 IFT=3THENDRAW"BM152,28F8L2"
760 IFT=4THENDRAW"BM72,28D8E2"
770 IFT=5THENDRAW"BM20,144H8D2"
780 IFT=6THENDRAW"BM100,164E8D2"
790 IFT=7THENDRAW"BM100,76G8R2"
800 IFT=8THENDRAW"BM120,80H8R2"
810 IFT=9THENDRAW"BM172,168U8F2"
820 IFT=10THENDRAW"BM204,160R8G2"
830 IFT=11THENDRAW"BM208,88E8D2"
840 IFT=12THENDRAW"BM212,8G8R2"
850 IFT=13THENDRAW"BM16,88U8F2"
860 IFT=14THENDRAW"BM38,86R8G2"
870 IFT=15THENDRAW"BM44,160U8G2"
880 IFT=16THENDRAW"BM108,176R8G2"
890 IFT=17THENDRAW"BM96,132R8G2"
900 IFT=18THENDRAW"BM204,88G8R2"
910 IFT=19THENDRAW"BM132,88U8F2"
920 IFT=20THENDRAW"BM212,144H8R2"
930 IFT=21THENDRAW"BM232,116E8D2"
940 IFT=22THENDRAW"BM168,76E8D2"
1000 CLS:SCREEN1,0
1010 FORX=1 TO 132
1020 READA,B
1030 PSET(A,B,1)
1040 NEXTX:FORR=1 TO12000:NEXT R
1045 RESTORE:PRINT@251,"     PRESS enter TO RETURN CHART...  PRE
SS (X) AND enter TO RETURN TO SELECTION PAGE"
1050 INPUTW$:IF W$="X"THEN115
1051 GO TO 1000
1060 DATA 6,132,8,120,12,64,14,66,18,68,20,62,20,66,24,48,32,36,
32,112,36,54,36,120,38,116,42,36,42,126,44,140,46,46,46,134,50,1
14,54,58,56,136,58,82,58,88,58,114,60,86,60,142,62,50,62,104,64,
148,66,114,70,48,70,56,70,118,74,50,78,78,80,50,82,86,86
1070 DATA 92,86,104,92,94,100,56,100,106,102,62,102,96,104,70,10
6,64,110,68,114,126,114,150,116,136,118,132,120,118,122,116,122,
146,124,120,126,54,126,64,128,118,128,182,132,58,132,70,132,176,
136,122,138,68,138,164,140,180
1080 DATA 156,142,168,100,168,140,168,18,170,108,172,12,172,104,
174,30,174,148,176,60,176,136,178,34,178,56,180,62,182,108,184,1
2,184,98,186,54,186,102,186,128,188,18,188,36,188,120,188,122,19
0,50,190,62,194,22,194,44
1090 DATA 194,48,194,66,194,122,196,62,200,26,202,126,206,26,218
,70,220,64,226,38,226,72,226,156,228,30,228,68,228,152,230,78,23
0,158,232,154,234,40,244 ,32,236,72,244,38,236,84,240,92,240,152
,242,164,244,100,244,158,250,162,252,86,40,64
1095 DATA 158,44,162,46,168,48,174,46,178,42,178,48,184,44
```

Program Listing 4. Seasonal star systems—winter.

```
10 PMODE 4,1
15 PCLS
20 SCREEN 1,1
25 CLS:PRINT@69, "seasonal star systems"
26 PRINT@234,"winter stars"
27 PRINT@321,"COPYRIGHT 1982 BY SAM CONVISER"
28 PRINT@449,"PRESS enter":INPUT A$
50 CLS:PCLS:PRINT@34,"DO YOU WANT TO LOOK AT A..."
52 PRINT@160,"1.STAR SYSTEM  2.INDIVIDUAL STAR"
54 PRINT@449,"CHOOSE (1-2) THEN PRESS enter"
56 INPUTY:IFY=1THEN130
57 IFY<1 OR Y>2THEN 50
60 CLS:PRINT@10,"which star?"
62 PRINT@68,"1.POLARIS        11.DENEB"
64 PRINT@100,"2.MIZAR          12.REGULUS"
66 PRINT@132,"3.POLLUX         13.CASTOR"
68 PRINT@164,"4.PROCYON        14.SIRIUS"
70 PRINT@196,"5.RIGEL          15.MINTAKA"
72 PRINT@228,"6.MIRA           16.HAMAL"
74 PRINT@260,"7.ALGOL          17.CAPELLA"
76 PRINT@292,"8.EL NATH        18.PLEIADES"
78 PRINT@324,"9.ALHENA         19.HYADES
80 PRINT@356,"10.ALDEBARAN     20.BETELGEUSE"
82 PRINT@449,"CHOOSE (1-20) THEN PRESS enter"
83 INPUTF
84 IF F<0 OR F>20 THEN60
```

Listing 4 continued

Forum Sixty-Eight
Color Computer News

If the same old news and reviews cause you to snooze then choose

Forum Sixty-Eight or Color Computer News

Forum Sixty-Eight is new to date
and will prove itself real soon
So rouse from your slumber
and get the first number
Cause the first issue's coming in June

Forum Sixty-Eight is the journal for Motorola Microprocessors. The forum covers business, scientific and recreational computing.

Color Computer News will wake your computer
and open your eyes up wide.
And soon you'll discover
from cover to cover
there's lots of good info inside

Color Computer News is the *original* Color Computer magazine covering the entire spectrum of Color Computing from beginner to advanced.

BJ Markante Software, Inc.
P.O. Box 1192
Muskegon, MI 49443
(616) 728-9100

The 12 issue subscription rate is
United States $21.00
Canada-Mexico $26.00
Foreign $60.00
Combination Subscription $39.00
(U.S. only)

Reilly Software Ltd.
P.O. Box 11942
Edmonton, Alberta T5J 3L1
CANADA
Canadian subscriptions to Color Computer News only

Name _____
Address _____
City _____ State _____ Zip _____
☐ Visa Mastercard # _____ Expiration Date _____
☐ Color Computer News ☐ Forum Sixty-Eight ☐ Both
Subscription begins with next available issue 80M ✓145 Allow 8-10 weeks for delivery

The Perfect Companion For Your New Portable Computer

There's a new and exciting computer on the block — Radio Shack's TRS-80® Model 100 Portable Computer. It promises to be one of the most significant advances in personal computing of the 1980's!

And, now, there's a new and just-as-exciting magazine specifically devoted to your Portable Computer. It is called **PCM—The Portable Computing Magazine**, and it is published by the same people who bring you the most popular Color Computer magazine in the world — **the Rainbow**.

PCM—The Portable Computing Magazine sells for $3 per copy and $28 a year by subscription. If, after seeing your first issue, you find it is not for you, just let us know. We'll happily, cheerfully and immediately refund your entire subscription payment. We're that confident that you'll love PCM. After all, it is **The Portable Computing Magazine!**

PCM
THE PORTABLE COMPUTING MAGAZINE

9529 U.S. Highway 42
P.O. Box 209
Prospect, KY 40059
(502) 228-4492

YES! Sign me up for a year (12 issues) of **PCM—The Portable Computing Magazine**
Name _____
Address _____
City _____ *State* _____ *Zip* _____
☐ Payment Enclosed
Charge ☐ VISA ☐ MasterCard ☐ American Express
Account # _____ Interbank # (MC only) _____
Signature _____ Card Expiration Date _____

Subscriptions to **PCM—The Portable Computing Magazine** are $28 a year in the United States. Canadian and Mexican rate is $35 U.S. Surface rate elsewhere $64 U.S. Air mail $85 U.S. All subscriptions begin with the current issue. Please allow 5-6 weeks for first copy.

✓296

ENB

TRUE Relational Database Management for TRS - 80 Mod I/III

ENB is a *true* relational database manager. Your data is held in ordered sets. You impose structure by creating and linking sets in various ways. Prompt screens are automatically generated from this underlying structure. You define reports ordered by any set, showing directly or indirectly linked sets (and enforce a host of further conditions on the selected set members).

What's more, ENB has an integrated data dictionary; structural info is carried in the database as data, just like everything else. This lets you restructure your database at will, without reblocking or reprogramming, using the regular editing commands. Also, exchange files containing structural data with other ENB databases. Special reports on database structure are built in and (like all reports) are always current.

64K data items, spans 4 disk drives (or hard disk). Interfaces to BASIC, file exchange with Scripsit, VisiCalc and other ENB data bases. Includes 5 action tutorials, 150 page manual.
Developed in England by Southern Software.

You Owe It To Your Data!

$140 $3 Shipping
CA add 6%

TRS-80 SCRIPSIT™ Radio Shack; VISICALC™ Visicorp. ✓136

Allen Gelder Software

Box 11721 San Francisco, CA 94101 (415) 681-9371

✓See List of Advertisers on Page 323

80 Micro, October 1983 • 155

Listing 4 continued

```
 85 IFF=1THENDRAW"BM150,62U8G2"
 86 IFF=2THENDRAW"BM104,16L8F2"
 88 IFF=3THENDRAW"BM44,90E8D2"
 90 IFF=4THENDRAW"BM20,100R8G2"
 92 IFF=5THENDRAW"BM90,122U8G2"
 94 IFF=6THENDRAW"BM164,138U8G2"
 96 IFF=7THENDRAW"BM172,92L8F2"
 98 IFF=8THENDRAW"BM96,88R8G2"
100 IFF=9THENDRAW"BM60,108U8G2"
102 IFF=10THENDRAW"BM120,112U8G2"
103 IFF=11THENDRAW"BM212,40U8G2"
106 IFF=12THENDRAW"BM12,42D8H2"
108 IFF=13THENDRAW"BM58,60D8H2"
110 IFF=14THENDRAW"BM46,118D8H2"
112 IFF=15THENDRAW"BM102,98L8F2"
114 IFF=16THENDRAW"BM168,94R8G2"
116 IFF=17THENDRAW"BM122,58D8H2"
118 IFF=18THENDRAW"BM170,108L8F2"
120 IFF=19THENDRAW"BM124,110U8G2"
122 IFF=20THENDRAW"BM76,76D8H2"
125 GO TO 7000
130 CLS:PRINT@10,"which system?"
140 PRINT@68,"1.BIG DIPPER   11.CYGNUS"
150 PRINT@100,"2.CEPHUS       12.L.DIPPER"
160 PRINT@132,"3.DRACO        13.LEO"
170 PRINT@164,"4.CANCER       14.HYDRA"
180 PRINT@196,"5.PUPPIS       15.CANIS MA"
190 PRINT@228,"6.COLUMBIA     16.ERIDANUS"
200 PRINT@260,"7.LEPUS        17.CETUS
210 PRINT@292,"8.AQUARIUS     18.PEGASUS"
220 PRINT@324,"9.PERSEUS      19.AURIGA"
230 PRINT@356,"10.ORION       20.PISCES"
232 PRINT@388, "               21.TAURUS"
235 PRINT@449,"CHOOSE (1-21) THEN PRESS enter"
240 GO SUB 800
250 GO TO 7000
800 INPUT B:PCLS
801 IF B<0 OR B>21 THEN 130
805 CLS:SCREEN 1,0:PMODE 4,1
806 IF B=1 THEN DRAW"BM52,20F8L2"
810 IF B=2THENDRAW"BM180,32D8E2"
815 IF B=3THENDRAW"BM192,12L8E2
820 IF B=4THEN DRAW"BM64,62L8E2"
825 IF B=5THENDRAW"BM18,156U8F2"
830 IFB=6THENDRAW"BM76,176U8F2"
835 IFB=7THENDRAW"BM72,108D8E2"
840 IFB=8THENDRAW"BM224,108R8H2"
845 IFB=9THENDRAW"BM138,70F8U2"
850 IFB=10THENDRAW"BM84,74D8E2"
855 IFB=11THENDRAW"BM252,20L8E2"
860 IFB=12THENDRAW"BM126,48E8D2"
865 IFB=13THENDRAW"BM20,30D8E2"
870 IFB=14THENDRAW"BM16,92U8F2"
875 IFB=15THENDRAW"BM40,168U8F2"
880 IFB=16THENDRAW"BM144,160L8E2"
895 IFB=17THENDRAW"BM176,148U8F2"
896 IFB=18THENDRAW"BM252,44G8U2"
897 IFB=19THENDRAW"BM112,58D8E2"
898 IFB=20THENDRAW"BM220,120H8D2"
899 IFB=21THENDRAW"BM114,110U8F2"
7000 CLS:SCREEN 1,0
7001 PMODE 4,1
7005 X=1
7010 FOR X=1 TO 155
7020 READ A,B
7030 PSET(A,B,1)
7040 NEXT X:FOR R=1 TO12000:NEXT R
7045 RESTORE:PRINT@224,"PRESS enter TO RETURN CHART...  PRESS (X
) AND enter TO RETURN   TO SELECTION":INPUTW$:IF W$="X" THEN 50
7047 GO TO 7000
7050 DATA 4,76,12,58,12,76,14,138,20,56,20,74,22,50,22,140
7052 DATA 24,74,24,78,26,76,28,48,30,68,32,56,32,150,34,52,38,66
,38,74,38,146,40,134,40,142,42,64,42,150,44,136,46,58,50,138,54,
78,58,76,60,90
7054 DATA 66,86,68,132,70,136,70,160,72,128,68,28,74,156,70,36,7
6,92,82,11,80,20,78,106,78,138,78,158,78,26,80,98,84,16,82,98,80
,37,84,98,88,92,90,106,90,106,96,112,100,112,102,162,104,112,106
,166
7056 DATA 114,74,110,80,106,92,110,116,112,170,114,88,114,124,12
0,76,118,120,118,152,120,84,120,96,120,150,122,94,122,96,122,148
,124,94,124,96,124,174,124,176,126,34,126,150,128,22,128,30
7058 DATA 128,172,132,120,136,14,140,28,140,32,140,136,142,10,14
4,34,146,14,146,30,146,96,146,102,148,38,148,90,148,114,150,42,1
50,46,150,88,152,18,152,84,154,112,156,26,156,92,156,116,160,8,1
60,12,160,74,162,28,164,14,164,24,164,120,166,56
7060 DATA 166,76,168,10,168,72,172,50,174,70,174,74,174,126,176,
56,178,134,180,48,180,120,186,56,186,120,190,94,192,100,192,108,
194,66,198,106,198,128,206,68,206,100,210,98,212,18,212,26,214,7
0,218,22,220,66,226,14,226,26,228,76,232,54,244,64,248,96
7062 DATA 248,100,250,98,250,110,254,98,254,118,34,100,182,94,14
8,108,150,108
```

Program Listing 5. Seasonal star systems—spring.

```
10 PMODE 4,1
15 PCLS
20 SCREEN1,1
25 CLS:PRINT@70,"seasonal star systems"
30 PRINT@321,"COPYRIGHT 1982 BY SAM CONVISER"
50 PRINT@201,"spring season"
100 PRINT@450,"PRESS enter"
110 INPUT A$
130 CLS:PCLS:PRINT@67,"DO YOU WISH TO LOOK AT A..."
135 PRINT@160,"1.STAR SYSTEMS 2.INDIVIDUAL STAR"
140 PRINT@449,"CHOOSE (1-2) THEN PRESS enter"
145 INPUT O:IF O=1 THEN 300
146 IF O<=0 OR O>2 THEN 130
150 CLS:PRINT@10,"which star?"
160 PRINT@68,"1.POLARIS      9.ARCTURUS"
170 PRINT@100,"2.ALGOL       10.MIZAR,ALCOR"
180 PRINT@132,"3.SPICA       11.REGULUS"
190 PRINT@164,"4.PROCYAN     12.ALHENA"
200 PRINT@196,"5.CASTOR      13.POLLUX"
210 PRINT@228,"6.SIRIUS      14.RIGEL"
220 PRINT@260,"7.ALDEBARAN   15.PLEIADES(CL)
230 PRINT@292,"8.CAPELLA     16.HYADES"
235 PRINT@449,"CHOOSE (1-16) THEN PRESS enter"
240 INPUT P
242 IFP=<0 OR P>16THEN150
245 IFP=1THENDRAW"BM112,70U8G2"
246 IFP=2THENDRAW"BM216,48L8F2"
247 IFP=3THENDRAW"BM48,150U8G2"
```

Listing 5 continued

FREE 5 MEG HARD DRIVE

from

Mt. Olympus

Just purchase one of our integrated software packages at our low price of $2495. and we will install it on a 5 Meg hard drive ready to plug in and go. Now available for the TRS-80 Mod III/4 and soon IBM-PC. Over 30 types of businesses and professions supported. We also carry Local area and multiplexed networks. Call or write for our current list of applications.

CALL 203-828-0359

869 Mill Street
E. Berlin, CT 06023

↙23

Dealer inquiries invited

ACCEL 3/4

Compiler for TRS-80 Basic, Model I/III

$99.95

+ $2 Shipping CA add 6%

Extra-Compatible

ACCEL3/4 will handle the whole Basic language, and more.

Even non-standard Basic extensions don't debar compilation. E.g., the 20 new Basic keywords established by ENB (Southern Software's new relational dbms).

Includes: ACCEL3 (5.5K, all DOS) AND ACCEL4 (TRSDOS/LDOS overlay version)

FC/CMD

Use FC instead of DIR for a full-screen display of drive-directories, ordered as you choose. Point the floating cursor and execute shorthand commands against any file on any drive.

- Shows up to eight drive-directories.
- Many column orderings available.
- Easy-to-learn shorthand scheme saves 90% of the typing.
- Many built-in DOS commands, supports user-added commands.
- Relocatable, works with DOSPLUS, LDOS, NEWDOS80, TRSDOS.

A must for multi-drive systems, gives far better visibility, saves time and typing, brings order to your files.

$25 + $1.50 Shipping

New

EDIT

Full-Screen Editor for TRS-80 Basic, Mod I/III

You need better-than-wordprocessor control when you write and edit BASIC programs. That's why EDIT has lots of better-than-wordprocessor features.

- Full-floating cursor with autorepeat (including function keys).
- Navigation by cursor-controlled scrolling, by line number or by program content
- Overtype, Delete or Insert characters of text (including line numbers).
- Join or Split lines. Copy, Delete, Insert, Move, Position or Replicate lines.
- Copy, Delete, Move, Position or Replicate blocks of lines.
- Find and/or Replace occurrences of strings.
- Over 30 commands and functions, supports lower-case.
- 3.3K, relocatable (all DOS), also includes TRSDOS, LDOS overlay version.

$40

You owe it to your programming.

DOSPLUS tm Micro Systems Software, LDOS tm Logical Systems, NEWDOS80 tm Apparat, TRSDOS tm Tandy

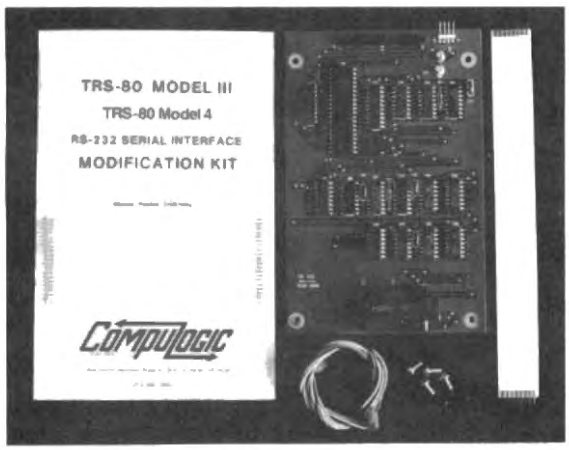
↙517

Allen Gelder Software

Box 11721 San Francisco, CA 94101 (415) 681-9371

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 compatability 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

CompuLogic

4831 SOUTH HAMPTON RD. #841
DALLAS, TEXAS 75232
214/330-1332

↙86

↙See List of Advertisers on Page 323

Listing 5 continued

```
248 IFP=4THENDRAW"BM180,108D8E2"
249 IFP=5THENDRAW"BM174,102R8G2"
250 IFP=6THENDRAW"BM234,140G8U2"
251 IFP=7THENDRAW"BM220,104U8G2"
252 IFP=8THENDRAW"BM172,60F8U2"
253 IFP=9THENDRAW"BM36,112U8G2"
254 IFP=10THENDRAW"BM74,64D8H2"
255 IFP=11THENDRAW"BM134,142U8G2"
256 IFP=12THENDRAW"BM208,124U8G2"
257 IFP=13THENDRAW"BM194,126U8G2"
258 IFP=14THENDRAW"BM252,128U8G2"
259 IFP=15THENDRAW"BM228,44D8H2"
260 IFP=16THENDRAW"BM244,78L8F2"
265 GOTO800
300 CLS:PCLS:PRINT@10,"which system?"
310 PRINT@68,"1.BIG DIPPER   11.AURIGA"
320 PRINT@100,"2.CEPHEUS      12.CANCER
330 PRINT@132,"3.DRACO        13.TAURUS"
340 PRINT@164,"4.HERCULES     14.ORION"
350 PRINT@196,"5.LIBRA        15.CANIS MAJ"
360 PRINT@228,"6.VIRGO        16.PUPPIS"
370 PRINT@260,"7.CASSIOPEIA   17.HYDRA"
380 PRINT@292,"8.PERSEUS      18.CORVUS"
390 PRINT@324,"9.ANDROMEDA    19.LEO
400 PRINT@356,"10.L. DIPPER   20.LEPUS"
405 PRINT@388,"               21.BOOTES"
410 PRINT@448,"CHOOSE (1-21) THEN PRESS enter"
420 INPUT T:IFT<1 ORT>21 THEN300:CLS:SCREEN0,0
430 IFT=1THENDRAW"BM114,82L8F2"
440 IFT=2THENDRAW"BM90,18R8H2"
450 IFT=3THENDRAW"BM76,20D8E2"
460 IFT=4THENDRAW"BM48,16G8U2"
470 IFT=5THENDRAW"BM28,110G8U2"
480 IFT=6THENDRAW"BM36,104F8U2"
490 IFT=7THENDRAW"BM184,24L8E2"
500 IFT=8THENDRAW"BM224,52L8E2"
510 IFT=9THENDRAW"BM236,16L8E2"
520 IFT=10THENDRAW"BM104,66U8G2"
530 IFT=11THENDRAW"BM164,80R8G2"
540 IFT=12THENDRAW"BM170,106G8R2"
550 IFT=13THENDRAW"BM244,80L8E2"
560 IFT=14THENDRAW"BM220,120E8D2"
570 IFT=15THENDRAW"BM240,176H8D2"
580 IFT=16THENDRAW"BM160,176R8G2"
590 IFT=17THENDRAW"BM160 ,180H8D2":DRAW"BM104,184L8E2":DRAW"BM18
8,148L8F2":DRAW"BM28,184E8D2"
600 IFT=18THENDRAW"BM40,148R8G2"
610 IFT=19THENDRAW"BM128,100D8E2"
620 IFT=20THENDRAW"BM228,136F8L2"
630 IFT=21THENDRAW"BM10,82R8G2"
800 CLS:SCREEN1,0
810 FORX=1TO137
820 READ A,B
830 PSET(A,B,1)
840 NEXTX:FORR=1TO12000:NEXTR
845 RESTORE:PRINT@231,"PRESS enter TO RETURN CHART...PRESS (X) A
ND enter TO RETURN TO SELECTION PAGE":INPUTW$:IFW$="X"THEN130
846 GOTO800
850 DATA 8,120,8,32,14,140,20,52,22,34,26,26,28,40,38,38,44,120,
48,132,32,76,54,114,32,84,56,120,56,144,60,36,60,42,36,94,40,72,
40,84,60,124,54,150,62,146,64,42
860 DATA 46,78,66,38,64,150,68,78,68,94,74,54,74,76,76,92,78,50,
78,58,78,78,80,44,82,34,82,80,84,84,86,40,86,62,88,32,88,68,90,5
0,94,46,98,78,96,84,94,52,98,48,102,46,106
870 DATA 46,110,18,110,50,118,28,112,124,118,14,120,120,120,124,
126,22,126,34,130,122,132,118,134,124,134,128,136,116,138,118,14
8,112,148,132,152,120,152,124,154,22,160,28,162,20,162,38,166,32
,164,128,180,80,180,166,182,46,192,182,184,72,186,50
880 DATA 186,166,188,56,188,88,194,102,194,108,202,190,196,48,19
8,62,200,76,200,88,212,184,208,62,208,100,208,108,212,16,212,92,
212,156,204,170,212,164,210,168,218,82,218,158,220,80,220,84,214
,170,222,82,224,78,226,160,228,104,238,98,238,110,238,120
890 DATA 28,164,48,160,78,186,108,170,118,172,124,164,134,174,14
4,154,146,166,152,152,158,144,160,142,162,142,162,146,70,188
895 DATA 240,108,242,106,244,148,248,152,252,110,252,140
896 DATA 180,128,228,54
```

```
10 CLS:PMODE4,1
15 SCREEN1,1
19 PRINT@34,"planetary weight program"
20 PRINT@97,"THIS PROGRAM COMPUTES YOUR      WEIGHT ON THE OTHER
 PLANETS     IN OUR SOLAR SYSTEM"
22 PRINT@321,"COPYRIGHT 1982 BY SAM CONVISER"
25 PRINT@449,"PRESS enter"
30 INPUT A$
35 CLS:PRINT@72,"WHICH PLANET?"
40 PRINT@132,"1.THE SUN      6.SATURN"
45 PRINT@164,"2.MERCURY      7.URANUS"
50 PRINT@196,"3.VENUS        8.NEPTUNE"
55 PRINT@228,"4.MARS         9.PLUTO"
57 PRINT@260,"5.JUPITER
59 PRINT@449,"CHOOSE (1-9) THEN PRESS enter"
60 INPUTB:IFB>9ORB<=0THEN35
100 CLS:PRINT@199,"input your weight"
110 PRINT@449,"PRESS enter"
120 INPUTA:IFA<0THEN 100
130 IFB=1THENX=A*28
140 IFB=2THENX=A*.38
150 IFB=3THENX=A*.88
160 IFB=4THENX=A*.39
170 IFB=5THENX=A*2.65
180 IFB=6THENX=A*1.17
190 IFB=7THENX=A*1.05
200 IFB=8THENX=A*1.23
210 IFB=9THENX=A*.19
220 ON B GOTO 250,260,270,280,290,300,310,320,330,340
250 M$="THE SUN":GO TO 370
260 M$="MERCURY":GOTO370
270 M$="VENUS":GOTO370
280 M$="MARS":GOTO370
290 M$="JUPITER":GOTO370
300 M$="SATURN":GOTO370
310 M$="URANUS":GOTO370
320 M$="NEPTUNE":GOTO370
330 M$="PLUTO":GOTO370
370 CLS:PRINT@138,"YOUR WEIGHT ON"
380 PRINT@205,M$
390 PRINT@266,"IS"X"POUNDS"
400 PRINT@449,"PRESS enter"
410 INPUT B$
420 GOTO35
```

Program Listing 6. Personal planetary weights.

TCS Heart of TEXAS COMPUTER SYSTEMS

Toll Free 1-800-433-5184 Texas 1-817-274-5625

TCS Model IV, 64K, 2 Disks

Systems come with 180 Day TCS Warranty

$1499 With standard 40 track double density drives Over 340,000 bytes Enhanced Model IV Operating System

RS-232 FREE!

$1699 With 2 dual headed 40 track double density drives Over 730,000 bytes Enhanced Model IV Operating System

Fully assembled and tested systems that are software compatible and functionally identical to Radio Shack units sold at computer stores for $hundreds more

- CONTROLLER BOARDS are high quality double sided epoxy boards with gold plated contacts.
- POWER SUPPLY is the finest switching type available
- MOUNTING HARDWARE includes power and data cables
- DISK DRIVES are Tandon, the same ones used by Radio Shack 40 track, double density, with a 5 millisecond stepping rate.

TCS MODEL III DISK EXPANSION KITS

1 Controller, Power Supply, Mounting Hardware & Instructions	$249
2 Controller, Power Supply, Hardware & one 40 track Tandon Drive	$429
3 Controller, Power Supply, Hardware, two 40 track Tandon Drives	$598
3a Kit 3 but with two 80 track drives (dual sided 40s)	$791
3b Kit three but with two 160 track drives (dual sided 80s)	$989

TCS MODEL IV DISK EXPANSION KITS

11 Controller, Power Supply, Mounting Hardware, one 40 Track Tandon Drive	$479
12 Controller, Power Supply, Mounting Hardware, two 40 Track Tandon Drives	$649
12A Kit 12 but with two 80 Track Tandon Drives	$629
12B Kit 12 but with two 160 Track Tandon Drives	$849

TRS-80

TRS-80 equipment below has original 90 day Manufacturer's Limited Warranty

MODEL 12 and MODEL 16

MODEL 12, 1 drive	$CALL
MODEL 12, 2 drives	$CALL
TCS MODEL 12 Version, 2 Tandon drives (like the original) TCS Warranty	$2995

MODEL 16B...Support up to 6 users. Run your whole office with hard disk capabilities for about $1000 per user!

MODEL 16B, 1 drive	$CALL
MODEL 16B, 2 drives	$CALL

Model 12 and Model 16 Accessories

128K memory board (256K Max.)	$629
128K extra memory chips (RS)	$269
128K extra memory chips (TCS)	$189
Xenix Microsoft Multi-user Basic	$269
Xenix Accounting Software	$CALL
Xenix Multiplan Spread Sheet Software	$263
MII/12 to M16 multi-user upgrade kit	$1339
DT/1 Video Terminal	$629

MODEL IV

MODEL IV, 16K Cassette	$825
MODEL IV, 64K, 2 drives, RS-232	$CALL

Model III Color Computer

All Radio Shack equipment is shipped from our store in Brady, Texas

Tandon

TCS DRIVE CABINET is industrial grade heavy guage metal, safety fused, and comes with gold plated external connector with extender cable.

1 DRIVE in Cabinet

40 track single sided	$199
80 track (dual sided 40 track)	$299
160 track (dual sided 80 track)	$399

2 DRIVE Double Cabinet

40 track single sided	$399
80 track (dual sided 40 tracks)	$599
160 track (dual sided 80 tracks)	$799

1 DRIVE Double Cabinet

40 track single sided	$269
80 track (dual sided 40 track)	$369
160 track (dual sided 80 track)	$449

Drives in cabinets come assembled and tested with power supply. Order cable separately.

BARE DRIVES ONLY

40 track single sided	$165
80 track (dual sided 40 track)	$CALL
160 track (dual sided 80 track)	$CALL
8 inch Slimline sgl/dbl sided	$CALL
Winchester Hard Drives 5 Meg	$399

CALL IF YOU FIND A LOWER PRICE ON DRIVES

CORVUS

HARD DISK DRIVES Complete from **$1649**

Single and multiuser HARD DRIVES for all brands of computers One or several computers can share A HARD DISK.

PERCOM

Hard Drives supporting both DOSPLUS and LDOS

Mod III-IV HARD DRIVES	
5 Megabytes	$1390
10 Megabytes	$1690
15 Megabytes	$1990
20 Megabytes	$2490

ATARI DISK DRIVES	
Single Density	$395
Double Density	$549
TI 99/4 DISK DRIVES	
Single Density	$379

TRS-80 DMP PRINTERS

DMP 100
DMP 120
DMP 200
DMP 400
DMP 500
DMP 2100
DAISY WHEEL II
DAISY WHEEL 210
DAISY WHEEL 410

MODEMS - RS - I..$122 II..$199

HAYES Smart Modem	$212
U.S. ROBOTICS 300/1200 baud	$449

TCS Heart of TEXAS COMPUTER SYSTEMS

P.O. Box 1327 Arlington, Texas 76004-1327

Toll Free 1-800-433-5184 Texas 1-817-274-5625

Payment by cashier's check, money order or certified check. Call for credit card $. No tax out of state. Texans add 5%. Prices subject to change at any time.

DOSPLUS 3.5

by John B. Harrell III

If you're ready for an operating system with capabilities far beyond TRSDOS, you should consider DOSPLUS 3.5 for the Models I and III.

★★★★

DOSPLUS 3.5
Micro Systems Software Inc.
4301-18 Oak Circle
Boca Raton, FL 33431
Models I and III
$149.95

DOSPLUS 3.5 is the newest—and one of the best—disk operating systems for the Models I and III. I'm impressed with it.

DOSPLUS 3.5 isn't just an extension of the TRSDOS operating system; it's a totally different concept. It offers device independence, letting you switch, kill, reassign, and reconfigure input/output devices at will. You can also install filters on any device, letting you alter data as it moves between the device and the computer.

DOSPLUS 3.5 suffers no reduction in operating speed over TRSDOS 1.3. In fact, the difference in speed between this system and TRSDOS is enough to make you want to buy it. Where TRSDOS 1.3 takes exceedingly long to perform even simple back-up operations, DOSPLUS performs the task in much less time.

I won't attempt to explain the features of DOSPLUS that also exist in TRSDOS. Where similar functions exist, I'll explain those features of DOSPLUS that extend the basic functions of the commands.

DOSPLUS comes in a binder designed to lie flat on your work area. The binder has seven sections that provide a comprehensive discussion of the operating system.

The introduction to the system contains a brief description of the manual and leads into a subdivision that describes the sequence of booting the master disks and creating a back-up.

The reference manual comes with either one double-density disk containing the Model III operating system or two single-density disks with the Model I operating system. A user addendum helps the Model I user with double-density drives construct a disk with the full system on it. This addendum also provides some information omitted from the reference manual.

The remainder of this section is a detailed discussion of file, drive, and device specifications (called filespec, drivespec, and devicespec in subsequent references). Filespecs are basically identical to those used with TRSDOS. DOSPLUS 3.5 allows eight special characters in a filespec in addition to normal characters.

DOSPLUS defines its communications resources as character devices or drive devices. The system has six character devices and eight drive devices available (see Table 1). These devices don't all have driver routines, so they aren't directly available for use as input/output devices.

The first group is character oriented—DOSPLUS performs input/output one byte at a time. The second

Character-Oriented Devices:

$00	KI	<— Input from the keyboard device
$01	DO	—> Output to the video device
$02	PR	—> Output to the printer
$03	RS	<—> Input/Output from the serial interface
$04	U1	— User assigned device number 1 (unassigned)
$05	U2	— User assigned device number 2 (unassigned)

Drive Devices:

$00	:0	Floppy,Dden,Size = 5,Sides = 1,Step = 0,PD = 0,MD
$01	:1	Floppy,Dden,Size = 5,Sides = 1,Step = 2,PD = 1,MD
$02	:2	Floppy,Dden,Size = 5,Sides = 1,Step = 2,PD = 2,MD
$03	:3	Floppy,Dden,Size = 5,Sides = 1,Step = 2,PD = 3,MD
$04	:4	NIL (typically unassigned or NIL)
$05	:5	NIL (for devices four through seven)
$06	:6	NIL (unless a hard disk is)
$07	:7	NIL (installed)

Table 1. DOSPLUS devices.

TCS Heart of TEXAS COMPUTER SYSTEMS

Toll Free 1-800-433-5184 Texas 1-817-274-5625

STAR PRINTERS

STAR's goal is to be the LARGEST Printer Manufacturer in the world, and we are getting there fast!

- 100 - 120 - 160 CPS
- Friction and Tractor Standard
- 9X9 Dot Matrix
- Hi-Res Bit Image Block Graphics
- Underlining
- 5, 6, 8 1/2, 10, 12 and 17 Pitch
- Bidirectional Logic Seeking
- Roll and Fanfold Paper
- True Decenders
- Super Script-Subscript
- Backspacing Doublestrike
- Programmable Line Spacing

* SIX MONTH WARRANTY

STX 80 (80 Column, 60 cps.), Thermal ..... List $199-CALL
GEMINI 10X (9 Inch Carriage, 120cps) Friction and Tractor .....$CALL
GEMINI 15 (15 Inch Carriage, 100cps) Friction and Tractor .....$CALL
GEMINI 15X (15 Inch Carriage, 120cps) Friction and Tractor ....$CALL
DELTA 10 (10 Inch Carriage, 160cps) Friction and Tractor .....$CALL

CABLES/INTERFACES

STAR Printers can be interfaced with most computers on the market today, such as: Apple II IIe III / IBM PC / Osborne / Heath Kit H89 / TRS-80 Model I II III,4 12,16,100 /Zenith Z89/90/100 TI99/4A / Kaypro / Atari 400,800 / Commodore 64 Vic 20
CALL FOR OUR LOW PRICES

GENERIC DISKETTES

What's in a name?

Buy GENERIC and save!

- SSSD - SINGLE SIDED SINGLE DENSITY
- SSDD - SINGLE SIDED DOUBLE DENSITY
- DSDD - DOUBLE SIDED DOUBLE DENSITY

BOXED: 10 Diskettes in attractive sleeved box

TYPE	1-3 BOXES	4-9 BOXES	10+ BOXES
SSSD	$16.99	$15.99	$14.99
SSDD	$17.99	$16.99	$15.99
DSDD	$22.99	$21.99	$20.99

BULK: Buy in quantities of 10 per pack

TYPE	1-3 PACKS	4-9 PACKS	10+ PACKS
SSSD	$15.99	$14.99	$13.99
SSDD	$16.99	$15.99	$14.99
DSDD	$21.99	$20.99	$19.99

NOTE: MINIMUM ORDER Orders for diskettes only are limited to a minimum $100 purchase. Diskettes may be purchased in smaller quantities with other products ordered at the same time from TCS.

ALL DISKS INCLUDE:

- *Hub Rings
- *Certified Density
- *Guaranteed
- *Individual Sleeves
- *Write protect tabs
- *Peel-off Labels

For orders of 1000 diskettes or more, $CALL.

Smith-Corona® TP-I

LOW COST LETTER QUALITY DAISY WHEEL PRINTER

Your choice PARALLEL or SERIAL Interface

List Price $895.....$~~499~~.....$CALL

TCS Heart of TEXAS COMPUTER SYSTEMS

~59

P.O. Box 1327 Arlington, Texas 76004-1327

Toll Free 1-800-433-5184 Texas 1-817-274-5625

group (drive devices) are file oriented. They're used to move one file at a time.

You can make files perform as character-oriented devices allowing these drive devices to function as members of the first group. This means that you can link character devices with or totally route them to/from files for character data transmission.

DOSPLUS allows commands in upper- or lowercase letters or a mixture of both: tbasic, TBASIC, and TbAsIc are all equivalent. The command structure can be very general. Each command has a default syntax consisting of the command, the input/output (I/O) field, the parameter field, and the comment field:

COMMAND (FROM) source-field (TO) destination-field (USING) wildmask (parameters) (-comment)

The I/O field immediately follows the command and specifies the direction of data movement and the files/devices affected. You can change the normal syntax of the command's I/O field by using the optional delimiters From, To, and Using to override the expected positions.

The Using portion of those commands that allow this field is the filespec wildmask—a partial filespec containing wildcard characters. Wildmasks limit global commands to a subset of the files contained on a single disk or all available disks.

You can specify more than one command on the same command line by separating them with a semicolon. This lets you enter powerful command strings without using the Do command.

Older disk operating systems like TRSDOS use fixed structures governing the devices that the system device control blocks (DCBs) address. It's extremely difficult to route input or output to a device other than the naturally assigned device, or to build and install customized device drivers.

DOSPLUS classifies all devices into a character-oriented category (including files). You can use each device in this category in place of another of the same type by using a few simple commands. This allows the use of devicespecs or drivespecs in places where other operating systems allow only filespecs.

"The manual's technical information section provides a complete description of how to write drivers for a disk drive device and a character device."

For example, you can use the DOSPLUS Kill command to kill a device or a drive as well as a file. This effectively removes the device from the system's resources.

Many commands in the DOSPLUS library use this feature and allow full input/output redirection. The ability to assign a devicespec or a drivespec adds a great deal of flexibility to this system.

Library Commands

Many DOSPLUS commands have names similar to their TRSDOS counterparts (see Table 2). Don't let this mislead you. These commands are, in general, far more powerful than in TRSDOS. For example, the DOSPLUS command KILL :0 USING ! (ECHO = Y) performs a global kill operation of all visible files contained on drive zero, echoing the killed file names to the video.

The Using part of the I/O field specifies the wildcard mask ! that matches every visible filespec in the directory. To make optimal use of the flexible command structure, you could shorten this to: KILL !:0,E. The recognition of the wildmask character overrides the positioning of the I/O field members and the comma sets off the parameter field from the command.

The commands to manipulate devicespecs and drivespecs and assign alternate paths for input/output are Assign, Join, Force, and Reset. Join connects the specified devices to receive the same byte simultaneously or to link two input devices so that one unit supplies data for the other. You can also use Join to join the device to a disk file (remember that DOSPLUS treats disk files as character-oriented devices).

For example, you can use the command: JOIN (FROM) @DO (TO) @PR to provide a printout of all items displayed to the video. The command Join alone provides a listing of the current-status of the character-oriented devices and their driver addresses (see the first part of Table 1 for a partial example).

The Force command diverts output from the previously assigned device and sends it to the new device. This allows the redirection of input and/or output paths for the system's devices. For example, the command FORCE (FROM) @PR (TO) filespec reroutes the output from the printer to the filespec disk file. Force without any I/O field provides a listing similar to Join.

Reset restores a device or disk drive to the previously assigned driver. This dissolves any Joins or Forces in effect for the specified device and restores the default or initial driver to service. Reset without any other fields performs a global reset of all devices.

Assign installs drivers for a device or drive. This command lets you install a nonstandard driver for any device or drive in the system.

The driver is a program that controls the input/output from a specific device or drive, such as hard disk drives. Once you install the driver program on a device by using the Assign command, you can assign the same driver to other devices by using the Assign command without allocating more memory.

Assign requires that the driver pro-

Library Commands

Append	Assign	ATTRIB	Auto	Boot
Break	Build	CAT	Clear	Clock
CLS	CONFIG	Copy	Create	Date
Debug	DIR	Do	Dump	Error
Filter	Force	Forms	Free	I
Join	Kill	LIB	List	Load
Pause	PROT	Rename	Reset	RS-232
Screen	System	Time	Verify	

DOSPLUS Utilities

Back-up	Convert	Crunch	DIRCHECK	Diskdump
Diskzap	Format	Help	Label	Map
Patch	Restore	SYSGEN	Tape	Trap

Table 2. DOSPLUS commands.

80micro's REVIEW GUIDE

The guide that will save you time and money.

You'll spend more time at your computer and less money for the right product.

80 Micro's Review Guide is the most comprehensive collection of TRS-80* reviews ever compiled in book form. You get 500 hardware, software and book reviews packed with information about:

- Modems
- Games
- Business programs & Word Processing
- Joysticks
- Books on programming
- Printers
- Utilities
- Editor/ Assemblers
- Educational software
- Monitors
- Databases
- And more

Don't waste valuable time chasing down the right product. We've done it for you with **80 Micro's Review Guide**, compiled and condensed from the pages of **80 Micro**, the magazine you've come to rely on.

A five-star rating system lets you decide what's best. And each review gives you the product manufacturer's information so you can order and receive your product *fast*.

All for $7.95

Order now. Use the attached order form, the coupon, or call toll free 1-800-258-5473.

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

yes, I want to save time and money.

Send me **80 MICRO's REVIEW GUIDE** today.

Please send me _____ Review Guides at $7.95 each and add $1.50 per book shipping and handling.

80ARG

☐ Check enclosed ☐ MC ☐ VISA ☐ AE

Please allow 6-8 weeks for delivery

Card #_____ Exp. Date_____

Signature _____

Name _____

Address _____

City_____ State_____ Zip Code_____

Wayne Green Inc. • 80 Pine St. • Peterborough, NH 03458 Attn: Marcia Stone

gram be in a loader format machine-executable file. The Assign command loads this driver into memory and the program executes the routine.

The manual's technical information section provides a complete description of how to write drivers for a disk drive device and a character device.

CONFIG controls the attributes of the drive devices, such as the floppy disks and hard disk drives. The second part of Table 1 is a listing the CONFIG command provides of the floppy disk drive configuration for my system. With the exception of density and drive type, you can alter the parameters using the CONFIG command (the disk driver provides automatic density recognition).

CONFIG's second major function is to let the system accept hard drives. CONFIG lets the user set up a hard disk drive in any configuration the hardware allows, including sophisticated partitioning of the data set on the hard disk drive.

The Filter command lets you establish a filter on an input or output device to translate data during its progress along the data path. Under DOSPLUS, filters are translation tables the driver uses for a device to convert the input/output data from one form to another.

Creating a filter file is easy. Use the Build command (or a word processor that writes an ASCII file output to the disk) and create the file by entering the translation table in the following manner using hexadecimal constants or quoted literals:

```
41 = 61
"A" = "a"
41 = "a"
```

Each line above represents the same code conversion. Translation codes can have places on the same line when separated by a semicolon.

CAT and DIR allow full display control of various directory formats. DOSPLUS uses two of these commands to display either an abbreviated directory consisting of file names or a full directory listing all pertinent attributes of the files. The command syntax is

DIR (FROM) drivespec (TO) filespec/devicespec (USING) wildmask (parameters).

The To portion of the command allows full redirection of the output, and the wildmask selects any subset of the directory for display. These are powerful features—the command DIR ! TO @PR prints the entire visible directory for every disk mounted in the system. Also, the directory can optionally display invisible, system, and killed files in sorted or unsorted order.

The Load command contains powerful extensions. Load lets you load and execute a core-image file. A core-image file is distinguished from the normal loader file (CMD) by the lack of loader control codes.

The core-image file is written to disk in exactly the format in which it resides in memory. The normal loader file contains control codes that let the system loader place it properly in memory. You can load and execute files from a disk without an operating system resident on the disk in a single-drive system.

Customizing DOSPLUS

The powerful System command has three functions: to display the values of certain memory parameters, to set customizing parameters, and to build a file

MODEL 4 $1629.00

64K 2 Disk RS232

COMPUTERS

PC-2 POCKET	$169.00
PC-3 POCKET	79.95
MODEL 100 8K	675.00
MODEL 100 24K	799.00
MODEL IV 16K	845.00
MODEL 16 128K 2D	4699.00
MODEL 3 to 4 UPGRADE KIT	699.00

DISK DRIVES

COLOR DRIVE 0	$310.00
COLOR DRIVE 1	230.00
5 MEG HARD DISK	1725.00
12 MEG HARD DISK	2699.00

PRINTERS

OKIDATA 80	$ 315.00	DMP-100	$299.00
OKIDATA 82A	395.00	DMP-120	399.00
OKIDATA 83A	650.00	DMP-200	590.00
OKIDATA 84A	990.00	DMP-400	999.00
OKIDATA 92	495.00	DMP-500	1499.00
OKIDATA 93	855.00	DMP-2100	1750.00
GEMINI 10X	290.00	CGP-115	199.00
GEMINI 15	409.00	P.C. PLOT	175.00
	DAISY WHEEL II	$1700.00	
	DWP-410	1050.00	
	SILVER REED	659.00	

MODEL 12

2 DISKS

$3250.00

ALL SOFTWARE 15% OFF

BODEX CORP.

224 East Main St. Marlboro Mass.

HOURS M-Fri. 10-9/Sat. 9:30-6

UPS items shipped FREE!

We can ship C.O.D.

Phone 1 617 485 5115

or 481 1027

381

Prices subject to change without notice.
Not responsible for typographic errors.

TRS 80 is a trademark of Tandy Corporation

of the custom configuration you've designed. This method configures your system for hard disks on each boot—a configuration file would save the operating system's pertinent information.

On any system boot, DOSPLUS uses the system drivers provided in the read-only memory of the TRS-80. The specialized drivers and functions load only when you ask for them. This lets Micro Systems Software alter the driver any time without making extensive modifications to the operating system, and provides greater flexibility in their support of your needs.

To get the specialized keyboard, video, printer, and serial driver features, you must assign them to their appropriate devices. This includes any filtering you want to do on the input or output from these devices. You must assign the drivers for support of your hard disk or other specialized input device.

Next, you must configure the drive devices properly. Drives zero through 3 are generally floppy disks; 4 through 7 are reserved for hard disks. You must properly establish the parameters for each drive in the system. Then set the parameters controlled by the Forms (for the line printer) and RS-232 (serial input/output) commands for your desired values.

Before you can build the configuration file, you must examine the specific parameters changed by the System command. The Date, Time, and Logo parameters control the logo display and the date/time prompts on any reset.

Blink engages and disengages the cursor blink function. Caps sets the default status of the case for a system reset. Cursor lets you set a value to use for the system cursor. High establishes the top of available memory. Step sets the default drive stepping rate—it sets all drives to this rate on a reset.

Save immediately makes the status of Blink, Caps, and Cursor permanent. Port and Mode output the value of one 8-bit byte to the specified port; automatic speed-up modifications love this.

After all this tedious work, use the System command to write this system configuration to your specified disk file. If you call your file CONFIGR/CMD, System CONFIGR/CMD writes the status information to the disk and the command CONFIGR automatically loads all attributes and resets the system to this status.

You can specify many different configurations on the same disk and change the system in seconds by specifying any one of them.

Utilities

The DOSPLUS system disk contains 14 utilities. The utility package contains the back-up and formatting routines normally found on a disk operating system.

Convert copies from alien system format disks to DOSPLUS disks. This lets DOSPLUS copy files from other double-density systems, display the directory of double-density disks, and make a single-density Model I disk readable under Model III DOSPLUS.

DIRCHECK checks the target disk's directory for errors and repairs some of them. The command format conforms to the normal DOSPLUS command structure. DIRCHECK can repair most errors in the file entry table, the hash index table (HIT), and the granule allocation table (GAT).

DOSPLUS contains two utilities to manipulate and edit disks. Diskdump

TRS-80™ "CAN YOU BUY DIRECT?"

HAVE YOU GOT OUR PRICES?

WILL YOU PAY TOO MUCH?

WARRANTY:

the RADIO SHACK warranty accompanies all R. S. merchandise sold by us.

SAVE SALES TAX*
PLUS DISCOUNT
*TEXAS RESIDENTS ADD ONLY 4%

FORT WORTH COMPUTERS

(Located 30 miles from Fort Worth)

377 Plaza • GRANBURY • NR FORT WORTH . TEXAS 76048

214

TOLL FREE NUMBER: 1 - 800 - 433-S-A-V-E

IN TEXAS CALL: 817-573-4111

TM: TRADE MARK OF RADIO SHACK

BOOT ERROR DC

PLUG YOUR MOD II
DISC EXPANSION UNIT INTO THE
SeeBee UNIT AND FORGET ABOUT
THE BOOT ERROR DC MESSAGE

"In my opinion, all users of older Model II's. . . should get a SeeBee as cheap insurance against the dreaded Boot Error."
R.H. Young, Editor/Publisher
Two/Sixteen · Jan-Feb 1983

"SeeBee performs as represented. It's a better mousetrap. . ."
C.R. Perelman
Product Review
80 Micro · July 1983

—Totally software transparent
—Run your disk expansion unit only when needed
—Eliminate ruined system diskettes
—Compact 2 in. x 3 in. size
—Simple plug in installation
—Money back guarantee · 90 day warranty
—$64.50 plus $3.00 shipping and handling
—Indiana residents · add 5% sales tax
PLEASE SPECIFY IF YOU ALSO HAVE A HARD DISK

MICROCOMPUTER PRINTOUT BASKET
—Use on any table
—Sturdy steel construction
—Beige epoxy finish
—Special power cord & signal cable retainer
—12 inch $22.50 18 inch $24.50 plus $3.00 shipping and handling

SYSTEMS ENHANCEMENT ENGINEERING, INC.
P.O. BOX 40215
INDIANAPOLIS, IN 46240
317-844-8817
↙63

We show the way with our special interest publications.

- MECHANIX ILLUSTRATED COMPUTERS
- MECHANIX ILLUSTRATED PLANS & PROJECTS
- MECHANIX ILLUSTRATED HOME IMPROVEMENTS

We reach *your* specific target audience with a low out-of-pocket cost. And our readers buy because they want to, not because they have to. What better way to reach the hard core target market of do-it-yourselfers who are expected to purchase over a hundred billion dollars worth of goods in the next ten years.

MECHANIX ILLUSTRATED
↙513

We show the way.

1515 Broadway, New York, NY 10036
Call Edwin T. Knobloch, (212) 719-6572

Command Key	Command Function
<ENTER>	Execute file—if no CMD extension is found then assume file is Basic—load and run the file under Basic.
<SPACE> & <ENTER>	Force CODIR to execute the file as a CMD file even if no CMD extension is present.
<BREAK> or <CLEAR>	Exit CODIR.
<A>	Get a directory of the specified drive of all visible and invisible files in sorted order.
<C>	Copy the file to the specified drive.
<D>	Get an unsorted directory from the drive specified—pressing shift D causes the display to also contain invisible files.
<F>	Display the Free space map for the drive specified.
<H>	Display a Help listing of the command keys on the command line.
<J>	Activate a Do file for job chaining—same as typing DO "filespec".
<K>	Kill the specified file.
<L>	List the file to the video screen and then restore to the directory display.
<M>	Modify the specified file by running Diskdump.
<O>	Load the CMD or CIM file to memory.
<P>	Print the file to the printer.
<R>	Rename the specified file.
<S>	Search the directory for the partial filespec or extension entered.
<V>	View (display) the copyright and license notice then restore the screen.
<Z>	Zero the file.

Table 3. Cursor-oriented directory version 2.1.

lets you display or modify the contents of any disk file by sectors. You don't need to know the file's location on the disk—the system finds it for you. If you're familiar with NEWDOS80, this is similar to the "display file sectors" mode of Superzap.

Diskzap provides access to the disk structure on a cylinder/sector basis. Diskmap provides functions to fill sectors with a specified byte, copy sectors from one part of the disk to another, print selected sectors, verify read and check sectors, format a selected track, and display or modify disk sectors.

DOSPLUS has a very powerful Help command that displays the command syntax then lists each allowable parameter with a brief description of its function. If you enter only the command Help, the routine displays a menu describing those system commands for which help is available.

The Map utility provides a list of the disk spaces allocated to files by cylinder/sector. The format is:

MAP (FROM) drivespec (TO) filespec/devicespec (USING) wildmask (parameters).

This is similar to the format of the directory commands and Map performs essentially the same functions.

It displays each directory file entry, showing the cylinder/sector information for each extent present. You can display the cylinder/sector information in octal or hexadecimal.

DOSPLUS provides a versatile Patch utility capable of applying modifications to any load module (typically a file with the /CMD extension). You can direct Patch to read the changes from a disk file or use it in the interactive mode by typing the changes in from the keyboard.

The Restore utility reclaims files that you've killed. This works in most cases, because DOSPLUS only zeros the first byte of the file primary directory entry (FPDE) when performing a kill operation. The entry is otherwise intact and available (hence, CAT and DIR commands display killed files).

Restore has some limitations. The file will be intact only if you haven't written to the disk in the interim. Restore reclaims only the first occurrence of the file in the directory. If you've created

and killed the file several times, the reclaimed information might not be correct.

The SYSGEN command places the DOSPLUS system in the proper format on any DOSPLUS-compatible media. You must first properly configure and format the drive. SYSGEN copies system files to the destination media to create a system disk. SYSGEN lets you include an optional filespec containing a bootstrap program on the new system disk.

Tape, a general tape/disk utility, reads or writes a cassette tape, reads or writes a disk file, displays the load map for the file, or relocates the load addresses and adds an appendage to move the file to the correct area. This is much the same function as LMOFFSET (NEWDOS80) or CMDFILE (LDOS).

The powerful utility CODIR (Cursor Oriented Directory) allows a full directory display and many single-key commands to manipulate these files (see Table 3).

Languages

DOSPLUS contains a powerful feature called JCL (job control language). This is another computer language for control of the computer's functions, either the disk operating system or any applications programs.

JCL performs a wide variety of functions, though they aren't an integral part of the disk operating system.

You must load JCL into high memory prior to executing any of these procedures. You can do this by loading the JCL program into high memory and using the System command to save this as a configuration file. Once you install JCL, you can execute any JCL procedure by using the DOS command: EX JCL-Proc-Name (expressions).

"...CODIR allows a full directory display and many single-key commands..."

JCL isn't another form of chaining commands, such as the Do command. JCL lets the user write complex procedures including the use of substitutional parameters and conditional execution.

JCL commands place character strings into the keyboard queue from the JCL procedure itself or by reading them from a disk file. This lets JCL execute a DOS utility or command and maintain complete control over the input phase of the program.

The Disk Basic supplied with the DOSPLUS system is an extension of TRSDOS Disk Basic. DOSPLUS includes all the features in the TRSDOS Disk Basic system and many other enhancements to the interpreter (see Table 4).

The two Basic interpreters on the DOSPLUS system disk are TBASIC and Basic. TBASIC is a subset of the Basic interpreter and provides all the functions normally found in TRSDOS Disk Basic. Basic is the full extended Disk Basic interpreter implemented under DOSPLUS.

Basic uses overlays to give you the widest range of features available. TBASIC is totally memory resident and about 3K smaller in size.

The remaining features I'll discuss are those in Table 4, which are available only from Extended Basic.

The CMD string feature executes the

COLUMBIA DATA MPC

COLUMBIA System Includes IBM COMPATIBLE Dual 320K Floppies 128K RAM Two RS 232 Serial ports Centronic Printer port IBM Compatible Keyboard Hi Res Color Graphics Card Green or Amber Monitor and more

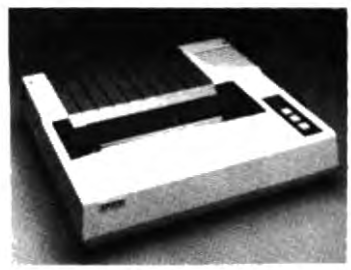
$3 000 IBM Software bundle Including Perfect Writer Speller Calc Filer Graphs Communications Support Space Commanders Col Tutor Diagnostics B ASICA MACRO Assembler & MS DOS

COLUMBIA LOW TOTAL PRICE CALL

OTHER COMPUTERS

• COMMODOR 64	CALL
• EAGLE II Business Computer	$1995
• EAGLE III Business Computer	$2695
• EAGLE IV Business Computer	$3495
• EAGLE 1630 Computer	$5995
ALL EAGLE CPUs Includes Software Bundles	
• NEC PC 8001A PC 8012A PC-8031A JB 1201 PC 8023 w/Software	$1995
• NEC PC 8800 8 BIT or 16-BIT w/Softweare	CALL
• NEC APC SYSTEM 16 bit	CALL
• SANYO MBC 1000 with Bundled Software	$1595
• SANYO MPC 3000 with Bundled Software	CALL
• XEROX 820	CALL

EPSON PRINTERS



MODEMS

• HAYES SMARTMODEM (300 BAUD)	$ 227
• HAYES SMARTMODEM (300 & 1200)	CALL
• HAYES CHRONOGRAPH	$ 199
• NOVATION J CAT	$120
• NOVATION 212 AUTO CAT	CALL
• SIGNALMAN MARK I and others	CALL
• U D S Series Modems	CALL

APPLE SOFTWARE

• ASTON TATE D BASE II	$ 465
• CONTINENTAL ACCOUNTING	CALL
• DATAMOST	CALL
• HOWARD REAL ESTATE ANALYZER	$ 167
• I U S EASY WRITER	$ 89
• LOTUS	CALL
• MICROPRO WORDSTAR	$372
• MICROTEX	CALL
• SOUTHWESTERN DATA SYSTEMS	CALL
• STONEWARE	CALL
• SUB LOGIC - FLIGHT SIMULATOR	$ 33
• VISI CORP VISICALC	$ 239

• EPSON FX Series NEW	CALL
• EPSON RX 80 w/GRAFTRAX +	CALL
• EPSON MX-100 80 & F/T w/GRAFTRAX +	CALL

OTHER PRINTERS

• NEC 3550	CALL
• NEC 3510 2515 3520 3525 & 3530	CALL
• NEC 7710 7715 7720 7725 & 7730	CALL
• NEC PC8023A C	$ 449
• GEMINI 10 $ 355 GEMINI 15	$ 499
• C ITOH 8510 Parallel or Serial	CALL
• C ITOH 1550 Parallel or Serial	CALL
• C ITOH F10 40 and F10 55 Par or Ser	CALL
• TALLY MT160	$ 799
• TALLY MT1602 MT1605 MT1802 & MT1805	CALL
• DIABLO 630 CALL * DIABLO 620	$ 989
• IDS 80 and 132 PRISM Printers	CALL
• QUME SPRINT 11/40 and others	CALL
• ANADEX ADX 9500 AND OTHERS	CALL
• BROTHERS HR 1 Serial or parallel	$799
• COMREX CR 1 Serial or Parallel	CALL
• DAISYWRITER 2000 w/48K Buffer	CALL
• TOSHIBA P1350-P or P1350-S	$1649
• SILVER REED EXP550 P or EXP550 S	CALL
• SMITH CORONA TP 1 and others	CALL
• TRANSTAR 315	CALL
• TRANSTAR 130	CALL
• OKIDATA 82A	$ 420
• OKIDATA 83A 84A	CALL
• OKIDATA 92 93 2350 & 2410	CALL

APPLE CARDS

• AMDEK RGB COLOR II INTERFACE	$ 169
• M&R ENTERPRISES RGB INTERFACE	$ 69
• PRACTICAL PERIPHERALS MICROBUFFER II	CALL
• VIDWX VIDEOTERM CARD	$ 285
• WESPER MICRO SYSTEMS	CALL
• B P O 16K EPSON OKIDATA NEC	$ 159
• WIZARD IPL	$ 85
• OTHER APPLE CARDS	CALL

CALL 7 DAYS (800) 854-8498 Calif. (714) 545-2216

COOSOL, INC. P.O. 2642 COSTA MESA, CA 92626-2642

105

COMPUTER BARON 3013 HARBOR BLVD. COSTA MESA, CA 92626 714 979-2488

string as a DOS command. When execution of the command is complete, control returns to your Basic program. All program statements and variables remain intact unless the executed command conflicts in the memory areas where Basic is resident. Most DOSPLUS commands won't interfere.

The DI and DU commands let you move or duplicate full Basic statements in the program store. DI is the delete and insert command that moves the program line from the specified line number to the target line number. DU is the duplicate command that simply duplicates the specified line at the target line location.

You enter the shorthand commands from the BASIC READY prompt. They allow easier editing and manipulation of the program text. A nonalphabetic command must be the first character typed on the current command line. You can place the alphabetic commands anywhere in the command line and Basic correctly interprets them.

The TRON command is a greatly enhanced tracing function. Executing it engages the Basic single-step trace function. Unlike some other single steppers, TRON displays the part of the program line it will execute next and waits for you to press any key. You single-step through each individual statement, not each program line.

A disadvantage to this method is failure to preserve the screen contents prior to break-pointing the execution. The screen format becomes a jumble of program statements, trace output, and program output. This small annoyance doesn't detract from the absolute power of this function.

The RENUM, REF, M, and SR commands allow easy manipulation of all or part of the Basic programs. CMD"RENUM" quickly renumbers all or part of the program. CMD"REF" provides a cross-reference listing of a single variable, line, or keyword; all variables; all line numbers; and all keywords.

The CMD"M" function provides a dynamic variable dump of all currently allocated simple variables (not arrays). The CMD"SR" function performs global editing of the program text or quickly locates and lists all references to a particular string.

The CMD"O" function provides a powerful sort verb that sorts any type of data into ascending or descending order. The sort command uses key and tag arrays in the sort.

The key arrays determine the final outcome of the sort. For example, if you specify three keys for ascending order, all entries sort by order on the first key. If you obtain equal matches on the first key, the second key specifies sorting order, and so on.

The tag arrays tag along with the key arrays. When the order of the key arrays changes, the order of the tag arrays changes accordingly.

An extremely powerful feature of DOSPLUS Basic is the controlled screen input using the Input@ statement. The format is:

INPUT@<position>,"prompt",field-length, item-type;var$.

The position, prompt, and field-length entries are self-explanatory. The item-type specifies whether the input field is numeric or alphanumeric.

In this part of the command, you can also specify a "return on field full" mode. The input variable must be a string variable for either input type. This statement creates a visible field of underline characters of the specified field length. The item-type flag restricts input characters. This allows the replacement of many worn out INKEY$ routines.

Last, Extended Basic allows the use of named statements as the target of GOTO and GOSUB statements. This is extremely valuable in developing well-written code. The programmer can concentrate on the program's content and doesn't have to worry about maintaining the references (line numbers) of subroutines.

Extended Disk Basic Features

Command	Function
CMD"string"	Execute a DOS command from Basic.
DI	Delete and insert a Basic program line.
DU	Duplicate a Basic program line.
Shorthand	See the shorthand commands below.
RENUM	Renumber Basic program text.
Tab	Expanded Tab function.
TRON	Expanded Trace function.
REF	Cross-reference variables, line numbers, or keywords.
CMD"M"	Dynamic variable display.
SR	Global editing of Basic program text.
CMD"O"	Basic sort verb.
Input@	Controlled screen input (string).
Labels	Indirect label addressing.
Error Messages	Detailed error message display.

Basic Shorthand Commands

Command	Function
; (semicolon)	List the first line of the program.
Shift-up arrow	List the first line of the program.
/ (slash)	List the last line of the program.
down arrow	List the next line of the program.
up arrow	List the preceding line of the program.
L	Abbreviation for List (L10-100).
D	Abbreviation for Delete (D10-100).
E	Abbreviation for Edit (E10).
G	Abbreviation for Go (G1000).
A	Abbreviation for Auto (A100).
N	Abbreviation for Next (N Test).
R or R"	Abbreviation for Run (R"Games").
L"	Abbreviation for Load (L"Games").
S"	Abbreviation for Save (S"Games").
K"	Abbreviation for Kill (K"Games").
. (period)	List the current program line (List.).
, (comma)	Edit the current program line (Edit.).

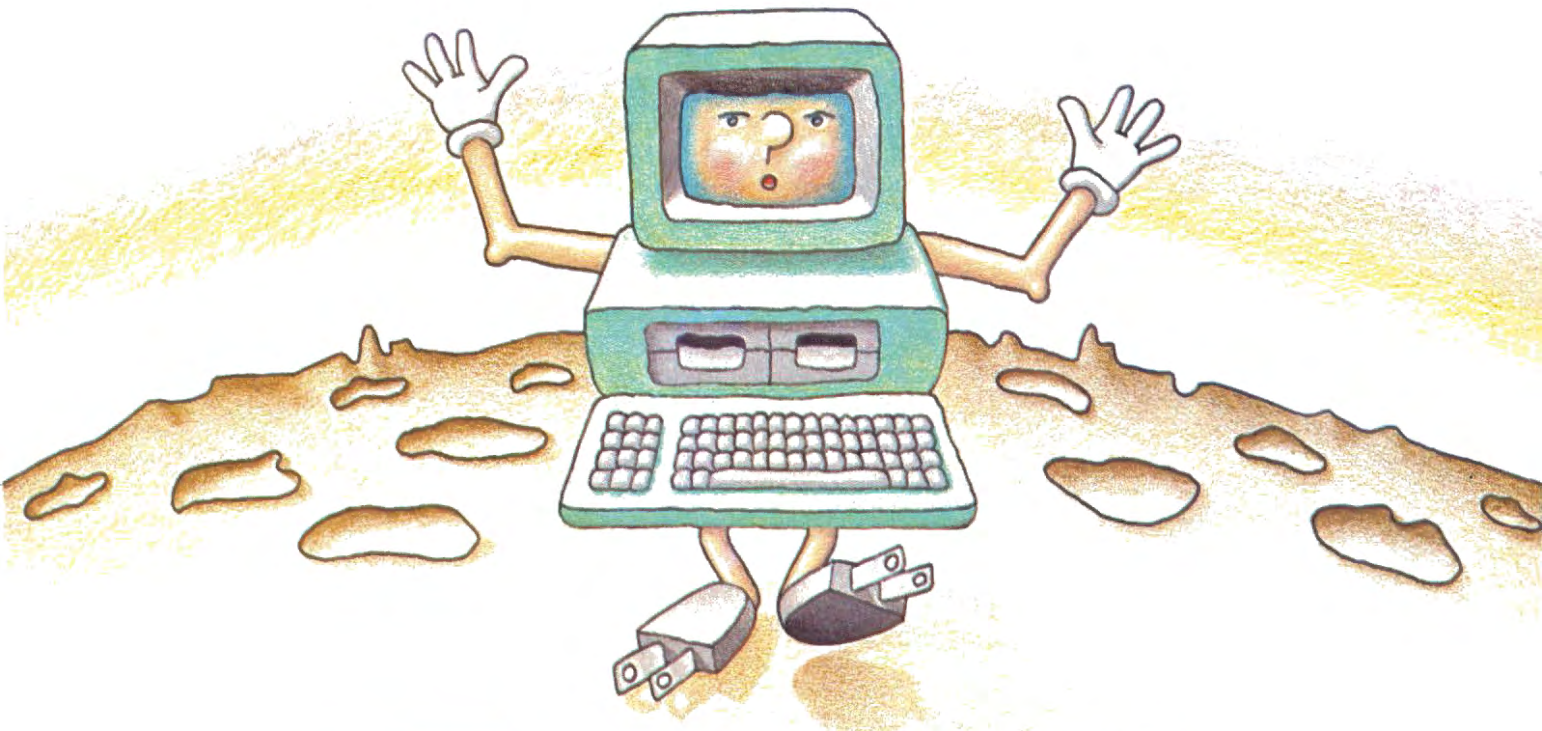
Table 4. Extended Disk Basic features and commands.

Drivers and Filters

The external drivers are the heart of sophisticated device control. These drivers provide many features unavailable in the ROM drivers. This is particularly important on the Model I where ROM drivers are most restrictive.

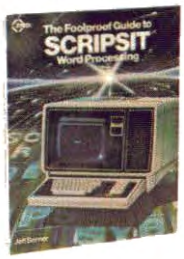
The keyboard driver (KI/DVR) ex-

"What more can I do?"



Your computer can probably do more for you than you originally thought. And learning to expand its capabilities is as easy as reading a good book.

SYBEX is the pioneer of computer book publishing, offering over 60 titles developed for beginners through advanced. They are so well written and easy to understand that virtually anyone can learn to operate a computer in a matter of hours.

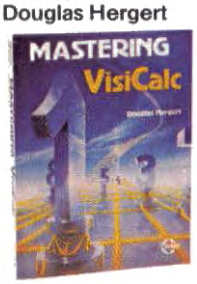


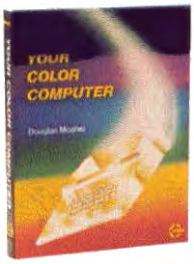
***The Foolproof Guide to SCRIPSIT Word Processing* by Jeff Berner** ($11.95) The ins and outs of SCRIPSIT, the TRS-80 word processing program are explained here in witty, conversational style.

***Your First BASIC Program* by Rodnay Zaks** ($9.95) At last, a book designed for the first-time computer user who wants to learn how to program. It is simply written, educational, beautifully illustrated and fun to read.

***Your Color Computer* by Doug Mosher** ($12.95) This is an introduction to your color computer, complete with cartoons, diagrams, photographs and a BASIC thesaurus and command reference section. Descriptions of available software and peripherals make this an ideal guide for those who aren't interested in programming, but who want to use their computers right away.

***Mastering VisiCalc*® by Douglas Hergert** ($11.95) Beginning with a description of what VisiCalc can do for you, this book provides step-by-step explanations of each feature. It tells you how to get the most from your "electronic spreadsheet," for tasks ranging from planning to examining projection scenarios.





SYBEX books are available at bookstores and computer stores everywhere. For a free catalog, mail the coupon or call TOLL-FREE 800/227-2346. Prices subject to change without notice.

Send me: ☐ A free catalog
☐ 0-098 *The Foolproof Guide to SCRIPSIT Word Processing* $11.95
☐ 0-092 *Your First BASIC Program* $9.95
☐ 0-097 *Your Color Computer* $12.95
☐ 0-090 *Mastering VisiCalc*® $11.95
Add: ☐ $2.00/Book UPS ☐ 6½% Sales Tax CA Res
☐ $12.00/Book Overseas Mail
Charge my:
☐ VISA ☐ MasterCard ☐ American Express
Card # _____ Exp. Date _____
Total Amount Enclosed $ _____
Signature _____
Name _____
Address _____
City/State/Zip _____
Mail to: SYBEX Inc., 2344 Sixth St., Berkeley, CA 94710
© 1983 SYBEX, Inc. **1010**

SYBEX COMPUTER BOOKS

tends the ROM driver to add variable debounce and repeat delays, variable key repeat rate, macro key expansions, and character filtering. You can generate all ASCII character codes with KI/DVR installed by using the control key.

You can also install macro-key definitions with this driver. The key definitions are created in an ASCII file and are installed when you initially load the driver. To use each key, press the clear key in conjunction with the desired key. The macro definition appears. Macro-key definitions can call other macro keys.

DO/DVR is the video driver and implements special cursor support (blinking cursor) and lowercase support for the Model I.

The combined printer driver PR/DVR offers parallel and serial support, spooling, automatic pagination, and indenting. The default driver is for parallel printers, so you must specify the serial driver.

The driver directs serial output to the RS-232 port. Spooling of printed output goes to a memory buffer only. The operating system specifies the buffer size when the driver is assigned and you can't change it unless you reconfigure the system.

One of the most interesting drivers on DOSPLUS is FILE/DVR. This driver allows a file resident on any disk drive to act as another disk drive device. You configure the device as a hard disk and you can perform all possible disk operations on this file disk except floppy disk functions such as Back-up and Format.

This driver's primary use is with hard disk drives. It partitions the drive and allows efficient use of disk space while maximizing the available directory space. Because of the indirect access necessary with this structure, using file disks slows file access significantly.

Evaluation

DOSPLUS has its problems. The technical documentation in the system's reference manual is very detailed; however, in one important area, it's confusing and vague. The set-up and operation of hard disk systems with DOSPLUS is scattered throughout the manual and the technical section on partitioning does little good if the user can't get his hard disk system operating.

One nice feature not provided by the external keyboard driver is a type-ahead feature. This lets the user overtype the system and input the next step it should perform while the system completes the last command.

Also, the keyboard/video drivers provide lowercase support on the Model I and DOSPLUS doesn't have even a minimal lowercase driver in the system on power-up. The keyboard/video drivers occupy high memory and conflict with some applications programs that have fixed machine-language appendages in this area. This prevents the use of lowercase in some applications.

The spooler is memory-resident only. You must allocate an inordinate amount of memory to the spooler to prevent printer delays or the spooler soon becomes full with the computer still output-bound to the printer.

DOSPLUS's Debug monitor is essentially the same as the TRSDOS Model I monitor and doesn't have some of the more advanced features of Model III Debug.

"...the technical information...provides the advanced programmer with the complete details to fully integrate any program with DOSPLUS."

The Copy function doesn't provide a simple mechanism for copying selected files from one data disk to another in a two drive system. With the job control language, you can generate a make-shift routine to perform this function.

One significant and confusing restriction exists in the use of Basic named statements. The name isn't supposed to contain any Basic keywords. However, the example in the user's addendum contains a keyword and executes fine until the ON GOTO statement encounters an out-of-range value.

The user receives a cryptic syntax error in the affected line. A simple solution is to alter the Name command structure to search for the name of a line as a string enclosed in quotation marks.

The machine-language sort is extremely powerful. You can easily specify significantly large and complex sorts with one statement. One omission that could greatly improve the sort routine's speed is an indirect sort where the only data movement is the index array.

On the positive side, the technical information section of the user's manual is excellent. It provides the advanced programmer with the complete details necessary to fully integrate any program with DOSPLUS.

The section also contains a detailed description of the use of file/device control blocks, and two important examples of writing self-relocating driver programs for drives and other devices.

The user's reference manual is well-written in laymen's terms. Even the novice can easily operate the complex system functions. Unfortunately, the manual has no cross-references of pertinent areas. This feature would improve the manual's quality greatly.

DOSPLUS provides one utility in an attempt to maintain compatibility with other systems. Label reads one Basic source file from disk and resolves all named statements into syntactically correct Basic programs with line numbers. This allows transportability of Basic source code.

The Disk Basic system's extended error facility is excellent. DOSPLUS flags the error with full extended error messages, points to the offending statement, and displays only the erroneous part of the long statement (from one colon to the next).

User support from Micro Systems Software gets a big plus. I received the Model III version of the operating system for this review. It didn't run well on my Model I. After contacting Micro Systems Software, I received the Model I version within a couple of days—not bad for mail from Florida to New Hampshire.

I liked DOSPLUS 3.5. It's easy to use and learn if you're experienced with the TRSDOS family of operating systems. Those users just entering the microcomputer world will need a little more effort—but not too much—to learn this system.

The advanced user will find plenty to keep his interest; DOSPLUS 3.5 provides a fine basis for applications programming. And the novice will find DOSPLUS 3.5 a good initial system to own.

With DOSPLUS 3.5, Micro Systems Software has now provided a relatively stable, compatible, and functionally similar operating system for each Radio Shack computer in the Z80 processor series. With today's hardware capabilities, this allows an unheralded ability to transfer data among these processors. ■

Contact John Harrell c/o 80 Micro, *80 Pine St., Peterborough, NH 03458.*

Phoenix

an advanced personal computer

Basic $599 kit (not shown) includes:

- Software compatibility with TRS-80 Model III and Model IV, plus CP/M
- 128k RAM card (64k normal plus 64k bank-selectable), less RAM
- 80 x 24 and 64 x 16 U/L case alphanumeric displays (software selectable)
- Z-80 CPU, with bootstrap ROM and hardware/software selectable 2 MHz and 5 MHz clock
- High resolution 512 x 256 graphics circuitry, with alphagraphics (less 16k high resolution RAM)
- Disk controller for any mix of up to four disk drives (5-¼"/8", single/double sided, single/double density, built-in/external)
- Parallel printer and light pen interfaces.
- Built in audio
- Provisions for readily available system ROM
- Tan polyurethane enameled metal enclosure, with power supply
- Standard typewriter keyboard, plus numeric keypad
- CPU board, with six expansion slots
- Parts kit, including ICs, sockets, fasteners and mounting hardware
- Assembly manual

Complete $1699 kit shown includes:

- High-resolution 12" green screen monitor
- Two SSDD slimline 5-¼" floppy drives and power supplies
- Hand rubbed, solid walnut end panels
- RS232 Interface board
- System ROM
- 128K system and user RAM
- 16k high resolution graphics RAM

Additional Options

- Single or dual built in slimline 5¼" SSDD or DSDD floppy drives and power supply
- Single or dual external slimline 8" SSDD or DSDD floppy drives, enclosure, power supply
- 128k bank selectable RAM board (for 256K total)
- 4164 RAMs
- Monitor
- Color Graphics (available 12/83)
- Light Pen (available 10/83)
- Hard disk host adapter (available 10/83)
- Factory assembled units (available soon)

PROGRESSIVE ELECTRONICS

537 East Main Street • Lancaster, Ohio 43130 • Tel: (614) 687-1019 ↙143

TRS 80 is a Tandy trademark CP/M is a Digital Research trademark Dealer Inquiries Invited

↙See List of Advertisers on Page 323

Sorting in Place

by George Reardon

Learn how to sort data "in place" when you have too little memory for a random-access disk file.

When memory is too small for your random access disk file and you don't have extra disk space, you must sort it "in place." Here's how.

Many articles have been published about sorting technique, usually how to sort data in memory. Some tell how to sort key data from random access disk files in memory. But with disk systems, the in-memory sort is only half of the problem. After you sort the key data in memory, you must still rearrange the complete records in the disk file, a problem often overlooked.

The problem can be serious when your disk file consumes all or most of your available disk space. You may not have room for an index file or for a sorted duplicate of your disk file.

In that instance, you must rearrange the existing disk file in place, without using any additional disk space. The program provided here performs such an in-place rearrangement. It runs on any Model I, II, or III disk system with a fixed-length records file.

Program Operation

The program performs a tag sort of your disk records. It loads key data fields from each disk record into a string array, with the number of the original position in the file attached to the end of the string. An in-memory sort of the the array is then performed. After the sort, the strings are stripped of the key data, leaving only the tags (the numbers of the original positions in the disk file) in the string array.

The next section of the program (lines 10000–10050) rearranges the disk file according to the "map" provided by the tags. The logic of this routine is trickier than you might suppose. It is based on the fact that every unsorted list of n elements contains from one to INT (n/2) subsets of out-of-place elements, which can each be sorted into completely correct order. Table 1 illustrates this principle.

The rearrangement routine moves records one subset at a time. It looks for a subset by finding an out-of-place item in the array. Then it moves records within the subset, going from one element to the next and marking as sorted the records it moves until it finds itself back at the starting point, which means that all elements of the subset are in their correct places. Then the routine looks for another subset.

I've made compromises with speed to make the program compatible with three TRS-80 models and with early versions of TRSDOS. I assume 256-byte physical records, requiring subrecord calculations before each Get instruction. The CMD"O" sort command of Model III TRSDOS 1.3 is not available in Models I or II, so I used a Basic in-memory shell sort.

To sort faster, Model III owners can substitute lines 100–170 with:

```
100 CMD"O",L,S$(1).
```

Model II owners can substitute the line below for the original line 150 to speed up the sort slightly:

```
150 C4=C3+B:IFS$(C4)<S$(C3)THEN
SWAP$(C3),S1(C4):C3=C3-B:IFC3>0
THEN150
```

I used the MID$ instruction extensively to avoid delays caused by Basic's "garbage-collection" process.

The program maximizes its sorting capacity by using one array for three purposes: the original tagged strings, the tag number array, and the double-index array (in which each string element contains two numbers). You can ensure

Sorted List		Unsorted List	
A		C	
B	Subset 1	H	
C		A	
D	Subset 3	E	
E		D	Subset 2
F		F	
G		B	
H		G	

Table 1. Sort logic.

The Key Box

Models I, II, and III
32K RAM
Disk Basic
1 Disk Drive

COMPUTER-PERIPHERAL SWITCHERS

Connect any number of peripherals to a single I/O port — use a single printer to support several microcomputers — use two or more printers to support a single microcomputer — access a modem from any of several microcomputers — ideal for demonstrating or comparing equipment. The Selecto-Switches are designed to eliminate the unnecessary plugging & unplugging of cables which connect printers, terminals or modems to various computers. By using a Selecto-Switch you achieve more efficient system operation, better utilization of peripherals & computer ports, eliminate redundant hardware & reduce service calls. 5 yr limited warranty on all Selecto Switches. No power required. Size (inches): 10L x 7W x 2¾"H. 2 lb. ea.

RS232 SERIAL SELECTO-SWITCH

• Switches all lines of asynchronous data • Easy expansion of serial ports • Connectors are female DB25 type

PART NO	DESCRIPTION	PRICE
GRS232-AB	2-Way Switch	$139.95
GRS232-ABC	3-Way Switch	$179.95

DB25 PARALLEL SELECTO-SWITCH

• "RS-80, Apple and IBM compatible • Switches 24 lines (line 1 is ground) • Connectors are female DB25 type

PART NO	DESCRIPTION	PRICE
GP24-AB	2-Way Switch	$139.95
GP24-ABC	3-Way Switch	$179.95

CENTRONICS-STYLE SELECTO-SWITCH

• Switches all 36 lines • Connectors are female Centronics

PART NO	DESCRIPTION	PRICE
GCENT-AB	2-Way Switch	$199.95
GCENT-ABC	3-Way Switch	$229.95

Micro-Logic Corp. MICRO-CHARTS

• Fully decoded data • Instant access • 7 tablet, totally comprehensive • Compact 8½ x 11 in. durable credit card plastic • Perfect for programmers & beginners • Clear & concise tables for: hex instruction set, disassembly, ASCII, base convertables, offset, 8 flags, compare vs. jump, interrupt structure, pinout, cycle times, flag jmps, jmp, flag notes, & much more

PART NO	REFERENCE	PRICE
ML-Z80	Z80 CPU	$5.95
ML-8080A	8080A/8085A	$5.95
ML-6502	6502 (65XX)	$5.95
ML-8048	8048, Relatives	$5.95
ML-7400	5400/7400 TTL Pin-Outs	$5.95

BOOKS

30001	National CMOS Data Book (1981) (640 pages) 74C, CD4000, and A/D Converters	$6.95
30005	National Linear Data Book (1982) (1376 pages) LM, LF, ADC, DAC, LH Series	$11.95
30008	National Memory Data Book (1980) (464 pages) RAMs, ROMs, PROMs, EPROMs Series	$6.95
30009	Intersil Data Book (1983) (1356 pages) Complete line	$9.95
30010	National Audio/Radio Handbook (1980) (240 pages) Pre-Amps, AM, FM & FM Stereo, Power Amps	$5.95
30011	National Linear Application Handbook (1980) (736 pages) Application Notes, Linear Briefs, etc.	$15.95
30012	National PAL Data Book (1982) (176 pages) Application Notes, Linear Briefs, etc.	$5.95
30013	Zilog Data Book (1983) (841 pages) Microprocessors and Support Chips	$7.95
210830	Intel Memory Components Handbook (1983) (798 pages) Contains all Application Notes, Article Reprints, Data Sheets, and other design information on Intel's RAMs, EPROMs, E²PROMs & Bubble Memories	$14.95
210844	Intel Microprocessor & Peripheral Handbook (1983) (1027 pages) Contains Data Sheets on all of Intel's Microprocessors and Peripherals.	$14.95

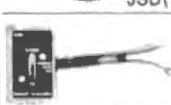
ATARI

ATARI PADDLES

JSP (2) . . . . . $2.95 pair

ATARI DRIVER

JSD(1) . . . . . $2.95 ea.



TV GAME SWITCH

Used on Atari. Cosmetically blemished. 100% functional.

TGS-1 . . . $1.95 ea.

Jameco ELECTRONICS — Digital Thermometer Kit

Dual sensors — switch controls for indoor/outdoor or dual monitoring — can be extended to 500 feet. Continuous LED .6" ht. display. Range -40°F to 199°F, -40°C to 100°C. Accuracy ±1° nominal. Calibrate for Fahrenheit/Celsius. Simulated walnut case. AC wall adapter included. Size 6¾"L x 3¼"H x 1½"D.

JE300 . . . . . $39.95

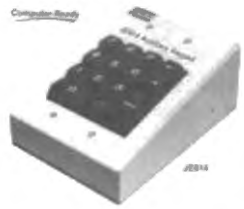
Universal Computer Keyboard Enclosures

DTE (Blank Desk Top Enclosures) are designed for easy modification. High strength epoxy molded end pieces in mocha brown finish. Sliding rear (bottom panel for service/component access. Top/bottom panels .060" thick alum. alodine type 1200 finish (gold tint color) for vinyl panel adhesion after modification. Vented top & bottom panels for cooling efficiency. Rigid construction provides unlimited applications. Assembly instructions included.

DTE-8	Panel Width 7.5"	$24.95
DTE-11	Panel Width 10.13"	$27.95
DTE-14	Panel Width 13.5"	$29.95
DTE-20	Panel Width 19.25"	$34.95

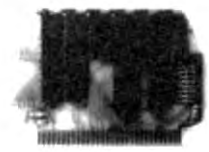
ACCESSORIES FOR APPLE* COMPUTERS

Numeric/Auxiliary Keypad for APPLE *IIe*



JE614 Assembled and Tested $89.95

Extended 80 Column/64K RAM Card for APPLE *IIe*



JE604 Assembled and Tested $169.95

Switching Power Supply for APPLE II, II+ and *IIe*

Part No. KHP4007 $79.95

Cooling Fan for APPLE II, II+ and *IIe*

Part No. APF-1 $49.95

APPLE and APPLE IIe are registered trademarks of APPLE Computers — **IIe/Clock is a registered trademark of Jameco, Inc.

5¼" HALF-HEIGHT DISK DRIVES

FIT TWO DRIVES IN THE SAME SPACE AS ONE CONVENTIONAL 5¼" DRIVE

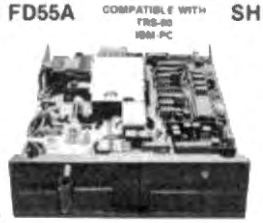
TEAC FD55A

SINGLE-SIDED:

- 48 tpi
- 40 Tracks
- 250Kbytes single-sided
- Single/double density
- Brushless DC direct-drive motor
- Low 5W power consumption
- Power req.: +12VDC @ .3A, +5VDC @ .55A
- 6 msec. track to track
- One year warranty
- Size: 5¾"W x 1¾"H x 8"D
- Weight: 3 lbs. 5 oz.

FD55A $249.95

COMPATIBLE WITH TRS-80 IBM-PC



SHUGART SA455

DOUBLE-SIDED:

- 48 tpi
- 40 Tracks
- 500Kbytes double-sided
- Single/double density
- Brushless DC direct-drive motor
- Power req.: +12VDC @ .75A, +5VDC @ .7A
- 6 msec. track to track
- Compatible with SA400/450
- One year warranty
- Size: 5.75"W x 1.63"H x 8"D
- Weight: 3.3 lbs.

Shugart SA455

SA455 . . . . . $259.95

Keytronics 90-Key Keyboard

WITH SECURITY KEYLOCK SWITCH

BRAND NEW!!

- RFI shielded
- Cursor controls
- Numeric keyboard
- 8-bit Parallel
- Solid state switches
- 10 user-programmable keys
- Positive TTL Logic
- Size: 17"L x 8¼"W x 2¾"H

Made for Visual Technology, this keyboard features a security keylock (includes two keys) to guard against unauthorized use, an 11 key numeric keypad, cursor controls and 10 user-programmable keys. Electrical requirements: +5VDC. Color (case): White. Color (keycaps): Black. Complete with cable, keyboard assembly, 40-inch interface cable, and schematics. Weight: 7 lbs.

Part No. KB270 . . . . . $79.95 each

23"L x 5¼"W x 1 3/8"H

MICRO SWITCH 85-KEY KEYBOARD

Word Processing Keyboard. 26 Pin Edge Card Connection. Supply Voltage +5VDC. 85pin Keyboard a QWERTY. Additional Key Pads for Cursor and word processing functions.

Part No. 85SD18-1 $29.95 each

3"L x 3"W x 1½"H

HI-TEK 14-KEY NUMERIC KEYPAD

SPST switching. Charcoal grey keycaps. Mounted on printed circuit board.

Part No. K-14 . . . . . $9.95 each

POWER SUPPLY +5VDC @ 1 AMP REGULATED — Transaction Tech

Output: +5VDC @ 1A (also +30VDC) reg. Input: 115VAC 60Hz. 2-tone (black/beige) self-enclosed case: 6"H, 3 cond. black power cord: 6½"W x 7"D x 2¾"H. Wt. 3 lbs. Data sheet incl.

Part No. PS51194S . . . . . $14.95 each

POWER SUPPLY +5VDC @ 3 AMP REGULATED — Deltron

Input: 115VAC, 47-440Hz. Output: 5VDC Adjustable @ 3 amp. 6VDC @ 2.5 amp. Adjustable current limit. Ripple & Noise: 1MV rms, 5MV p-p — 2 mounting surfaces. UL recognized. Size: 4"W x 4¼"L x 2-7/16"H - wt. 2 lbs. Data sheet included.

Part No. OPS-1 . . . . . $29.95 each

POWER SUPPLY +5VDC @ 7.5 AMP, 12VDC @ 1.5 AMP SWITCHING

Input: 115VAC, 50-60Hz @ 3 amp/230VAC, 50Hz @ 1.6 amp. Fan volt./power supply select switches (115/230VAC). Output: 5VDC @ 7.5 amps, 12VDC @ 1.5 amps. 8 ft. blk. pow. cord. 11¾"W x 13¾"D x 3¼"H. Wt. 6 lbs.

Part No. PS94V0S . . . . . $39.95 each

POWER SUPPLY 4-Channel Switching - Apple Compatible

FOR USE AS AN EXTERNAL POWER SUPPLY FOR APPLE

Microprocessor, mini-computer, terminal, medical equipment and process control applications. Input: 90-130VAC 47-440Hz. Output: +5VDC @ 5A, -5VDC @ 1A, +12VDC @ 1A, -12VDC @ 1A. Line reg.: ±0.2%. Ripple: 30mV p-p. Load reg.: ±1%. Overcurrent protection. Adj: 5V main output: 10%. 6-3/8"L x 1-7/8"W x 4-15/16"H. Wt. 1¼ lbs.

Part No. FCS-604A . . . . . $69.95 each

$10.00 Minimum Order — U.S. Funds Only
California Residents Add 6½% Sales Tax
Shipping — Add 5% plus $1.50 Insurance
Send S.A.S.E. for Monthly Sales Flyer!

Spec Sheets — 30¢ each
Send $1.00 Postage for your *FREE 1983 JAMECO CATALOG*
Prices Subject to Change

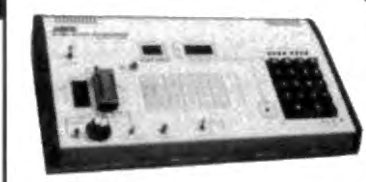
Mail Order Electronics - Worldwide

MasterCard

Jameco ELECTRONICS

VISA®

✓534 1355 SHOREWAY ROAD, BELMONT, CA 94002
10/83 *PHONE ORDERS WELCOME — (415) 592-8097 Telex: 176043*



JE664 EPROM PROGRAMMER

8K TO 64K EPROMS — 24 AND 28 PIN PACKAGES

• Programs, validates, and checks for properly erased EPROMs • Emulates PROMs or EPROMs • RS232C Computer Interface for editing / program loading • Loads data into RAM by keyboard • Changes data in RAM by keyboard • Loads RAM from an EPROM • Compares EPROMs for constant differences • Copies EPROMs • Power input 115VAC, 60Hz, 10W power consumption • Enclosure: Color-coordinated light tan panels w/ molded mocha brown end pieces • Size: 15-5/8"L x 8¼"D x 3¼"H • Weight: 5¾ lbs.

JE664-A EPROM Programmer — $995.00
Assembled & Tested (Includes JM16A Module)

JE665 — RS232C INTERFACE OPTION — The JE665 RS232C Interface Option implements computer access to the JE664's RAM. Sample software written in BASIC provides for "RS-80" Model I Level II Computer. Baud rate 9600. Word size 8 bits, odd parity. Stop bits 2. Option may be adapted to other computers. The JE665 can be interfaced to any computer with an RS-232 port. Interconnection is also provided for interfacing to any CP/M system with an RS232 port.

JE664-ARS EPROM Prog. w / JE665 Option — $1195.00
Assembled and Tested (Includes JM16A Module)

EPROM JUMPER MODULES — The JE664's JUMPER MODULE (Personality Module) is a plug-in Module that pre-sets JE664 for proper programming pulses to the EPROM & configures EPROM socket connections for that particular EPROM.

P/N	EPROM	EPROM MANUFACTURER	PRICE
JM16A	2708	AMD, Motorola, Nathional, Intel, TI	$14.95
JM16A	2716 TMS2516	Intel, Motorola, National, NEC, TI	$14.95
JM16B	TMS2716	Motorola, TI (+5, -12, +12)	$14.95
JM32A	TMS2532	Motorola, TI	$14.95
JM32B	2732	AMD, Fujitsu, NEC, Mostek, Intel	$14.95
JM32C	2732A (TRW)	Fujitsu, Intel	$14.95
JM64A	MCM68764 MCM68B764	Motorola	$14.95
JM64B	2764	Intel	$14.95
JM64C	TMS2564	TI	$14.95
JM64D	HM4864/6464	Hitachi (TRW)	$14.95

iii's Black Hole EPROM Eraser

9 Chips — 8 Minutes

The Black Hole EPROM Eraser will completely and safely erase 9 EPROMs in less than 8 minutes. The Black Hole is a fully automatic cassette loading eraser featuring 9 shaped 4000 w uV lamps mounted on a special ALZAK UV reflectivity of 95 (aesthetic light tunnel). In operation the user slips in up with static Bug Box (3 ea incl.) containing the EPROMs to be erased into the loading slot on the front panel of Black Hole. The rest is fully automatic. The Black Hole latches the Bug Box into place, turns on the UV lamps and starts its fully solid state (CMOS) UV integration time timer. The percentage erasure time is monitored and displayed on a front panel LED readout. At the end of the erase cycle, the Black Hole ejects the Bug Box containing the 9 erased EPROMs and turns off power.

PART NO.		PRICE
ULV-008	Replacement Lamp for ERS-008	$29.95
ERS-008	Eraser, Auto Eject & LED Readout	$249.95

IBM MEMORY EXPANSION KIT

SAVE HUNDREDS OF $$$ BY UPGRADING MEMORY BOARDS YOURSELF!

Most of the popular memory boards allow you to add an additional 64K, 128K, 192K, or 256K. The IBM64K Kit will populate these boards in 64K byte increments. The kit is simple to install — just insert the nine 64K RAM chips in the provided sockets and set the two groups of switches. Directions are included.

IBM64K (Nine 200ns 64K RAMs) . . . $59.95

EXPAND YOUR MEMORY

TRS-80 to 16K, 32K, or 48K

**Model 1 = From 4K to 16K Requires (1) One Kit
Model 3 = From 4K to 48K Requires (3) Three Kits
Color = From 4K to 16K Requires (1) One Kit

**Model 1 equipped with Expansion Board up to 48K. Two Kits Required — One Kit Required for each 16K of Expansion —

TRS-16K3 *200ns for Color & Model III — $12.95
TRS-16K4 *250ns for Model I — $10.95

TRS-80 Color 32K or 64K Conversion Kit

Easy to install kit comes complete with 8 ea. 4164-2 (200ns) 64K dynamic RAMs & conversion documentation. Converts TRS-80 color computers with E circuit boards, & all new color computers to 32K. Minor modifications of 32K memory will allow the use of all the 64K of the dynamic RAM providing you have a FLEX DOS operating system.

TRS-64K2 . . . . . $54.95

5¼" Mini-Floppy Disk Drive

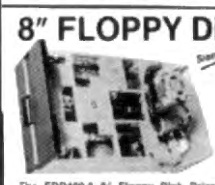
FOR TRS-80 MODEL I / COLOR COMPUTER

Features single or double density. Recording mode: FM single, MFM double density. Seek time: 25msec. Track to track: Power: +12VDC (±0.6V) 1.6A max., +5VDC (±0.25V) 0.8A max. Unit as pic. (4 right doors not incl.) case, power supply, cables: 30-pg. data book incl. Wt. 3½ lbs. Size: 5¾"W x 8"D x 3¾"H.

Perfec Computer Corp.

Part No.	Limited Quantity!	Price
FD200	Single-sided, 40 tracks, 250K bytes capacity	$179.95
FD250	Double-sided, 35 tracks, 630K bytes capacity	$199.95

8" FLOPPY DISK DRIVE



- Shugart 801R compatible
- Single-Sided
- 77 Tracks
- 400/800K Bytes Capacity
- Industry Standard

The FDD100-8 8" Floppy Disk Drive (Industry Standard) features single or double density Recording mode: FM single, MFM double density. Transfer rate: 250K bits/sec. single density, 500K bits/sec. double density. The FDD100-8 is designed to work with the single-sided soft sectored IBM Diskette I, or eq. disk cartridge. Power: 115VAC @ 50-60Hz, +24VDC @ 1.7 amps max., +5VDC @ 1.2 amps max. Unit as pictured above does not include case, power supply, or cables. Size: 8.56"W x 14"L x 4.5"H. Weighs 12 lbs. Incl: 96-pg. manual.

Part No.	Price
FDD100-8 . .	$169.95 ea.

✓See List of Advertisers on Page 323

LARGECAPACITYSYSTEMSLARGECAPACITYSYSTEMSLARGECAPACITYSYSTEMSLARGECAPACITYSYSTEMSLARGECAPACITYSYSTEMSLARGECAPACITYSYSTEMS

SMALL & (REQ. 32K 2 DISKS)

LARGE CAPACITY

MI PROGRAMS MIII

ON TDOS (A MINI DOSPLUS)

ACCOUNTS RECEIVABLE

5000+ CUSTOMERS

15000+ TRANSACTIONS

BALANCE FORWARD 99 TRANSACT CODES 30-60-90-120 AGED STATEMENTS SHOW DATE/INV#/DESCRIP/AMT (WITH AGEING) SELECTIVE FINANCE CHARGES & RATES FAST ENTRY POSTING W/AUDIT REPORT SUB-ACCTS % OF CREDIT LIMIT DATE OF LAST PAYMENT SALES ANALYSIS SPECIAL 90 DAY ACCOUNTS LABELS

$149.95

GENERAL LEDGER

400+ ACCOUNTS

5000+ TRANSACTIONS/MONTH

NO OTHER SYSTEM OFFERS...

† REPORT FLEXIBILITY/CAPACITY
† DEPARTMENT P & L (UP TO 5)
† UNLIMITED ACCOUNT CATAGORIES
† STATEMENT OF CHANGES (ASSETS)
† PERCENT P&L comparison
100% sales MTD vs YTD
or net sales QTD vs YTD
or total Exp MTD vs QTD

$149.95

TEST SETS $50.00 MANUALS $30.00

HOLMAN D-P SERVICE

2059 WEST LINCOLN 3.00 S&H
OROVILLE, CA 95965 VISA OR MC
916-533-5992 COD

Both for $199.95 ↙355

COTTAGE SOFTWARE

PACKER Machine language program that edits all or part of your Basic program to run faster save memory, or ease editing The 5 options include UNPACK—unpacks multiple statement lines into single statements maintaining logic, inserts spaces and renumbers lines SHORT—deletes unnecessary words spaces and REM statements PACK—packs lines into maximum multiple statement lines, including all branches MOVE—moves line or blocks of lines to any new location on program On 2 cassettes for 16K 32K & 48K
For TRS-80 Mod I or III Level II or Disk Basic ... $29 95

SYSTEM TAPE DUPLICATOR Copy your SYSTEM format tapes Includes verify routines The Model III version allows use of both 500 and 1500 baud cassettes speeds
For TRS-80 Model I or III Level II ... $15 95

CASSETTE LABEL MAKER A mini word processor to print cassette labels on a line printer Includes 50 peel - and - stick labels on tractor feed paper
For TR-80 Model I of III Level II & Printer ... $17 95

PRINT TO LPRINT TO PRINT Edits your Basic program in seconds to change all Prints to LPrints (except Print@ or Print#) or LPrints to Prints Save edited version
For TR-80 Model I or III Level II ... $12 95

FAST SORT ROUTINES for use with Radio Shack's Accounts Receivable Inventory Control I, and Disk Mailing List Systems for Model I Level II Sorts in SECONDS! You'll be amazed at the time they can save Supplied on data diskette with complete instructions
FAST SORT for Accounts Receivable ... $19 95
FAST SORT for Inventory Control I ... $19 95
FAST SORT for Disk Mailing List (specify data diskette of cassette for 1 drive system) ... $14 95
ALL THREE ROUTINES ... $44 95

Prices subject to change without notice Call or write for a complete catalog Dealer inquiries invited VISA and Mastercharge accepted Foreign order in US currency only Kansas residents add 3% sales tax

On-line catalog in Whichita FORUM-80: 316-682-2113
Or call our 24 hour phone (316) 683-4811 or write:

COTTAGE SOFTWARE
614 N HARDING
WICHITA, KANSAS 67208 ↙187

TRS-80™ is a trademark of Tandy Corporation

maximum available memory by requesting only one file (not variable) when you enter Basic from TRSDOS.

Using the Program

When you use this program, you have to enter some information twice. The information is used first to determine how much string space should be reserved. When the string space is reserved with a Clear instruction, the information you entered is erased and must be reentered.

You can move logical records as long as 256 bytes because the buffer splits each record into two fields during the rearrangement routine. However, because the tag sort adds 2 bytes to the strings to be sorted, you may not specify a key field length greater than 253 bytes. This should not detract from the program, since you do not need a tag sort or an in-place rearrangement routine if you can fit that much data into memory.

The rearrangement routine is the heart of this program. The logical approach of that section can be applied in many other ways to achieve greater speed, multikey capability, descending sorts, sorts of compressed numeric variables, and even sorts when the key fields do not fit completely into memory. ■

George Reardon (1450 Ranchero Drive, Sarasota, FL 33582) is a self-employed insurance broker and custom programmer.

```
10 CLS:CLEAR500:DEFINTA-Z:PRINT"DISK SORT IN PLACE":PRINT:PRINT"YO
U WILL HAVE TO GIVE THE COMPUTER SOME INFORMATION TWICE":FORKK=1TO
2500:NEXT
20 CLS:F=1:GOSUB15000:CLS:GOSUB11000:CLOSE:Z!=MEM-200-3*L:IFZ!>327
67THENZ!=32767
22 IFZ!<L*(LK+2)THENCLS:PRINT"INSUFFICIENT MEMORY -- PROGRAM TERMI
NATED":CLOSE:END
25 Z=Z!:CLEARZ:DEFINTA-Z:GOSUB15000:CLS:GOSUB11000
30 IFS1<FBTHENB1=1:M1=0:GOTO50ELSEB1=FB
40 IFLK=<S1-B1+1THENM1=LK:B2=1:M2=0:GOTO80ELSEM1=S1-B1+1
50 IFFB=<S1+1THENB2=1ELSEB2=FB
60 M2=LK-M1
70 REM        LOAD ARRAY ROUTINE
75 CLS:PRINT"LOADING KEY DATA"
80 DIMS$(L):TE$=STRING$(KL,32):FORX=1TOL:S$(X)=TE$:NEXT:FORX=1TOL:
T=X:GOSUB13000:MID$(S$(X),1,M1)=MID$(F1$,B1,M1):MID$(S$(X),M1+1,M2
)=MID$(F2$,B2,M2):MID$(S$(X),LK+1,2)=MKI$(X):NEXT
90 REM        SORT ROUTINE
95 CLS:PRINT"SORTING"
100 B=1
110 B=2*B:IFB<LTHEN110
120 B=INT((B-1)/2):IFB=0THEN190
130 C1=L-B
140 FORC2=1TOC1:C3=C2
150 C4=C3+B:IFS$(C4)<S$(C3)THENMID$(TE$,1,KL)=S$(C3):MID$(S$(C3),1
,KL)=S$(C4):MID$(S$(C4),1,KL)=TE$:C3=C3-B:IFC3>0THEN150
160 NEXT
170 GOTO120
180 REM        REARRANGEMENT ROUTINE
190 CLS:PRINT"PREPARING TO REARRANGE"
10000 FORW=1TOL:S$(W)=RIGHT$(S$(W),2):NEXT:FORW=1TOL:V=CVI(LEFT$(S
$(W),2)):S$(V)=S$(V)+MKI$(W):NEXT:D1$=STRING$(S1,32):C1$=D1$:E1$=D
1$:D2$=STRING$(S2,32):C2$=D2$:E2$=D2$
10005 CLS:PRINT"REARRANGING"
10010 FORX=1TOL:W=X:V=CVI(LEFT$(S$(W),2)):IFV=0ORV=WTHEN10050
10020 Z=V:T=W:GOSUB13000:MID$(D1$,1,S1)=F1$:MID$(D2$,1,S2)=F2$:T=Z
:GOSUB13000:MID$(C1$,1,S1)=F1$:MID$(C2$,1,S2)=F2$:T=W:GOSUB13000:L
SETF1$=C1$:LSETF2$=C2$:PUT1,J:MID$(S$(W),1,2)=MKI$(0)
10030 Y=CVI(RIGHT$(S$(W),2)):IFY=ZTHENT=Y:GOSUB13000:LSETF1$=D1$:F
2$=D2$:PUT1,J:MID$(S$(Y),1,2)=MKI$(0):GOTO10050
10040 T=Y:GOSUB13000:MID$(E1$,1,S1)=F1$:MID$(E2$,1,S2)=F2$:T=Y:GOS
UB13000:LSETF1$=D1$:LSETF2$=D2$:PUT1,J:MID$(D1$,1,S1)=E1$:MID$(D2$
,1,S2)=E2$:MID$(S$(Y),1,2)=MKI$(0):W=Y:GOTO10030
10050 NEXT:CLOSE:CLS:PRINT"SORT COMPLETED":CLEAR0:END
10990 REM      SUBROUTINES
11000 S1=INT(LR/2)+1:S2=LR-S1:OPEN"R",1,NF$:L=N*LOF(1):T=L
11010 GOSUB13000:IFF1$=STRING$(S1,0)ANDF2$=STRING$(S2,0)THENT=T-1:
GOTO11010ELSEL=T:RETURN
13000 J=INT((T-1)/N)+1:M=T-N*(J-1):FIELD1,((M-1)*LR)ASS$,(S1)ASF1$
,(S2)ASF2$:GET1,J:RETURN
15000 CLS:INPUT"LENGTH OF LOGICAL RECORD";LR
15010 INPUT"NUMBER OF LOGICAL RECORDS PER SECTOR";N
15020 INPUT"LENGTH OF KEY DATA FIELD";LK:KL=LK+2:IFLK>253THENPRINT
"KEY FIELD MAY NOT EXCEED 253 BYTES":GOTO15020ELSEIFF=1THEN15040
15030 INPUT"POSITION IN LOGICAL RECORD OF FIRST BYTE OF KEY FIELD"
;FB
15040 LINEINPUT"NAME OF FILE? ";NF$
15050 PRINT:LINEINPUT"ARE THESE ANSWERS CORRECT (Y/N)? ";X$:IFX$<>
"Y"THEN15000ELSERETURN
```

Program Listing. Disk sort program.

SUPER-FAST!

Z80

Relocating Macro

ASSEMBLER

$169.95

Directly generates COM, HEX, or REL files. Flexible REL format allows external bytes and words with complete math operations on them (Microsoft format optional). Features Zilog mnemonics with nested macros, conditionals and include files. Unique one-pass design generates compact intermediate code which is then processed to resolve forward references, yielding tremendous time savings. Complete listing, symbol table and cross-reference output may be sent to any device. The perfect tool for assembly language programming. Linker included. Manual only — $30. For Z80 CP/M and TRS-80.

↙340

SLR Systems

1622 NORTH MAIN ST. • BUTLER, PA 16001 • (412) 282-0864

Shipping $3 U.S., others $7. PA - 6% Check, MO, VISA, M.C., C.O.D.
Most formats available. Dealer and OEM inquiries invited.
Z80, CP/M, TRS-80 TM's of Zilog, Digital Research, Tandy Corp.

DISnDATa

The Only Disassembler That Even Tracks Down DATA!!!

- Outputs instead of the meaningless "equivalent".

```
" H37F7  DEFM  'Cass?'          " AB25  LD   B,E
         DEFB  03H                      LD   H,C
                                        LD   (HL),E
                                        LD   (HL),E
                                        CCF
                                        JR   NZ,$+5     etc
```

- **AUTOMATICALLY** identifies such data areas
- Outputs fully-labeled Radio Shack* or APPARAT** "EDTASM"-format code to display, printer, cassette, or disk. (Printer output fully paginated.)
- Relocates itself to any desired RAM area, up or down by as little as one byte or as many as required.
- Loads programs from cassette or disk and displays entry points.
- Runs on TRS-80 Model I (Level II), Model III, or Model 4 (in Model III mode). 16K or more, cassette or disk.

#1354-12 (Model I/III cassette, Version 2) $34.95
#1354-22 (Model III/4 diskette, TRSDOS* format, Version 2) $39.95

* Registered Trademark, Tandy Corp. ** Registered Trademark, APPARAT, Inc.

REPLiCAS

- Copies virtually **all** formats of cassette files!!!
- **AUTOMATICALLY** senses input cassette density!!! (Model III)
- Allows Mod. III user selection of output density, each file.

#1366-10 (Model I/III cassette) $19.95

Professional Software for both Novice and Expert

Pro/Am Software

To order: phone (513) 435-4480 (M-F, 9 a.m. - 5 p.m. EST) or send check or money order to:

Pro/Am Software
220 Cardigan Road
Centerville, Ohio 45459

↙260

Visa and MasterCard accepted
When ordering via card, include: card number, expiration date, your name, address and phone number.

U.S. Funds only. Add $2.00 shipping (U.S.), $5.00 (overseas) per item.
C.O.D. orders $3.00 additional per item.
(Ohio residents please add 6% Sales Tax.)

TRS-80 Model I is alive and well at the Micromint. We still have the expansion interfaces you need!

Disk-80 Expansion Interface

As featured in Ciarcia's Circuit Cellar
Byte Magazine, March 1981

Reviewed in March '82 "80 Microcomputing"

DSK01	Disk-80 Expansion Interface with 32k RAM A & T	$330.00
DSK02	Disk-80 Expansion Interface with 32k RAM & Printer Port A & T	380.00
DSK03	Disk-80 Complete Kit with 32k RAM & Printer Port	275.00
DSK04	Disk-80 Bare Printed Circuit Board	48.00
DSK05	Printer/Power Supply Circuit Board	16.00

The Disk-80 Expansion Interface is the perfect peripheral for converting your TRS-80 Model I into a professional computer system. The Disk-80 controls up to four 35 to 77 track mini-disk drives, and contains a hardware data separator which substantially increases the reliability of data transfers. Attaches to the CPU/Keyboard connector and comes complete with mini-disk controller, 32K expansion memory, power supply, optional Centronics compatible printer port, real time clock and buffered bus expansion connector.

"Reviewing Disk-80 is almost incongruous, because any comments can be summarized with the sentence, "It works." Dennis Bathory Kitsz, 80 Microcomputing, March 1982.

All interfaces are Radio Shack hardware and software compatible and carry a 60 day warrantee including parts and labor.
All units include user's manual, power supply & auxiliary TRS-BUS connector for future expansion.

Dealer Inquires Invited

N.Y. State residents please add appropriate sales tax.

To Order: Call Toll Free: 1-800-645-3479
(In N.Y. State Call: 1-516-374-6793)
For Information Call: 1-516-374-6793

MICROMINT INC.
561 Willow Avenue
Cedarhurst, NY 11516

Comm-80

As featured in Ciarcia's Circuit Cellar
Byte Magazine, May and June 1980

The COMM-80 is the only interface you need to turn your TRS-80 Model I into a time sharing terminal with provisions for a printer. The COMM-80 combines the most used features of the RS expansion interface in a low cost unit containing a built-in RS-232-C interface, a full 8-bit parallel port and a 40 pin bus connector for future expanstion. Terminal software is included at no extra cost.

- RS-232-C Serial output port (50-19200 baud) with standard DB25 connector.
- Centronics compatible parallel printer port (34 pin)
- 40 pin card edge connector for bus expansion
- Connects directly to CRT terminals, modems, printers, other computers.
- Includes case, power supply & interconnecting cable.

CM01 COMM-80 Serial/Parallel I/O Interface A&T **$150.00**

TRS-80 is a trademark of Tandy Corp. ↙117

↙See List of Advertisers on Page 323

The Biobox

by J.J. Barbarello

Construct a biofeedback interface and learn to monitor and control daily stress and tension.

Biofeedback monitors electronically measure body variations resulting from stress and tension. In day to day living, you consciously vary your behavior (thoughts, mood, and so on). A biofeedback monitor can relay the effect of those variations on your tension level. This information denotes which variations help you reduce stress and tension by practicing conscious control of those emotions.

You can build a biofeedback interface for your Model II, present the software that lets you use the interface, store the results of each use, and document your progress in tabular and graphical formats.

The interface is fairly simple and inexpensive to build. It monitors the change in skin resistance between two adjacent fingers on your hand, a parameter directly proportional to your tension level. The interface is battery powered for safety and requires no modification of the Model II.

The Hardware

You measure skin resistance (which I'll call "R Bio") with two probes connected to a hardware interface (the "biobox"). The biobox connects to the parallel printer port of the Model II (see Fig. 1). Its input comes from the port's prime pin. Alternately (for Model IIs with the newer version Floppy Disk board, Model 12s, and Model 16s), the input can come from the port's strobe pin (pin 1).

The biobox's output goes to the port's p.e. (paper empty) pin (which normally looks for an input from a printer signalling that it is out of paper). A machine-language monitor program, which I'll also describe, controls these pins.

Under software control, the port's prime pin sends a short 5-volt positive pulse to the biobox. The CMOS NAND gate IC2a senses this pulse. A NAND gate connected as in Fig. 1 simply acts as an inverter, reversing the state of the input signal. Note that the 9-volt battery powers IC1 directly, but the CMOS NAND gate receives its power from the 5.6-volt Zener diode source (R2 is required to properly bias the Zener). Thus, any input voltage above 2.8 volts (half the supply) triggers the NAND gate. Also, IC2b's output level is compatible with the Model II's TTL (5-volt) logic level.

Prior to the prime pulse, IC2a's input is at zero volts, making its output 5.6 volts. This high logic level keeps IC1 in an untriggered state. When the computer generates the prime signal, the output of the NAND gate decreases to zero volts for a short time, triggering IC1 (a 555 timer IC). Alternately, if you use the strobe pin as an input, it can be connected directly to pin 2 of IC1. Strobe is normally at the 5-volt level, keeping IC1 in an untriggered state. When you send a pulse to the strobe pin, it also goes to zero volts for a short time, triggering IC1.

When triggered, IC1 begins its timing cycle. Capacitor C1 receives charge from the 9-volt source through the resistance combination that the subject's fingers and R1 provide. (R1 provides a minimum resistance if you short the bioprobes, represented by R Bio, together.) When the charge on C1 reaches 6 volts (2/3 the supply voltage), a comparator inside IC1 rapidly discharges C1. The time required to charge C1 to 6 volts is approximately R * C seconds, where R is specified in megohms and C in microfarads. Since

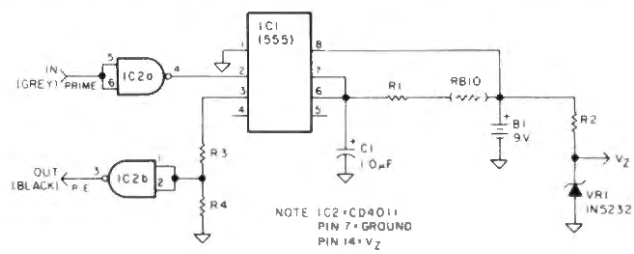


Figure 1. Schematic diagram of the biobox.

The Key Box

Model II
64K RAM
Basic
Editor/Assembler

Ammicro introduces the first letter quality printer for $680 that can also be used as a typewriter.

The MICROWRITER™ Daisy wheel printer.

There was a need for a low cost letter quality machine that would be suitable for use as an office typewriter, and as a computer printer. Ammicro met that need by combining the Microwriter parallel interface and the traditional Olivetti craftsmanship that was available in their **Praxis machine.**

With the Microwriter you can have the best of both worlds a letter quality printer, and a high quality office typewriter all in one machine, that sells for less than the cost of a good dot matrix printer!

It's not just printer or a typewriter that comes complete with a deluxe carrying case, but a feature-packed, lightweight machine that doubles as an office typewriter. This printer is a simple, low cost, reliable unit which can be utilized with word processing systems, microcomputers, personal computers, and small business systems. The Microwriter's low noise level and slim modern styling allow it to blend with any decor.

The Microwriter's print quality is identical to the finest office typewriters on the market. This machine is not only perfect for letters and manuscripts, but with it s 165 character, 12 inch print width, the machine is perfect for letter quality budget spread sheets, price lists, data sheets, and forms.

The Microwriter can tab, rule single lines both vertical and **horizontally**, underline and print at 10, 12, or 15 characters per inch (switch selectable)! Its ten character memory for automatic error correction, lift off correction ribbon, and fixed or **programmable** page formats are a few of the many features that make it a perfect office typewriter. Microwriter not only handles letter and legal size sheet paper in widths up to 12 inches wide, but also handles fanfold paper.

There's a wide selection of 21 interchangeable daisy wheels available. And ribbon cassettes that just drop in.

It s operation as a computer printer is simple. Just load it up with paper and you are ready to go. Centronics compatible parallel output cables are currently available from stock for the following computers: IBM PERSONAL COMPUTER™, OSBORNE 1™, ZENITH Z-100™, BURROUGHS B-20™, Convergent Technologies models IWS & AWS™, TRS-80 MODEL I, II, III™, APPLE II™. . . custom cables also available by special order.

This machine creates a new standard by which all current low cost letter quality printers will follow. Ammicro's Microwriter is truly designed for the lifestyles of the 80's and for decades to come.

Why settle for just any printer when you can have a MICROWRITER. . . . a fine letter quality typewriter for you and your computer.

The Microwriter is the only daisy wheel printer on the market for $680. For more information, see your local computer dealer or contact Ammicro directly.

ammicro™ corp

122 East 42 Street, Suite 1700, New York, N.Y. 10168
(212) 254-3030

258

MasterCard OR VISA

MICROWRITER is a trademark of Ammicro Corporation. PARAXIS 30 is a trademark of Olivetti.

See List of Advertisers on Page 323

C and R1 remain constant, the duration of the timing cycle is directly proportional to the value of R Bio.

Prior to the timing cycle, pin 3 of IC1 is at zero volts. NAND gate IC2b inverts this zero-volt level to provide a 5.6-volt output to the Model II. During the timing cycle, pin 3 of IC1 rises to 9 volts. Resistors R3 and R4 form a voltage divider which provides 4.5 volts to the NAND gate IC2b. Since the NAND gate inverts the voltage level, the output pin is at zero volts. When the time cycle is complete, pin 3 of IC1 returns to zero volts and IC2b's output returns to 5.6 volts.

The result is that for each time IC1 is triggered, the p.e. output produces a negative pulse whose duration is directly proportional to the resistance across R Bio. When R Bio decreases (as with increased sweating caused by tension), the resultant output pulse is shorter. When R Bio increases (as with increased calm), the output pulse is longer. The duration of the output pulse is a direct measure of level of calm (or an inverse measure of tension). Knowing this, all you need do is create a software controller to send a pulse via the prime (or strobe) pin and measure the time until the p.e. pin returns to its normal high state. You can use this data in a subsequent program as a basis for determining the current level of tension.

```
00010          ;*********************************************
00020          ;*      SOURCE=BIO/SRC    -   OBJ=BIO/CMD    *
00030          ;*      Version 1.0             5 Mar 1983   *
00040          ;*          c 1982 by J.J. Barbarello        *
00050          ;*      Biofeedback Monitoring Interface     *
00060          ;*      Machine Language Driver. For use     *
00070          ;*      with BIOBOX Hardware.                *
00080          ;*                                           *
00090          ;*********************************************
00100          ORG     0F050H
00110          LD      A,129   ;TURN OFF
00120          OUT     (255),A ;  REAL TIME CLOCK.
00130          LD      (0F095H),HL;Save HL counter
00140          LD      HL,0    ;Initialize
00150          LD      DE,1    ;  Registers.
00160          LD      A,0     ;Send A pulse
00170          OUT     (0E0H),A;  To the Line Printer's
00180          LD      A,8     ;  "PRIME" Pin (# 26),
00190          OUT     (0E0H),A;  (PRIME Stays at Logic 1).
00200 LOOP     IN      A,(0E0H);Get status of "Printer".
00210          BIT     6,A     ;Check Bit 6 ("Paper Empty")
00220          JR      NZ,DONE ;If set, jump to "DONE".
00230          ADD     HL,DE   ;Increment HL Counter.
00240          JR      C,Done  ;If Count FFFFH, Return.
00250          LD      B,2     ;Must delay here so count
00260 WAIT     DJNZ    WAIT    ;  is not too high!
00270          JR      LOOP    ;Not done yet. Go back.
00280 DONE     EX      DE,HL   ;Save count in DE.
00290          LD      HL,(0F095H);Get addr of variable.
00300          LD      (HL),E  ;Put Count LSB in variable.
00310          INC     HL      ;Get ready for MSB.
00320          LD      (HL),D  ;Put Count MSB in variable.
00330          RET             ;Return to BASIC Program.
00340          ;
00350          ;   RESTORE PROPER "PRIME" LOGIC LEVEL
00360          ;
00370          LD      A,0
00380          OUT     (0E0H),A
00390          RET
00400          END
```

Program Listing 1. BIO/CMD driver.

R1,R2,R3,R4	10,000 ohm, ¼ watt resistor
C1	1.0 μF dipped tantalum capacitor
VR1	1N5232 (5.6-volt Zener diode)
IC1	555 timer integrated circuit
IC2	CD4011 quad 2-input CMOS NAND gate IC
B1	9-volt battery clip
Connector	AP Products Header #929975 (see text)

Hardware Items:
Snap-in 9-volt battery holder
5 feet of #24 AWG stranded speaker wire
1 package Velcro fastener strips (Radio Shack P/N 64-2345)
1½-inch by 1¼-inch piece of household aluminum foil
Two #4-40 by ¼-inch machine screws
Two #4-40 nuts
Four #6 flat washers
One printed circuit board (see text)

NOTE: A kit of all items listed above and a minimum system disk containing the BIO/CMD and BIO programs is available for $39.95 from the author. NJ residents add 6 percent sales tax. A similar Model I/III kit is available. Write for details.

Table 1. List of materials needed.

The Software Controller

There are two separate elements of software. The first is a machine-language software controller. Under normal circumstances, the interface produces a pulse of about 100 milliseconds. To determine minor variations in the pulse width, your software must produce a significant count within that time span. In addition, there are no Basic commands that allow you to address the

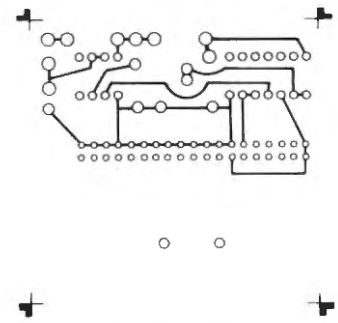


Figure 2. Printed circuit board pattern.

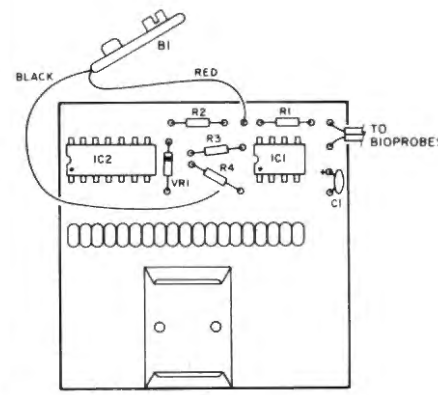


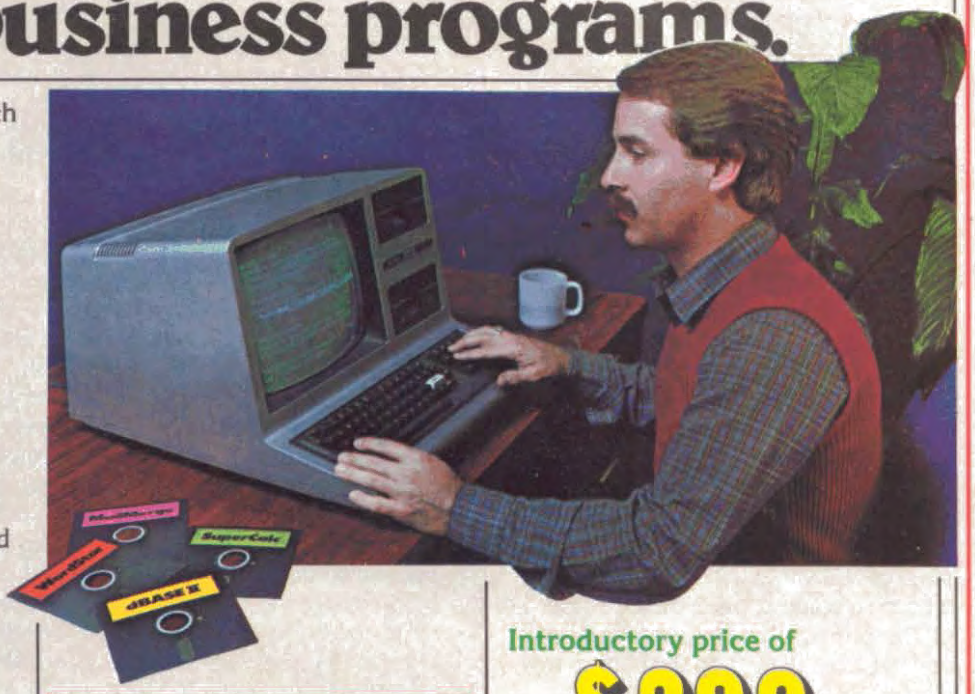
Figure 3. Component side of printed circuit board.

Put 64K CP/M® 2.2 in your TRS-80 Model III and tap into 2,000 business programs.

Now you can run programs such as WordStar, dBASE II, SuperCalc, MailMerge and virtually thousands of other CP/M-based programs on your TRS-80 Model III.

CP/M 2.2 is the industry standard operating system that gives you access right now to over 2,000 off-the-shelf business programs.

Our plug-in Shuffleboard III comes with 16K of RAM, giving your Model III the power of full 64K CP/M 2.2 without interference of the ROM or video memory. In fact, the Shuffleboard will appear transparent in the TRS-80 mode and will not interfere with any DOS operation.



READ and WRITE Osborne, Xerox and IBM personal computer software plus many more popular formats.

Unfortunately, there is no standardized CP/M format for 5¼" diskettes. But we have developed a way to READ/WRITE and RUN standard programs under the following single-sided formats: Osborne 1 S/D, Xerox 820 S/D, IBM PC* D/D for CP/M 86 only, Superbrain D/D, Kapro II D/D, HP 125 D/D and TeleVideo D/D.

*Will Read and Write Only.

Easy plug-in installation.

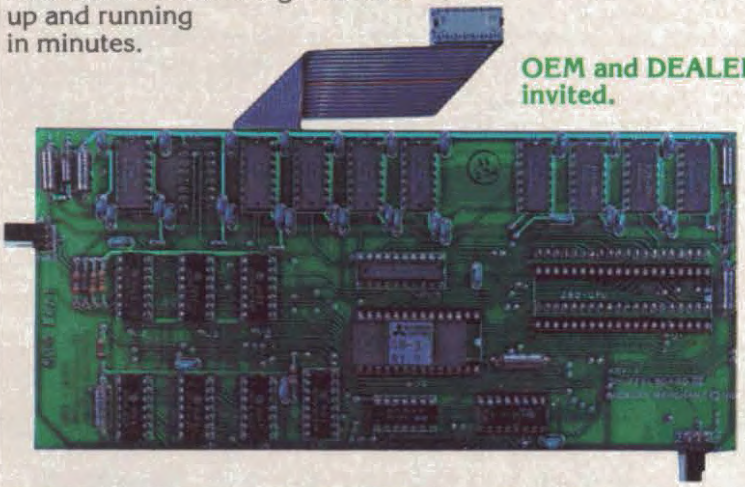
It's so simple. The Shuffleboard III plugs into two existing sockets inside your Model III. There are no permanent modifications, no cut traces and no soldering. You'll be up and running in minutes.

New Products.

80 x 24 VIDEO BOARD: Features dual intensity screen, programmable cursor control for block, underline & blink rate, on-board bell with audible keyclick, battery-operated real time calendar/clock, full ASCII character set plus 256 special character graphics, dual RS-232 outputs and composite video output.

FLOPPY DISK CONTROLLER: Now you can access 5¼" and 8" floppy disk drives in any combination up to 4 drives of S/D density, S/D sided. Tap into a wealth of CP/M software which comes on 8" IBM 3740 format or Pickles & Trout CP/M for the Model II.

SOFTWARE: Additional CP/M software programs are available. Call or write for details.



OEM and DEALER inquiries invited.

Introductory price of $299.

The Shuffleboard III comes fully burned-in and tested complete with 64K CP/M 2.2 and MBASIC 80 interpreter, plus software manuals and a first class user's manual — with a 1-year limited warranty and 15-day no-risk free trial — for only $299.

See the Shuffleboard III at your dealer's now.

Once you see what the Shuffleboard can do for your Model III you'll want one at once. If your dealer does not yet stock the Shuffleboard have him give us a call. Or send check, money order, VISA or MASTERCARD number (sorry, no COD's) plus $5 shipping per board ($17 outside the USA & Canada)* directly to the address below. Cal. residents please add sales tax. Credit card purchases can be phoned in directly and we'll ship from stock.

(415) 483-1008

*Air mail shipments to Canada & all other countries.

Memory Merchant™

14666 Doolittle Drive San Leandro, CA 94577
(415) 483-1008

461

WordStar & MailMerge are trademarks of MicroPro.
SuperCalc is a trademark of SORCIM.
dBASE II is a trademark of Ashton-Tate.
CP/M is a trademark of Digital Research.
TRS-80 is a trademark of Tandy Corporation.
IBM is a trademark of IBM Corporation.

printer port's prime pin directly. So, machine-language is the only viable approach.

However, once you obtain the count data, Basic is more than adequate to provide feedback to the human subject. So the main biofeedback monitor program (the second element of software) is a Basic program.

Building the Biobox

Figure 2 is a full-scale printed circuit board (PCB) pattern used to make the biobox PCB. You must make the single connector from AP Products Header #929975, a 36-contact per row, dual-row female header. The header is cut so that 19 contacts per row remain, and it fits properly in the Model II's parallel printer port. The biobox is self-contained on the PCB; it requires no case and plugs directly into the printer port connector.

However, if you're using the strobe pin, you must first modify the PCB pattern. Remove the trace (line) between pin 4 of IC2 and pin 2 of IC1. Then add a trace to connect pin 2 of IC1 to pin 1 of the printer port connector (the second pin from the left on the bottom row of pins).

Using Fig. 3 as a guide, mount the components on the component side (without the copper pattern) of the finished PCB (see Table 1 for identification of the components). Pay special attention to the orientation of IC1, IC2, VR1, and C1; these components are polarized and you must orient them as shown. Then mount a 9-volt battery holder and a 9-volt battery clip on the copper pattern side of the PCB.

There is no power switch; to apply power, simply connect the battery clip to a 9-volt battery.

At this point, inspect your soldering. The IC leads and connector pins are very close together (0.1-inch spacing). Be sure you solder each lead, but that there are no solder bridges.

The last item to construct (and perhaps the most important) is the bioprobe set. It consists of two identical bioprobes attached to the index and middle fingers of one hand. Its only purpose is to make electrical contact with the skin surface. You'll need the material listed in Table 1 and an Exacto knife.

Before you begin, slit between the conductors on one end of the zip cord. Grasp the two conductors and "unzip" the wire to a length of about 7 inches. Make a knot at the end of the separation.

Now, to make a bioprobe, follow these steps: Cut a 1 1/4- by 3/4-inch piece of loop material from one of the 3- by 1-inch loop pieces. Cut one of the 3- by 1-inch hook pieces to 3- by 3/4-inches. Using the Exacto knife, cut a 1/8-inch square in one of the short ends of each of the pieces just formed (see Fig. 4).

Get a 1 1/2- by 1-inch piece of aluminum foil. Remove the blue backing paper from the loop piece and place the aluminum foil on the self-sticking surface of the loop piece. Trim off the ex-

Software Controller Line Descriptions

The Software Controller

The software controller (BIO/CMD) is shown in Program Listing 1. Line 100 indicates the starting address (0F050 hexadecimal (hex)) in the protected memory area of the Model II. Lines 110 and 120 send data to port 0FF hex, the memory bank select register, non-maskable interrupt mask register, and video enable. The contents of this memory address determine if the program can read the keyboard, if the video display is on or off, if the real time clock is running and whether you've selected the 80- or 40-character display mode. Data sent to this port turns off the real time clock interrupts while maintaining all other parameters.

If the clock were not disabled, it would periodically interrupt program operation. During these interruptions, the driver would not be counting, but the biobox timing cycle continues, though the count is incorrect. So, before triggering the biobox, the program disables the clock. When you return from the controller, TRSDOS automatically reenables it.

Line 130 saves the address of the Basic variable to which the count is transferred (i.e., the "X" in X = USR (0)). Line 140 loads the HL register (where the program stores the count) with zero. Line 150 loads the DE register with 1 (the value by which the count increases each time). Lines 160–190 send the pulse to the prime pin.

Line 200 starts the timing loop. Here, the program loads the printer port status into the A register, then checks bit 6 (the p.e. pin) to see if it's high. If it is, line 220 passes execution to line 290 (DONE). Otherwise, line 230 adds 1 in the DE register to the count in the HL register. If the program counts a value greater than 65535 (FFFF hex), a carry occurs. Line 240 checks for this and, if found, also passes execution to DONE. This condition lets the monitor break out of an endless count if the p.e. pin is never triggered. Since the routine is fast, you must delay somewhat to get the count in a useable range. Lines 260 and 270 create a short delay. Then line 270 returns execution to the beginning of the timing routine.

When the count is done, line 280 transfers it to the DE register for temporary storage. Then the program retrieves the address of the Basic variable and loads it into the HL register in line 290. The count then passes, in least significant bit-most significant bit form, to that variable in lines 300–320. Finally, line 330 returns execution to Basic.

After the main biofeedback program ends, you must reset the prime pin to a high level; otherwise the program won't print its results. Lines 370–390 reset the prime pin and return to Basic.

In the strobe pin version, the following lines are changed:

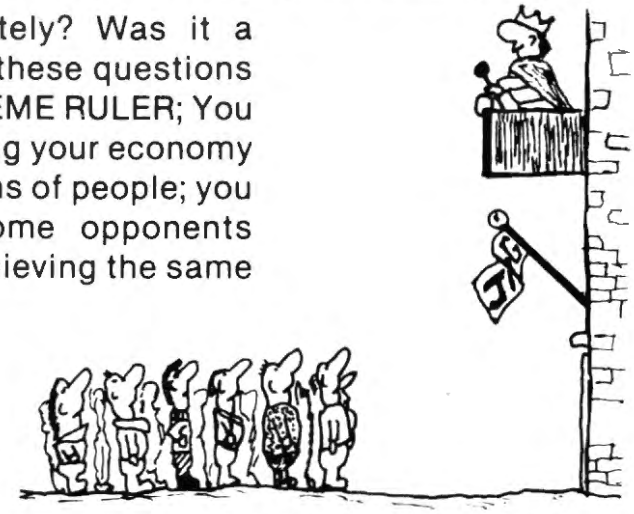
```
00160   LD      A, 1          ; Create a STROBE pulse and send
00170   OUT     (0E1H),A      ;  it to the printer port.
00180   NOP                   ; Lines 180, 190, 370, and 380 are
00190   NOP                   ;  not necessary so they've
00370   NOP                   ;  been replaced with NOPs.
00380   NOP
```

The Biofeedback Monitor Program

Program Listing 2 monitors your responses in Basic. Line 10 loads the machine-language monitor and defines the entry points of 0F050 hex (monitor) and 0F07C hex (restore proper prime level). Line 40 opens a disk file that maintains the results of all trials you want to store. The program

SUPREME RULER

Have you conquered the World lately? Was it a Challenge? If the answer to either of these questions is NO, you obviously don't have SUPREME RULER; You haven't led your own country, managing your economy and controlling the destinies of millions of people; you haven't had the chance to overcome opponents (Human and/or Computer) bent on achieving the same goals.



In SUPREME RULER you must protect your economy (or else risk a recession), support and feed your people, encourage new business, manage government revenues, and control your army. These and many other factors are interdependent, making this a very challenging game/simulation.
Supports up to 9 countries (4 with 16K), either human or computer controlled. The computer plays by all the rules, and makes a worthy opponent in single-player games.

16K and 32K versions together on Cassette, with 40 Page Manual. PRICE: $18.50
32K version (with SAVE GAME feature) on Disk with 40 Page Manual. PRICE: $20.50

Model I/III

For those of you with 48K:

SUPREME RULER PLUS!

The extra memory is filled with many new features, expanded reports, more intelligent computer opponents with selectable "skill levels", and MUCH MORE! Comes with a 50 page manual and a start-up booklet.

Provided on either Disk or Cassette. PRICE: $26.50

DEALER INQUIRIES INVITED

OUR "TRIPLE PROTECTION" GUARANTEE

In today's software world it is hard to tell a good program from a bad one by only a magazine ad. that's why JMG has a warranty plan that will guarantee your satisfaction. Here is our "Triple Protection" guarantee

1) **QUALITY GUARANTEE**: If you are unsatisfied with the software product you have purchased, you may return it (in good condition) within 14 days for a refund, less a $2 handling charge. (We also ask that you send us a brief letter stating the reason for your return.)
2) **UPDATES GUARANTEE**: We always listen to our customers, and we often improve and expand our software products on the basis of their comments. If we make an improvement to a product and release a new version, all our previous purchasers will be notified and offered the update. To receive an update, you only have to return your original disk plus $1 for shipping costs.
3) **MEDIA GUARANTEE**: The diskette or cassette has a Lifetime Guarantee. If yours turns out to be defective, or it fails and you do not have any backups made, then just return the disk/cassette and we'll replace it.

TO ORDER: Mail or Phone your order,

OR

Go and see your nearest dealer. If he doesn't carry JMG programs, shout at him a bit.

JMG SOFTWARE INTERNATIONAL

P.O. BOX 598
FALLS STATION,
NIAGARA FALLS, N.Y.
U.S.A. 14303

OR

710 UPPER JAMES ST.
HAMILTON, ONTARIO
CANADA L9C 2Z8
(416) 389-6086

THE FINE PRINT:

We accept VISA and MasterCard
All prices in U.S. Funds
Please allow 1 or 2 weeks for PERSONAL CHECKS to clear
SHIPPING CHARGES are $2.00 in North America, $5.00 overseas

EXTERMINATE!

The World is counting on you to annihilate a horde of alien bugs that are trying to escape from an underground cavern. Your only weapons are your skill, strategy, and an armed "Rover". This 100% Machine Language program has quality graphics and sound, and surprises to keep you busy at every new skill level.

EXTERMINATE on Cassette, PRICE: $15.50
Model I/III Diskette, PRICE: $17.50

* Order now and you will receive a free "Bug Hopper" Jumping Disc! *

126

See List of Advertisers on Page 323

cess foil. On the end of the hook piece with the 1/8-inch square, measure back 1/2 inch and make a cut just deep enough so the 1/2- by 3/4-inch of backing paper can be removed. Remove the blue backing piece, leaving the rest intact.

Place the loop piece on the exposed self-stick surface of the hook piece so the 1/8 inch squares align and the aluminum foil is in the middle (see Fig. 5). Make a single puncture in the aluminum within the 1/8-inch square. Do not remove the aluminum; you only want to be able to insert a screw. Insert a #4-40- by 1/4-inch screw through the 1/8-inch square so that the screw head rests against the Velcro. Place a single #6 washer over the end of the screw.

Strip 3/4 inch of insulation from one conductor on the separated end of the zip cord. Wrap the exposed wire around the screw end so that the insulation ends at the surface of the washer. Place another washer on the screw over the wire. This creates a "sandwich" with the washers on the outside and the wire in between.

Secure the assembly with a #4-40 nut. Don't rotate the screw while tightening the nut. The aluminum foil makes contact with the screw in the 1/8-inch square and you don't want to break this contact. Remove the remaining blue backing from the Velcro. Now handle the self-stick material until it no longer adheres.

Repeat the preceding steps to make an identical bioprobe. You will now have the two bioprobes on the separated end of the zip cord. Strip 1/4 inch of insulation from the two conductors on the free end of the zip cord and attach either conductor to either of the two remaining holes in the PCB. This completes construction of the biobox.

Creating BIO/CMD

If you have an editor/assembler available, you can use Listing 1 to create BIO/CMD. If not, you use TRSDOS'

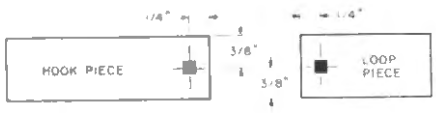


Figure 4. Overview of bioprobe set.

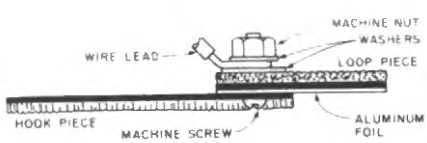


Figure 5. Side view of bioprobe set.

```
TRS-80 Model II DEBUG Program
F050   FF 00 FF 00 FF 00 FF 00   FF 00 FF 00 FF 00 FF 00   ................
F060   FF 00 FF 00 FF 00 FF 00   FF 00 FF 00 FF 00 FF 00   ................
F070   FF 00 FF 00 FF 00 FF 00   FF 00 FF 00 FF 00 FF 00   ................
F080   FF 04 FF 00 FF 00 FF 00   FF 00 FF 00 FF 00 FF 00   ................
F090   FF 00 FF 00 FF 00 FF 00   FF 00 FF 00 FF 00 FF 00   ................
F0A0   FF 00 FF 00 FF 00 FF 00   FF 00 FF 00 FF 00 FF 00   ................
F0B0   FF 00 FF 00 FF 00 FF 00   FF 00 FF 00 FF 00 FF 00   ................
F0C0   FF 00 FF 00 FF 00 FF 00   FF 00 FF 00 FF 00 FF 00   ................
   PC    SP  SZHPNC  AF    BC    DE    HL    IX    IY    AF'   BC'   DE'   HL'
 2800  21FE  000000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
```

Figure 6. Debug screen before entering BIO/CMD machine code.

fields the buffer into five variables. A1 is the initial mood you identify, an integer between two and nine. A2 is the initialization count the interface obtains, a single-precision number between zero and 65535. A3 represents the final count obtained at the end of the session. A4 is the increment (an integer) and A5 is the total elapsed time of the session in seconds.

Line 40 also obtains the date and formats it for presentation. Line 50 obtains the current time. The first request for time accesses the disk; subsequent requests do not. Therefore, this initial request accesses the disk as it rotates due to previous requests to load BIO/CMD and open the disk file; subsequent requests do not. This is simply a device to avoid additional wear on the disk.

The remainder of line 50 and the lines that follow (through line 120) create the screen display. The monitor consists of a graph-type presentation. The area formed by the X axis is divided into 10 increments, with the first labelled "CALM" and the last "TENSE". The Y axis is also divided into 10 increments, each indicating increased tension. One hundred boxes (10 boxes by 10 boxes) populate the area formed by the X and Y axes. Each vertical stack of 10 boxes represents a major mood change; each box within the stack represents a minor mood change. The object is to consciously cause all boxes to disappear.

Line 130 asks if you want instructions. Should you request them, execution jumps to line 600. Lines 600–710 present the instructions on two separate screens. The first screen asks you to press any key to continue (i.e., GOSUB 720 in line 680). After both screens have appeared, line 710 clears the screen, sets a flag (FLG = 2), and returns execution to line 60 to redraw the monitor presentation. Note that line 120 skips the instructions prompt if the flag is greater than zero.

Line 150 erases the copyright notice, and line 160 asks for an evaluation of your initial mood. Line 170 only accepts a number between two and nine. The program uses the number entered in line 180 to define C (column), while R (row) is initially set to five, the highest value on the Y axis. In addition, line 180 clears the error message area (screen line 3) and turns off the cursor.

Line 190 erases all boxes to the right of the stack corresponding to the initial mood specified. Line 200 tells you where initialization takes place, sets the flag (if it hasn't been set previously), and triggers the interface once (i.e., X = USR(0)) to bring the prime pin down to zero volts (its normal state is 5 volts). Then lines 210 and 220 interrogate the interface five times, take an average of the results, and use this number as the initial count (XO = X Old, or old count). The program determines other variables here also. INC (or increment) is the quantum number. For instance, if the initial count is 16000 and the range selected is 5, it calculates the increment as 16000/(10 * (5 + 5)), or 160. To add or remove a box, the count must change by at least 160. XL is the other calculated variable (XL = X (low count)). This number corresponds to a fully calm mood (where all boxes are erased). Line 230 clears the initializing prompt and sets the start time (TS$).

Lines 240–420 make up the monitoring routine. Line 240 displays a small dot above the last box remaining (e.g., the 10th box in stack 5 if 5 were selected as the initial mood). Line 260 retrieves the current status of the interface. If it returns a zero, the monitor counted past 0FFFF hex or didn't count at all. In either case, a fault has occurred in the hardware, and line 260 forces a jump to the Error Trap routine starting at line 550.

this publication is available in microform

University Microfilms International

300 North Zeeb Road
Dept. P.R.
Ann Arbor, MI 48106
U.S.A.

18 Bedford Row
Dept. P.R.
London, WC1R 4EJ
England

80micro
Single Back Issues

January 1980 to June 1980 . . . . . 3.00
Single back issue
July 1980 to May 1983 . . . . . 3.50
Single back issue
June 1983 on 4.50
Add $1.00 per magazine for shipping.

10 or more back issues
add $7.50 per order for shipping.

Back issues•Attn. Mail Order
80 Pine St.•Peterborough, NH 03458

PRESERVE 80 MICRO WITH BINDERS & FILE CASES.

Keep your issues of *80 Micro* handy and protected in handsome and durable library file boxes or binders. Both styles are bound in dark green leatherette with the magazine logo stamped in gold.

File boxes: each file box holds 12 issues, with spines visible for easy reference.
$5.95 each, 3 for $17.00, 6 for $30.00
Binders: each binder holds 12 issues and opens flat for easy reading.
$7.50 each, 3 for $21.75, 6 for $42.00
(USA postage paid. Foreign orders must include $2.50 per item.)
Please state years desired (1980 to 1984).
Send check or money order to:
Jesse Jones Box Corp., P.O. Box 5120, Philadelphia, PA 19141; please allow 6 to 8 weeks for delivery. Sorry, no C.O.D. or phone orders.

Instant typing

NOW FOR MODEL 100

Say "Goodbye" to the awkward hunt & peck method of typing! Instant Software introduces you to Typing Teacher—the patient tutor that will improve your typing skills. This complete seven-part package takes you all the way from initial familiarization with the keyboard, through words and phrases, to complete mastery of the keyboard.

On screen diagrams show you the correct placement for fingers. Displays keep eyes up and away from keyboard to master proper techniques.

Take home TYPING TEACHER today and type like a pro tomorrow.

Requires: TRS-80* Model 100. 8K #0463RH $17.95.

TRS-80*, Tape, Mod I and Mod III. 16K. #0099R $17.95

TRS-80 Disk Model I & III w/CONVERT, or PMC, 16K, #0451RD $22.95

☐ *YES!* **Send me Instant Typing from Instant Software.**

____0463RH@$17.95

____0099RD@$17.95 ____0451RD@$22.95

Please add $2.50 for postage & handling.

VISA, MASTERCARD, AMERICAN EXPRESS ACCEPTED.

Card#

MC Bank# Expires

Signature

Name

Street

City

State Zip

OR CALL TOLL FREE **33AB8T**
1-800-258-5473

✓597

Instant Software
Rt. 101 & Elm St.
Peterborough NH 03458

Instant Software

*TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation.

LIMITED OFFER

NEWDOS - 80 ver. 2.0
and DOSPLUS ver. 3.4

A combined regular price of $299.96

Now $149.00 combined price

or call for separate pricing. Offer subject to cancellation without notice.

CALL TOLL FREE
800-835-0071

In Kansas
316-665-3611

SALES DATA, INC.

526 E. 4th ✓142

HUTCHINSON, KANSAS 67501

MODEL 1 UPGRADE

- Run 64K CP/M or your Model 1 DOS
- 48K internal memory on power-up
- plus access to 32K E/I memory
- 2.7K protected RAM above ROM
- Overlay ROM with your RAM BASIC

BIGMEM kit includes 64K RAM chips, A&T controller, cable, solder and instructions. NEW LOW PRICE $169! Disk software: 64K CP/M 2.2 ($119), Utilities ($20), Expand AIDS3 Mem ($20), 55K VisiCalc Storage ($34). Free USA shipping.

VISA MasterCard

MICROHATCH
PO Box 501
DeWitt, NY 13214
(315)446-8031 after 6PM

VISICALC TM VISICORP, BIGMEM TM MICROHATCH, CP/M TM DIGITAL RESEARCH INC.

✓419

The Lawyer's Microcomputer

A twice monthly newsletter for lawyers using Radio Shack Computers.

For a one year subscription
$58 U.S.
$70 Canada-Mexico
$94 Foreign

R.P.W. Publishing Corp.
P.O. Box 1046A
Lexington, S.C. 29072
(803) 359-9940 ✓191

✓See List of Advertisers on Page 323

Line 270 scans the keyboard, and if you have pressed any key, it gets the current time (TF$ = Final Time). If you have pressed the F1 key, line 280 triggers a restart after asking if you want to save the results (i.e., GOSUB 800). If you have pressed the F2 key, line 290 causes the program to jump to the End Session routine at line 900. If you've pressed no keys (or any key other than F1 or F2), the program erases the locating dot at line 300. Printing and erasing the locating dot causes a blinking effect.

Line 310 checks to see if the count has changed by more than the increment. If not, the program jumps to line 420, where a delay proportional to the current count occurs before returning to the beginning of the monitoring routine.

In use, the time to remove or add a box due to change in mood may be significant. The locating dot blinks with each pass through the monitoring routine for two reasons. First, its blinking rate indicates your current mood. The faster it blinks, the more tense you are; the slower it blinks, the calmer you are. Second, it assures you that something is happening; you might otherwise think the computer is caught in an endless loop.

If the count changes by more than one increment, line 320 checks for an increasing count (calming) and, if so, jumps to line 380. Otherwise the program continues in line 340 where XO increases by one. R increases too, and the program erases one box and checks for the bottom of the stack. In this case, C decreases by five to point to the next stack on the left. Line 350 checks to see that all boxes are removed and, if not, delays via the subroutine at line 500. It then returns to line 330 to see if it must remove another box (i.e., if X is still more than the updated XO). If not, the program jumps to line 410 and creates the proportional delay before returning to the start of the monitoring routine.

If the monitor identifies a decreasing count in line 320 (more tense), the program jumps to line 380. Then R decreases, adding one box, and checks for the top of the stack. C increases by five to point to the new stack on the right. Line 390 checks to see if all 100 boxes are present and, if so, adds no more. Line 400 decreases XO by one, adds the new box, delays, and then returns to line 320 to see if another box must be added (i.e., X is still less than the updated XO).

The error trap starting at line 550 serves two purposes. If the program encounters an error during a Top-of-Form command or normal printing, it displays an error message and you can resume printing after you correct the error. If the program encounters any other error, you can reset or restart it.

Lines 800–850 store results of the session. Line 830 extracts the total time by evaluating TS$ (the start-time string) and TF$ (the ending-time string). Line 840 fills the buffer and adds the data to the end of the file. Line 850 clears the message line and returns to the calling portion of the program.

PROFESSIONAL SOFTWARE TRS-80* MODEL I & 16 NOW AVAILABLE!

DISK SORT 2.0 FOR HARD DISK OR FLOPPIES NEW! UP TO 15 • % FASTER $119.95*
TRSDOS* 2.0a & 4.1 COMPATIBLE FILL IN THE BLANKS & GO TO IT
WILL SORT ANY RANDOM FILE OUTPUT OPTIONS TAGS TAGS & KEYS OR COMPLETE FILE
1,000 REC.s SORTING 15 BYTES INCLUDING ALL DISK I/O = 2 MIN. 33 SEC.s (FLOPPY)
HARD DISK IS MUCH FASTER! NON STOP JOB STREAM EXECUTION

BASIC CROSS REFERENCE • SAVE HOURS! $59.99*
• SEE USED LINE #s/NAMES AT A GLANCE • PRODUCES NICE PROGRAM LISTING
• OTHER OPTIONS INCLUDE MAKING NEW PROGRAMS DROPPING REMARKS

CUSTOM PROGRAMMING/SYSTEMS DESIGN

DOC. ONLY $10.00 DEDUCTIBLE ON PURCHASE

*PLUS POSTAGE AND HANDLING PRICES SUBJECT TO CHANGE WITHOUT NOTICE

TRS-80 & TRSDOS ARE REGISTERED TRADEMARKS OF TANDY CORP.

GOOD-LYDDON DATA SYSTEMS ☞186
5486 RIVERSIDE DR. • CHINO, CA 91710 • (714) 980-4563

M/C VISA ACCEPTED

Debug and Dump utilities to create it as follows:

From TRSDOS READY, type DEBUG ON, hit the enter key, type DEBUG, and press the enter key.

When the Debug presentation appears, press the M key and then press F050 (do not press the enter key).

When the presentation of Fig. 6 appears, press the F1 key. The cursor jumps to the first position on the F050 line. For the prime pin version, type in the following characters exactly (do not press the space bar or the enter key and make sure the caps key is on):

```
3E81D3FF2295F02100001101003E00D3E03E08
D3E0DBE0CB772009193806060210FE18F1EB
2A95F0732372C93E00D3E0C9
```

For the strobe pin version, use these characters:

```
3E81D3FF2295F02100001101003E01D3E10000
0000DBE0CB772009193806060210FE18F1EB
2A95F0732372C900000000C9
```

Check to ensure that you entered all characters correctly. If not, move the cursor with the arrow keys to the incorrect entry and type in the proper character. When everything is correct, press the F2 key.

Press the escape key. Then press the O key. When TRSDOS READY appears, type DUMP BIO/CMD [START = F050,END = F080] and hit the enter key.

Type DIR, hit the enter key, and note that you have a new file named BIO/CMD.

You may now enter Basic, and type in and save the BIO program.

Using the Biobox

Enter Basic with at least one file buffer available (i.e., BASIC -F:1). Using the disk with both the BIO and BIO/CMD programs, type RUN"BIO". Plug the biobox into the printer port so that the battery is on the bottom. The area should be quiet, and you should relax yourself by loosening tight clothing, removing your shoes, and so on.

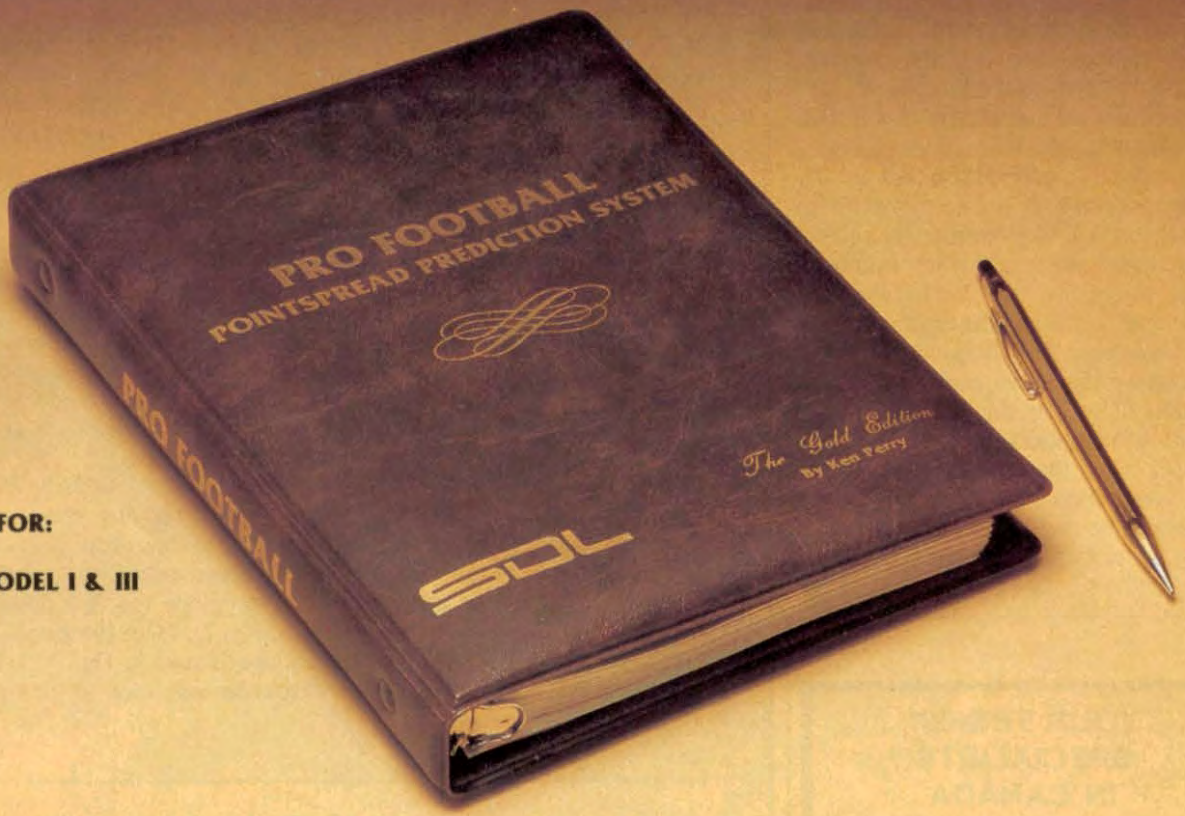
Sit in a comfortable position that provides arm and elbow support. For best results, your hand should be clean and dry, and the room temperature should be around 70 degrees F. Wrap one bioprobe snugly around your index finger so the aluminum foil covers your fingerprint. Wrap the other bioprobe around your middle finger on the same hand.

The program title (Biofeedback Monitor) appears at the top of the screen. The graph-like monitor with its 100 boxes appears in the middle along with the ques-

PRO FOOTBALL

The Gold Edition

POINTSPREAD PREDICTION SYSTEM



AVAILABLE FOR:
APPLE
TRS-80 MODEL I & III
IBM PC

THE GOLD EDITION

THE MOST SOPHISTICATED SYSTEM EVER DESIGNED FOR THE PREDICTION OF PRO FOOTBALL POINTSPREADS

If you're looking for a PROFESSIONAL pro football prediction system, then take a look at THE GOLD EDITION. THE GOLD EDITION is the most sophisticated pro football pointspread prediction system ever designed. THE GOLD EDITION is not a game — its recommended only for the serious pro football handicappers. From weeks 6 to 16 during the 1980 and '81 seasons THE GOLD EDITION has been a proven WINNER IN ALL CATEGORIES over the Las Vegas Line:

SEASON	FAVORITES		UPSETS		TOTAL		TOTAL GAMES
	HOME	AWAY	HOME	AWAY	HOME	AWAY	
1981 SEASON:	57%	80%	63%	70%	59%	71%	154
1980 SEASON:	53%	67%	70%	66%	61%	66%	154
TWO YEAR AVG:	**55%**	**73%**	**66%**	**68%**	**60%**	**68%**	**308**

THE GOLD EDITION ALSO FEATURES.....

- Completely Menu Driven Screens
- Easy to Use Commands
- Accesses One or Two Disk Drives
- Requires Only 10-15 Minutes to Update
- Includes Two Seasons of Data
- Can be Used Year After Year
- Predicts Real or Hypothetical Games
- Predicts Accurate Pointspreads
- Predicts Accurate Over/Under Scores
- Can Generate 20-35 Pages of Analysis Weekly
- Hardcopy Reports Include....
  - Full Season Schedule
  - Team Performance Detail Analysis
  - Team Performance Summary Analysis
  - YTD Divisional Standings
  - Computer Prediction Analysis
  - Pointspread Differential Graphing
  - Over/Under Differential Graphing

STOP GAMBLING.....THE GOLD EDITION provides the highest quality of information necessary to beat the Las Vegas Line. Retail price includes THE GOLD EDITION System Diskette, Data diskette with two years of data, and over 100 pages of comprehensive documentation with padded leather-like binding **$199.50**

SDL

2612 ARTESIA BLVD., SUITE B
REDONDO BEACH, CA 90278
(213) 374-4471

-366

VISA

master charge

tion INSTRUCTIONS (Y/N)? at the bottom of the screen. If you press Y, the first page of the instructions appears below the title. At the bottom, the prompt PRESS ANY KEY TO CONTINUE appears. When you read the instructions and press a key, the second page of instructions appears. Note that you can restart by pressing the F1 key, or end by pressing the F2 key.

When you again press any key as instructed, the program returns to the initial presentation. But now the program prompts "Select Initial Mood (2–9)...." This is where you would be if you had answered no to the instructions prompt.

Consider the mood you are in. If average, select 5. If you're calmer than normal, try a lower number. If you're more tense, select a higher number. When you press the number you've chosen, all boxes to the right of that stack disappear. In addition, a dot appears above that stack and the message INITIALIZING at the bottom of the screen. After a short time, the message disappears and the dot begins blinking.

As your mood changes, the program either adds or removes boxes. (The dot always appears above the last box added

Continued on p. 189

YOUR TRS-80* SPECIALISTS IN CANADA

HACKER'S PARADISE

MICRO COMPUTING SERVICES LIMITED

SOFTWARE FROM
ADVENTURE INTERNATIONAL
APPARAT INC.
BIG FIVE
CORNSOFT
MED SYSTEMS
FANTASTIC SOFTWARE
INFOCOM
AND MORE

EPSON PRINTERS
DISK DRIVES
BOOKS
MODEL I LOWER CASE MOD

WRITE OR PHONE FOR A FREE CATALOGUE

CMD MICRO

10447 - 124 STREET ✓181
EDMONTON, ALBERTA
T5N 1R7
PHONE 403 - 488-7109

VISA & MASTERCARD ACCEPTED
*TRS-80 IS A TRADEMARK OF TANDY CORP.

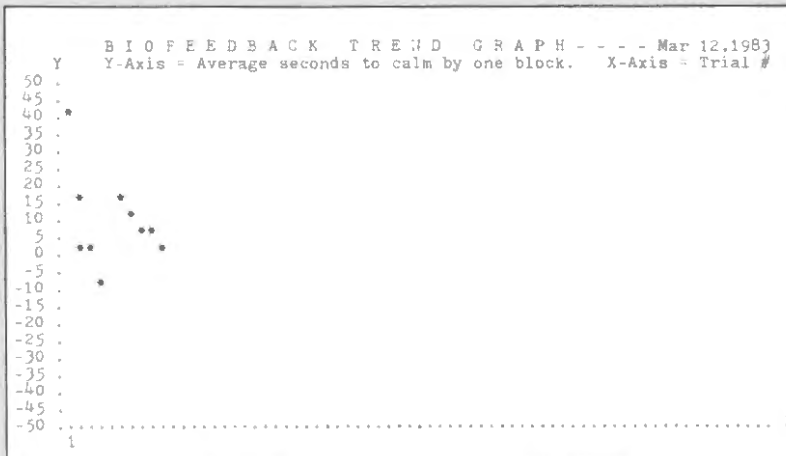
Lines 900–940 let you review results on file, return to the monitoring function, or end the program. If you decide to end the program, line 940 clears the screen, closes the data file, resets the prime pin, and ends the program. If you choose to return to monitoring, line 920 causes the program to jump to line 60. If you choose the remaining function (review results on file), you must indicate if you want a hardcopy record of the review (as requested in line 930).

The review results function extends from line 1020 through line 1220. Line 1020 resets the prime pin (to enable the printer), sets dimensions of a data array, and determines if more than 70 records are on file. This function creates an X-Y graph on the screen and scales the Y-axis based on the data to be presented. (If the program used a fixed Y-axis, you would not recognize minor data variations.) The X-axis allows a maximum of 70 data points. Line 1020 checks the file length and, if greater than 70, branches to the subroutine at line 950.

Line 960 cites the number of records on file and lets you select a start record. Line 980 equates the variable BG to this record number. Line 990 equates FI to either the last record on file (if there are less than 70 records after BG) or the number 70 (if there are 70 or more records after BG) and then returns.

Line 1030 gets the records for display and stores them in the D array. Line 1040 calculates the average time to calm by one box (a measure of how effective your efforts were). Lines 1050–1070 scale the Y-axis based on the range of data to be presented. Lines 1080–1130 draw the graph on the screen, while line 1140 plots the data on the graph.

Line 1150 asks if you want hardcopy and, if not, returns to the End Session routine. When you select hardcopy, line 1150 advises you to prepare the printer and press any key when ready. When you press a key, TRSDOS' Screen command sends the screen contents to the printer. The Screen command does not allow the graphics of the X-Y axes to be printed, but substitute periods instead (see Fig. 7). Once the graph is complete, lines 1160–1220 print the statistics (also shown in Fig. 7), bring the paper to the top of the next page, and transfer execution to the End Session routine. ■

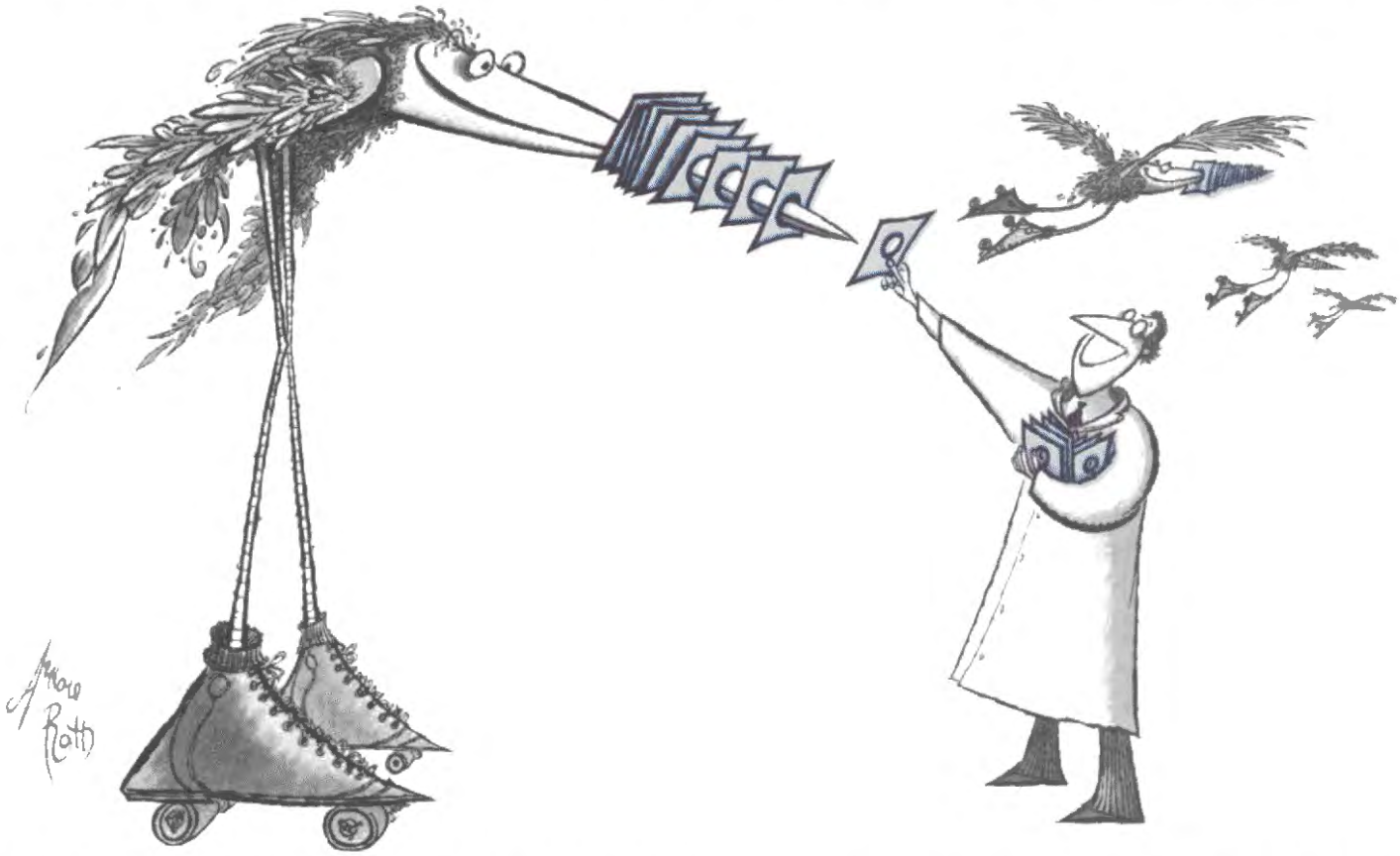


********* S T A T I S T I C S **********

TRIAL #	# BOXES - START	END	ELAPSED SECONDS	AVG TIME TO CALM BY 1 BLK
1	50	46	150	41.53
2	50	39	204	18.72
3	80	0	356	4.50
4	50	22	93	3.36
5	30	32	13	-6.15
6	50	38	231	19.43
7	50	0	568	11.58
8	50	44	38	7.52
9	50	39	60	5.73
10	50	15	164	4.74

Figure 7. BIO printout.

Smallware™



Our software is making a name for itself.

Smallware. That's what we've named our unique software designed for microcomputers. Smallware offers much more than ordinary software: high quality, customer support and a complete product line. You can buy software anywhere. But for the special features of Smallware, The Small Computer Company is your one and only source.

The Small Computer Company is known to many as the company who developed the filing system software Profile® II, Profile Plus and Profile III Plus for Radio Shack; and filePro,™ our CP/M® version.

Now, whether you're a microcomputer end-user, dealer or manufacturer, you can order our Smallware directly from us.

Here are just some of the enhancements we offer to Model III users:

PROSORT: If you need to select records for a report by more than two criteria (income, zip code, purchases, etc.) Prosort lets you use up to sixteen. Once selected, the records can be sorted by up to five criteria (zip code, within state, by last name). Prosort also offers substantially greater sorting capacity. . . $150

FORMS: If you prepare forms that require several lines of data, from invoices to shipping instructions, Forms is invaluable. It allows you to print individual forms (up to 13" x 11") with graphics, trademarks, logos, underlining, subscript and superscript functions. $125

ARCHIVE: Lets you maintain up-to-the-minute, clean files by removing inactive records and transferring them to a pre-determined list or file; split an existing data base into any number of specialized files; free substantial disk storage space $150

PROPACK:™ A tool that lets BASIC programmers more easily customize Profile systems. The resulting programs are shorter, easier to write and faster running. Propack also gives the BASIC program indexed access to Profile data $75

For Model II, 12 and 16 users, there's Quikback™ with Format, Display, Transfer, 8 Line Reports With Math, Math Upgrade for Profile Forms, Math 64, Propack and more.

The Small Computer Company does more than create award-winning Smallware. Our commitment to the customer extends to custom design as well as system consultation.

For further information, call (212) 398-9290. To order, ask for Mr. Burton.

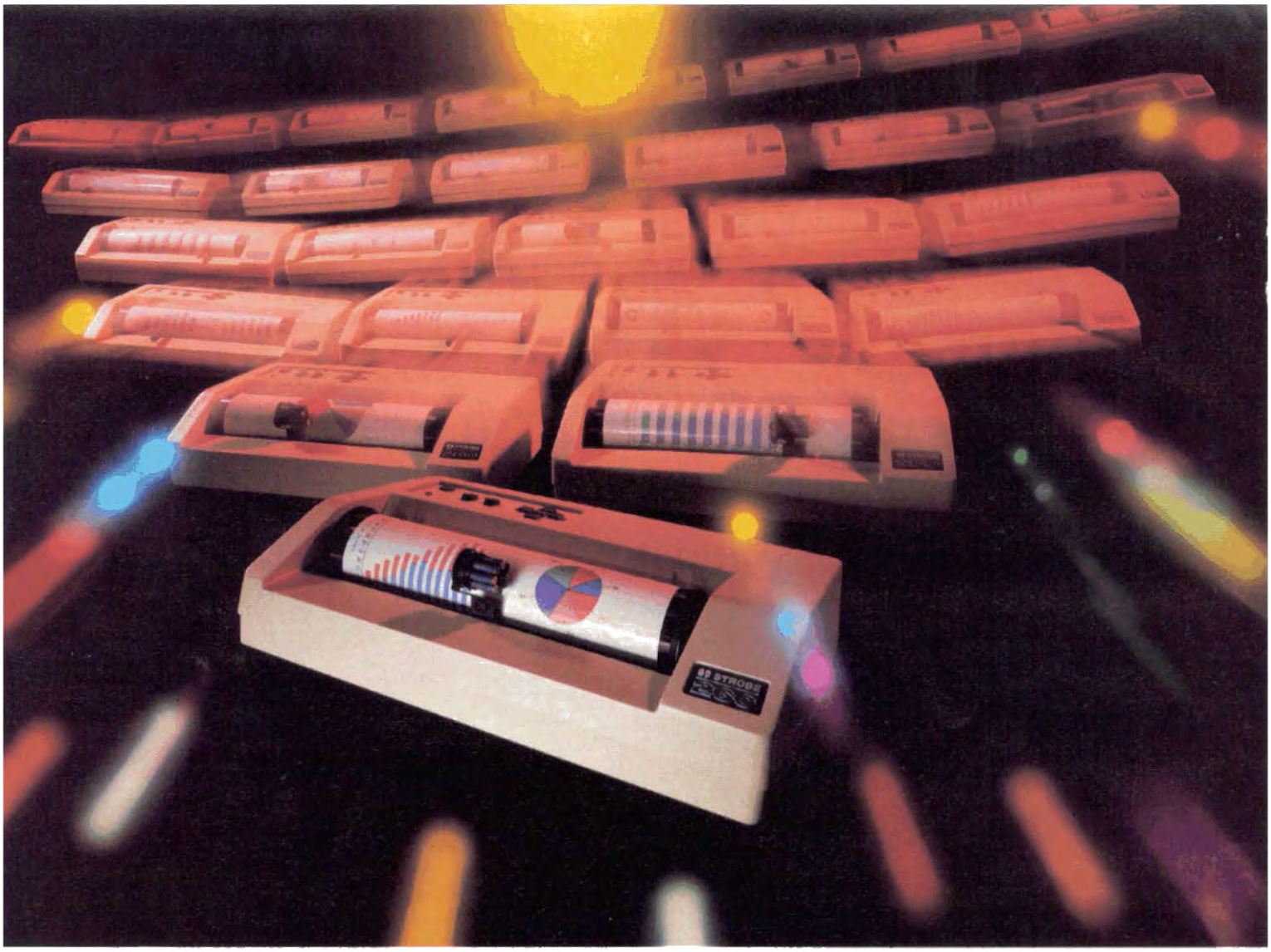
The Small Computer Company, Inc.

230 West 41st Street, Suite 1200, New York, New York 10036

245

80 readers' choice micro 1982

Smallware, Propack, Quikback and filePro are trademarks of The Small Computer Company, Inc.
CP/M is a registered trademark of Digital Research, Inc. Profile is a registered trademark of Radio Shack.



The Best Just Got Better

Introducing the new Strobe Models 260 and 200 Graphics Plotters. How do you make the world's most cost-effective graphics system even more remarkable? Simple. Make it easier to use, more powerful, more versatile and more attractive. The hard part is doing all of the above while holding the line on a very affordable price. With the new Models 260 and 200 Graphics Systems, Strobe has done it all. And the benefits are all yours.

The Strobe 260 is the first eight-pen plotter and software package available for under $1,000. With just a few keystrokes on your computer, the system produces superb high-resolution charts, drawings and transparencies with up to eight automated color breaks. The even more economical Model 200 produces the same wide range of graphics with a single pen which may be changed manually.

The new Strobe plotters interface with virtually every popular microcomputer made today, including the Apple II, IIe and III, Victor, IBM PC, Kaypro and Osborne systems. What's more, the StrobeWare software programs provide every graphic format you will probably ever need, including multicolor pie charts, bar graphs, line graphs, text processing, and a broad selection of symbols and character styles. To further increase your capabilities, the new Strobe systems also interface with over 40 other popular graphics programs.

Every feature of the new Strobe Graphics System is designed to give you the highest quality graphics quickly, easily and inexpensively. The system also looks very nice on your desk. So visit your local dealer today and see how much better the best can be.

Apple II, IIe and III, Victor, IBM PC, Kaypro and Osborne are trademarks of Apple Computer, Inc., Victor United, Inc., International Business Machines Corporation, Kaypro Corporation, and Osborne Computer Corporation, respectively.

Strobe Inc.
897 5-A Independence Ave.
Mountain View, CA 94043
415/969-5130

The Strobe Graphics System

Seeing is believing

Continued from p. 186

or at the last box removed.) Try to concentrate on calming yourself by thinking of a pleasant situation or a tranquil scene. At first you may actually tense up somewhat; biofeedback takes practice! Now bite your lip or otherwise cause mild pain. Note that boxes begin appearing, indicating tension. Also note that you tend to tense up much faster than you calm down. With practice you'll be able to consciously remove all boxes on the monitor.

If you want to stop the particular trial, press the F1 key; RESTART appears at the top of the screen. At the bottom the program asks if you want to STORE RESULTS? (If you answer positively, the disk activates.) When you make your choice, the program returns to the initial screen. If you want to end or review the stored results, press the F2 key. The screen clears below the title and presents three choices, Review Results, Continue Monitoring, or End. If you select End, the message SESSION ENDED appears, the disk file is closed, the prime pin is reset, and the program ends. If you press F2 by mistake, or want to continue, press C to continue monitoring.

If you press R (Review Results), the program asks if you want hardcopy. If you respond yes, the program performs a Forms set.

After you provide your answer, the screen clears and the biofeedback trend graph appears. At the bottom of the screen you will see the question DO YOU WANT HARDCOPY (Y/N)?. Answer yes or no accordingly. If you answer no, the program returns to the Review Results, Continue, or End question. If you answer yes, the program asks you to prepare your printer and signal when ready. It prints the trend graph along with a tabular list of results. If the program encounters any printing fault, the message PRINTER NOT READY. PRESS ANY KEY TO CONTINUE appears at the bottom of the screen. You can then correct the fault and continue printing. After printing is completed, the program returns to the Review Results, Continue, or End question.

Summing It Up

With the use of the biobox and the BIO program, you can change your Model II into a sophisticated biofeed-

Continued on p. 192

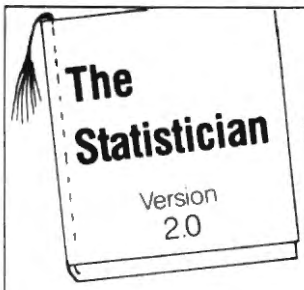
Program Listing 2. BIO (Basic biofeedback program).

```
1 REM**          BIOFEEDBACK PROGRAM
2 REM**          NAME: BIO
3 REM**          (c) 1983 by J. J. BARBARELLO
4 REM**          LATEST REVISION: # 2, 18 FEB 1983
5 REM**
6 REM**          NOTE: Requires BioBox II Hardware and BIO/CMD Ut
ility
7 REM**
8 REM
10 CLS:CLEAR1000:SYSTEM"LOAD BIO/CMD":DEFUSR=&HF050:DEFUSR1=&HF0
7C:ON ERROR GOTO 550
20 PRINTCHR$(2);TAB(22);"B I O F E E D B A C K   M O N I T O R":
PRINT STRING$(79,150):DIM D(1,1)
30 PRINT@(3,18),"(c) 1983 by J. J. BARBARELLO, Englishtown, NJ"
40 DEFSTR A:OPEN"D",1,"BIO/DAT",14:FIELD 1,2ASA1,4ASA2,4ASA3,2AS
A4,2ASA5:DTE$=MID$(DATE$,4,3)+" "+MID$(DATE$,7,2)+","+MID$(DATE$
,9,4)
50 AI=TIME$:DEFINT C,I,R:A=STRING$(4,154)+" ":FORI=1TO10:AL=AL+A
:NEXT
60 PRINT@(4,0),CHR$(24);:FORI=5 TO 15:PRINT@(I,15),CHR$(135):NEX
T
70 PRINT@(15,15),CHR$(131);CHR$(138);
80 FORI=17TO65STEP5:PRINT@(15,I),STRING$(4,150);CHR$(138);:NEXT
90 FOR I=5 TO 14:PRINT@(I,17),AL;:NEXT
100 AX=CHR$(159)+" TENSE":FORI=7TO13:PRINT@(I,12),MID$(AX,I-6,1)
;:NEXT
110 FOR I=1 TO 10:PRINT@(16,13+I*5),;:PRINTUSING"##    ";I;:NEXT
120 PRINT@(17,17),"CALM";TAB(62);"TENSE":PRINT@(20,0),STRING$(79
,150);:IF FLG>0 THEN 150
130 PRINT@(22,30),"INSTRUCTIONS (Y/N) ?";
140 GOSUB 750:IF AI="Y" THEN 600
150 PRINT@(3,0),CHR$(23):PRINTCHR$(23);
160 PRINT@(22,20),CHR$(1);"Select initial mood (2 - 9)...";CHR$(
23);
170 AI=INPUT$(1):IF ASC(AI)=2 THEN 900ELSE IF VAL(AI)<2 OR VAL(A
I)>9 THEN 170ELSE PRINT AI
180 PRINT@(3,0),CHR$(2);CHR$(23);:C=VAL(AI)*5+12:R=5:CC=VAL(AI)
190 FOR I=5 TO 14:PRINT@(I,C+5),CHR$(23);:NEXT
200 PRINT@(22,0),CHR$(23);TAB(30);"INITIALIZING";:Y=0:FLG=2:X=US
R(0)
210 FORI=1TO5:PRINT@(R-1,C+2),CHR$(144);:X=USR(0):PRINT@(R-1,C+2
),"  ";:IF X<0 THEN X=65535+X
220 Y=Y+X:NEXT:XO=Y/5:INC=XO/(10*(CC+5)):XL=XO-CC*INC*10
230 PRINT@(22,0),CHR$(23);:TS$=TIME$
240 PRINT@(R,C),A;:PRINT@(R-1,C+2),CHR$(144);
250 'CALM DOWN: X INCREASES - TENSE UP: X DECREASES
260 X=USR(0):IF X<0 THEN X=X+65535 ELSE IF X=0 THEN ERROR 1
270 AR=INKEY$:IF AR=""THEN 300ELSE TF$=TIME$
280 IF ASC(AR)=1 THEN PRINT@(3,32),CHR$(26);" R E S T A R T.";CH
R$(25):IF FLG=1 THEN 80ELSE GOSUB 800:FLG=2:GOTO 80
290 IF ASC(AR)=2 THEN 900
300 PRINT@(R-1,C+2)," ";
310 IF ABS(XO-X)<INC THEN 420
320 IF X<XO THEN 380' TENSING UP
330 IF X<XO THEN 410' CALMING DOWN
340 PRINT@(R,C),CHR$(23);:XO=XO+INC:R=R+1:IF R=15 THEN R=5:C=C-5
350 IF C>=17 THEN GOSUB 500:GOTO 330ELSE TF$=TIME$
360 PRINT@(9,30),"MAXIMUM CALM ATTAINED.":GOSUB 800:PRINT@(10,18
),"Press [F1] to RESTART, or [F2] to END SESSION...";
370 AR=INPUT$(1):IF ASC(AR)=1 THEN 280ELSE IF ASC(AR)=2 THEN 290
ELSE 370
380 R=R-1:IF R=<4 THEN R=14:C=C+5
390 IF C>62 THEN C=62:R=5:GOTO 410
400 XO=XO-INC:PRINT@(R,C),A;:GOSUB 500:GOTO 320
410 X=XO
420 FOR I=1 TO (X-XL)*500/XL:NEXT:GOTO 240
470 REM
480 REM**************   UTILITY SUBROUTINES   ******************
```

Listing 2 continued

```
TRS-80 Model II DEBUG Program
F050   3E 81 D3 FF 22 95 F0 21   00 00 11 01 00 3E 00 D3   ...."..!..... ..
F060   E0 3E 08 D3 E0 DB E0 CB   77 20 09 19 38 06 06 02   . .......w ..8...
F070   10 FE 18 F1 EB 2A 95 F0   73 23 72 C9 3E 00 D3 E0   .....*..s#r. ...
F080   C9 00 FF 00 FF 00 FF 00   FF 00 FF 00 FF 00 FF 00   ................
F090   FF 00 FF 00 FF 00 FF 00   FF 00 FF 00 FF 00 FF 00   ................
F0A0   FF 00 FF 00 FF 00 FF 00   FF 00 FF 00 FF 00 FF 00   ................
F0B0   FF 00 FF 00 FF 00 FF 00   FF 00 FF 00 FF 00 FF 00   ................
F0C0   FF 00 FF 00 FF 00 FF 00   FF 00 FF 00 FF 00 FF 00   ................
   PC    SP  SZHPNC  AF   BC   DE   HL   IX   IY   AF'  BC'  DE'  HL'
 2800  21FE  000000 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000
```

Figure 8. Debug screen after entering BIO/CMD machine code.



NEW
First in Its Class and Looking for Work.

TRS-80 1, 2, 3, 4, 12, 16
CPM XENIX

- Multiple Regression
  - Stepwise
  - Ridge
  - All Subsets
  - Backward Elimination
- Time Series Analysis
- Descriptive Statistics
- Transformations
- Survey Research
- Nonparametrics
- X-Y Plots
- ANOVA
- Random Samples
- Data Base
- Search & Sort
- Hypothesis tests

Please call **TOLL FREE**
1-800-334-0854 (Ext. 814)

for more information
or write:
Quant Systems ↵194
Box 628
Charleston, SC 29402
VISA-M/C Accepted

Model 4
Plus

Model 4 64K
2 Tandon Drives
RS 232

$1499.

Plus

- TRS DOS 6.0
- FREE SOFTWARE
  - Mailing List
  - Home Budget
  - Loan Amortization
  - 100 K in all
- FREE 6 month subscription "TRS 80 Microcomputer News"
- 128 K Ram Add $49
- 120 Day Warranty

Model 4 Conversion Kits
For Model III — $ Call

Visa — Mastercard
(Add 3% Handling)

ASHLAND COMPUTER
(606)325-2210 ↵514
Mon. - Fri. 10 to 5 E.S.T.

Listing 2 continued

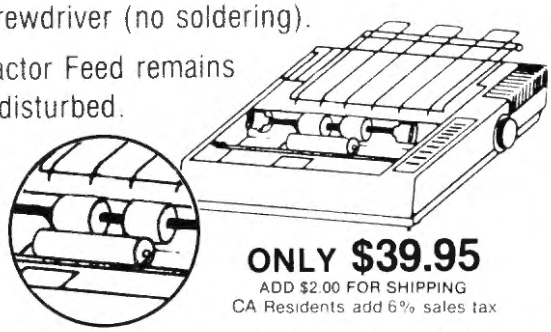
```
490 REM
500 REM**       DELAY LOOP
510 FOR Z=1 TO 100:NEXT:RETURN
550 REM**       ERROR TRAP
560 IF ERR=42 OR ERR=56 THEN PRINT@(23,20),CHR$(23);CHR$(26);" P
RINTER NOT READY.";CHR$(25);" Press ANY key to continue...";:AI=
INPUT$(1):RESUME 1150
570 PRINT@(3,20),CHR$(26);" ERROR OCCURRED. Press [F1] to RESET.
..";CHR$(25);
580 AI=INPUT$(1):IF ASC(AI)<>1 THEN 580ELSE PRINT@(3,0),CHR$(23)
:PRINTCHR$(23);:RESUME 80
600 REM**       INSTRUCTIONS
610 PRINT@(3,0),CHR$(24);TAB(18);"(c) 1983 by J. J. BARBARELLO,
Englishtown, NJ":
620 PRINT@(5,4),"The Biofeedback System II measures and displays
 your changes in mood. Beforebeginning, check that the hardware
interface is attached, and power is applied."
630 PRINT"Next, attach one Bioprobe to your index finger above t
he first joint. Then placethe remaining Bioprobe on your middle
finger above its first joint.":PRINT
640 PRINT"     When you have finished reading these instructions
, you'll be asked the ":PRINT"question ";CHR$(34);"Select initia
l Mood (2 - 9)...";CHR$(34);". Select a number between 2 (CALM)
and 9 (TENSE). ";
650 PRINT"If you are in an average mood, select 5. If you're cal
mer, select a  lower number(like 3). If you're more tense than a
verage, select a higher number (like 8)."
660 PRINT:PRINT"     Your mood is represented by the 100 blocks
on the display. When you select your initial mood, the higher te
nsion-indicating blocks will disappear. The"
670 PRINT"object is to relax and, in the process, make all the b
locks disappear. If you  increase tension, the blocks will begi
n reappearing. A Blinking dot will remind"
680 PRINT"you where you currently are. The more tense you get, t
he faster it blinks. The  calmer you get, the slower it blinks."
:GOSUB 720
690 PRINT@(5,0),CHR$(24);:PRINT@(8,0),"  If a fault occurs in t
he BioBox hardware (Ex: Bioprobes come loose, power      not ap
plied), a message will appear and let you re-start by pressing [
F1].":PRINT
700 PRINT"  It you wish to re-start at any other time, also pre
ss the [F1] key.":PRINT:PRINT"  When you wish to end the sessio
n (or review results), press the [F2] key.":GOSUB 720
710 PRINT@(2,0),CHR$(24);:FLG=2:GOTO 60
720 REM**       PRESS ANY KEY
730 PRINT@(23,28),"PRESS ANY KEY TO CONTINUE...";:AI=INPUT$(1):P
RINT@(20,0),CHR$(24);:RETURN
750 REM**       YES/NO INPUT
760 AI=INPUT$(1):NU=(ASC(AI) MOD 32)+64:IF NU<>89 AND NU<>78 THE
N 760ELSE AI=CHR$(NU):PRINTAI;:RETURN
800 REM**       STORE RESULTS
810 FLG=1:PRINT@(22,32),"STORE RESULTS (Y/N) ?...";:GOSUB 750
820 IF AI="N" THEN PRINT@(22,0),CHR$(23);:RETURN
830 T=(VAL(LEFT$(TF$,2))-VAL(LEFT$(TS$,2)))*3600+(VAL(MID$(TF$,4
,2))-VAL(MID$(TS$,4,2)))*60+VAL(RIGHT$(TF$,2))-VAL(RIGHT$(TS$,2)
)
840 LSET A1=MKI$(CC):LSET A2=MKS$(Y/5):LSET A3=MKS$(X):LSET A4=M
KI$(INC):LSET A5=MKI$(T):PUT 1,LOF(1)+1
850 PRINT@(22,0),CHR$(23);:RETURN
900 REM**       END SESSION
910 PRINT@(0,0),CHR$(24);:PRINTTAB(22);"B I O F E E D B A C K
M O N I T O R":PRINT STRING$(79,150):PRINT@(10,15),CHR$(26);" R
";CHR$(25);"eview Results, ";CHR$(26);" C ";CHR$(25);"ontinue Mo
nitoring, or ";CHR$(26);" E ";CHR$(25);"nd...";
920 AI=INPUT$(1):AI=CHR$((ASC(AI)MOD32)+64):PRINTAI;:IF AI="C" T
HEN 60 ELSE IF AI="E" THEN 940 ELSE IF AI<>"R" THEN 920
930 PRINT@(12,20),"Will you be wanting Hardcopy? (Y/N)...";:GOSU
B 750:PRINT@(14,35),"WAIT...";:IF AI="N" THEN 1000 ELSE PRINT@(1
4,0),CHR$(23);:SYSTEM"FORMS L=66":GOTO 1000
940 PRINT@(2,0),CHR$(24);:PRINT@(10,32),"SESSION ENDED.":PRINT@(
18,0),,:X=USR1(0):CLOSE:END
950 REM**       SELECT TRIAL RANGE
960 PRINT@(3,3),CHR$(24);"File contains";LOF(1);"trials, of whic
h only 70 can be displayed at any one time.":PRINT"Select a star
t trial number (EX: Selecting 5 will cause trials 5 through 74 t
o":PRINT"be displayed)."
970 PRINT@(12,29),"START TRIAL NUMBER?...";CHR$(23);:LINE INPUT
ST$
980 BG=VAL(ST$):IF BG<1 OR BG>LOF(1)-1 THEN 970 ELSE PRINT@(14,3
5),"WAIT...";
990 IF BG+69>LOF(1) THEN FI=LOF(1)-BG+1:RETURN ELSE FI=70:RETURN
1000 REM**      DATA PLOTTING ROUTINE
1010 REM**      A1=RANGE:A2=START CNT:A3=END CNT:A4=INCREMENT:A5
=ELAPSED TIME
1020 ERASE D:X=USR1(0):DIM D(5,70):IF LOF(1)<70 THEN BG=1:FI=LOF
(1) ELSE GOSUB 950
```

Listing 2 continued

Micro-Grip™ III

FRICTION FEED for your EPSON MX-80 or RX-80

- Converts your printer to friction feed of SINGLE SHEETS or ROLL PAPER.
- Fits other printers based on Epson models (IBM PC, Commodore, H-P Dot Matrix, etc.).
- Simple installation; all you need is a screwdriver (no soldering).
- Tractor Feed remains undisturbed.



ONLY $39.95
ADD $2.00 FOR SHIPPING
CA Residents add 6% sales tax

MONEY BACK GUARANTEE • QUANTITY RATES AVAILABLE

MICRO-GRIP
3164 DUMBARTON AVENUE, DEPT. 80
SAN BERNARDINO, CA 92404
PHONE (714) 864-6643

↙161

master charge | VISA

UNITED SOFTWARE ASSOCIATES

PRESENTS

ULTRA TERM

A FULL FEATURED TERMINAL PROGRAM

The Ultra Term communications package is one of the easiest to use and most versatile communications programs available for the TRS-80. It includes a full featured intelligent terminal program, with all the popular features of competing programs costing two to three times as much, and some new features that can't be found anywhere else at any price. Ultra Term also includes a self relocating host program, and hex conversion utilities for bulletin board downloading. Some of Ultra Terms unique features are:

- Supports both manual and auto dial modems.
- Exclusive Ultra Term direct to disk file transfer mode, allows unattended operation at the receiving computer.
- Exclusive split screen feature allows simultaneous two way communications without confusion.
- Line printer support with a 1K print buffer.
- Half and full duplex support.
- Universal ASCII format file transfer with a 33K Buffer.
- A full featured host program.

• ULTRA TERM	$59.95	• LYNX MODEM	$249.00
• INFOEX 80	$99.95	• ANCHOR 1-300	$99.00
• M TERM	$69.95	• HAYES 300	$249.00
• COMMBAT	$44.95	• HAYES 1200	$619.00
• MODEM GAMES	$19.95	• ORCHESTRA 85/90	$89.00
		• PIANO SOFTWARE	$34.95

ORDERS 305/965-3496 BBS 305/842-2687
COD ADD $3.00 TECHNICAL INFOR. 305/842-8805 (5-9 E S T.)
734 Flamingo Way, North Palm Beach, FL 33408

↙332

CONVERT YOUR SERIAL PRINTER TO PARALLEL
CONVERT YOUR PARALLEL PRINTER TO SERIAL

The UPI serial printer interfaces allow an ASCII serial printer to be connected to the parallel printer port of the TRS-80 computers or any other computer which has a Centronics compatible parallel printer port.

Software compatability problems which normally result when a serial printer is used are totally eliminated because, the computer "thinks" that a parallel printer has been connected. Special driver programs and changes to the operating system are not required with computers designed to work with a parallel printer.

The UPI interfaces are completely self contained and ready to use. A DB25 socket mates with the cable from your serial printer. The ribbon cable attaches to the parallel printer port of your computer. The UPI interfaces convert the output of your parallel printer port into serial data in both the RS232-C and 20 ma. loop formats. Switch selectable features include:

- Linefeed after Carriage Return
- Handshake polarity (RS232-C)
- Nulls after Carriage Return
- 7 or 8 Data Bits per word
- 1 or 2 Stop Bits per word
- Odd, Even, or, No Parity
- Baud rates 110 to 9600

UPI-3VB for TRS-80 I & III	$149.95
UPI-2VB for TRS-80 II & 16	$149.95
UPI-3VB-6 for TRS-80 I & III with 6 ft. cable	$159.95
UPI-2VB-6 for TRS-80 II & 16 with 6 ft. cable	$159.95
Models for most other computers available at	$159.95

NEW SERIAL TO PARALLEL INTERFACES

The SPC SERIAL to PARALLEL interfaces convert serial ASCII data into parallel format for use with Centronics type parallel printers. A DB25 socket accepts serial data from your computer. The 36 contact ribbon connector plugs into your parallel printer. Can be used to add a second parallel printer port to computers which reliably support both serial and parallel printers.

Switch selectable options include the following:

- 7 or 8 Data Bits per serial word
- Odd or Even parity for serial word
- Parity or No parity for serial word
- 1 or 2 Stop Bits per serial word
- 300, 600, 1200, 2400, or 4800 BAUD

SPC-1 as described above	$89.95
SPC-CC with DIN plug and cable for the TRS-80 Color Computer	$69.95

All prices U.S. funds. VISA, MASTER CARD, COD, Purchase Orders accepted from schools, major corporations, and government agencies. Shipping and Handling on U.S. orders $4.00. Ten day return period. Ninety day warranty.

BINARY DEVICES
11560 TIMBERLAKE LANE
NOBLESVILLE, IN 46060
(317) 842-5020

↙106

TRS-80 is a trademark of TANDY

Continued from p. 189

back monitoring system. Not only can you use the system for real-time monitoring, but you can save the results and track your progress over an unlimited number of trials. By reviewing these results, you may find it possible to determine events and conditions in your daily life which add to tension and stress.

Once you've recognized such events and conditions, their management may be only a step away. Even without these benefits, the biobox makes for a relaxing interlude and can be a lot of fun when used with family and friends. (Try using it as a lie detector at your next party!)

In a future issue, *80 Micro* will present a biobox for the Model I and Model III. It includes all features of the Model II version, except for the trend graph and permanent storage. However, the presentation will fully explain the program involved and provide hints on how you can include permanent storage for your own configuration system. ■

Contact J. J. Barbarello at R.D.#1, Box 241H, Tennent Road, Englishtown, NJ 07726.

Listing 2 continued

```
1030 FOR I=1 TO FI:GET 1,I+BG-1:D(1,I)=CVI(A1):D(2,I)=CVS(A2):D(
3,I)=CVS(A3):D(4,I)=CVI(A4):D(5,I)=CVI(A5)
1040 D(0,I)=D(5,I)/((D(3,I)-D(2,I))/D(4,I))
1050 NEXT:HI=0:LO=0:FORI=1TOFI:IF D(0,I)>HI THEN HI=D(0,I) ELSE
IF D(0,I)<LO THEN LO=D(0,I)
1060 NEXT:HI=HI-HI MOD 10+SGN(HI)*10:LO=LO-LO MOD 10+SGN(LO)*10:
HI=INT(HI):LO=INT(LO):RNG=ABS(HI-LO):FORI=5TO100STEP5:IF RNG/I<2
2 THEN STP=I ELSE NEXT
1070 IF ABS(HI)>ABS(LO) THEN MAX=HI ELSE MAX=LO+20*STP
1080 CLS:FOR I=2 TO 22:PRINT@(I,0),;:J=MAX-(I-2)*STP:PRINTUSING"
####";J:NEXT
1090 PRINT@(0,10),"B I O F E E D B A C K  T R E N D  G R A P H
 - - - - ";DTE$
1100 PRINT@(1,5),"Y    Y-Axis = Average seconds to calm by one b
lock.   X-Axis = Trial #"
1110 FORI=2 TO 22:PRINT@(I,5),CHR$(135);:NEXT:PRINT@(23,5),;:PRI
NTUSING"##";BG;
1120 PRINT@(22,5),CHR$(131);:FORI=6 TO 75:IF IMOD5=0 THEN PRINT@
(22,I),CHR$(134);:NEXT ELSE PRINT@(22,I),CHR$(138);:NEXT
1130 PRINT@(22,77),"X";
1140 FOR I=1 TO FI:J=(MAX-D(0,I))/STP:J=INT(J+3):PRINT@(J,I+5),"
*";:NEXT
1150 PRINT@(23,20),CHR$(23);TAB(28);"Do you wish HARDCOPY? (Y/N)
...";:GOSUB 750:IF AI="Y" THEN PRINT@(23,28),"PREPARE PRINTER. P
ress ANY key to begin...";:AI=INPUT$(1):PRINT@(23,20),CHR$(23);:
SYSTEM"SCREEN" ELSE 900
1160 LPRINT:LPRINTTAB(20);"*********  S T A T I S T I C S  *****
*****":LPRINT TAB(20);STRING$(42,"-"):LPRINTTAB(20);"TRIAL  - #
BOXES -";TAB(40);"ELAPSED";TAB(50);"AVG TIME TO":LPRINTTAB(20);"
  #    START   END  SECONDS  CALM BY 1 BLK"
1170 LPRINT TAB(20);STRING$(42,"-")
1180 FOR I=1 TO FI
1190 LPRINT TAB(20);:LPRINTUSING" ###";BG+I-1;:LPRINT TAB(27);:L
PRINT USING"###     ";D(1,I)*10;
1200 ED=D(1,I)*10-INT((D(3,I)-D(2,I))/D(4,I))-1:IF ED>100 THEN E
D=100 ELSE IF ED<0 THEN ED=0
1210 LPRINT USING"###";ED;:LPRINT TAB(40);:LPRINT USING"#####";D
(5,I);:LPRINT TAB(51);:LPRINT USING"###.##";D(0,I)
1220 NEXT:SYSTEM"T":GOTO 900
```


CONVERT YOUR TRS-80 MODEL I, III, OR 4 INTO A

DEVELOPMENT SYSTEM

Now you can develop Z-80 based, stand-alone devices such as games, robots, instruments and peripheral controllers, by using your TRS-80 as a development system. The DEVELOPMATE plugs into the expansion connector of your TRS-80 and adds **PROM PROGRAMMING** and **IN-CIRCUIT-EMULATION** capabilities to your system (with or without expansion interface).

Complete instructions and sample schematics are included to help you design your own simple stand-alone microcomputer systems. THESE SYSTEMS CAN BE AS SIMPLE AS FOUR ICs: one TTL circuit for clock and reset, a Z-80, an EPROM, and one peripheral interface chip.

When the In-Circuit-Emulation cable is plugged into the Z-80 socket of your stand-alone system, the system becomes a part of your TRS-80. You can use the full power of your editor/assembler's debug and trace program to check out both the hardware and the software. Simple test loops can be used to check out the hardware, then the system program can be run to debug the logic of your stand-alone device.

Since the program is kept in TRS-80 RAM, changes can be made quickly and easily. When your stand-alone device works as desired, you use the Developmate's PROM PROGRAMMER to copy the program into a PROM. With this PROM, and a Z-80 in place of the emulation cable, your stand-alone device will work by itself.

The DEVELOPMATE is extremely compact: Both the PROM programmer and the In-Circuit-Emulator are in one small plastic box only 3.2" x 5.4". A line-plug mounted power supply is included. The PROM programmer has a "personality module" which defines the voltages and connections of the PROM so that future devices can be accommodated. However, the system comes with a "universal" personality module which handles 2758, 2508 (8K), 2716, 2516 (16K), 2532 (32K), as well as the new electrically alterable 2816 and 48016 (16K EEPROMs).

The COMPLETE DEVELOPMATE 81, for Model I, with software, power supply, emulation cable, TRS-80 cable, and "universal" personality module $329

DEVELOPMATE 83, Model III/4 version, same as above $329
PM2 PERSONALITY MODULE for 2732A EPROM $15
PM3 PERSONALITY MODULE for 2764 EPROM $15

ORION Instruments ↩151

172 Otis Avenue, Dept. M, Woodside, CA 94062
(415) 851-1172

Master Charge and Visa phone orders accepted
California residents please add 6½% sales tax

SUPER SOFTWARE FOR THE TRS 80 MODELS II, III, 4, 12, and NOW MODEL 16

– SPECIAL –

MAKE YOUR MODEL III OR MODEL 4, IBM-PC COMPATIBLE!

under the UCSD p-System. Read and write IBM-PC p-System disks with the:

Model III p-System AND Holmes Engineering VID 80 (tm) **Board** *(SAVE $40 – WAS $635)* **$595**
Gives you 64K and 80 x 24 screen (compiler separate)

AND JUST RELEASED!!!

Model 4 p-System **$650**
Full development system, choice of compiler

THE UNIVERSAL OPERATING SYSTEM

UCSD p-SYSTEM

Version IV.1 - Full development system includes:
Full screen editor, file handler, interpreter, assembler and linker. Over 1000 pages of documentation.

Radio Shack Model II,† 12† $650
Radio Shack Model II,† 12† w - Corvus interface . . $850
† - comes standard with Pascal compiler
Radio Shack Model 16† (68000 side, Ram disk) . . $850
† - choice of compilers

Compilers also available separately:
Pascal . . $375 Fortran . . $350
Basic . . $225

Lisp Interpreter $100

UTILITY PROGRAMS

Operating system format exchange programs
Convert data and text files from one OS format to another.
TRSDOS to p-System $100
CP/M to p-System $100
IBM 3741 to p-System $285

UTILITY PROGRAMS (Continued)

Disassemblers - Z80, 6502, 68000 . . . . . $100
Corvus Hard-disk Drivers - 5, 10, 20 MB $200
MOD II, 12 (Watch for III, 4 and 16 drivers soon!)
PFAS - Keyed ISAM file handler $225
ASE - Advanced System Editor $150
Programmable function keys, disk based file area
CRTForm (tm) - The Bug Killer $450
Let your computer generate your screens & I/O source code.

SOFTWARE PRODUCTS INTERNATIONAL

A family of FULLY intergrated software packages

LogiQuest III - Relational Data Base $495
55 fields/record, 15 sort/find criteria
Create & work with virtual files from multiple data bases
ProCalc - Financial Planning $350
Allows extremely large models, disk based data base
Asset - Accounting $1250
Sophisticated accounting package, GL, AR, AP, IC
Interfaces with LogiQuest, ProCalc & LogiCalc
Modules available separately (each) $390
DBtool interface $695
Allows you to write programs which will interface to the data base of all the above programs.

LOGICALC

Financial modeling & spreadsheet

A superb speadsheet that goes well beyond others at a superb price. This is the spreadsheet chosen by IBM for their own sales force to sell. For the:

Models II, III, 4, 12 . Was $190 . . NOW . . $98
Model 16 . . . . . $190

– APPLICATIONS PROGRAMS –

DATEBOOK - Appointment Scheduling
Personal DateBook –
Format available for 9 persons $150
Datebook II - Format available for 27 persons . . . $295

MILESTONE - Project, Time Scheduling. $295
Up to 300 activity subroutines with over 30,000 time units. Best features from PERT (program evaluation and Review Technique) and CPM (Critical Path Method)

EPICS - Executive Planning $250
Includes Schedule Overview, Personal Scheduler, Document Tracking System, Tickler File, Index Scheme, Name & Address File, Questionaires/Data Tabulator, Personal Analysis Management System, and Project Planning Tool

IMP - Instant Mathematical Programming $250
Program generator used to solve simultaneous linear & nonlinear equations, linear programming problems and others. Designed for engineers, scientists & mathematicians.

PDBase - Database Management $245
Uses English-like commands to review and display the data base. Procedure files can be store; data security allows levels of access.

CPR - Text Formater $195
Designed for use with UCSD p-System text editor or Advanced System Editor for maximum control over raw text formatting & printing

Nutri-Calc (tm) *(PRICE CUT 60%)* $129
Allows you to manage diets of any number of people, calculates caloric intake, stores recipes & menus, and computes schedules for weight loss or gain.

MAILER $125
More than just another mailing list. Allows mail-merge with form letters you prepare yourself.

CAN ELIMINATE THE NEED FOR AN ADDITIONAL PROCESSOR IN MANY CASES!

· trademark of Tandy Corporation.
PCD Supports Systems Software on DEC LSI-11, Radio Shack Models II, 3, 4 12 & 16, Altos, Terak, IBM PC, Apple II +, & Sage.
* UOS is a trademark of SofTech Microsystems,
UCSD p-System is a trademark of the University of California.
IBM is a trademark of International Business Machines.
Vid 80 is a trademark of Holmes Engineering.

MasterCard VISA
COD or MONEY ORDER

PCD Systems, Inc.
P.O. Box 143
Penn Yan, N.Y. 14527
(315) 536-7428

433

LOAD 80
LOAD 80
TO YOUR
RESCUE

LET LOAD 80 AND COLOR LOAD 80 RESCUE YOU

In the dawn of the computer age programmers needed the patience of Job to manually keyboard all the major program listings from a single issue of 80 MICRO.

Then LOAD 80 burst onto the scene and exploded that practice. Today thousands of TRS-80* owners use LOAD 80 cassettes and disks every month. These time-conscious computerists spend more time enjoying all the benefits of those 80 MICRO programs.

LOAD 80 programs come directly from 80 MICRO giving you complete and detailed documentation right there in the magazine. And now, the new disk transfer system allows Model III users to run LOAD 80 disks without conversions.

Save close to 30% on the single issue price by subscribing to LOAD 80 today (choose either monthly cassettes or disks).

Color Computer users can now order our Third Color Volume containing programs from the August, September and October issues of 80 MICRO (available September 1983). Also available is the "Best of '82" cassette, containing Color Computer programs from the 1982 issues of 80 MICRO.

Start enjoying all the benefits of the programs in 80 MICRO without all the programming hassles. Fill out the attached order form and send it to **LOAD 80**, 80 Pine Street, Peterborough, NH 03458. Or call toll free and use your MasterCard, Visa, American Express.

****ATTENTION MODEL III USERS****
New, Improved Operating System!
—Ready To Run!!

1-800-258-5473

NEW DISK TRANSER SYSTEM ALLOWS **LOAD 80** *TO NOW BE RUN ON MODEL III SINGLE DRIVE UNITS WITH NO CONVERSIONS NECESSARY!!*

LOAD 80 *is simply the listing from* **80 MICRO**. *Use the KEYBOX accompanying each article as your guide to system configurations.* **LOAD 80** *runs on the *TRS-80 Model I and Model III computers only.* **COLOR LOAD 80** *runs on the *TRS-80 Color Computer only. *TRS-80 and Color Computer are trademarks of Radio Shack, a division of Tandy Corp.*

Yes! Send me the October **LOAD 80** 10-83

☐ Disk $21.47 ☐ Cassette $11.47
Price includes postage and handling.

Foreign air mail please add $.45 per item for postage and handling.

Please enter my subscription for one year, beginning with this month's issue.
☐ Disk $199.97 ☐ Cassette $99.97

Foreign air mail please add $25 per subscription for postage and handling.

☐Check/MO ☐MC ☐Visa ☐AE

Card#_____ Exp. date _____

Signature_____

Name _____

Address _____

City _____ State_____ Zip_____

LOAD 80•80 PINE ST.•PETERBOROUGH, NH 03458

Yes! Send me **COLOR LOAD 80** QC10-83

☐ 1st Color Volume (Jan, Feb, March) @ $11.47
☐ 2nd Color Volume (Apr, May, June) @ $11.47
☐ 3rd Color Volume (August, September, October) @ $11.47
☐ "Best of '82" at $16.47
Price includes postage and handling.

Foreign air mail please add $.45 per item for postage and handling.

☐Check/MO ☐MC ☐Visa ☐AE

Card#_____ Exp. date _____

Signature_____

Name _____

Address _____

City _____ State_____ Zip_____

COLOR LOAD 80•80 PINE ST.•PETERBOROUGH, NH 03458

Directory of Software Manufacturers and Distributors

Here is a list of manufacturers and distributors of TRS-80-compatible software. (Our hardware directory appeared in July, p. 297.) Manufacturers are listed first, in alphabetical order, followed by distributors.

Only those companies that responded to the directory questionnaire are included.

Software Manufacturers

A$tring Systems
6475 Tamarind Circle
Orlando, FL 32811
305-351-0428
- Custom software
- Data–base management
- Education
- Report generators

ABS Suppliers
3352 Chelsea Circle
Ann Arbor, MI 48104
313-971-1404
- Diagnostic for disk system
- Games
- Programming aids
- Technical publications
- Utilities
- Word processors

Acorn Software Products Inc.
1945 Gallows Road, Suite 205
Vienna, VA 22180
703-556-9788
- Education
- Games
- Utilities
- Word processors

Action Computers
85 Factory St.
Nashua, NH 03002
603-883-5369
- Accounting
- Banking
- Billing
- Budget and forecast
- Cash management
- Compilers
- Cost accounting
- Custom software
- Data-base management
- Education
- Financial analysis
- Games
- Insurance
- Interpreters
- Inventory control
- Medical
- Operating systems
- Payroll/personnel
- Plotting/graphics
- Program/data security
- Program generators
- Programmer aids
- Purchase order/invoice
- Report generator
- Sales
- Scientific
- Simulator
- Utilities
- Word processing

Adventure International
722 Commerce Circle
Longwood, FL 32750
305-830-8194
- Cash management
- Data-base management
- Games
- Mail lists
- Report generator
- Scientific
- Utilities

Algorithmic Associates
P.O. Box 244
Bedford, MA 01730
617-646-4615
- Custom software
- Games
- Plotting/graphics

Algorix Software
Box 11721
San Francisco, CA 94101
415-387-3131
- Compilers
- Data-base management
- Operating systems
- Programmer aids
- Simulators
- Utilities

Alpha Products
79-04 Jamaica Ave.
Woodhaven, NY 11421
212-296-5916
- Games
- Scientific

Alphanetics
P.O. Box 339
Forestville, CA 95436
707-887-7237
- Accounting

The Alternate Source
704 N. Penn Ave.
Lansing, MI 48906
800-248-0248
- Cash management
- Compilers
- Custom software
- Data-base management
- Games
- Interpreters
- Operating systems
- Program generators
- Programmer aids
- Report generators
- Typesetting
- Utilities
- Word processing

Analytical Processes Corp.
635 Main St.
Nassau Building
Montrose, CO 81401
303-249-1400
- Accounting
- Billing
- Budget and forecast
- Custom software
- Education
- Financial analysis
- Games
- Inventory control
- Plotting/graphics
- Programmer aids
- Purchase order, invoice
- Tax software
- Utilities

Anitek Software Products
P.O. Box 1136
Melbourne, FL 32935
305-259-9397
- Word processing

Apparat Inc.
4401 S. Tamarac Parkway
Denver, CO 80237
303-741-1778
- Operating systems
- Programmer aids
- Utilities

Astro-Star Enterprises
5905 Stone Hill Drive
Rocklin, CA 95677
916-624-3709
- Budget and forecast
- Cash management
- Custom software
- Education
- Scientific
- Word processing

Chuck Atkinson Programs
Route 5, Box 277-C
Benbrook, TX 76126
817-249-0166
- Accounting
- Cash management
- Financial analysis
- Inventory control
- Payroll, personnel
- Sales

Aton International Inc.
260 Brooklyn Ave.
San Jose, CA 95128
408-554-9922
- Bisync packages for the Model II/16
- Custom software
- Operating systems
- Utilities

Autel Electronic Co.
146 Wisconsin NE
Albuquerque, NM 87108
505-255-6451
- Data-base management
- Games
- Plotting/graphics

Scientific
Utilities

Avalon Hill Microcomputer Games
4517 Harford Road
Baltimore, MD 21214
301-254-9200
Education
Games

Banana Soft
1601 Wildwood Drive
Fallston, MD 21047
301-879-8149
Games

Basics and Beyond Inc.
Pinesbridge Road, Box 10
Amawalk, NY 10501
914-962-2355
Education
Games
Utilities

Bayesian Investment Services
757 Santa Rosita
Solana Beach, CA 92075
619-755-6225
Financial analysis

Becker Electronics Inc.
108 W. Franklin St.
Chapel Hill, NC 27514
919-942-7959
Education
Scientific

Robert R. Belanger, Ph.D.
541 W. 6th St.
Azusa, CA 91702
213-969-4112
Data-base management
Financial analysis
Scientific
Statistics, research

Bible Research Systems
8804 Wildridge Drive
Austin, TX 78759
512-346-2181
Bible study aids
Data-base management
Education

Big Five Software
14619 Victory Blvd.
Van Nuys, CA 91411
213-782-6861
Games

Bi-Tech Enterprises
10B Carlough Road
Bohemia, NY 11716
516-567-8155
Billing
Custom software
Inventory control
Payroll, personnel
Programmer aids
Purchase order, invoice
Sales
Utilities

Blechman Enterprises
7217 Bernadine Ave.
Canoga Park, CA 91307
213-346-7024
Amway Product programs

Howard Bowe
16 Lombardi Place
Amityville, NY 11701
516-691-0156
Custom software
Programmer aids
Scientific
Utilities

Robert J. Brady Co.
Routes 197 & 450
Bowie, MD 20715
301-262-6300
Programming book

Business Problem Solvers
250 Richards Road
Kansas City, MO 64116
816-471-8660
Custom software
Gambling aids
Inventory control
Programmer aids
Purchase order, invoice
Utilities

Canty & Associates
8909 Bellington Road
Pensacola, FL 32504
904-478-0765
Accounting
Budget and forecast
Financial analysis
Operating systems
Utilities
Word processing

Cedar Software
1943 Woodson Court
Centerville, OH 45459
513-435-5966
Games

Century Software Systems
1875 Century Park East, Suite 1730
Los Angeles, CA 90067
213-879-5911
Accounting
Budget and forecast
Cash management
Custom software
Data-base management
Financial analysis
Inventory control

Chromasette Magazine
P.O. Box 1087
Santa Barbara, CA 93102
805-963-1066
Budget and forecast
Compiler
Education
Financial analysis
Games
Interpreters
Plotting/graphics
Programmer aids
Scientific
Simulators
Utilities
Word processing

CLOAD Magazine Inc.
P.O. Box 1448
Santa Barbara, CA 93102
805-962-6271
Budget and forecast
Compilers
Education
Financial analysis
Games
Interpreters
Plotting/graphics
Programmer aids
Sales
Scientific
Simulators
Utilities
Word processing

Color Software Services
P.O. Box 1708
Greenville, TX 75401
214-454-3674
Accounting
Budget and forecast
Custom software
Education
Games
Inventory control
Payroll, personnel
Purchase order, invoice
Sales
Scientific

Communications Electronics
Box 1002
Ann Arbor, MI 48106
313-994-4444
Cash management
Custom software

Compucover
P.O. Box 324
Mary Esther, FL 32569
904-244-5238
Preventive maintenance software

Compusoft Publishing
1050-E Pioneer Way
El Cajon, CA 92020
619-588-0997
Computer books

Computer Applications Unlimited
Box 214
Rye, NY 10580
800-354-5400
Custom software
Games
Programmer aids
Utilities

Computer/Business Services
28333 Suburban Drive
Warren, MI 48093
313-751-6291
Custom software
Inventory control
Medical
Purchase order, invoice

Computer Discount
West Milford Mall
West Milford, NJ 07480
201-728-8080
Accounting
Banking
Billing
Budget and forecast
Cash management
Compilers
Cost accounting
Custom software
Data-base management
Financial management
Insurance
Interpreters
Inventory control
Medical
Operating systems
Payroll, personnel
Plotting/graphics
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Scientific
Simulators
Utilities
Word processing

Computer Generated Data, Division of Wagener Enterprises Inc.
5541 Parliament Drive, Suite 206
Virginia Beach, VA 23462
804-497-1165
Accounting
Banking
Billing
Budget and forecast
Cash management
Cost accounting
Custom software
Data-base management
Inventory control
Payroll, personnel
Programmer aids
Purchase order, invoice
Sales
Utilities

Computer Services of Danbury
P.O. Box 993, 1 Franklin St.
Danbury, CT 06810
203-743-1299
Communications

Computer Shack
1691 Eason
Pontiac, MI 48054
800-392-8881
Billing
Cash management
Games
Purchase order, invoice
Utilities

Computerware
4403 Manchester Ave.
P.O. Box 668
Encinitas, CA 92024
714-436-3512
Accounting
Billing
Cash management
Custom software
Data-base management
Games
Interpreters
Inventory control
Payroll, personnel
Plotting/graphics
Program/data security
Purchase order, invoice
Sales
Utilities
Word processing

Computone Data Systems Inc.
1532 Elbridge St.
Philadelphia, PA 19149
215-744-5582
Dietary planning

Compuware Corp.
1008 Abington Road
Cherry Hill, NJ 08034
609-428-2309
Utilities

Conex Electro Systems Inc.
1602 Carolina St.
Bellingham, WA 98227
206-734-4323
Real estate programs

Control Craft Inc.
P.O. Box 123
Muskego, WI 53150
414-784-9027
Custom software
Games
Program/data security
Utilities

Cook Laboratories Inc.
375 Ely Ave.
Norwalk, CT 06854
203-853-3641
Duplicating services

Cornsoft
6008 W. Keystone
Indianapolis, IN 46220
317-257-3227
Games

Cornwall Computer Systems Inc.
4 Cornwall Drive
East Brunswick, NJ 08816
201-238-5757
Apartment management system

CPAids Inc.
1640 Franklin
Kent, OH 44240
216-678-9015
Accounting
Payroll, personnel
Tax planning aids

CRB Microtools
14835 North First Ave.
Phoenix, AZ 85023
602-993-3999
Compilers
Custom software
Intelligent terminal
Programmer aids
Utilities

Creative Computer Center
1236 E. Colonial Drive
Orlando, FL 32803
800-327-9294
Accounting
Banking
Budget and forecast
Cash management
Cost accounting
Custom software
Education
Financial analysis
Inventory control
Payroll, personnel
Programmer aids
Purchase order, invoice
Sales

Custom Data
P.O. Box 1066
Alamogordo, NM 88310
505-434-1096
Church donation program
Custom software

Custom Software
9 Martin Road
Poughkeepsie, NY 12601
914-462-7098
Games
Utilities

Cybernetics Inc.
8041 Newman Ave., #208
Huntington Beach, CA 92647
714-848-1922
Accounting
Billing
Payroll, personnel
Program generators
Purchase order, invoice
Report generators
Sales
Utilities

D.B. Software Co.
11840 N.E. Brazee
Portland, OR 97220
503-255-7735
Accounting
Billing
Cash management
Cost accounting
Inventory control
Payroll, personnel
Purchase order, invoice

Data Management Systems
211 N. El Camino Real, 101C
Encinitas, CA 92024
619-942-0744
Data-base management
Programmer aids
Utilities

Data Strategies Inc.
332 South Juniper St., Suite 210
Escondido, CA 92025
619-489-9218
Data-base management
Dental
Medical
Word processing

Datacom Computer
3318 West 61st St.
Cleveland, OH 44102
216-281-8820
Custom software
Data-base management
Report Generators

Datamate Company
4135 S. 100th East Ave.
Tulsa, OK 74145
918-664-7276
Financial analysis
Programmer aids

Datasoft Inc.
9421 Winnetka Ave.
Chatsworth, CA 91311
213-701-5161
Games

DCS Software
86 Mansel Drive
Landing, NJ 07850
201-398-8281
Accounting
Custom software
Games
Inventory control
Payroll, personnel
Order control
Purchase order, invoice
Sales
Utilities

Design Enterprises of San Francisco
P.O. Box 14695
San Francisco, CA 94114
415-282-8813
Word processing

Dilithium Press
P.O. Box E
Beaverton, OR 97075
800-547-1842
Books on software

Discovery Games
3936 W. Highway 36
St. Paul, MN 55113
612-488-6843
Games

DLP Co.
36798 Wetheridge Drive
Cincinnati, OH 45230
513-232-7791
Accounting
Billing
Cash management
Custom software
Financial analysis
Insurance
Payroll, personnel
Programmer aids
Utilities

Dorsett Educational Systems Inc.
P.O. Box 1226
Norman, OK 73070
415-321-0000
Education

EAP Co.
P.O. Box 14
Keller, TX 76248
817-498-4242
Utilities

Early Games
Suite 140, Shelard Plaza North
Minneapolis, MN 55426
800-328-1223
Education
Games
Preschool software

Easi Software Inc.
Windsor Court
Jackson, NJ 08527
201-367-5735
Custom software
Engineering software
Plotting/graphics
Scientific

Educational Software Library Inc.
3262 Park Lane
King of Prussia, PA 19406
215-337-3298
Education

Elgen Systems
Box 10234
Austin, TX 78766
512-837-4665
Communications
Compilers
Custom software
Games
Program/data security
Report generators
Scientific
Utilities
Word processing

Eltech Associates
2466 Moreno Drive
Los Angeles, CA 90039
213-663-0347
Bill of materials processor
Inventory control
Manufacturing control systems
Manufacturing, labor collection system
Order control
Purchase order, invoice

En-Joy Computer Products
P.O. Box 1535
Goleta, CA 93116
805-735-1941
Education
Medical
Program generator
Programmer aids
Utilities

Epyx Inc.
1043 Kiel Court
Sunnyvale, CA 94086
408-745-0700
Games

B. Erickson Software
P.O. Box 11099
Chicago, IL 60611
312-276-9712
Games
Utilities

Esmark Inc.
507 East McKinley
Mishawaka, IN 46544
219-255-3035
Games

ETS Center
P.O. Box 651
35026-A Turtle Trail
Willoughby, OH 44094
216-946-8479
Utilities

FGA Software
74 Meyer Road
Hamilton, MA 01956
617-468-1634
Data-base management
Education
Games
Utilities
Word processing

Donald M. Fielding
2207 NW 61 Place
Margate, FL 33063
305-972-6744
Utilities

Continued

It's Simple. . . CALL AND SAVE MONEY

1-800-841-0860

CONVENIENT ORDER ENTRY

GA. INFO. 912-377-7120

"Telemarketing Works For You"

FRANKLIN

ACE 1000 COMPUTER
ACE 1200 COMPUTER
FROM **$CALL**

commodore

COMPUTERS
MONITORS, PRINTERS & DRIVES
FROM **$CALL**

TRS-80 COMPUTERS

	DISCOUNT PRICED FROM
MODEL 4 TRS-80	$809
MODEL 12 TRS-80	$2639
MODEL 16 TRS-80	$3998
MODEL 100 TRS-80	$677
MC-10 TRS-80	$99
COLOR COMPUTER	$CALL

PURE RADIO SHACK EQUIPMENT

WE SELL THE COMPLETE LINE OF TRS-80 COMPUTERS AND ACCESSORIES

IBM COMPATIBLES

YOUR CHOICE

EAGLE PC
COLUMBIA PC
CORONA PC
$CALL

Hayes®

MODEMS
FROM **$239**
MICRO MODEM I
SMART MODEM 300
SMART MODEM 1200

TRS-80 COMPUTERS

MICRO COLOR **$99**

MODEL 100 FROM **$677**

Novation

MODEMS
FROM $119

- J-CAT
- D-CAT
- CAT
- AUTO CAT
- SMART CAT
- APPLE CAT

EPSON PRINTERS

FROM **$CALL**

FX-80	SAVE
RX-80	SAVE
FX-100	SAVE

TRS-80 PRINTERS

COMPLETE LINE FROM $199

SCM SMITH CORONA
TP-I DAISY WHEEL PRINTER
FROM **$CALL**

star
PRINTERS
FROM $309
GEMINI
10X & 15

C. Itoh
PROWRITER
8510 ..... $339
NEW!
8600 ..... $CALL

OKIDATA PRINTERS

FROM **$CALL**
MICROLINE SERIES
•83A
•84P •92P •93P
PACEMARK 2350P

DATA FLEX

APPLICATIONS
DATA BASE
BY DATA ACCESS
$CALL

COMREX AMDEK

$CALL

NOTICE

ALL PRODUCTS WE SELL ARE BRAND NEW AND COVERED BY THE MANUFACTURER'S SPECIFIC WARRANTIES. COPIES AVAILABLE UPON REQUEST.
WE DO NOT SELL ANY USED, RECONDITIONED, FOREIGN OR INFERIOR MODIFIED EQUIPMENT.
PRICES AND PRODUCTS SUBJECT TO CHANGE WITHOUT NOTICE.

PRINTER CARDS AND CABLES GRAPPLER+

QUADRAM CORPORATION
•IBM BOARDS
•MICROFAZERS
•APPLE BOARDS
$CALL

FREE

UPON REQUEST
•DISCOUNT PRICE LIST & INFORMATION KIT
WRITE
MICRO MANAGEMENT SYSTEMS
TELEMARKET DEPT. # 4

NEW PRODUCTS

$CALL

Verbatim

DATALIFE DISKETTES
$CALL

Since 1978

- REPUTATION BACKED BY YEARS OF EXPERIENCE.
- PIONEER IN DIRECT TO CONSUMER SALES OF MICRO COMPUTERS AND ELECTRONICS
- MILLIONS OF DOLLARS IN SALES OVER THE YEARS
- TENS OF THOUSANDS OF CUSTOMERS
- HONEST
- RELIABLE
- LARGE INVENTORY
- NAME BRAND PRODUCTS

Man's Best Friend

Micro Management Systems, Inc.
2803 Thomasville Road East
Cairo, Georgia 31728
(912) 377-7120

96

DISCOUNT PRICES

BUY DIRECT
TELEMARKET DEPT. 4

See List of Advertisers on Page 323

Is your filing system a

BLACK HOLE?

Do you file documents, never to see them again? Do you spend hours trying to locate the right reference, report, or client record? If you do, **MAP** is the solution to your problems.

The MAP product line includes programs that:

Build and edit text files
Quickly search free-text files
Query structured data files
Create flexible databases

Sample Applications

- Office filing systems
- Indexing references
- Litigation support
- Client or patient records
- Cross-referencing of research notes
- Mailing lists
- Journal abstracts
- Inventory control
- Catalogs

Prices range from $35.00 to $195.00
Programs for TRSDOS and CP/M operating systems.

Send for a brochure on **MAP's** free-text information retrieval programs and new database management system.

We will include a brief explanation of our unique signature screening technique.

SOFTSHELL Corporation

The Small Computer Specialists for Professionals
P.O. Box 18522, Baltimore, MD 21237

57

CIRCLE COMPUTERS

148

15% DISCOUNT ON MOD I/III SOFTWARE FROM BIG FIVE & SOFT SECTOR MARKETING

DISK DRIVES WITH POWER SUPPLIES AND CASES	
TANDON TM100-1 40TRK SINGLE SIDE	199.00
TANDON TM100-2 40TRK DOUBLE SIDE	279.00
TANDON TM100-3 80TRK SINGLE SIDE	299.00
TANDON TM100-4 80TRK DOUBLE SIDE	379.00
TEAC DUAL SIDED 40TRK	259.00
REMEX 40TRK SINGLE SIDED	299.00
WE ALSO HAVE 2 DRIVES IN A DOUBLE CASE CALL FOR PRICES	
BARE DISK DRIVES	
TANDON TM100-1 40TRK SINGLE SIDE	169.00
TANDON TM100-2 40TRK DOUBLE SIDE	249.00
TANDON TM100-3 80TRK SINGLE SIDE	249.00
TANDON TM100-4 80TRK DOUBLE SIDE	339.00
TEAC DUAL SIDED 40TRK	220.00
REMEX 40TRK	260.00
HARD DRIVES	
5 MEGABYTE HARD DRIVE (FORMATTED)	1395.00
10 MEGABYTE HARD DRIVE (FORMATTED)	1695.00
DMA OPTION	250.00
MODEL 3 COMPUTERS AND DRIVE KITS	
MODEL 3 INTERNAL DRIVE KIT/NO DRIVES	254.00
MODEL 3 INTERNAL DRIVE KIT/1 DRIVE	399.00
MODEL 3 INTERNAL DRIVE KIT/2 DRIVES	574.00
MODEL 3 LEVEL 1 4K	649.00
MODEL 3 LEVEL 2 16K	799.00
MODEL 3 LEVEL 2 48K	850.00
MODEL 3 LEVEL 2 48K 1 DISK DRIVE	1395.00
MODEL 3 LEVEL 2 48K 2 DISK DRIVES	1695.00
CABLES, CASES AND POWER SUPPLIES	
2 DRIVE CABLES	25.00
4 DRIVE CABLES	35.00
EXTENDER CABLES	13.00
SINGLE POWER SUPPLY AND CASE	49.95
DOUBLE POWER SUPPLY AND CASE	79.95
4116 200NS MEMORY CHIPS	8/16.00
LOWERCASE MOD FOR MODEL 1	11.00
REVERSE VIDEO MOD FOR MODEL 1	16.00

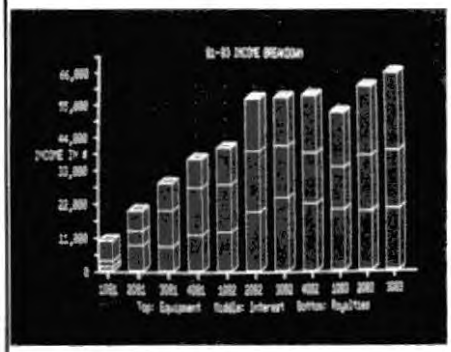
ALL HARDWARE ITEMS ARE WARRANTED FOR 120 DAYS

MON-FRI 8 AM-5 PM
SAT-SUN 9 AM-7 PM

SEND FOR FREE HARDWARE AND SOFTWARE CATALOG
CIRCLE COMPUTERS P.O. BOX 108 LOWELL, MA 01853 (617)453-4953
CERTIFIED CK/MO/COD ACCEPTED. SHIPPING CHARGES ARE ACTUAL.
PERSONAL CHECKS WILL DELAY ORDER UP TO 2 WEEKS

Bizgraph™

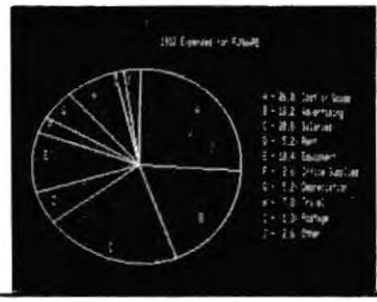
The Grafyx Solution™ for your Business

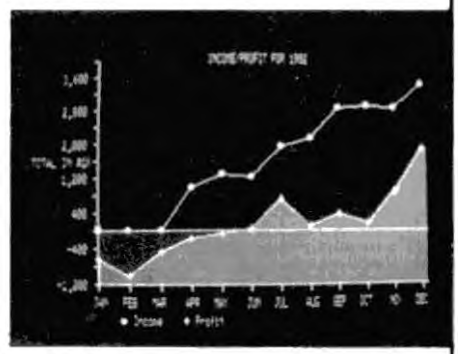


Powerful Graphics. BIZGRAPH is a self-prompting business graphing program designed to work exclusively with Grafyx Solution. Micro-Labs' Grafyx Solution is a plug-in, clip on board which gives you 98,304 points in a 512 × 192 matrix. That's sixteen times as many points as a standard Model III! Improve your business with clear, accurate graphs. Perfect for managers, small businessmen and analysts. The BIZGRAPH package can display Line Graph, Bar Chart, Pie Chart, Area Plot, Histogram Plot, and Scatter Plot. Data can be entered from the keyboard or disk files - including VisiCalc®.

Quality Grafyx. Select graph type, enter data or file name, select options, and a graph is quickly displayed in amazingly fine detail. Multiple data sets can be combined on one graph. Another unique feature is the ability to display the hi-res screen along with the normal text and low-res screen.

Versatile Grafyx. BIZGRAPH is a flexible program providing automatic





labeling of X and Y axis points using 85 characters/line. Forecasting future trends is possible using line fitting, quadratic, and third order linear regression analysis. Data smoothing using moving averages is also possible. The finished graph can be saved on disk or printed on any of 20 popular printers.

The Grafyx Solution package is shipped from stock and includes the board, 44 programs, and a 54 page manual all for $299.95. The BIZGRAPH program, sample graphs, and manual is $98. Shipping is free on pre-paid or COD orders. (Tx. res. add 5% sales tax.)

VisiCalc is a Registered TM of VisiCorp

464

MICRO-LABS, INC. 214-235-0915
902 Pinecrest, Richardson, Texas 75080

Continued

Fireside Computing Inc.
5843 Montgomery Road
Elkridge, MD 21227
301-796-4165
- CAI authoring systems
- Education

Five Stones Software
P.O. Box 1369
Station B, Ottawa,
Ontario, Canada K1P 5R4
613-238-1299
- Games

Forthright Software
278 Connecticut Ave.
Newington, CT 06111
203-677-3826
- Color Computer graphics package
- Custom software
- Education
- Games
- Operating systems
- Scientific
- Utilities

Freedom Micro-Systems Inc.
Star Route 2
Wytheville, VA 24382
703-228-5800
- Accounting
- Banking
- Billing
- Budget and forecast
- Cash management
- Cost accounting
- Custom software
- Education
- Financial analysis
- Insurance
- Inventory control
- Payroll, personnel
- Purchase order, invoice
- Sales
- Utilities

Funsoft Inc.
28611 Canwood
Agoura, CA 91301
213-991-6540
- Games

Gamester Software
9 Southmoor Circle
Kettering, OH 45429
914-634-1821
- Accounting
- Budget and forecast
- Custom software
- Data-base management
- Data communications
- Diagnostic
- Mailing list
- Purchase order, invoice
- Utilities
- Word processing

Good-Lyddon Data Systems
5486 Riverside Drive
Chino, CA 91710
714-980-4563
- Accounting
- Billing
- Budget and forecast
- Cost accounting
- Custom software
- Financial Analysis
- Inventory control
- Payroll, personnel
- Purchase order, invoice
- Sales
- Utilities

Gooth Software
3931 South Bemiston
St. Louis, MO 63105
314-727-2229
- Income tax program

H & E Computronics
50 North Pascack Road
Spring Valley, NY 10977
914-425-1535
- Accounting
- Banking
- Billing
- Budget and forecast
- Cash management
- Compilers
- Cost accounting
- Custom software
- Data-base management
- Education
- Financial analysis
- Games
- Insurance
- Interpreters
- Inventory control
- Medical
- Operating systems
- Payroll, personnel
- Plotting/graphics
- Program generators
- Programmer aids
- Purchase order, invoice
- Report generator
- Sales
- Scientific
- Simulators
- Utilities
- Word processing

Hayes Microcomputer Products Inc.
5835 Peachtree Corners East
Norcross, GA 30092
404-449-8791
- Communications

Hexagon Systems
P.O. Box 397, Station A
Vancouver, B.C., Canada V6C 2N2
604-682-7646
- Utilities
- Word processing

Holman Data Processing
32059 W. Lincoln
Oroville, CA 95965
916-533-5992
- Accounting
- Billing

Holmes Engineering
33555 South 3200 West
Salt Lake City, UT 84119
801-261-5652
- Accounting
- Financial analysis
- Payroll, personnel
- Purchase order, invoice
- Sales
- Word processing

Hon Finance & Insurance Computers
P.O. Box 23825
Pleasant Hill, CA 94523
415-680-7888
- Banking
- Cost accounting
- Custom software
- Data-base management
- Financial analysis
- Inventory control
- Program generators
- Programmer aids
- Report generator

Horizons Software
P.O. Box 4792
Springfield, MO 65808
417-831-5673
- Games

Howe Software
14 Lexington Road
New City, NY 10956
914-634-1821
- Accounting
- Budget and forecast
- Custom software
- Data-base management
- Data communications
- Diagnostic
- Mailing list
- Purchase order, invoice
- Utilities
- Word processing

HPB Vector Co.
130 Center St.
East Stroudsburg, PA 18301
717-421-3061
- Cash management
- Compilers
- Cost accounting
- Data-base management
- Interpreters
- Operating systems
- Program/data security
- Report generators
- Scientific
- Simulators
- Utilities
- Word processing

Hurricane Laboratories Inc.
5149 Moorpark Ave.
San Jose, CA 95129
408-257-8676
- Accounting
- Data-base management
- Education
- Inventory control
- Linewriter
- Medical
- Pretty print
- Purchase order, invoice
- Utilities
- Word processing

ICM Industries
10529 Connaught Drive
Carmel, IN 46032
317-872-4827
- Custom software
- Games
- Program/data security
- Programmer aids
- Utilities

ICR FutureSoft
1718 Kingsley Ave. #3
Orange Park, FL 32073
904-269-1918
- Communications
- Data-base management
- Inventory control
- Program generators
- Programmer aids
- Report generators

I.J.S.
625 Cedar St.
Rock Springs, WY 82901
307-382-9742
- Custom software
- Inventory control

Individual Systems Inc.
P.O. Box 343
Downers Grove, IL 60515
312-968-2337
- Data-base management
- Inventory control
- Programmer aids
- Purchase order, invoice

Infocom Inc.
55 Wheeler St.
Cambridge, MA 02138
617-492-1031
- Games

Instant Software Inc.
Route 101 & Elm St.
Peterborough, NH 03458
603-924-9471
- Accounting
- Billing
- Budget and forecast
- Cash management
- Cost accounting
- Education
- Financial analysis
- Games
- Simulators
- Utilities

Institute for Scientific Analysis Inc.
P.O. Box 7186
Wilmington, DE 19803
215-358-3735
- Accounting
- Billing
- Budget and forecast
- Cost accounting
- Custom software
- Data-base management
- Education
- Inventory control
- Payroll, personnel
- Plotting/graphics
- Program generators
- Project management and manufacturing
- Purchase order, invoice
- Sales
- Scientific
- Utilities
- Word processing

Interface Technology
P.O. Box 383
Des Plaines, IL 60017
312-297-2265
- BSR X-10 operating system

Intergraphics Inc.
106-A South Columbus St.
Alexandria, VA 22314
703-683-9414
- Typesetting software

Interpro Corp.
P.O Box 4211
Manchester, NH 03108
603-669-0411
- Games

Mail list system
ROM emulator
Utilities

Intracolor Communications
6048 Horizon Drive
East Lansing, MI 48823
517-351-8537
Games

J & M Systems Ltd.
137 Utah, NE
Albuquerque, NM 87108
505-265-5072
Custom software
Disk alignment program

J. Eli & Associates
635 South Hennessey
New Orleans, LA 70119
504-286-6448
Custom software
Education

J.F. Consulting
74355 Buttonwood
Palm Desert, CA 92260
619-346-2051
Education
Medical
Plotting/Graphics
Program generators
Programmer aids
Purchase order, invoice
Report generators
Utilities
Word processing

Khadin & Co.
1420 W. Shaw #B
Fresno, CA 93711
209-221-1118
Education

Krell Software
1320 Stony Brook Road
Stony Brook, NY 11790
516-751-5139
Education
Games

Libra Laboratories Inc.
3495 Main St.
Metuchen, NJ 08840
201-494-2224
Accounting
Billing
Custom software
Data-base management
Education
Inventory control
Payroll, personnel
Plottting/graphics
Purchase order, invoice
Report generators
Sales
Scientific
Simulator

Lindbergh Systems
41 Fairhill Road
Holden, MA 01520
617-852-0233
Communications
Utilities

Little Bee Educational Programs
P.O. Box 262
Massillon, OH 44646
216-832-4097
Education

Lizcon Trading
32949 So. 300 W.
Salt Lake City, UT 84115
801-484-8179
Accounting
Billing
Custom software
Integrated invoicing/inventory/accounts receivable
Inventory control
Medical
Purchase order, invoice
Video tape rental software

LNW Research Corp.
2620 Walnut
Tustin, CA 92680
714-544-5744
Plotting/graphics
Scientific
Special LNW80 software
Utilities

Lobo Drives International
358 S. Fairview Ave.
Goleta, CA 93117
805-683-1576
LDOS and SmalDOS operating systems

Logical Systems Inc.
8970 N. 55th St.
P.O. Box 23956
Milwaukee, WI 53223
414-355-5454
Education
Inventory control
LDOS
Mail list manager
Programmer aids

Management Services
2901 Clendenen
Longview, TX 75601
Commodities
Custom software
Financial analysis
Simulators

Manhattan Software Inc.
P.O. Box 1063
Woodland Hills, CA 91365
213-704-8495
Accounting
Cash management
Cost accounting
Data-base management
Financial analysis
Games
Inventory control
Purchase order, invoice

Marathon Software
P.O. Box 1493
Jacksonville, TX 75766
214-586-8212
Games
Football prediction

Mark Data Products
24001 Alicia Parkway, #226
Mission Viejo, CA 92691
714-768-1551
Games

Master Electronics Inc.
154 N. 5th St.
Raymondville, TX 78580
512-689-5536
Accounting
Billing
Budget and forecast
Cash management
Compilers
Cost accounting
Data-base management
Education
Financial analysis
Games
Inventory control
Medical
Operating systems
Payroll, personnel
Programmer aids
Purchase order, invoice
Report generators
Sales
Word processing

Maxtek Inc.
2908 Oregon Court, Bldg. G-3
Torrance, CA 90503
213-320-6604
Plotting/graphics

Judson D. McClendon
844 Sun Valley Road
Birmingham, AL 35215
205-853-8440
Surveying

McClintock Corp.
P.O. Box 430980, SW 62nd Ave.
Miami, FL 33143
305-666-1300
Energy management
Engineering
Project management
Scientific

Meca
56677 Sunset Ave.
Yucca Valley, CA 92284
619-365-7686
Data-base management
Education
Inventory control

Med Systems Software
P.O. Box 3558
Chapel Hill, NC 27514
800-334-5470
Education
Games
Medical
Plotting/graphics
Utilities
Word processing

MedComp Inc.
142 Crescent St.
Brockton, MA 02402
617-583-4480
Billing
Medical
Utilities

Jerry Medlin & Associates
310 S. Jefferson St.
Napa, CA 94559
707-255-4475
Accounting

Melbourne House Software Inc.
333 E. 46th St.
New York, NY 10017
212-490-7957
Games

Menlo Systems
3790 El Camino Real #221
Palo Alto, CA 94306
415-856-0727
Plotting/graphics
Simulators

Micon Micro Systems
P.O. Box 360
Azle, TX 76020
817-444-2533
Accounting
Billing
Custom software
Inventory control
Purchase order, invoice
Sales

Micro Architect Inc.
96 Dothan St.
Arlington, MA 02174
617-643-4713
Accounting
Banking
Billing
Budget and forecast
Cash management
Custom software
Data-base management
Inventory control
Mailing list
Medical
Payroll, personnel
Programmer aids
Purchase order, invoice
Report generator
Utilities
Word processing

Micro-Computer Sales Corporation
Box 53376, 223 Fairway Drive
Fayetteville, NC 28305
919-483-2003
Accounting
Amusement game management
Billing
Country club management
Custom software
Insurance
Inventory control
Mailing list
Management
Medical
Payroll, personnel
Property management
Vet management

Micro-80 Inc.
2665 N. Busby Road
Oak Harbor, WA 98277
206-675-6143
Amateur radio
Budget and forecast
Data-base management
Education
Financial analysis
Games
Utilities
Word processing

Micro-Labs Inc.
902 Pinecrest
Richardson, TX 75080
214-235-0915
Custom software
Plotting/graphics

Micro Mainframe
11325 Sunrise Gold Circle
Rancho Cordova, CA 95670
916-635-3997
Accounting

Billing
Education
Inventory control
Operating systems
Payroll, personnel
Programmer aids
Purchase order, invoice
Sales
Simulators
Utilities

Micro Projects Engineering Co.
10810 W. Washington Blvd.
Culver City, CA 90230
213-202-1865
Custom software
Utilities

Micro Software
205 Dumaine Court, #105
Fort Walton Beach, FL 32548
904-862-5588
Data-base management

Micro Software Systems
1815 Smokewood Ave.
Fullerton, CA 92631
714-526-8435
Plotting/graphics

Micro Systems Software
2905-B Homestead Road
Santa Clara, CA 95051
408-984-0660
Utilities

Micro-Tax
P.O. Box 4262
Mountain View, CA 94040
415-964-2843
Federal and California State Income Tax

MicroTech Exports Inc.
467 Hamilton Ave., Suite 2
Palo Alto, CA 94301
415-324-9114
Utilities

The Micro Works Inc.
P.O. Box 1110
Del Mar, CA 92014
619-942-2400
Games
Language (Color Forth)
Programmer aids
Utilities

Misosys
P.O. Box 4848
Alexandria, VA 22303
703-960-2998
Compilers
Operating systems
Plotting/graphics
Utilities

M-P-Software
(Formerly Micro Pro Systems)
Route 2, Box 533
Cumming, GA 30130
404-887-6814
Accounting
Banking
Custom software
Education
Games
Utilities

Mumford Micro Systems
Box 400
Summerland, CA 93067
805-969-4557
Custom software
Photo typesetting interface
Plotting/graphics
Programmer aids
Scientific
Utilities

R.E. Musser & Sons
2816 Texas Ave.
Simi Valley, CA 93063
213-882-9264
Custom software
Home inventory for insurance
Sales
Utilities

Nanos Systems Corp.
P.O. Box 24344, 5981 W. Cadillac
Speedway, IN 46224
317-244-4078
System reference cards

National Integrated Software Services Inc.
8800 E. Arapahoe Road
Englewood, CO 80112
303-694-1994
Budget and forecast

National Software Marketing Inc.
4701 McKinley St.
Hollywood, FL 33021
305-625-6062
Accounting
Billing
Business management
Custom software
Games
Inventory control
Medical
Purchase order, invoice
Simulators

NC Software
7216 N. Boone Ave.
Minneapolis, MN 55428
612-533-8862
Communications
Custom software
Plotting/graphics
Programmer aids
Utilities

Nepenthe Programs
44 Third Ave., Suite F
Chula Vista, CA 92010
714-425-5501
Accounting
Billing
Cash management
Cost accounting
Custom software
Inventory control
Payroll, personnel
Programmer aids
Purchase order, invoice
Utilities
Word processing

New Classics Software
239 Fox Hill Road
Denville, NJ 07834
201-625-8838
Compiler
Inventory control
Purchase order, invoice

New Generation Software
241 North Hills Drive
North Hills, WV 26101
304-428-7098
Accounting
Budget and forecast
Custom software
Education
Financial analysis
Games
Medical
Plotting/graphics

Options-80
Box 471-E
Concord, MA 01742
Stock option analysis

PAB Software Inc.
6827 Kirkdale Drive
Fort Wayne, IN 46815
219-485-6980
Education
Plotting/graphics
Programmer aids
Scientific

Pacific Office Systems of Mountain View
2265 Old Middlefield Way
Mountain View, CA 94043
415-493-7455
Personal income tax interview program

Peggytronics
381 First St.
Los Altos, CA 94022
408-737-2253
Custom software
Plotting/graphics
Utilities

Pel/Tek
P.O. Box 1026
Southampton, PA 18966
215-947-2334
Games
Word processing

Personal Micro Computers Inc.
475 Ellis St.
Mountain View, CA 94043
415-962-0220
Budget and forecast
Word processing

Phantasy
Box 02205
Cleveland, OH 44102
Games

Phase One Systems Inc.
7700 Edgewater Drive, #830
Oakland, CA 94621
415-562-8085
Communications
Compilers
Data-base management
Inventory control
Operating systems
Program/data security
Program generators
Report generators
Utilities

Philadelphia Consulting Group Inc.
P.O. Box 102
Wynnewood, PA 19104
215-649-1598
Communications
Utilities

Pickles & Trout
P.O. Box 1026
Goleta, CA 93116
805-685-4641
Operating systems

Picotrin Technology Inc.
3531 San Castle Blvd.
Lantana, FL 33462
305-586-2377
Utilities

Pion Inc.
74 Appleton St.
Arlington, MA 02174
617-648-1717
Utilities

Pioneer Software
1746 NW 55th Ave., #204
Lauderhill, FL 33313
305-739-2071
Custom software
Games
Music generator and editor
Plotting/graphics
Program generators
Programmer aids
Utilities
Word processing

Platinum Software
P.O. Box 833
Plattsburgh, NY 12901
518-643-2650
Programmer aids
Utilities

Plus Computer Technology Inc.
7360 N. Lincoln Ave.
Lincolnwood, IL 60646
312-647-0988
Accounting
Billing
Financial analysis
Inventory control
Payroll, personnel
Purchase order, invoice
Sales

Powersoft, Div. of Breeze/QSD Inc.
11500 Stemmons Fwy., Suite 125
Dallas, TX 75229
214-484-2976
Custom software
Interpreters
Operating systems
Program/data security
Programmer aids
Utilities
Word processing

Precision Prototypes
410 E. Roca
Refugio, TX 78377
512-526-4758
Banking
Calendar
Football scouting report
Loan amortization
Mailing list system
Utilities

Pro/Am Software
220 Cardigan Road
Centerville, OH 45459
513-435-4480
Disassemblers
Utilities

Process Control Technology
8030 Lorraine Ave., #328
Stockton, CA 95210
209-952-6576
Accounting
Billing
Custom software
Inventory control
Payroll, personnel
Purchase order, invoice

Program Innovations
P.O. Box 1368, 400 N. Walnut St.
Lumberton, NC 28358
919-739-3680
Custom software
Insurance
Plotting/graphics
Premium finance insurance
Programmer aids
Utilities

Programmer's Institute
P.O. Box 3191
Chapel Hill, NC 27514
919-967-0861
Accounting
Cash management
Data-base management
Education
Games
Plotting/graphics
Programmer aids
Utilities

Prosoft
P.O. Box 560
North Hollywood, CA 91603
213-764-3131
Data-base management
Games
Plotting/graphics
Programmer aids
Utilities
Word processing

Prototype Machine Works
7741 Alabama Ave., #8
Canoga Park, CA 91304
213-346-6711
Plotting/graphics
Scientific

Quality Software & Consulting
P.O. Box 11355
El Paso, TX 79924
915-751-7638
Communications

Rabco Enterprises
806 Freedom Circle
Harleysville, PA 19438
215-368-4866
Custom software
Modification of stock programs

Racet Computes Ltd.
1330 N. Glassell, Suite M
Orange, CA 92667
714-997-4950
Compilers
Interpreters
Operating systems
Programmer aids
Scientific
Utilities
Word processing

Rainbow Software Services Ltd.
7070B Farrell Road SE
Calgary, Alberta T2H 0T2
Canada
403-253-6142
Accounting
Billing
Budget and forecast
Cash management
Cost accounting
Custom software
Financial analysis
Inventory control
Payroll, personnel
Program/data security
Purchase order, invoice
Sales
Utilities

Real Software Co.
P.O. Box 401
Hopedale, MA 01747
617-393-6281
Games
Education
Plotting/graphics
Simulators

Refware, Division of
David Whitney Associates
P.O. Box 451
Chappaqua, NY 10514
914-238-8896
Word processing

Reliable Cash Register Inc.
415 Millbury St.
Worcester, MA 01607
617-755-8084
Communications
Custom software
Retail inventory control

Rem Industries Inc.
9420 B Lurling Drive
Chatsworth, CA 91311
213-341-3719
Custom software
Forms generators
Home inventory for insurance
Utilities

Remarkable Software Inc.
1781 Fifth St.
Muskegon, MI 49441
616-728-9100
Color Computer magazine
Typesetting service

Remsoft Inc.
571 E. 185th St.
Euclid, OH 44119
216-531-1338
Education
Insurance

Rockware Data Corporation
P.O. Box 401710
Dallas, TX 75240
214-596-0588
Accounting
Amortization
Tax and pension plan

Rogo Computer Products
4752 De Beers Drive
El Paso, TX 79924
915-751-7638
Communications

Rontel Corp.
903 Shady Drive, SE
Vienna, VA 22180
703-281-4061
Games
Programmer aids

Sandpiper Software
P.O. Box 336
Maynard, MA 01754
617-568-8641
Accounting
Custom software
Education
Games
Inventory control
Point of sale

See-Thru Enterprises
933 Frank Ave.
Windsor, Ontario, Canada
519-735-2995
Education
Light pen software
Music Program
Plotting/graphics

Semi Disk Systems
P.O. Box GG
Beaverton, OR 97075
503-642-3100
Installation software for Semi Disk

Serious Personal Computing
P.O. Box 7059
Nashua, NH 03060
603-888-1376
Accounting
Compilers
Custom software
Education
General business
Inventory control
Operating systems
Scientific
Utilities

Shawmut Systems
105 Circle Drive
Somerset, MA 02726
617-672-9794
Accounting
Banking
Billing
Budget and forecast
Cash management
Custom software
Inventory control
Payroll, personnel
Purchase order, invoice
Utilities

The Smallsystem Center
P.O. Box 268
New Hartford, CT 06057
203-482-3689
Custom software
Data-base management
Education
Plotting/graphics
Program/data security
Program generators
Programmer aids
Sales
Utilities

Small System Design
225A Lowell Road
Hudson, NH 03051
603-880-1322
Text editing
Word processing

Soft Images
200 Route 17
Mahwah, NJ 07430
201-529-1440
Custom software
Education
Games
Plotting/graphics
Programmer aids
Scientific
Simulators
Utilities
Word processing

Softbyte Computing
Box 217
Wallingford, CT 06492
203-288-2036
Data-base management
Education
Food coupon shopping list
Plotting/graphics
Sales
Scientific
Simulators

Softouch
3200 Polaris, Suite 3
Las Vegas, NV 89102
702-367-2033
Utilities

Software Affair
858 Rubis Drive
Sunnyvale, CA 94087
408-730-1030
Music synthesizers

Software Concepts
105-106 Preston Valley
Shopping Center
Dallas, TX 75230
214-458-0330
Data-base management
Games
Plotting/graphics
Utilities
Word processing

Software Models
23913 Bowl Road
Crestline, CA 92325
714-338-5075
Budget and forecast
Custom software
Financial analysis
Purchase order, invoice
Sales
VisiCalc templates

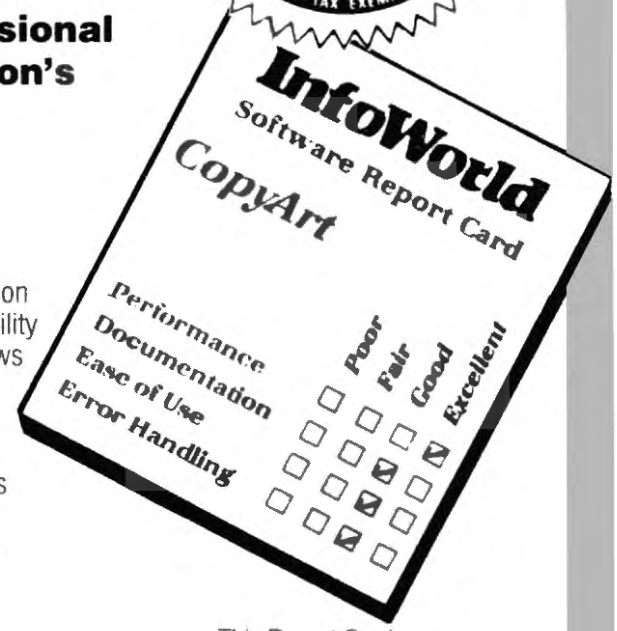
Spectral Associates
141 Harvard Ave.
Tacoma, WA 98466
206-565-8483
Compilers
Education
Games
Operating systems
Program generators
Programmer aids
Scientific

Continued

CopyArt II

WORD GRAPHICS DATA PROCESSOR

CopyArt II has earned the "Professional Software Programmers Association's Recommended Seal of Approval" Certification #1633



This Report Card was done for CopyArt Version One (since vastly improved to CopyArt II).

- Columns
- Sorting
- Graphics
- Math
- Graphic Characters
- Justify/Proportional
- Super/Sub Script
- Underlining
- Change Character Size or Pitch Easily!
- Help Command
- Electric Webster Integration
- Headers/Footers
- Page Numbering
- Edit Basic Programs
- DOS Commands Like Dir, Kill & Free
- Hi-Res Graphics Supported on Most Printers with Capability
- Free Mail List Program Allows Merging Names with Form Letters
- Scripsit File Loader
- Imbed Printer Control Codes
- Block Move
- Find/Replace with Wildcard and Repeat
- Super Easy Manual & Reference Card!
- Add Graphics Easily!

CUSTOMIZED PRINTER DRIVERS FOR

Radio Shack LP II, V, VI, VIII, DMP2100, DMP100, DMP500, DMP600, Daisy Wheel II

Epson MX-80, MX-80F/T, MX-100, FX-80 (all with or without Graftrax 80, Graftrax Plus, or Type III)

Smith-Corona Daisy Wheel

Okidata 80, 82A, 83A, 84, 92, 93

Brother HR-1 Daisy Wheel

C. Itoh 8510, 1550, Prowriter Series, Starwriter F-10 series, Printmaster

Others supported. Call if yours is not listed. Printer must have mechanical ability to do some features.

> "As a word processor with integral graphics capabilities, CopyArt is fabulous!"
>
> Dan Robinson,
> 80 MICRO, Sept 82

call toll free

800-528-1149

SPECIFY PRINTER WHEN ORDERING

COPYART ***149.95***
Extra printer drivers ***19.95***
"ELECTRIC WEBSTER" . . ***149.95***

Visa/MC/AMEX
Check/COD

Hardware Requirements TRS-80 Mod I, III or IV
48K Memory One Disk Drive/Double Density Two Disk Drives/Single Density

SIMUTEK
Computer Products Inc.
4897 E. Speedway Tucson, AZ 85712
(602) 323-9391 ⌐164

⌐See List of Advertisers on Page 323

GRADE BOOK

- Disk program (one disk required)
- Simple comprehensive
- Teacher designed and acclaimed
- In use for over 3 years
- No computer knowledge required
- Line printer optional
- Guaranteed

IBM-PC	TRS-80 I/III	APPLE II
$36.95	$34.95	$36.95

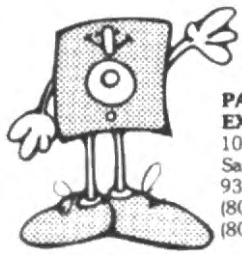
- Brain CompuTeasers IBM-PC APPLE $19.95
- Testmaster Series IBM-PC $19.95 each
- Boggel Word Game IBM-PC $10.95
- Jeopardi TRS-80 I/III $9.95
- Factor Label (CAI) TRS 80 I/III $29.95
- Grade Point Average IBM TRS-80 $7.95

DEC COMPUTING

Dept 2
609 Oakleaf Drive • Garrett, Indiana 46738

Verbatim
flexible disks

Call Free **(800) 235-4137** for prices and information. Dealer inquiries invited. C.O.D. and charge cards accepted.



VISA

PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401. In Cal. call
(800) 592-5935 or
(805) 543-1037

✓207

Seduction

the male-female connection!

® TRS-80 III/4
48K-1 DRIVE **$49.95**

adult video games

X-rated

7325½ RESEDA BLVD.
SUITE 637
RESEDA, CA 91335 ✓56

wabash®

six-year warranteed ✓367

DISKETTES!
$18.95/box (10)
with FREE library case!

5¼" single-side, single-density; double-density add $2/box. 8" disks comparably priced. Add $2 per order shipping. *In Illinois add 6% sales tax.* Immediate shipment on VISA, Master Card or Money Order; Add 14 days for personal checks.

CALL TOLL FREE
(800) 222-1248
In Illinois Call (312) 882-8315

DEALERS! SCHOOLS! USER GROUPS!
Call for our low volume discount prices!

DIGITAL IMAGES
Box 941005, Schaumburg IL 60194

DISKETTES

maxell
LIFETIME WARRANTY
5¼ - SS/DD
28.95
SPECIAL 10% OFF SECOND BOX!

NEW
3M SCOTCH
5¼ SS/DD
23.50

C.O.D.'s ACCEPTED

VERBATIM
Datalife
24.95
5¼ SS/DD
Also Available 5¼ SS/DD
21.95
HEAD CLEAN KIT BY VERBATIM - $8.

MEGA - BYTE IND.
4699 S.W. 45th St.
Ft. Lauderdale, Florida 33314
305-587-1130
NOW OPEN SAT.
10:00 to 3:00 EST.
1-800-327-1013
ASK FOR FREE CATALOGUE

RIBBONS
EPSON - Cartridges 4.00 EA. Min. 3
C. ITOH - Cartridges 7.00 EA. Min. 3
DIABLO Cartridges 4.00 EA. Min 3

✓199

ATTENTION
Foreign Computer Stores/Magazine Dealers

You have a large technical audience that speaks English and is in need of the kind of microcomputer information the Wayne Green Publications group provides.

Provide your audience with the magazines they need and make money at the same time. For details on selling *Microcomputing*, *80 Micro*, *Desktop Computing*, *inCider*, *HOT CoCo*, *Instant Software* and *Wayne Green Books* contact:

Sandra Joseph
World Wide Media
386 Park Ave. South
New York, N.Y. 10016
Phone—(212) 686-1520
Telex—620430

™TRS80 color

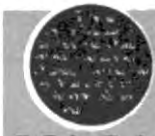
From the January 1981 issue of the CSRA Computer Club newsletter.

There was some amusement at the November meeting when the Radio Shack representatives stated that the software in the ROM cartridges could not be copied. This month's 68 Micro Journal reported they had disassembled the programs on ROM by covering some of the connector pins with tape. They promise details next month. Never tell a hobbyist something can't be done! This magazine seems to be the only source so far of technical informations on the TRS-80 color computer™. Devoted to SS-50 6800 and 6809 machines up to now, 68 Micro Journal plans to include the TRS-80 6809 unit in future issues.

To get the MOST from your 6809 CPU - This is the BEST SOURCE! The ONLY Magazine for the 6809 Computer. Months Ahead of All Others!

68 MICRO JOURNAL
5900 Cassandra Smith Rd.
Hixson, TN 37343
USA
1 Yr.—$24.50 2 Yr.—$42.50 3 Yr.—$64.50
*Foreign Surface Add $12 Yr. to USA Price
Foreign Air Mail Add $35 Yr. to USA Price
*Canada & Mexico Add $5.50 Yr. to USA Price ✓213

two/sixteen magazine



THE ONLY MAGAZINE FOR MODEL II & 16 USERS

two/sixteen magazine
131A East Orange St.
Lancaster, Pa. 17603
✓522 **(717) 397-3364**

Subscription Problem?

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

Continued

Utilities
Word processing

Standard Microsystems Inc.
136 Granite Hill Court
Langhorne, PA 19047
215-968-5966
Data-base management
Investment analysis

Star-Kits
P.O. Box 209
Mt. Kisco, NY 10549
914-241-0287
Cash management
Games
Operating systems
Utilities
Word processing

Star Value Software
12218 Scribe Drive
Austin, TX 78759
512-837-5498
Cash management
Investment analysis

Starrs-80
P.O. Box 2163
E. Peoria, IL 61611
309-694-7075
Custom software
Data-base management
Financial analysis

Storybooks of the Future
P.O. Box 4447
Santa Clara, CA 95054
415-386-5184
Education

STSC Inc.
2115 E. Jefferson St.
Rockville, MD 20852
301-984-5000
APL*Plus/80 application development system

Sublogic Communication Corp.
713 Edgebrook Drive
Champaign, IL 61820
217-359-8482
Education
Games
Plotting/graphics
Simulators
Utilities

Swallow Software
P.O. Box 502
Florence, AL 35631
205-766-0030
Games

Swayback Software
Box 1531
Merchantville, NJ 08109
609-778-0811
Custom software
Data-base management
Program generators
Programmer aids
Report generators
Utilities

T & D Software
144 W. 28th St.
Holland, MI 49423
616-396-7577
Education
Games
General business

T.C.E. Programs
P.O. Box 2477
Gaithersburg, MD 20879
301-963-3848
Custom software
Education
Plotting/graphics

Taranto & Associates Inc.
121 Paul Drive
San Rafael, CA 94903
415-472-2670
Accounting
Billing
Budget and forecast
Cash management
Cost accounting
Inventory control
Payroll, personnel
Purchase order, invoice
Report generators
Sales
Word processing

Telexpress Inc.
Route 130 & Beverly-Rancocas
Willingboro, NJ 08046
609-877-4900
Communications
Insurance
Program generators
Report generators

Think Software Inc.
572-810 W. Broadway
Vancouver, B.C., Canada V5Z 4C9
604-261-7261
Financial analysis

Thoughtware Publishing
(Formerly Data Train)
P.O. Box 669
Grants Pass, OR 97526
503-476-1467
Accounting
Billing
Budget
Cash management
Cost accounting
Custom software
Education
Financial analysis
Interpreters
Inventory control
Payroll, personnel
Program/data security
Program generators
Purchase order, invoice
Report generators
Sales
Utilities

Transformation Technologies
194 Lockwood Lane
Bloomingdale, IN 60108
312-351-1210
Cash management
Utilities
Word processing

Trend Software Co.
P.O. Box 741
Bloomfield Hills, MI 48013
313-540-8143
Games

Triple-D Software
P.O. Box 642-A
Layton, UT 84041
801-546-2833
Compilers
Custom software
Education
Games
Home knitting
Operating systems
Programmer aids
Purchase order, invoice
Utilities

Tsasa Inc./Powerbyte Software
2 Chipley Run
West Berlin, NJ 08091
609-346-3063
Accounting
Banking
Billing
Budget and forecast
Cash management
Data-base management
Financial analysis
Purchase order, invoice
Sales
Utilities
Word processing

Univair Inc.
9024 St. Charles Rock Road
St. Louis, MO 63114
314-426-1099
Accounting
Billing
Budget and forecast
Cash management
Cost accounting
Custom software
Education
Financial analysis
Insurance
Inventory control
Legal time and billing
Medical
Payroll, personnel
Property management
Purchase order, invoice
Real estate multi-list
Sales

Universal Data Research Inc.
2457 Wehrle Drive
Buffalo, NY 14221
716-631-3011
Accounting
Billing
Church contributions
Compilers
Custom software
Data-base management
Interpreters
Inventory control
Operating systems
Payroll, personnel
Purchase order, invoice
Report generators
Utilities

Videotronics of Sarasota Inc.
1725 S. Tamiami Trail
Sarasota, FL 33579
813-953-2332
Tax

Volks-80 Software Inc.
202 Packets Court
Williamsburg, VA 23185
804-220-0005
Communications
Custom software
Data-base management
Utilities

Western Operations
395 N. Hayden Bay Drive
Portland, OR 97217
503-289-1133
Operating systems
Programmer aids
Utilities

John Wiley & Sons
605 Third Ave.
New York, NY 10158
212-850-6542
Billing
Data-base management
Education
Utilities

Williams Enterprises
3101 Cheverly Ave.
Cheverly, MD 20785
301-773-3015
Bible teaching

Windham Software Inc.
29/31 Ivanhill St.
Willimantic, CT 06226
203-456-3530
Budget and forecast
Cash management
Dental office system
Medical office system

Xitex Corp.
9861 Chartwell
Dallas, TX 75243
214-349-2491
TRS-80 to standard bus (CPU) driver handshaking software

XYZT Computer Dimensions Inc.
2 Penn Plaza, Suite 1500
New York, NY 10121
212-244-3100
Data-base management
Interpreters
Programmer aids
Utilities

Software Manufacturers by Product

Accounting
Action Computers
Alphanetics
Analytical Processes Corp.
Chuck Atkinson Programs
Canty & Associates
Century Software Systems
Color Software Services
Computer Discount
Computer Generated Data
Computerware
CPAids Inc.
Creative Computer Center
Cybernetics Inc.
D.B. Software Co.
DCS Software
DLP Co.
Freedom Micro-Systems Inc.
Good-Lyddon Data Systems
H & E Computronics
Holman Data Processing
Holmes Engineering
Howe Software
Hurricane Laboratories Inc.
Instant Software Inc.
Institute for Scientific Analysis Inc.
Libra Laboratories Inc.
Lizcon Trading
Manhattan Software Inc.
Jerry Medlin & Associates
Micon Micro Systems
Micro Architect Inc.
Micro-Computer Sales Corp.
Micro Mainframe
M-P-Software
National Software Marketing
Nepenthe Programs
New Generation Software
Plus Computer Technology Inc.
Process Control Technology
Rainbow Software Services Ltd.
Rockware Data Corp.
Howard W. Sams & Co. Inc.
Sandpiper Software
Serious Personal Computing
Shawmut Systems
Taranto & Associates Inc.
Thoughtware Publishing
Tsasa Inc./Powerbyte Software
Univair Inc.
Universal Data Research Inc.

Banking
Action Computers
Computer Discount
Computer Generated Data
Creative Computer Center
Freedom Micro-Systems Inc.
H & E Computronics
Hon Finance & Insurance Computers
Micro Architect Inc.
M-P-Software
Precision Prototypes
Shawmut Systems
Tsasa Inc./Powerbyte Software

Billing
Action Computers
Analytical Processes Corp.
Baudy House
Bi-Tech Enterprises
Computer Discount
Computer Generated Data
Computer Shack
Computerware
Cybernetics Inc.
D.B. Software Co.
DLP Co.
Freedom Micro-Systems Inc.
Good-Lyddon Data Systems
H & E Computronics
Holman Data Processing
Instant Software Inc.
Institute for Scientific Analysis Inc.
Libra Laboratories Inc.
Lizcon Trading
MedComp Inc.
Micon Micro Systems
Micro Architect Inc.
Micro-Computer Sales Corp.
Micro Mainframe
National Software Marketing Inc.
Nepenthe Programs
Plus Computer Technology Inc.
Process Control Technology
Rainbow Software Services Ltd.
Howard W. Sams & Co. Inc.
Shawmut Systems
Taranto & Associates Inc.
Thoughtware Publishing
Tsasa Inc./Powerbyte Software
Univair Inc.
Universal Data Research Inc.
John Wiley & Sons

Budget and Forecast
Action Computers
Analytical Processes Corp.
Astro-Star Enterprises
Canty & Associates
Century Software Systems
Chromasette Magazine
CLOAD Magazine Inc.
Color Software Services
Computer Discount
Computer Generated Data
Creative Computer Center
Freedom Micro-Systems Inc.
Good-Lyddon Data Systems
H & E Computronics
Howe Software
Instant Software Inc.
Institute for Scientific Analysis Inc.
Micro Architect Inc.
Micro-80 Inc.
National Integrated Software Services Inc.
New Generation Software
Personal Micro Computers Inc.
Rainbow Software Services Ltd.
Howard W. Sams & Co. Inc.
Shawmut Systems
Software Models
Taranto & Associates Inc.
Thoughtware Publishing
Tsasa Inc./Powerbyte Software
Univair Inc.

Cash Management
Action Computers
Adventure International
The Alternate Source
Astro-Star Enterprises
Chuck Atkinson Programs
Century Software Systems
Communications Electronics
Computer Discount
Computer Generated Data
Computer Shack
Computerware
Creative Computer Center
D.B. Software Co.
DLP Co.
Freedom Micro Systems Inc.
H & E Computronics
HPB Vector Co.
Instant Software Inc.
Manhattan Software Inc.
Micro Architect Inc.
Nepenthe Programs
Rainbow Software Services Ltd.
Howard W. Sams & Co. Inc.
Shawmut Systems
Software Models
Star-Kits
Star Value Software
Taranto & Associates Inc.
Thoughtware Publishing
Transformation Technologies
Tsasa Inc./Powerbyte Software
Univair Inc.
Windham Software Inc.

Compilers
Action Computers
Algorix Software
The Alternate Source
Chromasette Magazine
CLOAD Magazine Inc.
Computer Discount
CRB Microtools
Eigen Systems
H & E Computronics
HPB Vector Company
Misosys
New Classics Software
Phase One Systems Inc.
Racet Computes Ltd.
Serious Personal Computing
Spectral Associates
Triple-D Software
Universal Data Research Inc.

Cost Accounting
Action Computers
Color Software Services
Computer Discount
Computer Generated Data
Creative Computer Center
D.B. Software Co.
Freedom Micro-Systems Inc.
Good-Lyddon Data Systems
H & E Computronics
Hon Finance & Insurance Computers
HPB Vector Co.
Instant Software Inc.
Institute for Scientific Analysis Inc.
Manhattan Software Inc.
Nepenthe Programs
Rainbow Software Services Ltd.
Taranto & Associates Inc.
Thoughtware Publishing
Univair Inc.

Custom Software
Action Computers
Algorithmic Associates
The Alternate Source
Analytical Processes Corp.
A$tring Systems
Astro-Star Enterprises
Aton International Inc.
Bi-Tech Enterprises
Howard Bowe
Business Problem Solvers
Century Software Systems
Color Software Services
Communications Electronics
Computer Applications Unlimited
Computer Business Systems
Computer Discount
Computer Generated Data
Computerware
Control Craft Inc.
CRB Microtools
Creative Computer Center
Custom Data
Datacom Computer Sales & Supplies
DCS Software
Easi Software Inc.
Eigen Systems
J. Eli & Associates
Forthright Software
Freedom Micro-Systems Inc.
Good-Lyddon Data Systems
H & E Computronics
Hon Finance & Insurance Computers
Howe Software
ICM Industries
I.J.S.
Institute for Scientific Analysis Inc.
J & M Systems Ltd.
Libra Laboratories Inc.
Lizcon Trading
Management Services
Micon Micro Systems
Micro Architect Inc.
Micro Projects Engineering Co.
Micro-Computer Sales Corp.
Micro-Labs Inc.
M.P. Software
Mumford Micro Systems
R.E. Musser & Sons Marketing Inc.
NC Software
Nepenthe Programs
New Generation Software
Peggytronics
Pioneer Software
Powersoft, Div. of Breeze/QSD Inc.
Process Control Technology
Program Innovations
Quality Software & Consulting
Rainbow Software Services Ltd.
Reliable Cash Register Inc.
REM Industries Inc.
Sandpiper Software
Serious Personal Computing
Shawmut Systems
The Smallsystem Center
Soft Images
Starrs-80
Swayback Software
T.C.E. Programs
Thoughtware Publishing
Triple-D Software
Univair Inc.
Universal Data Research Inc.
Volks-80 Software Inc.

Data-Base Management
Action Computers
Adventure International
Algorix Software
The Alternate Source
A$tring Systems
Autel Electronic Co.
Robert R. Belanger, Ph.D.
Bible Research Systems
Century Software Systems
Computer Discount
Computer Generated Data
Computerware
Data Management Systems

Continued

CONQUER YOUR MOUNTAIN OF BUSINESS PAPERWORK

Because it's there. And it'll be there until you have Easy Calc, Business Analysis and Master Plot... three essential additions to the modern professional's survival gear. Why spend endless hours forecasting, calculating and graph-plotting when Instant Software's business programs can do it for you? At a fraction of the time. And at a fraction of what you'd expect to pay.

MASTER PLOT

Get your point across graphically with this professional graph-plotting and printing package.

- Enter graph data from keyboard equations or from your BASIC programs.
- Plot up to 10 sets of data on the same graph.
- Create your own plotting symbols.
- Choose any number of horizontal and vertical lines.
- Select your own number of interpolated points between your data points.
- Print graphs any size from 1 × 1 to 7 × 24 inches.

Plus much more! Make your charts and graphs the easy way... with Master Plot.

Requires: TRS-80* Model I only
48K Disk Epson **MX-80 printer with Graphtrax
#0435RD $149.95

BUSINESS ANALYSIS

Get forecasting capabilities previously available only on large computers. This flexible, professional time series analysis and forecasting package lets you:

- Forecast and analyze sales.
- Perform product and business planning.
- Analyze stock, trends and growth rates.
- Research business cycles.
- Forecast spending and energy consumption.

Plus much more! Analyze and forecast like a pro with Business Analysis.

Requires: TRS-80 Model I and III 32K
Tape #0140R $75.00
Disk #0152RD $99.95

EASY CALC

Turn your TRS-80 into an electronic spreadsheet!

- Write numeric data into simple rows and columns on your screen.
- Add, subtract, multiply, divide or exponentiate single values or rows and columns.
- Calculate percentages and summations of rows or columns.
- Enter and save entire series of calculations.
- Handles up to 600 figures.

Written for non-computerists. Easy to understand instructions. Easy to use.

Requires: TRS-80 Disk 48K
Model I: #0269RD $49.95
Model III: #0369RD $49.95

**Epson is a trademark of Epson America *TRS-80 is a trademark of the Radio Shack Division of Tandy Corp.

YES! I want to conquer that mountain!

Send me ___#0269RD @ $49.95 ___#0369RD @ $49.95
___#0435RD @ $149.95 ___#0152RD @ $99.95 ___#0140R @ $75.00

☐Check/MO
☐Amer. Ex.
☐MC
☐VISA

NAME _____
ADDRESS _____
CITY_____ STATE_____ ZIP_____
CARD# _____
INTERBANK#_____ EXP. DATE_____
SIGNATURE _____

Add $2.50 postage and handling

33AB8C

Instant Software

1-800-258-5473
Rte. 101 & Elm Street
Peterborough, NH 03458 598

See List of Advertisers on Page 323

FREE
business software directory

- Radio Shack's Model 1, 2, 3 & 16
- CPM: Xerox, Alto...
- IBM Personal Computer & compatibles

"(DBMS) is GREAT!" -publisher of 80-US

"(GL) superior to either the Osborne (SBSG & Taranto) or Radio Shack... MAIL-X has a greater capacity...more flexible than (R.S.)" -columnist of 80-microcomputing

"imperceptively fast...(DBMS) is a good and reliable workhorse" -publisher of Interface Age

Data base manager, integrated accounting package (AR, AP, GL & Payroll), inventory, word processing, and mailing list. Compare and be selective! Top-quality software at mass-production prices!

Micro Architect Inc.
6 Great Pine Ave. Burlington, MA 01803
617-273-5658

149

The call for authors is out!

Wayne Green Books announces a December 31, 1983 deadline for submitting manuscript proposals for the upcoming publication list. Ideas for book-length manuscripts about any microcomputer system or area of electronics will be considered. In addition to payment and royalties, we offer our distribution channels and the marketing support your book deserves.

Send proposals or requests for a copy of our Writer's Guide to:

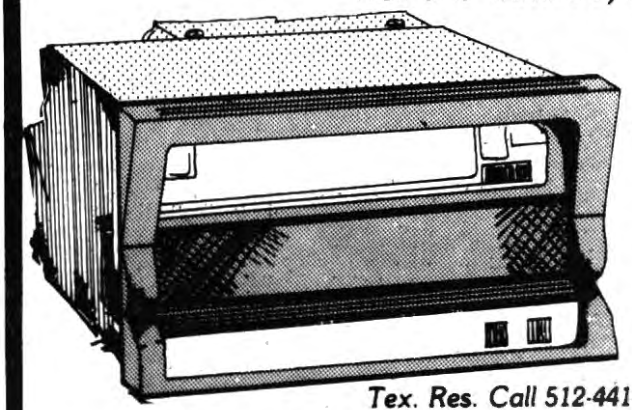
Editor, **Wayne Green Books**
Peterborough, NH 03458.
Or call **toll-free 1-800-343-0728.**

MICRO DESIGN INTRODUCES

REMOVABLE

WINCHESTER HARD DISK SYSTEM

For the TRS-80, IBM & Apple Computer



FEATURES

- *Approximately nine times faster than standard floppy disk drives*
- *Mix & Match Fixed & Removable drives for a custom system*
- *Up to 45 megabyte on-line storage* • *Built-in error detection & correction.*

Starting At **$1299.95**

MICRO DESIGN

6301 Manchaca Rd. Suite B • Austin, TX 78745

Tex. Res. Call 512-441-7890

1-800-531-5002

429

Continued

Data Strategies Inc.
Datacom Computer Sales & Supplies
FGA Software
H & E Computronics
Hon Finance & Insurance Computers
Howe Software
HPB Vector Co.
Hurricane Laboratories Inc.
ICR Futuresoft
Individual Systems Inc.
Institute for Scientific Analysis Inc.
Libra Laboratories Inc.
Manhattan Software Inc.
Meca
Micro Architect Inc.
Micro-80 Inc.
Micro Software
Phase One Systems Inc.
Prosoft
Quality Software & Consulting
The Smallsystem Center
Softbyte Computing
Software Concepts
Standard Microsystems Inc.
Starrs-80
Swayback Software
Tsasa Inc./Powerbyte Software
Universal Data Research Inc.
Volks-80 Software Inc.
John Wiley & Sons
XYZT Computer Dimensions Inc.

Education

Acorn Software Products Inc.
Action Computers
Analytical Processes Corp.
Astro-Star Enterprise
Avalon Hill Microcomputer Games
Basics & Beyond Inc.
Becker Electronics Inc.
Bible Research Systems
Chromasette Magazine
CLOAD Magazine Inc.
Color Software Services
Creative Computer Center
Dorsett Educational Systems Inc.
Early Games
Educational Software Library Inc.
En-Joy Computer Programs
FGA Software
Fireside Computing Inc.
Forthright Software
Freedom Micro-Systems Inc.
H & E Computronics
Hurricane Laboratories Inc.
Instant Software Inc.
Institute for Scientific Analysis Inc.
J. Eli & Associates
J.F. Consulting
Khadin & Co.
Krell Software
Libra Laboratories Inc.
Little Bee Educational Programs
Meca
Micro-80 Inc.
Micro Mainframe
M-P-Software
New Generation Software
PAB Software
Quality Software & Consulting
Real Software Co.
Remsoft Inc.
Howard W. Sams & Co. Inc.
Sandpiper Software
ScreenPlay
See-Thru Enterprises
Serious Personal Computing
The Smallsystem Center
Soft Images
Softbyte Computing
Spectral Associates
Storybooks of the Future
Sublogic Communication Corp.
T & D Software
T.C.E. Programs
Thoughtware Publishing
Triple-D Software
Univair Inc.
John Wiley & Sons

Financial Analysis

Action Computers
Analytical Processes Corp.
Chuck Atkinson Programs
Bayesian Investment Services
Robert R. Belanger, Ph.D.
Canty & Associates
Century Software Systems
Chromasette Magazine
CLOAD Magazine
Color Software Services
Computer Discount
Creative Computer Center
Datamate Co.
DLP Co.
Freedom Micro-Systems Inc.
Good-Lyddon Data Systems
H & E Computronics
Holmes Engineering
Hon Finance & Insurance Computers
Instant Software Inc.
Management Services
Manhattan Software Inc.
Micro-80 Inc.
New Generation Software
P. Tree Enterprises
Plus Computer Technology Inc.
Rainbow Software Services Ltd.
Howard W. Sams & Co. Inc.
Software Models
Starrs-80
Think Software Inc.
Thoughtware Publishing
Tsasa Inc./Powerbyte Software
Univair Inc.

Games

ABS Suppliers
Acorn Software Products Inc.
Action Computers
Adventure International
Algorithmic Associates
Alpha Products
The Alternate Source
Analytical Processes Corp.
Autel Electronic Co.
Avalon Hill Microcomputer Games
Banana Soft
Basics & Beyond Inc.
Big Five Software
Cedar Software
Chromasette Magazine
CLOAD Magazine Inc.
Color Software Services
Computer Applications Unlimited
Computer Shack
Computerware
Control Craft Inc.
Cornsoft
Custom Software
Datasoft Inc.
DCS Software
Discovery Games
Early Games
Epyx/Automated Simulations Inc.
B. Erickson Software
Esmark Inc.
FGA Software
Five Stones Software
Forthright Software
Funsoft Inc.
Gamester Software
Instant Software Inc.
Manhattan Software Inc.
Mark Data Products
Melbourne House Software Inc.
The Micro Works Inc.
Micro-80 Inc.
M-P-Software
National Software Marketing Inc.
New Generation Software
Pel/Tek
Phantasy
Pioneer Software
Prosoft
Quality Software & Consulting
Real Software Co.
Rontel Corp.
Sandpiper Software
ScreenPlay
Soft Images
Software Concepts
Spectral Associates
Star-Kits
Sublogic Communication Corp.
Swallow Software
T & D Software
Trend Software Co.
Triple-D Software

Insurance

Action Computers
Computer Discount
DLP Co.
Freedom Micro-Systems Inc.
H & E Computronics
Micro-Computer Sales Corp.
Program Innovations
Remsoft Inc.
Univair Inc.

Interpreters

Action Computers
The Alternate Source
Chromasette Magazine
CLOAD Magazine Inc.
Computer Discount
Computerware
H & E Computronics
HPB Vector Co.
Phase One Systems Inc.
Powersoft, Div. of Breeze/QSD Inc.
Racet Computes Ltd.
Thoughtware Publishing
Universal Data Research Inc.
XYZT Computer Dimensions Inc.

Inventory Control

Action Computers
Analytical Processes Corp.
Chuck Atkinson Programs
Bi-Tech Enterprises
Business Problem Solvers
Century Software Systems
C.F. Kerchner & Associates Inc.
Color Software Services
Computer/Business Services
Computer Discount
Computer Generated Data
Computerware
Creative Computer Center
D.B. Software Co.
DCS Software
Eltech Associates
Freedom Micro-Systems Inc.
Good-Lyddon Data Systems
H & E Computronics
Hon Finance & Insurance Computers
Hurricane Laboratories Inc.
ICR Futuresoft
I.J.S.
Individual Systems Inc.
Institute for Scientific Analysis Inc.

Libra Laboratories Inc.
Lizcon Trading
Manhattan Software Inc.
Meca
Micon Micro Systems
Micro Architect Inc.
Micro-Computer Sales Corp.
Micro Mainframe
National Software Marketing Inc.
Nepenthe Programs
New Classics Software
Plus Computer Technology Inc.
Process Control Technology
Rainbow Software Services Ltd.
Sandpiper Software
Serious Personal Computing
Shawmut Systems
Taranto & Associates Inc.
Thoughtware Publishing
Univair Inc.
Universal Data Research Inc.

Medical
Action Computers
Computer/Business Systems
Computer Discount
Data Strategies Inc.
En-Joy Computer Programs
H & E Computronics
Hurricane Laboratories Inc.
J.F. Consulting
Lizcon Trading
MedComp Inc.
Micro Architect Inc.
Micro-Computer Sales Corp.
National Software Marketing Inc.
New Generation Software
ScreenPlay
Univair Inc.
Windham Software Inc.

Operating Systems
Action Computers
Algorix Software
The Alternate Source
Apparat Inc.
Aton International Inc.
Canty & Associates
Computer Discount
Computerware
Forthright Software
H & E Computronics
HPB Vector Co.
Micro Mainframe
Misosys
Phase One Systems Inc.
Pickles & Trout
Powersoft, Div. of Breeze/QSD Inc.
Racet Computes Ltd.
Serious Personal Computing
Spectral Associates
Star-Kits
Triple-D Software
Universal Data Research Inc.
Western Operations

Payroll/Personnel
Action Computers
Chuck Atkinson Programs
Bi-Tech Enterprises
Color Software Services
Computer Discount
Computer Generated Data
Computerware
CPAids Inc.
Creative Computer Center
Cybernetics Inc.
D.B. Software Co.
DCS Software
Freedom Micro-Systems Inc.
Good-Lyddon Data Systems
H & E Computronics
Holmes Engineeering
Institute for Scientific Analysis Inc.
Libra Laboratories Inc.
Micro Architect Inc.
Micro-Computer Sales Corp.
Micro Mainframe
Nepenthe Programs
Plus Computer Technology Inc.
Process Control Technology
Rainbow Software Services Ltd.
Howard W. Sams & Co. Inc.
Shawmut Systems
Taranto & Associates Inc.
Thoughtware Publishing
Univair Inc.
Universal Data Research Inc.

Plotting/Graphics
Action Computers
Algorithmic Associates
Analytical Processes Corp.
Autel Electronic Co.
Chromasette Magazine
CLOAD Magazine Inc.
Computer Discount
Computerware
Compuware Corp.
Easi Software Inc.
H & E Computronics
Institute for Scientific Analysis Inc.
J.F. Consulting
Libra Laboratories Inc.
LNW Research Corp.
Menlo Systems
Micro-Labs Inc.
Micro Software Systems
Misosys
Mumford Micro Systems
NC Software
New Generation Software
PAB Software Inc.
Peggytronics
Pioneer Software
Program Innovations
Prosoft
Prototype Machine Works
Real Software Company
ScreenPlay
See-Thru Enterprises
The Smallsystem Center
Soft Images
Softbyte Computing
Software Concepts
Sublogic Communication Corp.
T.C.E. Programs

Program/Data Security
Action Computers
Computer Discount
Computerware
Control Craft Inc.
Eigen Systems
H & E Computronics
HPB Vector Co.
Phase One Systems Inc.
Powersoft, Div. of Breeze/QSD Inc.
Rainbow Software Services Ltd.
The Smallsystem Center
Thoughtware Publishing

Program Generators
Action Computers
The Alternate Source
Computer Discount
Cybernetics Inc.
En-Joy Computer Programs
H & E Computronics
Hon Finance & Insurance Computers
ICR Futuresoft
Institute for Scientific Analysis Inc.
J.F. Consulting
Phase One Systems Inc.
Pioneer Software
The Smallsystem Center
Spectral Associates
Swayback Software
Telexpress Inc.
Thoughtware Publishing

Programmer Aids
ABS Suppliers
Action Computers
Algorix Software
The Alternate Source
Analytical Processes Corp.
Apparat Inc.
Howard Bowe
Business Problem Solvers
Chromasette Magazine
CLOAD Magazine Inc.
Computer Applications Unlimited
Computer Discount
Computer Generated Data
Computerware
CRB Microtools
Creative Computer Center
Data Management Systems
Datamate Co.
DCS Software
DLP Co.
En-Joy Computer Programs
H & E Computronics
Hon Finance & Insurance Computers
ICM Industries
ICR Futuresoft
I.J.S.
Individual Systems Inc.
Institute for Scientific Analysis Inc.
J.F. Consulting
Micro Architect Inc.
Micro Mainframe
The Micro Works Inc.
Mumford Micro Systems
NC Software
Nepenthe Programs
PAB Software Inc.
Pioneer Software
Platinum Software
Powersoft, Div. of Breeze/QSD Inc.
Program Innovations
Prosoft
Racet Computes Ltd.
Rontel Corp.
Howard W. Sams & Co. Inc.
The Smallsystem Center
Soft Images
Spectral Associates
Swayback Software
Triple-D Software
Western Operations
XYZT Computer Dimensions Inc.

Purchase Order, Invoice
Action Computers
Analytical Processes Corp.
Bi-Tech Enterprises
Business Problem Solvers
Color Software Services
Computer/Business Services
Computer Discount
Computer Generated Data
Computer Shack
Computerware
Creative Computer Center
Cybernetics Inc.
D.B. Software Co.
DCS Software
Eltech Associates
Freedom Micro-Systems Inc.
Good-Lyddon Data Systems
H & E Computronics
Holmes Engineering

Howe Software
Hurricane Labs Inc.
Individual Systems Inc.
Institute for Scientific Analysis Inc.
J.F. Consulting
Libra Laboratories Inc.
Lizcon Trading
Manhattan Software Inc.
Micon Micro Systems
Micro Architect Inc.
Micro Mainframe
National Software Marketing Inc.
Nepenthe Programs
New Classics Software
Plus Computer Technology Inc.
Process Control Technology
Rainbow Software Services Ltd.
Howard W. Sams & Co. Inc.
Shawmut Systems
Software Models
Taranto & Associates Inc.
Thoughtware Publishing
Triple-D Software
Tsasa Inc./Powerbyte Software
Univair Inc.
Universal Data Research Inc.

Report Generators
Action Computers
Adventure International
The Alternate Source
A$tring Systems
Computer Discount
Cybernetics Inc.
Datacom Computer Sales & Supplies
Eigen Systems
H & E Computronics
Hon Finance & Insurance Computers
HPB Vector Co.
ICR Futuresoft
Institute for Scientific Analysis Inc.
J.F. Consulting
Libra Laboratories Inc.
Micro Architect Inc.
Phase One Systems Inc.
Swayback Software
Taranto & Associates Inc.
Telexpress Inc.
Thoughtware Publishing
Universal Data Research Inc.

Sales
Action Computers
Chuck Atkinson Programs
Bi-Tech Enterprises
CLOAD Magazine Inc.
Color Software Services
Computer Discount
Computer Generated Data
Computerware
Creative Computer Center
Cybernetics Inc.
DCS Software
Freedom Micro Systems Inc.
Good-Lyddon Data Systems
H & E Computronics
Holmes Engineering
Institute for Scientific Analysis Inc.
Libra Laboratories Inc.
Micon Micro Systems
Micro Mainframe
R.E. Musser & Sons
Plus Computer Technology Inc.
Rainbow Software Services Ltd.
The Smallsystem Center
Softbyte Computing
Software Models
Taranto & Associates Inc.
Thoughtware Publishing
Tsasa Inc./Powerbyte Software
Univair Inc.

Scientific
Action Computers
Adventure International
Alpha Products
Astro-Star Enterprises
Autel Electronic Co.
Becker Electronics Inc.
Robert R. Belanger, Ph.D.
Howard Bowe
Chromasette Magazine
CLOAD Magazine Inc.
Color Software Services
Computer Discount
Easi Software Inc.
Eigen Systems
Forthright Software
H & E Computronics
HPB Vector Co.
Institute for Scientific Analysis Inc.
Libra Laboratories Inc.
LNW Research Corp.
McClintock Corp.
Mumford Micro Systems
PAB Software Inc.
Prototype Machine Works
Racet Computes Ltd.
Howard W. Sams & Co. Inc.
Serious Personal Computing
Soft Images
Softbyte Computing
Spectral Associates

Simulators
Algorix Software
Chromasette Magazine
CLOAD Magazine Inc.
Computer Discount
H & E Computronics
HPB Vector Co.
Instant Software Inc.
Libra Laboratories Inc.
Management Services
Menlo Systems
National Software Marketing Inc.
Real Software Co.
Soft Images
Softbyte Computing
Sublogic Communication Corp.

Utilities
ABS Suppliers
Acorn Software Products Inc.
Action Computers
Adventure International
Algorix Software
The Alternate Source
Analytical Processes Corp.
Apparat Inc.
Aton international Inc.
Autel Electronic Co.
Basics & Beyond Inc.
Bi-Tech Enterprises
Howard Bowe
Business Problem Solvers
Canty & Associates
Chromasette Magazine
CLOAD Magazine Inc.
Color Software Services
Computer Applications Unlimited
Computer Discount
Computer Generated Data
Computer Shack
Computerware
Control Craft Inc.
CRB Microtools
Custom Software
Cybernetics Inc.
Data Management Systems
DCS Software
DLP Co.
EAP Co.
Eigen Systems
En-Joy Computer Programs
B. Erickson Software
ETS Center
FGA Software
Donald M. Fielding
Forthright Software
Freedom Micro-Systems Inc.
Good-Lyddon Data Systems
H & E Computronics
Hexagon Systems
Howe Software
HPB Vector Co.
Hurricane Laboratories Inc.
ICM Industries
I.J.S.
Instant Software Inc.
Institute for Scientific Analysis Inc.
Interpro Corp.
J.F. Consulting
Lindbergh Systems
LNW Research Corp.
MedComp Inc.
Micro Architect Inc.
Micro-80 Inc.
Micro Mainframe
Micro Projects Engineering Co.
Micro Systems Software
The Micro Works Inc.
Microtech Exports Inc.
Misosys
M-P-Software
Mumford Micro Systems
R.E. Musser & Sons
NC Software
Nepenthe Programs
Peggytronics
Phase One Systems Inc.
Philadelphia Consulting Group Inc.
Pion Inc.
Pioneer Software
Platinum Software
Powersoft, Div. of Breeze/QSD Inc.
Precision Prototypes
Pro/Am Software
Program Innovations
Prosoft
Racet Computes Ltd.
Rainbow Software Services Ltd.
Rem Industries Inc.
Howard W. Sams & Co. Inc.
ScreenPlay
Serious Personal Computing
Shawmut Systems
The Smallsystem Center
Soft Images
Softouch
Software Concepts
Spectral Associates
Star-Kits
Sublogic Communication Corp.
Swayback Software
Thoughtware Publishing
Transformation Technologies
Triple-D Software
Tsasa Inc./Powerbyte Software
Universal Data Research Inc.
Volks-80 Software Inc.
Western Operations
John Wiley & Sons
XYZT Computer Dimensions Inc.

Word Processing
Action Computers
The Alternate Source
Anitek Software Products
Astro-Star Enterprises
Canty & Associates
Chromasette Magazine
CLOAD Magazine Inc.
Computer Discount

Computerware
Data Strategies Inc.
Design Enterprises of San Francisco
Eigen Systems
FGA Software
H & E Computronics
Hexagon Systems
Holmes Engineering
Howe Software
HPB Vector Co.
Hurricane Laboratories Inc.
Institute for Scientific Analysis Inc.
J & M Systems Ltd.
J.F. Consulting
Micro Architect Inc.
Micro-80 Inc.
Nepenthe Programs
Pel/Tek
Personal Micro Computers Inc.
Pioneer Software
Powersoft, Div. of Breeze/QSD Inc.
Prosoft
Racet Computes Ltd.
Refware Div. of David Whitney Associates
ScreenPlay
Small System Design
Soft Images
Software Concepts
Spectral Associates
Star-Kits
Taranto & Associates Inc.
Transformation Technologies
Tsasa Inc./Powerbyte Software

Software Distributors

ABS Suppliers
3352 Chelsea Circle
Ann Arbor, MI 48104
313-971-1404
Games
Programmer aids
System diagnostic package
Technical publications
Utilities
Word processing

Ace Computer Products of Florida Inc.
1640 NW 3rd St.
Deerfield Beach, FL 33441
305-427-1257
Data Communication

Action Computers
85 Factory St.
Nashua, NH 03062
603-883-5369
Accounting
Banking
Billing
Budget and forecast
Cash management
Cost accounting
Custom software
Data-base management
Education
Financial analysis
Inventory control
Medical
Operating systems
Payroll, personnel
Plotting/graphics
Program change
Program/data security
Program generators
Programmer aids
Purchase order/invoice
Report generator
Sales
Software operations check
Word processing

Alamo Computer Co.
1234 Avant
San Antonio, TX 78210
512-534-7782
Radio Shack software

Algorithmic Associates
P.O. Box 244
Bedford, MA 01730
617-646-4615
Custom software
Games
Plotting/graphics

Algorix Software
P.O. Box 11721
San Francisco, CA 94101
415-387-3131
Compilers
Data-base management
Operating systems
Programmer aids
Simulators
Utilities

Alpha Products
79-04 Jamaica
Woodhaven, NY 11421
212-296-5916
Games
Scientific

The Alternate Source
704 N. Penn. Ave.
Lansing, MI 48906
800-248-0284
Budget and forecast
Cash management
Cost accounting
Custom software
Data-base management
Education
Games
Operating systems
Plotting/graphics
Programmer aids
Report generators
Scientific
Word processing

American Small Business Computers
118 S. Mill St.
Pryor, OK 74361
918-825-4844
Accounting
Billing
Compiler
Custom software
Data-base management
Education
Games
Interpreters
Inventory control
Medical
Operating systems
Payroll, personnel
Programmer aids
Purchase order, invoice
Sales
Simulators
Utilities
Word processing

Amflex Products & Services
P.O. Box 852
Adrian, MI 49221
517-423-7112
Accounting
Billing
Cash management
Custom software
Data-base management
Games
Inventory control
Operating systems
Payroll, personnel
Purchase order, invoice
Sales
Word processing

Anitek Software Products
P.O. Box 1136
Melbourne, FL 32935
305-259-9397
Word processing

Astro-Star Enterprises
5905 Stone Hill Drive
Rocklin, CA 95677
916-624-3709
Budget and forecast
Cash management
Custom software
Education
Scientific
Word processing

Banana Soft
1601 Wildwood Drive
Fallston, MD 21047
301-879-8149
Games

Basics & Beyond Inc.
Pinesbridge Road, Box 10
Amawalk, NY 10501
914-962-2355
Education
Games
Utilities

Robert R. Belanger, Ph.D.
541 W. 6th St.
Azusa, CA 91702
213-969-4112
Data-base management
Financial analysis
Scientific
Statistics, research

Bi-Tech Enterprises Inc.
10B Carlough Road
Bohemia, NY 11716
516-567-8155
Accounting

Continued

for the TRS-80 from Micro-Mega

The Original GREEN-SCREEN

The eye-pleasing Green-Screen fits over the front of your TRS-80 Video Display and gives you improved contrast with reduced glare. You get bright luminous green characters and graphics like those featured by more expensive CRT units.

Don't confuse the Original Green-Screen with a piece of thin film stuck to the face of your video tube, such as that advertised by others. The Original Green-Screen is mounted in a full frame perfectly matched to the color and texture of the TRS-80 Video Display. It is attached with adhesive strips which do not mar your unit in any way.

The full frame design of the Original Green-Screen "squares off" the face of your video display and greatly improves the overall appearance of your system.

(Specify whether for Model I or Model III)

THE GREEN-SCREEN *$15.95*

Add $1.50 for postage and handling.

Terms: Check or money order, no CODs or credit cards, please. Add amount shown for postage and handling to price of the item. All items shipped within 48 hours by first class or priority mail. Virginia residents, add 4½% sales tax. ✓162

Micro-Mega · P.O. Box 6265 · Arlington, Va 22206

WANTED

"Buyers" & We'll pay the shippin'

• CALL FREE (800) 654-4058 •

"Call For Reduced Prices At Various Quantities"

Verbatim

5¼" sin-side dbl-den.	2.45
5¼" dbl-side dbl-den.	3.50
5¼" sin-side quad	3.45
5¼" dbl-side quad	4.45
8" sin-side sin-den.	2.95
8" sin-side dbl-den.	3.40
8" dbl-side dbl-den.	3.95

Head Cleaning Kits.... 9.40
Refills..14.50

Prices per ea. 10 per box

Dysan CORPORATION

5¼" sin-side dbl-den.	3.95
5¼" dbl-side dbl-den.	4.45
5¼" sin-side quad	4.45
5¼" dbl-side quad	4.95
8" sin-side sin-den.	3.45
8" sin-side dbl-den.	4.45
8" dbl-side dbl-den.	4.95

We Stock "Bulk-Packed" Diskettes

3M Scotch

5¼" sin-side dbl-den.	2.35
5¼" dbl-side dbl-den.	3.25
8" sin-side sin-den.	2.45
8" sin-side dbl-den.	3.00
8" dbl-side dbl-den.	3.95

Disk Minder
• Smoked Plastic
• Holds 75 Disks
17.95 ea

Dealer Inquiries Welcomed

the Diskette Connection™

P.O. Box 1674
Bethany, OK 73008

✓441

MasterCard VISA

*(Continental U.S. only. Add 3.00 on orders under 40.00)

Continuous Checks, Statements, and Invoices

for Desk-Top Computers

- Compatible with software from over 300 sources. Or program to NEBS standard forms yourself.
- Continuous Micro-Perf™ Letterheads and matching continuous Envelopes provide a clean, trim look.
- Also, diskettes, continuous labels, other supplies and accessories.
- Our policy is to process forms printed with your name within 6 working days. Then ship direct to you (We pay shipping charges on prepaid orders).

QUALITY PRODUCTS
SMALL QUANTITIES AT LOW PRICES
MONEY-BACK GUARANTEE

FREE Full-color, catalog

fast service by mail or phone

TOLL FREE 1 + 800-225-9550

(Mass. residents 1 + 800-922-8560)

NAME/TITLE | PHONE
COMPANY
STREET
CITY, STATE, ZIP
SOFTWARE BRAND | PACKAGE # | ☐ DO OWN PROGRAMMING
COMPUTER BRAND | MODEL | PLAN TO PURCHASE WITHIN:
YOUR LINE OF BUSINESS | NUMBER OF EMPLOYEES
I MOST OFTEN USE MY COMPUTER FOR:
☐ WORD PROCESSING ☐ ACCOUNTING ☐ OTHER _____

✓533

15109

✓See List of Advertisers on Page 323

TRS-80 Model 4
Super Business System

System Includes:

- Model 4 64K
- 2 Disk Drives
- EPSON FX-80 Printer
- Super Scripsit & Printer Driver
- Profile Plus
- 3200 Sheets Fan Fold Paper
- Box of 3M Diskettes
- 3M Head Cleaner
- Printer Cable
- Printer Stand
- Lemon Surge Protector
- Computer Dust Cover
- Printer Dust Cover

List Price $3489

Only $2888

ORDER TOLL FREE: 800-526-5313
COMPUTER DISCOUNT OF AMERICA, INC.
15 Marshall Hill Road, West Milford Mall
West Milford, New Jersey 07480-219
In New Jersey Call 201-728-8080 ↙133

Computer Discount of America

PROTECT YOUR TRS-80 MOD III* KEYBOARD
WITH
PLEXA-LOK

PROTECT YOUR $2000 INVESTMENT FOR UNDER $20!

PLEXA-LOK slips up and over the keyboard – then gently snaps into position.

- Your valuable computer is protected from objects and spills directly on top of keyboard which could cost hundreds of dollars to repair!
- *PLEXA-LOK* allows your secretary to go on break without having to worry about visitors accidentally destroying their hours (and your $) of work

HOMES – SCHOOLS – BUSINESS

PLEXA-LOK

- **ENHANCES** looks of your system
- **PROTECTS** keyboard from dust
- **30-DAY GUARANTEE**
- **ALLOWS** computer to remain on while unattended
- **KEYBOARD** protected from kids
- **HIGH QUALITY** Acrylic
- **SCHOOLS – A MUST!**

INTRODUCTORY SPECIAL
$19.95 Prepaid UPS
Continental USA

CA Residents Add 6% Tax
Allow 4-6 Weeks Delivery
Dealer Inquiries Welcome

TM TANDY CORPORATION

MON.-FRI. 9:00-5:00

MasterCard and Visa Accepted

LAST ELECTRONICS
P.O. BOX 1300E
SAN ANDREAS, CA 95249
(209) 754-1800

↙336

THE SELECTRIC™ INTERFACE

Daisy wheel quality without daisy wheel expense.

You need the quality print that a daisy wheel printer provides but the thought of buying one makes your wallet wilt. *The Selectric™ Interface*, a step-by-step guide to interfacing an IBM Selectric I/O Writer to your microcomputer, will give you that quality at a fraction of the price. George Young, co-author of *Microcomputing* magazine's popular "Kilobaud Klassroom" series, offers a low-cost alternative to buying a daisy wheel printer.

The Selectric™ Interface includes:

- step-by-step instructions
- tips on purchasing a used Selectric™
- information on various Selectric™ models, including the 2740, 2980, and Dura 1041
- driver software for Z80, 8080, and 6502 chips
- tips on interfacing techniques

With *The Selectric Interface* and some background in electronics, you can have a high-quality, low-cost, letter-quality printer. Petals not included.

Credit card orders call TOLL-FREE 1-800-258-5473. Or mail your order with payment plus $1.50 shipping and handling to: Wayne Green Inc. Attn: Retail Book Sales, Peterborough, NH 03458.

Dealer inquiries invited.

ISBN 0-88006-051-4 128 pages **$12.97**

☐ Yes, I want **Selectric Interface** (BK7388). Enclosed is $12.97 per copy plus $1.50 for shipping and handling.

☐ MASTER ☐ VISA ☐ AMEX

Card # _____ Expires _____

Signature _____

Name _____

Address _____

City _____

State and Zip _____

All orders shipped UPS if complete street address is given.

33AB8S

Alarm service package
Billing
Budget and forecast
Bulletin board
Communications
Compilers
Custom software
Data-base management
Games
Host program
Interpreter
Inventory control
Mailing list program
Operating systems
Purchase order, invoice
Report generators
Utilities
Vehicle maintenance
Word processing

Howard Bowe
16 Lombardi Place
Amityville, NY 11701
516-691-0156
Custom software
Enhancements to Model I & III Basic interpreters
Operating systems
Programmer aids
Scientific
Utilities

BV Engineering
P.O. Box 3351
Riverside, CA 92509
714-781-0252
Cash management
Custom software
Data-base management
Electronic engineering
Scientific
Utilities

Cheever Microware
4120 McKnight Road
Texarkana, TX 75503
214-832-4251
Accounting
Billing
Budget and forecast
Cash management
Compiler
Cost accounting
Custom software
Data-base management
Financial analysis
Interpreters
Inventory control
Operating systems
Payroll, personnel
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Utilities
Word processing

CMD Micro Computer Services Ltd.
10447-124 St.
Edmonton, Alberta, Canada T5N 1R7
403-488-7109
Accounting
Data-base management
Games
Utilities
Word processing

Color Software Services
P.O. Box 1708
Greenville, TX 75401
214-454-3674
Accounting
Budget and forecast
Cost accounting
Custom software
Education
Financial analysis
Games
Inventory control
Payroll, personnel
Purchase order, invoice
Sales
Scientific
Utilities

Communications Electronics
Box 1002-Dept. WG
Ann Arbor, MI 48106
313-994-4444
Cash management
Custom software

Compumax Inc.
P.O. Box 7239
Menlo Park, CA 94025
415-854-6700
Accounting
Bill of materials processor
Data-base management
Education
Inventory control
Materials requirement planning
Payroll, personnel
Purchase order, invoice
Report generators

Compusoft Publishing
1050-E Pioneer Way
El Cajon, CA 92020
619-588-0996
Books

Computer Center
31 E. 31st St.
New York, NY 10016
212-889-8130
Compilers
Data-base management
Games
Inventory control
Operating systems
Purchase order, invoice
Simulators
Utilities
Word processing

Computer Discount
West Milford Mall
West Milford, NJ 07480
201-728-8080
Accounting
Banking
Billing
Budget and forecast
Cash management
Compilers
Cost accounting
Custom software
Data-base management
Financial analysis
Insurance
Interpreters
Inventory control
Medical
Operating systems
Payroll, personnel
Plotting/graphics
Program/data security
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Scientific
Simulators
Utilities
Word processors

Computer Generated Data
Division of Wagener Enterprises Inc.
5541 Parliament Drive, #206
Virginia Beach, VA 23462
804-497-1165
Accounting
Banking
Billing
Budget and forecast
Cash management
Cost accounting
Custom software
Data-base management
Financial analysis
Inventory control
Payroll, personnel
Programmer aids
Purchase order, invoice
Sales
Utilities

Computer Peripheral Resources
P.O. Box 834-9105-925E
Oak Harbor, WA 98277
206-679-4797
Purchase order, invoice
Utilities

Computer Services of Danbury
P.O. Box 993, 1 Franklin St.
Danbury, CT 06810
203-743-1299
Accounting
Billing
Cash management
Custom software
Data-base management
Education
Financial analysis
Games
Inventory control
Operating systems
Payroll, personnel
Purchase order, invoice
Sales
Simulators
Utilities
Word processing

The Computer Store Inc.
5153 S. Peoria
Tulsa, OK 74105
918-747-9333
Accounting
Banking
Billing
Budget and forecast
Cash management
Compilers
Cost accounting
Custom software
Data-base management
Education
Financial analysis
Games
Interpreters
Inventory control
Medical
Operating systems

Payroll, personnel
Plotting/graphics
Programmer aids
Purchase order, invoice
Report generators
Sales
Simulators
Utilities
Word processing

Computerware
4403 Manchester Ave.
P.O. Box 668
Encinitas, CA 92024
714-436-3512
Accounting
Billing
Budget and forecast
Cash management
Compilers
Custom software
Data-base management
Education
Financial analysis
Games
Interpreters
Inventory control
Medical
Operating systems
Payroll, personnel
Plotting/graphics
Programmer aids
Purchase order, invoice
Report generators
Sales
Utilities
Word processing

Coosol Inc.
2845 Mesa Verde East, #1
Costa Mesa, CA 92626
714-545-2216
Accounting
Banking
Billing
Budget and forecast
Cash management
Compilers
Cost accounting
Custom software
Data-base management
Education
Financial analysis
Games
Inventory control
Operating systems
Payroll, personnel
Plotting/graphics
Purchase order, invoice
Report generators
Sales
Scientific
Simulators
Word processing

Cosmopolitan Electronics Corp.
5700 Plymouth Road
Ann Arbor, MI 48105
313-668-6660
Custom software
Interpreters
Operating systems
Utilities

Creative Computer Center Inc.
1236 E. Colonial Drive
Orlando, FL 32803
800-327-9294
Accounting
Banking
Budget and forecast
Cash management
Cost accounting
Custom software
Education
Financial analysis
Games
Insurance
Inventory control
Payroll, personnel
Programmer aids
Purchase order, invoice
Sales

Custom Software
9 Martin Road
Poughkeepsie, NY 12601
Games
Utilities

Cybernetics Inc.
8041 Newman Ave., #208
Huntington Beach, CA 92647
714-848-1922
Accounting
Financial analysis
Inventory control
Program generators
Purchase order, invoice
Report generators
Sales
Utilities

D. A. & D. Sales Inc.
601 Belleville Ave.
Belleville, NJ 07109
201-751-8444
Accounting
Billing
Cash management
Compilers
Custom software
Data-base management
Education
Games
Insurance
Interpreters
Inventory control
Operating systems
Payroll, personnel
Programmer aids
Purchase order, invoice
Report generators
Sales
Utilities
Word processing

Data Strategies Inc.
332 S. Juniper St., Suite 210
Escondido, CA 92025
619-489-9218
Data-base management
Dental
Medical
Word processing

Data Technology Industries
701-A Whitney St.
San Leandro, CA 94577
415-638-1206
Accounting
Banking
Billing
Budget and forecast
Cash management
Compilers
Cost accounting
Custom software
Data-base management
Education
Financial analysis
Games
Insurance
Interpreters
Inventory control
Medical
Operating systems
Payroll, personnel
Plotting/graphics
Program/data security
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Scientific
Simulators
Utilities
Word processors

Datacom Computer
Sales & Supplies
P.O. Box 02294
Cleveland, OH 44102
216-281-8820
Accounting
Custom software
Games
Inventory control
Programmer aids
Purchase order, invoice
Word processing

Decision Science Software Inc.
865 Castle Ridge Road
Austin, TX 78746
512-327-1463
Education
General
Medical
Operations research
Purchasing
Scientific
Statistics

Dilithium Press
P.O. Box E
Beaverton, OR 97075
800-547-1842
Books with cassettes/disks

Discovery Games
936 W. Highway 36
St. Paul, MN 55113
612-488-6843
Games

DLP Co.
6798 Wetheridge Drive
Cincinnati, OH 45230
513-232-7791
Accounting
Billing
Cash management
Custom software
Financial analysis
Payroll, personnel
Programmer aids
Utilities

DSI/Cyzern
P.O. Box 1225
Fayetteville, AR 72702
501-521-0281
Accounting
Compilers
Custom software
Data-base management
Games
Medical
Scientific
Utilities
Word processing

Duck Co.
1691 Eason
Pontiac, MI 48054
800-392-8881
Billing
Cash management
Compiler
Games
Operating systems
Purchase order, invoice
Sales
Utilities
Word processing

EAP Co.
P.O. Box 14
Keller, TX 76248
817-498-4242
Operating systems
Utilities

Easi Software Inc.
2 Windsor Court
Jackson, NJ 08527
201-367-5735
Custom software
Engineering
Plotting/graphics
Scientific

Endicott Software
P.O. Box 12543
Huntsville, AL 35802
205-881-0506
Education
Games
Stock analyzer
Utilities

En-Joy Computer Programs
P.O. Box 1535
Goleta, CA 93116
805-735-1941
Education
Medical
Music teacher
Program generators
Programmer aids
Utilities

Lawrence S. Epstein Associates
1169 59th St.
Brooklyn, NY 11204
212-236-3173
Custom software

B. Erickson Software
P.O. Box 11099
Chicago, IL 60611
312-276-9712
Games
Utilities

Esmark Inc.
507 E. McKinley
Mishawaka, IN 46544
219-255-3035
Games

Exatron Corp.
181 Commercial St.
Sunnyvale, CA 94086
408-737-7111
Accounting
Data-base management
Games
Utilities

FGA Software
74 Meyer Road
Hamilton, MA 01936
617-468-1634
Data-base management
Education
Games
Utilities
Word processing

Donald M. Fielding
2207 NW 61st Place
Margate, FL 33063
305-972-6744
Utilities

William Fink
1105 N. Main St., #24-B
Gainesville, FL 32601
904-377-4847
Education
Games

Fireside Computing Inc.
5843 Montgomery Road
Alkridge, MD 21227
301-796-4165
CAI authoring systems
Education

Five Stones Software
P.O. Box 1369
Ontario K1P 5R4
Canada
613-238-1299
Games

Fort Worth Computers and Video
377 Plaza, HWY 377
Granbury, TX 76048
817-573-4111
Accounting
Banking
Billing
Budget and forecast
Cash management
Compilers
Cost accounting
Custom software
Data-base management
Education
Financial analysis
Games
Insurance
Interpreters
Inventory control
Operating systems
Payroll, personnel
Programmer aids
Purchase order, invoice
Report generators
Sales
Utilities
Word processing

H & E Computronics
50 N. Pascack Road
Spring Valley, NY 10977
914-425-1535
Accounting
Banking
Billing
Budget and forecast
Cash management
Compilers
Cost accounting
Custom software
Data-base management
Education
Financial analysis
Games
Insurance
Interpreters
Inventory control
Medical
Operating systems
Payroll, personnel
Plotting/graphics
Program/data security
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Scientific
Simulators
Utilities
Word processing

Heart of Texas
Computer Systems Inc.
1900 E. Randol Mill Road, #114
Arlington, TX 76004
817-274-5625
Accounting
Compilers
Data-base management
Games
Interpreters
Inventory control
Medical
Payroll, personnel
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Utilities
Word processing

Hon Finance &
Insurance Computers
P.O. Box 23825
Pleasant Hill, CA 94523
415-680-7888
Auto dealer finance and insurance
Banking
Cost accounting
Credit report generator
Custom software
Financial analysis
Program generators
Programmer aids
Report generators

ICM Industries
10529 Connaught Drive
Carmel, IN 46032
317-872-4827
Custom software
Games
Program/data security
Programmer aids
Utilities

I.J.G. Inc.
1953 W. 11th St.
Upland, CA 91786
714-946-5805
Accounting
Data-base management
Games
Interpreters
Utilities
Word processing

I.J.S.
625 Cedar St.
Rock Springs, WY 82901
307-382-8742
Custom software
Inventory control
Programmer aids
Utilities

Individual Systems Inc.
P.O. Box 343
Downers Grove, IL 60515
312-968-2337
Data-base management
Inventory control
Programmer aids
Purchase order, invoice

Institute for Scientific Analysis Inc.
P.O. Box 7186
Wilmington, DE 19803
215-358-3735
Accounting
Billing
Budget and forecast
Cost accounting
Custom software
Data-base management
Education
Inventory control
Manufacturing control
Payroll, personnel
Plotting/graphics
Program generators
Programmer aids
Project management
Purchase order, invoice
Report generators
Sales
Scientific
Utilities
Word processing

Interpro Corp.
P.O. Box 4211
Manchester, NH 03108
603-669-0477
Custom software
Games
Programmer aids
Utilities

Intracolor Communications
6048 Horizon Drive
East Lansing, MI 48823
517-351-8537
Games

JDL Software
P.O. Box 33006
Raleigh, NC 27606
919-782-9650
Data-base management
Utilities

J.F. Consulting
74355 Buttonwood
Palm Desert, CA 92260
619-346-2051
Games
High-resolution typesetting
Medical
Plotting/graphics
Program generators
Programmer aids
Utilities
Word processing

J & M Systems Ltd.
137 Utah, N.E.
Albuquerque, NM 87108
505-265-5072
Word processing

JMC Software Distributors
1025 Industrial Drive
Bensenville, IL 60616
Accounting
Billing
Books
Cash management
Custom software
Financial analysis
Games
Sales
Simulators
Utilities

J.M.S. Corp.
Box 18083
Pittsburgh, PA 15236
Games

Khadin & Company
1420 W. Shaw #B
Fresno, CA 93711
209-221-1118
Education

Krell Software
1320 Stony Brook Road
Stony Brook, NY 11790
516-751-2474
Education

Laredo Systems Inc.
2264 Calle de Luna
Santa Clara, CA 95050
408-980-1888
Operating systems

Libra Laboratories Inc.
495 Main St.
Metuchen, NJ 08840
201-494-2224
Accounting
Billing
Custom software
Data-base management
Education
Inventory control
Payroll, personnel
Plotting/graphics
Purchase order, invoice
Report generators
Sales
Scientific
Simulators

Lindbergh Systems
41 Fairhill Road
Holden, MA 01520
617-852-0233
Communications
Compilers
Forth systems from MMS
Interpreters
Utilities

Logical Systems Inc.
11520 N. Port Washington
Mequon, WI 53092
414-241-3066
Billing
Budget and forecast
Cash management
Compilers
Cost accounting
Custom software
Data-base management
Education
Financial analysis
Games
Insurance
Interpreters
Inventory control
Inventory
Medical
Operating systems
Payroll, personnel
Plotting/graphics
Program/data security
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Scientific
Simulators
Utilities
Word processing

Marathon Software
P.O. Box 1493
Jacksonville, TX 75766
214-586-8212
Football prediction

Mayday Software
P.O. Box 66, Rock Creek Road
Phillips, WI 54555
715-339-3966
Custom software
Data-base management
Games
Operating systems
Programmer aids
Utilities
Word processing

Judson D. McClendon
844 Sun Valley Road
Birmingham, AL 35215
205-853-8440
Surveying

MedComp Inc.
142 Crescent St.
Brockton, MA 02402
617-583-4480
Compilers
Operating systems

Jerry Medlin & Associates
310 S. Jefferson St.
Napa, CA 94559
707-255-9475
Accounting

Micro-Computer Sales Corp.
P.O. Box 53376, 223 Fairway Drive
Fayetteville, NC 28305
919-483-2003
Accounting
Amusement game management
Billing
Country club management
Custom software
Insurance
Inventory control
Mailing list
Payroll, personnel
Property management
Vet management

Micro Data Supplies
22295 Euclid Ave.
Euclid, OH 44117
216-481-1600
Accounting
Billing
Compiler
Cost accounting
Data-base management
Education
Games
Interpreters
Operating system
Payroll, personnel
Sales
Utilities
Word processing

Micro-80 Inc.
2665 N. Busby Road
Oak Harbor, WA 98277
206-675-6143
Amateur radio
Data-base management
Education
Financial analysis
Games
Utilities
Word processing

Micro Management Systems Inc.
2803 Thomasville Road E.
Cairo, GA 31728
912-377-7120
Accounting
Billing
Compilers
Data-base management
Financial analysis
Inventory control
Medical
Operating systems
Payroll, personnel
Purchase order, invoice
Report generators
Word processing

Micro Projects Engineering Co.
10810 Washington Blvd., Suite C
Culver City, CA 90230
213-202-1865
Operating systems

Micro Software
205 Dumaine Court, Suite 105
Ft. Walton Beach, FL 32548
904-862-5588
Data-base management

Micro Software Systems
1815 Smokewood Ave.
Fullerton, CA 92631
714-526-8435
Plotting/graphics

Micro-Tax
P.O. Box 4262
Mountain View, CA 94022
415-964-2843
Federal and California income tax packages

MicroTech Exports Inc.
467 Hamilton Ave., Suite 2
Palo Alto, CA 94301
415-324-9114
Utilities

The Micro Works Inc.
P.O. Box 1110
Del Mar, CA 92014
619-942-2400
Games
Programmer aids
Utilities

Misosys
P.O. Box 4848
Alexandria, VA 22303
703-960-2998
Operating systems
Utilities
Word processing

MTS Enterprises
P.O. Box 596
Niceville, FL 32578
904-678-3328
Accounting
Church administration
Custom software
Data-base management
Education
Games
Inventory control
Plotting/graphics
Scientific
Utilities
Word processing

NC Software
7216 Boone Ave. N.
Minneapolis, MN 55428
612-533-8862
Communications
Custom software
Plotting/graphics
Programmer aids
Utilities

New Generation Software
241 N. Hills Drive
North Hills,WV 26101
304-428-7098
Accounting
Budget and forecast
Custom software
Education
Financial analysis
Games
Medical
Plotting/graphics

National Integrated Software Services Inc.
8800 E. Arapahoe Road
Englewood, CO 80112
303-694-1994
Budget and forecast

Nocona Electronics
600 E. Highway 82
Nocona, TX 76255
817-825-4027
Accounting

Continued

We will give you 10 megabytes of hard disk storage for your IBM PC FOR $1195

For Toll Free Support
There Is Only One Number To Call

1-800-237-8977

In Florida call 1-813-786-1259

For an additional $300 we will give you a 20 megabyte drive! (Includes Interface & Cables)

The Systems Group

2340 State Route 580/Suite 234
Clearwater, Florida 33575

CIRCLE 100

THE ULTIMATE COMPUTER. THE NEW

LNW80 2 +

NOW:

MODEL 1, 3, and 4 COMPATIBLE!!
CP/M 2.2 and 3.0 COMPATIBLE!!

SOON:

IBM MS-DOS and CP/M-86 COMPATIBILITY!!
PLUS add up to 1 Megabyte of RAM!!
High Speed RAMDISK is coming!

SYSTEMS START AT $1999

Includes: LNW80-2+, Hi-Res Green Monitor, One Disk Drive, CP/M 2.2, DOSPLUS, Microterm, Electric Pencil, Electric Spreadsheet, Chartex, and the LNW Small Business and Professional Accounting Software Series.

CALL US FOR THE BEST PRICES AVAILABLE
IN STOCK NOW! Ready for immediate delivery!

EXCELLONIX

(714) 973-1939 ** (213) 650-5754 ↙267

MAKE IT EASY TO SAVE your copies of 80micro

Your magazine library is your prime reference source—keep it handy and keep it neat with these strong library shelf boxes. They are made of white corrugated cardboard and are dust resistant. Use them to keep *all* your magazines orderly yet available for constant reference.

Self-sticking labels are available for the following:

80 Micro	*73 Magazine*	*Radio Electronics*
Microcomputing	*QST*	*Personal Computing*
inCider	*CQ*	*Byte*
Desktop Computing	*Ham Radio*	*Interface Age*

One box (BX1000) is $2.00, 2-7 boxes (BX1001) are $1.50 each, and 8 or more boxes (BX1002) are $1.25 each. Be sure to specify which labels we should send.

Call **TOLL-FREE** for credit card orders:

1-800-258-5473

Or use the order form in this magazine and mail to:

80micro®

Attn: Book Sales, Peterborough, NH 03458

☐SHIPPING AND HANDLING CHARGES $2.00 per order up to and including a quantity of eight 25¢ for each additional box ordered.☐

A MAGICAL INTRODUCTION TO COMPUTING.

COMPUTER CARNIVAL has arrived, with 60 easy-to-use TRS-80 Level II BASIC programs for children of all ages. Characters like Sugar Louie and Madam Zelda will help your child expand his or her creativity and develop keyboard skills through games, puzzles, and educational quizzes.

COMPUTER CARNIVAL by Richard Ramella features:

★LARGE, READABLE TYPE
★SHORT, EASY-TO-TYPE PROGRAMS
★SPIRAL BINDING

To make the adventure even more enjoyable, take along **CARNIVAL COMPANION**, a ready-to-load cassette that lets your children spend more time playing and less time typing.

COMPUTER CARNIVAL
(book only) BK7389 $16.97 **COMPUTER CARNIVAL** and **CARNIVAL COMPANION** (book and cassette) CC7389 $24.97. Add $2.00 shipping and handling. Dealer inquiries invited
Call **TOLL-FREE 1-800-258-5473**
WAYNE GREEN BOOKS, PETERBOROUGH, NH 03458

☐**COMPUTER CARNIVAL** and **CARNIVAL COMPANION** (book and cassette) CC7389 $24.97
☐**COMPUTER CARNIVAL** (book only) BK7389 $16.97
(include $2.00 per order for shipping and handling charges) ☐ Payment Enclosed
☐MC ☐VISA ☐AMEX Card # _____
Expires _____ MC Bank# _____
Signature _____
Name _____
Address _____
City _____
and State
Zip _____

Photocopy of coupon is acceptable for ordering.

33AB8C

UPS delivery if complete street address is provided.

★A WAYNE GREEN PUBLICATION

*TRS-80 is a trademark of the Radio Shack division of Tandy Corp.

Continued

Banking
Billing
Budget and forecast
Cash management
Compilers
Cost accounting
Data-base management
Education
Financial analysis
Games
Insurance
Interpreters
Inventory control
Medical
Operating systems
Payroll/ personnel
Plotting/graphics
Program/data security
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Scientific
Simulators
Utilities
Word processing

Omikron Systems
1127 Hearst
Berkeley, CA 94702
415-845-8013
Interpreters
Operating systems
Programmer aids
Word processing

Options-80
Box 471-E
Concord, MA 01742
Stock option analysis

P. Tree Enterprises
2701C W. 15th St., Suite 269
Plano, TX 75075
214-867-5656
Financial analysis

PAB Software
6827 Kirkdale Drive
Fort Wayne, IN 46815
219-485-6980
Education
Plotting/graphics
Programmer aids
Scientific

Pan American Electronics
1117 Conway Ave.
Mission, TX 78572
512-581-2765
Accounting
Banking
Billing
Budget and forecast
Cash management
Compilers
Cost accounting
Custom software
Data-base management
Education
Financial analysis
Games
Insurance
Interpreters
Inventory control
Medical
Operating systems
Payroll/personnel
Plotting/graphics
Program/data security
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Scientific
Utilities
Word processing

Peggytronics
381 First St., Suite 5147
Los Altos, CA 94022
408-737-2253
Custom software
Plotting/graphics
Utilities

Phantasy
Box 02205
Cleveland, OH 44102
Games

Phase One Systems Inc.
7700 Edgewater Drive, #830
Oakland, CA 94621
415-562-8085
Oasis system software and utilities

Pioneer Software
1746 NW 55th Ave., #204
Lauderhill, FL 33313
305-739-2071
Custom software
Games
Plotting/graphics
Program generators
Programmer aids
Utilities
Word processing

Powersoft
11500 Stemmons Fwy., Suite 125
Dallas, TX 75229
214-484-2976
Data-base management
Operating systems
Plotting/graphics
Programmer aids
Purchase order, invoice
Utilities
Word processing

Pro/Am Software
220 Cardigan Road
Centerville, OH 45459
513-435-4480
Disassemblers
Utilities

Prosoft
P.O. Box 560
North Hollywood, CA 91603
213-764-3131
Data-base management
Games
Plotting/graphics
Programmer aids
Utilities
Word processing

Quality Software & Consulting Inc.
P.O. Box 11355
Kansas City, MO 64112
816-765-4297
Custom software
Data-base management
Education
Games
Property management system

Rabco Enterpises
806 Freedom Circle
Harleysville, PA 19438
215-368-4866
Operating systems
Plotting/graphics
Stock programs
Word processing

Racet Computes Ltd.
1330 N. Glassell, Suite M
Orange, CA 92667
714-997-4950
Operating systems
Utilities
Word processing

Radio Ranch Inc.
RR 3
Polo, IL 61064
815-946-2371
Accounting
Banking
Billing
Budget and forecast
Cash management
Compilers
Custom software
Data-base management
Education
Financial analysis
Games
Insurance
Interpreters
Inventory control
Operating systems
Payroll, personnel
Plotting/graphics
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Word processing

Rainbow Software Services Ltd.
7070 B Farrell Road SE
Calgary, Alberta, T2H 0T2
Canada
403-253-6142
Accounting
Banking
Billing
Budget and forecast
Compilers
Cost accounting
Custom software
Data-base management
Education
Financial analysis
Games
Insurance
Interpreters
Inventory control
Operating systems
Payroll, personnel
Plotting/graphics
Programmer aids
Purchase order, invoice
Report generators
Sales
Simulators
Utilities
Word processing

Real Software Company
P.O. Box 401
Hopedale, MA 01747
617-393-6281
Education

Continued

Games
Plotting/graphics
Simulators

Refware
P.O. Box 451
Chappaqua, NY 10514
914-238-8896
Education
Reference thesaurus

Reliable Cash Register Inc.
415 Millbury St.
Worcester, MA 016077
617-755-8084
Cash management
Custom software
Inventory control
Payroll, personnel
Purchase order, invoice
Utilities

Softbyte Computing
Box 217
Wallingford, CT 06492
203-288-2036
Data-base management
Education
Food coupon shopping list
Plotting/graphics
Sales
Science
Simulators

Softouch
3200 Polaris, Suite 3
Las Vegas, NV 89102
702-367-2033
Utilities

Software Affair
858 Rubis Drive
Sunnyvale, CA 94087
408-730-1030
Music synthesizers

Software Concepts
105-106 Preston Valley SC
Dallas, TX 75230
214-458-0330
Custom software
Data-base management
Games
Inventory control
Plotting/graphics
Purchase order, invoice
Sales
Utilities
Word processing

Software Etcetera
19973 Ventura Blvd.
Woodland Hills, CA 91364
213-702-8061
Accounting
Banking
Billing
Budget and forecast
Cash management
Compilers
Cost accounting
Custom software
Data-base management
Education
Financial analysis
Games
Insurance
Interpreters
Inventory control
Medical
Operating systems
Payroll, personnel
Plotting/graphics
Program/data security
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Scientific
Simulators
Utilities
Word processing

Software Models
23913 Bowl Road
Crestline, CA 92325
714-338-5075
Budget and forecast
Cash management
Financial analysis
Purchase order, invoice
Sales
VisiCalc templates

Southwest Systems
44-3rd Ave., Suite F
Chula Vista, CA 92010
714-425-5500
Accounting
Billing
Cash management
Cost accounting
Inventory control
Payroll, personnel
Purchase order, invoice
Word processing

Spectral Associates
141 Harvard Ave.
Tacoma, WA 98466
206-565-8483
Education
Games
Operating systems
Scientific
Utilities
Word processing

SRA-Science Research Associates Inc.
115 N. Wacker Drive
Chicago, IL 60606
312-984-7000
Education
Games
Programmer aids

Star-Tronic Distributor Co.
23995 Freeway Park Drive
Farmington Hills, MI 48024
313-477-7586
Accounting
Billing
Budget and forecast
Data-base management
Financial analysis
Inventory control
Medical
Operating systems
Purchase order, invoice
Sales
Word processing

Star-Ware
Route 5 Box 277-C
Benbrook, TX 76126
817-249-0166
Accounting
Banking
Billing
Budget and forecast
Cash management
Compiler
Cost accounting
Data-base management
Financial analysis
Games
Interpreters
Inventory control
Operating systems
Payroll, personnel
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Simulators
Word processing

Sublogic Communication Corp.
713 Edgebrook Drive
Champaign, IL 61820
217-359-8482
Education
Games
Plotting/graphics
Simulators
Utilities

Swayback Software
Box 1351
Merchantville, NJ 08109
609-778-0811
Custom software
Data-base management
Program generators
Programmer aids
Report generators
Utilities

Taranto & Associates Inc.
121 Paul Drive
San Rafael, CA 94903
415-472-2670
Accounting
Billing
Budget and forecast
Cost accounting
Custom software
Data-base management
Inventory control
Medical
Operating systems
Payroll, personnel
Purchase order, invoice
Report generator
Sales
Word processing

T.C.E. Programs Inc.
P.O. Box 2477
Gaithersburg, MD 20879
301-963-3848
Custom software
Education

T & D Software
144 W. 28th St.
Holland, MI 49423
616-396-7577
Education
Games
General business

Telexpress Inc.
Rt. 130 & Beverly-Rancocas
Willingboro, NJ 08046
609-877-4900
Communications
Insurance
Program generators
Report generators

Tenon Software Services
1910 Fairview Ave. E., Suite 205
Seattle, WA 98108
206-324-0116
Accounting
Cost accounting
Custom software
Payroll, personnel
Utilities

Thoughtware Publishing (Formerly Data Train)
P.O. Box 669
Grants Pass, OR 97526
503-476-1467
Accounting
Billing
Budget
Cash management
Cost accounting
Custom software
Data-base management
Education
Financial analysis
Interpreters
Inventory control
Operating systems
Payroll, personnel
Plotting/graphics
Program/data security
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Utilities
Word processing

Universal Software Applications Inc.
13001 Cannes
St. Louis, MO 63141
314-878-1277
Accounting
Billing
Cash management
Compilers
Cost accounting
Custom software
Data-base management
Inventory control
Medical
Operating systems
Payroll, personnel
Programmer aids
Purchase order, invoice
Report generators
Scientific
Word processing

Van Horn Office Supply
P.O. Box 1060
Van Horn, TX 79855
915-283-2920
Accounting
Billing

MOVING?

Let us know 8 weeks in advance so that you won't miss a single issue of **80 Micro**
Attach old label where indicated and print new address in space provided. Also include your mailing label whenever you write concerning your subscription. It helps us serve you promptly

☐Extend my subscription one additional year for only $35.97

☐ Payment enclosed ☐Bill me

Canadian and Mexican $44.97 1 year only US funds drawn on US bank. Foreign $54.97 1 year only US funds drawn on US bank. Please allow 6-8 weeks for delivery.

80 MICRO

If you have no label handy, print OLD address here.

AFFIX LABEL

Name_____

Address _____

City_____ State_____ Zip _____

print NEW address here.

Name_____

Address _____

City_____ State_____ Zip _____

P.O. Box 981 ● Farmingdale NY 11737

GET EXPRESSED
AND OWN TRS FOR LESS!

100% PURE **Radio Shack**

15% to 20% OFF LIST PRICE

JOIN THE CO—OP AND
RECEIVE ALL **Radio Shack**
EQUIPMENT BELOW RETAIL

TRADE—INS WELCOME

THE COMPUTER EXPRESS

32 E. MAIN St. MILAN, MI 48160

(313) 439-2475 ✓138

LOAD 80 CASSETTES & DISKS - Back Issues

If you have not yet ordered any Load 80 tapes or disks and wish you had, don't worry. We are now offering a "BACK ISSUE" inventory clearance. You can order nearly any Load 80 starting from September of 1982 to date. We do have limited quantities, so order early to avoid disappointment! Back issues of *80 Micro* are also available. With complete documentation found in the companion magazine, you should have no difficulty loading any of the programs listed on Load 80.

Please send the following:

	Month	Year		Month	Year
Cassettes			**Disks**		

Prices
Load 80 Cassettes $9.97 (plus $1.50 for postage and handling)
Load 80 Diskettes $19.97 (plus $1.50 for postage and handling)

Foreign Air Mail $1.95 per item for postage and handling
U.S. Funds drawn on U.S. Banks Only

☐**Check/Money Order** ☐**MC** ☐**AE** ☐**VISA**

Name: _____

Address: _____

City: _____ State: _____ Zip: _____

Card#: _____ Exp. Date: _____

Signature: _____

Please Allow 3-4 Weeks Delivery
LOAD 80 attn: Debbie Walsh • Pine Street • Peterborough, NH 03458

10-83

✓See List of Advertisers on Page 323

Budget and forecast
Cash management
Compilers
Cost accounting
Custom software
Data-base management
Education
Financial analysis
Games
Inventory control
Medical
Operating systems
Payroll, personnel
Programmer aids
Purchase order, invoice
Sales
Word processing

Vespa Computer Outlet
16727 Patton
Detroit, MI 48219
313-538-1112
Data-base management
Games
Inventory control
Operating systems
Utilities
Word processing

VolksMicro Computer Systems Inc.
202 Packets Court
Williamsburg, VA 23185
804-220-0005
Communications
Data-base management
Utilities

VR Data Corp.
777 Henderson Blvd.
Folcroft, PA 19032
800-345-8102
Data-base management

Williams Enterprises
3101 Cheverly Ave.
Cheverly, MD 20785
301-773-3015
Bible teaching

Windham Software Inc.
29 Ivanhill St.
Willimantic, CT 06226
203-456-3530
Dental
Medical
Utilities

X L Systems
Suite 5, 151 Bldg.
Peterborough, NH 03458
603-924-9471
Accounting
Banking
Billing
Budget and forecast
Cash management
Cost accounting
Custom software
Data-base management
Financial analysis
Insurance
Inventory control
Legal
Medical
Operating systems
Payroll, personnel
Plotting/graphics
Program/data security
Program generators
Programmer aids
Purchase order, invoice
Report generators
Sales
Utilities
Word processing

XYZT Computer Dimensions Inc.
2 Penn Plaza, Suite 1500
New York, NY 10121
212-244-3100
Custom software
Data-base management
Interpreters
Programmer aids
Utilities

Software Distributors by Product

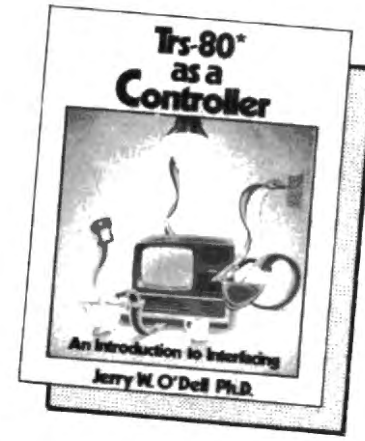
Accounting
Action Computers
American Small Business Computers
Amflex Products & Services
Bi-Tech Enterprises
Cheever Microware
CMD Micro Computer Services Ltd.
Color Software Services
Compumax Inc.
Computer Discount
Computer Generated Data
Computer Services of Danbury
Computerware
The Computer Store Inc.
Coosol Inc.
Creative Computer Center Inc.
Cybernetics Inc.
D. A. & D. Sales Inc.
Data Technology Industries
Datacom Computer Sales & Supplies
DLP Co.
DSI/Cyzern
Exatron Corp.
Fort Worth Computers & Video
Freedom Micro-Systems Inc.
Freedom Technology International
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics
Heart of Texas Computer Systems Inc.
IJG Inc.
Institute for Scientific Analysis Inc.
JMC Software Distributors
Libra Laboratories
Micro-Computer Sales Corp.
Micro Data Supplies
Micro Management Systems Inc.
MTS Enterprises
New Generation Software
Nocona Electronics
Pan American Electronics
Radio Ranch Inc.
Rimes Computer Products
Sandpiper Software
SBSG Inc.
Seneca Electronics
Serious Personal Computing
Shawmut Systems
Software Etcetera
Southwest Systems
Star-Tronic Distributor Co.
Star-Ware
Taranto & Associates Inc.
Tenon Software Services
Thoughtware Publishing
Universal Software Applications Inc.
Van Horn Office Supply

Banking
Action Computers
Computer Discount
Computer Generated Data
The Computer Store Inc.
Coosol Inc.
Creative Computer Center Inc.
Data Technology Industries
Fort Worth Computers & Video
Freedom Micro-Systems Inc.
E.B. Garcia & Associates
H & E Computronics Inc.
Hon Finance & Insurance Computers
Nocona Electronics
Pan American Electronics
Radio Ranch Inc.
Rainbow Software Services Ltd.
Seneca Electronics
Shawmut Systems
Software Etcetera
Star-Ware

Billing
Action Computers
American Small Business Computers
Amflex Products & Services
Bi-Tech Enterprises
Cheever Microware
Computer Discount
Computer Generated Data
Computer Services of Danbury
The Computer Store Inc.
Computerware
Coosol Inc.
D. A. & D. Sales Inc.
Data Technology Industries
DLP Co.
Duck Co.
Fort Worth Computers and Video
Freedom Micro-Systems Inc.
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Institute for Scientific Analysis Inc.
JMC Software Distributors
Libra Laboratories
Micro-Computer Sales Corp.
Micro Data Supplies
Nocona Electronics
Pan American Electronics
Radio Ranch Inc.
Rainbow Software Services Ltd.
Rimes Computer Products
Seneca Electronics
Shawmut Systems
Software Etcetera
Southwest Systems
Star-Tronic Distributor Co.
Star-Ware
Taranto & Associates Inc.
Thoughtware Publishing
Universal Software Applications Inc.
Van Horn Office Supply

Budget and Forecast
Action Computers
The Alternate Source
Astro-Star Enterprises
Bi-Tech Enterprises
Cheever Microware
Color Software Services
Computer Discount
Computer Generated Data
Computerware
Coosol Inc.
Creative Computer Center Inc.
Data Technology Industries
E.B. Garcia & Associates
Fort Worth Computers and Video
Freedom Micro-Systems Inc.
Freedom Technology International
Good-Lyddon Data Systems
H & E Computronics Inc.
Institute for Scientific Analysis Inc.
National Integrated Software Services Inc.
New Generation Software
Nocona Electronics
Pan American Electronics
Radio Ranch Inc.
Rainbow Software Services Inc.
Seneca Electronics
Shawmut Systems
Software Etcetera
Software Models
Star-Tronic Distributor Co.
Star-Ware
Taranto & Associates Inc.
Thoughtware Publishing

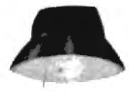
PUT YOUR TRS-80* IN CONTROL

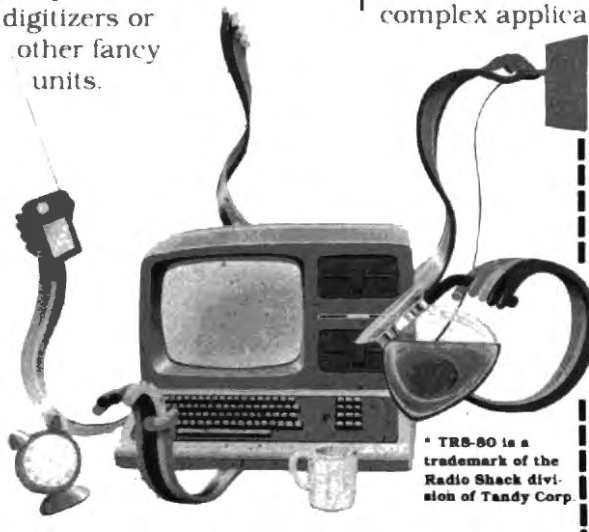


Interface your TRS-80 to outside devices. Learn with the projects in ***TRS-80 as a Controller.*** You can use your computer to control lights, switches, and even a small computer you build yourself.

All it takes is a minimum knowledge of electronics and programming. Circuits are simple. Most programs are fewer than fifteen lines long. The instructions are clear and fully illustrated with photographs, schematics, and figures.

Jerry O'Dell has designed these projects to be both easy and inexpensive. You don't need disk drives, plotters, digitizers or other fancy units.





* TRS-80 is a trademark of the Radio Shack division of Tandy Corp.

You don't have to be an expert and you don't have to be rich.

All you need is a TRS-80 Model III with 16K RAM, Level II BASIC, and a few other parts that you will no doubt find useful at a later date. (You can also use a Model I, with the conversions provided in an appendix.) The components you'll need are all readily available.

The book begins with a description of the Model III and Z80 and all the chips, circuits, prototyping boards, and other devices used in TRS-80 interfacing. There are also helpful suggestions throughout for expanding the projects into more complex applications.

Jerry W. O'Dell, Ph.D., is a psychology professor at Eastern Michigan University. He has published many articles, including several in ***80 Micro*** and the ***Encyclopedia for the TRS-80.***

BK7394 $12.97 softcover
7 by 9 approx. 176 pp.
ISBN 0-88006-061-1
Wayne Green Books 1983

Credit card orders call **TOLL-FREE 1-800-258-5473** or mail your order with payment of $12.97 each plus $1.50 per book shipping and handling to: Wayne Green Book Sales, Peterborough, NH 03458.

Dealer inquiries invited

Check the box on the coupon for your **FREE WAYNE GREEN BOOKS 1983 RETAIL CATALOG.**

WAYNE GREEN BOOKS

Put my TRS-80 in control. Please rush me _____ copies of **TRS-80 as a Controller** (BK7394) at $12.97 each.

☐ Enclosed is $12.97 per copy plus $1.50 for shipping and handling. ☐ Please send me a 1983 retail catalog.

☐ MASTERCARD MC bank # _____
☐ VISA ☐ AMEX
Card # _____ Expires _____
Signature _____
Name _____
Address _____
City _____
State _____ Zip _____
All orders shipped UPS if complete street address is given.

33AB8T

Van Horn Office Supply

Cash Management
Action Computers
The Alternate Source
Amflex Products & Services
Astro-Star Enterprises
B.V. Engineering
Cheever Microware
Communications Electronics
Computer Discount
Computer Generated Data
Computer Services of Danbury
The Computer Store Inc.
Coosol Inc.
Creative Computer Center Inc.
D. A. & D. Sales Inc.
Data Technology Industries
DLP Co.
Duck Co.
Fort Worth Computers & Video
Freedom Micro-Systems
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
JMC Software Distributors
Nocona Electronics
Pan American Electronics
Radio Ranch Inc.
Seneca Electronics
Shawmut Systems
Software Etcetera
Software Models
Southwest Systems
Star-Ware
Thoughtware Publishing
Universal Software Applications Inc.
Van Horn Office Supply

Compilers
American Small Business Computers
The Alternate Source
Bi-Tech Enterprises
Cheever Microware
Computer Discount
Computerware
Coosol Inc.
D. A. & D. Sales Inc.
Data Technology Industries
DSI/Cyzern
Duck Co.
Fort Worth Computers & Video
Freedom Technology International
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
Lindbergh Systems
MedComp Inc.
Micro Data Supplies
Micro Management Systems Inc.
Nocona Electronics
Pan American Electronics
Radio Ranch Inc.
Rainbow Software Services Ltd.
Seneca Electronics
Software Etcetera
Star-Ware
Universal Software Applications Inc.
Van Horn Office Supply

Cost Accounting
Action Computers
Cheever Microware
Color Software Services
Computer Discount
Computer Generated Data
The Computer Store Inc.
Coosol Inc.
Creative Computer Center Inc.
Data Technology Industries
Fort Worth Computers & Video
Freedom Micro-Systems Inc.
Freedom Technology International
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Hon Finance & Insurance Computers
Institute for Scientific Analysis Inc.
Micro Data Supplies
Nocona Electronics
Pan American Electronics
Rainbow Software Services Ltd.
Seneca Electronics
Software Etcetera
Southwest Systems
Star-Ware
Taranto & Associates
Tenon Software Services
Thoughtware Publishing
Universal Software Applications Inc.
Van Horn Office Supply

Custom Software
Action Computers
Algorithmic Associates
The Alternate Source
American Small Business Computers
Amflex Products & Services
Astro-Star Enterprises
Bi-Tech Enterprises
B.V. Engineering
Cheever Microware
Color Software Services
Communications Electronics
Computer Discount
Computer Generated Data
Computer Services of Danbury
The Computer Store Inc.
Computerware
Coosol Inc.
Cosmopolitan Electronics Corp.
Creative Computer Center Inc.
D. A. & D. Sales Inc.
Data Technology Industries
Datacom Computer Sales & Supplies
DLP Co.
DSI/Cyzern
Easi Software Inc.
Lawrence S. Epstein Associates
Fort Worth Computers & Video
Freedom Micro-Systems Inc.
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
Hon Finance & Insurance Computers
Howard Bowe
ICM Industries
I.J.S.
Institute for Scientific Analysis Inc.
Interpro Corp.
JMC Software Distributors
Libra Laboratories
Mayday Software
Micro-Computer Sales Corp.
MTS Enterprises
NC Software
New Generation Software
Pan American Electronics
Peggytronics
Pioneer Software
Quality Software and Consulting Inc.
Radio Ranch Inc.
Reliable Cash Register Inc.
Sandpiper Software
SBSG Inc.
Seneca Electronics
Serious Personal Computing
Shawmut Systems
Software Concepts
Software Etcetera
Swayback Software
Taranto & Associates Inc.
T.C.E. Programs Inc.
Tenon Software Services
Thoughtware Publishing
Universal Software Applications Inc.
Van Horn Office Supply
XYZT Computer Dimensions Inc.

Data-Base Management
Action Computers
Algorix Software
The Alternate Source
American Small Business Computers
Amflex Products & Services
Robert R. Belanger Ph.D.
Bi-Tech Enterprises
B.V. Engineering
Cheever Microware
CMD Micro Computer Services Ltd.
Compumax Inc.
Computer Center
Computer Discount
Computer Generated Data
Computer Services of Danbury
The Computer Store Inc.
Computerware
Coosol Inc.
D. A. & D. Sales Inc.
Data Strategies Inc.
Data Technology Industries
DSI/Cyzern
Exatron Corp.
FGA Software
Fort Worth Computers & Video
Freedom Technology International
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
IJG Inc.
Individual Systems Inc.
Institute for Scientific Analysis Inc.
JDL Software
Libra Laboratories
Mayday Software
Micro Data Supplies
Micro-80 Inc.
Micro Management Systems Inc.
Micro Software
MTS Enterprises
Nocona Electronics
Pan American Electronics
Powersoft
Prosoft
Quality Software & Consulting Inc.
Radio Ranch Inc.
Rainbow Software Services Ltd.
Rimes Computer Products
Seneca Electronics
Software Concepts
Software Etcetera
Star-Tronic Distributor Co.
Star-Ware
Swayback Software
Taranto & Associates Inc.
Thoughtware Publishing
Universal Software Applications Inc.
Van Horn Office Supply
Vespa Computer Outlet
VolksMicro Computer Systems Inc.
VR Data Corp.
XYZT Computer Dimensions Inc.

Education
Action Computers
American Small Business Computers
Astro-Star Enterprises
Basics & Beyond Inc.

Color Software Services
Compumax Inc.
Computer Services of Danbury
Computerware
Coosol Inc.
Creative Computer Center Inc.
D. A. & D. Sales Inc.
Data Technology Industries
Decision Science Software Inc.
Endicott Software
En-Joy Computer Programs
FGA Software
William Fink
Fireside Computing Inc.
Fort Worth Computers & Video
Forthright Software
Freedom Micro-Systems Inc.
Freedom Technology International
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Institute for Scientific Analysis Inc.
Khadin & Co.
Krell Software
Libra Laboratories
Logical Systems Inc.
Micro Data Supplies
Micro-80 Inc.
MTS Enterprises
New Generation Software
Nocona Electronics
PAB Software
Pan American Electronics
Quality Software & Consulting Inc.
Radio Ranch Inc.
Rainbow Software Services Ltd.
Real Software Co.
Refware
Remsoft Inc.
Rimes Computer Products
Sandpiper Software
Seneca Electronics
Serious Personal Computing
Softbyte Computing
Software Etcetera
Spectral Associates
SRA-Science Research Associates Inc.
Sublogic Communication Corp.
T & D Software
T.C.E. Programs Inc.
Thoughtware Publishing
3G Company Inc.
Van Horn Office Supply

Financial Analysis
Action Computers
Robert R. Belanger, Ph.D.
Cheever Microware
Color Software Services
Computer Discount
Computer Generated Data
Computer Services of Danbury
The Computer Store Inc.
Computerware
Coosol Inc.
Creative Computer Center Inc.
Cybernetics Inc.
Data Technology Industries
DLP Co.
Fort Worth Computers & Video
Freedom Micro-Systems Inc.
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics
Hon Finance & Insurance Computers
JMC Software Distributors
Micro-80 Inc.
Micro Management Systems Inc.
New Generation Software
Nocona Electronics
P. Tree Enterprises
Pan American Electronics
Radio Ranch Inc.
Rainbow Software Services Ltd.
Rimes Computer Products
Seneca Electronics
Software Etcetera
Software Models
Star-Tronic Distributor Co.
Star-Ware
Thoughtware Publishing
Van Horn Office Supply

Games
ABS Suppliers
Algorithmic Associates
Alpha Products
The Alternate Source
American Small Business Computers
Amflex Products & Services
Banana Soft
Basics & Beyond Inc.
Bi-Tech Enterprises
CMD Micro Computer Services Ltd.
Color Software Services
Computer Center
Computer Services of Danbury
The Computer Store Inc.
Computerware
Coosol Inc.
Creative Computer Center Inc.
Custom Software
D. A. & D. Sales Inc.
Data Technology Industries
Datacom Computer Sales & Supplies
Discovery Games
DSI/Cyzern
Duck Co.
Endicott Software
B. Erickson Software
Esmark Inc.
Exatron Corp.
FGA Software
Five Stones Software
Fort Worth Computers & Video
Forthright Software
Gamester Software
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
ICM Industries
IJG Inc.
Interpro Corp.
Intracolor Communications
JMC Software Distributors
JMS Corp.
Mayday Software
Micro Data Supplies
Micro-80 Inc.
The Micro Works Inc.
MTS Enterprises
New Generation Software
Nocona Electronics
Pan American Electronics
Phantasy
Pioneer Software
Prosoft
Quality Software & Consulting Inc.
Radio Ranch Inc.
Rainbow Software Services Ltd.
Real Software Co.
Rimes Computer Products
Sandpiper Software
Seneca Electronics
Software Concepts
Software Etcetera
Spectral Associates
SRA-Science Research Associates Inc.
Star-Ware
Sublogic Communication Corp.
T & D Software
3G Company Inc.
Van Horn Office Supply
Vespa Computer Outlet

Insurance
Computer Discount
Creative Computer Center Inc.
D. A. & D. Sales Inc.
Data Technology Industries
Fort Worth Computers & Video
Freedom Micro-Systems Inc.
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Micro-Computer Sales Corp.
Nocona Electronics
Pan American Electronics
Radio Ranch Inc.
Remsoft Inc.
Seneca Electronics
Software Etcetera
Telexpress Inc.

Interpreters
American Small Business Computers
Bi-Tech Enterprises
Cheever Microware
Computer Discount
The Computer Store Inc.
Computerware
Cosmopolitan Electronics Corp.
D. A. & D. Sales Inc.
Data Technology Industries
Fort Worth Computers & Video
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
IJG Inc.
Lindbergh Systems
Micro Data Supplies
Nocona Electronics
Omikron Systems
Pan American Electronics
Radio Ranch Inc.
Rainbow Software Services Ltd.
Seneca Electronics
Software Etcetera
Star-Ware
Thoughtware Publishing
XYZT Computer Dimensions Inc.

Inventory Control
Action Computers
American Small Business Computers
Amflex Products & Services
Bi-Tech Enterprises
Cheever Microware
Color Software Services
Compumax Inc.
Computer Center
Computer Discount
Computer Generated Data
Computer Services of Danbury
The Computer Store Inc.
Computerware
Coosol Inc.
Creative Computer Center Inc.
Cybernetics Inc.
D. A. & D. Sales Inc.
Data Technology Industries
Datacom Computer Sales & Supplies
Fort Worth Computers & Video
Freedom Micro-Systems Inc.
Freedom Technology International

E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
I.J.S.
Individual Systems Inc.
Institute for Scientific Analysis Inc.
Libra Laboratories
Logical Systems Inc.
Micro Management Systems Inc.
MTS Enterprises
Nocona Electronics
Pan American Electronics
Radio Ranch Inc.
Rainbow Software Services Ltd.
Rimes Computer Products Ltd.
Sandpiper Software
Seneca Electronics
Serious Personal Computing
Shawmut Systems
Software Concepts
Software Etcetera
Southwest Systems
Star-Tronic Distributor Co.
Star-Ware
Taranto & Associates Inc.
Thoughtware Publishing
Universal Software Applications Inc.
Van Horn Office Supply
Vespa Computer Outlet

Medical
Action Computers
American Small Business Computers
Computer Discount
The Computer Store Inc.
Computerware
Data Strategies Inc.
Data Technology Industries
Decision Science Software Inc.
DSI/Cyzern
En-Joy Computer Programs
Fort Worth Computers & Video
E.B. Garcia & Associates
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
Micro Management Systems Inc.
New Generation Software
Nocona Electronics
Pan American Electronics
Seneca Electronics
Software Etcetera
Star-Tronic Distributor Co.
Taranto & Associates Inc.
Universal Software Applications Inc.
Van Horn Office Supply
Windham Software Inc.

Operating Systems
Action Computers
Algorix Software
The Alternate Source
American Small Business Computers
Amflex Products & Services
Bi-Tech Enterprises
Cheever Microware
Computer Discount
Computer Services of Danbury
The Computer Store Inc.
Computerware
Coosol Inc.
Cosmopolitan Electronics Corp.
D. A. & D. Sales Inc.
Data Technology Industries
Duck Co.
EAP Co.
Forthright Software
Freedom Technology International
Good-Lyddon Data Systems
H & E Computronics Inc.
Laredo Systems Inc.
Logical Systems Inc.
Mayday Software
MedComp Inc.
Micro Data Supplies
Micro Management Systems Inc.
Micro Projects Engineering Co.
Misosys
Nocona Electronics
Omikron Systems
Pan American Electronics
Rabco Enterprises
Racet Computes Ltd.
Radio Ranch Inc.
Rainbow Software Services Ltd.
Seneca Electronics
Serious Personal Computing
Software Etcetera
Spectral Associates
Star-Tronic Distributor Co.
Star-Ware
Taranto & Associates Inc.
Thoughtware Publishing
Universal Software Applications Inc.
Van Horn Office Supply
Vespa Computer Outlet

Payroll/Personnel
Action Computers
American Small Business Computers
Amflex Products & Services
Cheever Microware
Color Software Services
Compumax Inc.
Computer Discount
Computer Generated Data
Computer Services of Danbury
The Computer Store Inc.
Computerware
Coosol Inc.
Creative Computer Center Inc.
D. A. & D. Sales Inc.
Data Technology Industries
DLP Co.
Fort Worth Computers & Video
Freedom Micro-Systems Inc.
Freedom Technology International
E.B. Garcia & Associates
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
Libra Laboratories
Micro Data Supplies
Micro Management Systems Inc.
Nocona Electronics
Pan American Electronics
Radio Ranch Inc.
Rainbow Software Services Ltd.
Rimes Computer Products
Seneca Electronics
Shawmut Systems
Software Etcetera
Star-Ware
Taranto & Associates Inc.
Tenon Software Services
Thoughtware Publishing
Universal Software Applications Inc.
Van Horn Office Supply

Plotting/Graphics
Action Computers
Algorithmic Associates
The Alternate Source
Computer Discount
The Computer Store Inc.
Computerware
Coosol Inc.
Data Technology Industries
Easi Software Inc.
Fort Worth Computers & Video
E.B. Garcia & Associates
H & E Computronics Inc.
Institute for Scientific Analysis Inc.
Libra Laboratories
MTS Enterprises
NC Software
New Generation Software
Nocona Electronics
PAB Software Inc.
Pan American Electronics
Peggytronics
Pioneer Software
Prosoft
Radio Ranch Inc.
Rainbow Software Services Ltd.
Real Software Co.
Seneca Electronics
Softbyte Computing
Software Concepts
Software Etcetera
Sublogic Communication Corp.
Thoughtware Publishing

Program/Data Security
Action Computers
Computer Discount
Data Technology Industries
Fort Worth Computers & Video
E.B. Garcia & Associates
H & E Computronics Inc.
ICM Industries
Nocona Electronics
Pan American Electronics
Seneca Electronics
Software Etcetera
Thoughtware Publishing

Program Generators
Action Computers
Cheever Microware
Computer Discount
Fort Worth Computers & Video
E.B. Garcia & Associates
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
Hon Finance & Insurance Computers
Institute for Scientific Analysis Inc.
Nocona Electronics
Pan American Electronics
Pioneer Software
Radio Ranch Inc.
Seneca Electronics
Software Etcetera
Swayback Software
Telexpress Inc.
Thoughtware Publishing

Programmer Aids
ABS Suppliers
Action Computers
Algorix Software
The Alternate Source
American Small Business Computers
Howard Bowe
Cheever Microware
Computer Discount
Computer Generated Data
Computer Services of Danbury
The Computer Store Inc.
Computerware
Creative Computer Center Inc.
D. A. & D. Sales Inc.
Data Technology Industries
Datacom Computer Sales & Supplies
DLP Co.
En-Joy Computer Programs
Fort Worth Computers & Video
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
Hon Finance & Insurance Computers
ICM Industries
I.J.S.
Individual Systems Inc.
Institute for Scientific Analysis Inc.
Interpro Corp.
Logical Systems Inc.
Mayday Software
The Micro Works Inc.
NC Software
Nocona Electronics
Omikron Systems
PAB Software Inc.
Pan American Electronics
Pioneer Software
Powersoft
Prosoft
Radio Ranch Inc.
Rainbow Software Services Ltd.
Rimes Computer Products
Seneca Electronics
Software Etcetera
SRA-Science Research Associates Inc.
Star-Ware
Swayback Software
Thoughtware Publishing
Universal Software Applications Inc.
Van Horn Office Supply
XYZT Computer Dimensions Inc.

Purchase Order, Invoice
Action Computers
American Small Business Computers
Amflex Products & Services
Bi-Tech Enterprises
Cheever Microware
Color Software Services
Compumax Inc.
Computer Center
Computer Discount
Computer Generated Data
The Computer Store Inc.
Computerware
Coosol Inc.
Creative Computer Center Inc.
Cybernetics Inc
D. A. & D. Sales Inc.
Data Technology Industries
Datacom Computer Sales & Supplies
Duck Co.
Fort Worth Computers & Video
Freedom Micro-Systems Inc.
Freedom Technology International
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
Individual Systems Inc.
Institute for Scientific Analysis Inc.
Libra Laboratories
Micro Management Systems Inc.
Nocona Electronics
Pan American Electronics
Powersoft
Radio Ranch Inc.
Rainbow Software Services Ltd.
Rimes Computer Products
Seneca Electronics
Shawmut Systems
Software Concepts
Software Etcetera
Software Models
Southwest Systems
Star-Tronic Distributor Co.
Star-Ware
Taranto & Associates Inc.
Thoughtware Publishing
Universal Software Applications Inc.
Van Horn Office Supply

Report Generator
Action Computers
The Alternate Source
Bi-Tech Enterprises
Cheever Microware
Compumax Inc.
Computer Discount
The Computer Store Inc.
Computerware
Coosol Inc.
Cybernetics Inc.
D. A. & D. Sales Inc.
Data Technology Industries
Fort Worth Computers & Video
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
Hon Finance & Insurance Computers
Institute for Scientific Analysis Inc.
Libra Laboratories
Micro Management Systems Inc.
Nocona Electronics
Pan American Electronics
Radio Ranch Inc.
Rainbow Software Services Ltd.
Seneca Electronics
Software Etcetera
Star-Ware
Swayback Software
Taranto & Associates Inc.
Telexpress Inc.
Thoughtware Publishing

Sales
Action Computers
American Small Business Computers
Amflex Products & Services
Cheever Microware
Color Software Services
Computer Discount
Computer Generated Data
Computer Services of Danbury
The Computer Store Inc.
Computerware
Coosol Inc.
Creative Computer Centers Inc.
Cybernetics Inc.
D. A. & D. Sales Inc.
Data Technology Industries
Duck Co.
Fort Worth Computers & Video
Freedom Micro-Systems Inc.
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
Institute for Scientific Analysis Inc.
JMC Software Distributors
Libra Laboratories
Micro Data Supplies
Nocona Electronics
Pan American Electronics
Radio Ranch Inc.
Rainbow Software Services Ltd.
Rimes Computer Products
Seneca Electronics
Softbyte Computing
Software Concepts
Software Etcetera
Software Models
Star-Tronic Distributor Co.
Star-Ware
Taranto & Associates Inc.
Thoughtware Publishing
Van Horn Office Supply

Scientific
Alpha Products
The Alternate Source
Astro-Star Enterprises
Robert R. Belanger, Ph.D.
Howard Bowe
B.V. Engineering
Color Software Services
Computer Discount
Coosol Inc.
Data Technology Industries
Decision Science Software Inc.
DSI/Cyzern
Easi Software Inc.
Fort Worth Computers & Video
Forthright Software
E.B. Garcia & Associates
H & E Computronics
Institute for Scientific Analysis Inc.
Libra Laboratories
MTS Enterprises
Nocona Electronics
PAB Software Inc.
Pan American Electronics
Seneca Electronics
Softbyte Computing
Software Etcetera
Spectral Associates
Universal Software Applications Inc.

Simulators
Algorix Software
American Small Business Computers
Computer Center
Computer Discount
Computer Services of Danbury
The Computer Store Inc.
Coosol Inc.
Data Technology Industries
Fort Worth Computers & Video

Let the
LETTER-WRITER
'WORK' for YOU

~383

CREATE: forms, labels and form letters.

This machine code word processor can even ADD/SUBTRACT bookkeeping columns.

Change, delete, add, insert, move, copy (characters/lines/blocks) of text fast.

SELECT: margins, page length, number of copies, tabs, center lines / page, line spacing and LEGAL PAPER LINE NUMBERING.

MODEL I users get: Model III shift key controlled upper / lower case letters!!

EASIER to USE than other systems. Only 8 keys control 96% of the LW features!!

TRY a LW for 3 MONTHS. If not satisfied return it. We will refund all but $3.50 to cover postage / handling. IF YOU CAN NOT RETURN IT, DO NOT BUY IT.

C. A. of N. Y. rates his LW purchase as "one of the best buys I have made. "!

TAPE 16K Model I/III systems $23.99

DISK 32K Model I/III systems $37.99

WE PAY: tax / US postage on ALL orders.

SPECIALS

Verbatim MD525 01 disks: 10 for $25.95
Microsette C10 tape+box: 20 for $13.95

Astro-Star Enterprises

24 HOUR

5905 Stone Hill Dr.
Rocklin, CA 95677

Computer Phone
(916) 624-3709

$$ WE WILL NOT BE $$ UNDERSOLD

EPSON
RX80, MX80FTIII, MX100FTIII,
FX80, and "NEW" FX100
CALL-LOWEST PRICES IN USA

PRINTERS

Gemini 10X $329
Gemini 15 ..... $499
Okidata 82A $419
Okidata 92 ..... $520
8510 Prowriter (P) $385
8510 Prowriter (S) $569
1550 (P) $679
1550 (S) $759
Brother HR 1 ..... CALL
Brother HR 15 ..... CALL
Smith-Corona TP1 (LQP) $549

MODEMS

Hayes 300 Baud $209
Hayes 300/1200 ..... $485
Novation Smartcat $487
300/1200

Shipping and Handling - Add 3%
M/C & Visa - Add 3%
C.O.D.'s - Add $2.00

THE COMPUTER STORE
Dept. 345
3941 B South Bristol Street
Santa Ana, CA 92704
(714) 261-1383

~244

E.B. Garcia & Associates
H & E Computronics Inc.
Libra Laboratories
Nocona Electronics
Pan American Electronics
Rainbow Software Services Ltd.
Real Software Co.
Seneca Electronics
Softbyte Computing
Software Etcetera
Star-Ware
Sublogic Communication Corp.

Utilities

ABS Suppliers
Algorix Software
The Alternate Source
American Small Business Computers
Basics & Beyond Inc.
Bi-Tech Enterprises
Howard Bowe
B.V. Engineering
Cheever Microware
CMD Micro Computer Services Ltd.
Color Software Services
Computer Center
Computer Discount
Computer Generated Data
Computer Services of Danbury
The Computer Store Inc.
Computerware
Cosmopolitan Electronics Corp.
Custom Software
Cybernetics Inc.
D. A. & D. Sales Inc.
Data Technology Industries
DLP Co.
DSI/Cyzern
Duck Co.
EAP Co.
En-Joy Computer Programs
Endicott Software
B. Erickson Software
Exatron Corp.
FGA Software
Donald M. Fielding
Forthright Software
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
IJG Inc.
I.J.S.
Institute for Scientific Analysis Inc.
Interpro Corp.
JDL Software
JMC Software Distributors
Lindbergh Systems
Logical Systems Inc.
Mayday Software
Micro Data Supplies
Micro-80 Inc.
MicroTech Exports Inc.
The Micro Works Inc.
Misosys
MTS Enterprises
NC Software
Nocona Electronics
Pan American Electronics
Peggytronics
Pioneer Software
Powersoft
Pro/Am Software
Prosoft
Racet Computes Ltd.
Rainbow Software Services Ltd.
Rimes Computer Products
Seneca Electronics
Serious Personal Computing
Shawmut Systems
Softouch
Software Concepts
Software Etcetera
Spectral Associates
Star-Ware
Sublogic Communication Corp.
Swayback Software
Tenon Software Services
Thoughtware Publishing
Vespa Computer Outlet
Volks Micro Computer
Windham Software Inc.
XYZT Computer Dimensions Inc.

Word Processing

ABS Suppliers
Action Computers
The Alternate Source
American Small Business Computers
Amflex Products & Services
Anitek Software Products
Astro-Star Enterprises
Bi-Tech Enterprises
Cheever Microware
CMD Micro Computer Services Ltd.
Computer Center
Computer Discount
Computer Services of Danbury
The Computer Store Inc.
Computerware
Coosol Inc.
D. A. & D. Sales Inc.
Data Strategies Inc.
Data Technology Industries
Datacom Computer Sales & Supplies
DSI/Cyzern
Duck Co.
FGA Software
Fort Worth Computers & Video
Freedom Technology International
E.B. Garcia & Associates
Good-Lyddon Data Systems
H & E Computronics Inc.
Heart of Texas Computer Systems Inc.
IJG Inc.
Institute for Scientific Analysis Inc.
Mayday Software
Micro Data Supplies
Micro-80 Inc.
Micro Management Systems Inc.
Misosys
MTS Enterprises
Nocona Electronics
Pan American Electronics
Pioneer Software
Powersoft
Prosoft
Rabco Enterprises
Racet Computes Ltd.
Radio Ranch Inc.
Rainbow Software Services Ltd.
Rimes Computer Products
Seneca Electronics
Software Concepts
Software Etcetera
Southwest Systems
Spectral Associates
Star-Tronic Distributor Co.
Star-Ware
Taranto & Associates Inc.
Thoughtware Publishing
Universal Software Applications Inc.
Van Horn Office Supply
Vespa Computer Outlet

End

pbh frees your computer for other operations while our **"BASIC BUFFER"** manages your printer. **BASIC BUFFER** offers **64K** with **FIFO COPY** and **ERASE.** It comes complete with power supply and cables for most computers and printers. (Specify manufacturer and model number of both when ordering.)
A real value at **ONLY $279.95** + shipping.
Also Available with 16K

ATTENTION, CoCo OWNERS

Stop changing Printer & Modem Cables! Our **PARALLEL PRINTER INTERFACE** provides **SWITCH SELECTABLE PRINTER** or **MODEM** operations. It features switchable baud rates from 300 to 9600; comes complete with power supply, modem cable & **"CENTRONICS"** type printer cable.
Introductory Price **ONLY $74.95** + shipping.

pbh computer products, inc.
P.O. DRAWER 55868
HOUSTON, TEXAS 77055
(713) 956-0207 ↙20

ORDER DIRECT FROM US OR FROM YOUR INDEPENDENT COMPUTER RETAIL STORE.
For more information circle reader card number 20.

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 ALE, which means more money for you. And that's a fact.

For information on selling *80 Micro*, call 800-343-0728 and speak with Ginnie Boudrieau, our bulk sales manager. Or write to her at *80 Micro*, 80 Pine St., Peterborough, NH 03458.

80micro®
80 Pine Street Peterborough, NH 03458
800-343-0728

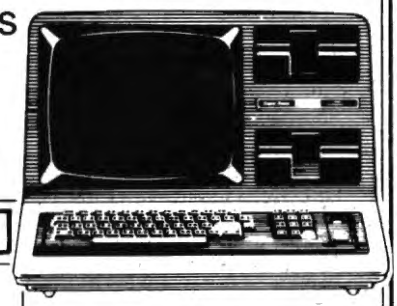
TRS-80 COMPUTERS

ALL PURE RADIO SHACK EQUIPMENT

DISCOUNT 15% AND UP

OFF SUGGESTED LIST

COMPUTERS
ALL TRS-80 MODELS
CALL FOR COMPETITIVE PRICES



PRINTERS
- RADIO SHACK
- EPSON
- OKIDATA
- C ITON
- SMITH CORONA

CALL FOR COMPETITIVE PRICES

ACCESSORIES
WE CARRY A FULL LINE OF
- SOFTWARE
- HARD DRIVES
- MODEMS
- PRINTER ACCESSORIES
- TELEPHONES AND ANSWERING MACHINES

GAMES
- BIG FIVE
- ADVENTURE
- SPECTRAL
- INSTANT SOFTWARE
- TOM MIX SOFTWARE

FREE PLEASE WRITE AND REQUEST . . .
- CUSTOMER DISCOUNT PRICE LIST
- MANUFACTURE WARRANTIES

TRS-80 TANDY CORPORATION

PERRY COMPUTERS

Dept. No. A-1 137 NORTH MAIN ST PERRY, MI 48872
FOR ORDERS CALL 1-800-248-3823
FOR INFORMATION CALL (517) 625-4161 ↙124

↙See List of Advertisers on Page 323

Making Hay with Arrays

by Karl Townsend

Most of us associate the term "random access" with disk operation. In almost any DOS manual, you'll find a section on opening a file for random access, fielding, putting, getting, and so on—all words relating to random filing and retrieving of records.

To achieve all the advantages of random access means you must lay out many dollars for that disk subsystem with its controller. This generally translates into staying with sequential tape files and their problems.

Even if you cannot afford disk operation at present, you *can* use the benefits of random access without disk.

All you need is Level II cassette-based 16K TRS-80. You can do it with 4K but, as we will substitute memory for disk, more memory is better.

At last, you can use random access to store and retrieve data even if you don't have disk drives.

Random Ideas

Some time ago, I wanted to write a checkbook maintenance program tailored to my own requirements such as account structure, balancing, and entry methods. Most of all, I wanted to work on any record—enter, edit, delete—without constantly reading tape files. In other words, I wanted a random access operation, but purchasing even one disk drive was out of the question.

It occurred to me that if I was willing to accept the normal tape load and save procedure for initial input and final output, I could achieve most of the features I wanted with an array.

An array is a series of numbered pigeonholes for data storage and retrieval on demand. Usually, you enter data in a For...Next loop. A loop again works through the array to retrieve data step by step. Between storing and retrieving, you might sort or rearrange data.

Figure 1 shows a simple array. To look at the data contained in any given record, just call the proper number and print the data. For example, to find Ed's telephone number, just type Print A$(3).

If you next want Andy's number, simply Print A$(1). This is just as random as disk files.

After retrieving the record from the array, you can rewrite it, edit parts, or delete it. You have complete control of the selected record's contents. Then write the record back into the array using a form such as Input A$(4). This tucks any changes into the pigeonhole designated.

You must know where each record is located in order to read it. For this purpose, you need an index. How else do you know Tony's telephone number is in record 5? How to set up an index for general use is a topic all its own, but if you know the locations of your records, you can read them in any order.

Available memory size limits use of the array for this type of operation. With more memory you can use a larger array. To make maximum memory available, use program compressing tricks such as eliminating spaces, using multistatement lines, and so on.

Now Organize Those Checks

How can you apply these concepts to checkbook records? (Figure 2 shows some typical checkbook records.)

A checkbook has a natural indexing system—the check number. These unique numbers refer to specific records and are in sequential order (as in an array).

Start out by dimensioning an array to hold your records: 100 DIM A$(100,5). This statement sets aside room for 101

A$(1)	Andy	—368 1234
A$(2)	Dan	—257 1598
A$(3)	Ed	—257 4587
A$(4)	Sam	—887 3254
A$(5)	Tony	—665 1227

Figure 1. An array.

The Key Box

Models I and III
16K RAM
Cassette Basic

check records, each containing six fields.

Remember, arrays start with the zero position. For example, A$(0,0) is a usable array position. You might as well use the zero position because it uses memory space whether you put data in it or not.

Record 4 in our array might look like Fig. 3. A check for $45.98 to Anderson Lumber on Sept. 25 is for house repairs. The check has not yet been returned by the bank, so an N appears in the cancelled field. Each record (check) from zero to 100 is laid out in the same pattern.

To find any given check, just call its array location and print it. For example:

```
200 FOR I = 0 TO 5: PRINT A$(4,I): NEXT I
```

prints the contents of record four on your screen.

Suppose you want to access checks by check number, rather than by some arbitrary array location number. Assume you start with check number 361. Array location 361 does not exist, so you must convert 361 to fit within the array. Since check number 361 is the first check, put it in location zero.

```
100 DIM A$(100,5)
110 FC = 361
```

Line 110 calls the first check (FC) number 361. To reference this or any other check number, use this constant (FC) to convert it to an array location. How does that work? Below is an example of how you might locate and print a selected check.

```
500 INPUT "ENTER CHECK NUMBER TO
    BE PRINTED";CN
510 CP = CN - FC
520 FOR I = 0 TO 5: PRINT A$(CP,I): NEXT I
```

Enter the check number 365 at the prompt. The program subtracts the first check number (FC) from the check number entered (CN) to give the check's position (CP) in the array. In this case: 365 minus 361 equals 4; the check you want is in A$(4,x). The first few checks in the array are found as follows:

Location	Heading	Contents
A$(4,0)	Check number	365
A$(4,1)	Date	810925
A$(4,2)	Made to:	Anderson Lumber
A$(4,3)	Amount	$45.98
A$(4,4)	Account	House repairs
A$(4,5)	Cancelled? Y/N	N

Figure 3. Record 4.

Check	Position
361	0
362	1
363	2
364	3
365	4
366	5

Entering newly written checks follows a similar pattern.

```
600 INPUT "ENTER CHECK NUMBER";CN
610 CP = CN - FC
620 A$(CP,0) = CN
630 INPUT "DATE??";A$(CP,1)
640 INPUT "MADE TO??";A$(CP,2)
650 INPUT "AMOUNT??";A$(CP,3)
660 INPUT "ACCOUNT??";A$(CP,4)
670 INPUT "CANCELLED Y/N ??";A$(CP,5)
```

As each check is entered, the first check (FC) number is subtracted from the check number (CN), resulting in the array position number (CP) used to store the record.

Cancelling a check using the check number is even easier.

```
700 INPUT "ENTER CHECK NUMBER TO
    BE CANCELLED";CN
710 CP = CN - FC
720 A$(CP,5) = "Y"
```

Set up editing to suit your own needs, but you must still use the first check (FC) for locating records. A very simple editing method is to call the record of the check and write over the stored information just as if you were making an original entry. This saves installing an edit module in your program.

Deposits are not usually numbered. To use this scheme, give them a number and, using a separate array, treat deposits just like checks.

```
DIM B$(25,3)
B$(DP,0) = DEPOSIT NUMBER
B$(DP,1) = DATE
B$(DP,2) = SOURCE
B$(DP,3) = AMOUNT
```

The deposits position (DP) is again set up by placing early in the program a notation showing the number of the first deposit (FD). Subtracting this from each deposit number (DN) gives the proper array position.

Enter service charges as a negative deposit with a notation in the source location.

There is no need to sort the data. You insert the data in checkbook order; therefore, they are ordered as you would normally use them. This saves a sort routine and its attendant problems.

You do not have to enter checks in any particular order. If, for example, you carry some prenumbered checks in your wallet and use them long after some subsequent number, it does not matter. The array position for each check remains blank until you use it. Higher numbered checks simply go into their allocated slots above the unused checks.

To close out a section of your checkbook record and start a new one, as you might do at the beginning of a new year, just save the current file for future reference, set the first check (FC) to the first check number of the new year, and set the first deposit statement (FD) to the first deposit of the new year. The first deposit of the new year should be the balance from the previous year.

Finally

For true random access of unsequenced data, you must develop an external index that you can then sequence on selected key data elements. Chaining records is one method of accomplishing this. ■

No.	Date	Made To:	Amount	Account	Cancelled
361	810813	Gas Co.	$ 35.39	house	Y
362	810919	80 Micro	$ 18.00	computer	Y
363	810920	City	$219.25	taxes	N
364	810920	Church	$ 50.00	contrib.	N
365	810925	Anderson Lumb.	$ 45.98	house rep.	N
366	810930	Jones College	$210.00	education	N

Figure 2. Checkbook records.

Karl Townsend can be reached at 103 Knollwood Drive, Lansdale, PA 19446.

Brief Exposures

by Brian Durell

Improve your perception and short-term memory by using your computer as a tachistoscope.

A tachistoscope is a device used in psychological studies to present visual displays of words and letters for carefully controlled brief periods of time. Such displays are useful in studying phenomena related to short-term memory and perception.

I have simulated a tachistoscope using a 16K Model I. I developed the program to provide a simulated laboratory experience for my students. It is entirely menu driven and modularized.

The User's Eye View

The program begins with credits and a short introduction. To advance from one page to the next, press any key or the number of your choice from a menu.

The main menu is shown in Fig. 1. It lets you select suggestions for carrying out an investigation, random displays, or prepared displays. It also provides a clean way out of the program with a quit selection.

Selecting the suggestions option produces the page shown in Fig. 2. Selecting random displays leads to the menu shown in Fig. 3. Selecting prepared displays leads to essentially the same menu except the heading indicates prepared rather than random displays.

Choice 1 of the Random Displays menu generates a random string of 25 letters. The screen clears and a line of 25 asterisks is flashed three times in approximately the middle of the screen. This helps you orient your attention to the place where the random letters are displayed. For a fraction of a second, a string of 25 letters such as

YDKVHSDSICSOJXEAKFHGQPWPH

Choices

1) Investigation Suggestions
2) Random Displays
3) Prepared Displays
4) Quit

Type the number of your choice

Figure 1. Main menu.

Suggestions for Investigations

1) Start with some random letter series.
   How many consecutive letters can you see each time?
2) Try varying the length of time of the display.
   What effect does that have on the number of letters which you can see?
3) Repeat 1) and 2) with prepared letter displays.

Press any key to continue

Figure 2. Investigation suggestions page.

Random Displays

1) Generate new display
2) Repeat previous display
3) Show display for confirmation
4) Change timing
5) Return to choices

Type the number of your choice

Figure 3. Random displays menu.

Change Timing

You may change the timing for the display to be anything from 1 to 500 ticks.
Each tick is the equivalent of about .004 seconds.
(It takes about 250 ticks to make up a second.)

At present the timing is set at 150 ticks.

Do not use decimals or fractions in setting the number of ticks.

How many ticks would you like (1-500):?

Figure 4. Change timing page.

The Key Box

Model I and III
16K RAM
Cassette or Disk Basic

appears in place of the asterisks and then the Random Displays menu reappears.

Choice 2, repeat the display, is provided in case you are distracted at a crucial moment or want to repeat the same display in order to attend to another part of it. Usually you will write down as many consecutive letters as you are able to see. Psychologist G.A. Miller's research indicates that you should be able to see from five to nine letters in any given brief exposure. Option 3, show display for confirmation, lets you check your observation.

You can change the timing of the display using option 4. It puts the page shown in Fig. 4 on the screen. When you type a new number, the display menu, Fig. 3, returns to the screen.

Long exposures, a second or more in duration, will increase the number of letters you will be able to see. Most users will be surprised to discover that the time has to decrease to 1/100 second or less before much degradation in their ability to see letters occurs. Choice 5 returns to the main menu.

Working with prepared displays differs from the random displays only in that the strings of letters are not randomly generated. They are prepared in advance. The prepared displays are in data lines starting at line 5000 (see the Program Listing).

There are several types of prepared displays. Some look much like random strings of letters. However, they are actually unrelated words strung together. In some cases, spaces are left between the words.

In other prepared strings, the words are related and form sentences or sentence fragments. These also may appear with the words run together or with spaces between the words. Other strings are familiar phrases that also may appear with or without spaces between the words.

Psychological Lessons

The main psychological point that this application reveals is Miller's "magical number seven plus or minus two," which shows the limitation that exists in our ability to perceive visual information in brief exposures. The program demonstrates the fact that we can see as much in 1/100 second as we can in about 1/2 second.

The most interesting point is that the prepared displays indicate that perception is an active, not a passive, process. When the displayed material is familiar to us, we see much more of it. This is due to prior learning and our active seeking

Program Listing. Tachistoscope.

```
10 ' ----- TACHISTOSCOPE BY BRIAN DURELL 30 OCT 80
15 CLEAR 1000
20 GOSUB 100: ' ----- PROGRAM.BEGIN -----
30 GOSUB 200: ' ----- CHOICES (1,C) -----
40 IF QUITFLAG = 0 THEN 30
45 CLS
50 END: ' ----- PROGRAM.END -----
99 '
100 ' ----- PROGRAM.BEGIN ROUTINE -----
110 GOSUB 300: ' ----- TITLE PAGE -----
120 GOSUB 400: ' ----- INSTRUCTIONS -----
130 ' ----- INITIALIZE VARIABLES -----
135 RANDOM
140 TIME = 150
145 DISPLAY$ = "PFMBTELNUDABRQLNBOHFWZMBK"
150 NUM = 21: ' ----- CURRENT NUMBER OF PREPARED DISPLAYS ----
155 DIM TALLY(NUM)
160 FOR I =1 TO NUM
165   TALLY(I) = 0
170 NEXT I
195 RETURN
199 '
200 ' ----- CHOICES ROUTINE -----
205 GOSUB 500: ' ----- DISPLAY CHOICES -----
210 IF CHOICE = 1 THEN GOSUB 600 ELSE 220: ' ----- SUGGESTIONS
215 GOTO 245
220 IF CHOICE = 2 THEN GOSUB 700 ELSE 230: ' ----- RANDOM DISP
225 GOTO 245
230 IF CHOICE = 3 THEN GOSUB 800 ELSE 240: ' ----- PREP. DISP.
235 GOTO 245
240 IF CHOICE = 4 THEN QUITFLAG = 1
245 RETURN
299 '
300 ' ----- TITLE PAGE -----
302 CLS
305 PRINT@ 148, "*** TACHISTOSCOPE ***"
310 PRINT@ 286, "BY"
315 PRINT@ 345, "A. B. DURELL"
320 PRINT@ 468, "UNIVERSITY OF TORONTO"
325 PRINT@ 668, "(C) 1980"
330 FOR I = 0 TO 500: NEXT I: ' ----- DELAY LOOP -----
335 RETURN
399 '
400 ' ----- INSTRUCTIONS -----
405 CLS
410 PRINT@ 404,"DO YOU WANT INSTRUCTIONS? (Y OR N)"
415 GOSUB 1500: ' ----- GET KEYPRESS$ -----
420 IF KEYPRES$ = "N" THEN 495
425 IF KEYPRES$ = "Y" THEN 435 ELSE GOSUB 1300: ' --- ERROR MSG
430 GOTO 415
435 PRINT@ 20,"*** TACHISTOSCOPE ***
440 PRINT: PRINT "A TACHISTOSCOPE IS USED TO STUDY MEMORY PHENOM
ENA."
445 PRINT "A SERIES OF LETTERS WILL BE PRESENTED BRIEFLY ON THE
SCREEN."
450 PRINT "TRY TO READ AS MANY LETTERS AS POSSIBLE EACH TIME."
455 PRINT "WRITE DOWN THE LETTERS WHICH YOU SEE.  THEN CHECK THE
M OUT."
460 PRINT "YOU MAY CHOOSE TO SEE RANDOM SERIES OF LETTERS, OR PR
EPARED"
465 PRINT "SERIES OF LETTERS.  YOU MAY REPEAT A PARTICULAR DISPL
AY IF"
470 PRINT "YOU WISH, OR YOU MAY CHANGE THE LENGTH OF TIME FOR WH
ICH"
475 PRINT "THE LETTERS ARE DISPLAYED.  YOU MAY ALSO RECALL A SER
IES"
480 PRINT "TO CONFIRM YOUR IDENTIFICATION."
485 PRINT@ 970,"PRESS ANY KEY TO CONTINUE";
490 GOSUB 1500
495 RETURN
499 '
500 ' ----- DISPLAY CHOICES -----
505 CLS
510 PRINT@ 148,"*** CHOICES ***"
515 PRINT@ 280,"1) INVESTIGATION SUGGESTIONS"
520 PRINT@ 344,"2) RANDOM DISPLAYS"
525 PRINT@ 408,"3) PREPARED DISPLAYS"
530 PRINT@ 472,"4) QUIT"
535 PRINT@ 660,"### TYPE THE NUMBER OF YOUR CHOICE ###"
540 GOSUB 1000: ' ----- GET CHOICE -----
545 RETURN
599 '
600 ' ----- SUGGESTIONS FOR INVESTIGATIONS -----
602 CLS
605 PRINT@ 20,"### SUGGESTIONS FOR INVESTIGATIONS ###"
```

Listing continued

Listing continued

```
610 PRINT@ 133,"1) START WITH SOME RANDOM LETTER SERIES."
615 PRINT@ 200,"HOW MANY CONSECUTIVE LETTERS CAN YOU SEE EACH TI
ME?"
620 PRINT@ 325,"2) TRY VARYING THE LENGTH OF TIME OF THE DISPLAY
."
625 PRINT@ 392,"WHAT EFFECT DOES THAT HAVE ON THE NUMBER OF LETT
ERS"
630 PRINT@ 456,"WHICH YOU CAN SEE?"
635 PRINT@ 581,"3) REPEAT 1) AND 2) WITH PREPARED LETTER DISPLAY
S."
640 PRINT@ 970,"PRESS ANY KEY TO CONTINUE";
645 GOSUB 1500: ' ----- GET KEYPRES$ -----
650 RETURN
699 '
700 ' ----- RANDOM DISPLAYS -----
705 CLS
710 PRINT@ 84,"*** RANDOM DISPLAYS ***"
715 GOSUB 900: ' ----- DISPLAY MENU -----
720 GOSUB 1100: ' ----- GET DISPLAY CHOICE -----
725 IF CHOICE = 1 THEN GOSUB 1600 ELSE 735: ' --- NEW DISPLAY
730 GOTO 705
735 IF CHOICE = 2 THEN GOSUB 1700 ELSE 745: ' --- REPEAT DISP.
740 GOTO 705
745 IF CHOICE = 3 THEN GOSUB 1800 ELSE 755: ' --- CONFIRM DISP.
750 GOTO 705
755 IF CHOICE = 4 THEN GOSUB 1900 ELSE 765: ' --- CHANGE TIMING
760 GOTO 705
765 RETURN: ' ----- BACK TO CHOICES -----
799 '
800 ' ----- PREPARED DISPLAYS -----
805 CLS
810 PRINT@ 84,"*** PREPARED DISPLAYS ***"
815 GOSUB 900: ' ----- DISPLAY MENU -----
820 GOSUB 1100: ' ----- GET DISPLAY CHOICE -----
825 IF CHOICE = 1 GOSUB 1200 ELSE 835: ' ----- NEW DISPLAY
830 GOTO 805
835 IF CHOICE = 2 GOSUB 1700 ELSE 845: ' ----- REPEAT DISP.
840 GOTO 805
845 IF CHOICE = 3 GOSUB 1800 ELSE 855: ' ----- CONFIRM DISP.
850 GOTO 805
855 IF CHOICE = 4 GOSUB 1900 ELSE 865: ' ----- CHANGE TIMING
860 GOTO 805
865 RETURN: ' ----- BACK TO CHOICES -----
899 '
900 ' ----- DISPLAY MENU -----
902 PRINT@ 128,STRING$(63,95)
905 PRINT@ 280,"1) GENERATE NEW DISPLAY"
910 PRINT@ 344,"2) REPEAT PREVIOUS DISPLAY"
915 PRINT@ 408,"3) SHOW DISPLAY FOR CONFIRMATION"
920 PRINT@ 472,"4) CHANGE TIMING"
925 PRINT@ 536,"5) RETURN TO CHOICES"
930 PRINT@ 660,"### TYPE THE NUMBER OF YOUR CHOICE ###"
935 RETURN
999 '
1000 ' ----- GET CHOICE -----
1010 GOSUB 1500: ' ----- GET KEYPRES$ -----
1020 IF ASC(KEYPRES$) > 48 AND ASC(KEYPRES$) < 53 THEN 1050: '
          ----- CHECK FOR KEYPRES$ >0 AND <5 -----
1030 GOSUB 1300: ' ----- ERROR MESSAGE -----
1040 GOTO 1010: ' ----- GET NEW INPUT -----
1050 CHOICE = VAL(KEYPRES$)
1060 RETURN
1100 ' ----- GET DISPLAY CHOICE -----
1105 GOSUB 1500: ' ----- GET KEYPRES$ -----
1110 IF ASC(KEYPRES$) >48 AND ASC(KEYPRES$) < 54 THEN 1125: '
       ----- CHECK FOR KEYPRES$ > 0 AND < 6 -----
1115 GOSUB 1300: ' ----- ERROR MESSAGE -----
1120 GOTO 1105: ' ----- GET NEW KEYPRES$ -----
1125 CHOICE = VAL (KEYPRES$)
1130 RETURN
1199 '
1200 ' ----- NEW PREPARED DISPLAY -----
1205 CLS
1210 GOFLAG = 0
1215 FOR I = 1 TO NUM: ' ----- CHECK FOR UNUSED DISPLAYS -----
1220    IF TALLY(I) = 0 THEN GOFLAG = 1
1225 NEXT I
1230 RANUMBER = RND(NUM): ' ----- PICK A DISPLAY RANDOMLY -----
1235 IF GOFLAG = 0 THEN 1250
1240 IF TALLY (RANUMBER) = 1 THEN 1230: ' ----- CHECK IF UNUSED
1245 TALLY (RANUMBER) = 1: ' ----- MARK AS USED -----
1250 RESTORE
1255 FOR I = 1 TO RANUMBER
1260    READ DISPLAY$: ' ----- SELECT FROM DATA STATEMENTS ----
1265 NEXT I
1270 GOSUB 1700: ' ----- FLASH DISPLAY -----
```

Listing continued

of information from the display.

If you doubt this, have a friend replace the prepared displays with equivalent material from a foreign language with which you are not familiar. Your performance will decline to the random display level. What you see depends in large part on what you already know. In some situations, believing is seeing.

The Program

The program operates through subroutines. The subroutines are labeled where the actual code appears and at the point where the routine is called. Each subroutine starts with a line number that is a multiple of 100. All subroutines are short and most call other subroutines.

"What you see depends in large part on what you already know. In some situations, believing is seeing."

I used long variable names for easier readability. This puts an extra strain on the programmer but should make it much easier to change the program later. You must keep track of the first two letters of the variable names as these are the only letters that Level II Basic sees.

The format of this program will be the despair of memory-packing programmers. It is wasteful of memory space, as many comments, spaces between words and variable names, and indented For...Next loops are included. Such extravagance does not get the maximum amount of program into a minimal memory capacity, but it lets you decipher and modify your code after several months of working on something else.

The executive portion of the program is contained in lines 15-50. The Clear instruction reserves some memory for string manipulation. The subroutine at line 100 initializes variables, displays the title page, and checks to see if you want instructions.

One company has sold more printers to this planet than anybody.

Epson.

By now, that shouldn't come as any surprise. After all, we *invented* digital printers for the 1964 Tokyo Olympics.

Since then, we've built more print mechanisms than the rest of the world combined. Including the world's smallest printers, the world's most reliable printers and the world's first disposable print head.

And today we are proud — but not surprised — to say that the world's best selling printers for small computers have the Epson name right on the front.

But the really amazing fact about Epson printers is this: they don't cost any more than other printers. In fact, they frequently cost less.

Here's how we got to be the world's best-selling printers: by building a quality product, by pricing it fairly and by standing behind it. That's the way we've done business for almost 20 years.

Only one printer can claim to be "number one." And measured by popular acceptance, by technological innovation, by honest-to-goodness value, not to mention sheer weight of numbers, that printer is Epson.

Number One.
And built like it.

EPSON
EPSON AMERICA, INC.
3415 Kashiwa Street
Torrance, CA 90505

New Epson RX and FX dot matrix printers. At computer stores now.

Please call (800) 421-5426 for the dealer nearest you. In California, (213) 539-9140.

97

See List of Advertisers on Page 323

Line 145 is included as a precaution against a user who might request to have a display shown for a second time or for confirmation as his very first choice, before any display has been generated. The display in line 145 will almost never be used, but if a user should choose to begin in such a curious manner the program will not crash.

In line 150, the variable NUM is set to the number of prepared displays stored in data statements with line numbers in the 5000 series. Line 4995 carries a reminder to change the value of NUM if you change the number of prepared displays.

Tally, lines 155 and 165, is an array used to tally the use of the prepared displays. These displays will be presented in random order, but all of them will be used before any one is repeated. Tally and the code using it in the subroutine at line 1200 ensure that the prepared displays will be used in this manner.

The subroutine at line 200 displays the basic choices menu and calls subroutines appropriate to your choice. The program simply continues to execute this subroutine and any subroutines that it calls as long as the quit flag

150 Programs for Business & Home— $49.95

Designed for **Radio Shack™**
Model I (Tape)
Model III (Disk) Computer

Executive Calculator Software Package™

Over 150 high-quality, user-proven programs integrated into a comprehensive software system you can afford!

Includes programs for:

Finance/Real Estate/Investments
Loans/Leases/Depreciation
Charts & Graphs
Plus many, many more.

All this for only $49.95

- Over 150 user-proven programs
- Complete Users Guide
- Automatic Update Privileges
- Complete Source Code
- Money Back Guarantee
- Shipping cost included
- Orders shipped within 24 hours
- Compatible to 48K, Disk or Tape

Order today with confidence by telephone or mail. Visa, Master Card accepted.

MCS SOFTWARE
809 Parkway, Conway, Arkansas 72032
Phone: 501-327-4443 ⌐393

Listing continued

```
1295 RETURN
1299 '
1300 ' ----- ERROR MESSAGE -----
1310 FOR J = 0 TO 3
1320    PRINT@ 970,"!!! INVALID INPUT.  TRY AGAIN !!!";
1330    FOR I = 0 TO 500: NEXT I: ' DELAY LOOP
1340    PRINT@ 970,STRING$(35,32);
1350    FOR I = 0 TO 100: NEXT I: ' DELAY LOOP
1360 NEXT J
1370 RETURN
1399 '
1500 ' ----- KEYPRESS -----
1510 KEYPRES$ = INKEY$
1520 IF KEYPRES$ = "" THEN 1510
1530 RETURN
1600 ' ----- GENERATE RANDOM DISPLAY -----
1605 LASTLTR$ = ""
1610 DISPLAY$ = ""
1615 FOR I = 1 TO 25
1620    LTR$ = CHR$(64 + RND(26)): ' ----- CHOOSE RANDOM LETTER
1625    IF LTR$ = LASTLTR$ THEN 1620: ' ---- NO SAME CONSECUTIVE
                                          LETTERS
1630    LASTLTR$ = LTR$
1635    DISPLAY$ = DISPLAY$ + LTR$: ' ----- BUILD DISPLAY -----
1640 NEXT I
1645 GOSUB 1700: ' ----- FLASH DISPLAY -----
1655 RETURN
1699 '
1700 ' ----- FLASH DISPLAY -----
1705 CLS
1710 FOR I = 1 TO 3
1715    PRINT CHR$(23): ' ----- LARGE PRINT -----
1720    PRINT@ 390,STRING$(25,42): ' ----- FLASH STARS -----
1725    FOR J = 1 TO 500: NEXT J: ' ----- DELAY LOOP -----
1730    CLS
1735 NEXT I
1740 PRINT CHR$(23): ' ----- LARGE PRINT -----
1745 PRINT@ 390,DISPLAY$
1750 FOR I = 1 TO TIME: NEXT I: ' ----- DELAY LOOP -----
1755 CLS
1760 FOR I = 1 TO 1000: NEXT I: ' ----- DELAY LOOP -----
1795 RETURN
1800 ' ----- SHOW DISPLAY FOR CONFIRMATION -----
1805 CLS
1807 PRINT CHR$(23): ' ----- LARGE PRINT -----
1810 PRINT@ 390,DISPLAY$
1815 PRINT@ 710,"PRESS ANY KEY TO CONTINUE"
1820 GOSUB 1500: ' ----- GET KEYPRES$ -----
1825 RETURN
1899 '
1900 ' ----- CHANGE TIMING -----
1905 CLS
1910 PRINT@ 84,"*** CHANGE TIMING ***"
1915 PRINT STRING$(64,95)
1925 PRINT "YOU MAY SET THE TIMING FOR THE DISPLAY TO BE ANYTHIN
G"
1930 PRINT "FROM 1 TO 500 'TICKS'.
1935 PRINT "EACH 'TICK' IS THE EQUIVALENT OF ABOUT .004 SECONDS.
"
1940 PRINT "THAT IS, IT TAKES ABOUT 250 TICKS TO MAKE UP A SECON
D."
1950 PRINT
1955 PRINT "AT PRESENT THE TIMING IS SET AT ";TIME; " TICKS."
1960 PRINT
1965 PRINT "DO NOT USE DECIMALS OR FRACTIONS IN SETTING THE NUMB
ER OF TICKS"
1970 PRINT
1975 GOSUB 2000: ' ----- GET NEW TIME SETTING -----
1985 RETURN
1999 '
2000 ' ----- GET NEW TIMING -----
2005 PRINT@ 836, "HOW MANY TICKS WOULD YOU LIKE ( 1 - 500 ):"
2006 PRINT@ 900, "TYPE THE NUMBER AND THEN PRESS THE 'ENTER' KEY
 ";
2007 INPUT TICK$
2010 IF TICK$ = "" THEN 2095
2015 IF LEN(TICK$) > 3 THEN GOSUB 1300 ELSE 2022
2017 PRINT@ 943,STRING$(7,32);
2020 GOTO 2005
2022 ERFLAG = 0
2025 FOR I = 1 TO LEN(TICK$)
2030    TEST$ = MID$(TICK$,I,1): ' ----- TEST EACH CHAR. -----
2035    IF ASC(TEST$) > 47 AND ASC(TEST$) < 58 THEN 2045
2040    ERFLAG = 1
2045 NEXT I
2050 IF ERFLAG = 1 THEN GOSUB 1300 ELSE 2060
```

Listing continued

remains set at zero. Choice 4, Quit, changes QUITFLAG to one, clearing the screen and terminating program execution.

The PRINT@ instruction is a screen-formatting device that prints a string starting at a specified screen location. The 1,024 screen print locations (16 lines of 64 characters each) are numbered 0–1,023.

I use the STRING$(n,m) function to print repeated strings of the same character where n gives the number of repetitions of the character and m is the ASCII code of the character. For instance, STRING$(5,32) prints a string of five blanks. I wish more commercial programs included this feature, particularly for strings of blanks, as counting blanks is difficult when they do not line up near non-blank characters.

CHR$(23) is a control code that turns on double-sized letters on the screen display. This display mode is canceled by a CLS (clear screen) command. ■

Write to Brian Durell c/o Faculty of Education, University of Toronto, 371 Bloor St. West, Toronto, Ontario M5S 2R7, Canada.

Listing continued

```
2052 PRINT@ 943,STRING$(7,32)
2055 GOTO 2005
2060 IF VAL (TICK$) <1 OR VAL (TICK$) > 500 THEN GOSUB 1300 ELSE
     2070
2062 PRINT@ 943,STRING$(7,32)
2065 GOTO 2005
2070 TIME = VAL (TICK$)
2095 RETURN
2099 '
4989 '
4990 ' ----- PREPARED DISPLAYS -----
4995 ' ----- THE NUMBER OF DISPLAYS IS STORED IN VARIABLE 'NUM'
           IN LINE 150. UPDATE THAT VARIABLE WHEN ADDING OR
           DELETING DISPLAYS. -----
5000 DATA WANTHORSEFIRETALKWOMANHIT
5010 DATA FROWNBOYTESTCARFOOTMIXTAR
5020 DATA BLOTWITCHGAMEDOGMOTORWISH
5030 DATA HUNGRYHORSESEATGRASSOFTEN
5040 DATA WILDMENHUNTFATBOARSFORFUN
5050 DATA MILD FARM BOOK STRING HAT
5060 DATA FOAM TROT BOSS HEM STRIKE
5070 DATA OLD CATS CHASE OLDER MICE
5080 DATA LONG BINS HOLD MUCH GRAIN
5090 DATA RAIN IN SPAIN STAYS MAINL
5100 DATA FOUR SCORE AND SEVEN YEAR
5110 DATA ASK NOT WHAT YOUR COUNTRY
5120 DATA THISFINEDAYWILLSOONBEGONE
5130 DATA RATHOMESHOPSALTDOLLCRAYON
5140 DATA WHENIFALLINLOVEITISAUGUST
5150 DATA STUDENTS READ SILLY PAPER
5160 DATA ITS MAINLY BECAUSE OF THE
5170 DATA DONT LEAVE HOME WITHOUT I
5180 DATA KEEP YOUR SUNNY SIDE UP
5190 DATA GIVETHEMTHEOLDSOFTSOAPNOW
5200 DATA TAPERULERSHIRTRUGSHELFOWL
```


UPGRADE

Micro-Designs System-Upgrade for the TRS Model III and 4

The Micro-Design TRS-80 upgrade includes Micro-Design's exceptional MDX-6 disk controller board, one 40 Track Disk Drive, necessary installation cables and hardware. Will also control external 8" Disk Drive Systems.

FOR MORE INFORMATION & FREE LITERATURE
CALL OR WRITE

MICRO-DESIGN
6301 Manchaca Road, Suite B
Austin, Texas 78745

TOLL FREE
1-800-531-5002
Texas Res. call 512-441-7890

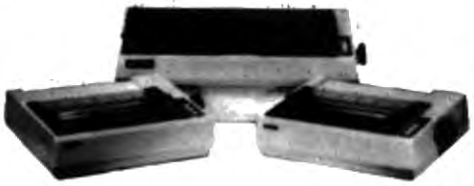
$399.00

463

See List of Advertisers on Page 323

DISPLAYED VIDEO IS DRIVING DOWN PRICES ON DISKS!

FREE SHIPPING!



TEC'S NEW HALF-HIGH 40 TRACK DISK DRIVE W/CASE & POWER SUPPLY AT AN INCREDIBLE LOW PRICE!

$195.00!!!!

NEW!
TRUE HALF HEIGHT DRIVES!
1 5/8 INCH NOT 2 INCH OR 2 7/16 INCH! DIRECT DRIVE!
NO DRIVE BELT! 3MS TRACK TO TRACK!

"YOU CAN BUY THE REST BUT WHY NOT BUY ONE OF THE BEST!"

TEAC's NEW SLIMLINE 40 TRACK W/CASE & POWER SUPPLY..... $235.00
TANDON 40 TRACK TM-100-1 W/CASE & POWER SUPPLY..... $220.00
(DOUBLE SIDED 40 TRACK DRIVES ADD $75.00)
SHUGART NEW SLIMLINE DOUBLE SIDED 40 TRACK W/CASE & POWER SUPPLY..... $299.00
SHUGART NEW SLIMLINE DOUBLE SIDED 80 TRACK W/CASE & POWER SUPPLY $379.00
TANDON SINGLE SIDED SLIMLINE 8" DISK DRIVE W/DUAL CASE & POWER SUPPLY..... $545.00
TANDON DOUBLE SIDED SLIMLINE 8" DISK DRIVE W/DUAL CASE & POWER SUPPLY.... $625.00
TWO DRIVE CASES AVAILABLE AT VARIED PRICES
TWO DRIVE 5 1/4" CABLE (FOR MOST COMPUTERS).....**$23.99** WITH GOLD PLATED CONNECTORS

DV'S COLOR COMPUTER 1st DRIVE ONLY..... $389.00

ONE YEAR WARRANTY ON TEAC & SHUGART DRIVES/180 DAYS ON TEC & TANDON

HAYES SMART MODEM 300 BAUD..... $225.00 **1200 BAUD.....$525.00**
MODEL I DOUBLE DENSITY BOARD..... $89.00

PRINTER PRICES

WE'RE NOT GOING OT MAKE YOU CALL FOR PRICES — HERE THEY ARE IN BLACK AND WHITE!!!

EPSON

MX80 FT W/GRAPHTRAX PLUS..... $459.00
MX100 W/GRAPHTRAX PLUS..... $659.00
RX80 W/GRAPHTRAX PLUS $389.00
FX80 W/GRAPHTRAX PLUS..... $569.00
FX100 W/GRAPHTRAX PLUS..... $779.00

STAR

GEMINI 10..... $349.00
GEMINI 15..... $479.00
CITOH PROWRITER 8510..... $395.00
STARWRITER F10..... $1169.00
SMITH CORONA TP1..... $595.00

PRINTER CABLE 10' LONG W/GOLD PLATED CONNECTORS STARTING AT..... $25.99
DAISY WHEEL PRINTERS AVAILABLE AT VARIED PRICES

Visit our two retail locations at:
886 Ecorse Road
Ypsilanti, MI 48197
(313) 426-5086/(313) 482-4424
or
111 Marshall Street
Litchfield, MI 49252
(517) 542-3280
(517) 542-3939
(517) 542-3947

WE CARRY TRS80, LNW, EPSON & FRANKLIN COMPUTERS

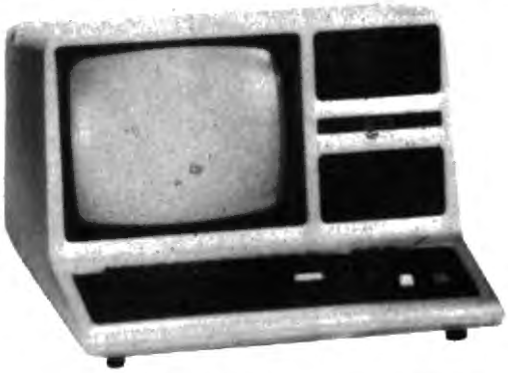
IMMEDIATE DELIVERY
180 Days Parts and Labor Warranty
DEALER INQUIRIES INVITED
Free Shipping in the U.S.
48 Contiguous States

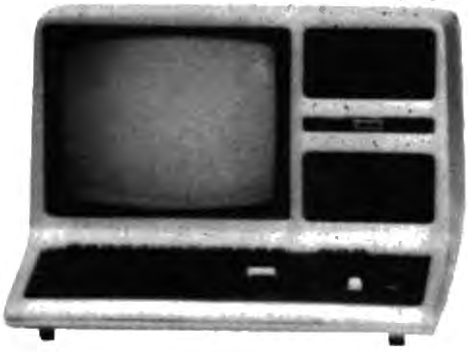
TO ORDER: Call (313) 426-5086 or (313) 482-4424 or (517) 542-3280
(517) 542-3939 (517) 542-3947
OR WRITE: DISPLAYED VIDEO 111 MARSHALL ST.,LITCHFIELD, MI 49252

*TRS-80 is a trademark of the Tandy Corporation

Prices & Specifications subject to change without notice

DV'S EXCLUSIVE "YOU CAN'T LOSE" SIX MONTH WARRANTY!





"NO YOURE NOT SEEING THINGS, THAT'S FOUR INTERNAL DRIVES IN A MODEL 4, WITH UP TO 4 MEG. DISK STORAGE AVAILABLE NOW, ONLY FROM DISPLAYED VIDEO!!'

DISPLAYED VIDEO IS DRIVING DOWN PRICES ON DISK!

DISPLAYED VIDEO is now offering TRS-80' MODEL 4 with TANDON/TEC/TEAC disk drives, one of the most reliable disk drive systems on the market, for **INCREDIBLY** low prices.

MODEL 4 with 64K dual 40 track double density disk drives, complete systems with TRSDOS 6.0 and one BOX OF DISKETTES

PLUG IT IN AND GO. . . . . . **$1599.00**/*128K*.....**$1679.00**

MODEL 4 with 64K dual 40/40 track double density disk drives, complete systems with TRSDOS 6.0 and one BOX OF DISKETTES

PLUG IT IN AND GO. . . . . . **$1899.00**/*128K* **$1979.00**

MODEL 4 with 64K dual 80 track double density disk drives, complete systems with TRSDOS 6.0 and one BOX OF DISKETTES

PLUG IT IN AND GO. . . . . . **$1899.00**/*128K* **1979.00**

MODEL 4 with 64K dual 80/80 track double density disk drives, complete systems with TRSDOS 6.0 and one BOX OF DISKETTES

PLUG IT IN AND GO. . . . . . **$2199.00**/*128K* **2279.00**

MODEL 4 with 64K four 40 track double density internal disk drives, complete systems with TRSDOS 6.0 and one BOX OF DISKETTES

PLUG IT IN AND GO. . . . . . **$2299.00**/*128K*....**$2379.00**

MODEL 4 with 64K four internal drives of any configuration available to achieve up to 4 meg of disk storage. . . . . **CALL**

MODEL III/4 Internal Two Drive Kit: Includes controller board, dual drive mounting bracket, dual power supply, all hardware cable; and connectors (gold plated) & TEC Drive. **$399.00**

4 DRIVE KIT MINUS DRIVE $349.00

MODEL 100 8K.....**$679.00** 24K.....**$839.00**

DV'S MODEL I DOUBLE DENSITY BOARDS....**$89.00**

WE CARRY TRS-80, IBM, LNW, EPSON & FRANKLIN COMPUTERS

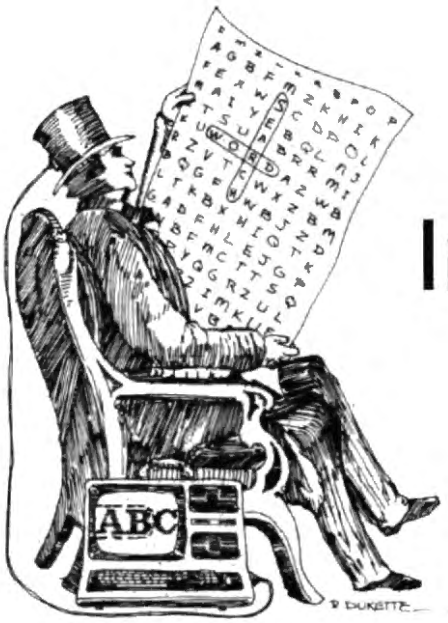
Visit our retail location at:
111 Marshall Street
Litchfield, MI 49252
(313) 426-5086
(313) 482-4424
(517) 542-3280
(517) 542-3939
(517) 542-3947

DISPLAYED VIDEO

IMMEDIATE DELIVERY
DV'S SIX MONTH
PARTS AND LABOR WARRANTY

Authorized Dealership at:
111 Marshall Street, Litchfield, Michigan 49252 **P142**
To Order: Call (313) 426-5086; (313) 482-4424; (517) 542-3280
(517) 542-3939; (517) 542-3947
OR WRITE:
Displayed Video, 111 Marshall St., Litchfield, MI 49252

*TRS-80 is a trademark of the Tandy Corporation Prices subject to change without notice



In Search of . . .

by James Blatt

Hidden-word puzzles have become a popular pastime and a proven educational tool. They provide a fun way to improve spelling and word-recognition skills. I wrote a program called Wordsearch that generates this type of puzzle (see Program Listing).

Wordsearch creates puzzles with up to 25 hidden words, using either standard- or double-sized letters. It prints puzzles in a square matrix along with a list of words hidden in the puzzle. The program produces any number of copies of the same puzzle or different versions of the puzzle using the same word list.

The recent popularity of word search games has brought them from paperbacks to computers.

Using Wordsearch

To use Wordsearch, you first have to type in your list of words. Enter words one at a time, using letters only. You must enter two-word phrases, hyphenated words, or words containing apostrophes or other punctuation marks as a single word without spaces or punctuation. Wordsearch accepts up to 25 words and runs automatically after you enter the 25th word. To make a puzzle with fewer than 25 words, enter Q after you type in your last word.

When you finish entering your word list, the program organizes the words from longest to shortest and determines the puzzle matrix size.

The program initializes the matrix with a zero in each space. A random routine then attempts to insert each word on the list into the matrix, beginning with the longest word. As the matrix fills up, a word being inserted may encounter a word already in place. When this occurs, the program compares the letter about to be inserted with the letter already in position. If the letters match, the insertion continues. If they don't, the program backs out and tries another random insertion.

It is possible, though unlikely, that a word won't fit into the puzzle. The program displays the number of the words it tries to insert, along with the number of attempts at insertion. If it hangs up

Continued on p. 248

Program Listing. Wordsearch.

```
10 CLS:CLEAR 1200:DEFINT A-Z
20 DIM W$(26):DIM A$(32,32)
30 RANDOM
40 PRINT STRING$(64,"*")
50 PRINT:PRINT TAB(23) "WORD SEARCH - 2.1"
55 PRINT TAB(23) "JAMES BLATT 3/18/83"
60 PRINT:PRINT STRING$(64,"*")
70 GOSUB 6000:GOSUB 1000:GOSUB 2000:GOSUB 3000:GOSUB 4000:GOSUB 50
00:GOTO 9000
80 CLS:PRINT "DO YOU WANT TO DO ANOTHER ONE?  (Y/N)";
90 INPUT X$:IF X$ = "Y" THEN 30 ELSE END
1000 CLS:X = 1:PRINT "ENTER WORDS USING LETTERS ONLY!":PRINT "DO N
OT USE SPACES, HYPHENS, OR APOSTROPHES.":GOSUB 6000
1020 CLS:PRINT "TYPE 'Q' AND PRESS ENTER IF NO MORE WORDS."
1030 PRINT:PRINT "WHAT IS WORD ";X;
1040 INPUT W$(X)
1050 IF X = 25 THEN PRINT "NO MORE WORDS ALLOWED.":GOSUB 6000:RETU
RN
1060 IF W$(X) = "Q" THEN X = X-1:RETURN
1070 X = X+1:GOTO 1020
```

Listing continued

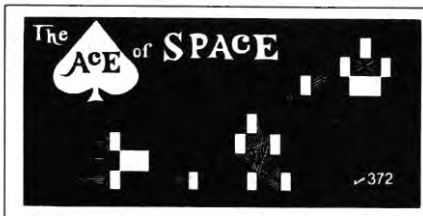
The Key Box

Models I, II, and III
16K RAM
Basic
Printer

Listing continued

```
2000 M = X:A = 0:B = 0:S = 0:GOSUB 7000
2010 FOR X = 1 TO M:A = A+LEN(W$(X)):NEXT X
2020 B = LEN(W$(1))
2030 S = INT(SQR(A))+2:IF S < B THEN S = B
2040 IF S < M THEN S = M
2050 S = S+4:IF S > 32 THEN PRINT "CAN'T HACK IT":GOSUB 6000:END
2055 GOSUB 8000
2060 RETURN
3000 CLS:FOR X = 1 TO M:Y = 0
3010 Y = Y+1:R = RND(14)-1:K = INT(R/3):IF R > 11 THEN K = K+R-12
3020 PRINT @ 512,"LOCATING WORD ";X;" ATTEMPT NUMBER ";Y
3040 X$ = INKEY$:IF X$ = "A" THEN GOSUB 5000:GOSUB 9000
3042 K = K+1:ON K GOTO 3050,3120,3190,3260,3330,3400
3045 NEXT X:RETURN
3050 L = LEN(W$(X)):H = RND(S):C = 0:E = 0:F = 0:R$ = "0"
3060 V1 = RND(S-L)-1
3070 FOR C = 1 TO L:V = V1+C
3075 IF ASC(A$(H,V)) = ASC(MID$(W$(X),C,1)) THEN E = H:F = V:R$ =
A$(H,V)
3080 IF ASC(A$(H,V)) <> 48 AND ASC(A$(H,V)) <> ASC(MID$(W$(X),C,1)
) THEN 3100
3090 A$(H,V) = MID$(W$(X),C,1):NEXT C:GOTO 3045
3100 C = C-1:IF C = 0 THEN GOTO 3010
3110 V = V-1:IF E = H AND F = V THEN A$(H,V) = R$:GOTO 3100
3115 A$(H,V) = "0":GOTO 3100
3120 L = LEN(W$(X)):H = RND(S):C = 0:E = 0:F = 0:R$ = "0"
3130 V1 = RND(S-L)-1
3140 FOR C = 1 TO L:V = S-V1-C
3145 IF ASC(A$(H,V)) = ASC(MID$(W$(X),C,1)) THEN E = H:F = V:R$ =
A$(H,V)
3150 IF ASC(A$(H,V)) <> 48 AND ASC(A$(H,V)) <> ASC(MID$(W$(X),C,1)
) THEN 3170
3160 A$(H,V) = MID$(W$(X),C,1):NEXT C:GOTO 3045
3170 C = C-1:IF C = 0 THEN GOTO 3010
3180 V = V+1:IF E = H AND F = V THEN A$(H,V) = R$:GOTO 3170
3185 A$(H,V) = "0":GOTO 3170
3190 L = LEN(W$(X)):V = RND(S):C = 0:E = 0:F = 0:R$ = "0"
3200 H1 = RND(S-L)-1
3210 FOR C = 1 TO L:H = H1+C
3215 IF ASC(A$(H,V)) = ASC(MID$(W$(X),C,1)) THEN E = H:F = V:R$ =
A$(H,V)
3220 IF ASC(A$(H,V)) <> 48 AND ASC(A$(H,V)) <> ASC(MID$(W$(X),C,1)
```

Listing continued



Definitely *THE BEST* of the space games for the **TRS-80 MOD I/III**

★ **1,2 or 3 SIMULTANEOUS players!**
- Each piloting a seperate space ship

★ **Incredibly realistic graphics!**

★ **Fast arcade responce!**

★ **Options individually selected!**
- Meteors
- Blackhole Gravity
- Flying Saucers
- Objects & Mines
- Bounce or Wrap-Around Screen
- Weapons: Missiles or Lasers

★ **Difficulty options selectable!**
- # of Saucers
- Saucer Speed
- Space Ship Power
- Gravity Force
- Meteor Speed
- Fuel Supply
- Weapon Supply
- Laser Length

★ **Sophisticated ship controls!**
- Variable thrust level
- Rotation
- Flip
- Fire left or right barrel
- Hyperspace

★ **Cooperative or Competitive!**
- Numerous scoring options
- 1 player can fly 2 ships - 1 with each hand!

★ **Alpha & Trisstick compatable** ★ **Sound**

32K Disk $29.95 or 16K Tape $26.95
Specify MOD I or III. 22 page manual included.
California residents add 6% sales tax.
Outside USA (except Canada) add $10.00
Copyright 1983 by John McAfee
TM TANDY CORP.

SOFT SYSTEMS & CONSULTING
PO BOX 60031 Santa Barbara, CA 93160

LEVEL IV PRODUCTS, INC.

LEVEL IV PRODUCTS, INC

** LEVEL IV MEANS FOUR LEVELS OF EXCELLENCE **
✓QUALITY ✓VALUE ✓SERVICE ✓SUPPORT

PREMIUM GRADE TRS80'S

BUILDING A PREMIUM GRADE MICROCOMPUTER IS A CLAIM FEW COMPANIES CAN MAKE, AND EVEN FEWER CAN BACKUP. WE DO IT EVERY DAY. EACH LEVEL IV COMPUTER SYSTEM IS CAREFULLY ASSEMBLED FROM PRE-TESTED COMPONENTS OF THE HIGHEST QUALITY, AND TESTED FOR PERFORMANCE TO A LEVEL FAR ABOVE THAT FOR WHICH IT WAS DESIGNED. AFTER BURN-IN, EACH UNIT IS DELIVERED WITH THE FAMOUS LEVEL IV 90 DAY LIMITED, PARTS AND LABOR WARRANTY (COPIES AVAILABLE ON REQUEST).

A LEVEL IV COMPUTER IS DESIGNED TO BE COMPLETELY COMPATIBLE WITH THE MOUNTAIN OF SOFTWARE AND HARDWARE READILY AVAILABLE FOR IT. ANY ITEM THAT WORKS ON OR ATTACHES TO, A STANDARD R/S UNIT WILL FUNCTION WITH OUR VERSION.

CONSIDER THESE OPTIONS TO ENHANCE YOUR COMPUTER:
1)..40 AND 80 TRACK SINGLE AND DOUBLE HEAD DISK DRIVES
2)..WINCHESTER DRIVES 6.4 MEG THRU 31 MEG
3)..CPU SPEED-UP MOD'S, MORE THAN DOUBLE YOUR SPEED
4)..80 COLUMN, 24 LINE DISPLAY, AND CP/M FOR MOD3
5)..MOD3 AND MOD4 DISK UP-GRADE AND MEMORY KITS

BUILDING A MOD3 OR MOD4 WITH THE ABOVE CAPABILITIES CERTAINLY MAKES IT A PREMIUM GRADE UNIT, BUT OUR MOST IMPORTANT PRODUCT IS AFTER-THE-SALE-SERVICE-AND-SUPPORT.

NOW FOR THE SURPRISE, BASE PRICE FOR OUR 64K MOD4 IS ONLY **$1599.00**
REMEMBER LEVEL IV MEANS *QUALITY *VALUE *SERVICE *SUPPORT
SOME MAY GET CLOSE TO OUR PRICES, BUT NONE WILL MATCH OUR VALUES.

OUR $300,000.00 INVENTORY OF ITEMS
FROM LEADING HARDWARE AND SOFTWARE
MFGR'S ASSURES YOU PROMPT SERVICE
AT THE VERY LOWEST DISCOUNT PRICES

3 COMPANY STORE LOCATIONS:

MAIL & PHONE ORDER CENTER
32429 SCHOOLCRAFT ROAD
LIVONIA, MICHIGAN 48150

COMPUTER SALES CENTER
182 NORTH 20TH STREET
BATTLE CREEK, MICHIGAN

FULL LINE R/S SALES CENTER
134 SOUTH FRONT STREET
DOWAGIAC, MICHIGAN 49047

ASK ABOUT OUR
DATA DOLLARS
DISCOUNT PROGRAM

CALL FOR OUR CURRENT LOW DISCOUNT PRICING
IN-STATE (313) 525-6200 OTHERS 800-521-3305
WE ACCEPT PAYMENTS BY VISA, M/C, CHECK, COD

YOUR ONE-STOP COMPUTER SHOPPING CENTER

See List of Advertisers on Page 323

EARLY GAMES

FOR YOUNG CHILDREN

Nine educational and entertaining games controlled by a single program. Even very young children can select a game, play it, and select a different game...ALL BY THEMSELVES!

- PICTURE MENU GIVES CHILDREN CONTROL
- MATCH NUMBERS AND LETTERS
- COUNT COLORFUL BLOCKS
- ADD AND SUBTRACT STACKS OF BLOCKS
- LEARN THE ALPHABET
- PRACTICE SPELLING NAMES
- COMPARE SHAPES
- DRAW AND SAVE COLORFUL PICTURES

The large numbers and letters fill the screen with color. Children enter single key stroke responses and get immediate visual and musical feedback. Hints are provided when appropriate. Beyond just teaching children basic skills, **EARLY GAMES** makes them feel comfortable as they control the computer. Designed for children ages 2½ to 6 years old.

EARLY GAMES offers the child a diverse selection of activities which stimulate the process of problem solving as well as foster individual creativity.

Pamela Bach, Director
Youth World Day Care Center

I took **EARLY GAMES** home for my kids and they really liked it! It held their attention and they learned from it!

Jeanette Fritze
Computer Saleswoman

EARLY GAMES can help children learn new concepts, information, and skills and also introduce them to the joys and benefits of home computers.

Peter Clark, faculty
Institute of Child Development
University of Minnesota

All nine games for $29.95
(Minnesota residents add 5% sales tax)

Apple II Plus
IBM Personal Computer
Atari 24K Disk or 16K Cassette
TRS-80 Model I/III 32K Disk or 16K Cassette
TRS-80 Color Computer 16K Disk or Cassette

VISA/MasterCard

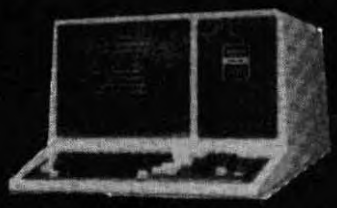
EARLY GAMES
educational software
Suite 140E
Shelard Plaza North
Minneapolis, MN 55426
1-800-328-1223
Minnesota residents call:
612-544-4720

Listing continued

```
) THEN 3240
3230 A$(H,V) = MID$(W$(X),C,1):NEXT C:GOTO 3045
3240 C = C-1:IF C = 0 THEN GOTO 3010
3250 H = H-1:IF E = H AND F = V THEN A$(H,V) = R$:GOTO 3240
3255 A$(H,V) = "0":GOTO 3240
3260 L = LEN(W$(X)):V = RND(S):C = 0:E = 0:F = 0:R$ = "0"
3270 H1 = RND(S-L)-1
3280 FOR C = 1 TO L:H = S-H1-C
3285 IF ASC(A$(H,V)) = ASC(MID$(W$(X),C,1)) THEN E = H:F = V:R$ =
A$(H,V)
3290 IF ASC(A$(H,V)) <> 48 AND ASC(A$(H,V)) <> ASC(MID$(W$(X),C,1)
) THEN 3310
3300 A$(H,V) = MID$(W$(X),C,1):NEXT C:GOTO 3045
3310 C = C-1:IF C = 0 THEN 3010
3320 H = H+1:IF E = H AND F = V THEN A$(H,V) = R$:GOTO 3310
3325 A$(H,V) = "0":GOTO 3310
3330 L = LEN(W$(X)):C = 0:E = 0:F = 0:R$ = "0"
3340 H1 = RND(S-L)-1:V1 = RND(S-L)-1
3350 FOR C = 1 TO L:H = H1+C:V = S-V1-C
3355 IF ASC(A$(H,V)) = ASC(MID$(W$(X),C,1)) THEN E = H:F = V:R$ =
A$(H,V)
3360 IF ASC(A$(H,V)) <> 48 AND ASC(A$(H,V)) <> ASC(MID$(W$(X),C,1)
) THEN 3380
3370 A$(H,V) = MID$(W$(X),C,1):NEXT C:GOTO 3045
3380 C = C-1:IF C = 0 THEN 3010
3390 H = H-1:V = V+1:IF E = H AND F = V THEN A$(H,V) = R$:GOTO 338
0
3395 A$(H,V) = "0":GOTO 3380
3400 L = LEN(W$(X)):C = 0:E = 0:F = 0:R$ = "0"
3410 H1 = RND(S-L)-1:V1 = RND(S-L)-1
3420 FOR C = 1 TO L:H = H1+C:V = V1+C
3425 IF ASC(A$(H,V)) = ASC(MID$(W$(X),C,1)) THEN E = H:F = V:R$ =
A$(H,V)
3430 IF ASC(A$(H,V)) <> 48 AND ASC(A$(H,V)) <> ASC(MID$(W$(X),C,1)
) THEN 3450
3440 A$(H,V) = MID$(W$(X),C,1):NEXT C:GOTO 3045
3450 C = C-1:IF C = 0 THEN GOTO 3010
3460 H = H-1:V = V-1:IF E = H AND F = V THEN A$(H,V) = R$:GOTO 345
0
3465 A$(H,V) = "0":GOTO 3450
4000 FOR V = 1 TO S:FOR H = 1 TO S
4010 C$ = "AABCDDEEEFGHIIJKLMNNOOOPRRSSSTTUVWY"
4020 R = RND(35)
4030 IF ASC(A$(H,V)) <> 48 THEN 4050
4040 A$(H,V) = MID$(C$,R,1)
4050 NEXT H:NEXT V:RETURN
5000 CLS:B$ = CHR$(32):P = 0
5010 ST% = PEEK(14312) AND 240
5020 IF ST% <> 48 THEN PRINT "PRINTER NOT ON LINE":INPUT "PRESS EN
TER TO CONTINUE";X$
5022 INPUT "DO YOU WANT LARGE PRINT ?  (Y/N) ";X$
5024 IF X$ = "Y" THEN GOSUB 9500
5026 IF P = 1 THEN LPRINT CHR$(31) ELSE LPRINTCHR$(30)
5030 FOR V = 1 TO S
5040 IF P = 1 THEN LPRINT:LPRINT ELSE LPRINT
5050 FOR H = 1 TO S
5060 LPRINT A$(H,V);B$;
5070 NEXT H:NEXT V:LPRINT:LPRINT
5080 LPRINT "WORD LIST":LPRINT:FOR X = 1 TO M:LPRINT W$(X):NEXT X
5090 PRINT:PRINT "DO YOU WANT TO PRINT ANOTHER COPY? (Y/N)";
5100 INPUT X$
5110 IF X$ = "Y" THEN 5000
5120 RETURN
6000 FOR T = 1 TO 2000:NEXT T:RETURN
7000 FOR I = 1 TO M-1
7010 FOR J = I+1 TO M
7020 IF LEN(W$(I)) >= LEN(W$(J)) THEN 7060
7030 T$ = W$(I)
7040 W$(I) = W$(J)
7050 W$(J) = T$
7060 NEXT J
7070 NEXT I
7080 RETURN
8000 FOR V = 1 TO S:FOR H = 1 TO S
8010 A$(H,V) = "0"
8020 NEXT H:NEXT V:RETURN
9000 CLS:PRINT "DO YOU WANT TO PRINT A NEW PUZZLE WITH THE SAME WO
RD LIST?"
9010 INPUT "(Y/N) ";X$
9020 IF X$ = "N" THEN 80
9030 GOSUB 8000:GOSUB 3000:GOSUB 4000:GOSUB 5000:GOTO 9000
9500 IF S < 17 THEN 9580
9510 CLS:PRINT "PUZZLE TOO LARGE FOR SINGLE PAGE" :PRINT
9520 PRINT "<1> ENTER SHORTER WORD LIST"
9530 PRINT "<2> USE SMALL PRINT"
9540 PRINT "<3> CONTINUE USING LARGE PRINT"
9550 PRINT:INPUT "WHICH NUMBER ";X
9560 IF X = 1 THEN 10
9570 IF X = 2 THEN RETURN
9580 P=1:RETURN
```

WILL YOU

DONATE $250 TO TANDY CORPORATION?



TRS-80 MODEL 4

That's Exactly What You Will Do If You Buy Your TRS-80 Model 4 From A Company Owned Radio Shack Store!

We sell the TRS-80 Model 4, 64K, RS-232, for $1749. Radio Shack sells it for $1995. If you don't need the RS-232 interface, you save $100. If you would like 128K RAM, add only $50.

This Month's Software Special
Good Thru 9-30-83

LDOS 5.1 — $99
For the TRS-80 Model III

READ THIS PART AND SAVE
ANOTHER COUPLE HUNDRED DOLLARS

It's a known fact that Computer Manufacturers sell their computers at a low margin and make up the difference on peripheral items. One of these items is Computer Memory.

If you would like 128K Memory instead of 64K, you pay Radio Shack **$149.** If you order it from us at the time you get your Model 4, it costs only **$50.** Save a quick **$100!** If you need a printer with your computer, see the following page and save **$100** to **$300** over what you would pay Radio Shack for an equivalent printer!

AMERICAN 918/825-4844
118 SO. MILL ST
PRYOR, OK 74361
(918) 825-4844

SMALL BUSINESS COMPUTERS

NEED INFO QUICK?

Then just call our automated TOLL FREE answering machines. Leave your name,address, and phone number. Requests will be mailed 1st Class the same day. **Only requests for product information will be processed, all others will be disregarded by our answering service.**

CALL 1-800-331-3896

In Oklahoma Call
1-918-825-4844 217

```
T I G R E E N A W M W O
S E J E L P R U P F E E
I G M W I K E S B N G B
S A I G C D E R Y W L E
M R M A P O A F E O D I
J F L B I S G H L R V R
H B I L V I J N L B N M
L I O U H B F S O O D D
N I S E R H G N W F R D
R R E T I H W Y O T B T
C D M T O A I N L O K W
H G O T O K Y L S T H O

WORD LIST

YELLOW
PURPLE
BLACK
WHITE
BROWN
GREEN
BLUE
RED
```

Figure 1. Hidden-word puzzle in large-size print.

Continued from p. 244

on a word, you can break out of the routine by holding down the A key. This causes the program to print out the incomplete matrix (so you can check program operation) and lets you try again with the same word list.

The program fills the remaining spaces in the matrix with randomly chosen letters and enters the printing routine. If your printer isn't on line, Wordsearch pauses and waits for operator input before it continues. If your printer is on line, a prompt gives you the choice of large or regular size print.

The large print option is best for younger children and may be preferred by many users. (See Fig. 1.) If your matrix is too big for this option, try using larger paper, fewer words, or printing the puzzle in standard-size print. (See Fig. 2.)

"When you finish entering your word list, the program organizes the words from longest to shortest and determines the puzzle matrix size."

Once the puzzle is printed, you can print another copy of the same puzzle, print a new puzzle with the same word list, or print a new puzzle using a new word list. The ability to make several different puzzles from the same word list is useful in classrooms because it gives each student a unique puzzle.

Notes on Program Operation

The program sets the puzzle's matrix size in lines 2000–2060 (see Listing). The size of the matrix is determined by the length of the longest word and the square root of the total number of letters or words, whichever is greater.

Since I print my puzzle on 8½- by 11-inch paper, I limit the matrix size to 32 characters square. You can change this by changing the formula that sets the variable S in line 2050.

The word insertion routine in lines 3000–3465 is the most complicated in the program. Wordsearch randomly

10–60	Initialization and title display
70	Main program
80–90	End or repeat program run
1000–1070	Word List entry
2000–2060	Establish matrix size
3000–3045	Choose word insertion mode
3050–3115	Vertical (bottom to top) word insertion
3120–3185	Vertical (top to bottom) word insertion
3190–3255	Horizontal (left to right) word insertion
3260–3325	Horizontal (right to left) word insertion
3330–3395	Diagonal (top left to bottom right) word insertion
3400–3465	Diagonal (bottom left to top right) word insertion
4000–4050	Insert dummy letters in matrix
5000–5120	Print puzzle matrix and word list
6000	Time delay
7000–7080	Sort word list by length
8000–8020	Initialize matrix
9000–9030	Option to create new puzzle with existing word list
9500–9570	Check for large print use

Table 1. Program subroutines.

A	Total number of characters in word list
A$(n,n)	Puzzle matrix
B	Length of longest word
B$	Blank space used in printing puzzle
C, I, J, T, X, Y	Counters
C$	Dummy letters
E, F	Hold values of H and V during insertion attempt
H, V	Horizontal and vertical matrix locations
H1, V1	Horizontal and vertical starting points
K	Word insertion mode
L	Word length
M	Number of words in word list
P	Print size (0 = regular printer, 1 = large print)
R	Random number
R$	Holds value of A$(H,V) during insertion attempt
S	Size of matrix (maximum value of H and V)
T$	Holds value of W$(n) during sort
W$(n)	Word list
X$	Menu variable

Table 2. Program variables.

WE STOCK THESE PRINTERS!

OKIDATA

82A	$419.95
83A	$699.95
84	$549.95
92	$929.95
93	$1049.95

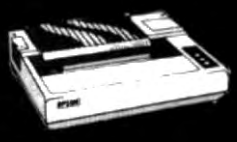
TP-1

Smith Corona $549.95

STOP

RIGHT NOW!

Call our Toll Free "Quick Information" Hotline for Epson Printer Prices. We'll send you any info you need on any of our products.



EPSON

MX-80 FT MX-100
FX-80 FX-100
RX-80

Our Epson Prices are So Low, We Can't Even Print Them!

STAR MICRONICS

Gemini 10X $319.95
Gemini 15 $499.95

918/825-4844

118 SO. MILL ST
PRYOR, OK 74361
(918) 825-4844

SMALL BUSINESS COMPUTERS

NEED INFO QUICK?

Then just call our automated TOLL FREE answering machines. Leave your name,address, and phone number. Requests will be mailed 1st Class the same day. **Only requests for product information will be processed; all others will be disregarded by our answering service.**

CALL 1-800-331-3896

In Oklahoma, Call:
1-918-825-4844

```
C L E V E L A N D F W U L U O E N W T J B T D D K L V N T
K D N D H N R M I N G R O E P F Y I N I V D E I E S B E K
E L L R A S J O E N G D E F Y K D V J O H N S O N B P S C
N V U H R A N V D J S N U O I J S N S Y N O G I T M F O T
N D T M D W R I K Y W W O P R E A G A N S T U H B S A N S
E I J H I S P H X S B R O R O O K F K S T L Y F O E D I D
D R L S N N O P O O V F M A D I S O N L I N C O L N I E W
Y N D H G B F Y E L N I K C M W C R P E O I N M D O L M I
O R O D J F I S A G W B T O S D F C M D I I O P E R R O L
E J D J G D C A D P J S L A D S V N C V O O S R O E V N S
V P A A E H S Y V J I I E T W E E D O O B T K E O N S Y O
R Y E J D E N O M R T D V J A O N S S S Y D C C S O D O N
N D L H Y Y I T O F I Y E A S R C G D E H C A N M N F E N
I T N A O I E S F Y O I S E H N O P E I A N J O J T N N U
I K H C N I T W R N D D O I I O N H S S R N F R S C O U S
C H A D T Y H W W I T E O I N M O I A E R W J N N R O N W
E A V N S M E T K E F A R U G I S C D N I S D C A S D W P
J O R Y O N E T U I P Y S R T A R S L H S O O A R I I K T
N R C T O S G C S R N S G E O E E E C O O M E N W N N N E
A O T R E A C H I P B W Y G N S F G N W N O N O S S S F O
M R K E D R E K I E L V N D E T F O K E Y V W P N Y U R A
U S R V W R T I T A D C O I S J E S C R R A N O I C C S D
R N D O R O F S T R T A N L E T J E S A U O S R H U S A A
T L O O R U A H E S S L I O J S K O O O P A A S F A E D M
S W E H K C T N G J S I E O H C F D D R I I O K P Y O R S
R S R E F R J R I A H S I C T O T D G D H S E I T O T O A
R E S Y H T L B A G E D W K V A E O U A P F D A T R O F I
F A E D F F N K A B J K E W Y Y E D I O I A S N I R H P D
D D O A P R F S A V S K K L E T U K S A T M R B V R O Y G
```

WORD LIST				
	JEFFERSON	HARDING	TRUMAN	REAGAN
	MCKINLEY	JACKSON	MONROE	NIXON
WASHINGTON	COOLIDGE	MADISON	WILSON	ADAMS
EISENHOWER	HARRISON	KENNEDY	HOOVER	HAYES
ROOSEVELT	LINCOLN	JOHNSON	CARTER	TAFT
CLEVELAND				FORD

Figure 2. Hidden-word puzzle in standard-size print.

selects between six modes of insertion in lines 3000–3045. Vertical and horizontal insertion are favored over diagonal insertion by a 3–1 ratio since diagonal words make the puzzle more difficult.

To make this a 2–1 ratio, change line 3010 to Y = Y + 1: R = RND(20): K = INT(R/4) : IF R > 17 THEN K = K + 1. Set a 1–1 ratio with 3010 Y = Y + 1 : K = RND(6) and the deletion of K = K + 1 in line 3042.

Lines 4000–4050 contain the random-letter insertion routine. The string variable C$ in line 4010 establishes the set of random letters. The set in the program favors the more commonly used letters and may be altered as needed. The RND value in line 4020 should equal the length of the C$.

Large and regular print sizes are set in line 5026 by LPRINT CHR$(31) for large characters and LPRINT CHR$ (30) for conventional-size characters. These values may be different for other printers and you should change them if necessary.

To use Wordsearch on a Model II, eliminate lines 5010 and 5020. ■

James Blatt can be reached at P.O. Box 995, Sandersville, GA 31082.

TURN YOUR COLOR COMPUTER ON TO THE POWER OF FLEX

NOW FROM THE WORLD'S LARGEST SUPPLIER OF SOFTWARE FOR THE FLEX OPERATING SYSTEM COMES FHL COLOR FLEX. JUST LOOK AT THESE FEATURES:

IF YOU ARE TIRED OF NO DISK SOFTWARE, THEN FHL COLOR FLEX IS THE ANSWER!

FLEX is the world's most popular operating system for the 6809 and with over 150 programs we are the largest supplier of serious software for FLEX. These programs range from word processors thru business applications to software development tools. Many Fortune 500 companies use our software. FHL Color FLEX turns your Color Computer into a powerful system more capable than systems costing several times as much.

*FLEX is a trademark of Technical Systems Consultants, Inc.

FLEX NOW ONLY ~~$99.00~~

- NEW "Ted" Tiny Editor
- NEW "ISM" Tiny Assembler
- NEW - Machine language monitor
- Hi-Res screen formats - 16 x 32, 24 x 51 upper and lower case, 24 x 64 and 32 x 64 upper case
- Advance disk I/O and terminal capabilities-supporting 35, 40 and 80T single or double sided, single or double density drives
- No additional hardware required

SPECIAL: FHL COLOR FLEX ONLY $69.95

FHL FRANK HOGG LABORATORY ✓262

THE REGENCY TOWER • SUITE 215
770 JAMES ST. • SYRACUSE, NY 13203
PHONE (315) 474-7856 • TELEX 646740

HEY! JOE COMPUTER INC.!
BEAT THESE DISK DRIVE PRICES!
(It's impossible — and you darn well know it!)

TEAC "Slimline" — *½ the width of a regular minifloppy disk drive*

	1 Drive with Power Supply & Cabinet	*2 Drives in One Cabinet*	*Bare Drive*
40 Track, Single Sided	**$219.95**	**$399.95**	**$179.95**
40 Track, Double Sided	**$249.95**	**$459.95**	**$209.95**
80 Track, Double Sided	**$299.95**	**$559.95**	**$259.95**

NOW...BEAT THIS WARRANTY

1 YEAR

Our minifloppy disk drives will work on TRS-80 Models 1, 3, and 4, the IBM Personal Computer and the Radio Shack Color Computer. All drives for the Model I and the 3rd & 4th drive for the Models 3 & 4 require a power supply & cabinet and drive cable ($29.95). The second drive for Models 3 & 4 is a bare drive. The first 2 drives for the IBM PC are bare drives; the 3rd and 4th drives require power supplies & cabinets. Color Computer disk drives require power supplies and cabinets. In addition, the 1st drive on a color computer requires a ROM pack & cable ($169.95). The second drive for a Model III requires a power cable ($10). If you have had your 1st drive on a Model 4 installed since you bought the Model 4, the second drive requires a power cable ($10).

Drive 0 Kit for the Model 3
$399
Complete with drive & complete installation instructions

TANDON Minifloppy Disk Drives

	Drive with Power Supply & Cabinet	*Bare Drive*
40 Track, Single Sided	**$239.95**	**$189.95**
40 Track, Double Sided	**$319.95**	**$269.95**
80 Track, Single Sided	**$329.95**	**$279.95**
80 Track, Double Sided	**$369.95**	**$319.95**

918/825-4844
AMERICAN COMPUTERS
SMALL BUSINESS
118 SO. MILL ST
PRYOR, OK 74361
(918) 825-4844

NEED INFO QUICK?
Then just call our automated TOLL FREE answering machines. Leave your name,address, and phone number. Requests will be mailed 1st Class the same day. **Only requests for product information will be processed. all others will be disregarded by our answering service.**

CALL **1-800-331-3896**
In Oklahoma, Call
1-918-825-4844

217

DATATP

by Jeff W. Collins

Here's an easier way to use tape data files via a hybrid Basic and Assembly listing.

Recently, while editing a tape file and rewriting the corrected version, it occurred to me that the information on the tape was locked into a restricted place. I could copy it to another tape or get a printed listing, but I couldn't use the tape data in a stand-alone program unless I rekeyed that data into data statements in the new program.

I found a solution to the problem by writing a hybrid program (a Basic program with an Assembly-language subroutine). Not being familiar with tape formats or floating-point numbers, my hybrid program lets the Level II interpreter do the hard work and simplifies my programming task.

In the Model I program, the Basic program provides the brains, while the Assembly language provides the hustle.

The Basic program itself (see Program Listing 1) is a driver program; it supplies information to the Assembly-language program (see Program Listing 2), telling it what to do and when to do it. Together, they provide the following capabilities:

- Transfer the contents of a tape data file to data-statement elements as quickly as it is read in, without the effort and errors of rekeying;
- Selectively copy any sequential group of resident data statements; and
- Reformat a selected group of data-statement elements into neat, readable columns.

You must learn how to make the adjustments to the Basic driver program to fit your needs.

The Key Box

Model I
16K RAM
Level II Basic, Assembly language Editor/Assembler

Because it's a Basic program modified by its Assembly-language subroutine, key in and CSAVE the Basic driver and assemble the source program to the top of your memory, and save the source and the object code on tape.

Answer the memory-size prompt with a number about the center of your free memory. For a 16K machine that's roughly 25000. Then load the Basic and object code.

After you enter the Run command, answer the line-number with any number higher than the highest line number now resident (for example, 400), then an increment of 1 when prompted further. Next you're prompted for the number of blocks to be read in. Line 190 reads the data statements; enter 4 to the prompt because there are four blocks in the program. Next you are asked if you wish to skip any blocks. Answering Y will allow you to specify the first and last blocks to convert. Pressing N or enter will convert all four.

All four data statements have been duplicated and reformatted. The reformatting was done by line 240, by the way the variables were print formatted onto the screen.

Rerun the program and use a higher line number than already resident as input to read eight blocks, then answer Y when prompted to skip any blocks. You now have twice as many data statements, so you can answer with a 2 for the first and a 5 for the last block to be duplicated. List the program again and see the result of the program's selective capability.

This is the kind of program that invites modification. You might want to print the number of the current block below and slow down the display with a timing delay loop.

I didn't include the delay in the example program because reading from tape produces delay as the tape is read in. To read in a data tape, edit line 190 from a Read to an INPUT#-1-type statement.

Type in the following line while in the command mode:

```
CLEAR500:FORI=1TO4:READA$,B,C$:
PRINT#-1,A$,B,C$:NEXTI
```

Now, delete all the resident data-statement lines; rewind the tape and set for play mode. Change line 190 to an INPUT#-1 statement with the same variable list, run the program again, and input the four blocks from the tape at a higher line number than the highest resident line. List the program and there is your tape data back into data statements.

The example Program Listing uses one loop to deal with the same variable format each time. This is not always the case, but adding minor additional statements will suit each situation.

The only essential elements of this driver program are:

- The USR(0), to signal the set-up of a protected memory pointer;
- The print line into the upper left corner, followed by a delimiter;
- The USR(line number), to pass the new incremented line number to the Assembly-language routine and get it to copy the screen line into protected memory; and
- The USR(–6), to signal that new data statements are now appended to the

THE PROGRAM STORE

Guarantee: We will ship your order for items in this ad within 48 working hours or you get a 20% rebate. (Books/non-released items excluded. Gift certificate issued. Offer expires October 10, 1983)

Newscript SALE

from Prosoft

Happiness is Newscript! This high quality word processor is for everything from simple letter to contracts. Its features include customized form letters, full screen editing, type-ahead, printahead and English language commands like HELP and WHOOPS. Now you can have right justified true proportional printing with Daisywheel style printers. Total printer control for 80 popular printers, menu driven selections, 277 page manual and tutorial.

20596 TRS80 M1 48K Disk $~~124.95~~
20608 TRS80 M3 48K Disk $~~124.95~~
20% OFF SALE
Now til October 10th $99.96

PERCOM DATA HARD DISK DRIVE JUST HOOK UP AND DRIVE AWAY

Having a reliable hard disk system is as easy as hooking up a cable! Percom Data PHD supports TRS-80 Models I and III and IV, DOSPLUS, LDOS and a variety of other systems. So, if you change your computer for a future system, you can still keep your most important investment. Your hard disk drive will pay off tomorrow through system compatibility. **ONLY AVAILABLE IN STORES.**

WINCHESTER 5¼" DRIVE TECHNOLOGY WORKS TO CAPACITY
MORE STORAGE
FASTER RETRIEVAL
MORE ACCURATE PROCESSING

COME INTO ANY OF OUR STORES
SEE THE PERCOM DATA DISK DRIVE
TRY A PERCOM DATA DISK DRIVE

23308 Percom Hard Disk 5 megabyte model $1990
27605 Percom Hard Disk 10 megabyte model $2300
35299 Percom Hard Disk 15 megabyte model $2800
18212 Percom Hard Disk 20 megabyte model $3300

COLOR DISKETTES

GET ONE COLOR DISKETTE FOR ONLY $1.00 WITH THIS COUPON AT ANY OF OUR PARTICIPATING STORES (coupon not redeemable through mail order)

The whole disk is colored — not just the envelope! It's so hard to describe, we want you to see it. Try these premium quality disks in 5 bright colors. Try a different color for each subject or person. Available in boxes of ten, all one color for $34.50.

#40262 Green #33242 Orange
#37460 Red #29865 Yellow $34.50
#33534 Blue
#18515 Assorted Colors $39.50

Name _____
Address _____
City _____ State _____ Zip _____
Type of Computer _____ 14

EDAS 4.0

by Roy Soltoff from Misosys

This preferred editor-assembler is becoming even more popular! Features include global editing, upper/lower case support, block moves, plus availability of DOS commands within EDAS. Designed with the programmer in mind!

33679 TRS80 M1 and M3 Disk $100.00

LC COMPILER

ONLY $50 MORE

from Misosys

For only an additional $50, you get the LC-Compiler! This is a great opportunity for you to learn this transportable language which has made many converts among assembly language programmers. LC provides a substantial subset of the C programming language with the assembler and cross-reference utilities supplied. Requires 2 drive, 48K, LDOS 5.1.

TRS80 M1 and M3 Disk $150

FASTER

from Prosoft

Faster analyzes a running BASIC program, then tells you how to make a simple change (usually one line) that can reduce the running time by 50%. No hardware changes! All programs, even games, run faster but large complex programs improve the most. A BASIC program optimized with Faster can still be modified and examined. Runs on any 16-48K Level II. If you value your time — you'll want FASTER.

20619 TRS80 M1 and M3 Tape $29.95
41128 TRS80 M1 and M3 Disk $29.95

LDOS 5.1 LDOS

from Logical Systems, Inc.

Choose the operating system Radio Shack adapted for the model 4! This advanced operating system offers benefits to everyone from novice to advanced programmers. LDOS comes with one of the most complete and well written documentation books ever, with easy to follow instructions to get started plus a wealth of knowledge when you need it. Completely device independent. LDOS provides for routing, linking, setting, and filtering of the input/output of a number of peripherals.

VISIT ANY OF OUR STORES TO SEE LDOS OPERATING WITH A PERCOM HARD DISK DRIVE

18920 LDOS TRS80 M1 Disk $~~129.00~~
18931 LDOS TRS80 M3 Disk $~~129.00~~
20% OFF SALE Now til October 10th $99.96

SUPER UTILITY PLUS

by Kim Watt from Powersoft

Voted #1 utility for TRS80 in 1982 by 80 Micro Reader's Choice Poll! If you have ever crashed a disk, you'll appreciate these 80 different functions for manipulating disk sectors, files and memory; formatting and back up; repairing and more! Comes with a Master and Backup and a completely revised manual in a rich three ring binder. Works in single or double density on DOSPLUS, MULTIDOS, DBLDOS, NEWDOS and NEWDOS/80 v.2.

TRS80 M1 and M3 Disk $79.95

THE C PROGRAMMING LANGUAGE

Brian W. Kerrighan and Dennis M. Ritchie from Prentice-Hall

This is the first available text on the rapidly-developing C programming language. It offers a detailed yet understandable explanation of all aspects of the C language. Incorporating examples that are complete programs the text not only teaches the language but demonstrates useful algorithms, data structures, and programming techniques.

Softcover book $17.95

Over 2500 Programs for TRS-80, ATARI 400/800, APPLE, IBM, VIC 20 & C64

VISIT OUR STORES

Tenley Mall, 4200 Wisconsin Ave., NW, Washington, DC
Harvard Square, 13 Dunster St., Cambridge, MA
W. Bell Plaza, 6600 Security Blvd., Baltimore, MD
White Flint Mall, Rockville Pike, Rockville, MD
Cherry Hill Mall, Rt 38 & Haddonfield Rd, Cherry Hill, NJ
Monmouth Mall, Rt 35 & Wyckoff Rd, Eatontown, NJ
Willowbrook Mall, 1400 Willowbrook Mall, Wayne, NJ
Nanuet Mall, Rt 59 & Middletown Rd, Nanuet, NY
Olentangy Plaza, 829 Bethel Rd, Columbus, OH
Westmoreland Mall, Rt 30 East, Greensburg, PA
Montgomery Mall, 230 Montgomery Mall, North Wales, PA
Plymouth Meeting Mall, 500 Germantown Pike, Plymouth Meeting, PA
Century III Mall, SR 51 & SR 885, West Mifflin Borough, PA
Seven Corners Center, Falls Church, VA

COMING SOON IN

CHICAGO ST. PETERSBURG
DENVER TAMPA
OKLAHOMA CITY TULSA

FRANCHISE OPENINGS IN SELECTED CITIES

To Order Call Toll Free 800-424-2738
For Information Call (703) 556-9778

Mailorders: List computer, item, item #, qty, tape/disk, rom, book, price, shipping, tax & total. Send check or M.O. for total purchase plus $2.00 shipping and handling. VA add 4% sales tax. Charge cards — include all embossed information. List name, address, city, state, zip & phone.

THE PROGRAM STORE®

© 1983 THE PROGRAM STORE

THE PROGRAM STORE Dept 14-10-3 Box 9582 4200 Wisconsin Avenue, NW Washington, D.C. 20016

80

WHAT THE HECK! IS THIS MANUAL TRYING TO SAY?

Profile III Plus© - 108 insert pages for your manual with plain English explanations and examples including two 16x22 wall charts showing where program goes and why $14.00

General Ledger - Insert pages for the TRS-80© Mod III Disk Manual clarifying the obscure. Section on HOW accounts interact and produce statements. 19x25 two-color wall chart shows Flow, Commands, Tips $14.00

Super SCRIPSIT© - 19x25 two-color wall chart shows commands with explanations and tips in highly visible form $4.00

VisiCalc© - 19x25 two-color wall chart shows All THOSE commands with clear explanations at a glance $4.00

© - Copyrights of Tandy or VisiCorp

Send cash, check, money order to:
CREST SOFTWARE ~223
2132 Crestview Drive • Durango, CO 81301
(303) 247-9518
Visa, MC accepted, include card # and expiration date
(Add $2.00 Shipping — We use UPS)

"Your Complete Computer Headquarters"
Friendly, Personal Service -
"West Texas Style"
"You don't talk to an order taker here"

TRS-80 Computers

We Carry The Entire TRS-80 Line Of Computers, Printers, Software and Accessories.

Special While They Last:
Epson MX-80's at $401**

For Your BEST INVESTMENT Value, Call Us At

1-800-351-1580

(Texas Residents Call Collect)
915-283-2920

Similar savings on other merchandise. ~169

Van Horn Office Supply
701 W. Broadway
P.O. Box 1060
Van Horn, Texas 79855
"Authorized Dealer Since 1976"

resident Basic program.

If you ever get a Basic Full message while using the program there is no room available to hold any significant number of additional data statements. This is the time to save the data-statement lines to tape for later merging or editing. After you delete the resident data statements to regain memory space, you can rerun the program to continue from the point the program stopped adding lines.

```
10 ' DRIVER PROGRAM TO READ A DATA TAPE INTO DATA STATEMENTS
20 ' ALSO USED TO COPY OR REFORMAT EXISTING DATA STATEMENTS
30 '  ** STRING SPACE REQUIRED BY STRING VARIABLES **
40 CLEAR 500
50 CLS:PRINTTAB(12)"DATA STATEMENTS FROM TAPE FILE PROGRAM"
60 PRINT:INPUT"BEGIN NEW DATA STATEMENTS AT LINE ";LNUMBER
70 PRINT:INPUT"INCREMENT FOR LINE NUMBERS ";NCRMENT
80 PRINT:INPUT"NUMBER OF DATA BLOCKS TO READ OR INPUT FROM TAPE
";BLOKS
90 ' ** SET UP USR( ) VECTOR, IN THIS CASE FOR 7EFBH **
100 POKE 16526,251:POKE16527,126
110 INPUT"ANY BLOCKS TO SKIP OVER (Y/N)";A$:IF A$="Y" THEN INPUT
"FIRST BLOCK NUMBER TO CONVERT";FIRST:INPUT"LAST BLOCK NUMBER TO
 CONVERT";LAST:ELSE LAST=BLOKS
120 ' ** TELL A/L PROGRAM TO SET UP PROTECTED MEMORY POINTER **
130 X=USR(0)
140 ' ** NUMBER OF TAPE (OR OTHER) BLOCKS OF DATA **
150 FOR I=1 TO BLOKS
160 ' ** TEST BELOW IF INPUT OR 'READ' TO BE STOPPED **
170 IF LAST < I THEN 310
180 ' ** READ INTO VARIABLES, NOT ARRAYS **
190 READA$,B,C$
200 ' ** TEST BELOW IF ANY ITEMS TO BE SKIPPED **
210 IF FIRST > I THEN 290
220 ' ** PUT SCREEN DATA WHERE A/L PROGRAM WILL LOOK ****
230 ' ** CURSOR DELIMITOR AT END **
240 CLS:PRINT@0," ";A$;",";B;",";C$;CHR$(95)
250 ' ** PASS NEW BASIC LINE NUMBER TO A/L PROGRAM ****
260 X=USR(LN)
270 ' ** ADD LINE # INCREMENT TO LINE NUMBER ****
280 LN=LN+NCRMENT
290 NEXT I
300 ' ** TELL A/L PROGRAM TO FINISH APPENDING ****
310 X=USR(-6)
320 DATA 1ST STRING A$,1981,80-MICROCOMPUTING
330 DATA 2ND STRING A$,1776,2ND STRING B$
340 DATA THIRD,333,3RD STRING
350 DATA FOURTH,1981,4TH STRING
```

Program Listing 1. The Basic program.

Program Listing 2. The Assembly-language program.

```
                00100 ;NAME: DATATP, APPENDS DATA STATEMENTS FROM DATA TAPE.
                00110 ;BASIC DRIVER PROGRAM DIRECTS THE A/L PROGRAM. SEE TEXT.
40F9            00120 TAILPT  EQU     40F9H    ;END OF BASIC PROGRAM ADDR.
40B1            00130 MEMSIZ  EQU     40B1H    ;MEM SIZE AS SET BY YOU
7EFB            00140         ORG     7EFBH    ;FOR 16K. CHANGE FOR OTHER MEMORY
7EFB FDE5       00150 WHICH1  PUSH    IY       ;SAVE FOR BASIC'S USE
7EFD D9         00160         EXX              ;EXCHANGE REGS.
7EFE CD7F0A     00170         CALL    0A7FH    ;GET USR( ) ARGUMENT INTO HL
7F01 7D         00180         LD      A,L      ;LSB OF ARGUMENT
7F02 B4         00190         OR      H        ;MSB OF ARGUMENT
7F03 2878       00200         JR      Z,GETPTR         ;IF IT IS 0, GET STARTED
7F05 E5         00210         PUSH    HL       ;SAVE LINE #
7F06 11FAFF     00220         LD      DE,65530         ;HIGHEST POSSIBLE LN #+1
7F09 AF         00230         XOR     A
7F0A ED52       00240         SBC     HL,DE    ;COMPARE THEM
7F0C E1         00250         POP     HL       ;RESTORE LINE #
7F0D CA937F     00260         JP      Z,EOJ    ;SIGNAL FROM BASIC TO STOP
7F10 D2937F     00270         JP      NC,EOJ   ;LINE # => 65530 IS TOO HIGH
7F13 FD2AE77F   00280 DOALIN  LD      IY,(NXTPTR)      ;A VALID BASIC LINE #
7F17 FDE5       00290         PUSH    IY       ;PT TO NEXT LINE PTR ADDR.
7F19 D1         00300         POP     DE       ;STARTS AT LSB OF NEXT LN PTR.
7F1A 13         00310         INC     DE       ;PT TO MSB OF NXT LN PTR.
7F1B 13         00320         INC     DE       ;PT TO LSB OF BASIC LN # ADDR.
7F1C 7D         00330         LD      A,L      ;GET LSB OF BASIC LN #
7F1D 12         00340         LD      (DE),A   ;STORE LSB OF LN #
7F1E 13         00350         INC     DE       ;PT TO MSB OF LN # ADDR.
7F1F 7C         00360         LD      A,H      ;GET MSB OF LN #
7F20 12         00370         LD      (DE),A   ;STORE LSB OF LN #
7F21 13         00380         INC     DE       ;PT TO LINE'S FIRST TEXT BYTE
7F22 3E88       00390         LD      A,136    ;PUT 'DATA' TOKEN VALUE IN REG A
7F24 12         00400         LD      (DE),A   ;IT'S NOW A BASIC 'DATA' LINE
7F25 13         00410         INC     DE       ;PT TO NEXT TEXT BYTE ADDRESS
7F26 21003C     00420         LD      HL,3C00H         ;PT TO ULHC OF VIDEO
7F29 7E         00430 GETCHR  LD      A,(HL)   ;GET CHARACTER FROM VIDEO
7F2A FE5F       00440         CP      95       ;CURSOR DELIMITER AT STRING END
7F2C 2805       00450         JR      Z,LINDUN         ;END OF VIDEO LINE FOUND?
7F2E 12         00460         LD      (DE),A   ;NO, MORE ON VIDEO TO DO
7F2F 13         00470         INC     DE       ;PT TO NEXT LINE BYTE
```

Listing 2 continued

A Buffer Full message means that its buffer is full until it is dumped into the Basic data statement lines. Once dumped, the buffer is ready for more, and the driver can be rerun until you get the Basic Full message.

The reason for having two different messages is that the Assembly-language program uses the memory-size answer you gave before loading the programs to create two memory work areas. The first area is for the Basic program and space for appending new data statements. The second area contains the buffer (ending 260 bytes lower than the start address of the assembled object code) to temporarily hold the new statements and the Assembly-language program itself—thus the reason for answering the memory-size prompt in the middle area of free memory.

For reading long tape files, if the Basic area is smaller than the buffer area, you'll have to dump the Basic area more often. Conversely, if the buffer area is smaller, you have to rerun the driver program several times before the Basic area is filled. The messages indicate that the buffer's memory was kept from crashing into the Basic memory because of the size difference between them.

If you use the same driver program often, without remark statements, it might be worthwhile to find a more exact memory size to use each time. That way either message lets you know that it's definitely time to dump the Basic contents and you won't have to rerun the driver to fill up the Basic area memory.

There are three things to keep in mind when using this program:

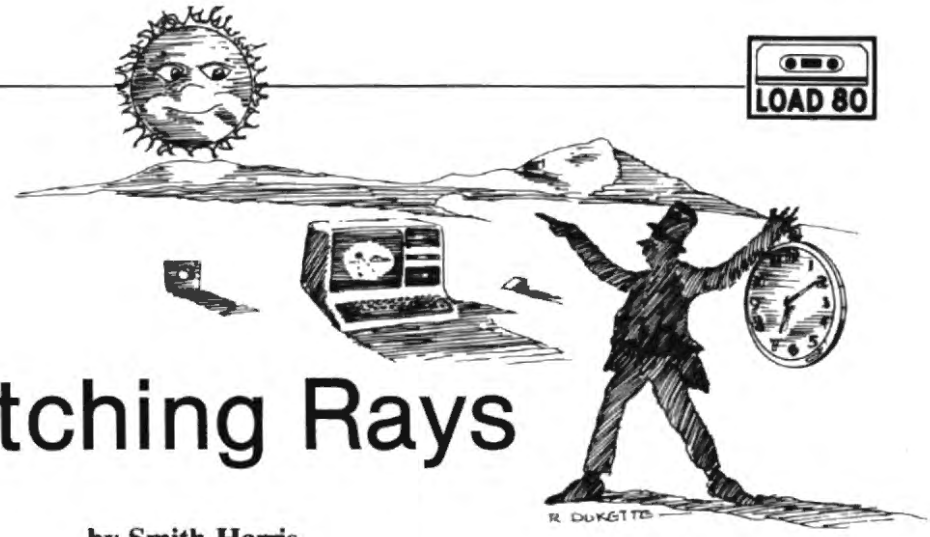
- Answer the memory-size prompt to the center of free memory;
- Load the object code and Basic driver, executing the driver with Run; and
- Make certain that when you create new lines they are numbered higher than the highest resident line number.

Now that I know I can easily use tape data files, I intend to make extensive use of them for program development as well as storage. For example, you don't need to insert the Data token in each line for the rest of the Assembly-language algorithm to function. Rather complex logical tests can be performed of literals, variables, and operator input within a Basic program to create actual program lines. ■

Jeff W. Collins can be reached at 6025 Hampstead Drive West, Columbus, OH 43229.

Listing 2 continued

```
7F30 23        00480          INC     HL      ;PT TO NEXT VIDEO CHAR.
7F31 18F6      00490          JR      GETCHR  ;GET ANOTHER VIDEO CHAR.
7F33 AF        00500 LINDUN   XOR     A       ;END OF LINE Ø MARKER INTO A
7F34 12        00510          LD      (DE),A  ;BASIC LINE COMPLETED
7F35 13        00520          INC     DE      ;PT TO LSB OF NXT LN PTR ADDR.
7F36 3E01      00530          LD      A,1
7F38 FD7700    00540          LD      (IY+Ø),A        ;SAVE LSB DUMMY
7F3B FD7701    00550          LD      (IY+1),A        ;SAVE MSB DUMMY
7F3E ED53E77F  00560          LD      (NXTPTR),DE     ;SAVE NXT LN PTR ADDR.
7F42 21FB7E    00570          LD      HL,WHICH1       ;ADDR OF PROGRAM START
7F45 010501    00580          LD      BC,261  ;261 BYTES FROM START SOUGHT
7F48 ED42      00590          SBC     HL,BC   ;START MINUS 261
7F4A B7        00600          OR      A       ;CLEAR CARRY FLAG
7F4B ED52      00610          SBC     HL,DE   ;START ADDR OF PROTECTED BUFFER MINU
S ADDR. OF NEXT BYTE FOR NEW DATA STATEMENT.
7F4D FA817F    00620          JP      M,BUFFUL        ;WRAP UP IF BUFFER FULL
7F50 D5        00630          PUSH    DE      ;PTR TO NEXT BUFFER BYTE
7F51 E1        00640          POP     HL      ;INTO HL
7F52 ED5BB140  00650          LD      DE,(MEMSIZ)     ;ADDR. HELD BY BASIC
7F56 13        00660          INC     DE      ;PLUS 2 = ACTUAL PROTECTED ADDR.
7F57 13        00670          INC     DE      ;PTR TO START OF BUFFER
7F58 ED52      00680          SBC     HL,DE   ;DIFFERENCE BETWEEN THEM
7F5A 23        00690          INC     HL      ;# OF BYTES OF BUFFER USED
7F5B E5        00700          PUSH    HL      ;SAVE TO STACK
7F5C CDC927    00710          CALL    27C9H   ;GET AMT. OF FREE MEMORY
7F5F CD7F0A    00720          CALL    ØA7FH   ;CONVERT TO INTEGER, INTO 4121H
7F62 2A2141    00730          LD      HL,(4121H)      ;# FREE BYTES FOR BASIC
7F65 D1        00740          POP     DE      ;RESTORE # OF BUFFER BYTES USED
7F66 010002    00750          LD      BC,512  ;MARGIN BEFORE ALLOWING MORE
7F69 ED42      00760          SBC     HL,BC   ;AMT FREE - AMT FOR MORE
7F6B B7        00770          OR      A       ;CLEAR CARRY
7F6C ED52      00780          SBC     HL,DE   ;MINUS AMT ALREADY USED IN BUFFER
7F6E FA867F    00790          JP      M,BASFUL        ;BASIC AREA FULL. STOP.
7F71 D9        00800          EXX             ;EXCHANGE REGS.
7F72 FDE1      00810          POP     IY      ;RESTORE FOR BASIC
7F74 C9        00820          RET             ;RETURN TO BASIC CALLING PROGRAM
7F75 2AB140    00830 GETPTR   LD      HL,(MEMSIZ)     ;START OF NEW LINES
7F78 23        00840          INC     HL      ;ADJUST
7F79 23        00850          INC     HL      ;PTS TO PROTECTED MEMORY
7F7A 22E77F    00860          LD      (NXTPTR),HL     ;FIRST NEW NXT LN PTR.
7F7D D9        00870          EXX             ;EXCHANGE REGS.
7F7E FDE1      00880          POP     IY      ;RESTORE FOR BASIC
7F80 C9        00890          RET             ;BACK TO BASIC CALLING PROGRAM
7F81 21E97F    00900 BUFFUL   LD      HL,BUFMSG       ;BUFFER MESSAGE ADDR.
7F84 1805      00910          JR      MESSAG          ;GO OUTPUT MESSAGE
7F86 21F57F    00920 BASFUL   LD      HL,BASMSG       ;BASIC MESSAGE ADDR.
7F89 1800      00930          JR      MESSAG          ;GO OUTPUT MESSAGE
7F8B E5        00940 MESSAG   PUSH    HL              ;SAVE MESSAGE PTR.
7F8C CDC901    00950          CALL    1C9H            ;CLEAR SCREEN SUBR.
7F8F E1        00960          POP     HL              ;RESTORE MESSAGE PTR.
7F90 CDA728    00970          CALL    28A7H           ;OUTPUT MESSAGE
7F93 2AE77F    00980 EOJ      LD      HL,(NXTPTR)     ;LAST NXT LN PTR.
7F96 AF        00990          XOR     A       ;ZERO INTO REG A
7F97 77        01000          LD      (HL),A  ;ZERO INTO LSB OF LAST NXT LN PTR
7F98 23        01010          INC     HL      ;PT TO MSB
7F99 77        01020          LD      (HL),A  ;ZERO INTO MSB (END OF PROGRAM)
7F9A ED5BB140  01030          LD      DE,(MEMSIZ)     ;WHERE NEW LINES BEGIN
7F9E 13        01040          INC     DE      ;ADJUST
7F9F 13        01050          INC     DE      ;PT TO PROTECTED MEMORY
7FA0 AF        01060          XOR     A       ;CLEAR CARRY
7FA1 ED52      01070          SBC     HL,DE   ;LAST MINUS FIRST ADDR OF BLOCK
7FA3 23        01080          INC     HL      ;# OF BYTES TO MOVE
7FA4 E5        01090          PUSH    HL      ;TO STACK
7FA5 C1        01100          POP     BC      ;# BYTES FOR BLOCK MOVE
7FA6 ED5BF940  01110          LD      DE,(TAILPT)     ;BASIC'S TAIL PTR ADDR.
7FAA 1B        01120          DEC     DE
7FAB 1B        01130          DEC     DE      ;NEW (APPENDED) NXT LN PTR ADDR.
7FAC D5        01140          PUSH    DE      ;SAVE NXT LN PTR ADDR.
7FAD 2AB140    01150          LD      HL,(MEMSIZ)     ;START POINT OF NEW LINES
7FB0 23        01160          INC     HL      ;ADJUST
7FB1 23        01170          INC     HL      ;PT TO PROTECTED MEMORY
7FB2 EDB0      01180          LDIR            ;BLOCK MOVE TO END OF OLD PROGRAM
7FB4 ED53F940  01190          LD      (TAILPT),DE     ;END OF BLOCK +1
7FB8 E1        01200          POP     HL      ;OLD TAIL PTR ADDR. -2
7FB9 E5        01210          PUSH    HL      ;ONTO STACK
7FBA FDE1      01220          POP     IY      ;THEN INTO IY ALSO (NEW LN PTR)
7FBC 010400    01230 NEXT1    LD      BC,4    ;# OF BYTES TO ADD TO HL
7FBF 09        01240          ADD     HL,BC   ;PT TO LINE'S FIRST TEXT BYTE
7FC0 7E        01250 AGAIN    LD      A,(HL)  ;LOOK AT LINE BYTE
7FC1 FE00      01260          CP      Ø       ;IS IT END OF LINE ZERO YET?
7FC3 23        01270          INC     HL      ;PT TO NEXT BYTE REGARDLESS
7FC4 20FA      01280          JR      NZ,AGAIN        ;NOT END OF LINE YET
7FC6 7E        01290          LD      A,(HL)  ;END OF LINE FOUND. LOOK AT NEXT.
7FC7 FE00      01300          CP      Ø       ;CHECK LSB OF NXT LN PTR CONTENTS
7FC9 2005      01310          JR      NZ,LOADPT       ;NOT A ZERO?
7FCB 23        01320          INC     HL      ;FIRST WAS ZERO. PT TO MSB.
7FCC 7E        01330          LD      A,(HL)  ;LOOK AT MSB CONTENTS
7FCD FE00      01340          CP      Ø       ;ALSO A ZERO?
7FCF 2B        01350          DEC     HL      ;PT BACK TO LSB
7FD0 FD7500    01360 LOADPT   LD      (IY+Ø),L        ;LSB OF LAST NXT LN PTR.
7FD3 FD7401    01370          LD      (IY+1),H        ;MSB OF SAME
7FD6 2805      01380          JR      Z,ENDPRG        ;MSB WAS ALSO A ZERO
7FD8 E5        01390          PUSH    HL      ;NEW NXT LN PTR ADDR.
7FD9 FDE1      01400          POP     IY      ;CHANGE NXT LN PTR (PREVIOUS)
7FDB 18DF      01410          JR      NEXT1   ;ANOTHER LINE TO DO
7FDD D9        01420 ENDPRG   EXX             ;RESTORE REGS.
7FDE FDE1      01430          POP     IY      ;RESTORE FOR BASIC
7FE0 F1        01440          POP     AF      ;WON'T RETURN TO CALLING PROGRAM
7FE1 CD491B    01450          CALL    1B49H   ;RESET BASIC'S POINTERS
7FE4 C3CC06    01460          JP      06CCH   ;BACK TO 'READY' PROMPT
7FE7 0000      01470 NXTPTR   DEFW    Ø
7FE9 42        01480 BUFMSG   DEFM    'BUFFER FULL'
7FF4 00        01490          DEFB    Ø
7FF5 42        01500 BASMSG   DEFM    'BASIC FULL'
7FFF 00        01510          DEFB    Ø
06CC           01520          END     06CCH   ;ENTER FROM BASIC DRIVER ONLY
```



Catching Rays

by Smith Harris

Ever tried to find the exact position of the sun? It's no easy task, but this program calculates the sun's altitude and azimuth for you.

At some time or other, almost everyone needs to know where the sun is or where it will be at a particular day or hour, whether you're a gardener laying out your plot or an architect designing a solar home. I wrote a Model I/III program called Sunfinder that determines the altitude and azimuth (compass direction) of the sun at any time in any locale.

Sunfinder is divided into two subprograms, which I call Where's the Sun and Sunrise-Sunset (see Program Listing). Where's the Sun computes the altitude and azimuth of the sun for any hour, series of hours, or fractional parts of an hour, and for any day or series of days. For example, Sunfinder determines the sun's location at 8 a.m. on February 14 in Washington, DC, between 9 a.m. and 6 p.m. every 10 minutes on May 22 in Dallas, and at 5:30 p.m. every day from July through September in Madrid.

Sunrise-Sunset gives the time of sunrise and sunset with the sun's corresponding azimuths as well as the azimuth and altitude of the sun at noon for any day or series of days with any desired increment of days. It provides this information for any day of the year, for the whole year, for every seventh day of the month of August, or for whatever day you desire, wherever you are.

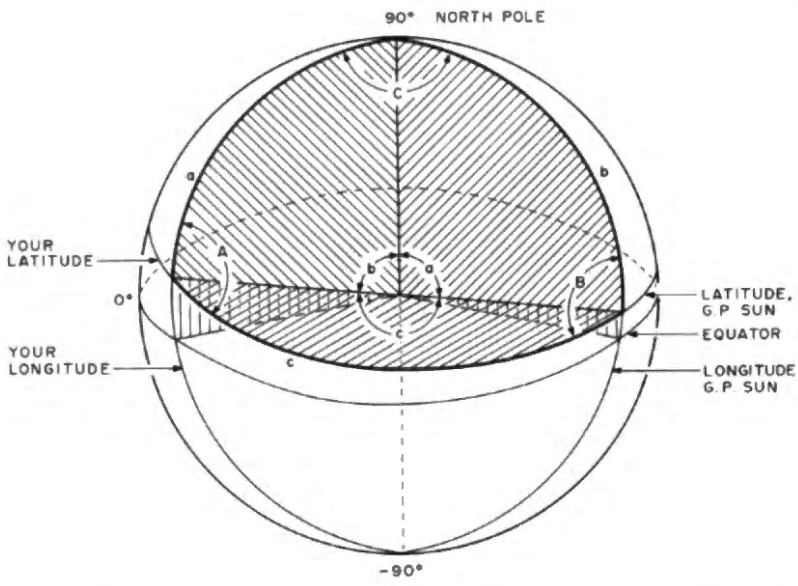


Figure 1. The Earth is shown in cutaway to illustrate the spherical triangle described in the text. While the figure illustrates the conditions at sunrise, it also applies to all morning hours, as angle C decreases by 15 degrees per hour until it is zero at noon. The figure's perspective is distorted for clarity.

Program Development

I developed Sunfinder from scratch since I know little about astronomy. Among the books helpful to me were *The Beginner's Guide to the Stars* by C.H. Cleminshaw and *The Astronomical Almanac* prepared by the U.S. Naval Observatory. Cleminshaw's book clearly describes the apparent daily path of the sun and the equation of time, while the *Astronomical Almanac* con-

The Key Box

Models I and III
16K RAM
Disk Basic
Printer

tains many valuable equations.

My approach to determining the sun's position does not use the astronomer's complex formulas, however. Instead, I developed my own method and approached the problem as essentially one in navigation, using the concept of "G.P. sun," a term frequently used by navigators that means the geographical position of the sun; that is, that spot on the Earth's surface where the sun is directly overhead or at its zenith.

This notion brings the sun down to Earth, so to speak, so that finding the altitude and azimuth of the sun becomes a problem in spherical trigonometry, the apexes of the triangle being your location, the North Pole, and G.P. sun. What I had to do was find an equation for G.P. sun as a function of the day of the year and write a computer program to solve the equations. (I have numbered the equations used here for easy reference.)

I was not concerned about calculating the longitude of G.P. sun since this is a function of time; the Earth revolves at a constant rate of 15 degrees per hour. What I needed to know was the latitude of G.P. sun, called the declination of the sun. Since the Earth is tilted at an angle of 23.45 degrees with respect to the ecliptic (the plane containing the sun and the Earth's orbit), the point on the Earth's surface where the sun is directly overhead, or G.P. sun, varies as the Earth orbits the sun.

The sun appears directly over the equator at the vernal and autumnal equinoxes (the first days of spring and autumn, respectively), over the Tropic of Cancer at the summer solstice (the first day of summer), and over the Tropic of Capricorn at the winter solstice (the first day of winter). In between these points G.P. sun follows a nearly sinusoidal path, which is easily computed from equations in *The Astronomical Almanac* and in lines 1500–1540 of the program.

Calculating Sunrise and Sunset

Knowing the latitude of G.P. sun for any day of the year, you can solve the spherical triangle. First determine the times of sunrise and sunset and the respective azimuths of the sun using the Sunrise-Sunset part of the program. This part is less complicated than the first, Where's the Sun, and provides a good introduction to the method of solution.

Figure 1 is a sketch of the Earth, showing the conditions at sunrise with the spherical triangle superimposed on it. You are at the apex of angle A, the North Pole is at the apex of angle C, and G.P. sun is at the apex of angle B. The sides of the triangle opposite each angle are designated with the corresponding lowercase letters.

Spherical triangles possess some unusual properties compared to conventional plane triangles. Two properties of interest are that the sides are segments of great circles and are measured in degrees, rather than length, by "face" angles taken in respect to the center of the Earth. These face angles are shown in Fig. 1.

You must solve the triangle for angle A, the azimuth of the rising sun, and for angle C, the difference in longitude between your location and the location of G.P. sun. Angle B is of no interest.

You can solve any spherical triangle if any three elements are known, such as two sides and an angle, three angles, or, in this case, the three sides a, b, and c. Side b is 90 degrees minus your latitude and side c is 90 degrees minus the latitude of G.P. sun. Side c, as measured by face angle C, is the angle be-

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

MAKE YOUR BUY/SELL DECISIONS ON LIVE DATA

- UPDATE PORTFOLIO VALUES IN SECONDS
- BE IN ON MARKET TRENDS WHILE THEY ARE HAPPENING
- GET ALL THE INFORMATION YOU NEED TO MAKE INFORMED AND TIMELY DECISIONS

The Software package that automatically loads data from Dow Jones News Retrieval® into your VisiCalc® with 100% accuracy. No need to manually enter data. Allows you to make Investment decisions with all the information in hand. Get current data as fast as your broker. Detailed financial data and historical data as you need it.

802-229-0368 FOR FASTEST CREDIT CARD ORDERING

FROM: SOLUTIONS
1193 STATE STREET BOX 989
MONTPELIER, VT 05602

802-229-0368
TCM 176 on SOURCE
70035,1377 on COMPUSERVE

NAME _____
COMPANY _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____
PHONE (_____) _____

PLEASE CIRCLE YOUR MACHINE MAKE AND MODEL.
I have: IBM™-PC; TRS-80® II/12/16, III; Apple® II+, IIE, or III

☐ SEND _____ COPIES VIS\BRIDGE/DJ™ So I can use the power of my VisiCalc on Wall Street information from Dow Jones. Comes with complete terminal package. @ $295.00 each postage paid ORDER TOTAL _____

PAYMENT METHOD: CHECK___ MASTERCARD___ VISA___
#_____
EXPIR. DATE_____ SIGNATURE _____

☐ SEND MORE INFORMATION ON: VIS\BRIDGE/DJ, VIS\BRIDGE/REPORT, SORT, AND GENERAL LEDGER.
Ask about multi-copy Corporate or Institution discounts.

325

VIS\Bridge/DJ™ is a trademark of Solutions Inc. VisiCalc® is a trademark of VisiCorp. TRS-80® is a trademark of Tandy Corp. IBM™ PC is a trademark of IBM Corp. Apple® is a trademark of Apple Computers. The Dow Jones News Retrieval® is a trademark of Dow Jones & Co. Inc.

tween your zenith and G.P. sun. At sunrise or sunset the angle is 90 degrees.

The solution is straightforward. The equations you need are shown in Table 1, which also gives the solution when sides a and b and angle C are known, as is the case for Where's the Sun.

You can now write the equations for sunrise. They are

(1) Azimuth, sunrise = A
(2) Time of sunrise = 1200 − C/15

Suppose C turns out to be 75 degrees. The sun is 75/15 or 5 hours east of us at sunrise and the time of sunrise is 1200 − 0500 or 0700 hours. The equations for sunset are:

(3) Azimuth, sunset = 360 − A
(4) Time of sunset = 1200 + C/15

Sunset takes place at 1700 hours.

You must make one correction to these calculations. The sun is not a point source of light, but rather a disk with an apparent diameter of 32 seconds of an arc. Furthermore, its rays are refracted by the atmosphere by about 18 seconds of an arc, producing a total effect of 50 seconds of an arc or 5/6 degree. Since the Earth requires four minutes to turn one degree, sunrise occurs 3 1/3 minutes earlier than we would expect and sunset 3 1/3 minutes later. Including this correction, rounded off to the nearest minute, you have:

(2a) Time of sunrise = 1200 − C/15 − 0003
(4a) Time of sunset = 1200 + C/15 + 0003

The correct time of sunrise in the example is 0657 and the correct time of sunset is 1703 hours.

You still need to find two values: the azimuth and the altitude of the sun at noon. The sun is due south at noon so its azimuth is 180 degrees. The altitude of the sun is found from the latitude of G.P. sun and from your latitude. It is:

(5) Altitude at noon = 90 degrees − your latitude + latitude GP sun

Sunrise and Sunset Corrections

Everything explained that pertains to sunrise and sunset would be correct if we kept time by the sun, but we don't—we use clocks. You need to make two major corrections.

The first is for how far east or west you are from the standard meridian of your time zone. The world is divided into time zones of one hour referenced to standard meridians located every 15 degrees starting in Greenwich, England. The actual boundaries of the zones are nominally 7.5 degrees on either side of the standard meridians, but are modified by political and geographical considerations.

In the continental United States the standard meridians are 75, 90, 105, and 120 degrees for the Eastern, Central, Mountain, and Pacific time zones, respectively. You must add the appropriate correction for how far east or west you are of the standard meridian, which I call the meridian correction or MC.

The second correction is for the equation of time. The equation of time is the difference between apparent solar time, the time kept by a sundial, and civil or clock time. The sun is a poor timekeeper due to the Earth's elliptical orbit and to the inclination of the Earth's axis. It is over 14 minutes slow around February 10 and over 16 minutes fast around November 3. It is correct only four times a year—on or about April 15, June 14, August 31, and December 25. A figure illustrating the equation of time and its components is given in *The Amateur's Guide to the Stars*. Fortunately, you can represent the equation of time with Fourier expansions. The

```
WHAT IS YOUR LATITUDE (XX.X DEGREES, - IF S)? 32.8
WHAT IS YOUR LONGITUDE (XX.X DEGREES, - IF E)? 83.7
WHAT IS YOUR STANDARD MERIDIAN? 75
WHAT IS YOUR MAGNETIC DEVIATION (XX.X DEGREES, - IF E)? 1
IS THIS A LEAP YEAR (Y/N)? N
WHAT PROGRAM DO YOU WANT TO RUN?
1=WHERE'S THE SUN
2=SUNRISE-SUNSET
3=QUIT
NOTE:  YOU CAN INTERRUPT ANY PRINTOUT BY
HOLDING DOWN THE SPACE BAR FOR A MOMENT.
? 2
FIRST DATE (NO. OF MONTH, DAY)? 3,21
LAST DATE (NO. OF MONTH, DAY)? 3,26
INCREMENT IN DAYS? (If increment is 1, either enter '1' or just
'enter'.).
 DATE            SUNRISE (ST)     SUNSET (ST)      ALTITUDE&AZ
                 AND AZIMUTH      AND AZIMUTH      OF NOON SUN
                  (DEGREES)        (DEGREES)        (DEGREES)
MAR 21           6.38 @ 91       18.46 @ 270       56 @ 170
MAR 22           6.37 @ 90       18.47 @ 271       56 @ 171
MAR 23           6.36 @ 90       18.47 @ 271       57 @ 171
MAR 24           6.35 @ 89       18.48 @ 272       57 @ 171
MAR 25           6.33 @ 89       18.49 @ 272       57 @ 171
MAR 26           6.32 @ 89       18.49 @ 272       58 @ 171
WHAT PROGRAM DO YOU WANT TO RUN?
1=WHERE'S THE SUN
2=SUNRISE-SUNSET
3=QUIT
NOTE:  YOU CAN INTERRUPT ANY PRINTOUT BY
HOLDING DOWN THE SPACE BAR FOR A MOMENT.
? 1
FIRST DATE (NO. OF MONTH, DAY)? 3,21
LAST DATE (NO. OF MONTH, DAY)? (If ending date is same as start-
ing date enter same day or just 'enter'.)
FIRST HOUR (0-24)? 6
LAST HOUR (0-24)? 19
INCREMENT IN HOURS AND/OR DECIMAL PARTS OF AN HOUR? (If the in-
crement is 1 either enter '1' or just 'enter'.).
 DATE            HOUR (ST)        AZIMUTH (DEG)    ALTITUDE (DEG)
MAR 21            6.00             85               -9
                  7.00             93                4
                  8.00             102              16
                  9.00             111              28
                 10.00             123              40
                 11.00             139              49
                 12.00             170              56
                 13.00             189              57
                 14.00             214              53
                 15.00             233              44
                 16.00             246              33
                 17.00             257              21
                 18.00             265               9
                 19.00             274              -4
WHAT PROGRAM DO YOU WANT TO RUN?
1=WHERE'S THE SUN
2=SUNRISE-SUNSET
3=QUIT
NOTE:  YOU CAN INTERRUPT ANY PRINTOUT BY
HOLDING DOWN THE SPACE BAR FOR A MOMENT.
? 3
READY
>.
```

Figure 2. Sample output.

Subscribe to 80 Micro for one year and get our 1983 Special Anniversary Issue absolutely FREE!

You'll receive 12 months of **80 Micro**, the magazine packed with programs and projects for Radio Shack's personal, business, and portable computers. **80 Micro** gives you:

- user-application programs—written by readers like you who need programs to maximize the productivity of their machines.
- new-product reviews—information you need to make the right buying decisions.
- debugging techniques—**80 Micro** saves time with expert solutions to common and irregular problems.
- hardware modifications—upgrade your computer and become more familiar with its functions while you save money and increase its value.

Subscribe today.

And don't forget, with your subscription, **80 Micro** gives you a free, 1983 Anniversary Issue. This bonus thirteenth issue, published in January of 1983, is loaded with over 70 new articles on games, tutorials, utilities, programming techniques, plus Bill Barden's Assembly-Language Primer, 3-D Stereoscopic programs, a complete **80 Micro** annotated index, and more.

Yes! Send me a year's subscription to **80 Micro** at $35.97.

I understand that upon receipt of payment, I will receive **80 Micro's** 1983 Special Anniversary Issue absolutely FREE!

☐ Check/mo ☐ MC ☐ Amex ☐ Visa ☐ Bill me

SIGNATURE _____

CARD # _____ EXP. DATE _____

NAME _____

ADDRESS _____

CITY _____ STATE ____ ZIP _____

Canada and Mexico $44.97, 1 year only. US funds drawn on US bank. Foreign Surface $54.97, 1 year only. US funds drawn on US bank. Please allow 6–8 weeks for delivery.

Send coupon with payment to:

80micro **P.O. Box 981 Farmingdale, NY 11737**

33AP8

one I used is taken from *The Astronomical Almanac* and appears in line 1550 of the program.

Adding the equation of time (ET) and the meridian correction (MC) to our first approximations, the final equations for sunrise and sunset become:

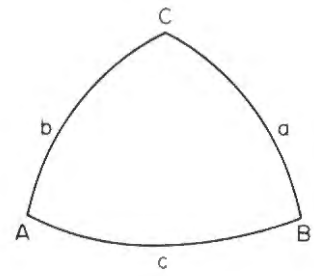
(2b) Time of sunrise = 1200 – C/15 + MC + ET – 0003

(4b) Time of sunset = 1200 + C/15 + MC + ET – 0003

CASE 1: Sides a, b, and c known.

(1) $\tan r = \dfrac{\sqrt{\sin(s-a)\sin(s-b)\sin(s-c)}}{\sin s}$

where $s = (a+b+c)/2$



(2) $\tan \frac{1}{2}A = \dfrac{\tan r}{\sin(s-a)}$

(3) $\tan \frac{1}{2}B = \dfrac{\tan r}{\sin(s-b)}$

(4) $\tan \frac{1}{2}C = \dfrac{\tan r}{\sin(s-c)}$

CASE 2: Angle C and sides a and b known.

For A,B (1) $\tan \frac{1}{2}(B+A) = \dfrac{\cos \frac{1}{2}(b-a)}{\cos \frac{1}{2}(b+a)\tan \frac{1}{2}C}$

(2) $\tan \frac{1}{2}(B-A) = \dfrac{\sin \frac{1}{2}(b-a)}{\sin \frac{1}{2}(b+a)\tan C}$

For c (3) $\tan \frac{1}{2}c = \dfrac{\tan \frac{1}{2}(b-a)\sin \frac{1}{2}(B+A)}{\sin \frac{1}{2}(B-A)}$

CASES 3–6: Pertain to other combinations of sides and angles. Not applicable here.

Table 1. Equation to solve spherical triangle.

Program Listing. Sunfinder.

```
10 '                          SUNFINDER
20 '                            BY
30 '                        SMITH HARRIS
40 '
50 '                      PRINCIPAL VARIABLES
60 '
70 ' AL - ALTITUDE OF SUN, DEGREES
80 ' AZ - AZIMUTH OF SUN, DEGREES
90 ' DR - DEGREES TO RADIANS (57.2958)
100 'CH - HOUR EQUIVALENT OF ANGLE YOUR LAT-N POLE-LAT OF SUN
110 'DL - DECLINATION OF SUN
120 'ED - ANGLE IN DEGREES FOR EQUATION OF TIME
130 'ER - ANGLE IN RADIANS FOR EQUATION OF TIME
140 'ET - EQUATION OF TIME
150 'G1 - MEAN ANOMALY OF SUN
160 'K  - CONVERTS DAY OF YEAR TO DEGREES
170 'L1 - MEAN LONGITUDE OF SUN
180 'LA - YOUR LATITUDE, RADIANS
190 'LD - ECLIPTIC LONGITUDE
200 'LO - YOUR LONGITUDE, DEGREES
210 'LX - YOUR LATITUDE, DEGREES
220 'MC - HOURS EAST OR WEST OF STANDARD MARIDIAN
230 'MG - YOUR MAGNETIC DEVIATION, DEGREES
240 'MR - RADIANS EAST OR WEST OF STANDARD MERIDIAN
250 'MX - DEGREES EAST OR WEST OF STANDARD MERIDIAN
260 'N1 - FIRST DAY
270 'N2 - LAST DAY
280 'N3 - FIRST HOUR
290 'N4 - LAST HOUR
300 'RD - RADIANS TO DEGREES (.0174533)
310 'S  - COUNTER FOR HOURS EXPRESSED AS DECIMAL VALUE
320 'SD - TIME OF SUNSET
330 'SX - YOUR STANDARD MERIDIAN, DEGREES
340 'SH - COUNTER FOR HOURS EXPRESSED AS HOURS AND MINUTES
350 'SU - TIME OF SUNRISE
360 'T  - AZIMUTH OF SUN, DEGREES (USED IN 'SUNRISE-SUNSET')
370 'Z  - LATITUDE OF SUN, RADIANS
```

Listing continued

Since these corrections represent a shift in the apparent position of the sun, you must also account for them in the equation for the azimuth of the sun at noon by dividing their sum by four (the Earth takes four minutes to revolve 1 degree.)

One more correction to be made in azimuth is for the magnetic deviation (MG) of your location. The final equation for azimuth is:

(1a) Azimuth of noon sun = 180 + (MC + ET)/4 + MG where MC and ET are in minutes and MG is in degrees.

There is also a slight correction to be made in the altitude of the noon sun. It is obtained be reducing the altitude by 90 degrees times the cosine of the sum of ET and MC, expressed in degrees. The final equation for the altitude is:

(5a) Altitude of noon sun = 90*cos(ET + MG) – your latitude + latitude of CP sun

To make the equation apply where the sun is north of your location, the program checks to see if the latitude is south of G.P. sun. If so, the constant 180 in equation 1a is changed to zero degrees or due north. The time of sunrise and sunset and the azimuth of the sun are not affected.

Where's the Sun

As mentioned earlier, the first part of the program, Where's the Sun, is more complicated. You solve the same spherical triangle shown in Fig. 1, but side c is not known. Sides a and b are the same as before and you determine angle C by multiplying the difference in time between noon and the hour for which you wish to solve by 15 degrees. By adding corrections for the distance from the standard meridian and for the equation of time you obtain for morning hours, angle C is:

(6) C = (1200 – S)*15 + MC + ET/4

where S is the hour, MC the meridian correction in degrees, and ET the equation of time in minutes.

For afternoon hours, to avoid C being a negative angle, set C as:

(7) C = (S – 1200)*15 + MC + ET/4

For example, if the time is 0800, MC is 5 degrees, and the equation of time is 8 minutes, angle C is:

C = (1200 – 0800)*15 + 5 + 8/4
= 4*15 + 5 + 2
= 67 degrees.

Since you know two sides, a and b, and the included angle C, you can solve for angle A and side c using the equations in Table 1. The altitude of the sun is 90 degrees minus side c. The azimuth of the morning sun equals angle A; the azimuth of the afternoon sun equals 360 degrees minus angle A.

Corrections for the standard meridian, the magnetic deviation, and for the equation of time, the latter converted to degrees, are applied to the azimuth to obtain:

(8) Azimuth of the morning sun = A + MC + MG + ET/4

(8) Azimuth of the afternoon sun = 360 − A + MC + MG + ET/4

If the time is exactly 1200, the program uses the expressions given in equations 1a and 5a for the altitude and azimuth.

Discussion of the Program

Sunfinder first asks for your latitude in degrees and decimal parts of degrees, and the number of degrees you are east or west of your standard meridian. Enter south latitudes and east longitudes as negative numbers.

The program asks for magnetic deviation, obtained from a local weather bureau or airport, and whether or not it is a leap year. It then presents a menu from which you select Where's the Sun, Sunrise-Sunset, or Quit to end program execution.

If you select Where's the Sun, the program asks for the starting date, the ending date, the increment in days, the starting hour and ending hour (using the 24-hour clock), and the increment in hours and decimal parts of an hour.

Enter dates as month,day. For example, for April 23 type 4,23. Leading zeros are not required for the month, day, or hour. If you want information for just one day, hit the enter key for the ending date and for the increment in days and hours.

If you select Sunrise-Sunset, the program asks for the starting date, the ending date, and the increment in days. If you only want the time of sunrise and sunset for one day, hit the enter key in response to the last two questions. You can go from one program to another without having to repeat the initialization process.

Checks are built in so that errors, such as entering an hour greater than 24, making the last day less than the first day, or making the last hour less than the first hour, are identified. If, however, you find an error or if you

Listing continued

```
380 'NOTE - OTHER VARIABLES ARE USED IN SOLVING THE SPHERICAL
390 '       TRIANGLES AND FOR HOUSEKEEPING
400 '*************************************************************
410 CLS
420 P$="##.##"  'PRINT FORMAT
430 DR=.0174533:RD=57.2958  'DEG TO RAD - RAD TO DEG
440 INPUT "WHAT IS YOUR LATITUDE (XX.X DEGREES, - IF S)";LX
450 INPUT"WHAT IS YOUR LONGITUDE (XX.X DEGREES, - IF E)";LO
460 LA=LX*DR  'LATITUDE IN RADIANS
470 INPUT "WHAT IS YOUR STANDARD MERIDIAN";SX
480 IF LO>=0 THEN MX=LO-SX ELSE MX=SX-LO 'DEG CORR FOR STAND MER
490 MC=MX/15  'HOURS CORRECTION FOR STAND. MER.
500 MR=MX*DR 'RADIANS EQUIV OF MER. CORRECTION
510 INPUT "WHAT IS YOUR MAGNETIC VARIATION (XX.X DEGREES, - IF E)"
;MG
520 INPUT "IS THIS A LEAP YEAR (Y/N)";Q$
530 IF LEFT$(Q$,1)="Y" THEN DA=366:Q1=1 ELSE DA=365.24232:Q1=0
540 K=360/DA  'DAYS TO DEG
550 PRINT "WHAT PROGRAM DO YOU WANT TO RUN?"
560 PRINT "1=WHERE'S THE SUN"
570 PRINT "2=SUNRISE-SUNSET"
580 PRINT "3=QUIT
590 PRINT "NOTE:  YOU CAN INTERRUPT ANY PRINTOUT BY"
600 PRINT "HOLDING DOWN THE SPACE BAR FOR A MOMENT."
610 N1=0:N2=0:N3=0:N4=0  'CLEAR VARIABLES
620 INPUT NU
630 IF NU>3 THEN 550
640 IF NU=3 THEN 1470
650 INPUT "FIRST DATE (NO. OF MONTH, DAY)";M1,D1:GOSUB 1730
660 N1=NQ
670 INPUT "LAST DATE (NO. OF MONTH, DAY)";M1,D1
680 IF M1=0 OR D1=0 THEN N2=0:GOTO 710  ELSE GOSUB 1730
690 N2=NQ
700 IF N1>N2 AND N2<>0 PRINT "1ST DAY > 2ND DAY.  REENTER.":N2=0:G
OTO 650
710 IF NU=2 GOTO 1100
720 INPUT "FIRST HOUR (0-24)";N3:IF N3>24 PRINT "TOO BIG":GOTO 720

730 INPUT "LAST HOUR (0-24)";N4:IF N4>24 PRINT "TOO BIG":GOTO 730

740 IF N3>N4 AND N4<>0 PRINT "1ST HOUR > 2ND HOUR.  REENTER.":N4=0
:GOTO 720
750 INPUT "INCREMENT IN HOURS AND/OR DECIMAL PARTS OF AN HOUR";I:I
F I=0 THEN I=1
760 LPRINT " DATE","HOUR (ST)","AZIMUTH (DEG)","ALTITUDE (DEG)"
770 BB=1.5708-LA '90 DEG - YOUR LATITUDE
780 FOR N=N1 TO N2
790 GOSUB 1600
800 GOSUB 1500
810 FOR S=N3 TO N4 STEP I
820 Z$=INKEY$:IF Z$=" "THEN 550  'ESCAPE FROM LOOP
830 SI=INT(S):SM=(S-SI)*.6:SH=SI+SM  'HOURS AND MINUTES
840 LPRINT,;:LPRINT USING P$;SH;
850 AA=1.5708-Z  'ANGLE AA=90 DEG-LAT OF SUN
860 IF S<12 THEN C=(12-S)*15*DR+ER+MR ELSE C=(12-S)*15*DR+ER+MR 'D
ELTA LONGITUDE OF SUN, RADIANS
870 E=(BB-AA)/2:F=(BB+AA)/2:G=C/2
880 X=COS(E)/(COS(F)*TAN(G))  'LINES 840-960
890 Y=SIN(E)/(SIN(F)*TAN(G))  'SOLVE
900 XX=ATN(X)*2               'SPHERICAL
910 YY=ATN(Y)*2               'TRIANGLE
920 B=(XX+YY)/2               'ABC
930 A=(XX-B) 'AZIMUTH IN RADIANS
940 L=(B+A)/2:M=(B-A)/2
950 ZZ=(TAN(E)*SIN(L))/SIN(M)
960 CC=2*ATN(ZZ)
970 AL=90-INT(CC*RD+.5) 'ALTITUDE OF SUN, NEAREST DEGREE
980 IF CC<0 THEN AL=180-AL
990 AZ=INT(A*RD+MG+.5) 'AZIMUTH OF SUN, NEAREST DEGREE
1000 IF CC<0 AND A<0 THEN AZ=180+AZ 'LINES 990-1010
1010 IF S>12 AND AZ<180 AND AZ>=0 THEN AZ=AZ+180 'TAKE CARE OF
1020 IF AZ<0 THEN AZ=AZ+360 'SOME SPECIAL CASES
1030 IF LA-Z>0 THEN 1060
1040 IF S=12 THEN AZ=INT(360+MG-MX-ED+.5):AL=FIX(90*COS(MR+ER)-(Z-
LA)*RD+.5):IF AZ>=360 THEN AZ=AZ-360
1050 GOTO 1070
1060 IF S=12 THEN AZ=INT(180+MG-MX-ED+.5):AL=INT(90*COS(MR+ER)-(LA
-Z)*RD+.5)  'SPECIAL CASE FOR NOON
1070 LPRINT,AZ,AL
1080 NEXT S:NEXT N
1090 GOTO 550
1100 'SUNRISE-SUNSET
1110 INPUT"INCREMENT IN DAYS";X1:IF X1=0 THEN X1=1
1120 LPRINT " DATE"," SUNRISE (ST)"," SUNSET (ST)"," ALTITUDE&AZ"
1130 LPRINT ," AND AZIMUTH"," AND AZIMUTH"," OF NOON SUN"
1140 LPRINT,"  (DEGREES)","  (DEGREES)","  (DEGREES)"
1150 FOR N=N1 TO N2 STEP X1
1160 GOSUB 1500
1170 CC=1.5708  '90 DEGREES AT SUNRISE, SUNSET
1180 IF LA-Z<0 THEN T=INT(360-ED+MG-MX+.5) ELSE T=INT(180-ED+MG-MX
```

Listing continued

Listing continued

```
+.5) 'AZ OF SUN, DEG.
1190 IF T>=360 THEN T=T-360
1200 AA=CC-Z   'LINES 1160-1260 SOLVE SPHERICAL
1210 BB=CC-LA  'TRIANGLE FOR ANGLES A AND C
1220 SS=(AA+BB+CC)/2
1230 ON ERROR GOTO 1480
1240 TR=SQR((SIN(SS-AA)*SIN(SS-BB)*SIN(SS-CC))/SIN(SS))
1250 C1=TR/SIN(SS-CC)
1260 C=2*ATN(C1)*RD  'C IS ANGLE IN DEG. OBSERVER-N POLE-SUN
1270 AZ=2*RD*ATN(TR/SIN(SS-AA))  'AZIMUTH OF SUN,DEGREES
1280 CH=C/15 'HOURS VS C
1290 SU=12-.056+ET+MC-CH  'SUNRISE
1300 UP=INT(SU)   'HOUR PART
1310 MU=(SU-UP)*60  'MINUTES
1320 MU=INT(MU+.5)/100  'ROUND OFF TO NEAREST MINUTE
1330 IF MU=.6 THEN MU=0:UP=UP+1  'IF 60 MINS, MINS=0, HR=HR+1
1340 SU=UP+MU  'HOURS AND MINUTES
1350 SD=12+.056+ET+MC+CH  'SUNSET
1360 DN=INT(SD)
1370 MD=(SD-DN)*60
1380 MD=INT(MD+.5)/100
1390 IF MD=.6 THEN MD=0:DN=DN+1
1400 SD=DN+MD
1410 IF LA-Z<0 THEN AL=FIX(90*COS(MR+ER)-(Z-LA)*RD+.5) ELSE AL=INT
(90*COS(MR+ER)-(LA-Z)*RD+.5)
1420 GOSUB 1600
1430 LPRINT ,;:LPRINT USING P$;SU;:LPRINT" @"INT(AZ+MG+.5),;:LPRIN
T USING P$;SD;:LPRINT" @"INT(360-AZ+MG-.5),AL;"@"T
1440 Z$=INKEY$:IF Z$=" "GOTO 550  'ESCAPE FROM LOOP
1450 NEXT N
1460 GOTO 550
1470 END
1480 LPRINT N,"CAN'T DETERMINE"
1490 RESUME 1450
1500 L1=(279.575+(K*N))*DR   'LINES 1500-1590 COMPUTE
1510 G1=(356.967+(K*N))*DR   'LONG OF GP SUN AND EQ TIME
1520 LD=L1+(1.916*SIN(G1)+.02*SIN(2*G1))*DR
1530 DL=.39782*SIN(LD)
1540 Z=ATN(DL/SQR(-DL*DL+1))
1550 EL=-104.7*SIN(L1)+596.2*SIN(2*L1)+4.3*SIN(3*L1)-12.7*SIN(4*L1
)-429.3*COS(L1)-2*COS(2*L1)+19.3*COS(3*L1)
1560 ET=-EL/3600
1570 ED=ET*15
1580 ER=ED*DR
1590 RETURN
1600 IF N<=31 LPRINT "JAN" N;  'LINES 1600-1720 CONVERT DAY OF
1610 IF N>31 AND N<=59+Q1 LPRINT "FEB" N-31;'  YEAR TO DATE
1620 IF N>59+Q1 AND N<=90+Q1 LPRINT "MAR" N-(59+Q1);
1630 IF N>90+Q1 AND N<=120+Q1 LPRINT "APR" N-(90+Q1);
1640 IF N>120+Q1 AND N<=151+Q1 LPRINT "MAY" N-(120+Q1);
1650 IF N>151+Q1 AND N<=181+Q1 LPRINT "JUN" N-(151+Q1);
1660 IF N>181+Q1 AND N<=212+Q1 LPRINT "JLY" N-(181+Q1);
1670 IF N>212+Q1 AND N<=243+Q1 LPRINT "AUG" N-212+Q1;
1680 IF N>243+Q1 AND N<=273+Q1 LPRINT "SEP" N-(243+Q1);
1690 IF N>273+Q1 AND N<=304+Q1 LPRINT "OCT" N-(273+Q1);
1700 IF N>304+Q1 AND N<=334+Q1 LPRINT "NOV" N-(304+Q1);
1710 IF N>334+Q1 LPRINT "DEC" N-(334+Q1);
1720 RETURN
1730 ON M1 GOTO 1740 ,1750 ,1760 ,1770 ,1780 ,1790 ,1800 ,1810 ,18
20 ,1830 ,1840 ,1850
1740 NQ=D1:RETURN        'LINES 1730-1850 CONVERT DATE TO
1750 NQ=31+D1:RETURN     'DAY OF YEAR
1760 NQ=59+D1+Q1:RETURN
1770 NQ=90+D1+Q1:RETURN
1780 NQ=120+D1+Q1:RETURN
1790 NQ=151+D1+Q1:RETURN
1800 NQ=181+D1+Q1:RETURN
1810 NQ=212+D1+Q1:RETURN
1820 NQ=243+D1+Q1:RETURN
1830 NQ=273+D1+Q1:RETURN
1840 NQ=304+D1+Q1:RETURN
1850 NQ=334+D1+Q1:RETURN
```

change your mind after you start printing, you can abort it and return to the menu by holding down the space bar for a moment.

A sample dialogue and examples of the results for Macon, GA, are shown in Fig. 2. All azimuths are rounded off to the nearest degree and time is rounded off to the nearest minute. Note that all times are expressed in standard time using the 24-hour clock. Daylight-saving time is not accounted for.

Some angles in solving the spherical triangle may turn out negative, especially when the sun is north of your location, and result in incorrect values for the sun's azimuth and altitude. The program accounts for these special cases, as well as the special case for noon in Where's the Sun, particularly in lines 980, 1000–1060, and 1180–1190.

The single-precision trigonometric routines the interpreter uses may result in a negative quantity under the radical in line 1240 at extreme northern or southern latitudes when the sun is near the horizon. An error-trapping routine displays the message CAN'T DETERMINE when this occurs and the program continues without crashing.

Times of sunrise and sunset agree with the tabulations in *The Astronomical Almanac* to within two minutes for the middle latitudes (40 degrees south to 40 degrees north). The actual times of sunrise and sunset where you are may vary slightly from the program's values because the index of the atmosphere's refraction may be different at your locality from that assumed and because of the absence of a true horizon.

The figures for azimuth and altitude of the sun agree to within a degree with charts given in *The Beginner's Guide to the Stars*. This figure is also consistent with the solution of the triangles. I believe that this accuracy is more than sufficient for any nonastronomical purpose. Execution time is limited chiefly by your printer's speed.

Conclusions

Sunfinder predicts the azimuth and altitude of the sun, the times of sunrise and sunset and the corresponding azimuths of the sun, and the altitude and azimuth of the noon sun for any day and hour. Its use is not limited to the continental limits of the United States or even to the Northern Hemisphere — it works for any location, anywhere. Its accuracy is more than sufficient for any practical application. ■

Smith Harris can be reached at Route 4, Box 59, Gray, GA 31032.

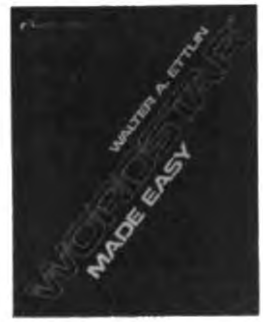
Model II/12/16 Conversion

CONVERSION BY

Beve Woodbury
80 Micro
Tech Editor

Edit the following lines by inserting THEN before PRINT or LPRINT:
700, 720, 730, 740, 1600-1710

INTRODUCTORY/GAMES



DON'T (or How to Care for Your Computer)—by Rodnay Zaks. In plain language, with numerous illustrations, this book tells all the do's and don't's of the care, preservation and correct operation of the small computer system. Specific chapters cover each piece of hardware and software, as well as safety and security precautions and help for problem situations. Have your computer work right the first time and keep it working. No technical background required. For all computer users. BK1237 $11.95

YOUR FIRST COMPUTER—by Rodnay Zaks. Whether you are using a computer, thinking about using one or considering purchasing one, this book is indispensable. It explains what a computer system is, what it can do, how it works and how to select various components and peripheral units. It is written in everyday language and contains invaluable information for the novice and the experienced programmer. (The first edition of this book was published under the title "An Introduction to Personal and Business Computing".) BK1191 $8.95*

MICROPROCESSOR INTERFACING TECHNIQUES—by Austin Lesea & Rodnay Zaks—will teach you how to interconnect a complete system and interface it to all the usual peripherals. It covers hardware and software skills and techniques, including the use and design of model buses such as the IEEE 488 or S-100. BK1037 $17.95 *

COMPUTERS FOR EVERYONE 2nd Edition—by Jerry Willis and Merl Miller. This new, updated edition shows you how computers can be used in your home, office or school. It explains what computers can do and features a consumer's guide of the more popular computers to help you decide which one to buy and who to buy it from. There's even a chapter devoted to software that describes over 100 programs currently available. Also included are chapters on peripherals, telecommunications and computers in education. Abounds with colorful photographs. BK1260 $5.95

INTRODUCTION TO WORD PROCESSING by Hal Glatzer. This book explains in plain language what a word processor can do, how to use one, how it improves productivity—especially in businesses that handle lots of words—and how to buy one wisely. No technical knowledge required, for all first-time users and those considering purchasing a word processor. BK1238 $12.95

A USER GUIDE TO THE UNIX SYSTEM by Jean Yates and Rebecca Thomas. Here at last is a clearly written book that allows you to use the Unix operating system easily, and at a fraction of the time it previously took. If you're using, evaluating or simply curious about this system, this is your book. BK1242 $15.99

WORDSTAR MADE EASY by Walter A. Ettlin. Now WordStar is as simple to learn as it is easy to use. This book teaches WordStar in 14 easy lessons, saving hours of hard work. It comes with a convenient pull-out Command Card. BK1239 $7.95

CAPTAIN 80 BOOK OF BASIC ADVENTURES—by Robert Liddil. This book contains 18 of the most popular Adventure programs available today, all in one easy to read book with listings ready to be keyed in to your computer. This unique book also contains an ADVENTURE GENERATOR program, not available from any other source. This generator program will actually write another BASIC ADVENTURE PROGRAM! Although specifically written for the TRS-80 Model I & III, these programs are adaptable to other computers using Microsoft BASIC. BK 1240 $19.95

40 COMPUTER GAMES FROM *KILOBAUD MICROCOMPUTING*—Forty games in all in nine different categories. Games for large and small systems, and even a section on calculator games. Many versions of BASIC used and a wide variety of systems represented. A must for the serious computer gamesman. BK7381 $7.95 *

WAYNE GREEN BOOKS

THE SELECTRIC INTERFACE—by George Young. You need the quality print that a daisy wheel printer provides but the thought of buying one makes your wallet wilt. SELECTRIC™ INTERFACE, a step-by-step guide to interfacing an IBM Selectric I/O Writer to your microcomputer, will give you that quality at a fraction of the price. George Young, co-author of *Kilobaud Microcomputing* magazine's popular "Kilobaud Klassroom" series, offers a low-cost alternative to buying a daisy wheel printer. SELECTRIC INTERFACE includes: step-by-step instructions, tips on purchasing a used Selectric, information on various Selectric models, including the 2740, 2980, and Dura 1041, driver software for Z80, 8080, and 6502 chips, tips on interfacing techniques. With SELECTRIC INTERFACE and some background in electronics, you can have a high-quality, low-cost, letter-quality printer. Petals not included. BK7388 (125 pages) $12.97

COMPUTER CARNIVAL—by Richard Ramella. Your child can become a crackerjack computerist with the sixty TRS-80 Level II programs in COMPUTER CARNIVAL. This large-type, spiral bound book for beginners is a veritable funhouse of games, graphics, quizzes and puzzles. Written by *80 Micro* columnist Richard Ramella, the programs are challenging enough to ensure continued learning, yet short enough to provide your child with the immediate delight and reward of mastering basic computing skills. And for even greater enjoyment, get the CARNIVAL COMPANION, a 30-minute cassette containing all the programs in the book. Eliminates tiresome typing and lets your child spend more time enjoying the programs. BK7389 $16.97 CC7389 Book and Cassette $24.97

TEXTEDIT—A Complete Word Processing System in Kit Form—by Irwin Rappaport. TEXTEDIT is an inexpensive word processor that you can adapt to suit your differing needs—from form letters to lengthy texts. Written in TRS-80 Disk BASIC, the system consists of several modules, permitting the loading and use of only those portions needed. A disk is also available which provides the direct loading of the modules, however, the book is required for documentation. For Model I and III with TRSDOS CONVERT., one disk drive (2 disk drives or copy utility needed to transfer to system disk). Runs under TRSDOS 2.2/2.3. May not function under other systems. BK7387 $9.97 Disk DS7387 $19.97

KILOBAUD KLASSROOM—by George Young and Peter Stark. Learning electronics theory without practice isn't easy. And it's no fun to build an electronics project that you can't use. *Kilobaud Klassroom*, the popular series first published in *Kilobaud Microcomputing*, combines theory with practice. This is a *practical* course in digital electronics. It starts out with very simple electronics projects, and by the end of the course you'll construct your own working microcomputer!

Authors Young and Stark are experienced teachers, and their approach is simple and direct. Whether you're learning at home or in the classroom, this book provides you with a solid background in electronics—and you'll own a computer that you built yourself! BK7386 $14.95

THE NEW WEATHER SATELLITE HANDBOOK—by Dr. Ralph E. Taggart WB8DQT. Here is the completely updated and revised edition of the best-selling *Weather Satellite Handbook*—containing all the information on the most sophisticated and effective spacecraft now in orbit. Dr. Taggart has written this book to serve both the experienced amateur satellite enthusiast and the newcomer. This book is an introduction to satellite watching, that tells you how to construct a complete and highly effective ground station. Not just ideas, but solid hardware designs and all the instructions necessary to operate the equipment are included. An entire chapter is devoted to microcomputers and the Weather Satellite Station, and for the thousands of experimenters who are operating stations, *The New Weather Satellite Handbook* details all the procedures necessary to follow the current spacecraft. Weather Satellite contains: Operation Satellite Systems, Antenna Systems, Weather Satellite Receivers, A Cathode Ray Tube (CRT) Monitor for Satellite Picture Display, A Direct-Printing Fascimile System for Weather Satellite Display, How to Find the Satellite, Test Equipment, Microcomputers and the Weather Satellite Station, Station Operations. BK7383 $8.95.*

ANNOTATED BASIC—A NEW TECHNIQUE FOR NEOPHYTES—BASIC programming was supposed to be simple—a beginner's programming language which was so near to English that is could be easily understood. But, in recent years, BASIC has become much more powerful and therefore much more difficult to read and understand. BASIC simply isn't basic anymore.

Annotated BASIC explains the complexities of modern BASIC. It includes complete TRS-80* Level II BASIC programs that you can use. Each program is annotated to explain in step-by-step fashion the workings of the program. Programs are flowcharted to assist you in following the operational sequence. And—each chapter includes a description of the new concepts which have been introduced.

Annotated BASIC deals with the hows and whys of TRS-80 BASIC programming. *How* is a program put together? *Why* is it written that way? By observing the programs and following the annotation, you can develop new techniques to use in your own programs—or modify commercial programs for your specific use.
Annotated BASIC Volume 1 BK7384 $10.95
Annotated BASIC Volume 2 BK7385 $10.95
Order Both Volumes and Save! BK738402 $18.95

*Use the order card in this magazine or itemize your order on a separate piece of paper and mail to: 80 Micro Book Department ● Peterborough NH 03458. Be sure to include check or detailed credit card information. No C.O.D. orders accepted. $1.50 for the first book, $1.00 each additional book for U.S. delivery and foreign surface. For foreign airmail $10.00 per book. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write to Customer Service at the above address.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

For Toll Free Ordering Call 1-800-258-5473

80 micro BOOK SHELF

PROGRAMMING•6809

TRS-80 EXTENDED COLOR BASIC—by Richard Haskell. This is a complete guide to programming the TRS-80 Color Computer in BASIC, with step-by-step instructions and lots of screen photographs. Good for beginning and advanced programmers, this book includes sample programs and information on using the keyboard, cassette tapes, graphics, sound effects, and more. Richard Haskell is also the author of *Apple BASIC* and *PET/CBM BASIC*. BK1285 12.95

TRS-80 COLOR BASIC—Bob Albrecht. Learn how to use the unique color, sound and graphics of the TRS-80 Color Computer. This self-teaching guide uses a learn-as-you-play format to teach Color BASIC. Packed with games, experiments, programming problems, and solutions, it is an ideal introduction for children, teachers, and adults. It starts with simple concepts and takes you on to more complicated games, graphics, and activities, including many chances for you to try out your newly learned programming skills. Included is an entire chapter on programming problems, which offers tip on adapting to Microsoft BASIC on other personal computers. BK1280 $10.95

PROGRAMMING THE 6809—by Rodnay Zaks and William Labiak. This book explains how to program the 6809 in assembly language, covering all aspects progressively and systematically: basic programming techniques and devices, application examples, data structures, and program development. No prior programming knowledge is required. BK1264 **$15.95**

TRS-80 COLOR COMPUTER GRAPHICS—by Don Inman with DYMAX. This exciting book will enable you to explore all the graphics capabilities of Extended Color BASIC. You'll learn how to create interesting graphics to enhance your own computer programs. Also included are application programs and subroutines that will be invaluable when you begin writing your own graphics programs. Each chapter ends with a summary and practice exercises. BK1266 $14.95

ASSEMBLY LANGUAGE GRAPHICS FOR THE TRS-80 COLOR COMPUTER—by Don Inman and Kurt Inman with DYMAX. This dynamic new book uses sound and graphics to show you how 6809 assembly language can be used to perform tasks that would be difficult or impossible with BASIC. All of the techniques are explained in a hands-on approach. Learn how to tailor you own programming style, from editing, assembling, executing and even debugging, to making your own programs run quickly and efficiently. It is also packed with video screen diagrams which explain each step of the process of creating your own graphics. BK1277 $??.??

6809 MICROCOMPUTER PROGRAMMING AND INTERFACING—by Andrew C. Staugaard, Jr. Getting involved with Tandy's new Color Computer? If so, this new book from the Blacksburg Group will allow you to exploit the awesome power of the machine's 6809 microprocessor. Detailed information on processor architecture, addressing modes, register operation, data movement, arithmetic logic operations, I/O and interfacing is provided, as well as a review section at the end of each chapter. Four appendices are included covering the 6809 instruction set, specification sheets of the 6809 family of processors, other 6800 series equipment, and the 6809/6821 Peripheral Interface Adapter. This book is a must for the serious Color Computer owner. BK1215 $13.95.*

Z80

INSIDE LEVEL II—For machine language programmers. This is a comprehensive reference guide to the Level II ROMs, allowing easy utilization of the sophisticated routines they contain. It concisely explains set-ups, calling sequences, variable passage and I/O routines. Part II presents an entirely new composite program structure which unloads under the SYSTEM command and executes in both BASIC and machine code with the speed and efficiency of a compiler. Special consideration is given to disk systems. BK1183 $15.95.*

Z-80 ASSEMBLY LANGUAGE PROGRAMMING—by Lance A. Leventhal. This book thoroughly covers the Z-80 instruction set, abounding in simple programming examples illustrating software development concepts and actual assembly language usage. Features include Z-80 I/O devices and interfacing methods, assembler conventions, and comparisons with 8080A/8085 instruction sets and interrupt structure. BK1177 **$18.95** *

TRS-80 ASSEMBLY LANGUAGE—by Hubert S. Howe, Jr. This book incorporates into a single volume all the pertinent facts and information you need to know to program and enjoy the TRS-80. Included are clear presentations of all introductory concepts, completely tested practical programs and subroutines, details of ROM and RAM and disk operating systems, plus comprehensive tables, charts and appendices. Suitable for the first time user or more experienced users. BK1217 $9.95.*

PROGRAMMING THE Z-80—by Rodnay Zaks. Here is assembly language programming for the Z-80 presented as a progressive, step-by-step course. This book is both an educational text *and* a self-contained reference book, useful to both the beginning and the experienced programmer who wish to learn about the Z-80. Exercises to test the reader are included. **BK1122 $16.95** *

Nanos System REFERENCE CARDS

FOR MODELS I, II, III, COLOR AND POCKET COMPUTERS!

At last! No more flipping through the pages of the BASIC manual! No more working through the maze of machine language instructions! These cards completely summarize the BASIC and Assembler manuals! FEATURES INCLUDE:
memory map, eyeball graphics, math instructions, BASIC commands, store instructions, BASIC functions, load instructions, BASIC statements, move instructions, special keys, exchange instructions, PRINT USING examples, shift instructions, BASIC special characters, compare instructions, BASIC and assembler messages and codes, branch instructions, BASIC facts, data alteration instructions, reserved words, I/O instructions, ROM routines, complete character chart with graphics and space-compression codes, hex-dec chart, control code cross-reference, assembler instructions, commands and operators, screen line layout, editor commands and subcommands, condition code easy access.
Plus—"magic graphics number—a mystery until you learn how to use it!
Designed as a fold-up, accordion-style card, fits in your pocket. Panels organized for optimum speed for reference.

Model I: BASIC and Assembler FC1002	$4.95
Model II: BASIC and Assembler FC1005	$5.95
Model II: Commands and Utilities FC1010	$3.95
Model III: BASIC and Assembler FC1005	$5.95
Color: BASIC and Extended FC1006	$4.95
Z-80: Microprocessor FC1011	$4.95
ZX80, ZX81 and Timex Sinclair 1000: FC1012	$5.95
Pocket Computer: BASIC FC1009	$2.95
Apple II and Apple II Plus: BASIC and 6502 FC1008	$4.95
Apple II and Apple II Plus: BASIC only FC1007	$3.95

BASIC & PASCAL

LEARNING TRS-80 BASIC-by David A. Lien. Dr. Lien, who is the author of THE BASIC HANDBOOK and the original Radio Shack LEVEL I USER'S MANUAL, has compiled a tutorial which includes portions of the original USER'S MANUAL, and most of LEARNING LEVEL II along with extensive additions. It will completely cover the TRS-80 Models I, II, III, and 16 (sorry, not the color or pocket computers). It is, of course, written in the easy learning style which readers of Dr. Lien's books have come to enjoy. BK1175 $19.95

THE BASIC HANDBOOK—SECOND EDITION—by David Lien. This book is unique. It is a virtual ENCYCLOPEDIA of BASIC. While not favoring one computer over another, it explains over 250 BASIC words, how to use them and alternate strategies. If a computer does not possess the capabilities of a needed or specified word, there are often ways to accomplish the same function by using another word or combination of words. That's where the HANDBOOK comes in. It helps you get the most from your computer, be it a "bottom-of-the-line" micro or an oversized monster. BK1174 $19.95.*

PROGRAMMING IN PASCAL—by Peter Grogono. The computer programming language PASCAL was the first language to embody in a coherent way the concepts of structured programming, which has been defined by Edsger Dijkstra and C.A.R. Hoare. As such, it is a landmark in the development of programming languages. PASCAL was developed by Niklaus Wirth in Zurich; it is derived from the language ALGOL 60 but is more powerful and easier to use. PASCAL is now widely accepted as a useful language that can be efficiently implemented, and as an excellent teaching tool. It does not assume knowledge of any other programming language and therefore suitable for an introductory course. BK1140 $12.95.*

INTRODUCTION TO PASCAL—By Rodnay Zaks. A step-by-step introduction for anyone wanting to learn the language quickly and completely. Each concept is explained simply and in a logical order. All features of the language are presented in a clear, easy-to-understand format with exercises to test the reader at the end of each chapter. It describes both standard PASCAL and UCSD PASCAL, the most widely used dialect for small computers. No computer or programming experience is necessary. **BK1189 $16.95**

*Use the order card in this magazine or itemize your order on a separate piece of paper and mail to: 80 Micro Book Department • Peterborough NH 03458. Be sure to include check or detailed credit card information. No C.O.D. orders accepted. $1.50 for the first book, $1.00 each additional book for U.S. delivery and foreign surface. For foreign airmail $10.00 per book. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write to Customer Service at the above address.

For Toll Free Ordering Call 1-800-258-5473

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

SPECIAL INTERESTS

THE CP/M HANDBOOK (with MP/M)—by Rodnay Zaks. A complete guide and reference handbook for CP/M—the industry standard in operating systems. Step-by-step instruction for everything from turning on the system and inserting the diskette to correct user discipline and remedial action for problem situations. This also includes a complete discussion of all versions of CP/M up to and including 2.2, MP/M and CDOS. BK1187 $14.95.*

BASIC FASTER AND BETTER AND OTHER MYSTERIES—by Lewis Rosenfelder. You don't have to learn assembly language to make your programs run fast. With the dozens of programming tricks and techniques in this book you can sort at high speed, swap screens in the twinkling of an eye, write INKEY routines that people think are in assembly language and add your own commands to BASIC. Find out how to write elegant code that makes your BASIC really hum, and explore the power of USR calls. BK1221 $29.95.*

THE CUSTOM TRS-80 AND OTHER MYSTERIES—by Dennis Kitsz. More than 300 pages of TRS-80 customizing information. With this book you'll be able to explore your computer like never before. Want to turn an 8 track into a mass storage unit? Individual reverse characters? Replace the BASIC ROMs? Make Music? High speed, reverse video, Level I and Level II? Fix it if it breaks down? All this and much, much more. Even if you have never used a soldering iron or read a circuit diagram, this book will teach you how! This is the definitive guide to customizing your 80! BK1218 $29.95.*

TRS-80 DISK AND OTHER MYSTERIES—by Harvard C. Pennington. This is the definitive work on the TRS-80 Model I disk system. It is full of detailed "How to" information with examples, samples and in-depth explanations suitable for beginners and professionals alike. The recovery of one lost file is worth the price alone. BK1181 $22.50.*

MOD III ROM COMMENTED—Soft Sector marketing, 1981. This book is not an instruction course on machine language, but rather an information source that you can use time and time again for writing your own program or patching old Mod I machine language programs. It contains an explanation of ROMs in the latest machine from Tandy, with most every location of the 14K ROMs listed, with comments. BK1235 $22.50.

MACHINE LANGUAGE DISK I/O AND OTHER MYSTERIES—by Mike Wagner. The purpose of this book is to inform anyone familiar with Z-80 assembly language programming how to control the TRS-80 Model I and III disk drive interrupt systems. Driver routines for every function described, with abundant examples, are included in this book. It also covers utilization of TRSDOS assembly language file I/O calls and techniques. BK1258 $29.95

MICROSOFT BASIC DECODED AND OTHER MYSTERIES—by James Earvour. From the company that brought you *TRS-80 DISK AND OTHER MYSTERIES*. Contains more than 6500 lines of comments for the disassembled Level II ROMs, six additional chapters describing every BASIC subroutine, with assembly language routines showing how to use them. Flow charts for all major routines showing how to use them. Flow charts for all major routines give the reader a real insight into how the interpreter works. BK1186 $29.50.*

MASTERING CP/M—by Alan R. Miller. For advanced CP/M users or systems programmers who want maximum use of the CP/M operating system, this book takes up where the *CP/M Handbook* leaves off. It will give you an in-depth understanding of the CP/M modules such as CCP (Console Command Processor), BIOS (Basic Input/Output System), and BDOS (Basic Disk Operating System). It explains the incorporation of additional peripherals to the system, console I/O, the use of the file control block and much more. It also includes a library of useful macros and a comprehensive set of appendices. BK1263 $16.95

80 micro BOOK SHELF

MODEL III TRSDOS COMMENTED—Published by Soft Sector Marketing. This book is intended to show moderately experienced programmers the organization and inner workings of a typical Z-80 disk operating system. Every function of the operating system has been decoded and explained, not to bit-by-bit detail, which would be a monstrous task, but rather at an instruction-by-instruction level. Many not-documented features of the system have been found, as well as a few errors. The techniques shown in the system coding will be useful as a guide to programmers interested in systems programming at an assembler level. BK1257 $29.95

DOS RANDOM ACCESS & BASIC FILE HANDLING—By H.J. Muller. This book was written for the nonprogrammer. It is ideal for the businessman or professional who needs to solve and write special programs for in-house business problems, or the hobbyist who wants to go beyond the cassette recorder and into disk storage and file manipulation. It is written as a self-instruction tutorial and will provide anyone with some Level II experience with the ability to write special programs for inventories, mailing list, work scheduling, record keeping, research project data manipulation, etc. 150 pages. BK1236 $29.50

TRSDOS 2.3 DECODED AND OTHER MYSTERIES—by James Less Farvour. This book is intended to guide the beginning or experienced system programmer through the internal operations of the TRSDOS operating system used on the Radio Shack Model I computer. A knowledge of basic computer architecture and assembly language programming is assumed, however the significant features of both are presented in the text. An absolute must-have for Model I owners! BK1276 $29.95

INSIDE SUPER UTILITY PLUS—by Paul Weiner. This book really explains *all* the mysteries and functions of that remarkable program—Super Utility Plus. This is an excellent tutorial on TRS-80 disks, it contains detailed instructions for recovering bad disks using Super Utility Plus, and also documents previously undocumented features of SUP. This is an excellent companion book to the Super Utility Plus manual. BK1269 $19.95

CP/M REVEALED—by Jack D. Dennon. Explore and master the popular CP/M operating system for microcomputers. The technical aspects of CP/M are explained, including the console monitor (CCP), the system manager (BDOS) and the input/output driver package (CBIOS). In addition, the data structure of the CP/M disk is fully described. Advanced users will also appreciate the detailed discussions of booting up, logging in, changing memory size, mapping disk space, calling programs and interfacing techniques. Included are CP/M utilities and other essential information for using CP/M effectively. BK1283 $13.95

MONEYMAKING/BUSINESS

USING MICROCOMPUTERS IN BUSINESS—By Stan Veit. Written by the owner/manager of one of the country's largest computer stores selling systems to small businesses, this book is an essential background briefing for any purchaser of microcomputer systems or software. In a fast-moving style, without the usual buzz words and technical jargon, Veit answers the most often asked questions. CONTENTS: How a computer can help your business; Data base management to advance your business; Effective use of word processing; How to use a computer without disrupting your business; Buying your system; Computer languages; What are the limitations of the microcomputer; Software, where to find it, how to judge it; What to do when the computer goes down. BK1225 $9.95.*

SMALL COMPUTERS FOR THE SMALL BUSINESSMAN—By Nicholas Rosa and Sharon Rosa. Here is an excellent guide for businessmen who are interested in finding out what a computer can do for their business, but are not interested in becoming "computer nuts." The authors are consultants who assess the computer needs of businessmen and who touch base with everything necessary to consider before purchasing a computer. The authors tell readers how and where to shop successfully for a computer; what to expect their computer to do for them; how large a computer to consider; how to select software, whether or not to use a consultant; how to introduce the computer to the staff, and much more. Specific topics addressed include accounting records, warehousing, light factory operation and parts inventories. BK1223 $12.95.*

SO YOU ARE THINKING ABOUT A SMALL BUSINESS COMPUTER—By Richard G. Canning and Nancy C. Leeper. For a well-organized manual on the process of selecting the right computer system for your small business, this text can't be excelled. Designed to introduce the novice in data and word processing to the real benefits of computerization, the book is filled with money- and time-saving tips, photos of equipment, lists of suppliers, prices, explanations of computer terminology, and helpful references to additional sources of information. Everyone contemplating a first computer installation should have this book. BK1222 $14.00.*

HOW TO MAKE MONEY WITH COMPUTERS—In 10 information-packed chapters, Jerry Felsen describes more than 30 computer-related, money-making, high profit, low capital investment opportunities. BK1003 $15.00.*

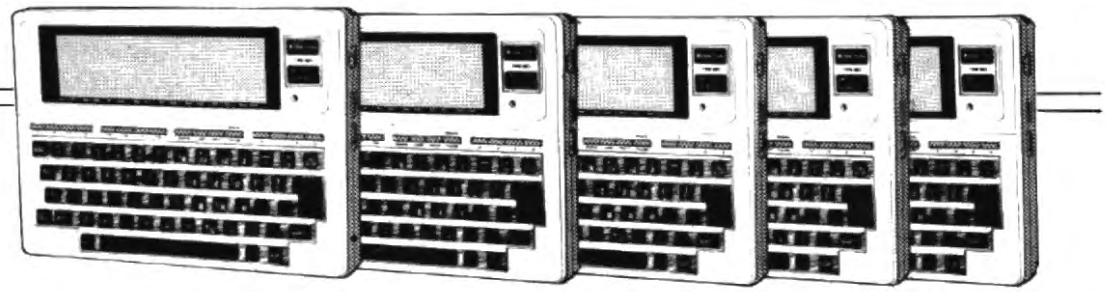
32 VISICALC WORKSHEETS—by Ted Lewis. Expand your VisiCalc horizons with these versatile worksheets. Thirty-two different programs include games and novelties, business and household applications, statistical analysis, and "what-if" models. Everything from tic-tac-toe to depreciation scheduling, from daily carbohydrate intake to installment payments. Two appendices cover VisiCalc commands and functions. The fully documented programs are ready to be typed into your computer. A valuable resource for any VisiCalc user. BK1286 19.95

BUSINESS SYSTEM BUYER'S GUIDE—By Adam Osborne with Steven Cook. When you enter the market place of small business computers, you face a bewildering array of products, prices, features and fables. This guide cuts through the jargon and unravels the task of buying the right computer system. This book provides solid information on how to determine your needs, how to choose software and hardware for all business applications, what to expect from vendors, what to avoid, and what questions you must ask. It also provides a wealth of detailed information on products, manufacturers, retailers and the whole microcomputer market. BK1229 $9.95

*Use the order card in this magazine or itemize your order on a separate piece of paper and mail to: 80 Micro Book Department ● Peterborough NH 03458. Be sure to include check or detailed credit card information. No C.O.D. orders accepted. $1.50 for the first book, $1.00 each additional book for U.S. delivery and foreign surface. For foreign airmail $10.00 per book. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write to Customer Service at the above address.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

For Toll Free Ordering Call 1-800-258-5473



Mighty Write

by Bradford N. Dixon
***80 Micro* Technical Editor**

One of the Model 100's most useful firmware utilities is its word processing program. Unfortunately, however, it provides no formatting commands similar to those found in other word processing programs. PRNTXT.BA is a short Basic program that reads text stored in do-files and prints it according to a user-specified format (see Program Listing 1).

Running the Program

When you run PRNTXT.BA, the first screen displays the programs resident in the Model 100's RAM. The program informs you that it formats text in do-files only.

Select the text file you want printed. Type in the file name and press the enter key. The File to Print prompt disappears and the program asks you to set the right and left margins. Then it asks whether you want the text single- or double-spaced. As soon as you answer, the program goes to work.

Program Operation

Line 130 opens the file you specified and the program reads each character one by one. Lines 160–280 test for the presence of a character. Lines 160 and 170 check the position of the print head.

When the print head is at its starting point at the left margin and the next character is a space, the program reads the following character. But if the print head encounters a space within 10 characters of the right margin, the program automatically generates a carriage return and line feed to prevent a word break (line 240).

The program also checks to see if a character is a carriage return. A carriage return brings the print head to the start of the next line and inserts the appropriate number of line feeds. Otherwise, the program moves to line 310 to check the line counter, then returns to line 140 to read another character.

The line counter in this program is set to 57 single-spaced lines per page. If you want to use a different sized paper, modify lines 230 and 310. You could also make the line counter a user-defined variable at the start of the program.

When the line counter reaches 57 lines, printing stops, the screen clears, and a short menu appears. For multipage printouts, press the N key to start printing the next page. Lines 350–370 contain a loop that generates 10 line feeds to provide proper spacing at page breaks for fan fold and roll paper, or a top margin of 10 spaces for cut-sheet paper.

Press the enter key to close a previously opened file and send the program back to the first screen at line 40. The E key terminates the print formatting program.

Enhancements

One advantage inherent to this program is its size. PRNTXT.BA occupies less than 1,400 bytes—small enough so that it doesn't restrict the size of text files.

With a bit more imagination, you could add options such as page numbering, page titles, and top/bottom margins. A modification that allows more than double spacing is also a possibility.

Nevertheless, this simple utility gives you an easy and versatile text formatter. ■

Key Box

The programs in "Mighty Write," "Consulting the I Ching," and "Cram 100" will run in 8K RAM. The programs in "Quick On-Site Job Estimate" and "To Market, To Market" require 24K RAM.

Variable	Description
CR$	Carriage return
F$	File name
LC	Line counter
LM	Left margin
RM	Right margin
S	Spacing (single or double)

Table 1. Variables list for PRNTXT.BA.

Program Listing 1. PRNTXT.BA.

```
10 ' Text Formatting Program
20 ' by Bradford N. Dixon
30 ' 80 Micro Technical Editor
40 CR$=CHR$(13):SP$=" "
50 CLS:LC=1:FILES
60 PRINT@170,CHR$(27);"p";" Text files o
nly (.DO) ";CHR$(27);"q";
70 PRINT@240,"File to print: ";:INPUT F$
80 GOSUB 440:PRINT@240,"Left Margin: ";:
INPUT LM
90 GOSUB 440:PRINT@249,"Right Margin: ";
:INPUT RM
100 GOSUB 440:PRINT@244,"Single or Doubl
e Spacing (1/2): ";:INPUT S:S=S-1
110 GOSUB 450
120 LPRINTTAB(LM)
130 OPEN F$ FOR INPUT AS 1
140 IF EOF(1) THEN 420
150 A$=INPUT$(1,1)
160 IF LPOS(0)=LM AND A$=SP$ THEN 140
170 IF LPOS(0) < RM-10 THEN 240
180 IF A$<>SP$ THEN 240
190 LPRINT A$
200 LC=LC+1
210 GOSUB 450
```

Listing 1 continued

Listing 1 continued

```
220 LPRINTTAB(LM)
230 IF LC<57 THEN 140 ELSE GOTO 340
240 LPRINT A$;
250 IF A$<>CR$ THEN 310
260 LC=LC+1
270 A$=INPUT$(1,1)
280 IFA$=SP$ THEN 270
290 GOSUB 450
300 LPRINTTAB(LM);
310 IF LC<57 THEN GOTO140
320 CLS:PRINT@50,"PRESS 'N' to print nex
t page":PRINT@90,"<ENTER> to print anoth
er file":PRINT@130,"'E' to end printing"
330 I$=INKEY$:IF I$="N" THEN 340 ELSE IF
 I$=CHR$(13) THEN 430 ELSE IF I$="E" THE
N 400 ELSE 330
340 LC=1
350 FOR I=1 TO 10
360 LPRINT
370 NEXT I
380 LPRINTTAB(LM);
390 GOTO 140
400 CLOSE
410 END
420 CLOSE:GOTO 320
430 CLOSE:GOTO 40
440 PRINT@240,SPACE$(40);:RETURN
450 IF S=1 THEN LC=LC+1 ELSE RETURN
460 LPRINT:RETURN
```

Consulting the *I Ching*

Conversion by Amee Eisenberg
***80 Micro* Technical Editor**

People often seek guidance when they're faced with a tough decision. Some seek out the peace of a forest, others find solace in the rhythm of the sea. But some people need more than nature's solitude. I wrote a conversion of Anthony Scarpelli's *I Ching* program (*80 Micro*, April 1980, p. 123) so Model 100 owners can find spiritual guidance on land or sea.

The I Ching

The ancient Chinese consulted the *I Ching*, or *Book of Changes*, as an oracle whose messages could align the people with the cosmic forces governing their lives. They believed their fate was the result of a balance between opposing life forces—the dark and the light, the negative and the positive, the receptive and the active, devolution and evolution—what the Chinese generally called yin and yang. The *I Ching* (pronounced Yee Jing) provided guidance in periods of change by revealing the relative influences of these opposing forces.

The Chinese defined 64 patterns of life change in the *I Ching*. In ancient times, they cast yarrow stalks and, from the random pattern the stalks created, developed a hexagram identifying one of those life patterns. By throwing the *I Ching*, the Chinese believed they could determine appropriate responses to present circumstances and future events.

More recently, three coins are used to throw the *I Ching*. The two sides of a coin represent the opposing forces. You throw the coins six times to generate a pattern that corresponds to broken (yin) and solid (yang) lines called a hexagram (see Fig. 1).

Today, Westerners use the ancient book to forecast events and make decisions—not according to principles of cause and effect, but through the dynamics of chance and coincidence.

Model 100 *I Ching*

The program I converted puts the *I Ching* at your fingertips. Type Program Listing 2 into your Model 100 and save it; I use the file name ICHING.BA. Run the program by positioning the cursor over the menu listing and pressing the enter key. The program doesn't accept lowercase input, so press your 100's caps lock key or remember to answer in uppercase letters.

The program first asks you if you want instructions. If you do, the instructions appear and the display automatically continues to the next screen until all the instructions have appeared.

After the instructions, the computer asks you if you're ready to begin. When you press the Y key, the computer prompts, "What is your question (enter)?" I find it easier to concentrate on my question if I've typed it. But if you don't want your question displayed, press the enter key and the screen goes blank.

You can throw the *I Ching* at any point thereafter. Take your time, concentrate on your question and, when you feel the time is right, press the space bar to simulate the throw of the coins. One of the nicest features of this program is that it lets you determine the moment of the "coin toss," rather than using a random function to throw the *I Ching*. Press the space bar six times, once for each line of the hexagram.

The computer highlights the hexagram lines that indicate change with an arrow. It posts the changed hexagram next to the original. Consult the *I Ching* to read the interpretations for your hexagram, the changing lines and the final hexagram.

Finally, the computer asks you if you wish to cast another *I*

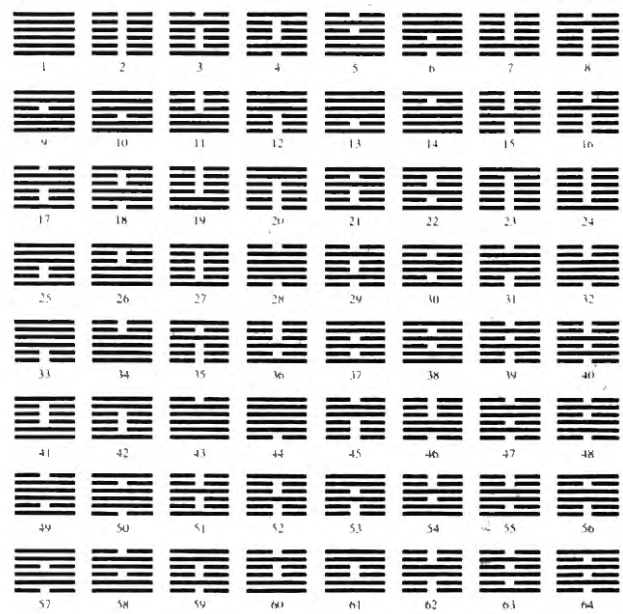


Figure 1. The King Wen sequence of hexagrams (devised in 1143 B.C.). In this arrangement the even numbered hexagram mirrors the previous odd numbered hexagram, reversing or inverting the pattern of broken and unbroken lines.

Ching hexagram. If you choose not to continue, press the break key to end the program.

Program Operation

As you run ICHING.BA, the program repeatedly counts from six to nine until you press the space bar. Six is a changing yin (broken) line that resolves itself to seven, a yang (solid) line. Nine, a changing yang line, resolves itself to eight, a yin line. Wherever the computer is in its count when you press the space bar determines the line cast.

The program counts with a nested For...Next loop in lines 300–400. Line 300 maintains a count from one to six to keep track of which of the six hexagrams it's casting. Line 310 generates the repeating count from six to nine. Line 320 checks to see if you've pressed the space bar. If you have, the program reads line 350, which jumps out of the six to nine counting loop to record which line it generates. Line 370 prints the generated line and line 390 adjusts the video display to accommodate the new line. If the hexagram is not complete by line 400, the program goes back to line 300 to start the process again. If you haven't pressed the space bar, lines 330 and 340 send the computer back to continue counting from six to nine.

Variable C acts as a flag to mark whether you've thrown a changing line. If C equals 1 after the program casts the original hexagram, the computer continues to the routine in lines 410–500. These lines write the changed hexagram.

By listing the numbers of the 64 hexagrams in the order of their progress from all yin to all yang lines, it's possible to have the computer calculate which hexagram is cast. After arranging the data, you then use the addressing routine in lines 520–590 (similarly for the changed hexagram in lines 710–810).

Line 520 initializes the variables A and T for the addressing routine. Line 530 begins another loop that counts to six. If the hexagram line is a broken line (a yin), the program skips to line 550. For example, if the hexagram comprises all yin lines, you count only A*2, or one. Six times through the loop still leaves T equal to 1. So in line 580, when the program counts from zero to T, it takes only one step.

The computer reads H, the first piece of data, and ends its loop. Line 610 prints H under the hexagram displayed on the screen. In the example presented here, the Model 100 displays a hexagram composed of all broken lines shown with the number 2 under it. And in fact, K'un or Natural Response is the second hexagram.

I've included a list of the hexagram names (see Fig. 2). As you become familiar with the *I Ching* and its hexagrams, knowing the name of the hexagram reminds you of its meaning. A simple program modification displays the hexagram name on the screen. Change the data statements in lines 620–670 to include the hexagram's name following its number. For example, DATA 2,Natural Response,....

Then, in lines 590 and 780, change READ H to READ H,H$. This tells the computer to put the numeric data, 2, in H and the string data, Natural Response, in H$. Modify PRINT H in lines 610 and 800 to PRINT H, H$. *Voila*! The computer now names the hexagrams. ■

Hexagram number	Hexagram name	Hexagram number	Hexagram name
1.	Creative Power	33.	Retreat
2.	Natural Response	34.	Great Power
3.	Difficult Beginnings	35.	Progress
4.	Inexperience	36.	Censorship
5.	Calculated Waiting	37.	Family
6.	Conflict	38.	Contradiction
7.	Collective Force	39.	Obstacles
8.	Unity	40.	Liberation
9.	Restrained	41.	Decline
10.	Conduct	42.	Benefit
11.	Prospering	43.	Resolution
12.	Stagnation	44.	Temptation
13.	Community	45.	Assembling
14.	Sovereignty	46.	Advancement
15.	Moderation	47.	Adversity
16.	Harmonize	48.	The Source
17.	Adapting	49.	Changing
18.	Repair	50.	Cosmic Order
19.	Promotion	51.	Shocking
20.	Contemplating	52.	Meditation
21.	Reform	53.	Developing
22.	Grace	54.	Subordinate
23.	Deterioration	55.	Zenith
24.	Returning	56.	Traveling
25.	Innocence	57.	Penetrating Influence
26.	Potential Energy	58.	Encouraging
27.	Nourishing	59.	Reuniting
28.	Critical Mass	60.	Limitations
29.	Danger	61.	Insight
30.	Synergy	62.	Conscientiousness
31.	Attraction	63.	After the End
32.	Continuing	64.	Before the End

For further reference:

I Ching, Richard Wilhelm and Cary F. Baynes, Princeton University Press.

I Ching, Raymond Van Over, Mentor Press.

Eight Lectures on the I Ching, Hellmut Wilhelm, Princeton University Press.

The I Ching and You, Diana Pfarington Hook, E.P. Dutton Publishers.

The I Ching Workbook, R.L. Wing, Doubleday and Company Inc.

Figure 2. Hexagram names.

Program Listing 2. ICHING.BA

```
10 REM INSTRUCTIONS AND QUESTION
20 CLS:INPUT "Do you want instructions
(Y/N)";Y$
30 IF Y$="Y"THEN1000ELSEIFY$<>"N"THEN20
40 CLEAR:CLS:PRINT"What is your
question(enter)";:INPUTQ$
60 CLS:PRINTQ$
110 CLEAR 60:DEFINT Y,C,D,I,L,J,A,T,H
120 DIM C(6):DIMD(6):DIML$(9)
150 A$=CHR$(231):C$=CHR$(154):D$="
"
210 L$(6)=A$+A$+A$+D$+A$+A$+A$+D$+C$
220 L$(7)=A$+A$+A$+A$+A$+A$+A$
230 L$(8)=A$+A$+A$+D$+A$+A$+A$
240 L$(9)=A$+A$+A$+A$+A$+A$+A$+D$+C$
250 Y=240
260 YC=255
270 C=0
300 FOR I=1TO6
```

Listing 2 continued

MODEL 4 OWNERS

CONVERT your MODEL I/III

PROGRAMS TO RUN ON MODEL 4

Do you have a lot of time and money invested in Model I/III software, well now you can convert Model I/III BASIC programs to Model 4 with **CONVERTR**.

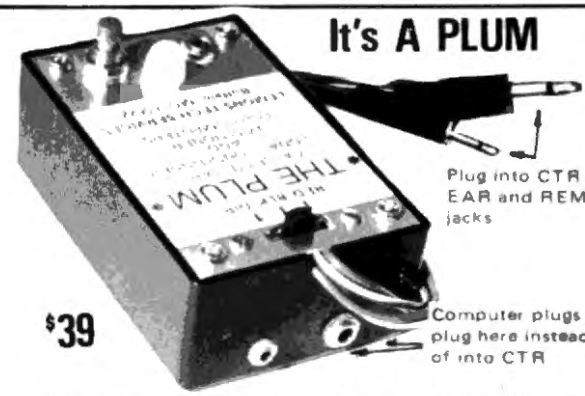
CONVERTR will eliminate unnecessary spaces and insert all required spaces in your BASIC programs. **CONVERTR** will identify lines which contain keywords not supported by Model 4. **CONVERTR** will identify lines and keywords which the Model 4 handles differently. **CONVERTR** is menu driven and includes an option to list your program and error table on your printer.

CONVERTR comes on a disk and includes an instruction booklet on How to Convert your BASIC programs.

CHECK – MONEY ORDER
COD – VISA – MC
CONVERTR
1 DRIVE SYSTEM - 89.00
2 DRIVE SYSTEM - 79.00

ADEL COMPUTER MART
DEPT 10 BOX 195 ⌐356
HARTLY, DE 19953
PHONE 5 pm-9 pm M-F
9-5 Sat (302) 492-8463

It's A PLUM



$39

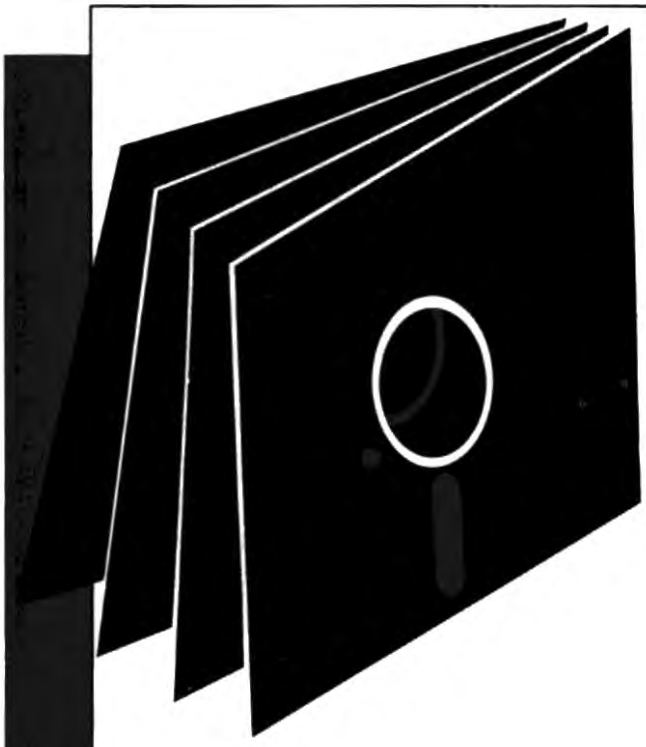
No more volume juggling when you SYSTEM and CLOAD. No more plug pulling either...with built-in audio and built-in CTR motor pushbutton you can find and position pgms with ease. Put silent 'marker' gaps at the touch of a button too. Plus hear what's happening as you load and save.

The new PLUM (power-loader-universal-model) works with most CTRs incl. R/S CTR 80, 80A, 40,41,CCR81 and others. Install in seconds.... just plug between Mod I/III/4 and CTR. Works all bauds including =kwik=. No line cord. Auto on-off...standard 50¢ battery lasts for months. Life warranty on loading module. Money back guarantee of satisfaction.

Order PLUM by name....$39.00
Phone or write.
Postpaid except add $4 overseas air. Add $3 cod

LEMONS TECH
325 N. Hwy 65
P.O. Drawer 429
Buffalo, MO 65622
(417) 345 7643

MasterCard VISA ⌐515



TURNING THE PAGE TO A NEW DISKCOVERY

MERLIN
MAG-80
FLOPPY DISK MAGAZINE
"The Magazine of the 80's"

A monthly publication to run on your TRS 80* I, III or IV (available soon for 12 and 16)

- Useful and entertaining programs.
- Innovative, ready to run Puzzles/Games.
- Informative, up to date articles.
- Reviews of latest Games, and programs. (These items offered at discounted prices).
- Articles submitted for publication are welcome.

First month's subscription $10
(includes diskette, mailer and return postage)
Additional months only $5 each.
Send check, money order or inquiries to:

HBH PUBLISHING, INC.
DEPT. A, P.O. Box 8470
BOSSIER CITY, LOUISIANA 71113 ⌐318

*TRS-80 IS A TRADEMARK OF RADIO SHACK, A DIVISION OF TANDY CORP.

⌐See List of Advertisers on Page 323

Listing 2 continued

```
310 FOR J=6TO9
320 T$=INKEY$:IFT$=" "THEN350
330 NEXT J
340 GOTO 310
350 L=J
360 D(I)=L
370 PRINT@Y,I;" ";L$(L);
380 IF L=6 OR L=9 THENC=1
390 Y=Y-40
400 NEXT I
410 IF C=0THEN520
420 FOR I=1TO6
430 IF D(I)=6THENL=7:GOTO470
440 IF D(I)=9THENL=8:GOTO470
450 L=D(I)
470 C(I)=L
480 PRINT@YC,L$(L);"  ";
490 YC=YC-40
500 NEXT I
520 A=1:T=0
530 FOR I=1TO6
540 IF D(I)=6ORD(I)=8THEN560
550 T=T+A
560 A=A*2
570 NEXT I
580 FOR I=0TOT
590 READ H
600 NEXT I
610 PRINT @286,H;:RESTORE:GOTO700
620 DATA 2,24,7,19,15,36,46, 11,16,51,40,54
630 DATA62,55,32,34,8,3,29,60,39,63,48,5
640 DATA 45,17,47,58,31,49, 28,43,23,27,4,41
650 DATA 52,22,18,26,35, 21,64,38,56,30,50,14
660 DATA20,42,59,61,53,37,57,9,12,25,6
670 DATA10,33,13,44,1
680 PRINT"Press space bar to do
another hexagram";
690 T$=INKEY$:IFT$=" "THEN 40 ELSE
690
700 IF C=0 THEN 680
710 A=1:T=0
720 FOR I=1TO6
730 IF C(I)=8 THEN750
740 T=T+A
750 A=A*2
760 NEXT I
770 FOR I=0TOT
780 READ H
790 NEXT I
800 PRINT@298,H
810 RESTORE
820 GOTO680
1000 CLS:PRINT:PRINT"The oracle
of the I Ching speaks to you of
the changing patterns and compelling
forces in the cosmos."
1010 FORX=1TO2500:NEXTX:CLS
1020 PRINT:PRINT"Concentrate on
your question.":PRINT"The computer
allows  you  to write down your
question, if you choose."
1030 FORX=1TO2500:NEXTX:PRINT"'Throw'
your hexagram when the question
is clear in your mind. "
1040 FORX=1TO2500:NEXTX
1050 CLS:PRINT:PRINT"When  you
feel  it's right,  press the space
bar.  This throws  three symbolic
coins; a line appears."
1060 FORX=1TO2500:NEXTX
1070 CLS:PRINT:PRINT"Press the
space bar six times, once for each
line of the hexagram.  There will
be no prompts, just a blank screen"
1080 FORX=1TO2500:NEXTX
1090 CLS:PRINT:PRINT"The six lines
of  your hexagram compose the oracle's
answer. The hexagram's num-ber
appears underneath it."
1100 FORX=1TO2500:NEXTX
1110 CLS:PRINT:PRINT"Some of  the
lines you  throw  will be changing.
These are marked with  small  arrows."
1120 PRINT"The changed hexagram
and its number are shown to the
right of the first."
1130 FORX=1TO2500:NEXTX
1140 CLS:PRINT:PRINT"Consult  your
copy  of the  I Ching for insight
into the meaning of the hexagram..."
1150 FORX=1TO2500:NEXTX
1160 CLS:PRINT:INPUT "Are you ready
(Y)";Y$
1170 IFY$="Y"ORY$="y"THEN40ELSEGOTO1120
```

Quick On-Site Job Estimate

by Beve Woodbury
***80 Micro* Technical Editor**

Carry your Model 100 instead of a clipboard for quick on-site job estimates. It's convenient to handle, looks impressive, and relieves some of the tedium of calculating job estimates based on material and labor costs.

Setting up the Materials File

Program Listing 3 sets up the materials file. The record format begins with a part number that can be any number except zero. Next, enter a brief word description of the part and enter the cost (do not use commas).

The program loads the materials file into an array when it boots up, thus avoiding rewriting the file for each change. You add, delete, or change the cost of the materials from the main menu. You can also print a listing of all items in the array. When you print the array, all additions and changes appear. Deletions are indicated by a zero in the part number column.

You can change the Parts.DO file (the materials listing) in the Text mode. Changing the file using this method may seem faster, but if you make the slightest error in the format, the estimating program won't function properly.

When the program begins, you're asked how many items you want to add. The program sets up an array with sufficient rows for the requested additions and fills the row with zeros. You can make fewer but no more additions than you requested.

When you add an item, the computer asks for the part name, description, and cost. You can assign a labor part number and a per-hour cost.

When you delete or change an item's cost, you can search by either part number (U) or by part name (A). If the part is not in the array, the program displays Part Not Found and returns to the menu.

SOUND

HEAR PAC-MAN! WRITE MUSIC! ETC.

$19.95

FOR YOUR MODEL I, III OR 4

ECONOMICAL!

Our kit enables the amplifier and speaker in your CTR-41, CTR-80, or CCR-81 recorder to provide sound generated by your TRS-80*. Nothing else to buy. Does not eliminate any other function. (Modified CTR-80 will not accept batteries.)

ANYONE CAN INSTALL IT!

No trace-cutting. Detailed instructions permit easy installation within one hour. CTR-80 kit requires only a screwdriver to assemble. CTR-41 and CCR-81 kits require drilling one hole. Some CTR-41's may require removal of excess solder at one mounting point.

NO CLUTTER!

Installed components are enclosed within and are integral with the recorder case.

ONLY $19.95 POSTPAID!

Virginia residents add 4% sales tax. Be sure to specify recorder model CTR-41, CTR-80, or CCR-81 and send check or money order to:

THE LOWERRE COMPANY, INC.
P.O. Box 2183
Manassas, Virginia 22110

*TRS-80 is a trademark of Tandy Corp.

✓477

EPSON GRAPHICS

FROM YOUR

BASIC • FORTRAN • PL-1 • PASCAL

PROGRAMS

Grafpac-80 will read data from a disk file on your system and convert it to a hi-resolution plot or graph. Grafpac-80 plots up to 960 dots across and ± 32000 dots vertically on the Epson MX-80 — that's ± 25 pages !!

Grafpac-80 commands include: circle, ellipse, two and three dimensional data, penup/down, plot/move relative or absolute, single character or string plotting with rotation and size control, border generation, and many more.

Grafpac-80 is available for CP/M on 8 inch disk, TRS-DOS (model I and III) on 5¼ inch disk. Requires 48K memory. TRS-DOS systems need two disks.*

Prices: TRS-DOS I & III $49.95

CP/M $69.95

(Please include $3.00 shipping charge with all orders)

* A version is available for TRS-DOS users with one disk, however, you must send us a copy of your TRS-DOS and include $10.00 for copying.

M.E.S.C. • Parkhurst Drive • Salisbury, MD 21801 • (301) 742-7333

The following are registered trademarks: CP/M - Digital Research, TRS-DOS, TRS-80 - Tandy Corp., MX-80 Epson Corp.

✓398

PRICES YOU CAN'T BEAT!..

LNW-80 Model II

128K, 5"/8" DISK CONTR., RGB COLOR, HI-RES GRAPHICS, RS 232, PAR. PRINTER PORT, 80x24 DISPLAY, 1 YEAR WARRANTY, PLUS

MICROSOFT BASIC, LNW BASIC, DOS+ 3.4, CPM 2.2, CHART-X GRAPHICS, MICROTERM, ELECTRIC PENCIL, ELECTRIC SPREADSHEET, PROF. BUSS. ACCTING (general ledger, accts. pay., accts. rec., payroll) **$1959**

BUY THIS MONTH, GET A TEAC 40 TRK S/S **FREE**

COMPUTERS

PMC 81, 16K	$499	32K EXPANDOR	$375
TIMEX	$56	16 MEM	$42
APPLE CLONE (SYSCON 2)			$599
TRS 80 COLOR COMP. 16K			$269
TRS-80 MOD. IV, 64K, 2 40 TRK S/S			$1,799

CRT MONITORS

AMDEK 300 GREEN	$139
AMDEK 300 AMBER	$159
AMDEK COLOR I	$359
AMDEK COLOR II	$639
TAXAN RGB COLOR I	$299
TAXAN RGB GOLOR III	$535
TAXAN GREEN	$125
TAXAN AMBER	$139

TEAC ½ SIZE DRIVES

	Bare	Compl
FD 55A 40TRK S/S	$209	$245
FD 55B 40TRK D/S	$280	$319
FD 55F 80TRK D/S	$350	$390

ALL TEACS HAVE A 1 YEAR WARRANTY

TANDON DRIVES

	Bare	Compl
100-1 40TRK S/S	$189	$230
100-2 40TRK D/S	$259	$299
100-4 80TRK D/S	$340	$385

ECONOMY DRIVES

COMPLETE W/CASE/PWR SUPL/CABLE
40TRK S/S **$195**

APPLE COMPATIBLE DRIVE
W/ CONTR CARD, CASE & CABLE **$295**

C-ITOH PRINTERS

	PAR	SER
PROWRITER 8510	$375	$525
PROWRITER 1550	$579	$725
F-10 40CPS	$1195	$1195
F-10 55CPS	$1475	$1475
F-10 TRACTOR FEED		$195
QUME SPRINT 11 40CPS		$1,450

MODEMS

NOVATION J-CAT	$135
SIGNALMAN	$85

LNW SYSTEM EXPANSION II

UPGRADE YOUR MOD 1 OR PMC-80/81 WITH DISK CONTROLLER - RS 232 - PARALLEL PRINTER PORT - 32K 200 NS MEMORY - GOLD CONNECTORS - TRANSFORM - CASE - CABLE

SPECIAL THIS MONTH $339

EXPANSION INTERFACES

MICRO DESIGN MDX-2	$449
MICRO DESIGN MDX-3	$289
LNW DOUBLER w. DOS+ 3.4	$189
DOUBLE DENSITY MULTIPLIER	$95

SOFTWARE

LAZY WRITER	$159	MULTIDOS	$89
ELECTRONIC WEBSTER	$119	SUPER UTILITY +	$65
MAXI MANAGER	$129	M.A.S. 80	ea. $135
POSTMAN	$119	NEWSCRIPT	$114
DOS PLUS 3.4	$89	OMNITERM	$78

24 HOUR TOLL FREE ORDERS
VISA/MASTER CHARGE ONLY:
(800) 633-2252 EXT 720

ALL QUESTIONS: (313) 538-1112

MICHIGAN RESIDENTS ADD 4% SALES TAX. POSTAGE CALL FOR CHARGES. PRICES ARE DISCOUNTED FOR CASH AND MONEY ORDER (NON CERTIFIED CHECKS ALLOW 2 WEEKS TO CLEAR). MASTER CARD AND VISA ADD 3%. NO C.O.D. NO NET TERMS.

VESPA COMPUTER OUTLET

16727 Patton Detroit MI 48219

✓See List of Advertisers on Page 323

Variable	Description
A( )	Numeric array for part number (1) and cost (2)
A$( )	String array for part description
AD	Number of parts to be added
C	Cost of part
CA	Number of new parts input
D	Length of arrays
D$	Description of part
DL$	Decision—delete or not?
H	Loop counter
I$	Pause control
K	Loop counter
L	Line counter
N	Menu choice number
NA$	Name of part for search
NU	Number of part for search
P	Part number
R	Array row location for new part input
S	Array row location for file input
S$	Decision—search by part or number
X	Array row location for file output
Z	Part not found flag

Table 2. Parts set-up variables.

When the program finds the part, it prints the part number, description, and cost. If you choose the Change option, the program prompts you for the new cost. If you choose the Delete option, the program prompts you for a confirmation or cancellation. After each option, the program returns you to the menu.

Option 5, the Quit option, writes the file from the array and ends the program. If you don't use option 5, all additions, changes, and deletions made are lost.

Getting Estimates

Program Listing 4 is the job estimate program. The program reads the parts file into an array. You are asked for a job title and a job description. A menu gives you the option of entering a part needed, printing an estimate, printing the parts array, performing a special calculation, or ending the program.

Call up a part either by the part number or name. If the program can't find the part, you are notified and returned to the menu.

Enter the number of the parts you need, and the computer prints the quantity, description, and the calculated cost of the part.

The Print Estimate and Print Parts Array listings pause when they fill the screen; press any key to continue.

The Print Estimate option prints a list of the quantity, description, unit cost, and total parts cost of each item you need to complete a job. It then prints a parts estimate and a final estimate.

The Print Parts Array prints all parts in your inventory.

The program adds an overhead/profit markup of 35 percent to the parts estimate. Change this margin by changing the .35 in line 370. Pressing any key returns you to the main menu.

Program Listing 3. Parts set-up.

```
10 MAXFILES=1
20 F$="###  \         \  ##.##   ###"
30 OPEN"RAM:PARTS.DO" FOR INPUT AS 1
40 CLS:PRINT:PRINT"   SETTING UP ARRAY"
50 IF EOF(1) THEN CLOSE:GOTO70
60 INPUT#1,P,D$,C:R=R+1:GOTO50
70 PRINT:INPUT" HOW MANY NEW PARTS WILL
YOU ADD ";AD:D=R+AD
80 OPEN"RAM:PARTS.DO" FOR INPUT AS 1
90 DIM A$(D),A(D,2)
100 IF EOF(1) THEN CLOSE:GOTO140
110 INPUT#1,P,D$,C:S=S+1
120 A$(S)=D$:A(S,1)=P:A(S,2)=C
130 GOTO100
140 NU=0:NA$=" ":Z=0:CLS:PRINT@18,"MENU"
150 PRINT@50,"1. CHANGE PART PRICE"
160 PRINT@90,"2. ADD NEW PART"
170 PRINT@130,"3. DELETE PART"
180 PRINT@170,"4. PRINT ARRAY"
190 PRINT@210,"5. QUIT"
200 PRINT:INPUT"ENTER CHOICE NUMBER:";N
210 IF N>5 THEN140
220 IF N=5 THEN CLOSE:GOTO520
230 CLS:ON N GOTO 240,270,330,380
240 GOSUB420:IF Z=1THEN140
250 INPUT"NEW COST ";A(K,2)
260 GOTO140
270 R=R+1:CA=CA+1
280 IF CA>AD THEN PRINT@88, "BEYOND ADD
LIMIT":FOR H=1TO500:NEXT:GOTO140
290 PRINT:INPUT"PART NUMBER: ";A(R,1)
300 PRINT:INPUT"DESCRIPTION: ";A$(R)
310 PRINT:INPUT"COST: ";A(R,2)
320 GOTO140
330 GOSUB420:IFZ=1THEN140
340 INPUT"DELETE?  Y/N ";DL$
350 IF DL$="N"THEN 140
360 IF DL$="Y"THEN A(K,1)=0:GOTO140
370 GOTO340
380 FOR H=1TOD
390 PRINTUSINGF$;A(H,1),A$(H),A(H,2)
400 L=L+1:IFL=7THEN L=0:INPUTI$
410 NEXT:INPUTI$:GOTO140
420 CLS:INPUT"SEARCH BY PART NUMBER, OR
NAME? U/A:";S$:PRINT
430 IF S$="U" THEN INPUT"PART NUMBER ";N
U:GOTO460
440 IF S$="A" THEN INPUT"PART NAME ";NA$
:GOTO460
450 GOTO420
460 FOR K=1TOD
470 IF NU=A(K,1)OR NA$=A$(K)THEN510
480 NEXT
490 PRINT@210,"PART NOT FOUND":Z=1
500 FORH=1TO500:NEXT:RETURN
510 PRINT:PRINT"  "A(K,1)"  "A$(K)"  "A(
K,2):PRINT:RETURN
520 OPEN"RAM:PARTS.DO" FOR OUTPUT AS 1
530 CLS:PRINT" PRINTING NEW PARTS FILE"
540 FORX=1TOD
550 IF A(X,1)=0 THEN570
560 PRINT#1,A(X,1);",";A$(X);",";A(X,2)
570 NEXT:CLOSE:END
```

You've Got TOTAL ACCESS™

TO YOUR COMPUTER HARDWARE & SOFTWARE NEEDS. CALL ROSE TODAY!

AEROCOMP DISK DRIVES

External drives for TRS80 Mod. I or III, IBM PC & TI 99/4A are complete with power supply & enclosure.

40 Track Single Side (Tandon)	$199
40 Track SS "Flippy" (MPI)	239
40 Track Dual Head (Tandon/MPI)	279
80 Track SS (MPI)	299
80 Track SS "Flippy" (MPI)	329
80 Track Dual Head (Tandon)	379
Color Computer Add-On Drives (2nd & 3rd)	199

8" EXPANSION BOX

Complete system with power supply & fan (slimline)

Two 8" Single Side	$699
Two 8" Double Side	849

***All New! Half-High Drives Available Now. Call For Prices.**

BARE DRIVES

Internal drives for TRS80 Mod. III, IBM PC & TI 99/41 (controller required)

40 Track SS (Tandon)	$169
40 Track Dual Head (Tandon/MPI)	249
80 Track SS (MPI)	269
80 Track Dual Head (Tandon)	339
8 inch Single Side Thinline	260
8 inch Dual Head Thinline	375

MODEL III DRIVES

Complete internal drive kits with 40 track drives, disk controller, power supply, all hardware & cables.

Drive Kit Only (no drives)	**$199**
One Drive System Kit	369
Two Drive System Kit	**539**

MODEL I DOUBLE DENSITY CONTROLLER

AEROCOMP "DDC"	**$99**
AEROCOMP "DDC" w/LDOS	169
AEROCOMP "DDS" (Double dens. data separator for Percom Doubler, LNDoubler or Superbrain	49
AEROCOMP "SDS" (Single dens. data separator)	29

MISCELLANEOUS DRIVE STUFF

TRSDOS 2.3 Disk & Manual	$20
LDOS (Mod. I or III)	119
NEWDOS/80, 2.0 (Mod. I or III)	129
Diskettes (10 in library box)	23
MX80 Ribbons	$9
Drive Power Supply & Enclosure (5.25")	59
2-Drive cable	24
4-Drive cable	34
Extender cable	13

© Total Access 1983

MICRO DECISION

$1299

64K CP/M 2.2, two serial ports
MBASIC - WordStar - Logicalc
BaZic - Correct-IT
12" Green Video 80 x 25
Double Density (200K) Drive

FRANKLIN ACE1000
Uses APPLE Software
Call, it may be cheaper by now
$999

brother
EM-1 Electronic Typewriter
HR1 PRINTER
Choose Either One
$799

EPSON FX-80
160cps Friction/Tractor ($32 Option)
10,12,16.5 cpi + Doublewide 6,8,12 1pi
$569

TRS-80 SPECIAL EQUIPMENT

80 x 24 Video Board for the Model III	$199
112K CP/M 2.2 for the Model III	$399
16K Memory, 200nsec, Guar 1 yr	8/$12
64K Memory, 200nsec, Guar 1 yr	8/$48
12" Green Phosphor Monitor	$87

SOFTWARE

Super Utility Plus 3.0 by Kim Watt	$59
Alcor PASCAL, Model I or III	169
P&T CP/M for the Mod II	159
P&T CP/M for the Mod 16	189
P&T CP/M for the Hard Disk	199
All SNAPPWARE	**10%**OFF

I have lots of other software. Call me now for your needs. All at discount.

MEDIA & SUPPLIES

8" disks SS DblDen, Guar. Forever	$29
8" disks DS DblDen, Same Guarantee	39
5" Flipsort, holds 75 disks	19
8" Flipsort, same deal	29
5" Library boxes	$2.50
8" Library boxes	$3.50
5" or 8" Head cleaning kit	9
Tractor paper, letter size 2900 sheets	25

LNW COMPUTERS

128K LNW-80 Model II, Both NTSC & RGB outputs. RS232 and parallel printer port. Uses both 5" and 8" drives. Works on all known TRS-80 DOS's. Comes with DOSPLUS. Also works with CP/M 2.2 which is included at no extra cost. Now a FREE 12" GREEN PHOSPHOR monitor and cable included. All for the low price of $1695

PRINTERS & OTHER ACCESSORIES

ANADEX DP-9500A or 9501A	$1239
ANADEX DP-9620A, 200 cps	1399
ANADEX WP-6000, 284 cps, NLQ	2695
PROWRITER, 120 cps, 10" Friction/Tractor	375
PROWRITER 2, 120 cps, 15" Fric/Trac	669
STARWRITER F-10, 40 cps Daisy Wheel	1250
PRINTMASTER F-10, 55 cps Daisy	1499
Rutishauser Bidirectional Tractor	199
Rutishauser Sheet Feeder	895

PERIPHERALS –

32K LNW Expansion Interface w/RS232	$329
Mod III RS232 complete, ready to install	79
Signalman Mk I Modem 300 baud, direct connect	89

Please add $5 handling charge to all orders under $24

ORDER NOW! TOLL FREE 800-527-3582

Write or call. Toll free lines are for orders only. Texas residents call 214/458-1966 and deduct $2.00 from your order. If you need technical information or service use the Texas number. Prices are subject to change without notice and are mail order only. I accept VISA or MASTERCARD, you can send a check or money order (allow a couple of weeks for personal or company checks to clear) or order COD (cash, certified check or money order only). Shipping is not included unless otherwise indicated. Please add $5 handling charge to all orders under $24. Texas orders add 5% tax. No tax added on shipments outside Texas. Order up – I need the money!

TOTAL ACCESS™
P.O. BOX 790276
DALLAS, TX 75379
214-458-1966 ↙81

NEXT DAY SHIPMENT on all in stock Merchandise.

↙See List of Advertisers on Page 323

Variable	Description
A( )	Numeric array for part number (1), cost (2), amount (3)
A$( )	String array for part description
AD	Number of parts to be added
C	Cost of part
CR	Calculation result
C1	First calculation input
C2	Second calculation input
C3	Third calculation input
D	Length of arrays
D$	Description of part
E	Estimate including markup
F$	Parts print format
FF$	Job estimate file name
G$	Estimate print format
H	Loop counter
I$	Pause control
J$	Job description
K	Loop counter
L	Line counter
N	Menu choice number
NA$	Name of part for search
NU	Number of part for search
P	Part number
PE	Total parts estimate
PP	Cost of total number of specific part wanted
PX	Calculated cost of specific part wanted
S	Array row location
T$	Job title
WF$	Write file print format
X	Number of parts
Z	Part not found flag

Table 3. Job estimator variables.

Do Calculations lets you perform up to five calculations related to your estimates. I included calculations for square footage and cubic footage. Customize this part of the program area to suit your needs.

All calculation variables are set to zero (line 550) when the program prints the calculation menu in lines 540–600. Place your own function names here. Function 1 starts in line 640, function 2 in line 680, and so on (see line 630).

Use the Input command to enter commands to input the variables needed for the function in the first line (see lines 650 and 690). Put any comment that helps you understand the required input inside the quotes. If you use more variables than C1, C2, and C3, be sure to set them to zero in line 550.

The function formula goes in the next line. Use the variable name where you want the variable number put. Set up the formula in the format CR = (write in your own formula):GOTO 790. Line 790 prints the answer, waits for you to enter any key, and returns you to the main menu.

Quit writes the estimate file. H uses the first six letters of the job title and adds the .DO extension to the file name. This file contains the parts and quantity for a specific job, the parts' estimate, and the final estimate with the markup. Don't exit the program without the Quit option, or you'll lose all your data.

Read the estimate file by placing the cursor over the file name and pressing enter. Print a hard copy by using the Model 100's shift-print key function. ■

Program Listing 4. Job estimator.

```
10 CLS:MAXFILES=3
20 F$="###   \          \  ##.##    ###"
30 G$="###   \          \  ##.##   ####.##"
40 WF$="###   \          \  ##.##    ###   #
###.##"
50 PRINT:INPUT"    ENTER JOB TITLE: ";T$
60 PRINT:PRINT"    ENTER JOB DESCRIPTION:
 ":PRINT:INPUT J$
70 OPEN"RAM:PARTS.DO"FOR INPUT AS 1
80 CLS: PRINT "SETTING UP ARRAY"
90 IF EOF(1) THEN CLOSE:GOTO110
100 INPUT#1,P,D$,C:D=D+1:GOTO90
110 OPEN"RAM:PARTS.DO" FOR INPUT AS 1
120 DIM A$(D),A(D,3)
130 IF EOF(1) THEN CLOSE:GOTO170
140 INPUT#1,P,D$,C:S=S+1
150 A$(S)=D$:A(S,1)=P:A(S,2)=C
160 GOTO130
170 CLS:PRINT@18,"MENU"
180 PRINT@50,"1. ENTER PART"
190 PRINT@90,"2. PRINT ESTIMATE"
200 PRINT@130,"3. PRINT PARTS ARRAY"
210 PRINT@170,"4. DO CALCULATION"
220 PRINT@210,"5. WRITE JOB FILE/QUIT"
230 PRINT:INPUT"ENTER CHOICE NUMBER:";N
240 CLS:ON N GOTO 250,380,500,540,800
250 NU=0:X=0:NA$=" "
260 PRINT:INPUT" PART NUMBER ";NU
270 IF NU=0 THEN PRINT:INPUT"PART NAME "
;NA$
280 FOR K=1TOD
290 IF NU=A(K,1)OR NA$=A$(K)THEN330
300 NEXT
310 PRINT@210,"PART NOT FOUND":Z=1
320 FORH=1TO500:NEXT:GOTO170
330 PRINT:INPUT"NUMBER OF PARTS ";X
340 PX=X*A(K,2)
350 PRINT:PRINTUSINGF$;X,A$(K),A(K,2)
360 A(K,3)=A(K,3)+X
370 FOR H=1 TO 500:NEXT:GOTO170
380 PRINT:PRINTTAB(10);J$:PRINT:L=0:PP=0
:PE=0
390 FORK=1TOD
400 IFA(K,3)=0THEN 450
410 PP=A(K,2)*A(K,3)
420 L=L+1:IF L=8 THEN INPUTI$:L=0
430 PRINTUSINGG$;A(K,3),A$(K),A(K,2),PP
440 PE=PE+PP
450 NEXT:L=0
460 E=PE+(PE*.35) :E=(INT((E+.005)*100))
/100
470 PRINT:PRINT" PARTS ESTIMATE IS ";PE
480 PRINT:PRINT"       ESTIMATE IS ";E:I
NPUTI$
490 GOTO170
500 FOR H=1TOD
510 L=L+1:IFL=8THEN INPUTI$:L=0
520 PRINTUSINGF$;A(H,1),A$(H),A(H,2),A(H
,3)
530 NEXT:L=0:INPUTI$:GOTO170
540 CLS:PRINT@18,"MENU"
550 C1=0:C2=0:C3=0:CR=0
560 PRINT@50,"1. SQUARE FEET"
```

Listing 4 continued

IN CHICAGO

. . . YOU'VE HEARD ABOUT US . . .

EbG & ASSOC

Emmanuel B. Garcia, Jr. & Associates
203 North Wabash Ave. • Chicago, IL 60601
312/782-9750

- serving the TRS-80* community since 1978
- full service microcomputer store
- well-stocked display room
- quality products only
- personalized service
- good technical support
- repair facilities

ALL PERIPHERALS, YOU NEED... AND CAN AFFORD!

EbG & Associates
RADIO SHACK* DEALER STORE #R-619
414 Liberty Street • Morris, Illinois 60450
815/942-9521

your ACCESS TO INFORMATION

PREPAID ORDERS SHIPPED PROMPTLY.
AMERICAN EXPRESS / VISA / MASTERCHARGE & C.O.D. ACCEPTED. (Add $2 shipping, $9 per drive or printer)

Trademark of Tandy Corporation

✓271

TRS-80™ OWNERS... Enter the World of POWERSOFT

Nationally Acclaimed Programs for the TRS-80 Computers

Now from the authors of **SUPER UTILITY+** a complete line of software to increase the use and capabilities of your system.

While **SUPER UTILITY+** won recent honors as Utility Program of the year by the 200,000 readers of *80 Micro*, the quality and consistency carries through the complete Powersoft line.

Professionally written and completely documented, Powersoft programs are accepted as industry standards among TRS-80 enthusiasts.

SUPER UTILITY PLUS	74.95	PowerMAIL+	150.00
SCRIPLUS	39.95	PowerDRAW	39.95
TOOLBOX FOR LDOS	69.95	PowerDOT	49.95
MASTER MECHANIC SET FOR LDOS	39.95	PowerDRIVER	29.95
BASIC/S COMPILER SYSTEM	49.95	PowerTERM	29.95
MAKE/80	49.95	INSIDE SU+	19.95
SUPERMOVE XFER SYSTEM	700.00	SU+ TECH MANUAL	14.95
DOSPLUS II	250.00	SU+ SPECIAL EDITION	500.00

BOOT UP WITH POWERSOFT...
THE WORLD'S MOST POWERFUL SOFTWARE VENDOR!

WE SUPPORT LDOS! BUY ANY PRODUCT AND GET LDOS FOR $99!

SEND FOR OUR COMPLETE CATALOG TODAY!
DEALER INQUIRIES INVITED
AVAILABLE THROUGH SELECTED DEALERS EVERYWHERE

POWERSOFT
PRODUCTS FROM BREEZE/QSD INC

11500 Stemmons Fwy.
Suite 125
✓306 Dallas, Texas 75229
Info: (214) 484-2976
Orders Only 800-527-7432

MCW MIDWEST COMPUTER WHOLESALE MCW

AS A WHOLESALER, MCW'S SERVICE IS NOT RECOMMENDED FOR EVERYONE. A WHOLESALE TRANSACTION IS BEST SUITED TO THE INFORMED OR EXPERIENCED SHOPPER, ONE WHO KNOWS HIS NEEDS. IF YOU ARE A BEGINNER WE ASK THAT YOU DEAL WITH A RETAILER WHO'S HIGHER MARGIN ALLOWS THE "HAND HOLDING LEVEL OF SUPPORT WHICH WE CAN'T PROVIDE AT THESE PRICES. IF HOWEVER YOU DON'T NEED "HAND HOLDING" WE CAN OFFER YOU TREMENDOUS VALUES AND SAVINGS ON ALL YOUR COMPUTER SYSTEMS NEEDS. PLEASE READ ON.

CHECK THESE SAMPLES OF OUR PRODUCTS GIVE US A CALL IF YOU DON'T FIND EXACTLY WHAT YOU ARE LOOKING FOR

COMPUTERS * * * *
TRS-80 MOD4 64K (2) DRIVES 40TR/SS/DD.....$1549.00
TRS-80 MOD2 64K (1) DRIVE 77TR/SS/DD.....$2500.00
VICTOR 9000 128K (2) DRIVES 80TR/SS/DD.....$2995.00
SANYO MBC-1000 64K (1) DRIVE 40TR/DS/DD.....$1690.00

RAW DISK DRIVES * * * (WE STOCK TANDON AND MPI)
40 TRACK SINGLE SIDE DRIVES FROM.....$147.00
40 TRACK DOUBLE SIDE DRIVES FROM.....$184.00
80 TRACK SINGLE SIDE DRIVES FROM.....$202.00
80 TRACK DOUBLE SIDE DRIVES FROM.....$272.00
77 TRACK SINGLE SIDE 8" DRIVES FROM.....$357.00
77 TRACK DOUBLE SIDE 8" DRIVES FROM.....$462.00
SINGLE CASE AND POWER SUPPLY 5" FROM.....$53.00
DUAL CASE AND POWER SUPPLY 5" FROM.....$86.00
SINGLE AND DUAL 8" CASE AND POWER SUPPLY FROM...$200.00

WINCHESTER HARD DRIVES * * *
(5) SIZES COMPLETE, CASE, POWER SUPPLY, DOS, MOD 3 OR 4
6.4 MEG.....$1499.00
12.8 MEG.....$1649.00
14.3 MEG.....$1749.00
19.1 MEG.....$1849.00
31 MEG.....$2399.00

PRINTERS * * *
EPSON FX-80.....$559.00
EPSON MX-100.....$675.00
SMITH CORONA TP-1.....$499.00

CABLES * * *
(2) DISK DRIVES.....$16.00
(4) DISK DRIVES.....$26.00
PRINTER STD PARALLEL.....$18.00
RS-232C.....$15.00
SPECIAL CABLES MADE TO YOUR SPEC'S .....$CALL

MISCELLANEOUS * * *
COMPUTER POWERLINE FILTERS FROM.....$25.00
J-CAT MODEM 300 BAUD DIRECT CONNECT.....$109.00
SMART-CAT 1200 BAUD, AUTO ANS/DIAL DIR/CONN.....$445.00
SMART-CAT 300 BAUD, AUTO ANS/DIAL, DIR/CONN.....$190.00
GREEN CRT FILTER .0125" THICK.....$9.50
5.1 MEG MOD3 SPEED-UP KIT.....$79.00
16K MEMORY KIT (150NS PRIME NEC CHIPS).....$18.00
64K MEMORY KIT (150NS PRIME OKI CHIPS).....$59.00
MOD4 128K MEMORY UP-GRADE KIT COMPLETE.....$89.00
PRINTER SWITCH, 2 PRINTERS ON ONE COMPUTER.....$68.00

DISKETTES * * * (BOX OF 10).....OPUS.....VERBATIM
40 TRACK SGL SIDE, DBL DENSITY.....$20.....$25
40 TRACK DBL SIDE, DBL DENSITY.....$30.....$38
80 TRACK SGL SIDE, DBL DENSITY.....$35
80 TRACK DBL SIDE, DBL DENSITY.....$43
40 TRACK DBL SIDE, DBL DENSITY (FLIPPY)$30.....
PRICES AND SPEC'S ARE SUBJECT TO CHANGE, WITHOUT NOTICE

TRS-80 IS A TRADEMARK OF RADIO SHACK-DIV OF TANDY CORP. ALL TRS-80'S FROM MCW ARE CONSTRUCTED TO OUR SPEC'S AND ARE COVERED BY OUR WARRANTY SEE NOTE BELOW.

* * * PAYMENTS * * *
WE ACCEPT VISA, M/C, MONEY ORDERS, AND CHECKS. NOTE: NON-CERTIFIED CHECKS REQUIRE (2) WEEKS FOR BANK CLEARANCE. NO SALES TAXES ARE COLLECTED ON SALES OUTSIDE OF MICHIGAN.

* * * DELIVERY * * *
SHIPMENTS ARE MADE PROMPTLY FROM STOCK, VIA UPS, (SIZE PERMITTING), OTHERS, BEST WAY. COSTS UNLESS OTHERWISE NOTIFIED ARE 2.5% OF THE ORDER TOTAL BUT NOT LESS THAN $3

* * * WARRANTY * * *
YOUR HARDWARE PURCHASE IS COVERED BY AN MCW 90 DAY, LIMITED, PARTS AND LABOR WARRANTY OR THE WARRANTY OF THE ITEM'S MANUFACTURER CONFIRM YOUR COVERAGE WHEN PLACING AN ORDER. COPIES OF THE WARRANTY ARE AVAILABLE ON REQUEST.

MIDWEST COMPUTER WHOLESALE
PO BOX 39278 DETROIT, MI. 48239
TELEPHONE ORDER LINE (313) 525-3040

✓See List of Advertisers on Page 323

Listing 4 continued

```
570 PRINT@90,"2. CUBIC FEET"
580 PRINT@130,"3. FUNCTION 3"
590 PRINT@170,"4. FUNCTION 4"
600 PRINT@210,"5. RETURN TO MAIN MENU"
610 PRINT:INPUT"ENTER CHOICE NUMBER:";N
620 IFN>5THEN540
630 CLS:ON N GOTO 640,680,720,760,170
640 CLS:PRINT:PRINTTAB(5)"SQUARE FOOTAGE
 CALCULATION":PRINT
650 INPUT"LENGTH ";C1:INPUT"WIDTH  ";C2
660 CR=C1*C2:PRINT:PRINT"SQUARE FOOTAGE
IS ";CR
670 GOTO790
680 CLS:PRINT:PRINTTAB(5)"CUBIC FOOTAGE
CALCULATION":PRINT
690 INPUT"LENGTH ";C1:INPUT"WIDTH  ";C2:
 INPUT"HEIGHT ";C3
700 CR=C1*C2*C3:PRINT:PRINT"CUBIC FOOTAG
E IS ";CR
710 GOTO790
720 'place TITLE for function 3 here
730 'place INPUT for function 3 here
740 'place FORMULA for function 3 here
750 GOTO790
760 'place TITLE for function 4 here
770 'place INPUT for function 4 here
780 'place FORMULA for function 4 here
790 INPUTI$:GOTO170
800 FF$="RAM:"+LEFT$(T$,6)+".DO"
810 OPEN FF$ FOR OUTPUT AS2
820 PRINT" PRINTING JOB ESTIMATE FILE"
830 PRINT#2,T$
840 PRINT#2,J$
850 FORK=1TOD
860 IF A(K,3)=0 THEN880
870 PRINT#2,USINGWF$;A(K,1),A$(K),A(K,2)
,A(K,3),A(K,2)*A(K,3)
880 NEXT
890 PRINT#2,"PARTS ESTIMATE = ";PE
900 PRINT#2,"TOTAL ESTIMATE = ";E
910 CLOSE:END
```

Line	Description
10	Open file channel
20	Print format
40–70	Find array size for dimensioning
80–130	Dimension and set up array
140–230	Main menu print and choice
240–260	Change part price
230	GOSUB for search
250–260	Input new cost and return to menu
270–320	Add a new part
270	Calculate row location and number of parts added
280	Check for beyond add limit
290–320	Input new part information
330–370	Delete part
380–410	Print array
420–450	Get search name or number
460–500	Search for part
510	Print part information
520–570	Write parts file

Table 4. Parts set-up line descriptions.

Line	Description
10	Open file channels
20–40	Print formats
50–60	Title and description inputs
70–100	Find array size for dimensioning
110–160	Dimension and set up array
170–240	Main menu print and choice
250–370	Enter part wanted
250–270	Input part number or name
280–320	Search for part
330–370	Input number of parts wanted and print cost
380–490	Print estimate
380	Print heading
390–450	Print parts wanted and costs
460	Calculate final estimate
470–490	Print estimate
500–530	Print parts array
540–790	Calculations
540–630	Calculation menu print and choice
640–670	Square footage calculation
680–710	Cubic footage calculation
720–750	Third calculation
760–780	Fourth calculation
790	Pause and return to main menu
800–910	Print job estimate file

Table 5. Job estimator line descriptions.

To Market, To Market

Conversion by Mare-Anne Jarvela
***80 Micro* Technical Editor**

Most people consider food shopping a drudgery. It would be less bothersome if you had a master list of all the grocery items you usually buy and could quickly get a printout of a shopping list before you go to the store. This Model 100 conversion of Hal Smith's program (*80 Micro*, March 1981, p. 274) does just that and a little more (see Program Listing 5).

You need at least 16K of memory to run this program. The listing itself is only 5K but you need space for the data file.

When you run the program for the first time it asks you if you have a data file. Answer N and enter your first item. The program now creates the Shop.DO file. Line 20 sets maxfiles to two. After this, the program starts and you can add more items, delete, change, select items to buy, reset, flip pages, and get printouts of your shopping list.

If you already have a data file, answer Y on the first question or the computer writes over your existing file. When you finish changing, selecting, and so on, enter Q (quit) and your data file is automatically updated. If you break out of the program, you lose your changes.

With the Enter option (line 530) you can enter up to 250 items on your master list. Start the program, entering the grocery items you regularly buy. You don't have to reenter the list; pressing Q stores them on the data file. If there's not enough memory, change lines 50 and 60 to fit your computer.

The program stores all items alphabetically with code numbers. When you refer to an item on the list, use the code number assigned. The numbers change as you enter or delete items.

BACK TO SCHOOL SALE

DISK UPGRADE

Put Disk Drives into your TRS-80 or MODEL III or MODEL 4

- Easy to install with Photo Instruction Manual
- Featuring the Holmes Disk Controller (assembled and tested) available with Hardware Real Time Clock and Battery built in. Software Clock routines and TDOS Operating System included
- 40/80 Single /Double Density Support
- Dual Sided and 8"Drive Support
- Drives are optional

	MODEL III	MODEL 4
(203103) without clock	$269.50	$269.50
(203104) with clock	$329.50	$329.50
(200111) 40 SH Disk Drives	$200.00 ea	$200.00 ea
(213002) 32K Memory	$34.95	—
(204064) 64K Memory	—	$119.95
(204065) 64K Memory w/PAL	—	$144.95
Complete Kit with Clock Board, 2 Drives & Memory & TDOS	$699.00	$799.00

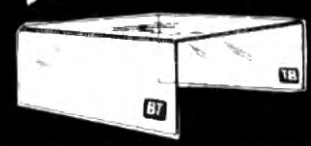
MICROFAZER

Microfazer is a printer buffer that lets printing take place while the computer is being used for other work.

#200873 64K PARALLEL
229.95
#200874 128K PARALLEL
309.95

Printer Stands help eliminate the mess on your computer desk by allowing the paper to be fed from under the printer making room for used paper to stack behind it.

WE NOW HAVE THE NEW EXTRA LARGE PRINTER STAND



REGULAR	$29.95
REGULAR w/Shelf	$44.95
LARGE	$34.95
LARGE w/Shelf	$49.95
LARGE w/Slot	$49.95
EXTRA LARGE	$79.95

MATERIAL: CLEAR ACRYLIC PLEXIGLASS

3M DISKETTES

(500452) SS/DD 5¼"	$23.50/10
(500455) DS/DD 5¼"	$32.50/10
(500457) DS/DD 5¼" 80 Track	$43.00/10
(500461) SS/SD 8"	$24.50/10
(500462) SS/DD 8"	$30.50/10
(500465) DD/DD 8"	$35.50/10

EPSON RELOADS

$30.00 dozen

(500001) Black	$30.00 doz.
(500011) Red	$30.00 doz.
(500021) Blue	$30.00 doz.
(500031) Green	$30.00 doz.
(500041) Brown	$30.00 doz.

CENTECH DISKETTE with COLORED JACKETS

(500212) Red SS/DD	$27.50/10
(500215) Red DS/DD	$30.50/10
(500262) Yellow SS/DD	$27.50/10
(500265) Yellow DS/DD	$30.50/10
(500222) Blue SS/DD	$27.50/10
(500225) Blue DS/DD	$30.50/10

EPSON RIBBON CARTRIDGES

$5.00 each

(500050) Black	$5.00 each
(500060) Red	$5.00 each
(500070) Blue	$5.00 each
(500080) Green	$5.00 each
(500090) Brown	$5.00 each

BT ENTERPRISES

B·T· Enterprises Dept. 1-J
10B Carlough Road ✓300
Bohemia, N·Y· 11716
B.T. Enterprises is a division of BiTech Enterprises Inc

Orders Only
800-645-1165
N·Y· call (516) 567-8155

(516) 567-8155 (voice) (516) 588-5836 (modem)

Dealer Inquires Welcome
Prices subject to change
N.Y.S. Residents add tax

American Express Carte Blanche
Diners Club MasterCard & Visa

✓See List of Advertisers on Page 323

Program Listing 5. Shoplist.

```
10 REM SHOPLIST
20 MAXFILES=2
30 CLS:PRINT@53,"S H O P  L I S T"
40 FORX=1TO1000:NEXT
50 CLEAR5000:DEFINTA-Z
60 DIM ML$(250),ML(250),TL$(50),TL(50)
70 R$=STRING$(26," ")
80 F1$="(###) ## "
90 FB$="          ## "
100 F2$="(###) "
110 F3$="   ## "
120 F4$="          ## "
130 CLS:GOSUB2040
140 CLS:PRINT@15,"SHOP LIST"
150 REM READ LIST FROM DISK
160 DATAC,D,E,L,P,S,Q,R
170 OPEN"RAM:SHOP.DO"FORINPUTAS1
180 N=1
190 J=1
200 INPUT #1,ML$(N),ML(N)
210 N=N+1
220 IF NOT EOF(1) THEN 200
230 I=N
240 CLOSE 1
250 START=1:REM ASSIGN 1 AS PAGE TO BE
PRINTED
260 COUNT=14:REM NUMBER OF LINES OF
ITEMS PRINTED (14 HERE)
270 REM MENU PRINT
280 V=0
290 CLS
300 G=INT((I-1)/14)
310 IFG<>((I-1)/14)THENG=INT((I-1)/14)+
1ELSEG=INT((I-1)/14)
320 J=J:IFJ<1THENJ=1
330 IFJ>GTHENJ=G
340 PRINT"MASTER LIST:";I-1;"ITEMS
FOR";G;"PAGES,PAGE";J
350 PRINT"FORMAT:(CODE #) (QTY NEEDED) (
ITEM NAME)"
360 PRINT"PRESS ANY KEY TO CONTINUE"
370 IFINKEY$=""THEN370
380 GOSUB1780
390 PRINT:PRINT"PRESS ANY KEY TO
CONTINUE"
400 IFINKEY$=""THEN400
410 CLS:PRINT@200," <C>HANGE "," <D>
ELETE "," <E>NTER "," <L>IST ":PRINT" <P
>AGE",
420 PRINT" <R>ESET "," <S>ELECT "," <Q>
UIT"
430 FORY=1TO8:READB$(Y):NEXT
440 ONERRORGOTO460
450 GOTO480
460 RESUME 470
470 FORT=1TO20:NEXTT
480 PRINT"YOUR CHOICE: "
490 GOSUB 2020:D=1
500 IFB$(D)=A$THEN510:ELSED=D+1:IFD<
10THEN500ELSE490
510 ONDGOSUB 1060,1360,530,860,
720,650,1980,1170
520 GOTO270
530 REM ENTER
540 INPUT"NAME OF ITEM TO ADD TO LIST (0
TO ABORT)";N$
550 IFN$="0"THEN270
560 FOR N=1 TO I-1
```

Listing 5 continued

Use the Change option (line 1060) if you make a mistake entering an item. You provide the code number and enter the new name for that item. You also provide the code number of the item you want to delete (line 1360).

The Page command (line 720) lets you look at different pages (one page is equivalent to 14 items). At the top of the screen you'll see how many items your file contains and the number of the page displayed. To display a different page, hit P and then the page number, or N for next page, P for previous page. This lets you look at your entire file. Since the program stores items in alphabetical order, you'll have a general idea which page to look for.

To start your list for the grocery store, use the Select option (line 650). This lets you enter the quantity you need to buy. Hit S, enter the code number of the item, and then the quantity needed. When you print the list, the amount appears to the left of the item.

When it's time to go to the store, use the List (line 860) command. You have the option to print a full list or a short list. If you answer Y to the question "Is the printer ready?" you'll get a printout. Answer N and your list appears only on the screen.

The short list (line 1490) prompts you to enter the item and amount. It is only a temporary list—the program doesn't save it to the data file. This is a good option when you're in a hurry and want a quick list.

The Reset option (line 1170) lets you change the values to zero after you finish your shopping (answer Y on the first question), or reset the quantity needed for each item. Answer N and you'll see the first item on your shopping list. When all the items on your list are reset, the program returns to the main menu. Remember to hit Q so that all your changes appear on the data file.

If for any reason you want a listing of all the items in your data file, load Shop.DO from the Model 100's menu. It will appear on the screen, and you can print it as a text file.

This is a handy program to use if you have a lot of grocery shopping to do. If you're single, you'll probably be better off with a piece of paper and a pencil.

You can also use this program for other types of inventory control. Use your imagination, and good luck. ■

C•Notes text continued on p. 283

Variable	Description	Variable	Description
X	Time delay.		
ML$	Item (full list).	I	Counter.
ML	Code number (full list).	J	Counter.
TL$	Item (short list).	Y	Menu choice.
TL	Code number (short list).	T	Time delay.
R$	String variable.	D	Menu choice.
F1$	Print format.	A$	INKEY.
FB$	Print format.	N$	Item to add.
F2$	Print format.	C	Code number of item.
F3$	Print format.	PA$	What page ?
F4$	Print format.	K	Counter.
N	Counter.	P	Print ?
J	Counter.	Q	Change.
V	Counter.	H	Page Counter.
G	Counter.	E	Counter.

Table 6. Shopping list variables.

INTRODUCING!!!
a *FAST, SOPHISTICATED*
and USER FRIENDLY
graphics and text program
✓75

KWIKDRAW

NEW! from Lichen Software

WITH KWIKDRAW YOU CAN QUICKLY AND EASILY CREATE/EDIT DISPLAYS COMBINING GRAPHICS, TEXT, AND SPECIAL CHARACTERS. YOU CAN: • Save/Load displays to/from disk in 3 formats: BASIC/ASCII/object • Save/Load/Overlay displays to/from 10 RAM buffers • Print in a variety of formats, with multiple copy and BACKGROUND printing • 2 cursor sizes, each can move at one of 255 speeds from slow to VERY FAST! • Set delay before keys repeat • Have cursors stop at screen edge or wraparound to opposite edge • Fast line & circle • Move/Duplicate/Erase individual figures and/or text • Fill figures • Reverse black/white • Scroll entire screen with/without wraparound • 2 mirror image routines • View directories • 8 menu/help screens • AND MUCH MORE!! Logical key assignments are easy to learn. 50+ page manual with instructions for using displays in your programs. What makes it KWIK? Written in 100% machine code — no SLOW BASIC or compiled BASIC! Backups allowed. REQUIRES: 48K Model III* & 1 disk drive. Printing routines require an Epson MX** series printer. TERMS: $74.95 — cash, certified check, money order, or personal check. Allow 2-3 weeks for personal checks to clear, all other orders will be shipped within 48 hours. LICHEN SOFTWARE, 6603 N. LEE ST. SPOKANE, WA 99207, (509) 448-4026 *Trademark of Tandy Corp. **Trademark of Epson America, Inc.

Don't wait till it's too late to insure your computer

Now you can insure your computer against theft, fire, accidental damage, earthquake, even damage from power surges.

For as little as $35/yr. SAFEWARE™ covers all hardware, media and purchased software for full replacement after a low $50 deductible.

To obtain immediate coverage or more information, call toll-free today.
(In Ohio call 1-800-848-2112)

1-800-848-3469

SAFEWARE™

COLUMBIA NATIONAL GENERAL AGENCY
88 E. Broad St., Columbus, OH 43215
✓368

T80-FS1 Flight Simulator

Available for Model I or Model III. $25.00 on cassette or $33.50 on disk (with enhancements) All versions require 16K.

If you order direct, please specify whether you have Model I or Model III (the media *are* different) and whether you want disk or cassette. Include $1.50 and indicate UPS or first class mail. Illinois residents add 5% sales tax. Visa and Mastercard accepted.

If you don't yet own a disk, don't fret. You can upgrade anytime. Cassette users may send back their cassette (but *not* the manual) along with $10 (first class shipping included) and receive the disk version.

See your dealer!

subLOGIC
Communications Corp.
713 Edgebrook Drive
Champaign, IL 61820
(217) 359-8482 ✓71
Telex: 206995

✓See List of Advertisers on Page 323

Listing 5 continued

```
570 IF N$>ML$(N)THEN NEXT N
580 FOR N1=I TO N+1 STEP -1
590 ML$(N1)=ML$(N1-1)
600 ML(N1)=ML(N1-1)
610 NEXT N1
620 ML$(N)=N$: ML(N)=0
630 I=I+1
640 RETURN
650 REM SELECT
660 INPUT"CODE NUMBER OF ITEM TO BE
BOUGHT (0 TO ABORT)";C
670 IF C>=I OR C<0 THEN PRINT:GOTO660
680 IFC=0THEN270
690 PRINT:PRINT"WHAT QUANTITY OF ";ML$(C
);
700 INPUT ML(C)
710 RETURN
720 REM PAGE COMMAND
730 INPUT"WHAT PAGE # (ENTER N FOR NEXT,
P FOR PREVIOUS, OR PG #) ";PA$
740 IFPA$="P"THENV=1:J=J-1:GOTO760
750 IFPA$="N" THENJ=J+1:GOTO790
760 IFV=1THEN START=START-1*
COUNT:GOTO810
770 J=VAL(PA$)
780 START=(VAL(PA$)-1)*COUNT+1:GOTO810
790 IF(START+1)+COUNT>I THEN RETURN
800 START=START+COUNT
810 IF VAL(PA$)>GTHENPRINT:GOTO730
820 IF I-COUNT<1 THEN RETURN
830 IF START <1 THEN START=1
840 IF START>I-COUNT THEN START=START
850 RETURN
860 REM PRINT LIST TO PRINTER
870 A$="":CLS:PRINT"DO YOU WANT THE FULL
LIST OR A SHORT ONE (F OR S) ? ";
880 A$=INKEY$:IF A$="" THEN880
890 IF A$="S" THENPRINTA$: FORZ=1TO250:
NEXT:GOTO1490
900 IF A$="F" THENPRINTA$:FORZ=1TO250:
NEXT:GOTO920
910 GOTO880
920 PRINT:INPUT"IS THE PRINTER READY (Y/
N)";A$
950 CLS:PRINTTAB(15);"SHOPPING LIST"
960 IF A$="Y"THEN LPRINT TAB(32)
;"SHOPPING LIST"
970 PRINT:IF A$="Y"THENFORK=1TO3:LPRINT"
":NEXTK
980 FOR N=1 TO I-1
990 IF ML(N)=0 THEN 1020
1000 PRINT:PRINTUSING F1$;N,ML(N)
;:PRINTLEFT$(ML$(N)+R$,15);
1005 IF A$="N"THEN1020
1010 LPRINT:LPRINTUSING FB$;ML(N)
;:LPRINTLEFT$(ML$(N)+R$,15);
1020 NEXT N
1030 IF A$="Y"THENLPRINTLEFT$(ML$(I-1))
1040 IFA$="N"THENPRINT:PRINT:INPUT"HIT <
ENTER> TO CONTINUE ";AN$
```

Listing 5 continued

the GOLD kit

New Life for your TRS 80 Model I

- *Memory Faults?*
- *Programs Freezing Up?*
- *Worn Contacts?*

The Model I is a good computer, but it is getting old. Your expensive gold connectors have to transmit data through the Mod I's worn and oxidized PC board contacts. With the **GOLD KIT** and fifteen minutes you can upgrade these old tin contacts to gold.

These new connectors are soldered onto the tin plated edge contacts of your computer and expansion interface. You need just a screwdriver and soldering iron.

The kit includes all six connectors and detailed instructions.

Send $29.50 Check or Money Order to:
*ADD $1.50 for Shipping

i/O tech ↙198
P.O. Box 2167
2445 N. 50th Street
Milwaukee, WI 53201-2167

Wisconsin Residents add 5% sales tax.

TRS-80 MODEL 100

TRS 80 is a trademark of the Tandy Corporation

Monthly magazine loaded with Software and Hardware Reviews, Useful How-to Tips, Program Listings, and Accessory Interface Suggestions for this unique new computer. Whatever your interest in this notebook size portable, this exclusive publication will help you realize its maximum potential while saving you money. Regular subscription rate is $24/year (12 issues), however charter subscriptions are available for a limited time at $9.00 for 6 months or $16.00 for 12 months. VISA MasterCard **customers call 800-227-1617 ext 425**
In California 800-772-3545 ext 425 or send check or Money Order to:

briefcase portable

560 South Hartz Avenue, Suite 447 • Danville, CA 94526 ↙165

SOMETHING NEW YOU'VE WAITED FOR THIS BETTER THAN A FORM LETTER
IT DOES WHAT THE OTHERS DO AND MUCH MORE
THERE IS TIME TO DO IT BEFORE CHRISTMAS!

Type in all the names, addresses, and personal information. Then you will tell your news to each friend: but not in a form letter! Enter your common interest codes to sort out which topics go to which friends. Then write on each topic to correspond with the codes. It's easy if you have

LET'R'WRYT

Our program lets you individualize your letters by printing on each letter only the presorted paragraphs corresponding to your precoded common interests. This way a unique letter can be tailored for each of your friends.

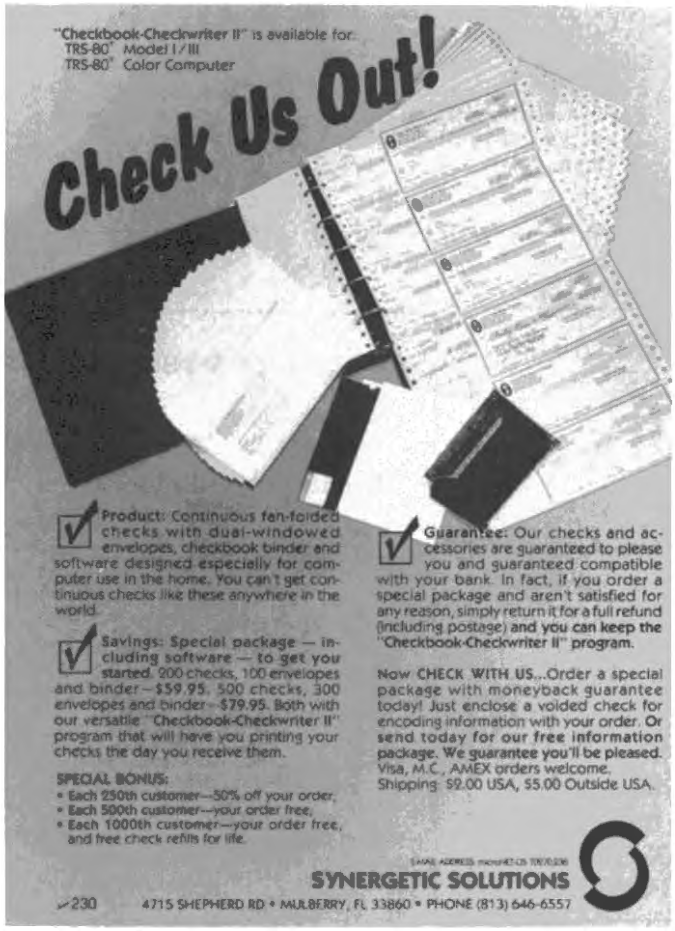
- menu driven-no study since you are trained by prompts on screen
- live keyboard
- address file with update/replace features
- topic file (paragraphs) with update features
- dozens of free options with prompting instructions: format, greeting, closing, nickname, search, sort, etc.
- no dead ends - errors lead to user friendly menu, not termination
- continuous file update - almost impossible to lose a file
- 600 names per disk on models 1,3,4

PRICE $35.99 till NOV 1 then $41.99 (our breakthrough price is on the rise!)
To order call 313-683-5094 (MC,VISA) or send your check or M.O. to:
Meyer's Place, 5132 Kitson Ln, West Bloomfield MI, 48033 ↙215

Listing 5 continued

```
1050 RETURN
1060 REM CHANGE COMMAND
1070 INPUT"CODE NUMBER OF ITEM TO CHANGE
(0 TO ABORT)";C
1080 IF C>=I OR C<0 THEN PRINT:GOTO1070
1090 IFC=0THEN270
1100 PRINT:PRINT"CHANGE ";ML$(C);" TO
WHAT ";
1110 INPUT N$
1120 Q=ML(C)
1130 GOSUB 1400: REM DELETE PREVIOUS
ENTRY
1140 GOSUB 560: REM ENTER NEW ENTRY
1150 ML(N)=Q
1160 RETURN
1170 REM RESET COMMAND
1180 INPUT"ARE ALL ITEMS TO BE RESET";A$
1190 IF A$="N"GOTO1240
1195 IF A$<>"Y"THEN1180
1200 FOR N=1 TO I-1
1210 ML(N)=0
1220 NEXT N
1230 RETURN
1240 PRINT
1250 CLS:PRINT"HERE IS A LIST OF THE
ITEMS YOU WERE TO BUY."
1260 PRINT"FOR EACH ITEM, HIT ENTER IF
IT WAS PURCHASED,"
1270 PRINT"OR ENTER THE QUANTITY
REMAINING TO BUY."
1280 FOR N=1 TO I-1
1290 IF ML(N)=0 THEN 1340
1300 PRINT:PRINT@200, ML(N);"  ";ML$(N);
1310 ML(N)=0
1320 INPUT ML(N)
1330 PRINT CHR$(13)
1340 NEXT N
1350 CLS:PRINT"THERE ARE NO MORE ITEMS
TO BE RESET":FORX=1TO1500:NEXT:RETURN
1360 REM DELETE
1370 INPUT"CODE NUMBER OF ITEM TO DELETE
(0 TO ABORT)";C
1380 IF C>=I OR C<0 THEN PRINT:GOTO1370
1390 IFC=0THENGOTO270
1400 FOR N=C+1 TO I-1
1410 ML$(N-1)=ML$(N)
1420 ML(N-1)=ML(N)
1430 NEXT N
1440 I=I-1
1450 H=INT((I-1)/14)
1460 IFH<>((I-1)/14)THEN RETURN
1470 START=START-14
1480 RETURN
1490 REM TEMPORARY LIST
1500 TI=1
1510 COUNT=14:REM NUMBER OF ITEMS TO
PRINT
1520 CLS
```

Listing 5 continued



MODEL 100

We're **ALPHAWARE,** and we think computers should be user-friendly, always. That's why, no matter where you are in **MicroEditor II** or **Mail Master,** you have immediate access to **GUARDIAN**™, a full-function help feature ready to assist at any time. Finally, programming that puts you in control: **MicroEditor II** and **Mail Master** by **ALPHAWARE.**

Dealer Inquiries Invited

MicroEditor II **$49.95**

- Pagination
- Right, left, alternate margins
- Control of page width & length
- Line and page numbering
- Clear memory
- Center, justify
- Headings
- File handling
- Form letters
- Tabs

Mail Master **$34.95**

- Cross reference
- Alphabetize
- Control sorting
- Mailing labels
- MicroEditor II compatible

ALPHAWARE INCORPORATED 21

2100 South Boulevard • Edmond, OK 73034

Listing 5 continued

```
1530 PRINT"TYPE IN ANY SPECIAL ITEMS
THAT YOU WISH TO BUY."
1540 GOSUB1700
1550 PRINT:PRINT"IS THE PRINTER READY?";
1560 GOSUB1920
1570 P=ANSWER
1580 CLS:PRINTTAB(15);"QUICK LIST"
1590 LPRINTTAB(32);"QUICK LIST"
1600 PRINT:FORE=1TO3:LPRINT"  ":NEXTE
1610 FOR N=1 TO TI-1
1620 PRINT:PRINTUSING F3$;TL(N)
;:PRINTLEFT$(TL$(N)+R$,15);
1630 IF P THEN LPRINT:LPRINTUSING F4$;TL
(N);:LPRINTLEFT$(TL$(N)+R$,15);
1640 NEXT N
1650 LPRINTLEFT$(TL(N)+R$,15)
1660 COUNT=14
1670 PA$="1"
1680 GOSUB 750
1690 RETURN
1700 PRINT:PRINT"HIT <ENTER> TO STOP"
1710 PRINTUSING"NAME OF ITEM ##";TI;
1720 INPUT TL$(TI)
1730 IF LEN(TL$(TI))=0 THEN RETURN
1740 PRINT"WHAT QUANTITY OF ";TL$(TI);
1750 INPUT TL(TI)
1760 TI=TI+1
1770 PRINT:GOTO1710
1780 REM PRINT LIST
1790 FOR N=START TO START+COUNT-1
1800 IF ML(N)=0 THEN 1820
1810 PRINT:PRINTUSING F1$;N,ML(N)
;:PRINTLEFT$(ML$(N)+R$,15);:GOTO1830
1820 PRINT:PRINTUSING F2$;N;:PRINTLEFT$(
ML$(N)+R$,15);
1830 IF N<I-1 THEN NEXT N
1840 RETURN
1850 REM UPDATE DATA FILE
1860 OPEN"RAM:SHOP.DO"FOROUTPUTAS1
1870 FOR N=1 TO I-1
1880 PRINT#1,CHR$(34);ML$(N);CHR$(34)
;",";ML(N)
1890 NEXT N
1900 CLOSE 1
1910 RETURN
1920 REM YES/NO ANSWER
1930 ANSWER=1
1940 AN$=INKEY$:IFAN$=""THEN1940
1950 IF AN$="Y" THEN ANSWER=-
1:PRINTAN$:FORZ=1TO250:NEXT:RETURN
1960 IF AN$="N" THEN
ANSWER=0:PRINTAN$:FORZ=1TO250
NEXT:RETURN
1970 GOTO1940
1980 REM QUIT
1990 GOSUB 1850
2000 END
2010 REM DATA FILE CREATION
2020 A$=INKEY$:IFA$=""THEN2020:RETURN
2030 RETURN
2040 A$="":PRINT"DO YOU ALREADY HAVE A
DATA FILE CREATED ?";
2050 A$=INKEY$:IFA$=""THEN2050 ELSE
PRINTA$:FOR Z=1 TO 250:NEXT
2060 IF A$="Y" THEN RETURN
2070 IF A$="N" THEN 2090
2080 GOTO 2050
2090 CLS:PRINT"NOTE: THIS SECTION WILL
CREATE YOUR SHOP LIST DATA FOR ONE
ITEM."
2100 PRINT"AFTER YOU PLACE IN THE FIRST
ITEM, THE PROGRAM WILL THEN START
RUNNING"
2110 PRINT
2120 INPUT"NAME OF AN ITEM TO PLACE ON
YOUR SHOPPING LIST ";N$
2130 ML$(N)=N$:ML(N)=0
2140 I=I
2150 OPEN"RAM:SHOP.DO"FOROUTPUTAS1
2160 N=0
2170 PRINT#1,CHR$(34);ML$(N);CHR$(34)
;",";ML(N)
```

Listing 5 continued

SCRIBE
REAL
WORD PROCESSING
CAPABILITY
for the
Radio Shack TRS 80
MODEL 100
Portable Computer
USES ONLY 2K RAM STORAGE
$24.95
PLUS $2.00 HANDLING
Chattanooga Systems Associates
P.O. Box 22261
Chattanooga, TN 37422
DEALERS INQUIRE ↙225

TRS-80 MODEL 16
XENIX
•CONSULTING
•SYSTEM CONFIGURATION
•INSTRUCTION
INTERACTIVE
SYSTEMS DESIGN
SUITE 201, 170 BROADWAY
NEW YORK, N.Y. 10038
(212)-233-6923 ↙147

CHURCH DONATIONS ↙307
Computer Program for TRS 80
Models I, II, III, IV, 12 & 16
IBM/PC
RECORDS, STORES & REPORTS
Gives printout of collections, totals to date as well as individual quarterly reports to congregation members
•NOW AVAILABLE•
Additional modules to provide
Church Directory
Word Processing
Attendance Record
Membership Profile
General Ledger
Radio Shack ★★★★★
Five-Star Rating
Designed to fulfill administrative & financial reporting and record keeping needs of churches
CUSTOM DATA
Dept. AC
505-434-1096
301 Eleventh Street
P.O. Box 1869
Alamogordo, NM 88310

Listing 5 continued

```
2180 CLOSE
2190 RETURN
```

C•Notes text continued from p. 278

Cram 100

Conversion by Bradford N. Dixon
***80 Micro* Technical Editor**

Since Cram first appeared in *80 Micro* (August 1982, p. 234) it has been the object of much gaming interest and at least one conversion (Take II, *80 Micro*, August 1983, p. 320). This Model 100 version of Cram uses the portable's graphics and sound capabilities to make for an exciting game that you take wherever you go.

Cram is easy to learn and addictive. The object of this version is to draw a line around the display without running into the screen edge or a previously drawn line.

The line starts in the upper left corner of the screen and runs to the right. Press any key and the line turns down. Press a key again and the line turns left, press a key again to go up, and so on.

The 100 emits a tone whenever you press a key and again when the game ends. During play, the program displays the previous high score and the last score at the top of the screen.

Program housekeeping takes place in lines 30 and 40 of Program Listing 6. The code that moves the line across the screen follows.

A counter keeps track of the line position and acts as a check for collisions with the sides or another part of the line. To get the most out of the program, I used PSET to light the pixels in the line. I could have used characters as in other versions of the game, but I was limited by the 100's screen size.

The Model 100, like the Model II, doesn't have a POINT (X,Y) function to check for lit pixels, so the counters keep track of the line while allowing full use of the 240- by 64-pixel matrix available on the 100's LCD screen. An INKEY$ routine initiates the line turns and facilitates the game's fast pace.

Program instructions are located in a subroutine at the end of Listing 6. You can bypass the directions after you know how to play. ■

Program Listing 6. Cram 100.

```
10 ' CRAM, A game by Hardin Brothers
20 ' ** Conversion by Brad Dixon **
25 ' ** 80 Micro Technical Staff **
30 DEFINTA-Z:GOSUB270
35 CLS:PRINT@14,"*** CRAM ***"
40 L=0:R=239:T=7:B=64:N=0:GOSUB250
50 ' MOVE RIGHT
60 J=J+1:IF J=R THEN 200 ELSE PSET(J,I)
70 IF INKEY$="" THEN60 ELSE
N=N+1:R=J:SOUND 2216,2
80 ' MOVE DOWN
90 I=I+1:IF I=B THEN 200 ELSE PSET(J,I)
100 IF INKEY$=""THEN90 ELSE
N=N+1:B=I:SOUND 2216,2
110 ' MOVE LEFT
120 J=J-1:IFJ=LTHEN 200 ELSE PSET(J,I)
130 IFINKEY$=""THEN120 ELSE
N=N+1:L=J:SOUND 2216,2
140 ' MOVE UP
150 I=I-1:IFI=TTHEN 200 ELSE PSET(J,I)
160 IF INKEY$=""THEN 150ELSE
N=N+1:T=I:SOUND 2216,2:GOTO60
190 ' GAME OVER
200 FORX=1TO5:BEEP:NEXTX:CLS:
PRINT@5,"TURNS=";N;"   PREVIOUS
HIGH=";M:IF N>MTHENM=N
210 FOR I=1TO2000:NEXTI:GOTO40
250 I=7:J=0:A$=INKEY$:RETURN
260 ' DIRECTIONS
270 CLS:PRINT@134,"*** CRAM
***":PRINT:PRINT:INPUT"DO YOU WANT
INSTRUCTIONS (Y/N)";Y$
280 IF Y$="Y"ORY$="y"THEN290 ELSE35
290 CLS:PRINT:PRINTTAB(5)"THE OBJECT OF
THE GAME IS TO SPIRALTHE LINE AROUND
THE SCREEN WITHOUT IT   RUNNING INTO
THE EDGES OR ITSELF. ":PRINT"PRESS
ENTER TO CONTINUE.":GOSUB320
300 CLS:PRINT:PRINTTAB(5)"PRESS ANY KEY
TO CHANGE THE        DIRECTION OF THE
LINE. THE GAME IS OVER WHEN YOU HIT THE
SIDES OR THE LINE."
310 PRINTTAB(5)"TO GET OUT OF THE GAME,
PRESS THE  'BREAK' KEY. WHEN YOU'RE
READY TO PLAY, PRESS 'ENTER'."
320 A$=INKEY$:IF A$=""THEN320ELSERETURN
```


CONVERT MOD III BASIC TO MOD 4

Good News! The Model 4 is twice as fast as the Model III.

Bad News! Model III disk BASIC programs only run at half speed on the Model 4.

Best News! **"CONV3TO4"** will automate many of the changes required to convert Model III BASIC programs to Model 4 BASIC. Your Model III BASIC programs will run twice as fast as they do now, and your manual conversion efforts will be vastly reduced.

In minutes this powerful utility can insert all required spaces, recalculate PRINT@ addresses, adjust TAB ( ) addresses, insert correct exponentiation symbols, and flag and list unresolved line numbers.

Other options enable your programs to run even faster - remove REM's, comments, down arrows, and unnecessary spaces.

Or, format your programs and make them easier to read and debug - insert down arrows and indent between multiple instructions, IF, THEN, and ELSE statements.

I agree. It's foolish to run my Model III disk BASIC programs at half speed on the Model 4. Send me **"CONV3TO4"** today. Enclosed is my check/money order for $49.95 plus $2.00 for shipping/handling (N.J. residents add 6% sales tax).

NAME: _____

_____

STREET: _____

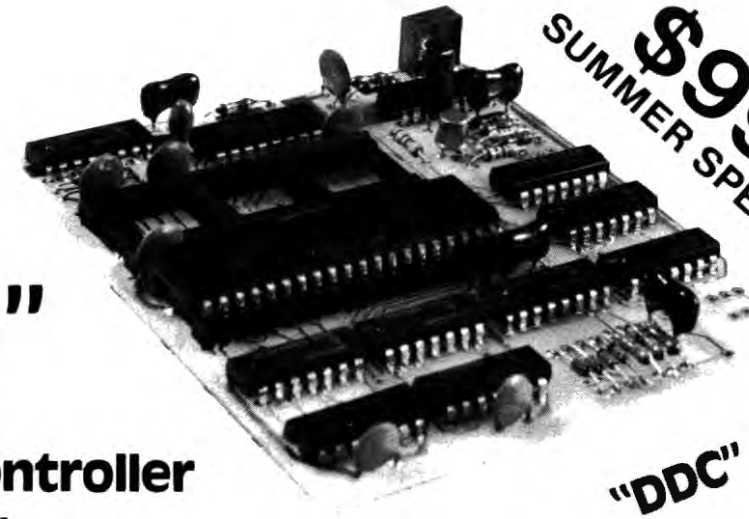
CITY: _____ STATE _____ ZIP _____

EDUCATIONAL MICRO SYSTEMS, INC.
P.O. Box 471, Chester, New Jersey 07930
201-879-5982

-85

Aerocomp's Proven Best-By Test! The "DDC"

Double Density Controller



$99.00 SUMMER SPECIAL

★ Technical Superiority

At last! A double density controller for Model I with HIGHER PROBABILITY OF DATA RECOVERY THAN WITH ANY OTHER DOUBLE DENSITY CONTROLLER ON THE MARKET TODAY! The "DDC" from Aerocomp. No need to worry about the problems that keep cropping up on existing products. AEROCOMP'S new analog design phase lock loop data separator has a wider capture window than the digital types currently on the market. This allows high resolution data centering. The finest resolution available with digital circuitry is 125 ns (nano seconds). The "DDC" analog circuit allows infinately variable tuning. Attack and settling times are optimum for 5-1/4 inch diskettes.
The units presently on the market use a write precompensation circuit that is very "sloppy". Board to board tolerance is extremely wide - in the order of ± 100 ns. The "DDC" is accurate to within ± 20 ns.
The bottom line is state of the art reliability!

★ Test Proven

Tests were conducted on AEROCOMP'S "DDC", Percom's "Doubler A"* and "Doubler II"* and LNW's "LNDoubler"** using a Radio Shack TRS80*** Model I, Level 2, 48 K with TRS80 Expansion Interface and a Percom TFD100 * disk drive (Siemens Model 82). Diskette was Memorex 3401. The test diskette chosen was a well used piece of media to determine performance under adverse conditions. The various double density adapters were installed sequentially in the expansion interface.
The test consisted of formatting 40 tracks on the diskette and writing a 6DB6 data pattern on all tracks. The 6DB6 pattern was chosen because it is recommended as a "worst case" test by manufacturers of drives and diskettes. An attempt was then made to read each sector on the disk once - no retrys. Operating system was Newdos/80, Version 1.0, with Double Zap, Version 2.0. Unreadable sectors were totalled and recorded. The test was run ten times with each double density controller and the data averaged. Test results are shown in the table.

★ Features

TRS80 Model I owners who are ready for reliable double density operation will get (1) 80% more storage per diskette, (2) single and double density data separation with far fewer disk I/O errors, (3) single density compatibility and (4) simple plug-in installation. Compatible with all existing double density software.

SUMMER SPECIAL $99.00
for the Best DD Controller on the market.

"DDC" and LDOS $169.95

$149.95 for "DDC" with DOSPLUS 3.3D (limited quantity)

★ TEST RESULTS ★

MFR & PRODUCT	SECTORS LOCKED OUT (AVG)
AEROCOMP "DDC"	0
PERCOM "DOUBLER II"	18
PERCOM "DOUBLER A"	250
LNW "LNDOUBLER"	202

Note: test results available upon written request. All tests conducted prior to 8-25-81

Aerocomp's 14 day money back guarantee applies to hardware only.
Specials will be prorated. Shipping $2.00 in Cont. US. See opposite page for details.

Data Separators

The advances that make the "DDC" great are incorporated in the new AEROCOMP Single Density Data Separator ("SDS") and Double Density Data Separator ("DDS").

★ Has your original manufacturer left you holding the bag?

If you already own a Percom "Doubler A", "Doubler II" or LNW "LNDoubler" or Superbrain, the AEROCOMP "DDS" will make it right. Look at the test results:

MFR. & PRODUCT	SECTORS LOCKED OUT	
	WITHOUT "DDS"	WITH "DDS"
PERCOM "DOUBLER II"	18	1
PERCOM "DOUBLER A"	250	0
LNW "LNDOUBLER"	202	0

Note: Same test procedures as "DDC".
* Trademark of Percom Data Co.
** Trademark of LNW
*** Trademark of Tandy Corporation

Plugs directly into your existing Double Density Controller.

★ **"DDS"** **$49.95**
(Use 1791 chip from your DD controller)

★ **"DDS"** with disk controller chip included **$79.95**

★ **Disk controller chip** **$34.95**

(Shipping $2.00 Cont. US - see opposite page for details)

Do you need a Single Density Data Separator?

The internal data separator in the WD1771 chip (R/S Expansion Interface) is NOT recommended by WD for reliable data transfer. Do you have any of these problems: Lost data, tracks locked out, CRC errors, disk retry? YOU NEED ONE!

★ **"SDS"** **$29.95**
(For Mod. I; shipping $2.00)

See opposite page ▸▸▸▸▸▸

DISK DRIVES
40 & 80 TRACK
SINGLE & DOUBLE SIDED

NEW!

as low as **$169**

PACESETTERS

Aerocomp leads the way to the BEST value in disk drives on the market. Quality, performance, reliability, warranty, service plus free trial – that's what you get from the leader. AEROCOMP!

BEST FEATURES

- ★ Fast 5 ms. track-track access
- ★ Single or double density
- ★ Easy entry door
- ★ "Flippy" feature allows read-write to the back of the diskette to cut media cost in half! (MPI)
- ★ Disk ejector (MPI)
- ★ External drive cable connection (no need to remove the cover to hook up the cable)

NEW!

HALF-HIGH DRIVES

Two complete drives in the space of one. Complete with power supply & enclosure. (Tandon).

- ★ Two 40 track SS $389
- ★ Two 40 track Dual Head $539
- ★ Two 80 track Dual Head $579

COMPLETE DRIVES

TRS80 Mod. I & III, IBM PC & TI 99/4A. Power supply & enclosure. Specify silver or almond. 5.25 inch.

- ★ 40 track single side (Tandon). $199
- ★ 40 track SS "Flippy" (MPI) $239
- ★ 40 track Dual Head (either). $279
- ★ 80 track SS (MPI) $299
- ★ 80 track SS "Flippy" (MPI) $329
- ★ 80 track Dual Head (Tandon). $379

Shipping & Handling $5.00 per drive.

BARE DRIVES

Internal drives for TRS80 Mod. III, IBM PC, TI 99/4A, 5.25 in. (controller required)

- ★ 40 track Single Side (Tandon) $169
- ★ 40 track Dual Head (either) $249
- ★ 80 track SS (MPI) $269
- ★ 80 track Dual Head (Tandon). $339
- ★ 8 inch Single Side Thinline. $260
- ★ 8 inch Dual Head Thinline $375

Shipping & Handling $4.00 Per Drive.

MODEL III DRIVES

Convert your cassette Mod. III to disk. Complete internal drive kits with 40 track SS drives, disk controller, power supply, mounting towers, hardware & cables (Tandon).

- ★ Drive Kit Only (no drives). $199
- ★ One Drive System Kit $369
- ★ Two Drive System Kit $539

Shipping & Handling $8.00 Per System

MODEL I STARTER PACKAGE

One 40 track SS drive, 2-drive cable, TRSDOS 2.3 disk & manual, freight & insurance (Tandon).

$249

MISCELLANEOUS GOODIES

- ★ TRSDOS 2.3 disk & manual. $20
- ★ LDOS (Mod. I or III) $119
- ★ NEWDOS/80, 2.0 (Mod. I or III). $129
- ★ Diskettes (10 in library box) $23
- ★ MX80 ribbons. $9
- ★ 5.25" Drive Power Supply & case $59
- ★ 2-Drive Cable $24
- ★ 4-Drive Cable $34
- ★ Extender Cable. $13

Shipping & Handling $2.00

8" EXPANSION BOX

Complete with power supply & fan (Tandon slimline)

Two 8" Single Side $699
Two 8" Double Side. 849

FREE TRIAL OFFER

Use your AEROCOMP drive for up to 14 days. If you are not satisfied for ANY REASON (except misuse or improper handling), return in the original shipping container for a full purchase price refund. Applies to hardware only. Sorry, we cannot refund on software. We have confidence in our products and we know you will be satisfied.

WARRANTY

We offer a six months warranty on parts and labor against defects in materials and workmanship. In the event service becomes necessary for any reason, our service department is fast, friendly and cooperative. Our goal is 48 hour turnaround on all warranty or repair drives!

100% TESTED

AEROCOMP disk drives are 100% subjected to burn-in and bench test. We even enclose a copy of the test check list, signed by the test technician, with each drive. AEROCOMP means reliability!

ORDER NOW!

Order by mail or call TOLL FREE TO THE NUMBERS BELOW. Please note toll free lines will accept orders only. We accept VISA or MASTERCARD. Be sure to include card number and expiration date. We will not charge your card until the day we ship. Order by mail with credit card or send check or money order. Please allow 2 weeks for personal checks to clear our bank. Order COD. No deposit required but all COD's will arrive cash, certified check or money order only. We'll send a card showing the exact COD amount before your shipment arrives. Shipping is **not** included in the prices shown. Texas residents add 5% sales tax. NEXT DAY SHIPMENT on all **in stock** items.

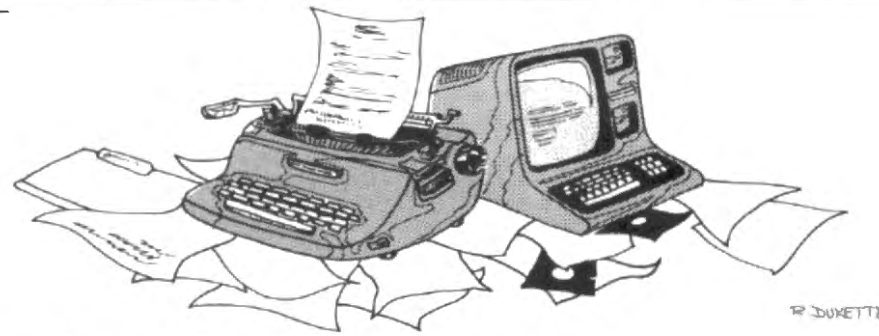
CALL TOLL FREE FOR FAST SERVICE
(800) 824-7888, OPERATOR 24
FOR VISA/MASTERCHARGE/C.O.D. ORDERS
California dial (800) 852-7777, Operator 24. Alaska and Hawaii dial (800) 824-7919, Operator 24.
TOLL FREE LINES WILL ACCEPT ORDERS ONLY!
For Applications and Technical information, call (214) 337-4346 or drop us a card.

Dealer inquiries invited

AEROCOMP
Redbird Airport, Bldg. 8
P.O. Box 24829
Dallas, TX 75224 ↙82

↙See List of Advertisers on Page 323

NEWS THIS MONTH



Monday the 13th

The TI plunge and micro industry implications.

In February of 1983, Texas Instruments discovered a transformer defect in the popular 99/4A home computer that could cause electric shock under certain conditions. TI halted shipments for four weeks while curing the problem, and subsequently declared a $30 million reduction in projected first-quarter profits.

By May, while announcing that net income fell 74 percent on first-quarter earnings to $7.1 million (compared to $27.7 million in 1982), a TI representative told *ISO World* that the sales slump caused by the transformer fix and stiff competition was over. The company shipped its millionth 99/4A in April, the spokesperson said, and the number of stores selling the machine had doubled from 10,000 to 20,000.

At the company's annual meeting on April 21, President J. Fred Bucy gave shareholders a mixed financial forecast. "Price movements in the home computer market continue to be aggressive and will impact our second quarter," Bucy said, but nevertheless, "1983 holds the promise of being a significantly better year for TI than 1982."

Late on Friday, June 10, after the New York markets closed, Texas Instruments announced a loss of $100 million in the second quarter. When trading opened the following Monday, even a 2½-hour delay wasn't time enough to find a price low enough to reopen bidding on TI stock. "A huge stack of sell orders," as *Business Week* put it, drove TI stock down 39 points, with another 11 points lost on Tuesday. The downturn had a contagious effect on other micro makers. The same two days saw Tandy lose four points and Commodore and Coleco five each.

By the end of the week, TI shares struggled up to $116.25 from their Tuesday low of $107. But the Monday plunge—which cost stockholders over $1 billion—started a debate that's still going on, about nothing less than the future of the home computer industry. Atari's multimillion-dollar losses of late 1982 had led onlookers to pronounce the video game industry dead; now an analyst interviewed on CBS predicted that computers would be going the way of CB radio.

Industry experts were less apocalyptic, but by late June some were telling *ISO World*'s Susan Carlson that "the current turmoil in the low end of the home market will look pale in comparison to a more serious crisis that will hit the upper reaches of that market by fall." People were careful to say "shakeup" rather than "shakeout," but it seemed that the obvious—that the micro industry cannot support 200 companies selling products at cost—had reared its ugly head.

What happened? Specifically, TI had put itself in an appalling position: it was selling a machine introduced in 1979 for $1,150 for $99. As Everett Purdy of the Service Merchandise showroom chain summarized the low-end market for the *New York Times*, "I've been in retailing 30 years and I have never seen any category of goods get on a self-destruct

TI's 99/4A: The machine that toppled Austin, TX.

The VIC-20: Commodore's price kamikaze.

PUT PRICES IN CHECK

RADIO SHACK® *
ZIP BOX RELOADS FOR
LINE PRINTER I, II, & IV
$2.77 EA. $29.92 DOZ.

NEW ITEM
CARTRIDGE RIBBONS FOR
RADIO SHACK® *
LINE PRINTER VI & VIII
$7.99 EA $86.29 DOZ

CARTRIDGE RIBBONS FOR
RADIO SHACK® *
LINE PRINTER III & V
NEWLY DESIGNED CARTRIDGE
$6.49 EA. $70.09 DOZ

INNOVATIVE CONCEPTS
FLIP'N'FILE
DISC STORAGE BOX
HOLDS UP TO 60 DISKETTES
5¼" 8"
$24.95 EA $29.95 EA

CARTRIDGE RIBBONS FOR
RADIO SHACK® *
DAISY WHEEL & DAISY WHEEL II
MULTI-STRIKE & NYLON
$5.99 EA $64.69 DOZ

PROTECTALL LINE VOLTAGE SURGE SUPPRESSOR
(SIX OUTLET)
$39.95 EA

CARTRIDGE RIBBONS FOR
APPLE PRINTERS
NEC 8023A
C. ITOH PROWRITER
$9.95 EA $107.46 DOZ.

MEMOREX DISKETTES
5¼ SINGLE-SIDE DUAL DENSITY
#3481
$24.99 10 PACK

MAXELL DISKETTES
5¼" SINGLE SIDE
DUAL DENSITY
MD-1
$29.90 10 PACK

CARTRIDGE RIBBONS FOR
EPSON
MX-80 MX-100
$6.99 EA. $11.95 EA.
$75.49 DOZ. $129.06 DOZ.

RIBBONS FOR
IDS PRINTERS

	EA.	DOZ.
440	$2.75	$29.70
PAPER TIGER	6.95	75.06
MICROPRISM	7.99	86.29
PRISM	10.95	118.25

LABEL SPECIAL
$2.99 / K
(5K MIN)
1 ACROSS 3½ x 15/16 CONTINUOUS LABELS

MOST RIBBONS AVAILABLE IN COLORS TOO!
CALL OR WRITE FOR OUR SUPPLIES CATALOGUE
ON ORDERS UNDER $14.00 PLEASE ADD $3.00 FOR SHIPPING
MINIMUM RIBBON ORDER $30.00 OR 1 DOZEN

MasterCard VISA

Check-Mate™ 466

TOLL FREE 800-343-7706
IN MASS 617-963-7694
PHONES OPEN 9AM-6PM EASTERN TIME

51 DIAUTO DR P O BOX 103
RANDOLPH, MA 02368

MASS RESIDENTS
ADD 5% SALES TAX

*RADIO SHACK IS A REGISTERED TRADEMARK OF THE TANDY CORP

pattern like this."

The 99/4A, with a better keyboard and much lower price than the original model, sold well last year, as did the less powerful (and less expensive to manufacture) Commodore VIC-20 and the $99.95 Timex-Sinclair 1000.

The march of the low-end lemmings began in August 1982, when TI offered a $100 rebate, bringing its micro to $149. Commodore cut VIC prices to match, then went still lower as Christmas approached. Atari started giving away software with its 400 and Timex stuck a rebate on the TS1000, but by early 1983 the slugfest came down to TI and Commodore.

In January, the Commodore 64 left computer stores for mass merchandise outlets at under $400, and the VIC reached the $130 range. By April, the VIC broke the $100 barrier; TI announced it would follow with a 99/4A rebate and price-cutting program in June, but its refusal to match Commodore's move immediately hurt sales.

By May, the Timex listed at $49 and a rebate brought the Atari 800 under $400. TI shelved the 99/2, intended as a Timex competitor and already out of contention, and started giving away a $300 expansion box for the 99/4A. On the fateful June 13, Commodore cut the 64's dealer cost to $200; retail prices quickly followed.

Besides suicidal pricing, the 99/4A was plagued by a lack of software. In March, *ISO World*'s Stewart Alsop II reports, a TI senior executive affirmed Austin's go-it-alone stance and dismissed microcomputer software firms: "Those companies don't know anything about consumer electronics marketing."

Rather than promote independent programmers, Alsop wrote, TI "actually discouraged third-party software and put hundreds of its own programs—largely undifferentiated and of marginal utility—on the market." 99/4A owners could choose from a fair amount of educational software and very little else, while VIC-20 buffs had a dozen companies' lineups to choose from.

"As TI discovered, it couldn't make its money on software if no one buys it," Alsop wrote, adding a sarcastic comment: "Given the company's performance in three markets—calculators, watches, and now home computers—it's easy to wonder who it is that really understands consumer electronics marketing."

More generally, TI's nosedive was interpreted as a symptom of overexuberance in the industry as a whole. Talmis, the Oak Park, IL, market research firm, reports that U.S. manufacturers make nearly half a million computers per month, but sell only 275,000 (though the figure rises during the Christmas rush).

Talmis predicts sales of 3.6 million home computers in 1983. Future Computing Inc. of Richardson, TX, is more optimistic with a sales figure of 5 million units, compared to 2.2 million in 1982. Texas Instruments, however, anticipated sales of 6.7 million micros this year—and hoped to account for half of that number single-handedly.

"The home market is being devastated and the impact is being felt at the higher end of the market already."

"TI went on a binge and created an oversupply of computers," Future Computing chairman Egil Juliussen told *Business Week*. Agreed the Yankee Group's Clive Smith, "TI was counting on extraordinary growth instead of merely exceptional growth."

TI now, needless to say, is in some disorder. The firm faces two lawsuits claiming it misled stockholders with optimistic forecasts such as Bucy's at the April 21 meeting, and the Consumer Group plans drastic cost-cutting measures such as a two-week involuntary vacation for employees and fire sale prices on existing inventory. Onlookers expected the company to survive overall, helped by TI's role as an electronics and military supplier and perhaps by some upscale computers.

Said TI spokesman Norman Neuriter, "We are not exiting this business. We will be in the market with higher priced, high-performance systems." TI's Professional Computer, an IBM PC competitor made by the Data Systems Group rather than the Consumer Group, has received favorable reviews. The high-end 99/8, on the other hand, was reportedly withdrawn from the Chicago Consumer Electronics Show in June and has not yet been unveiled.

The machine that allegedly upstaged the 99/8 may be partially responsible for the even greater shakeup that *ISO World* anticipates this fall: Coleco's Adam, an 80K, CP/M-compatible micro designed to sell for $600 with word processing firmware, bulk storage device, and daisy-wheel printer, is probably the first computer to occupy the "middle end," blurring the distinction between low- and high-end micros as we know it.

"If we were just talking about price cutting, it wouldn't be so bad," the Yankee Group's Smith said in Carlson's June 27 *ISO World* article. "But what we're seeing is an improving price-performance ratio. Sooner or later, that kind of performance will start impinging on what is currently regarded as the personal, as opposed to home, computer. The line between high-end home and business computers, in functional terms at least, will be completely blurred."

Atari, which has never made a profit in the computer business, has already moved to join Coleco, bundling its 16K 600XL micro with word processing software and a printer for $600. And an entry expected in October—IBM's Peanut, rumored to cost between $600 and $800 with 64K or more memory and a built-in disk drive—should establish the middle ground once and for all.

"The home market is being devastated and the impact is being felt at the higher end of the market already," Seymour Merrin, president of Computerworks in Westport, CT, told Carlson. "Customers at the Tiffany end of the home market are still buying the Apple and IBM computers, but their psychology is being changed by manufacturers and dealers who keep trying to drive prices down.

"In effect, consumers are being told that computers are going to go the same way as calculators. They believe that if they wait long enough, they'll be able to buy a 256K system with two disk drives for under $50." ■

—E.G.

Radio Shack TRS-80™ Computers

At Guaranteed Savings

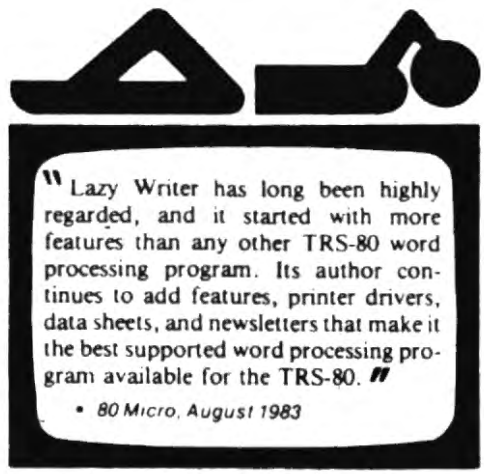
from
Pan American Electronics
✓122

Full Line Computers, Printers & Peripherals

1117 Conway Ave.
Dept. EM
Mission, Texas 78572
Ph. 512/581-2766

Telex 767339

TO ORDER
CALL TOLL FREE
800-531-7466



The BEST SUPPORTED word processor now has an 80 x 24 character display !

Extras include **MAILMERGE** for form letters, **LAZFONT** for custom fonts for Epson & Prowriter printers, **LAZYDOC** document maker for lawyers & anyone working with standard forms, **PROPORTIONAL SPACING** for many printers
for TRS-80 I/III/IV
still only $175.00

ALPHABIT COMMUNICATIONS, INC
13349 MICHIGAN AVE
DEARBORN, MI 48126
(313) 581-2896

VISA

✓476

GO BEYOND WORD PROCESSING

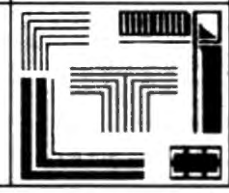
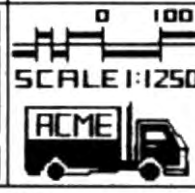
With *Crayon Deluxe* & *Scriptr*

Crayon Deluxe is a complete Bit-Image word/graphics processor which creates stunning visual effects using custom text and graphics. Use it with the *Fontmaker* to create your own **SPECIALITY FONTS**, Logos, Mail Labels, Charts, Graphs, Letters, Cartoons & Basic Screens. It features underlining, **wide** printing, overlays, reverses, justification, centering, custom graphics, foreign languages, logic seeking, line drawing and fancy borders with over 100 commands all in Z-80 Machine Language for speed and ease of use. The *Editor* is the most sophisticated **FULL SCREEN EDITOR** ever written for the TRS-80.

AVAILABLE NOW for the following printers:

All **MX + FX** printers with ***Graphtrax*** - All **PROWRITER** and **8510A** and All **GEMINI 10 + 15**

COMPLETE 70 page manual, 2 disks - samples - **FONTMAKER** - **PRICE = $80.00 Disk Mod 1,3,4** - with over 600 characters. 300 character fonts are **$15.00** - Fonts available are **DIGITAL — ELITE — HERITAGE** — Comes with Outline and Italics.

Brush	*Heritage*	*Digital*	*Outline*	*Borders*	*Shapes*
					

Scriptr - Turns *Scriptsit* into a full word processing system by providing complete printer support for the following printers **MX 80 + FX 80 - LP-4 + 8 — DMP 200 + 400 — DW2 — PROWRITER — CIOTH 8510A — GEMINI — MICROLINE — FEATURES** on most versions include Emphasized, Double Strike, access all available typestyles, change character widths, sub and super script, pausing, dot linespacing changes, Editing, Macro's, DOS Reentry, Send any Code to printer, Supports (ALL ***Graphtrax*** Functions, — most **Mid-Line**), **DIAL-A-PRINT**, Form Letters, Print to video only for trial pagination and much much more. Available with versions for **Models 1,3,4 on DISK/CASSETTE for $40.00** with teaching programs and a 66 page manual.

• • • QUALITY — INNOVATION — SUPPORT — PRINT SAMPLES AVAILABLE ON REQUEST • • •

Free Brochures **PIONEER SOFTWARE** ✓160 **Check (✓) 160**

1746 N.W. 55th AVE. No. 204 Lauderhill, FL 33313 Phone: (305) 739-2071 Checks/Money Orders/COD's accepted

✓See List of Advertisers on Page 323

SOFTWARE

Up from Basic

Will Microsoft's MSX spell world domination?

Not long ago, Microsoft Corp. of Bellevue, WA, was primarily a language software publisher, competing with firms like Ryan-McFarland in marketing Cobol and other compilers and interpreters, offering symbolic mathematicians the esoteric muMath/muSimp, and virtually dominant in Basic—Microsoft Basic has been the most popular computer language since its introduction on the 1975 Altair, and was "far and away the most obvious choice" for *80 Micro*'s first Hall of Fame in 1982.

Today, Microsoft is doing its best to become the General Motors of software, if not the ROM of the whole computer industry. At May's National Computer Conference in Anaheim, CA, Altos President Dave Jackson, fueled by "too many meetings selling to OEM customers" and "five Mexican beers," complained about Microsoft to a *MicroScope* reporter. "According to Jackson," the British magazine said, "[Microsoft Chairman] Bill Gates is not 'humane' enough, and should stop riding roughshod over nice people with his MS-DOS."

Meanwhile, Microsoft seems less and less likely to soft-shoe. Besides being the OEM force behind the two hottest machines in computing, the IBM PC and Tandy's Model 100, Gates' team—directed by new President Jon Shirley, formerly Radio Shack's vice-president of computer merchandising—is aiming at success in the software retail market, taking on bestsellers VisiCalc and WordStar.

And if that's not enough, a new agreement among Japanese manufacturers could establish the longtime dream of standardized micros with interchangeable software—and 32K of Microsoft ROM in every household.

Microsoft's ticket to stardom was MS-DOS, and "riding roughshod" may be an accurate phrase for the success of the IBM Personal Computer operating system. The MS-DOS story started in 1980, when IBM approached Gates about languages and a DOS for

Gates: "riding roughshod over nice people"?

the forthcoming PC. Gates, *Fortune* magazine says, referred Big Blue to the CP/M leaders, Digital Research Inc.; unfortunately for DRI, however, founder Gary Kildall was out of town and IBM was in a hurry.

The PC team went back to Microsoft, where Gates acquired an infant system—originally called QDOS, for Quick and Dirty Operating System—from Seattle Computer Products and set about making it the 8086 standard.

Today, MS-DOS rules the single-user, 16-bit world, perhaps more completely than CP/M does the 8-bit arena. Digital's CP/M-86 trailed the PC to market by more than six months; when it finally appeared, IBM priced it at four times MS-DOS' retail. As a result, 95 percent of IBM micros shipped to date use Microsoft's DOS, as do most of the dozen-plus PC clones. *Fortune* quotes a DRI director as admitting, "We suffered a terrible injury."

So may a lot of applications software companies. Microsoft's Multiplan has been acclaimed as a superior successor to VisiCalc; Microsoft Word, a new word processor, links with Multiplan to begin a series of Lisa- or VisiOn-style integrated software packages, controlled by the Microsoft Mouse.

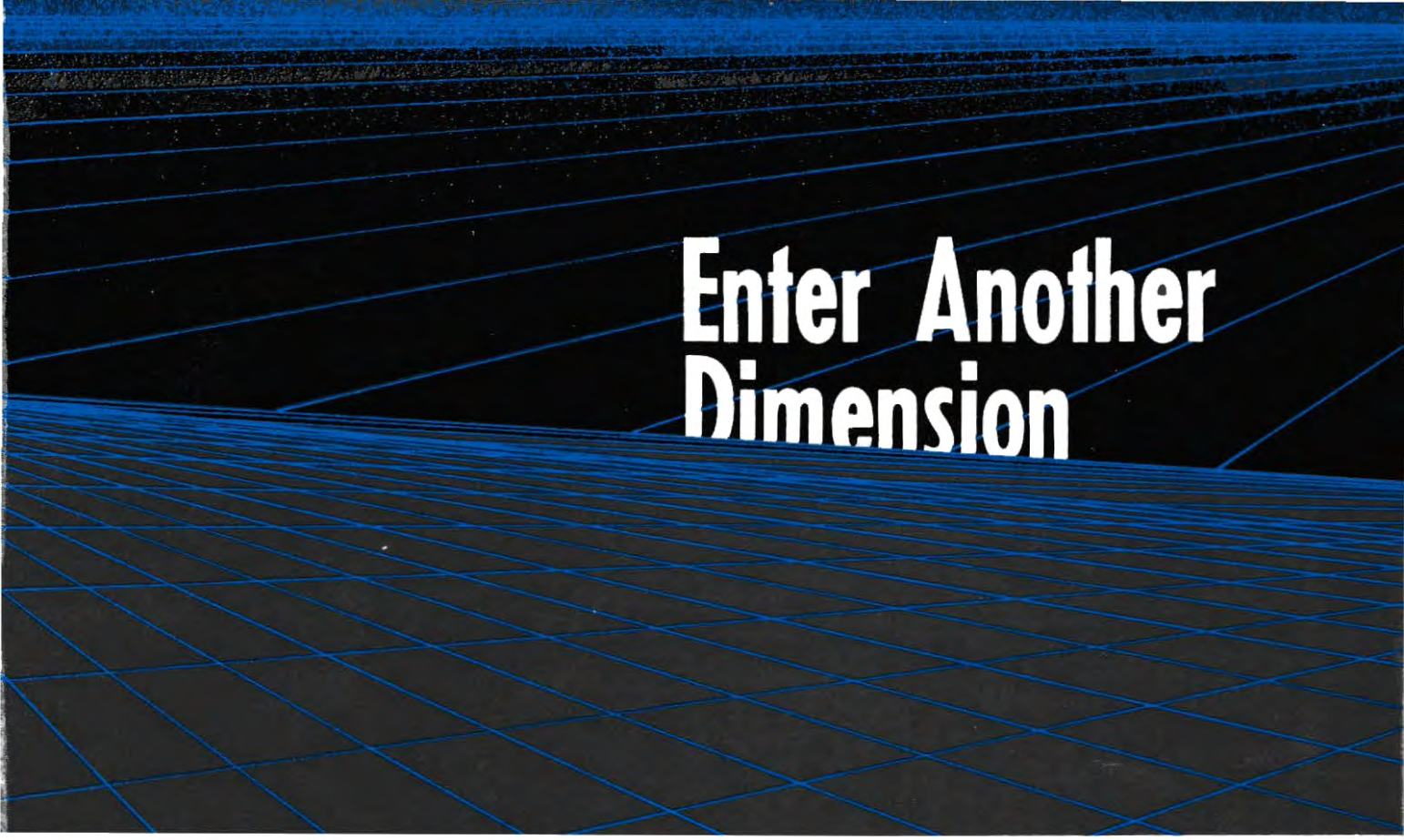
Responsible for selling these products is Jon Shirley, who left Tandy after 25 years with the words, "I believe Microsoft will lead an industry on the edge of explosive growth." Shirley told *80 Micro*, "I'll be essentially in charge of managing the operations side of the business, so Bill Gates can concentrate on research and development on the software side."

Besides selling to individuals, Microsoft plans to compete with such firms as MicroPro (makers of WordStar) and Lotus Development Corp. (1-2-3 marketers) in volume shipments. During the week of Shirley's appointment, Microsoft announced the addition of a major accounts division, which will concentrate on government, education, and Fortune 1000 customers. Former national sales manager Nicholas Roche told *Computer Retail News* that his Corporate Sales Group will occupy the same level in the Microsoft hierarchy as the OEM and retail divisions.

Most software houses would be content with Microsoft Basic, MS-DOS, and Multiplan, but Gates isn't sitting still. The newest development from Bellevue is MSX, a set of specifications designed to create a market for low-end micros in Japan. While Microsoft downplays the possible significance of MSX for the U.S., the guidelines establish an 8-bit standard that could rival the success of PC architecture and MS-DOS among IBM imitators.

The MSX concept—design parameters shared by a dozen companies, whose resulting computers could swap cartridge software—was created by Matsushita and NEC in Japan and Spectravideo in the U.S., with Microsoft coming aboard when asked to provide a common version of its Basic interpreter. Other subscribers include Hitachi, Sony, Canon, Mitsubishi, Toshiba, Kyocera, General, Yamaha, Pioneer, Sanyo, and JVC.

The parts list—"Standard technology, off the shelf," says Microsoft pub-



The world of 3D.

You'll find it in **80 MICRO**'s Anniversary Issue: true stereoscopic three-dimensional Color Computer* graphics, with your own complimentary pair of 3D glasses bound right into the magazine. This is the biggest **80 MICRO** we've ever published, 600 pages loaded with the kind of programs and information you need:

- stereoscopic 3D Color Computer graphics programs
- how to shop for a printer
- 3-year **80 MICRO** index, annotated and cross-referenced
- CoBOL tutorial for beginners
- a list of over 200 user's groups
- Model II utilities and applications programs
- Bill Barden's introduction to Assembly Language
- NODOS 80—disk utilities for cassette users

And it's yours for only $5.95. Order your Anniversary Issue today. Use the attached order form, the coupon below, or call toll free

1-800-258-5473

and use your MasterCard, Visa or American Express.

Experience the 3rd Dimension.
Order your **80 MICRO** Anniversary Issue today.

*TRS-80 Color Computer & TRS-80 are trademarks of Radio Shack, a division of Tandy Corp.

You can also get the Special Edition Load 80 Companion to the Anniversary Issue: dozens of programs on easy-to-load cassette or disk. Save hours of keyboarding. The Anniversary Issue Load 80 cassette is just $9.95; the disk, $19.95. Programs included run only on the TRS-80* Model I and Model III computers.

YES! *I want to enter another dimension.*

Send me_____copies of **80 MICRO**'s Anniversary Issue
@ $5.95 for a total of_____

Send me The Special Edition LOAD 80 Companion*
to **80 MICRO**'s Anniversary Issue
_____cassettes @ $ 9.95_____
_____diskettes @ $19.95_____
total_____

☐MC ☐VISA ☐AE ☐CHECK/MO

CARD# _____ EXP. DATE _____

SIGNATURE_____

NAME _____ INTERBANK# _____

ADDRESS_____

CITY _____ STATE_____ZIP_____

80 Micro•80 Pine Street•Peterborough, NH 03458

Please allow 6 to 8 weeks for delivery. **10-83**

*LOAD 80 programs are for TRS-80 Model I and Model III only.

lic relations director Pam Edstrom. "It's boring technology, really"—includes a Z80 microprocessor, Texas Instruments' 9918 graphics and General Instrument's 8910 sound chips, input/output ports, cassette and joystick interfaces, and an MSX logo. More important from Microsoft's point of view, each machine will carry 64K of RAM and 32K of ROM, the latter including an enhanced version of Microsoft Basic, and Microsoft is responsible for licensing prospective manufacturers and collecting royalties on MSX sales.

MSX is not taking over Japan, let alone the world, quite yet. Fujitsu, Sharp, and NEC withdrew their support at the last minute to consider proposals for other standards (notably one from Digital Research). The Japan Electronic Industry Development Association is working on a homegrown standard, though MSX backers argue that a unified market for home computers in Japan—between 200,000 and 500,000 units in 1984, guesses Yankee Group analyst Clive Smith—would rely on American firms' supplying software.

Some Japanese, according to *Business Week*, feel Microsoft's licensing fees are too steep. Masayoshi Son, chairman of Japan Soft Bank, claims that Bellevue wants $250,000 per participant and $3 to $4 per MSX micro sold.

Nevertheless, MSX could mean a boost for Japanese hardware and U.S. software firms alike. As for U.S. hardware, Spectravideo President Harry Fox plans a $50 MSX adapter for his SV-318 computer, though Microsoft's Edstrom is noncommittal about other manufacturers: "There are some companies that have come to us and that we're talking with, but nothing's been settled yet."

As to whether the Japanese might join the low-end wars in America, Edstrom was doubtful. "If I were a manufacturer from any country, I would seriously question whether I wanted to get into that market," she told *80 Micro*. "There's been extensive price cutting, and it's starting to have financial effects on firms such as Texas Instruments and Atari."

"Microsoft is the broadest-based systems software company."

So will ten Japanese companies invade America with home computers this Christmas? "Well, geez, would you? I mean, what's the advantage?" Edstrom asked. "Traditionally, people have said about the Japanese that they come into a market and they're able to price very competitively, because they've had low production costs. But the U.S. companies in the low end are producing overseas already, making computers in countries like Korea and Hong Kong, where labor is cheaper than it is in Japan."

While Altos' Jackson may mutter about Gates and MS-DOS, Microsoft seems to have plenty of eggs besides those in the MS-DOS basket.

"Microsoft is the broadest-based systems software company," Edstrom claims. "In operating systems we compete with Digital Research, in applications we compete with VisiCorp, in word processing we're going to compete with MicroPro, in languages there are several companies—Ryan-McFarland in Cobol, for instance.

"Our philosophy is to provide software to the broadest possible base. That's always been our goal and we'll continue to do that."

In fact, as of this summer there seemed to be only two clouds on Microsoft's horizon. One was Commodore's announced intention to sell Multiplan for under $100, less than dealers currently pay for the spreadsheet, and the other was Microsoft Word—not the product, but the name. It was introduced as Multi-Tool Word, emphasizing its status as one of a series of integrated packages; the computer press, however, decided that that was the clumsiest program name in software history. Microsoft Word is the new title.

"See?" Edstrom quipped. "We do listen to people." ■

—E.G.

DISCOUNT COMPUTERS

100% RS COMPONENTS, NO FOREIGN DRIVES OR MEMORY—FULL WARRANTY

8K MODEL 100	$ 649.00	DMP 100 PRINTER	$ 299.00
24K MODEL 100	799.00	DMP 200 PRINTER	599.00
16K MODEL 4	799.00	DMP 500 PRINTER	1398.00
64K MODEL 4	1579.00	DMP 2100 PRINTER	1599.00
80K MODEL 12, 1 DR	2499.00	DWP 410 DAISY	1095.00
80K MODEL 12, 2 DR	3149.00	DWP DAISY WHEEL II	1599.00
128K MODEL 16, 1 DR	3898.00	12 MEG HD MODEL II/12/16	2769.00
128K MODEL 16, 2 DR	4510.00	ALL RS SOFTWARE	20% OFF

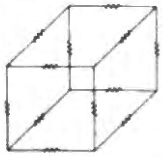
CASHIERS CHECK OR MONEY ORDER MUST ACCOMPANY ALL ORDERS.

(817) 825-4027

NOCONA ELECTRONICS • Box 593 • Nocona, TX 76255

232

CIRCUIT SOLVER I



You don't have to be an engineer to make productive use of this program. A large clear manual leads you through the use of Circuit Solver using sample problems which have practical application.

Features

- Simple Circuit Entry
- Circuit Listing
- Circuit Storage & Retrival
- Easy Circuit Editing
- Supports Op-Amps
- Many Useful Sample Circuits

ORDER #

CSI-100C	PET CBM 64*	$34.95
CSI-101C	APPLE*	34.95
CSI-102C	TRS-80*	34.95

Include $2.50 shipping and handling.

*PET CBM 64, APPLE and TRS-80 are * Trademarks of Commodore, Apple Computer and Tandy Resp.*

SHS SOLUTIONS
1430 N. LATROBE
SUITE 2A
CHICAGO, IL 60651

↙432

Verbatim® Diskettes

↙440

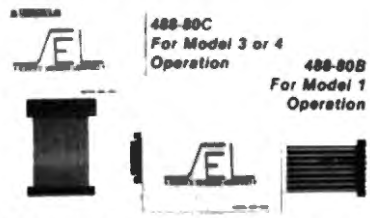
Top-quality Verbatim® Diskettes from **Tech•Data**, your complete supply and peripheral wholesaler. **Dealers only.**

Call Toll Free
1-800-237-8931.
In Florida, call
813-577-2794.

Tech•Data Corporation
3251 Tech Drive North
St. Petersburg, FL 33702

IEEE-488 TO TRS-80* INTERFACE

Everything needed to add *powerful* BASIC GPIB-488 controller capability to TRS-80 Model 1, 3 or 4, Level 2 or DOS with a minimum of 16K.



488-80C
For Model 3 or 4 Operation

488-80B
For Model 1 Operation

Model 488-80B or 488-80C Price: $375
+ shipping, insurance & tax

WHEN ORDERING SPECIFY DISK OR TAPE

SCIENTIFIC ENGINEERING LABORATORIES
11 Neil Drive • Old Bethpage, NY 11804
Telephone: (516) 694-3370

**Trademark of Tandy Corp.*

↙203

There is no affiliation between Scientific Engineering Laboratories and Tandy Corp. or Radio Shack.

SEND AND RECEIVE MORSE CODE

- **SEND UP TO 40 WPM**
- **COPY OVER 100 WPM**

Your Model I or III becomes a programmable keyboard keyer that can send morse from the keyboard or from stored messages. Keying is done either by the relay or by the audio output. Received morse is decoded, displayed, stored and printed. The cassette earphone plug connects to the receiver speaker to copy off the air. No hardware except patch cords is required for many setups.

satisfaction guaranteed

Cassette with instruction booklet only $19.95 postpaid. Model I or III, LEVEL II, with at least 16k required.

ROGO Computer Products
4752 DeBeers Drive
El Paso, Texas 79924

↙343

TRS-80 COMPUTER DISCOUNTS

- Factory Direct
- Best Prices Anywhere
- No Out-of-State Taxes
- 100% Radio Shack Warranty
- Free Price List

SCOTT TASSO ASSOCIATES
175 E North Delsea Drive
Vineland, N.J. 08360
800-257-0426
NJ 609-691-7100

↙510

"CC" RISER

- **Raises & tilts TV monitor for easy viewing**
- **Allows CC keyboard to slip under monitor for more desk space**
- **Matching silver-gray fiberglass**
- **$37.50 + $2.50 shipping**

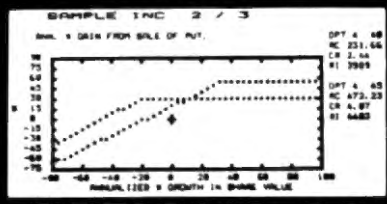
"80" DEMI-CASES

- **Models for LNW or MDX I & II Boards**
- **$32.50 + $2.50 shipping**

N.Y.S. Residents Add 7% Tax

↙174

SYRACUSE R & D CENTER
Box 125, Dewitt, N.Y. 13214
"Specializing in Electronic Packaging"



OPTIONS-80

ANALYZES OPTION INVESTMENTS

HANDLES CALLS, PUTS, SPREADS, BUYING AND SELLING. INCLUDES COMMISSIONS, RISK, COST OF MONEY, DIVIDENDS. PRESENTS RESULTS IN TABULAR OR GRAPHICAL FORM. HARDCOPY AND STORAGE TO DISK. ACCOMPANYING MANUAL A COMPLETE AND UNIQUE GUIDE TO OPTION INVESTING. $125. M/C AND VISA. MONEY BACK GUARANTEE. SEND FOR FREE BROCHURE.

FOR TRS-80, APPLE & IBM PC.

OPTIONS-80, BOX 471-E
CONCORD, MASS 01742.

↙206

TRSDOS↔CP/M with REFORMATTER™

Model II users! Convert files between TRSDOS and CP/MI

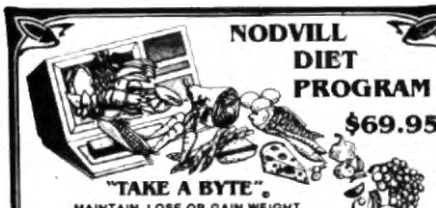
- **REFORMATTER** runs under TRSDOS
- Operates on single drive system
- Converts in both directions
- CP/M operating system not needed
- All TRSDOS record lengths supported
- Initializes blank CP/M diskette
- Displays or dumps CP/M files
- Manipulates CP/M directory under TRSDOS

↙380

$249.00 from stock. CP/M↔IBM, TRSDOS↔DEC, and CP/M↔DEC versions of **REFORMATTER** also available at $249.00 from MicroTech Exports, Inc., 467 Hamilton Ave., Palo Alto, CA 94301 ☐ Tel: 415/324-9114 ☐ TWX: 910-370-7457 MUH-ALTOS

NODVILL DIET PROGRAM

$69.95



"TAKE A BYTE"

MAINTAIN, LOSE OR GAIN WEIGHT
With your TRS-80 Double Density Disk Model I/III/4
and
The NODVILL DIET PROGRAM "Take a Byte"

you can quickly and accurately:

- **Calculate** caloric and nutritive food intake
- **Evaluate** nutritive value of your diet
- **Compare** daily diet to individual RDA Chart
- **Create** personalized daily meals and menus
- **Plan** varied daily menus based on sound nutrition
- **Save** records of daily meals and menus for future planning
- **Print** nutrition charts, food, meal, menu and grocery lists

"Take a Byte" is a Modular BASIC Program

MAIN Program Menu
(1) Recommended Daily Dietary Allowance (RDA) CHART
(2) 733 Expandable Random Access FOOD LIST Data File
(3) 28 Nutritional MEAL LIST Data File Examples
(4) 7 Balanced DAILY MENU LIST Data File Examples
(5) GROCERY LIST Program Module
(6) 25 Page USER'S MANUAL including Charts and Tables

ALL Data Files can be EXPANDED and RECRIPTED systematically and flexibly to reflect your personal diet, your choice of diet book, or your doctor's suggested diet.

For more information: Call: (203) 431-9449
To Order: Mail a check or money order for $69.95 to

NODVILL Software
24 Nod Road
Ridgefield, Conn. 06877

TRS-80 is a Trademark of the Tandy Corporation

↙54

↙See List of Advertisers on Page 323

PULSE TRAIN

MicroPro strikes back

"Rent Software Before You Buy!" say the ads in dozens of micro magazines, offering 7-day rentals of WordStar, VisiCalc, Multiplan, dBase II, Frogger, and other popular programs at 20–25 percent of the manufacturers' retail price. After stating that rental fees apply toward purchase, the ad proclaims in boldface capitals, "Remember, these are not demos, but original, unrestricted software programs."

If you think the whole idea, and particularly the emphasis on "unrestricted," sounds less like a trial service than an invitation to software piracy, you agree with MicroPro International Corp., the makers of WordStar. MicroPro is suing the advertiser, United Computer Corp. of Culver City, CA, for $14 million, plus $50,000 for each copyright infringement.

MicroPro's suit, filed June 17 in U.S. District Court in San Francisco, charges United with violating WordStar and other programs' nontransferable purchase agreement. Under the agreement, a customer does not "own" but is licensed to use the product—and is prohibited from lending it to others for copying.

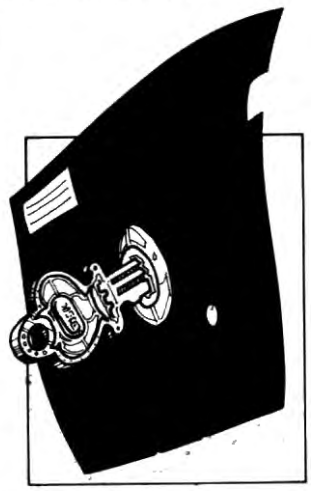
The San Rafael, CA, publisher accuses United of buying MicroPro's software, removing the printed license agreement, repackaging the disk, and renting the product to the public. "It is abundantly clear that United Computer is renting software programs so that customers can illegally copy them," claims MicroPro's general counsel, E. Ric Giardina.

The lawsuit claims United Computer "devised, set up, and conducted their software rental business in the belief and with the knowledge that the great majority of their customers will unlawfully copy the rented software and return it to the defendants prior to, or at the end of, the one-week rental period."

United's executive vice president, George Pollack, whom *InfoWorld* says admits removing manufacturers' licensing agreements, claims that his firm substituted its own anti-piracy notice.

Describing the MicroPro suit as "unfair harassment, untrue, and without grounds," Pollack declares, "We abhor any illegal usage of our rental software and have never violated any of the copyright agreements for the programs we provide our nationwide subscriber list. In fact, we include additional warnings in our literature concerning the illegal pirating of software and the consequences involved."

In a press release, Pollack accused MicroPro of trying to "unfairly interrupt a legitimate rental service to potential buyers of personal computer software." Pollack told *Computer Retail News*, "We're a marketer of software and give people the opportunity to try it first before they buy it. We're going to make sure this case is tested and that we continue to do business."



MicroPro is suing to protect its software.

The lawsuit, believed to be the first copyright infringement case of its kind, will come to a preliminary hearing in September. While MicroPro predicts "a lengthy court battle," according to *InfoWorld*'s Barbara Wierzbicki, Pollack looks for "a short trial" and a ruling in United Computer's favor: "MicroPro has as much chance of winning this case as I do of walking across the Charles River."

More CRT concern

Some people know them as CRTs, while others swear VDTs is the proper term. Whatever you call them, the monitor screens in microcomputers and word processors continue to attract attention as possible health hazards. Labor organizations like 9 to 5, the National Association of Working Women, are lobbying for worker safeguards and research, and several states are considering laws to regulate monitors or working hours.

In early June, Maine and Connecticut became the first states to pass CRT safety legislation. The Maine law directs the state's bureau of labor standards to investigate CRT health issues and, if necessary, establish rules to protect public employees. Connecticut's law authorizes the Department of Consumer Protection to study eye or muscular fatigue and radiation emission.

In Oregon, pressure from the business community and complaints of high implementation cost have watered down a CRT safety bill introduced in March. The original bill required that business offices provide lighting to minimize screen glare, semiannual CRT maintenance and radiation checks, free annual eye examinations for employees, and a maximum of two hours' consecutive time at a CRT between periods of work elsewhere.

Oregon's revised bill calls for "administrative rules" instead of "statutes," and offers eye exams only to operators who spend four or more hours per day before a screen.

Concern about the effects of CRTs on pregnancy is increasing. New York's Assembly Labor Committee passed a bill requiring CRT manufacturers to incorporate radiation shielding into their product and employers to guarantee pregnant women the right to non-CRT work, as well as Oregon-style eye exams and work breaks. An identical bill is before the corresponding Senate committee.

In California, the National Institute for Occupational Safety and Health (NIOSH) joined a private health care organization's study to determine whether CRTs' low-level radiation increases the risk of spontaneous abortion.

Meanwhile, a three-year study from the University of Wisconsin Medical School

REAL VOICE SYNTHESIZER/ANALYZER

OKI SEMICONDUCTOR'S REAL VOICE SYNTHESIZER/ANALYZER IS A REALITY FOR TRS-80 M 3 & 4™

NOT A KIT BUT A FULLY FUNCTIONAL SYSTEM. FULL DOCUMENTATION INCLUDED

POSSIBLE APPLICATIONS:

- DIGITAL RECORD/PLAYBACK - VOICE OR MUSIC
- MULTI-LINGUAL ANNOUNCEMENT SYSTEM
- DIALER/DECODER
- VOICE RECOGNITION
- SOUND EFFECTS

SYSTEM INCLUDES POWER SUPPLY, SYNTHESIZER/ANALYZER, DISK WITH DRIVER SOURCE & SAMPLE RECORD/PLAYBACK PROGRAM

KIT	$249 95
FULLY ASSEMBLED & TESTED	349 95
CONNECTOR CABLE	25 00

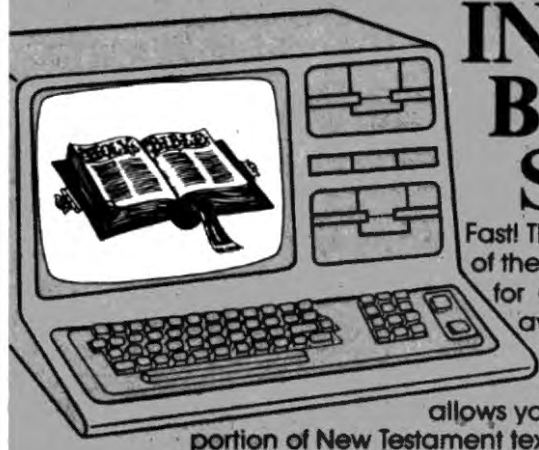
Above prices include shipping and handling

FOR MORE INFORMATION CONTACT
DATA DISPLAY CORP.
BOX 284
HANOVER, NH 03755
1-800-227-3800
Ext. 110 with orders only

↩19

TRS-80 M 3 & 4 is trademark of Tandy Corp

Now use your home computer for IN-DEPTH BIBLE STUDY



Fast! Thorough! For serious students of the Bible, an exciting new tool for analysis of Scripture is available through the use of computer technology. BIBLE SEARCH Version 1.3* allows you to display or print any portion of New Testament text from disk files, scan the text for topics you specify, and edit and retain reference lists of selected verses for future use.

Software, comprehensive instruction manual, and King James Version New Testament database_____$140

When ordering, please specify disk format and DOS.

Old Testment available soon at an additional cost (less than $100).

Send check or money order to:

SCRIPTURE SOFTWARE

P.O. Box 6131-C, Dept. 8M
Orlando, FL 32853 (305) 896-4264

↩431

*Bible Search currently requires a TRS-80 (TM of Tandy Corp.) Model I or III with 48K memory and two disk drives. Inquire about its availability on other computers.

TRS-80*

100% Radio Shack Equipment

SAVE A BUNDLE

Order Toll Free 1-800-874-1551

FLA Residents 904-438-6507 collect

EPSON, OKIDATA, CITOH, TABCO Printer Switches

HABJ SALES CO.

704 W Michigan Ave; P.O. Box 8098
Pensacola, FLA 32505

↩189

*TRS-80 is a trademark of Tandy Corporation

↩See List of Advertisers on Page 323

COLOR COMPUTER SOFTWARE

COMPLETE YOUR WORD PROCESSOR

SPELL—RITE

THE Cassette Spelling Verifier

You've got the best word processor. Now complete your system with the best spelling verifier. Spell-Rite is a convenient, fast way to insure that all of your documents are letter perfect. Spell-Rite was designed specifically for cassette-based word processors. Like Yours!

Spell-Rite is easy to use: completely menu driven.

Spell-Rite is Fast! You can verify a 1000 word document in under 9 minutes - including cassette I/O.

Spell-Rite is complete. It comes with its own 10,000+ word dictionary which you can expand. Also included is a superb manual.

Spell-Rite works with any word processor that generates ASCII tape files, such as Color Scripsit, Super Color Writer and Telewriter 64. 32K of RAM and Extended Basic are required.

Cassettes and manual $59.95

DISK BASIC AID

DISK BASIC MADE BETTER

Your Color Disk Basic is one of the most powerful Basics on any computer. Add Disk Basic Aid and it also becomes one of the easiest to use! The Basic Aid package will make developing and entering Basic programs a snap. Here are just *SOME* of the great features Basic Aid contains:

- Full Screen Editing
- Automatic Line Numbering
- 2 Key entry of Basic keywords
- Cross Reference
- Automatic Key Repeat
- User definable keys

PLUS Label support! This unique Basic Aid feature is a vast improvement in the Basic language. Label any line you want and use that label in all calls to that line. Forget about line numbers, just call routines by name like this:

ON A GOTO ENTERCHECKS, PAYABLES, EXIT

A real time saver. And for transportability, Basic Aid will convert all labels to line numbers.

These and other great features make Basic Aid a *must* for anyone who writes or modifies Basic programs. Basic Aid runs on 32K or 64K Disk systems. It comes with complete documentation and our new heavy duty keyboard overlay.

Disk Basic Aid $49.95

SPECTRUM — STICK

Put the joy back into color computing with the Spectrum Stick. This heavy duty joystick gives you a true feel of control. And it comes with an extra long cable and power on/off LED.

the feeling of this joystick is superb. March 1983 80 Micro

TX add sales tax $39.95

Send check or money order for total purchase price plus $1.50 S & H.
Charge cards. Include all embossed information.

☐ Spell-Rite ☐ Disk Basic Aid
☐ Spectrum Stick ☐ Send Free Catalog

SEND to Eigen Systems ←154

P.O. Box 180006
Austin, Texas 78718
(512) 837-4665

Name _____
Address _____
80 _____

PULSETRAIN

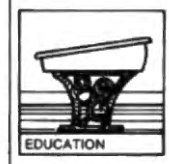
reports that CRT users experience no more stress, but complain more about job conditions, than non-users.

The Wisconsin survey compared the health and well-being of 248 CRT users to 85 non-users in similar state jobs. The former found their work environments less pleasant; about 25 percent complained of screen glare, and many more users than non-users reported burning eyes.

On the other hand, the CRT group had fewer psychological stress symptoms such as depression and tension. This, said UW psychologist Steven Sauter, confirms a 1981 study of CRT-using copy editors at a daily newspaper. Editors complained about eyestrain and irritation but, perhaps because they have considerable control over their work, didn't suffer from stress or job dissatisfaction.

"Even though health problems were not dramatically elevated among VDT users in our study, these problems should not be ignored," concluded Sauter. "About one-fourth to one-third of users complained of chronic eyestrain and musculoskeletal problems. More research is needed to determine how to improve working conditions to enhance VDT users' well-being and productivity."

How schools use micros



After its study showing that 42 percent of elementary and 85 percent of high schools in the U.S. have at least one computer (see *80 Micro*, August 1983, p. 292), Johns Hopkins' Center for Social Organization of Schools has gone on to investigate how widely micros are actually used. While a few schools' computers are gathering dust, most of the 1,086 schools surveyed report brisk traffic at the keyboard—though only a small minority of students have a turn.

In most institutions, one or two teachers regularly use computers in class; about half of the schools have more than two regular users among the faculty, and a majority have at least one spare-time computer hobbyist or programmer. About one in four elementary and one in five secondary schools use their equipment no more than an hour per day, but nearly the same number report five or

Computers are making themselves at home in America's schools.

LOGICAL SYSTEMS AND YOUR MODEL 4
CREATE A FUNCTIONAL COMBINATION

LS-FED II 6.x (FILE EDITOR) — The ultimate "Zapping" utility with Visual Disassembler built in. File and/or track/sector oriented. Catalog. #L-30-012.
only $49.00 plus $3.00 Shipping & Handling

LS-FM 6.x (FILE MANAGER) — Conditional Parameterized, Move, Kill, Cross Examine, Create Secondary Action Files and Much, Much More. Catalog #L-30-051.
only $49.00 plus $3.00 Shipping and Handling.

LS-TBA 6.x (The BASIC Answer) — TBA'S 5 Pass Text Processor allows structured programming for TRSDOS 6.x Basic. 14 character variables and Local variables (PSUEDO). No Line Numbers, use Labels instead, with Cross Reference System.
Catalog #L-21-011 only $79.00 plus $4.00 Shipping & Handling

LS-HELP 6.x (BUILT IN 6.x TUTOR) — The Handiest Utility a New Model 4 owner could possibly have. Provides almost all the information needed to use the powerful features of TRSDOS 6.x.
Catalog #L-30-061
only $29.00 plus $3.00 Shipping & Handling.

All of the above products are also available for the TRS-80™ Models I and III running under the LDOS 5.1 Operating System.

Contact Logical Systems, Inc. for a free detailed catalog containing these and many other products.

* Prices and Specifications subject to change without notice.
* TRSDOS™ and TRS-80™ are Trademarks of Tandy Corp. LDOS, LS-FED II, LS-FM, LS-TBA, LS-HELP are all products and trademarks of LSI. (The authors of TRSDOS™ 6.x)

LOGICAL SYSTEMS INC. ✓237

LOGICAL SYSTEMS, INC. 8970 N. 55TH ST. MILWAUKEE, WI 53223 (414) 355-5454

more hours' daily use.

How many students get hands-on computing experience, and what do they do with it? The survey concludes that the typical computer-owning elementary school has two machines, each used for 11 hours a week—about 20 minutes for each of 62 students (in a student body of 400). About 40 percent of this time goes for drill and practice; a third of it involves programming, and 20 percent is spent playing games under teacher supervision.

The corresponding secondary school has five micros, each used for 13 hours weekly; this provides 45 minutes of computer time to each of 80 students (out of a population of 700). Fully two-thirds of this time is spent in programming and computer literacy work.

As elementary schools get more micros, they give access to more students. Secondary schools acquiring extra machines give longer access to the same number of learners.

Retail traffic patterns

What's it like to be a computer store manager? You see about 17 customers a day, maybe 10 prospective buyers and seven casual shoppers. Your customers make several visits before buying, but most still don't correctly predict the price. Their main reasons for buying are games and educational programs; their favorite peripherals are printers, trailed by disk drives and modems.

Newsweek just tracked the habits of computer consumers in a survey on "Personal Computers: The Retailer's Perspective." The 300 managers polled—225 in computer stores, 75 in discount, department, and toy stores—describe their clients as serious, though not always well-informed, consumers.

Seven out of 10 customers are intentional visitors rather than walk-ins, and six of 10 are prospective buyers. An impressive 83 percent make two or three visits before buying a micro, though 24 percent underestimate and 31 percent overestimate the cost (an average of $1,800 for a machine and accessories for home use, $3,750 for a business system).

Of the *Newsweek* poll's choices, managers tend to describe first-time buyers—a whopping 87 percent of home and 77 percent of business customers—as "confused/scared/lacking knowledge," "curious/questioning," and "middle/high income, male." Retailers say most customers choose a computer outlet based on service (59 percent mentioned) or knowledge of sales staff (67 percent) rather than brands carried or software available (47 and 28 percent respectively). Friends, sales clerks, and advertising influence a buyer's decision far more than employers or spouses.

About 38 percent of the computers sold, managers say, are for business use, with 35 percent for personal use and 26 percent for both. Games and education lead word processing, accounting, and "for children" as reasons for purchase.

As for best-selling brands, the figures are mixed. Apple took first place, mentioned by 26 percent of managers, while Atari, Texas Instruments, IBM, and Radio Shack scored from 14 to 10 percent each. TI and Atari, however, dominated sales in general outlets but trailed the field in computer stores, where Apple, IBM, and Tandy set the pace among customers.

Proper protocol

If the Network Nation is ever to achieve its potential, different sizes and types of computers will have to be able to transfer more than ASCII text files. Microcom Inc., a data communications software and modem manufacturer located in Norwood, MA, claims it has the answer—and the big-name support to back it up.

The Microcom Networking Protocol is, as its name implies, a set of rules governing the transmission of data over standard telephone lines, with features designed to detect and correct garbled data. According to Microcom President James Dow, the system handles not only text but graphics, programs, and material such as VisiCalc charts and tables.

Because of its near-universal capability, the protocol carries the endorsement of Apple, Radio Shack, Victor, VisiCorp, and GTE, with IBM rumored to be not far behind. "VisiCorp will incorporate the protocol into the dial-up applications of its software product, VisiOn; it will be incorporated into software for the Apple IIe and Lisa this fall; and GTE's Telenet will be available to users of the Protocol network," Dow said.

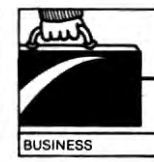
"The Networking Protocol allows transfer of data or text files between microcomputers, or between a microcomputer and a minicomputer or a mainframe," Dow continued. "It is the first networking protocol that integrates error correction, flow control, and total data transparency."

If accepted as a standard, Microcom's "virtual file format" and error-trapping routines could let businesses swap data among different micros and between micros and larger machines, whether in different offices or across the country. To encourage other hardware and software suppliers to join the Microcom roster, Dow's firm will license its technology and supply a one-day training session for $2,500.

"Our goal from the day we started this company was to develop a networking protocol for personal computers and make it a standard," Dow told the *Boston Globe*. "We are now reaching it."

—TOM WOODS

Selling with stars



Dick Cavett is the voice of Apple. William Shatner, playing off his Star Trek image, beams down to upstage a George Plimpton lookalike in Commodore commercials. Atari recently signed Alan Alda to a five-year contract said to total $10 million.

Like aspirin and coffee manufacturers, computer companies have turned to film and TV celebrities for product endorsements, borrowing the star's luster for the company name. At best, as *InfoWorld*'s Kathy Chin reports, celebrities make "today's technological breakthroughs as palatable as possible" to middle America; at worst, they provide a name that's worth more than the machine. Chicago Consumer Electronics Show watchers were unimpressed with toymaker Tomy Corp.'s $150, 16K, chiclet-keyboard Tutor,

Learn to Program Like a Professional!

THE COMPLETE BOOK OF RANDOM ACCESS & DATA FILE PROGRAMMING

Written for TRS-80™ I, II, & III - IBM™/PC - APPLE™ M/S - OSBORNE™ - HEATH™ - DEC™ - SUPERBRAIN™ - and all Computers using CP/M with Microsoft BASIC™

The last word on disk random access and file handling techniques, this series is intended for everyone — beginning programmers, businessmen and professionals will learn how to create custom programs to handle inventories, mailing lists, work scheduling, record keeping, and many other tasks, while more experienced programmers will learn advanced, professional programming techniques for faster, more efficient data storage and retrieval.

Although random access file handling is a matter of some complexity, the subject has been treated in a simple and down-to-earth fashion, so that anyone with some small familiarity with programming in Microsoft BASIC will be able to cope with the material. Each stage of learning uses a sample program as a starting point. The programs grow in capability and complexity as the books progress into all of the various aspects of file handling and record manipulation. An extensive effort has been made to keep the material coherent and every program line is explained in detail.

Volume I
BASIC FILE HANDLING

- The writing of a Menu to summarize program functions
- Screen format for data entry
- The creation of a basic record
- The FIELD and LSET routines for buffer preparation
- Disk storage of random access records
- Changing or editing stored records
- The LPRINT capability from disk using three different formats
- Sorting the random file
- Searching by name or key field
- Search in "next" or "prior" fashion
- Purging deleted records
- Using disk file data for calculations
- Future expansion of data fields
- Using flags to prevent program crashes
- Date setting, printer on-line and many other routines to make a program run like a commercially written program

VOLUME I **$29.95**
Option Vol. I Program Disk
TRS-80 Model I/III **$28.50**
TRS-80 Model II **$32.50**

Volume II
ADVANCED FILE HANDLING TECHNIQUES

- Relational database programming
- Comprehensive self-balancing accounting system with printouts
- Hashcoded data file manipulation -- (probably the fastest method of data retrieval). Hashing the input key and recovery method explained
- Span-blocking techniques allow creation of records longer than 256 bytes without wasted space
- Blocking & Deblocking
- Shell-Metzner sort
- In-place screen editing
- Recovery of deleted record space
- Alpha-index record retrieval
- Fast machine language/BASIC sort
- Linked list record structure and sort-merge, deleted record removal and file reorganization
- Multi-key file reorganization and record searching

VOLUME II **$29.95**
Optional Vol. II Program Disk
TRS-80 Model I/II/III **$49.95**

THE COMPUTRONICS INC
50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977 ✓9

AMERICAN EXPRESS · VISA · MasterCard

24 HOUR ORDER LINE
(914) 425-1535

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

DEALER INQUIRIES WELCOME

30-DAY MONEY BACK GUARANTEE

*** ALL PRICES & SPECIFICATIONS SUBJECT TO CHANGE ***
DELIVERY SUBJECT TO AVAILABILITY

★ ADD ★
ADD $3.00 FOR SHIPPING IN UPS AREAS
ADD $4.00 FOR C.O.D. OR NON-UPS AREAS
ADD $5.00 TO CANADA & MEXICO
ADD PROPER POSTAGE OUTSIDE OF U.S., CANADA & MEXICO

but consumers may be impressed with "Real People" host Sarah Purcell.

Manufacturers' reasons for hiring a given celebrity tend to be vague, but then the idea that a particular name lends authority or reassurance is vague in itself. Apple advertising manager Henry Whitfield told Chin, "Cavett represents the everyman. He's not heavy-handed, and not a computer buff. He's the middle manager who just wants to learn."

Atari's public relations head Bruce Entin is delighted with Alda, who inspected the Sunnyvale, CA, firm in several visits before signing: "His name has the highest credibility among anyone and that sincerity will be communicated to consumers," Entin said. Similarly, a Texas Instruments spokesman praised Bill Cosby, now in his third year of TI 99/4A ads: "He's got a Ph.D. in education and also he's got good rapport with kids and adults."

While companies don't want a formidably scientific front man, a technically up-to-date image doesn't hurt. Model II owner Isaac Asimov appears in Radio Shack's newspaper and magazine ads, as does pianist Peter Nero—a computer buff, according to RS Marketing Vice-President David Beckerman.

While Tandy appreciates

Moore: Would you buy a micro from this man?

Asimov and Nero, however, the company will not use celebrities in its TV spots. "All of our television ads are high-impact sell ads," Beckerman points out. "We only have about 26 seconds; using a celebrity would take up too much time. Even if we had President Reagan in our ads, we wouldn't sell any more computers."

Spectravideo, by contrast, has gone the celebrity route to the point of tongue-in-cheek chic. Public relations director Bob Griffin announced at CES that Roger Moore, known to gadget fans as James Bond 007, would appear in Spectravideo TV and print ads through 1985.

Said Griffin of Moore's contribution to computer marketing: "When people see him, they can't help but think of high tech." ■

Free home demonstration

END BYTES

● Idea of the week: 15,000 IBM PC buyers are getting a **FREE** "trial size" version of Software Publishing Corp.'s PFS:Write word processor. The sample, according to the Mt. View, CA, firm, "allows buyers to use all aspects of the program except the print or save functions." Sort of like buying a washing machine with a free box of detergent that cleans your clothes but won't rinse out.

● If you've been waiting for the **DRAGON** since the January 1983 *80 Micro* (p. 370), the Welsh Color Computer work-alike has finally arrived. Tano Corp. of New Orleans, LA, will manufacture and distribute the 64K, under-$400 micro in the U.S., selling it with both the Dragon and Tano names.

● Just as VisiCorp owns all rights to the prefix "Visi," ComputerLand Corp. is attempting to tie down the suffix "-land." The company has filed trademark infringement **LAWSUITS** against Softwareland Corp., an Arizona store chain, and Microland Computers, a California retailer.

Softwareland President Taylor Coleman, announcing an immediate countersuit, said, "There are a lot of other lands out there, like Toyland, Disneyland, and Musicland. We wonder which one will be next."

● A new reason to go to Comdex this November: The Softsel distributing chain, copying the Oscar, Emmy, Grammy, and Tony honors, will give the industry's first **AWARDS** for excellence in computer software. Publishers will be praised "for outstanding achievements in sales, packaging, performance, and innovation," with the first criterion—based on Softsel's "Hot List" dealer figures—preeminent.

● Other firms may be more glamorous, but **TANDY** is content with its lot. The Fort Worth titan's preliminary sales for the fiscal year ending June 30, 1983 were $2.47 billion, a 22 percent rise from 1981-82's $2.03 billion.

● **ATARI**, hoping to improve its share of the software market, is taking a radical step: producing programs for IBM, Apple, Commodore, and Radio Shack computers. Says division head Fred Simon: "We're giving the consumers what they want, and they want hits on systems that aren't Atari."

Simon, developer of Walt Disney Productions' software business, told *ISO World* that non-Atari versions of popular Atari games would be available by late summer, with educational and business programs to follow in 1984.

● If you've finally written the Great American Program, you can market it the way you would a novel or film script. Carolyn Kuhn, a former Control Data executive, has launched Software Mart Inc. of Austin, TX, to serve as an **AGENT** between developers and publishers, matching the latter's needs to the former's new products.

● According to Gary Thorne, marketing vice-president for the nationwide Team Electronics chain, consumers now expect **STEREO** stores to stock microcomputer products as well as sound equipment.

Thorne, speaking at June's Chicago CES, told *Computer Retail News* that today's educated customers demand computer-wise salespeople and a choice of different systems. Team also found that computers sell better in the back of the store than up front: "It's difficult to do a demo on a word processing package with Donna Summer disco playing," Thorne admitted. ■

H&E COMPUTRONICS INC.

• • EVERYTHING FOR YOUR TRS-80™ • ATARI™ • APPLE™ • PET™ • CP/M™ • XEROX™ • IBM™ • OSBORNE™ • •

* TRS-80 is a trademark of the Radio Shack Division of Tandy Corp. * ATARI is a trademark of Atari Inc. *APPLE is a trademark of Apple Corp. * PET is a trademark of Commodore
* CP/M is a trademark of Digital Research. *XEROX is a trademark of Xerox Corp. * IBM is a trademark of IBM Corp. * OSBORNE is a trademark of Osborne Corp

BUSINESS PAC 100

★ All orders processed within 24-Hours
★ 30-Day money back guarantee

100 Ready-To-Run Business Programs

(ON CASSETTE OR DISKETTE).....Includes 128 Page Users Manual.....
Inventory Control.....Payroll.....Bookkeeping System.....Stock Calculations.....
Checkbook Maintenance.....Accounts Receivable.....Accounts Payable.....

BUSINESS 100 PROGRAM LIST

	NAME	DESCRIPTION
1	RULE78	Interest Apportionment by Rule of the 78's
2	ANNUI	Annuity computation program
3	DATE	Time between dates
4	DAYYEAR	Day of year a particular date falls on
5	LEASEINT	Interest rate on lease
6	BREAKEVN	Breakeven analysis
7	DEPRSL	Straightline depreciation
8	DEPRSY	Sum of the digits depreciation
9	DEPRDB	Declining balance depreciation
10	DEPRDDB	Double declining balance depreciation
11	TAXDEP	Cash flow vs depreciation tables
12	CHECK2	Prints NEBS checks along with daily register
13	CHECKBK1	Checkbook maintenance program
14	MORTGAGE/A	Mortgage amortization table
15	MULTMON	Computes time needed for money to double, triple, etc.
16	SALVAGE	Determines salvage value of an investment
17	RRVARIN	Rate of return on investment with variable inflows
18	RRCONST	Rate of return on investment with constant inflows
19	EFFECT	Effective interest rate of a loan
20	FVAL	Future value of an investment (compound interest)
21	PVAL	Present value of a future amount
22	LOANPAY	Amount of payment on a loan
23	REGWITH	Equal withdrawals from investment to leave 0 over
24	SIMPDISK	Simple discount analysis
25	DATEVAL	Equivalent & nonequivalent dated values for oblig
26	ANNUDEF	Present value of deferred annuities
27	MARKUP	% Markup analysis for items
28	SINKFUND	Sinking fund amortization program
29	BONDVAL	Value of a bond
30	DEPLETE	Depletion analysis
31	BLACKSH	Black Scholes options analysis
32	STOCVAL1	Expected return on stock via discounts dividends
33	WARVAL	Value of a warrant
34	BONDVAL2	Value of a bond
35	EPSEST	Estimate of future earnings per share for company
36	BETAALPH	Computes alpha and beta variables for stock
37	SHARPE1	Portfolio selection model-i.e. what stocks to hold
38	OPTWRITE	Option writing computations
39	RTVAL	Value of a right
40	EXPVAL	Expected value analysis
41	BAYES	Bayesian decisions
42	VALPRINF	Value of perfect information
43	VALADINF	Value of additional information
44	UTILITY	Derives utility function
45	SIMPLEX	Linear programming solution by simplex method
46	TRANS	Transportation method for linear programming
47	EOQ	Economic order quantity inventory model
48	QUEUE1	Single server queueing (waiting line) model
49	CVP	Cost-volume-profit analysis
50	CONDPROF	Conditional profit tables
51	OPTLOSS	Opportunity loss tables
52	FQUOQ	Fixed quantity economic order quantity model
53	FQEOWSH	As above but with shortages permitted
54	FQEOQPB	As above but with quantity price breaks
55	QUEUECB	Cost-benefit waiting line analysis
56	NCFANAL	Net cash flow analysis for simple investment
57	PROFIND	Profitability index of a project
58	CAP1	Cap. Asset Pr. Model analysis of project
59	WACC	Weighted average cost of capital
60	COMPBAL	True rate on loan with compensating bal. required
61	DISCBAL	True rate on discounted loan
62	MERGANAL	Merger analysis computations
63	FINRAT	Financial ratios for a firm
64	NPV	Net present value of project
65	PRINDLAS	Laspeyres price index
66	PRINDPA	Paasche price index
67	SEASIND	Constructs seasonal quantity indices for company
68	TIMETR	Time series analysis linear trend
69	TIMEMOV	Time series analysis moving average trend
70	FUPRINF	Future price estimation with inflation
71	MAILPAC	Mailing list system
72	LETWRT	Letter writing system-links with MAILPAC
73	SORT3	Sorts list of names
74	LABEL1	Shipping label maker
75	LABEL2	Name label maker
76	BUSBUD	DOME business bookkeeping system
77	TIMECLCK	Computes weeks total hours from timeclock info
78	ACCTPAY	In memory accounts payable system-storage permitted
79	INVOICE	Generate invoice on screen and print on printer
80	INVENT2	In memory inventory control system
81	TELDIR	Computerized telephone directory
82	TIMUSAN	Time use analysis
83	ASSIGN	Use of assignment algorithm for optimal job assign
84	ACCTREC	In memory accounts receivable system-storage ok
85	TERMSPAY	Compares 3 methods of repayment of loans
86	PAYNET	Computes gross pay required for given net
87	SELLPR	Computes selling price for given after tax amount
88	ARBCOMP	Arbitrage computations
89	DEPRSF	Sinking fund depreciation
90	UPSZONE	Finds UPS zones from zip code
91	ENVELOPE	Types envelope including return address
92	AUTOEXP	Automobile expense analysis
93	INSFILE	Insurance policy file
94	PAYROLL2	In memory payroll system
95	DILANAL	Dilution analysis
96	LOANAFFD	Loan amount a borrower can afford
97	RENTPRCH	Purchase price for rental property
98	SALELEAS	Sale-leaseback analysis
99	RRCONVBD	Investor's rate of return on convertable bond
100	PORTVAL9	Stock market portfolio storage-valuation program

☐ TRS-80 Cassette Version $99.95
☐ TRS-80 (Mod-I or III), Pet, Apple or Atari Versions $99.95
☐ TRS-80 Mod-II, IBM, Osborne and CP/M Versions $149.95

ADD $3.00 FOR SHIPPING IN UPS AREAS
ADD $4.00 FOR C.O.D. OR NON-UPS AREAS
ADD $5.00 TO CANADA AND MEXICO
ADD PROPER POSTAGE OUTSIDE OF U.S., CANADA AND MEXICO

NEW TOLL-FREE ORDER LINE
(OUTSIDE OF N.Y. STATE)
(800) 431-2818

AMERICAN EXPRESS VISA

24 HOUR ORDER LINE
(914) 425-1535

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

ASK FOR OUR 64-PAGE CATALOG
DEALER INQUIRIES INVITED

ALL PRICES & SPECIFICATIONS SUBJECT TO CHANGE
DELIVERY SUBJECT TO AVAILABILITY

See List of Advertisers on Page 323

by Amee Eisenberg

Memory-related errors

Last month, Load 80 included a communications package called UTerm. If you get Load 80 on cassette, then TRSDOS's Tape command uploads the object code files UT1–UT5 to TRSDOS. Save the files to your disk; then create the Build file according to the author's instructions.

I know UTerm works from TRSDOS, but I was unable to write a Build file that would run it from DOSPLUS. Does anyone know the syntax that makes it run from DOSPLUS or NEWDOS?

Memory Error Messages

Judging from my mail, some of the error messages Load 80 users encounter need clarification.

Three interrelated errors are Out of Memory (OM), Out of String Space (OS), and Overflow (OV). These indicate the computer has reached the physical limits of its memory space; each tells you about a different kind of limit.

The Out of Memory (OM) message appears if you load a program that requires more memory than your system has available. Sometimes, this happens because your computer's memory still holds the last program you ran. More often, this occurs because you didn't read the key box to make sure the program suits your system.

You can avoid this error by always clearing memory before loading a program. In Basic, use the command New before CLOAD or Load. With source code listings, delete the buffer before loading a new listing. When using a system tape, type SYSTEM and answer the * prompt with /0. Then, providing the program fits into your system's memory, you shouldn't get an OM error.

On a side track, Basic programmers can save some memory using colons to stack many statements into a program line. Each line number takes 4 bytes of memory. Additionally, each space in a line takes up memory. In a short program, the amount of memory saved is negligible; but on a long program, packed, multi-statement lines use memory economically. Their disadvantages are that they are hard to read when you're debugging, and they're more apt to pick up bugs when you CSAVE and CLOAD them.

The Out of String Space (OS) message is a Basic error. It appears under two conditions: when your response to the program's prompt is too long, or when the programmer didn't allocate enough space for string variables in the Clear statement(s).

The first case, a user error, shows up after you've answered a program's question. Out of String Space appears on the screen as the program crashes. The usual cure is to try a shorter response. If all else fails, read the program's directions.

The second case, a program error, usually appears as the computer begins running the program. Although the computer generates an error message at a specific line number, you probably won't notice anything wrong with the line when you list it. The problem is with the statement that says "CLEAR xx" (where xx is a number). The programmer didn't clear enough memory space to handle the variables. To correct this, try clearing more space. For example, if the original line reads CLEAR

Index	Page	Article	File Spec	Comments
Side A				
A			COPYRGHT/BAS	Basic
B	256	Catching Rays	SUNFINDR/BAS	Basic
C	236	Brief Exposures	TACH/BAS	Basic
D	244	In Search of...	WORDSEAR/BAS	Basic
E	172	Sorting in Place	INPLACE/BAS	Basic
Side B				
F	90	Ephemeris for Comets and Minor Planets	EPEHM/BAS	Basic
G	100	Molecular Matters	HMO/BAS	Basic
H	114	What's Up and When	SIDEREAL/BAS	Basic
I	252	DATATP	DATATP/BAS	Basic
J	252	DATATP	DATATP/CMD	System
K	252	DATATP	DATATP/SRC	Editor/Assembler

October 1983 Load 80 cassette directory.

Index	Page	Article	File Spec	Comments
Side A				
	90	Ephemeris for Comets and Minor Planets	EPHEM/BAS	Basic
	100	Molecular Matters	HMO/BAS	Basic
	114	What's Up and When	SIDEREAL/BAS	Basic
	172	Sorting in Place	INPLACE/BAS	Basic
Side B				
	236	Brief Exposures	TACH/BAS	Basic
	244	In Search of...	WORDSEAR/BAS	Basic
	256	Catching Rays	SUNFINDR/BAS	Basic

October 1983 Load 80 disk directory.

50, try CLEAR 100. Another potential problem is that the dimension (DIM) statements may take up more space than was cleared. Again, try clearing more memory space.

Why, you may wonder, don't programmers just clear huge amounts of memory to insure against OS errors? Economy and efficiency are the answers. It pays to be economical with memory use; clearing vast amounts of memory means that the program needs more memory to run. Smaller programs run on more machines without creating OM errors.

Additionally, since the computer has to check every byte of reserved space when it manipulates strings, longer strings mean longer run times. Good programmers use the smallest amount of memory possible.

An Overflow (OV) error occurs when a mathematical calculation yields a number too large or too small for the computer to handle. Due to the way the computer handles these numbers, an overflow results in changing the answer's negative or positive sign.

Since the sign change occurs by accident, it yields an erroneous value. Rather than let this slip by, the computer sends you a message. Correcting OV errors requires changing the numbers the computer handles to smaller values.

Load 80 Trivia

If the tape from all Load 80 cassettes sold to date were stretched end to end, it would measure 9,034,930 feet, or 1,711.16 miles. Put another way, the tape would reach from Peterborough, NH, to Fort Worth, TX. ■

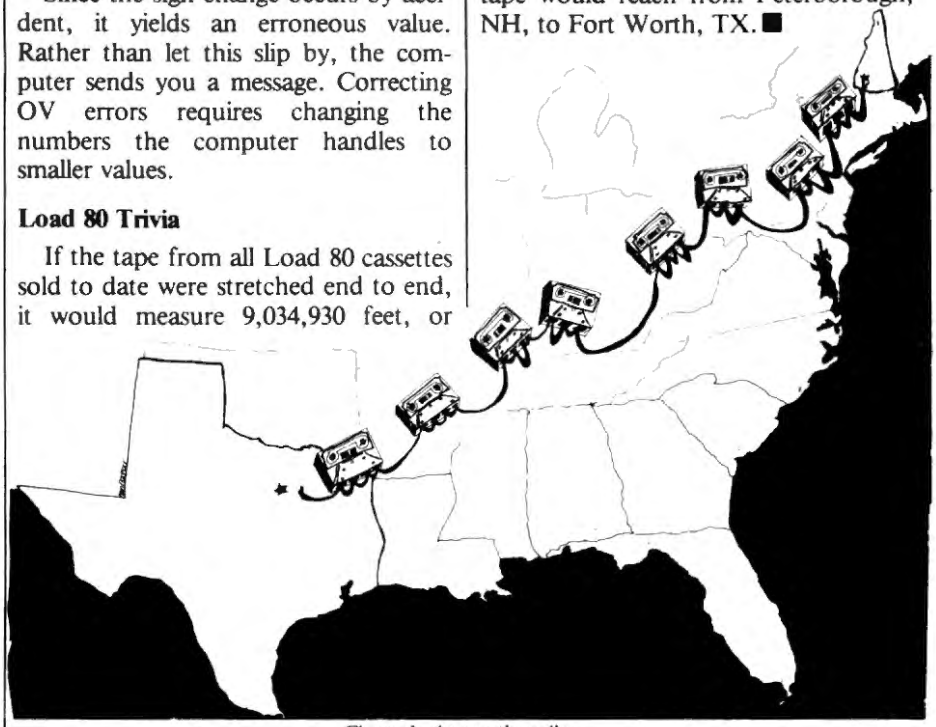


Figure 1. Across the miles.

TRACMASTER™ DATA CASSETTES

C10-$11.95 DOZ. C40-$14.95 DOZ.
C20-$12.95 DOZ. C50-$15.95 DOZ.
C30-$13.95 DOZ. C60-$16.95 DOZ.

INCLUDES HARD NORELCO BOX

Don't pay top dollar for warmed over audio cassettes with poor performance. Tracmaster cassettes are specifically designed for computer applications with a high output, low noise tape, digital pressure pad and large flanged rollers for smooth delivery and superior azimuth tracking.

Cassette duplicating- Mod 1, 3, Color, & Atari. Low rates, top quality. Call or write for rate sheet.

VISA, MC, and phone orders accepted. Mass. residents add 5% tax. Add $1.75 shipping 1st dozen, $.75 ea. additional. Free shipping on prepaid orders for 5 dozen or more. Write or call for rate sheet for large quantities. Dealer inquiries invited.

Sandpiper SOFTWARE
P O BOX 336
MAYNARD, MA 01754
(617) 568-8641

Which TRS-80* Accounting Software Do I Buy . . .

That's a tough question. I know, I asked it myself not very long ago. I'm Mike Motta. As president of Shawmut Systems, specialists in TRS-80* custom software, my customers were asking me for Model II and 16 Accounting Software — GL, AR, AP and Payroll. But I said "Why write the software. There must be a good package already available." So I searched for the best I could find. And I found it!

Now, when I tell you that these are the best Accounting programs I've seen on a microcomputer, you probably think that you are just listening to another sales pitch. But you're not. You're listening to a businessman with over twenty years combined experience in sales, management, and programming. So when I say that these programs will work for you, it really means something.

Each program, designed for the Model II or 16, will work with one or more floppy or hard disks. With each program, I'll include a 200 page manual written with the first time user in mind, and a set of sample data files so you can start using the program right away.

But I won't stop there. If you have a question, or a problem, call me. You won't get an operator, or order taker. You'll get me. And if I can't talk to you on the spot, I'll call you back. And I'll fix your problem. FAST.

Now I could say a lot more about these programs, but you really won't know how good they are until you try them. So, order the programs you need, and try them for 14 days. If you're not convinced that these are the programs for you, send them back, and I'll refund your money.

My price for these programs is only $289.00 each, postpaid. I could charge hundreds more, but I want you to have the best programs at the best possible price. So mail or call your order in today. I'll make sure you'll be satisfied.

Model II/16 Accounting Software Packages

Accounts Receivable	$289	Accounts Payable	$289
General Ledger	$289	Payroll	$289

SHAWMUT SYSTEMS
105 Circle Drive • PO Box 324-A
Somerset, MA 02726
(617) 672-9794

Ask about our Model I and III versions.

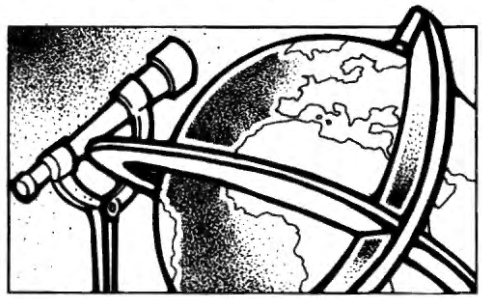
Send check, money order or Visa/MC number

*TRS-80 is a Trademark of Tandy Corp.

Mass. residents add 5% sales tax.

363

See List of Advertisers on Page 323



Theory of edge detection

Vision is a fascinating and complex phenomenon. Consider Fig. 1. What do you see?

Chances are you see more than some black scribbles or strokes. Chances are you see a young woman with short hair, lightly dressed, seated with her knees bent in front of her. You might even say she is scratching her back or applying suntan lotion as she basks in the sun.

Don't worry, this isn't a Rorschach test—but it does demonstrate the phenomenon of vision. With a few undefinable strokes we can infer and recognize much about an image.

Some of the conclusions you draw are more interpretation than true recognition. Still, your visual system's ability to recognize many details from so sparse a drawing is impressive.

Although not renowned in the animal kingdom for vision, humans detect various wavelengths of light (colors) over a very wide range of intensity (brightness). Using vague clues you can identify objects without ambiguity regardless of spatial orientation. You can recognize a picture of a person even if it's upside down.

This is possible because visual systems, animal or artificial, rely primarily on detection of edges. Marr and Hildreth of the MIT Artificial Intelligence Laboratory have developed a theory of edge detection with wide implications both in understanding how humans and animals process visual information and in constructing machines that recognize visual information.

To better understand the concept of machine visual systems, you should first understand the human visual system. I'll briefly cover the organization and information processing of the human visual system, then go into Marr and Hildreth's theory of edge detection. At the end I have developed a simple routine to illustrate edge detection.

The Human Visual System

The human visual system comprises two types of photoreceptor cells in the eye's retina, rods and cones—named for their shapes. (See Fig. 2.) Cones mediate color vision, but require more light to operate than rods. Rods aren't good at detecting colors, but don't require much light, particularly blue-green light. Cones correspond to *acuity*, or sharpness of an image, whereas rods are used for night vision. Acuity is achieved as follows.

Each photodetector in the retina communicates with, or innervates, a receiving cell called a ganglion. This ganglion cell sends its visual information to higher processing centers. If many photodetectors innervate the same ganglion cell (a situation called convergence), that cell is more likely to receive visual information than one with fewer photodetectors innervating it.

Thus, the ganglion cell with many photodetectors innervating it receives light from a larger area than one with fewer photodetectors. This means that the former is more sensitive to light and more useful in low-light situations. The latter receives light from a smaller area and defines a smaller area of the image field, providing greater acuity. However, since it receives less light, it is useful only in situations with sufficient light.

More rods than cones typically innervate a ganglion cell. You can see this

Figure 1.

Tired of WAITING on your printer or is your printer too SLOW . . . ? CALL 1-800-231-6667

MBIP STAND-ALONE PARALLEL PRINTER BUFFER

32K Parallel **$299.95**
64K Parallel **$349.95**
64K Upgrades **$179.95**

How It Works

The MBIP in-line parallel buffer works with almost any computer/printer combination utilizing a Centronics type parallel interface. Available with up to 256K of RAM for data buffering, the MBIP can accept very large files for buffering as fast as your computer can send it.

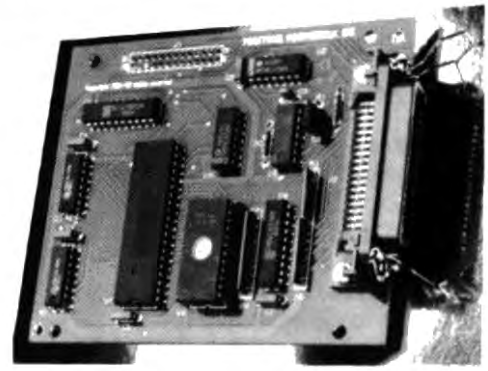
Saves Time

Most computers are able to send data to the printer at very high speeds, usually much faster than the printer can print it. The MBIP, placed between the computer and the printer, accepts this data as fast as the computer can send it, stores it in its own memory and then sends it on to the printer at the printer's own speed. Under normal circumstances without a MBIP the computer could be tied up for hours on a large file being dumped into the printer costing you valuable time and money.

Improves Efficiency

Using the MBIP's touch sensitive front panel controls, multiple copies of your document can be made without tying up the computer any further. Printing may be halted at any point and continued where it left off later. You can even turn your computer off and the MBIP will continue until the print job is complete.

The MBIP requires no user modifications of software and installs in seconds with virtually any computer (including TRS-80, ATARI, IBM-PC, APPLE, OSBORNE, NEC etc.) and any printer (including EPSON, CENTRONICS, NEC, C.ITOH, IDS, ANADEX, OKIDATA, IBM PERSONAL etc.), dimensions are 5⅛"W x 7¾"D x 1⅝"H.



INTERNAL PARALLEL BUFFER FOR EPSON

MBP 16K	MBP 32K	MBP 64K
$159.95	$199.95	$249.95

Operation

The MBP is an intelligent Centronic-Compatible parallel interface for the Epson MX-80, MX-80 F/T, and MX-100 printers, with 16K, 32K, 64K bytes of on-board RAM for data buffering. FX80 and FX100 compatible.

Eliminates Printer Bottleneck

The buffering capability of the MBP increases your data processing efficiency by eliminating the wait normally experienced while printing. An Epson printer prints at 80 characters per second; at this speed it takes about five minutes to print a 16,000 character document. During most of this time the computer is waiting for Epson to finish one line so it can send the next. By using the MBP it takes the computer only *four seconds* to send a 16,000 character document. The Practical Peripherals MBP interface typically accepts data as fast as the computer can send it, until full, returning use of the computer to you while it handles the printing. You can continue with other processing while simultaneously printing data from a previous job, gaining all the time you normally would have spent waiting for the printer to finish. Any program that involves printed output will be speeded up using the MBP.

The MBP supports all standard Espon Commands, is compatible with GRAFTRAX-80, and is plug compatible with the standard Epson cable. THE MBP does not require any user software for control.

Installs In Minutes

The MBP is easy to install — it simply plugs into the existing auxilliary interface connector inside the Epson without modification of the printer.

MICRO SOLUTIONS, INC.

9949 HARWIN #E, HOUSTON, TEXAS 77036
(713) 789-5443 1-800-231-6667
TELEX 794-250-CROWNTEX HOU
VISA • MASTER CARD • AMERICAN EXPRESS

316

See List of Advertisers on Page 323

schematically in Fig. 2.

In humans, there is a specialized area called the fovea adapted for high acuity. The fovea contains only cones; its ratio of cones to ganglion cells is about 1-to-1. This area is densely packed; 1 square inch viewed at a distance of 3 feet covers an area of about 40,000 photoreceptors.

When light stimulates a ganglion cell, it sends a bit of visual information down its axon to the optic nerve. Once there, the information goes to the preliminary vision centers, and on to the primary visual center at the base of the cerebral cortex. Ganglion cells are also inhibited. This means they are less likely to send a bit of information. An inhibited cell requires more light before it transmits information.

The Nobel Prize-winning work of Hubel and Weisel elucidated the receptive field for a typical ganglion cell (Fig. 3). The receptive field of a cell is the area of sensory cells that innervate it. Retinal ganglion cells are usually divided into two areas, on and off.

Figure 3 represents the on area with plus signs and the off area with minus signs. This particular receptive field is called a center-on, surround-off field. Light falling on the on area excites the ganglion cell, while light falling on the off area inhibits the cell. Diffuse, highly scattered light falling equally on both areas has no effect, since the two effects balance one another out. However, when differential (distinctive) light falls on the two areas, one effect prevails.

"In humans, there is a specialized area called the fovea adapted for high acuity."

Figure 4 shows the effects of light on certain areas of this center-on, surround-off cell. The dark area shows the parts of the receptive field receiving light. Beside each is a simplified plot of the frequency of firing of the ganglion cell before and during illumination.

The sensitivity of the center is greater in the middle than at the edges. The same is true of the surround. Both areas appear to act as though described by a two-dimensional Gaussian distribution. This is mathematically described as:

$$G(X,Y) = EXP(-r^2/(2\sigma^2)/(2\pi\sigma))$$

The σ is a spatial scale constant for the Gaussian curve. It differs between the two areas of the receptive field. The radius from the center is r. In X,Y coordinates, $r = SQR(x^2 + x^2)$. The two-dimension spatial coordinates of a specific pixel or image area are X and Y. G(X,Y) is the Gaussian distribution that approximates the sensitivity of the area of light. Together, the entire area acts as the difference of these two Gaussian distributions. This is known as the DoG function (Difference of two Gaussians):

$$G_1-G_2 = EXP(-r^2/(2\sigma_1^2)/(2\pi\sigma_1) - EXP(-r^2/(2\sigma_2^2)/(2\pi\sigma_2)$$

This is very low-level information

Computer Case Company

WE MAKE A GREAT CASE FOR YOUR RADIO SHACK.

CALL TOLL FREE: (800) 848-7548

RS204

•	RS201	Model I with expansion unit and drives	$109
•	RS204	Model III or IV	129
•	AP106	Amdek Color I, II or III Monitor	119
•	P401	Paper Tiger Printer (400/445/460)	99
•	P402	Centronics 730/737 & Radio Shack Printer	89
•	P403	Epson MX70 or MX80, Microline 82A Printer or Color Computer	89
•	P404	Epson MX100 Printer	99
•	P405	IDS 560 or Prism 132 Printer	109
•	P406	C. Itoh Starwriter/Printmaster F-10 Printer	119
•	P407	Okidata Microline 83A or 84 Printer	99
•	P408	C. Itoh Prowriter 2 Printer	99
•	P409	C. Itoh Prowriter (Apple Dot Matrix) or NEC PC8023 Printer	89
•	P410	Epson FX80 Printer	109
•	IB501	IBM Personal Computer with Keyboard	129
•	IB502	IBM Monochrome Monitor	99
•	CC50	Case Cart	79
•	CC80	Matching Attache Case (5")	85
•	CC90	Matching Attache Case (3")	75
•	CC91	Matching Accessories Case (5¼" Diskettes, Paper, etc.)	95
•	CC92	5.25" Diskette Case (Holds 75 Diskettes)	49

One size does not fit all. Our cases are designed for specific hardware configurations. When you put your computer in our case, it fits hand-in-glove. Once your equipment is safely inside the attache-style carrying case, it never has to be taken out again. To operate, simply remove the lid and connect the power. To store your computer, disconnect the power, enclose your disks, working papers, and manuals in the compartments provided, and attach the lid. It's as easy as that.

MasterCard VISA

139 Computer Case Company, 5650 Indian Mound Court, Columbus, Ohio 43213 (614) 868-9464

CELEBRATE!

Actually Produced With CHROMAtrs.

HERE'S NEW LIFE FOR YOUR OLD TRS-80

MOD I & MOD III

CHROMAtrs™ MAKES IT HAPPEN

Now You Can Create Spectacular Color Graphics... Exciting Sound Effects... Paddle & Joy Stick Game Action!

ONLY $199!

(American Version. For European Version & accessories, see coupon below.)

This powerful peripheral offers you 15 brilliant colors, lets you produce sensational effects the same day you plug it in! Easy-to-use "CHROMA BASIC" gives you 71 CHROMA COMMANDS to use in addition to regular BASIC. You can devise your own exciting games, plot points and lines, do 3-D rotations, translations, create a large range of sprite graphics, produce charts and graphs, and make great sound effects.

This is a quality product that can multiply the value of your TRS-80. Supplies are limited and prices subject to change. A word to the wise: Order TODAY!

CHROMAtrs™ Comes Complete With:

- 15 vivid colors
- High resolution graphics (256 x 192)
- 2 Atari joystick and paddle connectors
- 3-D animation using sprite graphics
- 16k display RAM
- Programmability in BASIC
- LOGO language subset on disk
- One complimentary game
- Easy-to understand operating manual
- Does not affect Radio-Shack warranty
- Money-back guarantee

I own a TRS-80 ☐ Model I ☐ Model III ☐ 16K ☐ 32K ☐ 48K

☐ CHROMA BASIC (Previous owners only)	$30
☐ CHROMAtrs assembled & tested, USA	$199
☐ CHROMAtrs assembled & tested, European (except France)	$230
☐ RF modulator with switch box	$25
☐ Mod 1 ribbon cable	$12
☐ Mod 3 ribbon cable	$14
☐ Cassette software	(free with CHROMAtrs)
☐ Diskette software	(free with CHROMAtrs)
Subtotal	_____
N.Y.S. residents add 8.25% sales tax	_____
Shipping and handling (USA)	$7.50
TOTAL	_____

Check one: ( ) Check ( ) M.O. ( ) COD ( ) M.C. ( ) Visa

Account # _____ Exp. _____

Name _____

Address _____

City _____

State _____ Zip _____

MICRO CONTROL SYSTEMS, INC.

(Formerly South Shore Computer Concepts)

1590 Broadway, Hewlett N.Y. 11557
Phone orders accepted (516) 569-4390

171

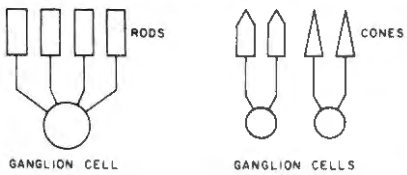


Figure 2. Rods and cones.

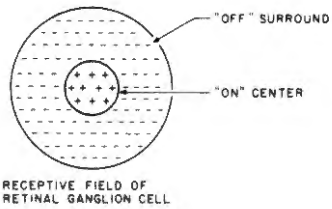


Figure 3. Receptive field of a ganglion cell.

processing. More intricate processing occurs in other areas of the cerebral cortex—the vision processing areas. These areas of the brain are called the striate and peristriate cortex because of their appearance. There are three types of visual receptor cells in the striate cortex: the simple, complex, and hypercomplex cells.

The simple cells in the striate cortex receive information from many retinal ganglion cells. This enables their connections to have more complicated receptive fields than the retinal ganglion cells. They also have discrete excitatory and inhibitory areas. Figure 5 shows examples of such receptive fields for simple cells in the striate cortex.

The receptive fields are divided into on and off areas as well, but the shapes are different. Typically, the receptive field is rectangular with one axis longer than the other. The rectangular area is oriented in a specific direction. If the receptive field is similar to that of Fig. 5, then it is most excited by a narrow line of light at a 45 degree angle. If the line of light is rotated slightly, the simple cell is still excited, but not as strongly. If the rotation is greater, then the cell isn't excited by the line of light. A rotation of 10 or 20 degrees can abolish the response.

This is an important point. The simple cells of the striate cortex are orientation-sensitive. Figure 6 shows how this is accomplished by wiring together a few retinal ganglion cells with on-centers and off-surrounds.

As their name implies, complex cells have more complex receptive fields. Unlike simple cells that are sensitive to lines of light, complex cells are sensitive to specific shapes (such as an L shape). A shape moving across their visual field with a certain orientation and direction of movement can also excite them. Complex cells innervate hypercomplex cells, which have more complicated receptive fields.

At the level of the simple cell, however, we view images as collections of edges.

This is a brief introduction to visual physiology and a number of simplifications have been made.

The Theory of Edge Detection

You might have noticed that the simple cells of the striate cortex are really detecting edges at various rotational orientations. It is then important to understand what an edge is.

An edge is an area at which the intensity of light changes significantly. This is shown in Fig. 7. Figure 8 shows what an edge looks like mathematically. In Fig. 8a, the ordinate axis is the intensity of light, a constant until the edge, where the intensity level changes abruptly. This is the graphic representation of an edge.

Figure 8b illustrates an edge in terms of the first derivative of the intensity function. (Remember, a derivative is the rate of change of a function.) The rate of change in intensity is small until the edge. Here, the rate of change is large. Continue away from the edge and the rate of change diminishes again, since the intensity function is a constant (though at a new level of intensity).

Figure 8c shows an edge in terms of the second derivative—the rate of change of the rate of change of the intensity of light. At the peak of the first derivative (the edge), the first derivative is at a maximum value and is, therefore, not changing. The second derivative at the edge must therefore be zero. That is, the edge occurs at the zero-crossing of the second derivative of the intensity function.

Our theory states that edge detection takes place in three stages. First, the image is smoothed, then differentiated, and then the derivatives are scanned for peaks (if the first derivative is used) or zero-crossings (if the second derivative is used).

In the visual system, the DoG function is the smoothing filter. We need a

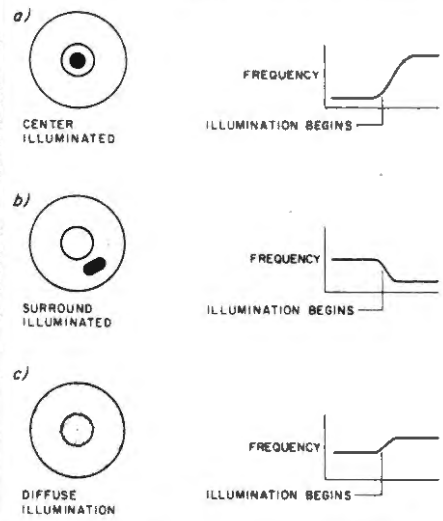


Figure 4. Effects of illumination on ganglion cell.

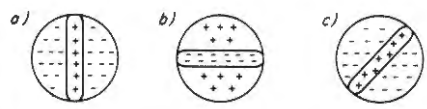


Figure 5. Receptive fields of simple cells.

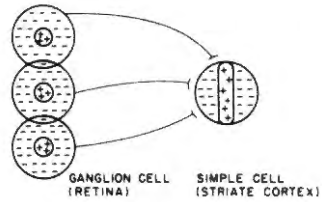


Figure 6. Wiring a receptor field.

derivatizer that operates in two dimensions. The Laplacian operator

$$\nabla^2 \left(\frac{\delta}{\delta x^2} + \frac{\delta}{\delta y^2} \right)$$

is such an operator. $\nabla^2 G$ is the spatial derivative of the smoothing function G. When the DoG function's spatial scaling parameters σ_1 and σ_2 are close in value, the DoG function is similar to the $\nabla^2 G$ function. The DoG function is normally used to describe what occurs in the retina, while the $\nabla^2 G$ is the ideal smoothing function.

A smoothed image is created by convolving the image I(X,Y) with the smoothing filter G. This is written $G * I$; the $*$ is the convolving operator in conventional mathematical notation. We then differentiate the smoothed image by applying the Laplacian operator

We will match any price in this issue of 80-Micro on any hardware or software product that we now have in stock!

How many companies offer toll free TOTAL SUPPORT on all hardware & software?

There is only one number to call:

1-800-237-8977

In Florida call 1-813-786-1259

We will also give you an additional 10% off that advertised price just to introduce you to our toll free total support!

Business Applications Software with **TOTAL SUPPORT**...specializing in: **IBM,™ APPLE,™ TRS-80™ and XEROX™**

There is only one catalog to have: Our new, free, 100 pages of the best in hardware and software. Send for your copy today!

The Systems Group

2340 State Route 580/Suite 234
Clearwater, Florida 33575 ← 100
Telex 701484

There is only one catalog to have: Our new, free, 100 pages of the best in hardware and software. Send for your copy today!

"Offer expires Oct. 15"

IBM is a trademark of IBM Corporation
APPLE is a trademark of Apple Computer Inc.
TRS-80 is a trademark of The Radio Shack Division of Tandy Corporation
XEROX is a trademark of Xerox Corporation

What's After Basic?

If you ever wished that you had a better programming language, PASCAL 80 may be the language you dream about. It is a compiled language, faster, more accurate and easier to modify than Basic. Yet it is so easy to use that you can forget the hassles and diskette spinning of other compiled languages, including other versions of Pascal.

Now you can create your own command files that execute from DOS without having to load a language into the computer first, but do it with far less work than machine language. You can sell your compiled programs without any royalty payments!

Although designed for teaching and ideal for that purpose, PASCAL 80 also allows serious applications with a full fourteen digits of accuracy, even on log and trig functions!

PASCAL 80 allows you to create files on the TRS-80® Model I, Model III, LNW-80, PMC-80, or LOBO MAX-80 that will run on any of the other machines under TRS-DOS®, LDOS, NewDOS, NewDOS 80, DBL-DOS or DOS Plus.

PASCAL 80 is used in dozens of High Schools, Colleges, and Technical Schools, and has been favorably reviewed in Byte, Creative Computing, and other magazines.

You get all of this at a bargain price of only $99 plus $2 shipping. If you call and order by MasterCard or VISA, we will even credit you $1 for the phone call. Call or send your check today!

NEW CLASSICS SOFTWARE

239 Fox Hill Road
Denville, NJ 07834
(201) 625-8838 ⌐255

TRS-80® and TRS-DOS are trademarks of Radio Shack, LNW-80 of LNW Research, PMC-80 of Personal Micro Computers, LOBO, LDOS, and MAX-80 of Lobo Systems, DOS-Plus of Micro Systems Software, NewDOS and NewDOS 80 of Apparat, and DBL-DOS of Percom. PASCAL 80 is a trademark of New Classics Software.

NEW!! POINTER VARIABLES!

Figure 7. An edge in visual image.

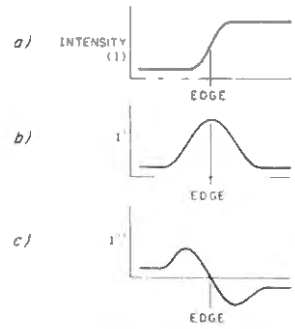


Figure 8. Edges—intensity changes.

to this smoothed image. The result is:

$$\nabla^2(G * I)$$

This smoothed and differentiated image is scanned for zeros, which indicate edges. The Marr-Hildreth theory of edge detection states that $\nabla^2(G * I)$ is what takes place in the retinal ganglion cells. The DoG function approximates the Laplacian of the image convolved with a two-dimensional Gaussian filter. This is the center-surround receptive field we noted previously. So, biology has a simple way of performing a computationally intensive task.

In this theory, the simple cells of the striate cortex scan for zeros (edges). The complex and hypercomplex cells in the striate and peristriate cortex use the edges to put together higher-order pieces of the image.

The G operator smooths the image according to the spatial scaling constants in the DoG function. Different constants detect different types of edges. One of the problems in detecting edges is that they don't all appear with the same smoothing filter. Some edges may be sharp and well delineated. Others may be more gradual. Varying the scaling constants allows us to detect edges over a wide range of scales. Creating several maps of the image, each at a different scale, produces a raw sketch of the image. The purpose of smoothing the image is to limit the range of scales over which edges occur. In this way, they are easily detected.

Convolution

I will deal briefly with convolution. In continuous mathematics, convolution is mathematically represented by the double-convolution integral:

$$S_{ij} = f * I = \int_v \int_u f(u,v)I(i-u,j-v)dudv$$

which has a discrete formulation:

$$S_{ij} = \sum_u \sum_v f(u,v)I(i-u,j-v)/n$$

The image I(X,Y) consists of pixels uniquely defined by the spatial coordinates (X,Y). It is a spatial map of pixels, each representing an intensity of light. S is the smoothed image. The smoothed image is thought of as a two-dimensional weighted average of the local area. Here the smoothing function f is the Laplacian of the Gaussian operator. This filter weighs the points near the center of the (I,J) pixel more than points further away. As you move away from the I,J position, the pixels contribute less and less to the smoothing of the I,J pixel, until the effect is essentially zero.

The convolution operator smooths and differentiates the image simultaneously, saving considerable computation. You can define r to be the radius

```
10  DEF FN LG(X,Y,S) = (2 - (X12 + Y12)/S12 * EXP( - (X12 + Y12)/2/S12)
20  FOR I = 1 TO 20
30      FOR J = 1 TO 20
40          S(I,J) = 0
50          FOR U = 1 TO 20
60              FOR V = 1 TO 20
70                  IF U > I OR J > V THEN GOTO 90
80                  S(I,J) = S(I,J) + I(I - U,J - V) * FN LP(U,V,S)
90  NEXT V,U,J,I
```

Figure 9. Image-smoothing subroutine.

SLICK PAGES? *NO!* GREAT DEALS? *YES!*

Computer Shopper pages aren't slick because they were designed for one purpose: to put buyers in touch with sellers at the lowest possible cost. This resulted in bargains on new and used equipment and software.

Individuals nationwide are able to list their pre-owned items for only a few dollars. This created hundreds of classified ads in over 100 big 11x14 pages.

And to make sure there were enough buyers for advertisers, the subscription price was set low, too!

So strike your first deal by taking advantage of the low subscription price. 12 issues for $10. That's a $13.40 discount off the newsstand price. Money back guarantee. **For faster service (MasterCard and VISA) Call 305-269-3211.**

COMPUTER SHOPPER
407 S. Washington Ave. • P.O. Box F585
Titusville, FL 32781 ↙39

MODEL 100 SOFTWARE

Take it with you when you go!

CRIBBAGE $22.95
Take a break in your journey for a relaxing hand with your micro. The **Cat's Paw®** Cribbage challenger is a worthy opponent for 1 player, or an electronic scorekeeper for 2. 24K required.

EXPENSE REGISTER $24.95
Keep track of expenses **while** you travel. Supports 15 different accts. Save to RAM file or Cassette. Printouts by date or acct. code. Stores records of 300 transactions with 32K.

Model III/IV Disk available.

BOTH only **$40.** Please add $2. ship./hndlg. per order.

L/R SOFTWARE
P.O. Box 39
Garfield, AR 72732
(501) 443-2257 ↙268

ALLOWS UNLIMITED COPIES OF MOST RADIO SHACK PROGRAMS INCLUDING SCRIPSIT AND VISICALC

Comes on a disk

No Programming Experience Necessary

ONLY $15.00

BACKUP

TOLL FREE 800-835-0071

In Kansas 316 665-3611

↙142

SALES DATA, INC.
526 E. 4th
HUTCHINSON, KANSAS 67501

Leaders Games Pins Blind Scores Handicaps Teams Players

BOWLING LEAGUE STATISTICS

High Game High Series Lanes Substitutes Points Averages Schedules

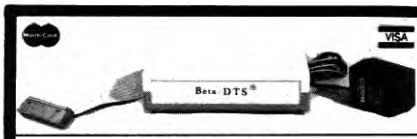
For the TRS-80*

BOWLSTAT 2.5 will generate team standing sheets suitable for posting with full team and player statistics, and also prints league scoring sheets. A wide range of handicapping and scoring options meets almost any league's requirements. Entry of weekly scores is fast and simple with extensive prompting and error detection.

On Diskette with User's Manual
Model I, III, IV **$79.95** Model II, 12, 16 **$119.95**

Manual Only
(Deductible on purchase of Diskette)
$9.95
Pa. residents add 6% Sales Tax

Datascore ↙438
Box 995, Sharon, Pa. 16146
*Trademark of Tandy Corp.



DISK BACKUP
ONE MEGABYTE ON A C-60
MODELS I or III

Includes Disk to Disk Copy
Auto Mixed Density Recognition
Supports most Double Density Boards
Configuration Mode For Your System
Hassle Free Cassette Recorder Operation
Set Volume Control to Maximum and Forget It
Tape Disks at Computer Clock Speeds to 4 MHZ
Auto Retreival of Taped Disk with Formatting
Will Backup Most Popular Dos Made Disks
Includes Cassette Recorder Controller, Power Supply, Computer Ribbon Cable, Disk & Manual

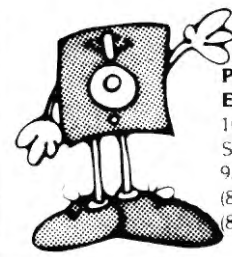
Minimum Requirements: Model I, or III Computer, One Drive, Recorder with Cable, 32K of Memory
Specify your TRS-80 Computer Model
$149.95 Plus $5.00 for Handling & Shipping

PLEASE WRITE FOR MORE INFORMATION.

BETA ENTERPRISES INC.
14049 Settlement Acres Drive
Cleveland, Ohio 44142
(216) 362-6191 ↙25

MEMOREX
FLEXIBLE DISCS

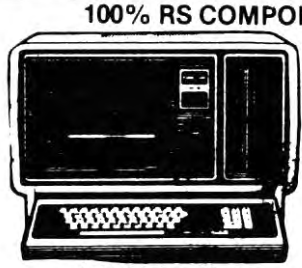
WE WILL NOT BE UNDERSOLD!! Call Free **(800)235-4137** for prices and information. Dealer inquiries invited and C.O.D.'s accepted.



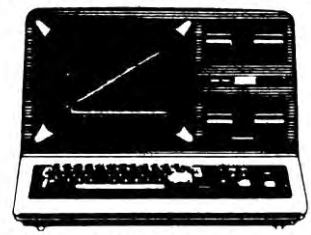
PACIFIC EXCHANGES
100 Foothill Blvd
San Luis Obispo, CA
93401 In Cal. call
(800)592-5935 or
(805)543-1037

↙207

100% RS COMPONENTS, NO FOREIGN DRIVES OR MEMORY — FULL WARRANTY



MOD 12
1 DR 80K $2499
2 DR 80K $3149



MOD 4
16K Ext. Bas. $ 799
64K 2DR RS232 $1579

MOD 16
1 DR 128K $3898
2DR 128K $4510

CASHIERS CHECK OR MONEY ORDER MUST ACCOMPANY ALL ORDERS

(817) 825-4027

NOCONA ELECTRONICS • P.O. Box 593 • Nocona, TX 76255

↙232

↙See List of Advertisers on Page 323

We have CP/M® for Radio Shack computers.

2,000 new programs for your TRS-80® 12.

CP/M is the runaway leader in disk operating systems, but until now owners of Radio Shack computers have been locked out of the thousands of useful programs that operate on CP/M.

Now you can put the power of CP/M into your Radio Shack TRS-80 II, 12, or 16, and be able to use all the popular and useful software—and hardware—that has been previously out of your reach.

Use any printer.

Instead of being chained to Radio Shack hardware, you'll be able to add a video terminal, any printer (serial or parallel) and several Winchester hard disk drives with storage up to 80 megabytes.

Uses only 8.5K of memory.

Since our first version went on the market in 1980, we've condensed and refined it into a compact, easy-to-use system enjoyed by thousands of users.

Besides the standard Digital Research CP/M manual, you'll get the 250-page manual we've developed through our long experience in adapting CP/M to Radio Shack computers. Our manual has lots of examples and an index and glossary.

You'll have your first working disk in ten minutes.

Only $200.

The floppy disk version of Pickles & Trout CP/M is $200. The hard disk versions (for Tandy, Corvus, and Cameo) are $250, except for the multi-user Cameo, which is $400.

Yes! Send me free information about CP/M for Radio Shack.

Name _____

Address _____

City _____ State ____ Zip _____

Phone _____

or send us your business card.

Pickles & Trout®, P.O. Box 1206, Goleta, CA 93116 (805) 685-4641

PICKLES & TROUT®

TRS-80® Radio Shack/Tandy Corporation. CP/M® Digital Research. Pickles & Trout® Pickles & Trout. ©1983 Pickles & Trout

290

from the (I,J) pixel you are currently smoothing. In terms of the (X,Y) spatial coordinate system, r = SQR ($X^2 + Y^2$). The Laplacian of the Gaussian operator is:

$$\nabla^2 G = -(1-r^2/2\sigma^2)\,EXP(-r^2/(2\sigma^2))/\pi\sigma^4$$

We can easily define a function in Basic that performs this function (after removing the scaling factors):

```
DEF FN LG(X,Y,S)=(2-(X↑2+Y↑2)/S↑2)
*EXP(-(X↑2+Y↑2)/2/S↑2)
```

For example, the routine in Fig. 9 takes a 20- by 20-pixel image in the array I(X,Y) and smooths it by convolving it with the Laplacian of the Gaussian operator.

Conclusion

I have (superficially) explored a computational model of vision. The method

"This theory of edge detection aids the understanding of human and animal vision..."

is computationally expensive for microcomputers, but more efficient than if convolution were not used. You can build special hardware to perform the smoothing function via convolution, differentiation, and scanning for zeros. With this hardware, it's possible to sample an image at high resolution, convolve it with the appropriate operator, and do so quickly.

This theory of edge detection aids the understanding of human and animal vision, as well as the construction of computer-based, robotic vision systems in the future. For those interested in pursuing the matter further, I recommened Dr. Marr's book, *Vision: A Computational Investigation into the Human Representation and Processing of Visual Information*.

Further suggested references are E. Hildreth's "Edge Detection in Man and Machine" (*Robotics Age*, Sept./Oct. 1981, p. 8), D. Hubel and I. Weisel's "Brain Mechanisms of Vision" (*Scientific American*, September 1979, p. 150), and D. Marr and E. Hildreth's "Theory of Edge Detection" (Proceedings from the Royal Society of London, Series B, Volume 207, 1980, p. 187). ■

PRO SPORTS STATS

LET YOUR HOME COMPUTER GIVE YOU "THE WINNING EDGE"

IT'S 100% GUARANTEED
IT WORKS OR YOU DON'T PAY

LET YOUR HOME COMPUTER HELP YOU PICK SUNDAY'S WINNERS ON SATURDAY.

AVAILABLE NOW THROUGH MODERN COMPUTER TECHNOLOGY
COMPLETE PROFESSIONAL FOOTBALL RECORDS FROM 1970 — RIGHT UP TO THE MINUTE

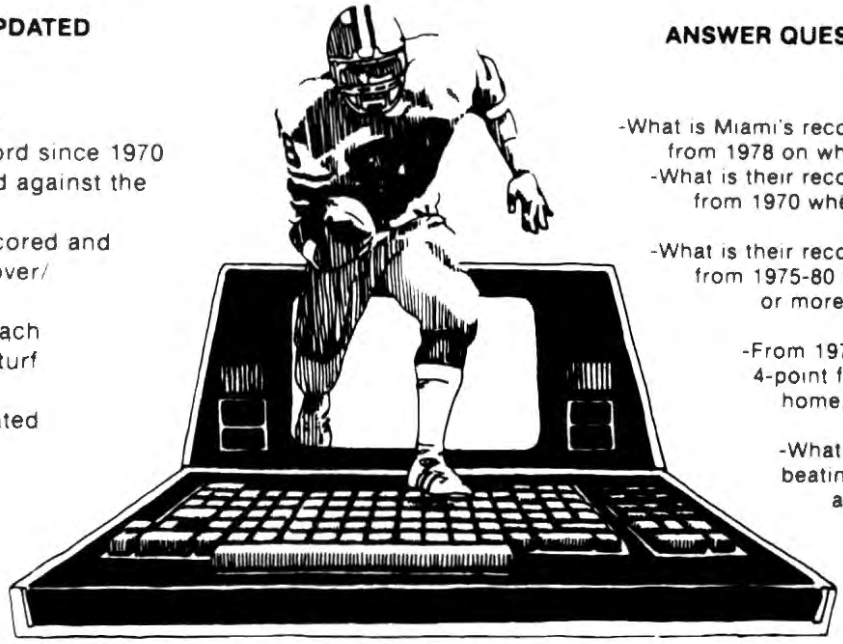
All of the history, information and data needed to help you pick winners against the spread available at your fingertips.

Available for Apple, I.B.M. P.C., Radio Shack, Commodore 64 and other micro computers. Comes with Data Base, operating program and instruction manual

EASY TO USE!

AUTOMATICALLY UPDATED EACH WEEK!

Data Base Includes:
- -Every win/loss record since 1970
- -Every team's record against the spread
- -History of points scored and points against for over/under
- -History of every coach
- -Artificial or natural turf
- -Includes USFL
- -Automatically updated each week computer to computer



ANSWER QUESTIONS LIKE THESE IN SECONDS

-What is Miami's record against the spread from 1978 on when they play Buffalo?
-What is their record against the spread from 1970 when they play any team on natural turf?
-What is their record against the spread from 1975-80 when they are 5 point or more favorites and playing at home?
-From 1976 on, if any team is a 4-point favorite and playing at home, what is its chance of beating the spread?
-What is a team's chance of beating the spread at home after three consecutive wins against the spread?

YOU SIMPLY WON'T BELIEVE THE QUANTITY OF IMPORTANT DATA AVAILABLE AT YOUR FINGERTIPS HELPS YOU SELECT WINNERS
YOU SELECT THE TEAMS, CRITERIA, AND THE TIME FRAME

FULL GUARANTEE
Run this program on your computer for seven days and if not completely satisfied, return it for a full refund.

ORDER NOW AND SAVE

Order before September 15, 1983 and pay only $285. Regular price $495. Weekly computer update only $15 per month for one season (Regular $25). 40% discount on baseball, hockey or basketball programs you may purchase.

☐ **Rush me my Data Base Program and Operating Manual for Pro Football Stats. If I order before September 15, I pay only $285 and will pay only $15 per month for a weekly update for one season along with a 40% discount on other Pro Sports Programs.**

☐ **Enclosed is my check for $25. Send me a Demo disk and instruction manual. My $25 will be applied toward the purchase price should I decide to buy Pro Football Stats.**

☐ **I'm not convinced, send me more information.**

Name _____
Street _____
City _____ State_____ Zip _____
Telephone _____
Make and Model Computer _____

Make check payable to:
Eastern Computer Consulting Associates, Inc.,
11 Dick Drive, Worcester, MA 01609
(617) 757-3131 Ext. 104

301
AD-MIC

See List of Advertisers on Page 323

FUN HOUSE
School Stuff

by Richard Ramella

This month I've decorated the Fun House as a little red schoolhouse to get you kids in the spirit of trying a few programs that will amaze your teachers and parents.

I'm not talking about education. I'm talking about school stuff. School stuff is when the teacher asks you to learn the capital of Rhode Island, even if you don't live there. It's when you have to know what nine times nine is and be quick about it.

So let's do some school stuff, not as education but as games.

All five programs run in Level II and Color Basic. Español is a demonstration program that helps you learn foreign vocabularies. Multiply is a one-player game that covers the multiplication tables from one times one to nine times nine.

States-Capitals helps you learn to match and spell the 50 U.S. states and their capitals. O Canada teaches you about that country's provinces and territories. And Recess for Numbers is a break from all this brain stuff—a number magic trick.

If this sounds like school, it isn't. Remember, we're in the Fun House, not the Work House.

```
100 REM * ESPANOL * TRS-80 LEVEL II AND COLOR BASIC
110 REM * FUN HOUSE/ OCT. 83/ SCHOOL STUFF /R.RAMELLA
120 CLS
130 DATA ROJO,RED,EL SOL,SUN,LA LUNA,MOON,EL GATO,CAT
140 DATA EL PERRO,DOG,QUANDO,WHEN,AQUI,HERE,GORDO,FAT,NO,NO,SI,YES
150 CLEAR 1000
160 DIM A$(20)
170 FOR A=1 TO 20
180 READ A$(A)
190 NEXT
200 A=RND(20)
210 IF A/2=INT(A/2) THEN B$=A$(A-1) ELSE B$=A$(A+1)
220 PRINT A$(A)
230 PRINT
240 INPUT C$
250 PRINT
260 IF C$=B$ THEN PRINT "RIGHT" ELSE PRINT "NO... "B$
270 PRINT
280 INPUT "TAP ENTER TO CONTINUE";X
290 CLS
300 GOTO 200
310 END
```

Español

Español

This program is simple but elegant. Lines 130 and 140 contain 20 words, 10 in Spanish and 10 in English. Each Spanish word is followed by the same word in English. In line 130, the Spanish *rojo* is followed by the English *red*.

When the program runs, it randomly displays a word. If it's an English word, type in the

Continued on p. 317

Multiply

```
100 REM*MULTIPLY*TRS-80 LEVEL II AND COLOR BASIC 4K/R.RAMELLA
110 REM*FUN HOUSE/OCTOBER 83/SCHOOL STUFF
120 CLS
130 CLEAR 1000
140 DIM A$(81)
150 C=1
160 D=81
170 FOR A=1 TO 9
```

Listing continued

The Key Box

Models I and III
Color Computer
4K RAM, Cassette Basic
32K RAM, Disk Basic
Color Basic

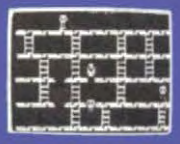
ABSOLUTELY FUN PHENOMENAL!

THE BLACK HOLE

Your forces have destroyed the Dorfian fleet as they attacked the galactic empire. Now, only their leader is left — hiding at the bottom of a black hole. Your mission is to seek him out and destroy him, once and forever!

An innovative game with no second chance — be perfect or die!

Tape — $19.95
Disk — $24.95



APPLE PANIC

A game is born: your life is peaceful until your crop of apples becomes prized — and ripe — for you. Now you're packed up to the ladder and where your only hope is to dodge holes in the floor to avoid eliminate your pursuers.

"Enjoyable ladder-climbing game . . . may be well on its way to the top of the charts" — CREATIVE COMPUTING

Tape — $19.95
Disk — $24.95

FAST ARCADE ACTION

JOYSTICK COMPATIBLE
FOR THE TRS-80, LEV 2, MOD I/III

WRITTEN BY Y. LEMPEREUR

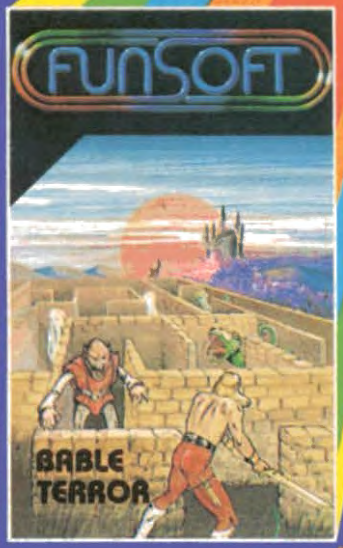
INCREDIBLE REAL-TIME GRAPHICS!

BABLE TERROR

Returning home from a long voyage, you find your castle surrounded by a strange labyrinth. Your servants have betrayed you and built the walls to prevent your return. Bodies and other strange creatures now roam the maze. Can you overcome all to reclaim what is rightfully yours?

"An incredible maze game — the best we've seen for the TRS-80" — BIG FIVE SOFTWARE

Tape — $19.95
Disk — $24.95



TIME RUNNER

Join the first intergalactic "space rush." Territory is yours for the taking — only watch out for the defenders and the perils of vanishing hyperspace. A no-nonsense struggle for wealth . . . and survival!

"An excellent and innovative game" — SOFTSIDE

"Time Runner is video gaming stripped down to its essentials" — 80 MICRO

Tape / Disk - $24.95

MAD MINES

The force has laid siege to your planet with an ever tightening force field. Mad mines are being sown into your diminishing life space. You'll need quick reflexes and perfect aim to destroy them and survive.

"The graphics are absolutely state-of-the-art . . . one of the most professional arcade games available." — CREATIVE COMPUTING

Tape — $19.95
Disk — $24.95

All games are 100% machine language for top quality graphics, voice and sound effects. Games are for the TRS-80 Lev 2, MOD I/III and are joystick compatible. Specify tape (16K) or disk (32K). Tape version will not transfer to disk.

FUNSOFT

Please see your local computer software dealer for FUNSOFT products. Should you desire to order direct, please add $2.00 for postage. California residents add 6 1/2% sales tax. Outside USA, please add $5.00. VISA, Mastercharge accepted — write in with card number and expiration date.

FUNSOFT, INC. 28611 CANWOOD ST., AGOURA, CA 91301 (213) 991-6540 -391

TRS-80 is a trademark of TANDY RADIO SHACK

Fame and Fortune may be yours by entering:

80 Micro's Young Programmer's Contest 1983–1984

Grand Prize $300, Plus Publication

3 1st prizes—$200 each, Plus Publication
3 2nd prizes—$100 each, Plus Publication
3 3rd prizes—$50 each, Plus Publication
Honorable Mentions—Free subscription to *80 Micro* and possible publication

(These prizes are in addition to our regular purchase price.)

If you are an aspiring Programmer, 18 years or younger, enter **80 Micro**'s 2nd Annual Young Programmer's Contest. Your entry may be for any TRS-80. Programs will be judged on originality, documentation (more on this below), and program elegance. The age categories are 11 and under, 12 through 14, and 15 through 18. All entries will be judged by the **80 Micro** staff.

Rules

1. Final entries must be in by November 1, 1983.
2. All entries must be submitted in a 10 × 13" envelope and must include: typewritten, double-spaced documentation; a printed copy of the program listing; a magnetic disk or cassette containing the program listing, the documentation, and any figures or tables; and a completed entry blank.
3. Documentation should consist of an explanation of the program, its purpose, how to use it, and the necessary software and hardware needed to use it (including memory requirements). Good documentation also points out the interesting algorithms and program techniques used without giving a line-by-line account.
4. Entries must be original and unpublished.
5. All winning programs become the property of **80 Micro**.
6. The category in which you will be judged will be determined by your age as of November 1, 1983. You must not have turned 19 by that date.
7. You may submit as many entries as you like, however, each one must be submitted separately and must have all of the information and materials stated above.

The *80 Micro* Young Programmer's Contest

Name_____ Age_____ Date of Birth_____

Street Address_____ City_____

State/Zip_____ Phone _____

Machine (circle one)

Model I Model III Model 4 Model II/12/16 Model 100

Color Computer Pocket Computer Other_____

Include this form with your entry and return to:

Young Programmer's Contest
80 Micro
80 Pine Street
Peterborough, NH 03458

*A trademark of Radio Shack, a division of Tandy Corporation.

Continued from p. 314

Spanish word with the same meaning. If it's a Spanish word, type in the English word. The program continues doing this as long as you wish.

No one will stop you from changing the words in data lines 130 and 140. Italian, German, French...they all work. You could also put in opposites such as far and near, and big and small, or present and past tenses such as swim and swam, and hope and hoped.

You might want a list longer than 20 words. Use any line number from 130 to 149 for data lines. Make sure the list contains sets of two words. When your list is complete, count the words. If you don't have an even number, find out why.

Let's say you have 200 words in the list. Now make three line changes:

160 DIM A$(200)
170 FOR A = 1 TO 200
200 A = RND(200)

You had to change the 20 to a 200 because you have 200 words in your data list. If you put hundreds of words in your list, you might run out of memory or string space.

Depending on how much memory your computer has, you can try increasing the number in line 150. Line 150, as I have left it, clears 1,000 bytes for strings.

You can save different versions of this program to tape and it becomes a real workhorse.

Multiply

All right, I see all you kids trying to sneak out! Come on back here! The program Multi-

Listing continued

```
180 FOR B=1 TO 9
190 A$(C)=STR$(A)+STR$(B)
200 C=C+1
210 NEXT B
220 NEXT A
230 CLS
240 E=RND(D)
250 IF D=0 THEN 500
260 IF A$(E)="" THEN 240
270 F=VAL(LEFT$(A$(E),2))
280 G=VAL(RIGHT$(A$(E),1))
290 CLS
300 PRINT F"X"G
310 INPUT H$
320 IF H$="QUIT" THEN 510
330 H=VAL(H$)
340 IF H=F*G THEN 400
350 PRINT "NO..."
360 PRINT F"X"G"="F*G
370 FOR T=1 TO 750
380 NEXT T
390 GOTO 230
400 PRINT
410 PRINT "R-I-G-H-T ! ! !"
420 IF E=D THEN A$(E)="":D=D-1: GOTO 240
430 FOR E=E TO D-1
440 A$(E)=A$(E+1)
450 NEXT
460 A$(E)=""
470 D=D-1
480 GOTO 230
490 END
500 PRINT "YOU ARE A CHAMPION MULTIPLIER."
510 FOR A=1 TO 81
520 IF A$(A)<>"" THEN PRINT LEFT$(A$(A),2)"X"RIGHT$(A$(A),1)" -";
530 NEXT
540 END
```

```
100 REM*STATES-CAPITALS*TRS-80 LEVEL II AND COLOR BASIC
110 REM*FUN HOUSE/ OCT. 83/SCHOOL STUFF/R.RAMELLA
120 DATA ALABAMA,MONTGOMERY,ALASKA,JUNEAU,ARIZONA,PHOENIX
130 DATA ARKANSAS,LITTLE ROCK,CALIFORNIA,SACRAMENTO,COLORADO
140 DATA DENVER,CONNECTICUT,HARTFORD,DELAWARE,DOVER,FLORIDA
150 DATA TALLAHASSEE,GEORGIA,ATLANTA,HAWAII,HONOLULU,IDAHO,BOISE
160 DATA ILLINOIS,SPRINGFIELD,INDIANA,INDIANAPOLIS,IOWA
170 DATA DES MOINES,KANSAS,TOPEKA,KENTUCKY,FRANKFORT,LOUISIANA
180 DATA BATON ROUGE,MAINE,AUGUSTA,MARYLAND,ANNAPOLIS
190 DATA MASSACHUSETTS,BOSTON,MICHIGAN,LANSING,MINNESOTA
200 DATA ST. PAUL,MISSISSIPPI,JACKSON,MISSOURI,JEFFERSON CITY
210 DATA MONTANA,HELENA,NEBRASKA,LINCOLN,NEVADA,CARSON CITY
220 DATA NEW HAMPSHIRE,CONCORD,NEW JERSEY,TRENTON,NEW MEXICO
230 DATA SANTA FE,NEW YORK,ALBANY,NORTH CAROLINA,RALEIGH
240 DATA NORTH DAKOTA,BISMARCK,OHIO,COLUMBUS,OKLAHOMA
250 DATA OKLAHOMA CITY,OREGON,SALEM,PENNSYLVANIA,HARRISBURG
260 DATA RHODE ISLAND,PROVIDENCE,SOUTH CAROLINA,COLUMBIA
270 DATA SOUTH DAKOTA,PIERRE,TENNESSEE,NASHVILLE,TEXAS,AUSTIN
280 DATA UTAH,SALT LAKE CITY,VERMONT,MONTPELIER,VIRGINIA,RICHMOND
290 DATA WASHINGTON,OLYMPIA,WEST VIRGINIA,CHARLESTON,WISCONSIN
300 DATA MADISON,WYOMING,CHEYENNE
310 CLS
320 CLEAR 200
330 DIM A$(100)
340 INPUT "WANT STATES(1) OR CAPITALS(2)";M
350 IF M<>1 AND M<>2 THEN CLS: PRINT "ENTER NUMBER 1 OR 2": GOTO
 340
360 V=50
370 FOR A=1 TO 100
380 READ A$(A)
390 NEXT
400 CLS
410 A=RND(100)
420 IF V=0 GOTO 560
430 IF A$(A)="" THEN 410
440 IF M=1 AND A/2=INT(A/2) THEN 410
450 IF M=2 AND A/2<>INT(A/2) THEN 410
460 IF M=1 THEN B$=A$(A+1) ELSE B$=A$(A-1)
470 PRINT A$(A)
480 PRINT
490 INPUT C$
500 PRINT
510 IF C$=B$ THEN A$(A)="":PRINT "RIGHT";:V=V-1:R=R+1:PRINT R:EL
SE PRINT "NO..."B$
520 PRINT
530 INPUT "TAP ENTER TO CONTINUE";X
540 CLS
550 GOTO 410
560 CLS
570 PRINT "YOU GOT THEM ALL."
580 PRINT "WELL DONE..."
590 END
```

States-Capitals

FUN HOUSE

ply is fun. This is the easy way to learn the multiplication tables. The program randomly presents 81 different multiplication problems—from one times one to nine times nine. You type in the answer and tap the enter key.

If you're right, you'll never see that same problem again during one play of the game. Remember that four times five and five times four are different problems although they have the same answer. If your answer is wrong, the program tells you the right answer. What could be fairer than that?

When you have all 81 answers right, the program names you a champion multiplier. At any time you want to stop the game, type the word Quit instead of an answer. The program lists all the combinations you haven't answered. This provides a handy study list.

```
100 REM*O CANADA*TRS-80 LEVEL II AND COLOR BASIC 4K/R.RAMELLA
110 REM*FUN HOUSE/ OCTOBER 83/ SCHOOL STUFF
120 CLS
130 DATA 1,QUEBEC,QUEBEC,WHITE GARDEN LILY,1867
140 DATA 2,ONTARIO,TORONTO,WHITE TRILLIUM,1867
150 DATA 3,BRITISH COLUMBIA,VICTORIA,FLOWERING DOGWOOD,1871
160 DATA 4,ALBERTA,EDMONTON,WILD ROSE,1905
170 DATA 5,SASKATCHEWAN,REGINA,PRAIRIE LILY,1905
180 DATA 6,MANITOBA,WINNIPEG,PASQUEFLOWER,1870
190 DATA 7,NEWFOUNDLAND,ST. JOHN'S,PITCHER PLANT,1949
200 DATA 8,NEW BRUNSWICK,FREDERICTON,VIOLET,1867
210 DATA 9,NOVA SCOTIA,HALIFAX,TRAILING ARBUTUS,1867
220 DATA 10,PRINCE EDWARD ISLAND,CHARLOTTETOWN,LADY'S-SLIPPER,18
73
230 DATA 0,NORTHWEST TERRITORIES,YELLOWKNIFE,MOUNTAIN AVENS,0
240 DATA 0,YUKON TERRITORY,WHITEHORSE,FIREWEED,0
250 CLEAR 200
260 DIM A$(60)
270 FOR A=1 TO 60
280 READ A$(A)
290 NEXT
300 CLS
310 A=RND(5)
320 B=RND(12)*5-4
330 ON A GOSUB 350,410,470,530,610
340 GOTO 300
350 PRINT "WHAT IS THE CAPITAL"
360 PRINT "OF "A$(B+1)"?"
370 INPUT B$
380 IF B$=A$(B+2) THEN PRINT "RIGHT" ELSE PRINT "IT'S "A$(B+2)
390 GOSUB 670
400 RETURN
410 PRINT "OF WHAT PROVINCE OR TERRITORY"
420 PRINT "IS "A$(B+2)" CAPITAL?"
430 INPUT B$
440 IF B$=A$(B+1) THEN PRINT "RIGHT"ELSE PRINT "IT'S ";A$(B+1)
450 GOSUB 670
460 RETURN
470 PRINT "WHAT IS THE FLORAL EMBLEM"
480 PRINT "OF "A$(B+1)"?"
490 INPUT B$
500 IF B$<>A$(B+3)THEN PRINT "IT'S "A$(B+3) ELSE PRINT "RIGHT"
510 GOSUB 670
520 RETURN
530 IF B>50 THEN RETURN
540 PRINT "IN WHAT YEAR DID"
550 PRINT A$(B+1)"
560 PRINT "BECOME A PROVINCE?"
570 INPUT B$
580 IF B$<>A$(B+4) THEN PRINT "IT WAS "A$(B+4) ELSE PRINT "CORRE
CT!"
590 GOSUB 670
600 RETURN
610 IF B>50 THEN RETURN
620 PRINT "AMONG THE PROVINCES,"
630 PRINT "WHAT IS RANK IN AREA"
640 PRINT "OF "A$(B+1)"?"
650 INPUT B$
660 IF B$<>A$(B) THEN PRINT "IT IS NO. ";A$(B);" IN SIZE" ELSE P
RINT "RIGHT"
670 FOR T=1 TO 750
680 NEXT T
690 RETURN
700 END
```

O Canada

States-Capitals

Along about the fifth grade you'll have a teacher who insists that everyone in the class learns to spell and match the 50 U.S. states and their capitals.

In this program, you choose states or capitals and then match the missing part. If you choose capitals, the program might present Charleston. It waits for the answer, West Virginia.

If you're wrong, it gives the answer and continues randomly. If you're right, that problem won't come back to haunt you during that program run. Remember that you have to spell the answers correctly.

Every time the computer tells you Right, it also displays a number telling you how many right answers you have so far. That way you know how you're progressing toward spelling all 50 capitals.

Near the end of a run, this program might pause for a while as it searches for the few remaining questions you haven't answered. Be patient.

O Canada

I've heard from a surprising number of Canadians—from Montreal all the way up to Yellowknife. And for them (and Americans too) I've put together a program about Canada's 10 provinces and two territories.

You Americans might envy the Canadians because they have only 12 state-like divisions to learn. I've talked to some

Your Computer Can Talk With

DIGY

SPEECH SYNTHESIS KITS

TYPICAL APPLICATIONS:

•Industrial •Games
•Educational •Security Systems

Kits contain all parts needed for functional, high quality speech synthesizer. Manuals guide you to a successful project.

DIGY I— $90.00 — use on parallel printer port for Models I, III, & IV computers. 143 + word vocabulary.

DIGY II— $125.00 — Use on Model III & IV I/O buss, Model I expansion buss. 143 + word vocabulary.

DIGY II+ $165.00 — Same as DIGY II with 274 word vocabulary.

Kits require +9v pwr supply, cable & 8-OHM speaker. Assembled and tested versions add $30.00

All parts guaranteed for 90 days

ARGONAUT SYSTEMS

P O Box 2492
Northbrook, IL
60062 (312) 394-8890

Money orders CODs & Personal checks accepted. Allow 3-4 weeks for delivery. Illinois residents add 6% Sales tax. Inquire about our qualified dealer quantity discounts

229

For Those Who Seek.

Bible study aids from Bible Research Systems include the complete KJV Bible text on disks. THE WORD processor can search the Scriptures for any word or phrase. Any portion of the Bible can be printed or displayed. Create your own library of research materials or use ours, called TOPICS. TOPICS contains cross-reference indexes on over 200 of the primary subjects discussed in Scripture.

Bible Research Systems applies computer technology to personal study of the Scriptures.

TOPICS
$49.95

Bible Research Systems
9415 Burnet, Suite 208
Austin, TX 78758
(512) 835-7981
7

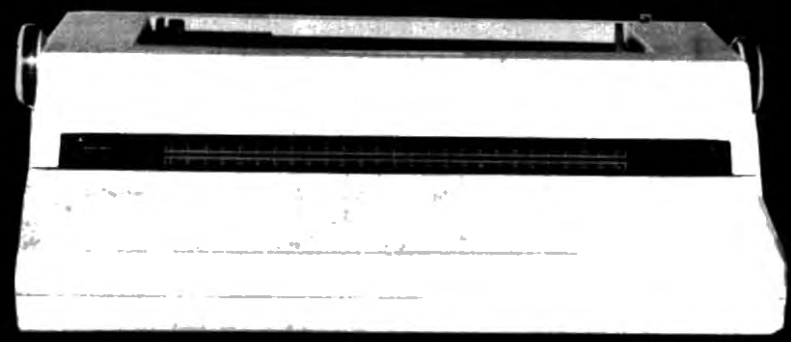
THE WORD
processor
$199.95
Plus $3 postage/handling

Requires APPLE II+, IBM-PC, TRS80-III, OSBORNE, KAYPRO, or CP/M 8"

DIABLO DAISY WHEEL PRINTER

$795

- Standard Centronics Parallel or Serial RS232
- Compatible with most computers — **Ask About Yours!**
- High Speed Heavy Duty, Commercial Grade
- Full 132 Column Printout Capacity
- 2,000 Character Print Buffer — No waiting on Printer
- Tested and reconditioned by Johnson & Johnson
- Full parts and labor WARRANTY
- 375,000 Character Ribbon Included FREE
- Uses Metal Printwheel Included FREE!
- Friction Feed Standard
- Serial Baud Rates up to 19,200



USE ALL THESE FEATURES AND MORE!

- 10+12 Pitch and True Proportional Spacing
- Bi-Directional Printing
- Bold Printing
- Underline Words or Sentences
- Subscripts and Superscripts
- Multiple Tabs
- Graphics on 1/120 inch
- Communications commands with serial
- Built-in self tests and Diagnostics
- Strike through Printing

PRINTS AVERAGE LETTER **FASTER THAN 80 CHARACTERS PER SECOND EPSON.**

LIMITED QUANTITY!

TO ORDER CALL (817) 589-2000

JOHNSON & JOHNSON COMPUTER CORP.

2229 EAST LOOP 820 NORTH, FT. WORTH, TEXAS 76112

536

See List of Advertisers on Page 323

RIBBONS & SUPPLIES

SATISFACTION GUARANTEED
FREE SHIPPING in US and CANADA
NO MINIMUM ORDER
FREE CATALOG

DISCOUNTS apply to ANY COMBINATION of products. Deduct 10% for 6 to 23 items, 15% for 24 to 99, and 20% for 100 or more items. SCHOOLS may take an additional 5% discount.

MASTERCARD & VISA orders, send card number and expiration date. Checks accepted with no delay.

FREE SUPPLIES CATALOG includes instructions for loading refill loops. Most orders shipped within 24 hours. Florida residents add 5% sales tax.

REPLACEMENT FABRIC RIBBONS FOR	Ribbon in Cartridge	Refill Loop
Anadex 9500	13.00	3.95
Anadex Word Scribe	13.00	3.95
Axiom GP-80M	6.50	2.93
Axiom IMP I & II	13.50	2.93
Base 2	13.50	2.93
C-Itoh Prowriter	5.50	2.43
C-Itoh F-10	5.50	1.68
Diablo Hytype I	5.50	1.59
Diablo Hytype II	5.50	1.68
DEC LA34	5.50	2.03
Epson MX-70, MX-80	6.50	2.93
Epson MX-100	9.75	4.45
IBM PC (MX-80)	6.50	2.93
IBM PC (MX-100)	9.75	4.45
MPI 88G, 99G, 150	13.50	2.93
NEC 3500	TBA	2.43
NEC Spinwriter	5.50	2.43
NEC PC 8023A-01	5.50	2.43
Okidata Microline 80, 82, 83 (spool)		2.50
R.S. DW II (1449)	TBA	2.08
R.S. DMP 200 (1483)	TBA	2.93
R.S. DMP 400, (1418)	5.50	1.68
R.S. DMP 500 (1482)	TBA	2.93
R.S. DWP 410 (1449)	TBA	2.08
R.S. LP6, LP8 (1418)	5.50	1.68
R.S. LP3, LP5 (1414)	5.50	2.43

BASF DISKETTES, 5¼"
with hub ring, LIFETIME WARRANTY

STOCK#	SIDE/DEN	SECTORS	PRICE/BOX
54974	SS/DD	SOFT	29.20
54976	SS/DD	10	29.20
54978	SS/DD	16	29.20
54980	DS/DD	SOFT	40.50
54982	DS/DD	10	40.50
54984	DS/DD	16	40.50
54986	SS/QUAD	SOFT	42.20
54988	SS/QUAD	10	42.20
54990	SS/QUAD	16	42.20
54992	DS/QUAD	SOFT	54.00
54994	DS/QUAD	10	54.00
54996	DS/QUAD	16	54.00

DATA SYSTEMS

(305) 788-2145 ~99

BOX 99 • FERN PARK, FL 32730

Canadians about this, and in their schools they must learn their provinces, territories, and the 50 U.S. states and capitals!

This program helps you learn to spell and match provinces and territories with capital cities and learn the ranks in area, floral emblems, and dates of entry as provinces. Just type in your answers (or guesses) and tap the enter key.

This sent me to the encyclopedia, and the facts I learned about the huge, amazing country of Canada make me want to visit.

Recess for Numbers

What is school without recess? Nothing! Without recess we'd go bonkers, so here it is.

At the start, the program asks you to think of a whole number (not 3½ and not 8.75), but to keep it a secret. Then the program shows you several lists of numbers.

Look at each list and answer yes or no as to whether your secret number is in the list. Then the program guesses your number.

If you have trouble keying in any Fun House program, write me: Richard Ramella, 1493 Mt. View Ave., Chico, CA 95926. Send a listing if you have a printer, or copy the lines that give you error messages and say what the error messages are. Send a stamped, self-addressed envelope (Canadians, send 40 cents in coin and a self-addressed envelope).

Next month we'll try some computer animation. ■

```
100 REM*RECESS FOR NUMBERS*TRS-80 LEVEL II AND COLOR BASIC 4K
110 REM*FUN HOUSE/OCTOBER 83/SCHOOL STUFF/R.RAMELLA
120 DATA 16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31
130 DATA 8,9,10,11,12,13,14,15,24,25,26,27,28,29,30,31
140 DATA 4,5,6,7,12,13,14,15,20,21,22,23,28,29,30,31
150 DATA 2,3,6,7,10,11,14,15,18,19,22,23,26,27,30,31
160 DATA 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31
170 CLS
180 PRINT "  THINK OF A WHOLE NUMBER FROM"
190 PRINT "  0 TO 31. DON'T TELL IT TO ME."
200 PRINT
210 INPUT "TAP ENTER TO CONTINUE";X
220 CLS
230 C=0
240 FOR A=1 TO 10
250 V$=V$+CHR$(32)
260 NEXT A
270 DIM B(80)
280 FOR A=1 TO 80
290 READ B(A)
300 NEXT A
310 FOR D=1 TO 5
320 X=C+RND(16)
330 IF B(X)=0 THEN 320
340 PRINTB(X);
350 B(X)=0
360 V=V+1
370 IF V<16 THEN 320
380 PRINT
390 PRINT "IS YOUR NUMBER IN THIS GROUP?"
400 PRINT
410 INPUT "YES OR NO";A$
420 IF A$<>"YES"AND A$<>"NO" THEN PRINT @ 160,V$;:PRINT @ 160,"";:GOTO 410
430 IF A$="NO" THEN 470
440 IF D=1 THEN F=F+16 ELSE IF D=2 THEN F=F+8
450 IF D=3 THEN F=F+4 ELSE IF D=4 THEN F=F+2
460 IF D=5 THEN F=F+1
470 C=C+16
480 V=0
490 CLS
500 NEXT D
510 CLS
520 PRINT "YOUR NUMBER SEEMS TO BE";F
530 END
```

Recess for Numbers

PRICES AND SERVICE TOO GOOD TO PASS UP!

PRODUCTS FOR THE TRS-80®

COLOR COMPUTER

	tape	disk
Diagnostics	17.25	
Graphics Editor	17.25	
Master Control II	22.95	
Bugout (Monitor)	16.95	
Oracle (Graphic Monitor)		25.75
Ultra 80 CC (Editor/Assembler)		42.50
Ultra 80 CC Plus Oracle		64.95
Soundsource (with Cable)	21.95	
Color Games by Lance	15.95	
CC thello	12.75	14.95
Ghost Cobbler, Space Invaders	17.50	20.50
Colorout		11.95
Color Bonanza	42.95	
Color Caterpillar or Death Trap	17.25	
Color Scarfman	17.25	
Deathplanet: The Dogstar Adv	15.95	
Mean Craps Machine	15.95	

GAMES

	tape	disk
Attack Force or Cosmic Fighter	12.75	15.95
Stellar Escort or Galaxy Invasion	12.75	15.95
Meteor Mission II or Robot Attack	12.75	15.95
Defense Command or Super Nova	12.75	15.95
Weerd	15.95	15.95
Forbidden City or Forbidden Planet		29.95
Hyperlight Patrol		15.50
Defiance (Disk Only) or Panik	15.50	19.50
Devil's Tower	12.75	15.95
Alien Defense or Bounceoids	13.95	17.25
Sneak Thief	17.25	18.95
Frogger	17.25	19.95
Reign of Red Dragon or Stratos	19.95	19.95
Double Feature		31.95
Caterpillar or Scarfman	13.95	17.25
Penitrator	21.75	21.75
Armoured Patrol or Eliminator	19.95	19.95
Rear Guard or Sea Dragon	19.95	19.95
Adv. Tripac 1-3, 4-6, 7-9, or 10-12		31.75
Adventure International Hint Book		6.95

Newscript™

Newscript 7.1	99.95
Newscript 7.1 plus Labels	114.95
Newscript Daisy Wheel Prop.	39.95
Newscript File Converter	19.95

LYNX MODEM

Auto Answer & Auto Dial
for the TRS-80 Models 1 & 3

$229

New Version
DOT WRITER 3.0

$66.50

Dot Writer Font Disks — $23.50

GEAP

$38.50

Includes Correcting Feature

$119.50

Grammatical Option	39.95
Hyphenation Option	39.95

TALLYMASTER

Designed to help those running a business or household. It is easier to learn than most spreadsheet programs and includes complete documentation and an on-line HELP command. Handles up to 702 expense or income categories. (By Prosoft, requires 48K, 1 disk drive)

$64.95

SOFTWARE

NEWDOS80/Vers. 2	$124.95
LDOS 5.1	109.95
DOSPLUS 3.5	119.95
DOSPLUS II	195.00
Micro Clinic — 24.50	
Micro Clinic — Mod 3	28.50
Trashman	34.50
Faster	24.95
R.P.M. — Disk Timer	22.50
Super Utility Plus 3.0	63.95
EDAS IV	84.95
M-ZAL Release Two	119.50
LDOS Utility Disk	42.50
LDOS FED (File Editor)	33.95
The BASIC Answer	59.95
Lazywriter Version 3.0	139.95
Lazystuff	34.95
Lazydoc	49.95
Maxi Manager B.O.	119.50
Maxi Mail (Mod 3 Only)	74.95
Maxi Stat	164.95
Maxi CRAS	79.95
The Home Accountant	62.95
Tallymaster	62.95
The Postman Deluxe	99.95
The Postman Deluxe w/Postwrite	123.50
Microterm	64.95
Omniterm	79.95
Percom Doubler II w Dos + 3.4	159.95
Percom Doubler II w/o Dos	139.95
Percom Data Separator	27.95
LNW Doubler 5/8 w Dos +	194.95
LNW Doubler w/o Dos	159.95
LNW System Expansion II	349.00
Small Business System Group's Accounting Modules — Mod 1 or 3	175.00
Accounting Modules — Mod 2	250.00
Verbatim Disks 5" SS/DD	26.50

- 24-Hour Shipping for Items in Stock
- Free Use of Credit Cards
- Large Selection-Call for Items Not Listed
- Toll Free Order Line
- Free Shipping on Orders over $100
- Friendly, Honest, Reliable Service

We accept Visa, Master Card, check, cash, money orders, and COD. In the 48 continental States add $2.50 for UPS standard shipping; we'll pay shipping if your order is over $100. Alaska and Hawaii orders are charged actual shipping charges. COD orders are charged an extra $2.00 and require cash or certified check on delivery. POs accepted upon approval.

When ordering by mail, include your telephone number, credit card information, computer model, memory size, and number of drives. Colorado residents add appropriate sales tax (6½% in Denver).

Prices are subject to change without notice.

Applied Microsystems, Inc.
612 Washington, Denver, CO 80203 ✓390

ORDER NOW TOLL FREE **1-800-468-4474**
IN COLORADO CALL 861-9250

LDOS is a TM of Logical Systems, Inc. **M-ZAL** is a TM of CAU, Inc. **TRS-80** is a TM of Tandy Corp. **NEWSCRIPT** is a TM of Prosoft

✓See List of Advertisers on Page 323

TRUNKS FOR THE MEMORIES.

Introducing the most logical place to store Elephant Memory Systems® (or lesser brands of disks): The Trunk.

With its alphabetized library index, you can file or retrieve up to 60 disks, instantly.

The Trunk is made of durable molded plastic with a hinged, one-piece lid, to keep disks safe from dust, dirt, and other detriments which disks despise.

And, it's portable. Because the lid doubles as a carrying handle so your Elephant Memory Systems® disks can go anywhere you do.

There's a model for 5¼" and 8" floppies, as well as a cassette-and-game file and a special Atari® version.

So if you're looking for the best disk storage system on the market . . .

The Trunk is an open-and-shut case.

THE TRUNK. ENDORSED BY ELEPHANTS.

Elephant Memory Systems® Disks

A full line of top-quality floppies, in virtually every 5¼" and 8" model, for compatibility with virtually every computer on the market. Guaranteed to meet or exceed every industry standard, certified 100% error-free and problem-free, and to maintain its quality for at least 12 million passes (or over a life-time of heavy-duty use).

Marketed exclusively by Leading Edge Products, Information Systems and Supplies Division, 55 Providence Highway, Norwood, MA 02062.

Dealers: Call toll-free 1-800-343-8413; or in Massachusetts, call collect (617) 769-8150

✓ 472

80 LIST OF ADVERTISERS

Reader Service Number		Page
374	ALPS	76
26	Access Unlimited	350, 351
356	Adel Computer Mart	269
56	Adult Video Game	208
82	Aerocomp Inc	284, 285
136	Allen Gelder Software	156
517	Allen Gelder Software	157
140	Allied Systems Company	327
487	Alpha 100	140
476	Alpha Bit Communications	289
224	Alpha Bit Communications	132
569	Alpha Bit Communications	354
17	Alpha Products Co	13, 15, 17
21	Alphaware	281
110	Amdek Corporation	81
217	American Small Business Computers	247, 249, 251
540	American Software Club	103
258	Ammicro	177
572	Anadex Inc	343
406	Analytical Processes Corp	146
172	Andreasen s Elec Research	105
141	Anitek Software Products	31
*	Ann Arbor Precision	20
40	Apparat Inc	111
390	Applied Microsystems Inc	321
229	Argonaut Electronics	319
514	Ashland Computer Systems	190
383	Astro-Star Enterprises	232
88	Avalon Hill Game Company	58
152	BCCOMPCO	79
300	B T Enterprises	117, 277
566	B T Enterprises	354
184	Baudy House Computer Products	347
243	Bay Technical Associates Inc	74
571	Ben Tores Ribbon Service	346
25	Beta Enterprises	311
7	Bible Research Systems	319
180	Bill Cole Enterprises	105
106	Binary Devices	191
381	Bodex Corp	164
*	Bottom Line, The	33
165	Briefcase Portable	280
236	Business Software Team	150
167	C.D.C.	116
65	C.D.P. (Computer Data Process)	327
181	CMD Micro	186
575	Call Manager Inc	340
64	California Word Exchange	71
225	Chattanooga Systems Assoc	282
466	Check-Mate	287
560	Chemtronics Inc	346
565	Chope-Stevens Paper Co	348
102	CLOAD Magazine	73
148	Circle Computer	200
563	C-Line Products	342
252	CompuAdd Corp	335
455	Compukit	344, 345
86	Compulogic Corp	157
235	Compuserve	97
120	Computer Applications Unltd	45
139	Computer Case Company	306
133	Computer Discount of America	216
138	Computer Express	225
357	Computer Friends	353
18	Computer Plus	19
453	Computer Shack	134
109	Computer Shack	135
39	Computer Shopper	311
244	Computer Store	232
27	Computex	325
581	Conex Electro Systems	349
405	Consolink Corporation	30
68	Contract Services Assoc	92
105	Coosol Inc	187
45	Cornucopia Software	141
*	Cosmopolitan Electronics Corp	85
187	Cottage Software	174
190	Creative Computers	75
223	Crest Software	254
307	Custom Data	282
*	DEC Computing	206
282	DFW Computer Center	327
574	Daisy Systems	340
19	Data Display	296
99	Data Systems	320
531	Datafile Systems	337
438	Datascore	311
202	Design Colorants	327
367	Digital Images	208
562	Dimension 4 Design Group	353
204	Diskount Data	108, 109
441	Diskette Connection	215
5	Diskette Junction	53
62	Displayed Video	242, 243
353	Dresselhaus Comp. Products	121
*	80 MICRO	
	80 Subscriptions	66, 67, 259, 291
	Dealers Sell	233
	Foreign Dealers	206
	HOT CoCo Subscription	35
	Load 80/Back Issues	183, 194, 195, 225
	Moving	225
	Subscription Problems	206
	University Micro	183, 257
216	EAP Co /Gold Plug	69
271	EBG & Associates	275
48	ESS-JAY	88
*	Early Games	246

Reader Service Number		Page
301	Eastern Computer Consulting Assoc	313
85	Educational Micro Systems	71, 283
154	Eigen Systems	296
159	Electronic Specialties	349
125	Elite Electronic Industries	337
97	Epson America Inc	239
267	Excellonix	222
454	Far West Systems & Software	353
214	Fort Worth Computers	165
262	Frank Hogg Laboratory Inc	250
391	Funsoft Inc	315
186	Good-Lyddon Data Systems	184
358	Gridsoft	29
287	H.A.K. Workshop	76
318	HBH Publishing	269
9	H & E Computronics	Gatefold, 299, 301
359	Harley D. Wilbur	339
355	Holman D-P Service	174
153	Holmes Engineering Inc	23
175	Howe Software	118
198	I/O Tech	280
89	Image Technology Inc	337
578	Inmac	346
377	Innovative Data Technology	122
*	Instant Software	
598	Conquer That Mountain	209
597	Typing Teacher	183
351	Institute for Scientific Analys	89
147	Interactive Systems Design	282
234	Int'l Communication Experts	327
470	Int'l Software Sales Inc	105
177	JSOFT	337
126	J M G Software Int l	181
121	J V B Electronics	138
534	Jameco Electronics	173
536	Johnson & Johnson	319
331	KSOFT	335
485	Kalglo Electronic Co Inc	138
354	Kuzel Computer Software	337
515	Kwik Software	269
31	LNW Research Corp	CIV
31	LNW Research Corp	7
32	LNW Research Corp	151
268	L/R Software	311
561	LWFW Inc	349
580	Ladco Development Co	340
462	Langley St. Clair Inc	25, 63
554	Langley St. Clair Inc	354
336	Last Electronics	216
191	Lawyers Microcomputer	183
472	Leading Edge Products Inc	322
584	Leading Edge Products Inc	346
155	Leds Publishing Company Inc	347
515	Lemons Tech Services	269
*	Level IV Products Inc	245
75	Lichen Software	279
135	Lindbergh Systems	37
330	Logical Devices Inc	349
251	Logical Systems Inc	91
237	Logical Systems Inc	297
477	Lowerre Co. Inc	271
115	Lynn Computer Service	95
393	MCS Software	240
398	MESC	271
575	Manager Inc	340
573	Mannesmann Tally Corp	348
241	Marathon Software	68
146	Master Electronics	339
551	Matra Technology Inc	354
513	Mechanix Illustrated	166
199	Mega-Byte	208
461	Memory Merchant	179
215	Meyer's Place	280
149	Micro Architect Inc	210
47	Micro Business Systems	331
171	Micro Control Systems	307
*	Micro Data Supplies	82, 83
14	Micro Data Supplies	9, 11
426	Micro-Design	22
429	Micro-Design	210
463	Micro-Design	241
132	Micro-80 Inc	342
161	Micro-Grip Ltd	191
419	Microhatch	183
157	Micro-Images	125
464	Micro-Labs Inc	200
555	Micro-Labs Inc	352
117	Microminl Inc	175
60	Micro Mainframe	129
96	Micro Management Systems Inc	145, 199
162	Micro Mega	215
526	Micro Software Systems	51
316	Micro Solutions	305
384	Micro Systems Software Inc	CII
312	Microsette Company	137
380	Microtech Exports Inc	293
557	Microtek Inc	346
*	Midwest Computer Wholesale	275
137	Miller Microcomputer Services	143
*	Misosys	75
58	Modular Software Assoc	47
23	Mt Olympus Software	157
*	Mumford Micro Systems	139
*	NRI Schools	77
533	NEBS Computer Forms	215
255	New Classics Software	119, 310
232	Nocona Electronics	292, 311
54	Nodvill Software	293
570	Norand Corp	352

Reader Service Number		Page
36	Omnisoft Research	75
195	Omnitek Computers Int'l Inc	335
206	Optrons-80	283
151	Orion Instruments	192
542	P80 Nut Software	70
20	PBH Computer Products	233
433	PCD Systems	193
296	PCM Magazine	155
207	Pacific Exchanges	206, 311
122	Pan American Electronics	289
324	Pel/Tek	98
*	Percom Data Company	3
124	Perry Computers	233
176	Personal Computer Products	16
239	Personalized Computer Paper	337
509	Phone Line, The	84
290	Pickles & Trout	312
553	Pickles & Trout	348
160	Pioneer Software	289
556	Pocket Info. Corp	352
306	Powersoft	275
11	Practical Peripherals	CIII
59	Producer Software	54, 55, 56, 57
260	ProlAm Software	175
449	Prof. Jones/Frogg House	18
80	Program Store, The	253
248	Programmers & Assoc Inc	71
143	Progressive Electronics	171
95	Prosoft	341
98	Prosoft	21
194	Quant Systems	190
552	R & L Marketing	342
78	R & S Software	34
273	RCM Computer	78
145	REMarkable Software	155
129	REMsoft Inc	149
559	Ring King Visibles Inc	348
518	Rizzo Data Systems	337
486	Rocky Mountain Software	133
567	Rogers Products Co	340
343	Rogo Computer Products	293
213	68 Micro Journal	206
366	SDL	185
432	SHS Solutions	293
35	SID	329
340	SLR Systems	175
368	Safeware	279
142	Sales Data Inc	183, 311
*	Sandpiper Software	303
293	Scientific Engineering Lab	293
510	Scott Tasso Associates	293
431	Scripture Software	295
563	See Inc	343
583	Selectone Corp	354
363	Shawmut Systems	303
34	Shepherd Marketing	76
102	Silverware/Cload	84
12	Simutek	147
164	Simutek	205
245	Small Computer Company	187
576	Smith Systems Manufacturing Co	352
104	Socatra Inc	150
372	Soft Systems & Consulting	245
492	Softrends	85
116	Softronics Computer Systems	343
57	Softshell	200
29	Software of The Month Club	34
327	Software Support	42, 43
276	Solutions Inc	72
325	Solutions Inc	257
292	Son Soft	115
558	Southern Computer Systems	342
506	Star Micronics Inc	49
338	Strobe Inc	188
71	SubLogic Communications Corp	279
285	Sun Research Inc	353
456	Sunlock Systems	69
579	Supersoft Inc	352
538	Sybex	189
230	Synergetic Solutions	261
174	Syracuse R & D Center	293
63	Systems Enhancement Engineering	186
100	Systems Group	39, 221, 309
208	3M Company	41
189	Tab Sales	285
70	Taranto & Associates Inc	127
440	Tech Data Corp	293
59	Texas Computer Systems	159, 161
83	Tinker Techniques	327
320	Today s Future	327
61	Total Access	273
22	Treesoft Software	89
487	Trimtek Company	333
489	Triple-D Software	32
522	two/sixteen magazine	206
332	United Software Associates	191
10	VR Data Corp	61, 153
169	Van Horn Office Supply	254
*	Vespa Computer Outlets	271
305	Wadsworth Electronics	79
90	Wallonick Associates Inc	32
*	Wayne Green Books	
	99, 163, 210, 216, 222, 227, 263, 264, 265, 333, 339	
226	William A. Fink	124
568	Wordmovers Inc	348
577	Xidex Corp	346
158	XYZT Computer Dimensions Inc	123
156	York 10 Computerware	347

For further information from our advertisers, please use the Reader Service card.

The GAMER'S CAFE

by Rodney Gambicus

The Cafe settles down

Yucko," said Mercedes. "Don't they have anything in this state besides condos and K-Marts?"

We were cruising down McGregor Blvd. in Ft. Meyers, FL, en route to our time-sharing bungalow by the sea. Mad Max had the radio cranked up to about 100 decibels and was lip-synching to Peggy Lee's "Fever." Mercedes had been griping about one thing or another ever since the Epcot Center. It was about 150 degrees, and I thought wistfully of blizzards in Utah.

"I'm hungry," Mercedes whined. "I'm bored. I'm carsick. I—I—" She glanced at a piece of paper in her hand. "Lessee...oh, yes—I have to go to the bathroom."

"Why don't you go write a new operating system or something?" I said.

"I'm tired of operating systems," she complained. "They're never finished. I'm already up to SilverDOS 1.3.1.1.1."

"Hey, how about a language?" said Max. "You haven't written a new language in weeks."

"Yeah," I chipped in. "You could call it Condo."

"Hmmm," Mercedes said. She wrinkled her brow for a moment, and then disappeared into the back of the van.

*****

We stopped at a phone booth where Max hooked up the Model 100 and collected our CompuServe e-mail from NHHQ.

"More high scores," he grumbled. "How come nobody ever sends us money?"

"You can't send money through e-mail," I pointed out. "Besides, high scores is our business."

Max had been turning sour ever since the scores on the Big Board started looking like the populations of Far Eastern countries.

"Aw, for heaven's sake," he said. "Do we have to take this 750,000 on Eliminator? And after you published Greg Hanssen's 99-ship patch."

The score did seem a little outrageous, and after several minutes' discussion we added Eliminator to our Games Non Grata list.

"A couple of new ones from West Germany," Max continued. "Martin Freiss of Aachen aces Apple Panic and Weerd, and Stefan Kunze of Moers checks in on Astroball. But Uwe Zimmermann of Bochum falls short in Flying Saucers.

"Hmmm...here's one for Olympic Decathlon from Adrie van Geffen of Rotterdam. William Hughes of Brussels, Belgium, misses in Penetrator. Sorry, Bill."

Max dutifully logged the new scores, and went on.

"What do you make of this?" he said. "These two guys from Long Valley, NJ, Brent Lewis and Mike Danke, say Strike Force is a pushover. Quote: 'The game is very easy to beat. After you have destroyed the enemy base about eight times, the game reverts back to the easiest level of play, and stays there indefinitely. We just took turns playing until we reached 1 million.' "

We then got into a long argument on endurance records. I thought that we should set up a special board for games like Galaxy Invasion that can be played for hours, or even days. We would record the time played as well as the score. Max argued that such activity entirely violated the spirit of gaming, and called me a fascist for suggesting otherwise. I gave in when he threatened to smash the windshield with his head.

*****

We finally reached our destination at Ft. Meyers Beach. The bungalow we had been promised by the time-sharing salesman (and which, you may recall from last month, was billed to our old buddy Winthrop) turned out to be a condo overlooking the ocean.

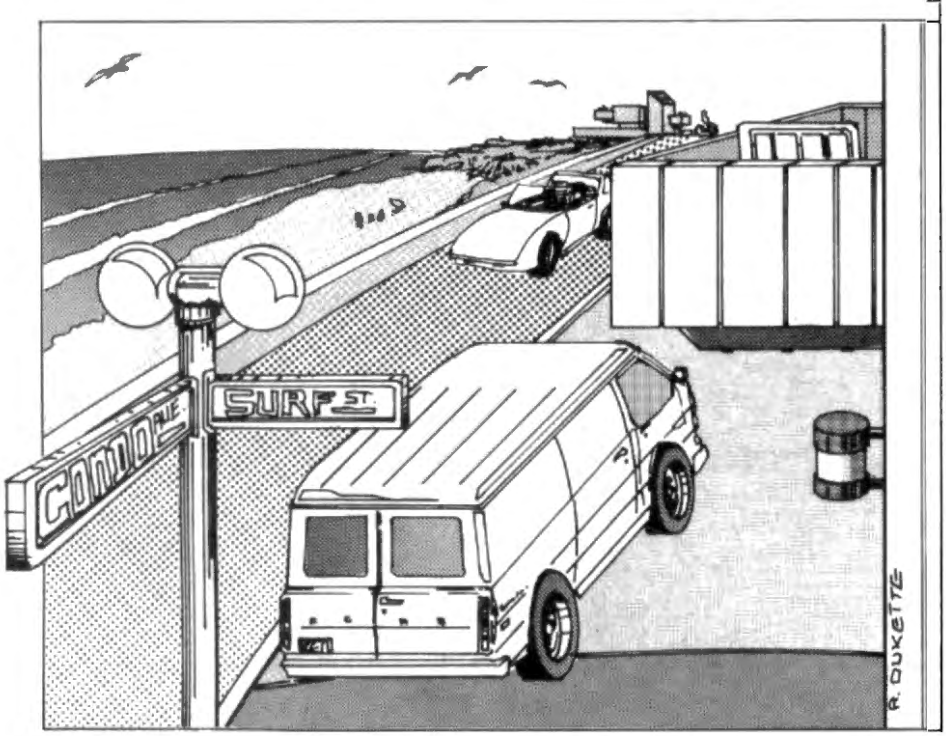
"Wow," Max whooped as he leaped from the van. "Look at all that sand! And sky! And surf! And sun!"

"Yeah, and all of those disgusting seagulls," Mercedes added sulkily.

We found our apartment, which, much to our delight, turned out to face the beach. This was too good to be true, I thought. Had Max finally done something right?

I slipped the key in the lock, and gently swung open the door. We gasped. Our summer retreat, our precious moments of solitude before we once again hit the open road, dissolved like sugar in water.

The apartment had been destroyed. The chairs and couches were stacked in the corners, and the pillows scattered about the room. Newspapers, TV din-

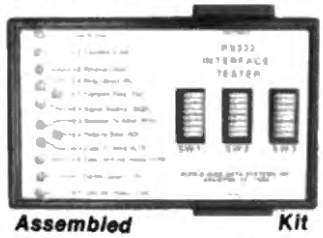


NEW TOLL FREE NUMBER.....Technical and calls within Texas --[713]488-8022

COMPUTEX 1-800-231-0566

div. of World Wide Data Systems Inc.

RS232 Serial Interface Breakout Box - Tester



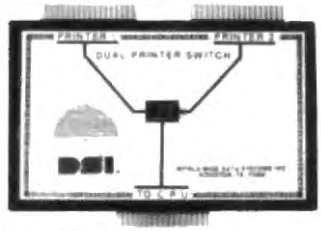
Assembled $89.95 **Kit $69.95**

Test your RS232 interface and peripherals quickly and inexpensively with the RS232 tester from Computex. Twelve Tri-Color LED's monitor the status of 11 of the most common RS232 signals while the twelfth LED allows you to check any of the lines using a test probe. The Tri-Color LED's glow red indicating positive signals, green for negative, and yellow indicating data flow. Three 8 position switches allow you to isolate any signal path between your interface and peripheral device, or replace the switches with headers and you can crosswire to configure for DCE or DTE equipment. Unlike many of the other RS232 testers, ours uses high impedance op amps which eliminate the possibility of loading the lines or damaging your interface. Easily one of the most versatile testers on the market. *Order yours today! - You'll only regret not having one the first time you need it!*

Dual Printer Switch

$29.95

Assembled & Tested



The Dual Printer Switch from Computex can be used in one of two ways; (1) Connect two printers to one computer -or- (2) Connect two computers to one printer. Works with MOD I, III, & IV. Six inch cable from computer to printer switch is $9.95. IBM P.C. model also available. Call for info...

MODEL III / IV RS232 / MODEM BOARD INTERFACE

M3CB2-1 Assembled RS232 Board $69.95
M3CB2-2 RS232 & Modem Kit . . . $129.95
M3CB2-3 Assy. RS232 & Modem . $149.95

The new M3CB2 series of internal communications boards for the MOD III & IV provide both RS232 serial interface and a complete auto answer direct connect modem. Board supports 150 to 19,600 Baud RS232 * Single chip 300 baud D.C. Modem * Totally software compatible *

All kits include printed circuit board, manual and all components required to make boards functional. Mounting kits, cases and cables may be extra - Call for details on the kit you want. We also carry individual parts and kits for other Micro Design and LNW boards and systems.

Micro Design Kit's By Computex

		P.C.B. & MANUAL	KIT	ASSEM & TESTED
MDX-2	Mod I Expansion Interface	$74.95	$259.95	$399.95
MDX-3	Mod III Controller, RS232, Modem	$74.95	$259.95	$299.95
MDX-4	Direct Connect Phone Modem	$29.95	$ 69.95	$N/A
MDX-5	Mod III / IV RS232 & Modem	$49.95	$129.95	$159.95
MDX-6	Mod III / IV Drive Controller	$49.95	$99.95	$129.95

MOD III / IV Disk Drive Kit's

No other drive controller provides the features and reliability that the Trilogy controller does. Designed around Western Digitals WD2793 controller chip, the Trilogy controller provides *automatic Phase Lock Loop Data Seperation and Write Precompensation, Gold Plated Edge Card Connections, Single - Double & Quad Density, and 5in. and/or 8in. disk drives.*

Trilogy Controller (Assembled) $129.95
Installation Kit (Mod III / IV) $99.95

TANDON DRIVE's

		With Trilogy	Bare Drive	With PS & C
TM100-1	SS-40T	$170	$180	$230
TM100-2	DS-40T	$230	$240	$290
TM101-4	DS-80T	$290	$300	$350
TM848-1	SS-8 Inch	$380	$400	$550
TM848-2	DS-8 Inch	$470	$500	$650
SA455	DS-40T H.H.	$240	$250	$Call

Other drives and accessories available - Call for info..

We Need Your Help !!!

*Computex is constantly looking for new products and kits to develop and market. If you design products, write reviews, or simply have product ideas -**We'd Like To Talk To You!** - Simply call Toll Free and ask for Kevin*

NEW KITS NEW KITS NEW KITS

Call for additional information on the following kits:

Model I RS232 for R.S. Expansion Interface, 64K Printer Buffer Kit, VIC-20 Super Expansion Board / Kit, EPROM Programmers, Voice Synthesizers, IBM PC 'QUAD' Board, Power Supply Kits and much more!!

PROMETHEUS HARD DISK

5M Byte $1295.00

Prometheus systems now run on LDOS, NEWDOS80, & DOSPLUS. Call or write for color brochure

We Won't Let You Fail

If for any reason you are unable to complete the assembly or installation of any kits purchased through Computex, Simply return the kit postpaid along with a check for the difference in price between kit and assembled - We will finish assembly of the board and return to you your kit in full working condition.

ORDERING INFORMATION

VISA, M.C. and American Express accepted. Prices shown are good through cover month - However, prices are constantly changing [Usually decreasing] - so call first! All orders over $1000 shipped free UPS Ground, all others call for rates.

Call for prices on 64K & 16K Ram, Diskettes, Printers, & Modems.

New Fall Catalog Ready -- Call!

15502 Highway 3 Suite 112
Webster, TX 77598

↩27

DSI.

ner trays, and beer cans littered the floor. The furniture was covered with candy wrappers, coffee cups, and old *TV Guides*.

"You didn't tell us we had to share the place with a team of sumo wrestlers," Mercedes muttered at Max.

*****

Max called the real estate office. The woman was effusively apologetic, and promised to send a cleaning crew.

"Make sure they bring their sand-blasters," Max warned.

We retreated onto the balcony, where Max continued with our e-mail. Richard Clope of Waukegan, IL, annihilated Kyle Hoyt's 265,800 in Dig Out with 3,276,500, and then proceeded to explain his secrets.

"I discovered that if I found a safe location just off the vertical tunnel or cave," he wrote, "almost all of the creatures would eventually end up at the top of the screen scurrying along the main horizontal tunnel. When they foolishly ventured into the vertical tunnel, I was there waiting."

"Sounds like something to contact the author about," I said.

Max immediately called John Crane, who was incredulous. "I've got very little over 100,000," he told us. "I'm really shocked that somebody could score that. I'm not saying that he couldn't get that score; I'm saying I'd like to be there next time someone gets it."

"You gotta have faith in human nature."

And Dig Out isn't the only game people are questioning. The next letter was from Dave Westfall of N. Olmstead, OH, who claimed that the last few months' scores on Missile Attack were all impossible.

"'You don't get points for attacking missiles, only for spare missiles in your silos and remaining cities,'" Max read. "'You can only clear 12 waves, and then the game is over.' And he's got a chart here saying the highest score you can get is 18,900."

Max got on the phone to the Cornsoft Group, which produced the program, but the author was out of town. "Innocent until proven guilty," Max proclaimed. "You gotta have faith in human nature."

"This from the man who took Eliminator off the board," Mercedes remarked. "Why do people always raise questions about games we don't have in the van?"

*****

As Max read, I began to feel the hair on my neck prickle.

"Don't look now," Mercedes whispered. "But there's a guy standing behind us."

I spun around. Sure enough, a man was in the middle of the room, staring grimly at us. He was short, a bit stocky, and balding. He wore a Hawaiian shirt, Bermuda shorts, and rubber flip-flops. Most disturbing of all, he had a gun in

The Big Board

Apple Panic	120,290	Martin Freiss, Aachen, W. Germany
Astroball	317,240	Stefan Kunze, Moers, W. Germany
Attack Force	1,732,820	Dave Smith, Raleigh, NC
Bable Terror	8,857	Mad Max
Barricade	17,520	Troy Scrapchansky, Uncasville, CT
Caterpillar	362,883	Alvah Werner, New Albany, OH
Centipedes	94,836	Belinda Chron, Tempe, AZ
Chicken	12,035	Noble Chowchuvech, Demarest, NJ
Cosmic Fighter	581,280	L. Ken Jackway, Phoenix, AZ
Crazy Painter	250,000	Kevin Josephson, Chilliwack, B.C.
Cyborg	99,960	George Heineman, Framingham, MA
Danger in Orbit	69,640	Steve Sustacek, Danube, MN
Defense Command	126,170	Bette Dufraine, Bolton, CT
Demon Seed	97,410	Darren Cotter, Oceanside, CA
Desert Peril	84,400	Jay McLain, Clatskanie, OR
Dig Out	3,276,500	Richard Clope, Waukegan, IL
Dungeon Escape	2,028	Farhad Abrishami, Silver Spring, MD
Flying Saucers	2,186	Stuart Lory, Victoria, B.C.
Fortress	246,100	Darren Cotter, Oceanside, CA
Frogger	400,900	Shawn Roberts, Oklahoma City, OK
Galaxy Invasion Plus	1,113,600	Geordon Portice, Twining, MI
Gauntlet	52,570	Kyle Hoyt, Titusville, FL
Ghost Hunter	41,190	John Kane, Nelson, N.Z.
Insect Frenzy	520,610	Darrien Ewaniuk, Vegreville, Alta.
Invaders from Space	655,360	Darren Cotter, Oceanside, CA
Jovian	133,320	Mark Brinkman, Emporia, KS
Laserball	72,530	Neil Matson, Panama City, FL
Laser Defense	1,000,000	David Cameron, Prince George, B.C.
Leaper	35,410	Tommy Seniuk, Vegreville, Alta.
Lunar Lander	14,100	Darren Cotter, Oceanside, CA
Mad Mines	10,220	Gorman Miller, Titusville, FL
Martian Patrol	17,740	Kyle Hoyt, Titusville, FL
Meteor Mission 2	119,750	Bob Brown, Dallas, TX
Missile Attack	43,750	Shawn Roberts, Oklahoma City, OK
Monster Invaders	32,620	Troy Scrapchansky, Uncasville, CT
Olympic Decathlon	10,278	Adrie van Geffen, Rotterdam, Netherlands
Outhouse	1,000,000	Kyle Hoyt, Titusville, FL
Paddle Pinball	3,980,310	Brian Gehrich, Quincy, IL
Panik	66,825	Mark Owens, Houston, TX
Penetrator	345,510	George Heineman, Framingham, MA
Planetoids	56,450	Carl Pflanzer, Gillette, NJ
Rear Guard	73,290	Kevin Josephson, Chilliwack, B.C.
Robot Attack	143,250	Mark Fertig, Northville, MI
Scarfman	679,490	David Heyman, Conway, PA
Sea Dragon	594,500*	Robert Fitzwilliam, Houston, TX
Space Castle	52,700	Kevin Josephson, Chilliwack, B.C.
Space Intruders	14,030	Ron Johnston, Emporia, KS
Space Warp (Level 8)	261	Jer McLanahan, New Canaan, CT
Stellar Escort	625,000	Kevin Josephson, Chilliwack, B.C.
Super Nova	2,138,710	Mark Fertig, Northville, MI
Swamp Wars	59,130	Farhad Abrishami, Silver Spring, MD
Temple of Apshai	390	Carl Pflanzer, Gillette, NJ
Time Runner	89,479	Mad Max
Venture	58,550	Darren Cotter, Oceanside, CA
Voyager 1	833	Farhad Abrishami, Silver Spring, MD
Weerd	35,370	Martin Freiss, Aachen, W. Germany
Wild West	15,400	Gorman Miller, Titusville, FL

*Expert mode: 339,080 (David Smith, Kingwood, TX).

Gamer's Cafe readers are invited to submit their high scores, preferably with screen photos, for these and other Model I/III/4 games. Sorry, but we are no longer accepting entries for Color Computer games and, due to known bugs or ridiculously high scores, the following: Alien Defense, Armored Patrol, Bounceoids, Eliminator, Galaxy Invasion, Liberator, Skyscraper, and Strike Force.

VITAMIN and MINERAL DEFICIENCY CHART

Your computer will analyze your answers to 192 questions concerning your body and then print a chart showing probable deficiencies of 33 vitamins and minerals plus protein and fat. (Such questions as: Do your eyes hurt when you go out into the sun? Is your hair beginning to grey? Do you sleep well? etc etc.)

Comes complete with 50 questionnaires, 50 blank Nutritional program forms, instructions on completing the Nutritional forms from your computer generated chart, and an excellent instruction manual and a 5 1/4 inch disk. This program can put you into a business of your own selling nutritional programs.

ALLIED SYSTEMS CO.

P. O. BOX 245 TRONA, CALIF. 93562

FOR MODELS I/III/4 48K — 619 372-5355
C.O.D. AND MONEY ORDERS — $89.50
ARE RUSH ORDERS

140

YOU CAN SEND YOUR MESSAGES USING E-COM (TRADEMARKED BY THE UNITED STATES POSTAL SERVICE) ELECTRONIC COMPUTER ORIGINATED FIRST-CLASS MAIL & SAVE MONEY!

TODAY'S FUTURE MAIL™
"We make E-COM® friendly"

TODAY'S FUTURE MAIL™ transforms typed messages into complex E-COM® formats ready for easy transmission to Serving Post Offices. Draw graphics right into your messages. Use all E-COM® message types in each transmission. There won't be much to do but type messages in your word processor. Use TODAY'S FUTURE MAIL™ to prepare the transmittable E-COM® files. $395 buys the entire package-programs on disk, (150 pages of clear documentation.) Direct or on-line support. (For TRS-80 Models 1,2,3,4,12 & 16 plus other computers using Microsoft BASIC).

Send check or money order to:
TODAY'S FUTURE, P.O. BOX 29251
San Antonio, TX 78229

Office: (512) 684-6505
Computer: (512) 684-6216
Brochure available;
VISA/MC

320

TOP QUALITY TRS-80 SOFTWARE FOR BUSINESS & HOME USE

PROGRAM I.D.	Model III*	Models 2/12/16*
Mailing List, (Alpha Sequence)	175.00	200.00
Mailing List, (Zip Sequence)	225.00	250.00
Data Bank System	275.00	295.00
Loan Amortization	115.00	125.00
Inventory Control	225.00	275.00
Desk Calendar	49.95	49.95
Wall Calendar	49.95	49.95

*Shipping Costs Included

For Additional Information send for User Documentation — $15.00 per copy.

VISA **CDP** MasterCard
Route 3, Box 1
Hamptonville, NC 27020
919-468-2113
8 am-5 pm Eastern

65

IS YOUR PRINTOUT FADING?
THEN YOU NEED:
RIBBON SAVER!
REVITALIZE YOUR FABRIC RIBBON WITH "RJ-1000B"- APPLICATOR

- Will revive all fabric cartridges, (except carbon)
- Works on all FABRIC ribbons, (all colors and sizes)
- Simple, no tools needed
- Extend life of your ribbon up to 3 times, or more
- Can also be used to rejuvenate fabric home typewriter ribbon
- Satisfaction guaranteed, or money back

PRICE: $3.95

shipping & handling included in cont. US
(Foreign add $2.00 extra, (pay in U.S. funds)
NJ residents add 6%
For heavily used ribbons order RP-2010B+ $1.00 extra (state color)

send check or M.O. to **DESIGN COLORANTS**
P.O. Box 612
Wayne, NJ 07470

202

For VISA or M.C. orders call: (201) 667-7545

:DISTANCE=:X1: VELOCITY:*X2:TIME:

MATH ANALYZER PAK ™

AN EXPANDABLE SOFTWARE TOOL SCREEN DSPLY FROM SINGLE KEY FUNCTION CONTRLS. EXECUTE; STORE IN REGISTERS OR SAVE TO DISC.
EQUATIONS AND SCIENCE TABLES

PREPROGRAMMED DISCS FOR:
CONVERSIONS, GEOMETRIC FIGURES, DERIVATIVES, INTEGRALS, SIMULTANEOUS EQUATIONS, PHYSICAL QUANTITIES, CHEMICAL ELEMENTS, STELLAR, GEODESICS, MICROWAVE, BESSEL FUNCTIONS, PERMUTATIONS, SPACE-TIME, AND MORE.

ALL STANDARD MATH FUNCTIONS PLUS HYPERBOLICS, SIGMA, DELTA, FACTORIAL. .

COMPILED MULTIDISC SET $150.
SPECIFY TRS 80* MOD I or III

INTERNATIONAL COMMUNICATION EXPERTS
P.O. BOX 6734
DENVER, COLORADO 80206

234

303-572-7522

*TM Tandy Corp

TEACHERS!
STUDENT GRADE SYSTEM

The complete grading package for the TRS-80 Model III or 4. 16K tape or 32K disk versions. Maintain multiple class lists. Use number or letter grades. Weighted test scores allowed. Make changes fast and easily. Print or display class lists, scores and grade averages. 65 page manual, sample session. Automatic data protection.
Price: $75.00

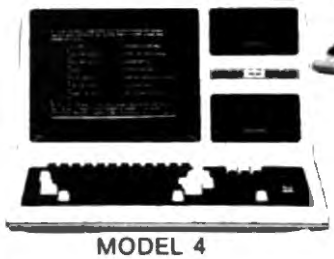
83

Orders and inquiries, write:

Tinker Techniques
435 Greenway Ave.
Trenton, NJ 08618

ALWAYS AT SALE PRICES TRS-80® ALWAYS AT SALE PRICES

OUR TRS-80s Have the Radio Shack warranty



COMPUTER DFW CENTER **WE SHIP FAST!**
DFW COMPUTER CENTER
326 MAIN ST., GRAPEVINE
TEXAS 76051 — (817) 481-7283

To get YOUR SALE price CALL:
1-800-433-SALE

282

* RADIO SHACK

See List of Advertisers on Page 323

his hand.

"Missiles, eh?" he growled. "I knew it! I knew you guys'd try to start without me!"

"Start what?" Max asked nervously.

"You know what," he said. "The invasion! The march to Cuba!"

"What's he talking about?" Max murmured.

"Uh—the Bay of Pigs, I believe," I said.

"Gee, mister, that all ended a million years ago," Mercedes said.

"It did?" He lowered his gun.

"Golly, yes. That was even before Woodstock."

He sighed and sat on the edge of the coffee table.

"Oh, dear," he said. "I must be having another flashback. Could you tell me what year it is?"

"1983," I said.

"Oh, dear," he said again. "It's never been this bad before. That means I've been living here for five years."

"If you call this living," said Max.

"Are you a CIA agent?" Mercedes asked.

"Mercedes!" I scolded. "Don't be rude to strangers."

"That's OK," the man said. "It doesn't matter any more. No, I'm not. But I was once. A pretty good one, too, I don't mind admitting. I retired back in '70, and moved to Sanibel Island to write spy novels. Everybody around here is an ex-CIA agent, you know. But every once in a while I get these—spells."

"Well," said Mercedes. "I'm Mercedes Silver, and this is Mad Max, and Rodney Gambicus. We're the Gamer's Cafe. What's your name?"

The man cleared his throat; he seemed embarrassed. "I know this is going to sound silly, but I used my code name for so long that I don't remember my real one any more. You can just call me P.F."

"What's P.F. stand for?" I asked.

He cleared his throat again. "Umm...Pink Flamingo."

We saw then and there that here was a man to be reckoned with. So we camped out on the balcony while the cleaners took care of the apartment, and drank pina coladas (Mercedes had a Shirley Temple) and watched the sun set over the Gulf.

There must be other ways to make a living, I thought. Thank goodness I don't know any of them. ■

Rapid Apshai

by Charles C. Edwards

From time to time, 80 Micro *receives articles that are (a) kind of short and (b) about games. We're happy to share Cafe space with the first such article, Charles Edwards' patch for Epyx Inc.'s Temple of Apshai. According to Charles, his disk conversion doubles Apshai's graphics speed and cuts the time to load a dungeon level by 96 percent. ("Swell," said Max. "Get killed faster.")—R.G.*

Temple of Apshai is an engrossing and stimulating game, but has one major disadvantage: It is s-l-o-w. Besides having to display a tremendous amount of material on the screen (Basic graphics are not known for their lightning speed), the game takes an inordinate amount of time to load a level of the dungeon from disk—about one and a half minutes for Level 1.

If you have the tape version of Apshai, some sort of renumbering utility (I used TRSDOS 2.3's BASICR, but any renumbering utility tucked away in high memory will do), and a 48K Model I/III, you can load a dungeon level in four seconds and halve the time required to draw a room.

The first step is to combine Dunjonmaster and Innkeeper into one program, eliminating the need to load from disk as you move between the two. Enter Basic (or BASICR) and CLOAD Dunjonmaster, then type PRINT PEEK(16548), PEEK(16549) and write down those values. (Under BASICR they should be 179 and 108.)

These two locations point to the beginning of any Basic program. To

```
1 POKE16561,177:POKE16562,246:GOTO12000
10 CLEAR600:DEFINTD,H-Z:GOSUB15000
16 KA=-2288:NO=KA:NT=4*Q+KA:D1=8*Q+KA:D2=12*Q+KA:MT=16*Q+KA:MN=MT+
Q:NP=MN+Q:XP=NP+Q:YP=XP+Q:TR=YP+Q:XR=TR+Q:YR=XR+Q:KB=KA+2251:FORI=
1TO60:POKEKA-I,0:NEXTI
18 DIMCC%(17):FORI=0TO17:READCC%(I):NEXT:DATA32717,1546,-15103,176
37,-12979,11,4369,6400,5861,-10880,31173,11051,20675,10497,-7878,9
409,-7408,201
110 IFL4>=L3THENNY=VARPTR(CC%(0)):POKENY+4,(L4-L3+1)*3:POKENY+18,1
28:POKENY+31,44:DEFUSR=NY:NY=USR(II*512+L3*3):NY=USR(II*512+256+L3
*3)
125 J=VARPTR(CC%(0)):POKEJ+4,L2-L1+1:POKEJ+18,1:POKEJ+31,44:DEFUSR
=J:J=USR(NX*256+L1):NEXTI:RETURN
145 J=VARPTR(CC%(0)):POKEJ+4,L2-L1+1:POKEJ+18,128:POKEJ+31,36:DEFU
SR=J:J=USR(L1*256+NY):NEXTI:RETURN
155 J=VARPTR(CC%(0)):POKEJ+4,L2-L1+1:POKEJ+18,1:POKEJ+31,36:DEFUSR
=J:J=USR(L1*256+NY):NEXTI:RETURN
10011 INPUT"DOST THOU WISH TO SAVE THE DUNJON";A$:IFLEFT$(A$,1)<>"
Y"THEN10015
10012 AN$="LEVEL"+RIGHT$(STR$(PEEK(KA)),1)+"/DAT":OPEN"R",1,AN$:FI
ELD1,249ASA$
10013 FORI=0TO8:LSETA$=PM$(I):PUT1:NEXT:CLOSE1
10014 PRINT"LEVEL";STR$(PEEK(KA));" SAVED":STOP
10020 POKEKB+10,SM:RUN12000
11010 PRINT"THOU ART EATEN":POKEKB-12,0:RUN12000
12010 CLEAR800:DEFINTD,I-Y:GOSUB15000:FORI=1TO43:READX:NEXT:FORI=1
TO10:READA$:NEXT
12030 C%=15360:KA=-2288:Q=60:KB=KA+2251
12550 INPUT"ENTER DUNGEON LEVEL";L$:LV=VAL(L$)
12580 AN$="LEVEL"+L$+"/DAT":OPEN"R",1,AN$:FIELD1,249ASA$
12590 GET1:LQ=ASC(LEFT$(A$,1)):PRINT"LEVEL:"LQ
12610 I=1:IFLV=LQTHENGOSUB12710
12650 GET1:IFLV=LQTHENGOSUB12710
12690 POKEKB-12,123:PRINT"LEVEL COMPLETE":RUN5
12710 LSETPM$(I-1)=A$:RETURN
12720 REM *** THIS LINE HAS BEEN DELETED ***
12730 REM *** THIS LINE HAS BEEN DELETED ***
15000 DIMPM$(8),X1,AD,X1,X2,I:FORI=0TO8:AD=VARPTR(PM$(I)):X1=63248
+I*249:X2=FIX(X1/256):X1=X1-X2*256:POKEAD,249:POKEAD+1,X1:POKEAD+2
,X2:NEXT:RETURN
```

Program Listing 1. Main Modifications.

modify them to point after Dunjonmaster, so that you can load Innkeeper right behind it, type in the following:

```
IF PEEK(16633)>=2 THEN
  POKE16548,PEEK(16633)-2:
  POKE16549,PEEK(16634)
ELSE
  POKE16548,PEEK(16633)+254:
  POKE16549,PEEK(16634)-1
```

At this point, if you try to list the program, you won't see anything in memory. Don't panic; Dunjonmaster is still there, hidden below the Basic start-of-program pointer.

Now CLOAD Innkeeper. Its line numbers overlap Dunjonmaster's, so renumber Innkeeper in increments of 10 starting with line number 12000. (In BASICR the syntax to do this is NAME 12000,,10.)

The programs should now have compatible line numbers, so POKE 16548 and 16459 back to their original values. Both programs are now merged in memory. Before making more changes, save this copy to disk so you'll have a backup.

Next, make the changes shown in Program Listing 1. These changes fall into three categories. Lines 1–16 modify the program for 48K and reset memory to its proper value for Apshai, letting you skip the "MEMORY SIZE?" prompt.

Lines 18–155 change the graphics processing, using machine-language subroutines instead of SET and RESET graphics to draw and erase Apshai's horizontal and vertical lines. Listing 2 shows the source code of this routine.

```
00110 LINE  CALL  0A7FH     ;GET X AND Y START
00120       LD    B,1       ;GET LENGTH OF LINE
                            ;(CHANGED FROM BASIC)
00130 LOOP  PUSH  BC        ;SAVE LENGTH
00140       PUSH  HL        ;SAVE COORDINATES
00150       LD    B,H       ;PUT COORDINATES
00160       LD    C,L       ;     INTO BC
00170       CALL  000BH     ;FIND OUT WHERE WE ARE
00180       LD    DE,RET-$  ;GET OFFSET
00190       ADD   HL,DE     ;COMPUTE RETURN ADDRESS
00200       PUSH  HL        ;PUT IT ON STACK
00210       LD    D,80H     ;80 = SET 01 = RESET
                            ;(CHANGED FROM BASIC)
00220       PUSH  DE        ;SAVE SET OR RESET
00230       PUSH  BC        ;SAVE X COORDINATE
00240       LD    A,C       ;GET Y INTO A
00241       DEC   HL        ;BACK UP POINTER
00242       DEC   HL
00250       JP    0150H     ;GO SET THE POINT
00253       DEFM  '):'      ;TERMINATOR FOR ROM
00260 RET   POP   HL        ;RESTORE COORDINATES
00270       POP   BC        ;RESTORE LENGTH
00280       INC   H         ;H=X L=Y (CHANGED FROM BASIC)
00290       DJNZ  LOOP      ;CONTINUE
00300       RET             ;BACK TO BASIC
00310       END   LINE
```

Program Listing 2. Graphics Speedup.

```
10 CLEAR30000:DEFINTA-Z
20 FORI=1TO4:AN$="LEVEL"+RIGHT$(STR$(I),1)+"/DAT":PRINT"LOADING ";
AN$:FORJ=0TO8:INPUT#-1,S$(J):NEXT
30 OPEN"R",1,AN$:FIELD1,249ASAS:PRINT"DUMPING ";AN$
40 FORJ=0TO8:S$="":FORK=1TO249:S$=S$+CHR$(ASC(MID$(S$(J),K,1))-59)
:NEXT:LSETA$=S$:PUT1:NEXT:CLOSE1
50 NEXT
```

Program Listing 3. Tape/Disk Transfer.

Finally, lines 10011–15000 speed up the loading and dumping of the dungeon. This is accomplished by "pointing" nine strings at the high memory where the dungeon is stored and LSETing these strings directly from the file buffer, a technique described in Lewis Rosenfelder's *Basic Faster and Better & Other Mysteries* (Upland, CA: IJG Inc., 1981; Radio Shack #62-1002).

After saving this final version to disk, run the program shown in Listing 3 to transfer the four dungeon levels from tape to disk. You must use this program and not the one provided by Epyx, since the accelerated Apshai uses a different disk format. ■

ARE YOU TIRED OF HEADACHES AND WATERY EYES
FROM STARING AT YOUR TRS-80'S HARSH WHITE VIDEO DISPLAY?

Well, a FATIGUE FIGHTER optical filter changes that display to a nice, easy on the eyes, green. It is made of hard 1/8 inch thick acrylic for durability, attaches in seconds without tools, and matches TRS-80® styling. So, invest in some relief, get a FATIGUE FIGHTER for your Model I, II, or III. It will probably be one of the most used accessories you will ever buy.

P.S. Available direct from us or at computer stores.

TRS-80 IS A TANDY CORP. TRADEMARK.

TO ORDER:
Send Name & Address Typed or Clearly Printed with Check or Money Order (U.S. FUNDS) for $14.95 Each, Including Shipping. Canadian Orders Add $1.00 Each. All Other Foreign Orders Add $3.00 Each for Shipping. NO CREDIT CARD ORDERS. COD's (U.S. ORDERS ONLY) are $3.00 Additional per Order & are Accepted by Mail or by Calling 904-378-2494 or 9-5 M-F. Florida Residents Add 5% Sales Tax.

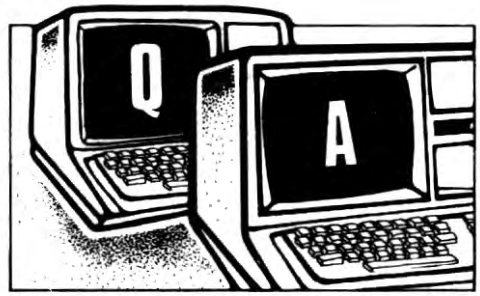
SID
SOUTHERN INNOVATIVE DESIGN
3033-15 N. E. 19TH DRIVE
GAINESVILLE, FL 32601-3326 ↙35

— DEALER INQUIRIES INVITED —

↙See List of Advertisers on Page 323

FEEDBACK LOOP

by Terry Kepner



Send any questions or problems dealing with any area of TRS-80 microcomputing to Feedback Loop, 80 Micro, *80 Pine St., Peterborough, NH 03458.*

I am interested in writing documentation for microcomputer systems. I recall seeing a program that provides a documentation boilerplate. That is, the author fills in a documentation model with a built-in word processor. Do you know where I can find the program?

P.M.
Portsmouth, VA

Offhand I don't know where to find the software you describe. If you're seriously interested in writing software documentation, forget about fill-in-the-blank and change-only-what-you-need outlines. You must tailor documentation to the software that it's describing. I've written several documentation books, and there isn't anything that makes it quicker or easier than having a firm grasp of the English language.

When you write a piece of documentation, hire someone who has a strong English background, and have him proofread your work. If he can read your documentation and understand the program when he's finished, then you've written good documentation. If he doesn't understand what you're saying, you'll have to rewrite it since your customers will also be unable to understand what you're saying.

I use that system and it really pays off. There have been many times I've had to rewrite whole sections because what I wrote and what I meant weren't the same. This is especially true when you're very familiar with the program. You are too close to it and forget that your reader will not understand any assumptions you make.

Necessities include a copy of Webster's *Collegiate Dictionary*, Strunk and White's *Elements of Style*, a thesaurus, and a spelling-checker program for your computer.

When writing, define all terms (everyone knows that TGIF means Tell Gertrude It's Finished), show the relationship of cause and effect (Press the 'A' key. The drives will spin.), avoid the voice-of-God syndrome, use active voice construction, and don't use technical terms for their own sake.

The most important consideration is documentation that's easy to read, doesn't confuse, and flows evenly from one topic to the next.

*About C.J. of Monaca, PA (June 1983, p. 344), who has a problem loading certain machine-language programs from tape to disk: I believe this is an old problem whose solution was published as far back as October 1979 (*Microcomputing, *p. 53). Programs that are loaded into low RAM, even indirectly as described by C.J., overwrite the low RAM keyboard debounce routine pointer address and crash the system.*

Most DOSes provide a method to defeat the debounce routine and avoid these crashes. Hold down the shift and up-arrow keys while powering up or resetting the computer. When the DOS logo appears, release the keys and start working. The debounce routine is lost, but it's a small price to pay to get low RAM programs to operate.

Next, W.C. of Cary, NC (June 1983, p. 352), has problems with disk reboots and syntax errors. His problem has a solution that I feel hasn't received enough publicity. Dennis Kitsz published a fix in the September 1981 issue of 80 Micro *(p. 76) that involves a minor change in the wiring for integrated circuit Z69 in the keyboard of the Model I. W.C. should take a look at it.*

G.S.
Orlando, FL

Good point about the debounce pointer; I'd forgotten about that.

As for the fix mentioned by G.S., he says it "...is necessary in situations where any part of the memory-select circuitry is marginal, and will improve reliability anyway. The simplest version: Locate Z69 in the keyboard unit, and find pin 5. You'll see that a circuit trace goes off to the left, around, and back underneath Z69. It leads to pin 12. Cut that trace. Now attach a jumper wire between pin 12 and pin 10."

S.M. wrote about a swaying screen trace (June 1983, p. 349). Your reply was RFI. Not so. RFI doesn't generally affect the stability of the trace, but rather the stability of the image. S.M.'s problem is simply a bad filter capacitor in his power supply. The amount of swaying depends on the temperature of the electrolytic capacitor, among other things.

You can verify this easily and quickly by paralleling a good capacitor of equal or a higher value around the big electrolytic(s) in your power supply section. When you find the bad capacitor, evident by a clear screen, you can replace it with the good one.

M.K.
Chagrin Falls, OH

Thanks for the advice; it's much appreciated.

I have a question concerning the terminal program (TCP) written by F. Barry Mulligan and distributed by The Bottom Shelf (TBS).

I bought the cassette version, and now I want to put it on disk. I also want to access the Dutch PTT Videotex network with my Model I. The network uses 75/1200 baud and I need to change TCP accordingly. How do I put the program on disk, and how can I change the baud rate? TBS doesn't respond to my letters.

I.A.W.R.
Vlissingen, Netherlands

There's a good reason why TBS doesn't respond: They're out of business and have been for over a year now.

I'm not familiar with the TCP pro-

Tired of swapping Disks from Inventory to Accounts Receivable to Accounts Payable etc.? Now, one system does it all.

Introducing

The M.B.S. Business Management System

At last a completely Integrated, Menu driven System for:

- INVOICING
  - Opens Customer Files
  - Opens A/R Accounts
  - Updates Inventory
  - Stores Mail List Files
  - Stores Sales Records
  - Computes Sales Tax
- CUSTOMER FILES
  - Maintains Order Status
  - Prints Labels
  - Prints Customer Balances
  - Stores Order Amounts
  - Stores Order Payments
- MAIL LABELS
  - Stores by Variable File Names
  - Sorts by Zip Code
  - Sorts by Name
- INVENTORY
  - Sets Upper and Lower Limits
  - Generates Purchase Orders
  - Lists Inventory by Vendor
- ACCOUNTS RECEIVABLE
  - Open A/R Accounts
  - Generates Monthly Statements
  - Interest and Non-Interest Accounts
  - Listing of Accounts Balances
  - Manually Enter Charges and Payments
- ACCOUNTS PAYABLE
  - Enter Charges to Accounts
  - Enter Payments to Accounts
  - List Payable Balances
- CHECK WRITING
  - Print or Record Checks
  - Maintains Bank Balance
  - Records Deposits
  - Credit Accounts Payable
  - Stores Expense Totals
- FINANCIAL STATEMENTS
  - Prints Sales Reports
  - Prints Operating Statements
  - Prints Receipts Reports
  - Modifies Expense and Sales Totals

Yes, now there is a complete business system for the small business man. With our Business Management System, you can increase sales with our mail label function. Complete your Schedule C in as little as 15 minutes. Know what your business is doing, and maintain other important business functions.

This easy to use system comes complete with instruction manual, and diskette on Dosplus mini TDOS operating system with extended Basic, and one year support. All programs are in Basic, and require two disk drives and 48K RAM. If you have waited for the right business software for your business, your wait is over. Our current users love our system and you will too.

Special Introductory Price $249.95

Specify Model I, Model III or LNW
Dealer Inquiries Invited

Hardware and Software

PRINTERS		L.N.W.		SOFTWARE	
Prowriter	$ 389	LNW80 II	$1595	DOSPLUS 3.5	$ 129
Prowriter 2	$ 689	LNDoubler ⅝	$ 199	DOSPLUS IV	$ 129
Starwriter F10	$1279	System Expansion	$ 339	MTERM	$ 69
Okidata 82A	$ 429	**MONITORS**		TRSDOS 6.0 Enhanc 1	$ 27
Okidata 83A	$ 689	Amdek 300 Green	$ 149	TRSDOS 6.0 Enhanc 2	$ 27
Okidata 92	$ 539	Amdek 300 Amber	$ 159	TRSDOS 6.0 Both	$ 45
Okidata 93	$ 939	Amdek Color I	$ 359	Newscript 7.1	$ 109
MODEMS		Amdek Color II	$ 719	Newscript w/labels	$ 119
Hayes Smartmodem	$ 219	BMC Green	$ 89	Trashman	$ 35
Hayes 300/1200	$ 539	Taxan RGB I	$ 319	Faster	$ 27
		Taxan RGB II	$ 549	RPM	$ 22
		Taxan RGB III	$ 619	Tallymaster	$ 69

Microcomputer Business Systems
14030 South Springfield Road
Brandywine, Maryland 20613
1-800-638-1857
in Maryland 1 (301) 372-8555 — Washington, D.C. Local Call ↙47

MICROCOMPUTER MBS BUSINESS SYSTEMS

master charge

VISA

↙See List of Advertisers on Page 323

gram and can't give you any direct advice on moving or altering it. Can someone else come to the rescue?

I want to upgrade my Model II to a full-memory Model 16, but Radio Shack memory cards are too expensive right now. Does anyone else offer cards for my Model II?

G.M.
Troy, NY

I can't find anything on second sources for converting a Model II to a Model 16 with full memory. Does anyone else have anything?

Where can I get a Technical Reference Manual *for the Model I and the* Technical Repair Manual *for both the Model I and the CTR-81 cassette recorder?*

Is the Internal Expansion Board (from Daltex Systems) still available?

Can I install a CRT from Langley-St. Clair in a Phillips TV?

There are two wires (white and yellow) and a ground from my computer to the monitor. Which is the 5-volt line?

K.W.S.
Singapore, Rep. of Singapore

The *Technical Reference Manual* and the *Technical Repair Manual* for the Model I are the same book. To get it, write to National Parts Division, 900 East Northside Drive, Fort Worth, TX 76102, 817-870-5662. It costs $15.25, and the order number is MT260-2103. The CTR-81 technical manual is $1; the order number MS260-1208. Be sure to include the $1.50 shipping charge with your order.

I can't find anything on Daltex Systems, although Holmes Engineering Inc. (5175 Green Pine Drive, Salt Lake City, UT 84107, 801-261-5652) does sell such a unit. There are two versions: IM-2 with 16K RAM costs $119.50, and IM-2 with 32K RAM costs $139.50.

You need to write directly to Langley-St. Clair to find out if their tubes fit your non-standard monitor. Tell them the exact model and type of Phillips TV you have, as well as the video tube type and serial number.

According to my technical manual, pin 5 of the DIN plug is the ground, pin 4 is the signal line, and pin 1 is the +5-volt line. The pins are numbered 1, 4, 2, 5, 3, going clockwise from the plug's front. Check the socket itself; the jacks should be numbered. Going by the colors alone isn't always a good idea, so check them with a volt/ohmmeter.

The backspace key on my Model III doesn't register. Do I have to replace the whole keyboard? If so, how can I do it cheaply?

N.I.
Daytona Beach, FL

No, you don't have to replace the entire keyboard. First, find someone who's skilled at soldering. Second, write National Parts (see previous letter) and ask for a keyswitch (#AS0992, cost $1.04) for your Model III. If you need a new keycap, specify the character and enclose an additional $1.04.

When the pieces arrive, have the technician install the new keyswitch in place of the old one. If you want to replace the entire keyboard (#AXX0205), it will cost you $68.95 plus $1.50 for shipping charges.

I have a Model I with an MDX-2 board (32K). I'm using a Percom disk drive and a Line Printer VII. The operating system is DOSPLUS 3.4. My problem is that I can't get the system clock to display on the screen. Everything else functions as advertised. I tried my DOS with a friend's Radio Shack expansion interface system and the clock feature worked. What gives?

J.L.
Kingwood, TX

Your problem is with the MDX board. When you're operating in a DOS environment, the DOS usually maintains an ongoing clock. There's a clash between DOSPLUS and the MDX board. The MDX board either prevents DOSPLUS from maintaining the clock or interferes when DOSPLUS tries to display the clock feature on the video. One way to test this is to go to Basic and try using the TIME$ and DATE$ commands to access the clock. If they work, then the MDX is interfering when DOSPLUS tries to display the time.

For a more thorough explanation, you'll have to contact the MDX board manufacturer. You may discover that your board is flawed and should be working perfectly with DOSPLUS in all respects.

I would like to purchase an APL package for my Model I, but I can't find a supplier. STSC sells one for the Model III, but not for the Model I. Can you help?

F.D.
Philadelphia, PA

APL for the Model I is available from four suppliers: Algorix/Allen Gelder Software (Box 11721, San Francisco, CA 94101, 415-681-9371, requires NEWDOS or LDOS), Alan Pearman Ltd. (Maple House, Mortlake Crescent, Chester, CM3 SUR, England, requires CP/M), Telecomputer Integrated Systems Inc. (251 Spadina Ave., Toronto, Ontario M5T 2E2, Canada, 416-363-9295, requires TRS-DOS, and Ramparts (Box S-8, Gulf Road, Greenfield, NH 03047, comes with DOSPLUS).

For the money, Ramparts has the best to offer. For $79.95 you get a package that contains Pascal, APL, Dome Bookkeeping, Inventory S, Typing Tutor, Floppy Disk Diagnostic (a necessity for disk drives), Tiny Comp (a compiler Basic), and Ninegames (for children).

By the way, my sources tell me that STSC does have a Model I version of APL.

My father is an electronics technician and I'm a second year electronics student. We recently bought and assembled a Model I expansion board from Micro Mint.

We can't seem to get the memory or anything else to work. What we need to know is whether the address line A15 is supposed to pulse all the time or not? Also, where can we get a schematic for a revision G board and one for our video display?

D.J.
Cleveland, TN

While I'm not an expert with the Micro Mint board, I do know that it's one of the best designed expansion units on the market for the Model I. In general, line A15 shows no activity if no expansion box is attached, or if there's no memory in the expansion box when it's attached. With memory and a properly operating unit, a logic probe picks up,

through the address lines, the pulsing of the system clock.

Check to make sure you don't have any solder bridges, and that all the socket pins are cleanly and firmly soldered. Either one of these conditions could cause the unit to fail to operate. If you can, get someone else to look at the board for mistakes. They may spot something you missed through familiarity. You can get the Technical Reference Manual from National Parts, as well as the manual for your video display (see previous letter for the address).

I'm a professional writer and I own a 48K tape-based Model III. I want to send text to a computer typesetter through a modem, but I can't find a program that sends tape-based Scripsit files over a modem. Radio Shack says I should get disk drives, but I don't see the need for them for this one purpose. I'd rather save my money for a good letter-quality printer.

Also, my typesetter uses braces to embed typesetting codes, but the Model III doesn't have braces on the keyboard. Is there a way I could use the < and > symbols and change them to braces? Fort Worth says it can't be done in tape-based Scripsit, just with disk drives. Can you help?

B.L.
Deerfield, IL

I checked all my files and couldn't find a terminal program to match your requirements. I'm sure there's one out there, but I don't know of it.

Does anyone know of a tape-based terminal program that can read in, then send out a Scripsit file? If it could change the < and > to ASCII codes 123 and 125 it would be perfect for B.L.'s needs. Thanks.

Using a Model I with Scripsit, I saved a lengthy and important file to tape. Later, I accidentally recorded another file over the end of the first file. Now when Scripsit tries to load the file, it fails and I end up with an empty screen and no file in the text buffer.

Using a For...Next loop, I can input the aborted file to RAM and then write it to disk. However, when the file is read by Scripsit it's all garbage, mostly alphanumeric gobbledegook.

It seems that all I need to do is decode the garbage. How do I do it? Or is there another way to recover the file?

W.L.
Manassas, VA

Have you tried reading, and then writing, the file to a new tape? Disk Scripsit and tape Scripsit use different methods of encoding data. If that fails, try using LINEINPUT# instead of INPUT#. These commands treat data differently.

If those suggestions don't work, I can think of only two ways out of this mess. The first is to go back to the second file and record over it. To do this, rewind to the end of the first file and record a new end by saving a series of blank spaces (set up to save a file, press the pause button, and start saving; after a second, release the pause button). If you time it right, you might be able to fool Scripsit into accepting the new file end as the end of the first file, and recover the first portion of your lost text.

The other method is to decode the text. Your familiarity with the text and how it starts gives you a clue to the cipher. The difficulties lie with the embedded Scripsit control codes, the block address (two for every 255-character block sent to the tape), and any special characters you may have.

In structure, Scripsit sends data to the tape as blocks. Each block consists of up to 255 characters, and shorter blocks are defined as anything with fewer than 255 characters terminated by a carriage return and a line feed. Thus a short paragraph of text (fewer than 255 characters) has its own block. A series of short paragraphs implies a series of short blocks on tape. Longer text messages require more than one block. Experiment by saving short files and trying to decipher them. When you can get them right, you'll know how to decode your lost file.

While trying to convert a cassette-based word processor to disk, I went to a Radio Shack Computer Center for a little help. The problem happened to be

SMALL SOFTWARE SYSTEM

TRIMTEK CO

SMALL SOFTWARE SYSTEM

NEW! — RSM3 FOR MDLS I—II—III and 4!!

IMPROVED versions of the popular **RSM-2D** monitor available exclusively through **TRIMTEK CO.**—**RSM3-x** retains all of the popular **RSM-2D** commands. An all new Editor modifies memory or disk in HEX or ASCII. Forward, Reverse and Split-screen scrolling. Multiple Break Points. Read/Write disk sectors single or double density etc. Runs anywhere in memory. On special self booting disk. Transfers to any Dos. **RSM3-4** written for MDL 4 80 character screen.

RSM3-I $29.95 (single density only) ..... **With DD patch $39.95**
RSMII — $39.95 **RSM3-III — $34.95** **RSM3-4—$39.95**

TRS232 PRINTER INTERFACE — A low cost software driven output port to any RS232 serial printer. Also drives model-33 110 baud teletypes. Plugs into cassette port on Mdls 1, 3 or 4. No tools required. Does not interfere with cassette operation. Drivers for the TRS232 are already included in many software packages including the new IJG version of ELECTRIC PENCIL.

TRS232 with standard driver software (cassette) **$59.95**
FORMATTER - "Smart" driver software for TRS232 **$14.95**

— Add $2.50 for Shipping & Handling. Foreign $5.00 —

EDIT YOUR ROM

L2-SUB Mdl 1—Substitute your EPROMS for ROMS. A direct replacement for the LEVEL-II board (please specify two or three ROMS). A forth socket is decoded at 3000H (the 2K omitted by RS) for your own custom 2716 EPROM or the **RSM-1P monitor listed below.** **L2-SUB $49.95**

L2-SUB PLUS—Extends **L2-SUBS** extra socket capabilities to 8K in 2K port selected increments, by allowing up to four custom 2716s.

L2-SUB PLUS **$49.95**

RSMP-I MONITOR ON A CHIP!—A mini-version of the SSS Mdl 1 Monitor. In the **L2-SUB fourth socket, RSMP-I is as available as basic.** ..... **RSMP-I $34.95**

POOR MAN'S EPROM PROMGRAMMER—**PMEP-x**—Economical EPROM Programmer for Mdls 1, 3 or 4. Programs 2716, 2532, 2732, 2764 & 27128. Please specify Computer Mdl

PMEP-1 thru 4 ..... **$79.95**

Complete documentation accompanies all TRIMTEK/SMALL SYSTEM SOFTWARE products.

Calif Residents Add 6½% State Tax (213) 889-8142

BOX 5028-A 1000 OAKS CA. 91360

467

See List of Advertisers on Page 323

a reserved word in a field statement (i.e., 2ASC$). Surprisingly, the computer assistant didn't know why the line constantly bombed on a syntax error. He suggested separating the 2, AS, and C$ with blanks. This worked, of course.

After we solved the problem, he asked why I was making the conversion. He then gave me a disk containing SCRIPSIT/CMD and SCRIPS/CMD. Not wanting to look a gift horse in the mouth, I made a backup copy on their computer and took it home. My question is: What's SCRIPS/CMD? Also, has 80 Micro *published any type of patch to Scripsit that lets you read a directory or send printer codes to an Epson MX-80?*

R.P.
Weatherford, TX

The salesman who gave you Scripsit was out of place. Giving away software like that will get him fired if Tandy hears about it. That's a flagrant violation of their rules, not to mention a violation of federal copyright laws.

SCRIPS/CMD should be a duplicate of your Scripsit program. You don't mention what your computer system is, but Model I Scripsit comes in two versions, one supporting lowercase, the other not. Try SCRIPS/CMD and see. If you can't get it to recognize lowercase, you have the non-lowercase version as SCRIPS/CMD.

I don't think we've printed an article adapting Scripsit to read a directory and that lets you embed printer codes, but Acorn Software has a patch program called SuperScript that does support these features. I've used it for several years and I'm pleased with its performance. In fact, I have never bothered upgrading to Radio Shack's SuperScripsit because I already had all its features in my patched version of Scripsit.

SuperScript retails for $50 and is available for Model I/III computers with a minimum of 32K and one disk drive. To get it, write: Acorn Software Products, 634 North Carolina Ave. SE, Washington, DC 20003, 202-544-4259.

Your comments in the April issue were very interesting. I can tell reader D.F. (April 1983, p. 380) that Apparat has issued zaps for the SuperScripsit programs as of September 2, 1982.

New zaps are forthcoming for the revised SuperScripsit Version 1.1. Registered NEWDOS80 owners will receive these zaps.

B.T.
Saratoga, CA

Thanks for the information.

To make it easier to use, I saved the Series I EDTASM at 1500 baud. Unfortunately, it still outputs object and source code at 500 baud. Do you have any suggestions on how to switch the source and object outputs to 1500 baud?

R.W.
New York, NY

I don't know the patches for that. Can anyone else help R.W.?

Using Scripsit, I saved a five-page document on a Maxell disk. When I try to read the file I get a directory read error or HIT (hash index table) error. I sure would like to get this document back—it took a lot of work to make it. Could you tell me what I did wrong and if there's anything I can do about it?

I have a two-drive Model I with Percom Data Separator and the edge connections are all good. I have no other problems with the system. I do have Super Utility Plus, but I'm a neophyte with it.

R.S.
Santa Maria, CA

First, you didn't do anything wrong; these things happen now and then. The most likely cause is a piece of dirt on the disk surface that makes the drive head skip a crucial bit of data. The dirt may not even be there anymore, but the gap in data is. To help prevent this from occurring again, buy a disk drive cleaning kit and clean your drives on a regular basis.

Now for your document. Since you have Super Utility Plus, most of the battle is over. All you need now is the IJG (1953 West 11th St., Upland, CA 91786, 714-946-5805) book *TRS-80 Disk and Other Mysteries* by H.C. Pennington ($22.50). What you have to do is to use Super Utility Plus to find the errant sector, and use the IJG book to show you how to rebuild the disk. With these two tools you should have no trouble retrieving your file. Once you have it in memory, save it to a new disk.

One thing before you buy the IJG book—have you tried the Super Utility Plus disk repair utilities? If not, I suggest that you try them first.

I own a 48K Model I with Percom's original Doubler and one 80-track Percom drive. I want to sell it to my brother, but he'll buy it only if it's compatible with my new 48K Model III (double-density, 40-track drives).

Is it possible for the Model I to read and write to my Model III disks, run its programs, and vice versa? If so, how is it done? I'm confused by ads that imply LDOS, DOSPLUS, or Super Utility 3.0 are the solution.

C.W.
Neilsville, WI

The answer to your question is a qualified yes. LDOS, DOSPLUS, and MULTIDOS can read Model III disks on a Model I as long as both machines are running the same DOS. Super Utility 3.0 can also read Model III disks on a Model I and vice versa, but you have to know what you're doing to make it work right. You've already overcome the biggest stumbling block: double-density on the Model I.

Each of the three DOSes uses a slightly different approach to the problem, so you'll have to contact the manufacturers directly to find out the exact problems involved with swapping Model I and Model III disks.

Your next problem is the 80-track drive. An 80-track drive writes a data path half the width of a normal 40-track drive. Putting a 40-track disk in an 80-track drive causes no problems. As far as the 80-track drive is concerned, the 40-track disk is an 80-track disk with every other track a duplicate of the preceding track. Going the other way is the problem. An 80-track disk in a 40-track drive causes difficulties. The drive picks up two tracks every time it tries to read one. There is no simple or inexpensive solution to this problem.

The best solution is to get a second disk drive for the Model I: a 40-track drive. This makes it easy to swap the disks and their data.

Swapping programs is still another story. Basic programs, when they don't use special features available on only one of the two machines, are easily transferred. Machine-language pro-

The Next Generation:

SUPERLOG

ADVANCED ELECTRONIC NOTEBOOK

BY KSoft

Over the past two years, LOG Electronic Notebook has quietly been creating a revolution in personal information management. Designed to emulate a familiar pencil and notebook, LOG Electronic Notebook can do for random information what a spreadsheet program does for numbers.

Now, even the best has been improved! KSoft is pleased to announce SUPERLOG, the next generation of the LOG family. SUPERLOG is not a patch! It is a totally rewritten version of the original LOG concept, fully compatible with the LDOS 5.1.3 operating system currently endorsed by Tandy.

SUPERLOG retains all of the versatile features of LOG while adding many new options requested by professional users: Floppy or Hard disk. Any number of LOG files per diskette. 1 to 32767 pages per file. Password protection and error checking. New text editing commands include automatic text Wrap-Around, Expand and Delete for entire lines, a Page Copy command, and an Undo key to reverse editing changes. Cursor motion is more flexible with new key commands plus a Forms simulator. The SEARCH function is greatly enhanced with a Wild-Card character, case-independent search, and multiple word search at 10 pages/second.

Also Note: SUPERLOG is now fully interrupt activated; it may be accessed from practically any foreground task including LDOS Utilities, LBASIC, LSCRIPT, EDAS, etc. with non-destructive return to the foreground program. No other information management program is this versatile!

Write or call Today! We'll be glad to tell you about SUPERLOG and what it can do for you!

SUPERLOG	Specify Model I or III. LDOS 5.1.3, 48K, and 2 Drives required. (Model IV version to be offered soon.)	$119.95
LOG	TRSDOS versions, Models I, III still available.	
KSoft	(601) 992-2239	
318 Lakeside Drive Brandon, MS 39042	Mastercard and Visa accepted. Add $5.00 for shipping and handling.	

(TRSDOS is a trademark of Tandy Corporation)
(LDOS is a trademark of Logical Systems Inc.)

↙331

OMNITEK COMPUTERS INTERNATIONAL, INC.
1300 MAIN STREET TEWKSBURY, MASS 01876
617-851-4580 ↙195

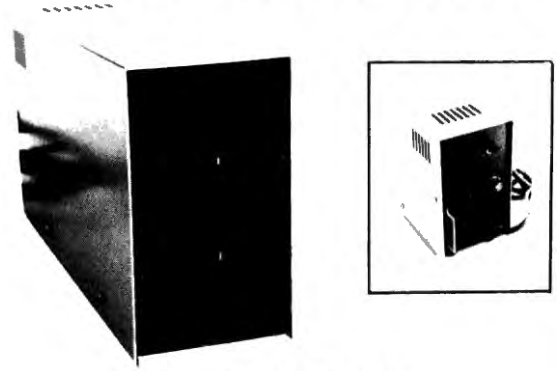
CBM64	CALL
Verbatim 5.25" D.L.	25.00
5¼" Head Cleaning Kits	5.00 each or 3 for $12.00
Okidata Microline 80	299.00
Okidata Microline 82A	399.00
Okidata Microline 83A	629.00
Okidata Microline 92 (160 C.P.S.) corresponds mode	499.00
Okidata Microline 93	799.00
Gemini 10 Printer	309.00
13" Green Monitor	99.00
B.M.C. 13" Color Monitor	299.00
Epson FX80 FT	539.00
Epson MX-100	629.00
Radio Shack M/4 w/64K	999.00
Radio Shack M/4 w/64K and 2 40 Trk	1699.00
and RS232	1787.00
40 track economy drive Power Supply with case	179.00
Tandon drives with Power Supply and case	
40 track singlehead	249.00
dual head	339.00
80 track singlehead	299.00
dual head	399.00
5.25" Power Supply and case	39.00
*BASF 40 track D.D. 5¼" new disk drive, as is, no return	89.00
8" Power Supply and case	89.00 or 10 for 790.00
Call for popular D.W. Printer Prices	
Full Commodore Line	CALL

OMNITEK COMPUTERS INTERNATIONAL, INC.

TRS-80 is a reg. trademark of Tandy Corp. Prices are for mail order only. TERMS: Check, money order, Mastercard and Visa accepted. F.O.B. Tewksbury, freight extra. Minimum $5.00 S & H. Mass residents add 5% sales tax. Write for FREE CATALOG.

DISCOUNT

TRS 80™ Model I & III
External Mini Disk Drives



Single Chassis
With Power Supply:

Fully assembled silver chassis with external card edge connector for easy cable installation. Chassis includes power supply and one Tandon drive.

★ **TM 100-1** With Chassis **$235**

★ **TM 100-2** With Chassis **$305**

Tandon Bare Drives:

★ **TM 100-1** Single Sided 40 Track **$179**

★ **TM 100-2** Double Sided 40 Track **$249**

CDC Bare Drives:

★ **9409** 5¼" Double Sided 40 Track **$249**

Printers

Epson:		**Okidata:**	
RX 80	$399	ML82A	$429
FX 80	$569	ML83A	$689
FX 100	$769	ML92	$539
Star-Micronics:			
Gemini-10X	$309	**Smith Corona:**	
Gemini-15	$439	TPI	$469

Free Shipping!
Order Now - Toll Free
1-800-531-5475 (If Outside Of Texas)
(512) 250-1523 (In Texas)

VISA ★ MasterCard ★ Money Order ★ Cashier's Check
Add 5% Sales Tax If Texas Resident

TRS 80 Is A Trademark Of Tandy Corp.

↙252

CompuAdd Corp. 13010 Research Blvd., Suite 101, Austin, TX 78750

↙See List of Advertisers on Page 323

grams that use any kind of cassette or disk I/O aren't transported as easily. The Model III uses different addresses for these purposes than the Model I. Also, if the machine-language programs contain any jumps to the ROMs, the programs will be incompatible.

I have a Model III with one Percom 80-track, double-density drive and an RS-232 board. My problem is with the disk drive. I've had trouble with it ever since I bought it, and now Percom tells me that they're discontinuing this product because of its unreliability.

Would there be a problem if I purchased a drive such as a Teac or Tandon and installed it as drive zero, and then installed the 80-track unit as drive 1? I know I can buy a second Percom drive and install it in either position.

F.C.
Grover, PA

I don't blame you for being wary, but as far as I know you can use almost any drive made for the Model III as drive zero. To maintain compatibility with commercial Model III software, make drive zero a 40-track, double-density unit. Whether the drive is single- or double-sided is up to you. The controller won't care one way or another.

I need a National Weather Bureau chart to use with A.P.'s weather forecasting program (January 1983, Feedback Loop, p. 400). Do you know where I can get one?

J.D.
Pocasset, MA

They're available from Richard E. Hallgren, National Weather Service, 8060 13th St., Silver Spring, MD 20910.

My Model I screen always filled with garbage, so Radio Shack replaced its ROMs. That solved the problem, but another problem arose: The machine rebooted at random intervals. Since I had just installed the Holmes IM2 expansion board, I sent the keyboard to them to check it out. The technician replaced the three-chip ROM set with a two-chip ROM set. This prevented reboots, but still another problem cropped up.

I have an Alpha Products joystick, which worked fine with my computer until this point. After I received my computer back from Holmes, the joystick wouldn't work. Using the Basic test routine supplied by Alpha Products, I discovered that instead of getting the proper number displayed, I got only 255! I then tried the joystick on a friend's computer and it worked fine.

I tried disabling the XRX modification with no results. I contacted Alpha Products and they replied that they weren't familiar with the Holmes board and so couldn't help me. Holmes didn't know anything about the joystick, and they couldn't help me either.

Help!

A.L.H.
Raritan, NJ

Shame on them. The Alpha Products people should have told you to check the 5-volt line on the card-edge connector of the keyboard. Alpha Products uses the 5-volt line of the expansion bus to drive the joystick. If that line is disabled, the joystick won't work.

The Holmes technician must be a good worker, since it's supposed to be standard practice with Radio Shack technicians when upgrading to the two-chip ROM set to disable the 5-volt line at the expansion interface edge connection, especially if there are problems with random reboots (many technicians forget to do this).

Disabling this 5-volt line reduces the amount of interference on the address and data lines. If you're skilled at soldering and know your way around the insides of the keyboard unit, open it up and examine the expansion port circuitry. You should see that the trace leading to pin 39 has been cut. Placing a jumper over the cut should restore the operation of your joystick. You may also find that it will restore the problem of random reboots.

I installed an amber video display in my Model I monitor cabinet. The problem is that the image is rather unsteady and responds visibly to power line fluctuations. Could I improve the performance by improving the electronics of the CRT? Would larger capacitors help?

J.P.
Cambridge, MA

According to my Radio Shack technician, there's no way to do that. But he does say that the Model I video unit is an RCA television and that they might know of a way to do what you want. He suggests you contact an RCA TV repair center and ask them.

I have an 11-year-old son who has a significant vision problem. Do you know of any word processing programs that use the 32-character display mode on the Model III? He doesn't need a real fancy program, but it has to be able to handle a minimum of 30–40 words per minute.

C.W.
Sacramento, CA

None of the word processors I can find are set up to operate in the 32-character mode. The best I can offer is a Basic word processor, which you can probably adapt to your needs, published by *80 Micro* in the May 1980 issue (p. 50).

A friend gave me Brian Smith's "Inverse Video" article that explains how to use inverse video on the Model I (May 1981, p. 176). To do this you need a lowercase modification. Radio Shack has the modification, but warns that some non-Radio Shack software won't run with their modification.

Do you know of any companies with a kit that avoids this problem, or a list of programs that don't work with the Radio Shack modification?

M.S.
Elmira, Ontario

I don't have a list of programs that don't work with the Radio Shack modification, and I don't know of a company that sells a lowercase kit. But you can install the Electric Pencil lowercase modification yourself in about an hour for less than $7.

The IJG book *The Custom TRS-80* (pp. 103–106) has the procedure on how to install the lowercase. All you need is a 2102 RAM chip, an SPST switch, and a little solder. You can order the book from the *80 Micro* Bookshelf, Wayne Green Books, Peterborough, NH 03458, #BK1218. The book costs $29.95.

I'm using a 32K Color Computer with one disk drive and a Daisywriter 2000 printer. Everything works fine except Disk Scripsit. When printing, I get a line of cents symbols. My printer manual says this symbol indicates a

NEW

FILEMATE II

A most versatile, easy-to-use, menu-driven manager for this truly Random Access Database System

TRS-80 Model I, III and IV
48K, 2 Disk Drives

- Create your own file structure
- Instant access to any record
- Select records for processing by attributes using logical AND, OR or NOT
- Transfer data from one file to another
- Merge address list with a form letter
- Edit, Sort, Calculate, Print custom reports
- Revise file structure if needs change No need to re-enter the data
- Up to 2000 records on a 40 track diskette

DATAFILE SYSTEMS
801 Welch Rd., Suite 211
Palo Alto, CA 94304
(415) 326-1447 ↙531

VISA
MasterCard

Diskette/Manual $75.00
Manual Only $10.00

FINALLY!!

ARCADE GAMES AND GOOD GRAPHICS FOR

MODEL 2, 12, 16

$19.95 each - or two for $29.95!

Galactic Invaders . . . . . Munchman
Quest for Adventure . . . . . Meteors
Space Trek . . . . . Wormy
Computer Casino . . . . . Bust-out
The Wrath of Ken . . . . . Chess
Racer X . . . . . Othello

Call or write for full game list

KUZEL COMPUTER SERVICES
8654 W. Berwyn Ave. #3S
Chicago, Illinois 60656
(312) 399-0273 ↙354

NOW ONE FINGER TYPING IS FAST WITH SUPA-EDIT

eei

SUPA★EDIT™

Supa-Edit is a powerful machine language utility, designed to enhance LIST/EDIT commands of Level II Basic.

Supa-Edit uses less than 0.5K of computer memory and suits Model I and Model III.

Supa-Edit comes with and without lower-case driver for 16K, 32K and 48K systems, on premium tape.

SUPA-EDIT SINGLE KEY FEATURES

- **LIST FIRST LINE**
- **LIST LAST LINE**
- **ENTER EDIT MODE**
- **LIST LINE BY LINE BACK AND FORTH**
- **RECOVER AFTER *NEW***

SEND PAYMENT
U.S. CURRENCY

U.S. $10 plus U.S. $3 FOR RETURN AIRMAIL DELIVERY

Elite Electronic Industries
36 LUXMOORE STREET,
CHELTENHAM, VIC. 3192
AUSTRALIA ↙125
TELEPHONE +61-3-583 1201

Model I & III products of Tandy Corp.

YOUR NAME HERE

PERSONALIZED COMPUTER PAPER

Printed with your name, club, anything. Paper is white 20# stock and fits all printers using 9½x11 continuous paper [8½x11 when detached]. **500 sheets $14.95, 1000 sheets $24.95. We pay shipping.** Texas orders add 5½% tax. Select ink color: red, blue, brown, gray or canary. Specify name[s] up to 30 letters & spaces. Enclose check or money order. No COD's. Allow 3 weeks. Faster delivery with M/C, Visa phone orders. Write or phone **Personalized Computer Paper E,** Box 20539/San Antonio, Tx. 78220/[512] 227-0585. ↙239

WE'RE SERIOUS ABOUT FUN!

Software for
Radio Shack's TRS-80
MODELS II/12/16

- GAMES • ADVENTURE
- BUSINESS • LANGUAGE
- EDUCATION

CALL OR WRITE FOR FREE BROCHURE AND MORE INFORMATION

Rizzo Data Systems Corp.
577 Burlington Rd., P.O. Box 458
Bridgeton, NJ 08302-0356
609/451-7979 ↙518

ATTENTION DEALERS!
RS-232 BOARD FOR TRS-80 MODEL 3 or 4

Functionally equivalent to the Radio Shack RS-232 Board. Meets EIA RS-232C specifications. Programmable baud rate from 50 to 19,200 baud. Programmable parity. Word length and stop bits. Full or half duplex operation.

IMAGE TECHNOLOGY INC (303) 794-2074
5994 South St. Paul Way
Littleton, CO 80121

Volume discounts available.

One year warranty. ↙89

TRS-80* SOFTWARE

Write for our incredible catalogue of over 100 pages, containing hundreds of programs for the Model I and III. Colour computer programs available in the Fall. Catalogue is $5.00 refundable on your first order. All software is unconditionally guaranteed for life!! Canadian manufacturer and distributor for Molimerx Ltd. of England

DEALERS WELCOME

GAMES/DOS/UTILITIES/ BUSINESS PROGRAMS

*LDOS	$159.95	*POWERMAIL PLUS	$199.95
*MULTIDOS	$129.95	*AIRBUS	$ 41.95
*ACCEL 4	$139.95	*DATA WRITER	$189.95
*FROGII	$ 23.95	*DRIVER COMPILER	$ 43.95
*JUMBO	$ 40.95	*ENIGMA	$ 36.95

FULLY SUPPORTED COMPUTER SOFTWARE
*Trademark of Tandy Corporation

JSOFT ↙177
P.O. Box 1437, WINNIPEG, Manitoba R3C 2Z4
(204) 942-0963 CANADA

↙See List of Advertisers on Page 323

parity, framing, or overrun error.

Radio Shack suggests that I create a Spool file on disk and then print from disk to printer. It works, but it's an extra step I could do without. I'm also having trouble editing the Spool file, so I have to save a text file, print a spool file to disk, and then print the file to the printer. Do you have any suggestions? Would another program such as Telewriter-64 have the same problem?

R.M.
Westminster, MD

Color Computer Scripsit seems to cause many people problems when printing. It doesn't send at precisely 600 baud, which makes things difficult for the printers. I suggest you get another word processor, such as Telewriter-64 or Super Color Writer. These programs seem to work better with most printers and offer more features for creating, manipulating, and printing text.

I just installed a lowercase modification (Radio Shack compatible) on my 48K Model I. Everything works fine, except when I try to enter Disk Basic. The machine hangs up after attempting to read the disk. I use DOSPLUS 3.4D, but their custom service desk never heard of this problem before. Do you have any suggestions?

T.R.
Edgewood, KY

My first thought is: Have you checked your keyboard/CPU board cable in the keyboard unit for broken lines? Since you just finished a new modification that involved moving the cable, that's the most likely spot to start with. Trouble here results in all kinds of weird reactions from the system.

The next step is to check your solder connections on the CPU board. If both these suggestions fail to correct the problem, clean all the edge connectors on the computer and the drive. If that doesn't work, I don't know what to suggest.

I have a 16K Model III with an RS-232. I recently upgraded to 48K, which I understood to be a plug-in-and-go operation. With the new chips, PRINT MEM gives an answer of 48068, but when I try to access any address over 32767 with PEEK or POKE, I get an OV error. Switching the RAMs didn't help. The new memory, therefore, is inaccessible to me.

Tandy suggested the problem might be in the ROM, but I don't want to take the unit to a repair center, have them remove my RAM, and then tell me that they can't find a problem. Now what do I do?

F.K.
Huntington, NY

I'm constantly amazed at the number of people with this problem. There's nothing wrong with your RAM, the ROM, or anything else in your computer. The problem is that you're using the PEEK and POKE commands incorrectly.

PEEK and POKE require the address specified be an integer between −32768 and +32767. To address memory in locations 32768–65535, you have to use a negative number as the specified address. To get the number used for the address above 32767, use this formula: −1*(65535 − desired address). To PEEK or POKE location 65000, you would use the number −535 (i.e., PEEK(−535) or POKE −535,32).

I tried to upgrade my 16K Model III to 48K using a kit from one of your advertisers. Their instructions mentioned three jumpers at the top of the logic board. I don't know what a jumper is or what it looks like, and their instructions didn't pinpoint jumper locations. When reassembling the computer I did notice a cable in the front of the logic board with three or four wires and I noticed a little black coupling about 2 inches long with three or four wires terminated. I didn't know what to do with this cable of wires, or where they went. There were no wires going to the CRT from the logic board. There was, however, one wire going from the board under the tube, but I presume this was ground.

When I put the computer together, plugged it in, and turned it on, there was no response or power to the CRT.

J.B.
Houston, TX

You need the Model III Technical Manual. Call National Parts 817-870-5662 in Fort Worth and order it from them.

I suspect your problem is the loose cable. You must have accidentally unplugged the cable while putting in the new chips. The video monitor has three or four wires coming from the logic board that tell it what to display and when. When you have the manual, you can easily track down the proper location for the loose cable. Good luck.

Quite some time ago I read a few articles about computing the ratio π to several thousand decimal places. I've tried several times to get more than 16 decimal places by using series calculations. However, shortly after starting the programs it's obvious that the numbers used in the calculations are getting so small that they cause errors due to limited decimal places. What method will ensure accuracy to as many places as you want?

B.C.
Wilmington, IL

That's an easy one: use long division. That is, use the same method on the computer the way you would on paper. Make each calculation as if it were an integer calculation. For an example, see Program Listing 1. With a little work, you can adapt this program to your own needs. ■

Terry Kepner is a freelance writer and programmer, and the vice president of Interpro. He's been writing about microcomputers since 1979.

```
10 A$ = ""
20 INPUT"Numerator";N
30 INPUT"Denominator";D
40 IFD>NTHENA$ = A$ + ".":GOTO190
50 R = NMODD
60 A = (N − R)/D
70 B$ = STR$(A)
80 A$ = A$ + RIGHT$(B$,LEN(B$) − 1)
90 IFR = 0THENPRINT"The answer is "
   A$:END
100 N = R
110 GOTO40
190 PRINT"The answer is :"A$;
200 IFD>NTHENN = N*10:IFD>NTHEN
   PRINT"0";:GOTO200
210 R = NMODD
220 A = (N − R)/D
230 PRINTRIGHT$(STR$(A),1);
240 IFR = 0THENEND
250 N = R
260 GOTO200
```

Program Listing 1.

TREND ANALYSIS PROGRAM

A COMPUTER AID FOR INVESTORS

Calculates moving averages & deviation from trend. Uses your printer to make graphs with scales of your choice. Creates & maintains disk data files.

Ideal for technical analysis of stocks, options, commodities or any numerical series. Supplied on disk with 5 yrs of daily NYSE Composite Index prices and 52 page Users Guide.

For TRS-80 Model I, III or 4. Requires 48K, two disks and printer.

Other investment software available.

$45 Postpaid in USA, Canada
Add $7 elsewhere
Free Brochure

Harley D. Wilbur
9709 Elrod Road
Kensington, Maryland 20895
(301) 949-8131 after 6 p.m.

✓359

MASTER ELECTRONICS, INC.

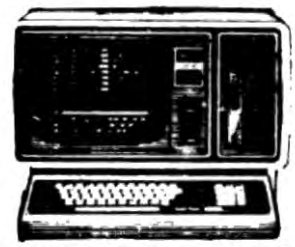
*TRS-80 is a trademark of Tandy

CAN SET YOU UP IN A

TRS-80

STATE-OF-THE-ART-COMPUTER

STARTING AT 15% DISCOUNT!



FULLY STOCKED
IN: Model II's
Model III's
ALL- PRINTERS
AND — MORE!!
* PLUS *
THE ALL NEW:

Model 16 and the 12.5 meg. Hard Drive!

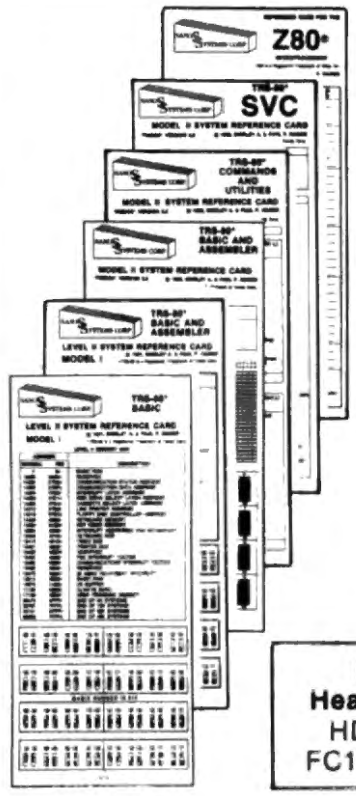
CALL US NOW!!!

Toll FREE: 1-800-531-7323

TEXAS CALL COLLECT 512/689-5536

MASTER ELECTRONICS, INC.
228 SOUTH 7th STREET
RAYMONDVILLE, TX 78580

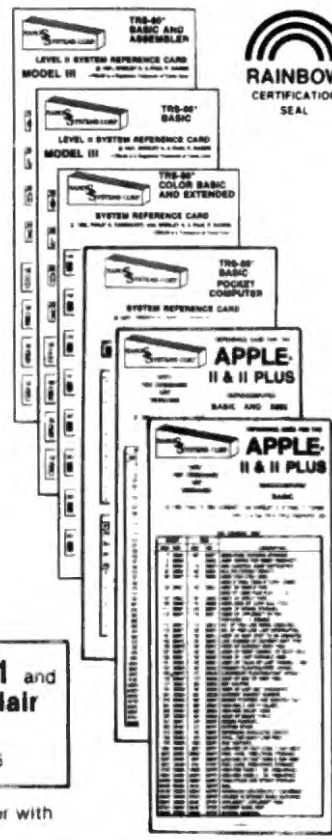
✓146



NANO SYSTEMS CORP.

SYSTEM REFERENCE CARDS

"This is a quality document and is beautifully conceived and produced. . . . I am in awe of your magnificent document."
H.W.W., Dayton, Ohio



RAINBOW CERTIFICATION SEAL

Send Check or Money Order

CARD	ORDER NO.	PRICE
MODEL I: BASIC & Assembler	FC1002	$4.95
MODEL I: BASIC Only	FC1001	2.95
MODEL II: BASIC & Assembler	FC1005	5.95
MODEL III: BASIC & Assembler	FC1003	5.95
MODEL III: BASIC Only	FC1004	3.95
COLOR: BASIC & Extended	FC1006	4.95
POCKET: BASIC	FC1009	2.95
APPLE II + II PLUS: BASIC & 6502	FC1008	4.95
APPLE II + II PLUS: BASIC Only	FC1007	3.95

NEW!

NEW! Heath/Zenith HDOS 2.0 FC1014 $5.95

Z80 MICROPROCESSOR FC1011 $4.95

ZX80, ZX81 and **Timex Sinclair 1000** FC1012 $5.95

Call **TOLL-FREE** for Credit Card Orders **1-800-258-5473**. Or, send your order with payment or complete credit card information to
WAYNE GREEN BOOKS ● Retail Sales ● Peterborough, NH 03458
Enclose $1.00 per order for shipping and handling

*TRS-80 is a Registered Trademark of Tandy Corp.
APPLE is a Registered Trademark of APPLE COMPUTER, INC.
Z80 is a Registered Trademark of Zilog, Inc.

✓See List of Advertisers on Page 323

NEW PRODUCTS

edited by S.F. Tomajczyk

The passive paper feeder for Olivetti typewriters.

A Guide for Your Typewriter

For those of you who use your Olivetti as a printer, Rogers Products Company now sells an attachable passive paper guide for the Olivetti ET series. It lets you use continuous, fan-fold, or roll paper and forms for conventional and computer-generated printing on your typewriter. It works equally well with single- and multiple-part forms, either punched or unpunched.

The Paper Guide is fully adjustable for paper widths of up to 15 inches. It snaps into place with no assembly or tools required. Available from Rogers Products Company Inc. (249-B East Emerson Ave., Orange, CA 92665, 714-974-6302), it costs $195.

Reader Service ✓567

You're the Boss

Manager Data Base Management System is a fully integrated software package consisting of a text editor and a report writer that prints out custom checks, preprinted business invoices, profit/loss statements, and virtually any other record or report.

The Manager system accommodates users at all levels of sophistication. Neophytes can open files to hold and immediately extract information, whereas experienced users can set up procedure files to customize applications, such as accounts receivable/payable and expense record-keeping.

Compatible with all CP/M-based computers, Manager costs $195 from Call Manager Inc., 1961 Old Middlefield Way, Mountain View, CA 94043, 415-964-5333.

Reader Service ✓575

Standby Power

You'll never have to worry about losing data because of power problems with Ladco's Model 250B. It is a power standby system that has a rating of 250-volt amperes at 115 volts ac. The system comes with a 10 ampere-hour, maintenance-free battery plus the usual Ramlock features.

Ramlock protects your computer against power problems by filtering commercial power, removing any noise or voltage spikes, and delivering clean power. It constantly monitors line voltage for variations of less than 105 and over 130 V. When the unit detects voltage problems, Ramlock automatically switches to the standby inverter and alerts you of the power failure condition. Switchover occurs invisibly to your computer and system operation goes on uninterrupted.

Standby operation from the battery lasts as long as 10 minutes, providing you with ample time to save data and power down. Ramlock automatically switches back to line power when it's restored and recharges its battery. A front panel battery meter indicates the charging status.

The Model 250B costs $545 and is sold by Ladco Development Co. Inc., P.O. Box 464, Olean, NY 14760, 716-372-0168. Any microcomputer that draws 250 watts or less, including the Model III, can use this power standby product.

Reader Service ✓580

Daisy Comes to America

Daisy System's M45 letter-quality printer is being introduced to the American market. The M45 measures 24 by 13½ by 7½ inches and weighs 18 kg. It handles both single-sheet and continuous forms, and offers bidirectional printing at 45 characters per second. Its long-life print hammer delivers high-quality print at seven different intensities.

Print wheels are interchangeable, and the M45 uses a multistrike ribbon driven by a separate motor to maximize ribbon life. You can program carriage motion. It provides both pitch and proportional spacing. Plotting resolution is 5,760 points per square inch.

The M45 sells for $1,995 and comes with an RS-232 module as well as a multipurpose module (a switch-selectable interface for RS-232, Current Loop, Centronics, and Data Products printers). The printer runs with many different computer systems by switching the interface module. For information, contact Daisy Systems, P.O. Box 1010, Torrance, CA 90505, 800-4ADAISY (US), 800-441-5273 (CA).

Reader Service ✓574

A Versatile Workspace

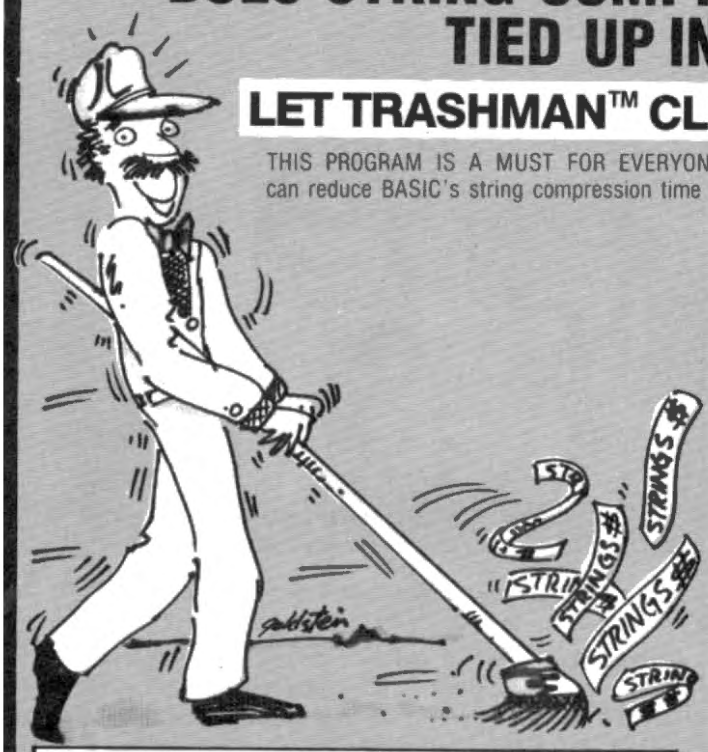
The Computer Center is a workstation designed for personal computers and their accessories. Made from woodgrained laminates, it has ample storage space for keyboard, monitor, disk drives, printer, manuals, floppy disks, and more. It also has a rear tray to keep cables neatly stored, and a multiple outlet receptical that provides convenient connection of all electrical cables at the table.

Daisy arrives in America with the M45 letter-quality printer.

DOES STRING COMPRESSION HAVE YOU TIED UP IN KNOTS?

LET TRASHMAN™ CLEAN UP THE MESS!

THIS PROGRAM IS A MUST FOR EVERYONE WHO USES "BASIC" ON A TRS-80. Why? Because it can reduce BASIC's string compression time delays by 95% or more.



# STRINGS	SECONDS DELAY NORMAL	SECONDS DELAY TRASHMAN	PERCENT IMPROVEMENT
250	11.8	0.7	94
500	45.8	1.6	96.5
1000	179.6	3.5	98
2000	713.2	7.8	98.9

(All timings done on TRS Model I. Model III 15% faster, but pct improvements identical. Listing of timing program available on request.)

WHAT'S STRING COMPRESSION?

When a BASIC program changes a string (words, names, descriptions), it moves it to a new place in memory, and leaves a hole in the old place. Eventually, all available memory gets used up and BASIC has to push the strings together to free up some space. This takes time. Lots of time. The computer stops running for seconds or minutes, and you may even think it's "crashed".

Yes! String compression is what's been causing all those intolerable delays. The keyboard won't work, and until all the strings have been collected, you just have to sit and wait. Then things run for a while, until string compression is needed again. And again.

If you're using your computer for business, that wastes your money. If you're using it personally, it wastes your time.

WHAT'S THE SOLUTION?

As soon as you start using TRASHMAN, those delays will almost disappear. The program is **very easy to use**, so you don't have to be a computer programmer to take advantage of it. It's written in "machine language" and uses only 578 bytes of memory for itself, plus two bytes for each "string" in your program. It works with other machine language programs and all the major operating systems.

HOW WELL DOES IT WORK?

If you use it with a BASIC program that has only a few strings, very little time is wasted in string compression, and TRASHMAN will be only slightly helpful. But, in programs that use hundreds or thousands of strings, including large string arrays, TRASHMAN is just what you need. If you have any remaining doubts, just look at the chart, and then get yourself a copy as fast as possible.

TRASHMAN is available on disk for just $39.95.

ATTENTION SOFTWARE PUBLISHERS:
Trashman may be licensed for use with your packages.
Call for details.

SAVE TIME WITH FASTER

"FASTER" speeds up most TRS-80 BASIC programs by 20-50%. It's helped hundreds of satisfied people and it can help you. Detailed instructions make it easy to use. FASTER analyses your BASIC programs *while they run*, then displays a simple change, usually one line, that sequences program variables so the ROM will find them faster.

You can use FASTER to speed up programs you've bought, as well as programs of your own. Since it isn't a compiler, your BASIC programs can be read and changed afterwards. FASTER works on business programs, models, and games. The more complex your program, the better the results.

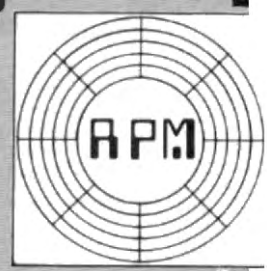
Does FASTER really work? Yes! Just check the reviews in *Personal Computing*, May, 1981, p. 116: **"FASTER is effective and easy to use"**; *80 U.S. Journal*, April, 1982, p. 106: **"I recommend FASTER to everyone"**; and *80 MICRO* (April, 1982, p. 40): **"If you...would like a significant increase in the run-time speed, then buy FASTER."**

FASTER runs on the TRS-80 Models I and III, 16-48K tape or disk, and all major operating systems. **$29.95**

"QUICK COMPRESS" takes only 276 bytes of memory, and removes the blanks and remarks from even the largest BASIC program in less than 3 seconds. It produces smaller, faster programs without altering their logic. **$19.95**

SPECIAL: FASTER and QUICK COMPRESS: **$39.95**

ERRATIC DISK DRIVES?



You can avoid unnecessary disk errors and repair bills by using **RPM.** This easy-to-use program measures the rotational speed and fluctuations of your disk drives, and warns you if they are running **too fast, too slow, or unevenly.**

Incorrect or erratic speed is a common cause of unexplained disk errors and loss of data. RPM's documentation explains how to **detect** *and* **correct** these problems quickly and easily. As *80 MICRO* (April, 1982, page 41) said: **"If your drives have problems I recommend RPM before paying to get it repaired."**

RPM is supplied on diskette for the TRS-80 Models I and III. We suggest you order a copy *before* you need it.

$24.95

ORDER FROM YOUR LOCAL SOFTWARE DEALER, OR CALL NOW, TOLL-FREE:

(800) 824-7888, Operator 422

FOR ORDERS OR INFORMATION CALL:
(213) 764-3131, or write to us.

PROSOFT®

Dept. G, Box 560, No. Hollywood, CA 91603 -95

TERMS: We accept VISA, MasterCard, checks, or even cash. Please add $2.00 shipping handling within U.S.A. or Canada, and $5.00 overseas. C.O.D. charge is $2.00 in U.S. only. We ship within one day of receiving orders. In Calif., add 6½% sales tax.

compu•sette®
TAPES & DISKS

100% ERROR-FREE
FULLY GUARANTEED

The Micro-Trac™ Generation

Used by Software Firms & Computer Hobbyists
Choice of School Districts Nationwide

CASSETTES	MINI 12-PAK	STANDARD 24-PAK
C-05	$ .79	$ .59
C-10	$. 89	$ .69
C-20	$ .99	$ .89
C-30	$1.29	$1.09
Custom Cases	$ .26	$ .21

Cases recommended to protect sensitive cassettes.

5¼" DISKETTES	MINI 5-PAK	STANDARD 10-PAK*
Soft Sector Single Sided S/D Density	$14.95	$26.95

*10 PAK w/custom library case, add $3.00

— UPS SHIPPING —
(No. P.O. Boxes please)
$3.00 per pack
— Canadian shipping multiply by 2 —

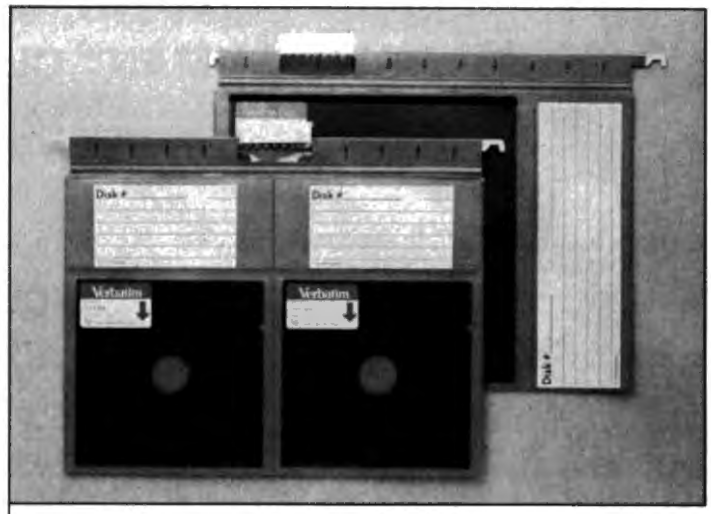
No. 1 Magnetic Media in the USA!
— Write for volume prices —

TOLL-FREE
(orders only)
1-800-528-6050
ext. 3005
In Arizona State
1-800-352-0458
ext. 3005

VISA
master charge

MICRO-80 ™ INC.
E. 2665 Busby Road
Oak Harbor, WA 98277
1 (206) 675-6143

↙ 132



File your disks away with suspension file holders from C-Line Products.

Castors allow ease of movement across floors and carpets.

Sold by R&L Marketing Inc. (P.O. Box 1918, Pleasanton, CA 94566, 415-945-2075), the Computer Center (Model #4024–1) has a suggested retail price of $219.95.

Reader Service ↙552

What's Your Code?

Datalock, a data protection program, provides a very reliable means of protecting your files so that only those who know the correct combination can unlock a file. Your combination can be any string of alphanumeric characters from one to 80 characters in length.

The program runs on CP/M and is available on 8- and 5¼-inch disks. Datalock costs $95 and is sold by Southern Computer Systems Inc., 2304 12th Ave. North, Birmingham, AL 35234, 205-933-1659.

Reader Service ↙558

Suspend Your Disks

Fill up your empty filing cabinets with C-Line Products' new suspension file folder for disks. The letter-size folder holds and protects two 5¼-inch disks and two index cards. The non-glare vinyl holder provides excellent visibility and complete protection. The index cards permit ready identification and accounting for location of disks when removed from files.

The Suspension File Holders fit into any standard hanging file system and are packed 10 to a box. Sold by C-Line Products Inc. (P.O. Box 1278, 1530 East Birchwood, Des Plaines, IL 60018, 312-827-6661), it has a suggested list price of $22.50.

Reader Service ↙563

Colorful Printing

The Color Scribe printer (DP-9725A) produces multiple colors in four modes that include enhanced, correspondence, data processing quality, and high-resolution graphics.

Color printing uses a four-color ribbon with yellow, magenta, cyan, and black bands. This lets you select a different color for each printer pass, providing multiple color combinations. You can change colors at any point in a printed line.

Single-color, correspondence-quality text prints at 50 characters per second (cps), 164 cps in the enhanced quality mode, and 200 cps for data processing quality. The single-color, correspondence-quality mode uses double-pass

Color Scribe printer produces multiple colors in four modes.

printing, whereas other single-color modes are single-pass.

Seven International Standards Organization character sets are provided, including, Swedish, Danish-Norwegian, German, French, Spanish, and Italian, in addition to the standard US ASCII.

Other Color Scribe features include left, right, and full justification; title centering; positive half-line feed; in-line font changes; and RAM expandable to 12.5K bytes in 4K byte increments.

Made by Anadex Inc. (9825 De Soto Ave., Chatsworth, CA 91311, 213-998-8010), it sells for $2,350. Specify whether you want Centronics or RS-232 serial interfacing.

Reader Service ✓572

A Basket Case

A low-cost printout basket designed for microcomputer, word processing, and low volume terminal printers is available from See Inc., P.O. Box 40215, Indianapolis, IN 46240, 317-844-8817.

The unit requires no special printer stand. The printer rests on the basket, equipped with rubber vibration eliminators to ensure that the printer and basket remain in place. A specially designed retainer rod keeps the signal cable and power cord out of the paper flow path. The step design of the basket lets you place the paper supply under it. You can also feed paper to the printer from a box on the floor. The printout basket accommodates both bottom- and rear-fed printers.

Made of steel rod and finished with a durable epoxy finish in neutral beige, the printout basket is available in 12- and 18-inch widths. You can use the 18-inch unit with either narrow or wide printers. The 12-inch basket costs $22.50; the 18-inch $24.50. Add $3 for shipping to each basket. Visa and Mastercard are accepted.

Reader Service ✓564

Store 'em Away

The Cassette File stores and protects up to 18 digital or audio cassettes. It is a smoke-tinted acrylic desktop file comprised of 18 separate cells. Its slanted design allows easy identification and removal of tapes. The heavy gauge acrylic top protects your tapes from dust and spilled liquids. The Cassette File has non-slip feet to provide extra security when you place the unit on smooth surfaces.

Made by Inmac (2465 Augustine Drive, Santa Clara, CA 95051, 408-727-1970), the Cassette File (#2444) costs

HARDWARE

Model IV 64K 2 Disk + RS-232	$1549.00
Model IV 128K 2 Disk + RS-232	1649.00
Model 12 80K 2 Disk System	3295.00
Model 16 128K 2 Disk System	4699.00
Model III Disk Kit with 2 Drives	599.00
Model IV Disk Kit 128K + 2 Drives	699.00
Tandon 5 meg disk for any computer	1249.00
Tandon 10 meg hard disk	1449.00
Tandon 15 meg hard disk	1599.00
Corvus 20 meg disk with IBM card	3595.00
Okidata ML-82A printer	399.00
Okidata ML-92	519.00
Gemini 10	329.00

Call for prices on our many other products.

FREE SOFTWARE

With any hardware purchase that totals over $1,000, you may have for FREE, any two programs shown in this advertisement! These programs are superior business programs that come on disk or cassette for any Model I, III, or IV. All programs come with our well written, user friendly manuals.

SOFTWARE

VISACALC SPREADSHEET $79.95

Complete spreadsheet with full screen cursor control. Make Projections, Reports, Graphs, labels, Searches, Sorts, and Formulations.

SCRIPIT WORD PROCESSOR $79.95

Full Screen Text Editor. You may add, move, delete, underline, indent, center, justify. Fully machine code for speed & performance.

VERSAFILE DATA BASE $79.95

Free formatted data base with extensive edit and search commands. Full printer support. High speed operation and menu supported.

ACCOUNTS RECEIVABLE $79.95

Monthly statements, aging reports, journals, automatic totals for posting to Ledger. Easy to add, delete, or modify all 500 accounts.

ACCOUNTS PAYABLE $79.95

Prints checks, monitor cash flow, detailed reports, up to 200 vendors. Handles 1000 transactions. User defined parameters.

Hundreds of other features! Call for details. Each program comes with an extensive manual and is available on Disk or Cass. for any Model I, III, or 4 computer with 16-64K of memory. All 5 programs may be purchased for only **$299.95!**

DEFENDOIDS

A superior arcade style game with fast action graphics and sound! Your mission is to rescue the fuel tanks from the planet's surface. You must do battle with the evil enemy ships. Machine Language. Model I, III, & 4. $15.95!

SOFTRONICS COMPUTER SYSTEMS

918-749-6211

2300 E. 14th Suite 203

Tulsa, Oklahoma 74104

✓116

Include 3% shipping. $1.00 minimum. OK residents add 5% tax. Call for prices on other products. Prices and availability subject to change. Open 10 a.m. to 6 p.m. BBS available 4 p.m. to 11 a.m. 918-749-6524.

MODEL 4 DRIVE KITS $299

MODEL 4 STUFF
MODEL 4 COMPUTERS

all include an RS232

No charge for shipping on any Compukit Computers
64K one single headed drive..... *$1495.*
64K two single headed drives..... *$1695.*
64K two double headed drives..... *$1895.*
128K systems add only..... *$99.*

MODEL 4 64K UPGRADE $62.95

prime grade pre-tested RAM with instructions

MODEL 4 RS232 KIT $69.95

completed and tested ready for installation

Model I, III, 4 green phosphor antiglare CRT Kit $89.

a complete new CRT, not a filter

MODEL 4 DISK DRIVE UPGRADE KITS

All of the Compukit Model 4 Disk Drive Upgrade Kits contain these features that other companies usually do not provide. Switching power supplies * Tandon disk drives * 64K of Model 4 RAM * Sound * and an Easy to Use installation Manual. Requires only a screwdriver (no soldering) The no drive upgrade kit.....$299.
One drive upgrade kit.....$499.
Two drive upgrade kit.....$699.
Two double headed drive kit.....899.

MODEL III to MODEL 4 UPGRADE $750.

Converts your Model III into a Model 4 (except for Cabinet and disk drives). Includes new keyboard, 64K RAM, Sound, and free installation (required). Ship us any working Model III, even if it's not all factory equipment, and get back a Model 4, in your case.

MODEL 4 SOUND UPGRADE $29.95

No soldering required, Includes instructions

COMPUKIT DOCTOR $29.95
Disk based diagnostic software package for the Model I, III, and soon the Model 4

MODEL III DISK DRIVE UPGRADE KITS

All of the Compukit Model 3 Disk Drive Upgrade Kits contain these features that other companies usually do not provide. Switching power supplies * Tandon disk drives * 32K of Model III RAM * Compukit Doctor * and an Easy to Use installation Manual. Requires only a screwdriver (no soldering).
The no drive upgrade.....$279.
One drive upgrade kit.....$479.
Two drive upgrade kit.....$679.
Two double headed drive kit.....$879.

MODEL III RS232 Kit $69.95

completed and tested ready for installation

TANDON DISK DRIVES

Perfect for replacement or add on drives for any 5" drive system including Model I, III, 4, COCO, IBM PC, LNW, MAX80, and many more.
Single Sided 40 track TM100-1.....$199.
Double Sided 40 track TM100-2.....$299.
Single case with extender.....$59.95.
Dual Case with extenders.....$89.95.
Two drive cable.....$24.95.
ask for a free copy of Doctor Robert's drive Manual with the purchase of any Compukit disk drive or Kit

NEW TANDON THINLINE DRIVES

all fast 6MS trk-to-trk

TM50-1 SS-40trk $159.
TM50-2 DS-40trk $219.
DUAL THINLINE CASE $84.95

new microprocessor drives

TM55-2 DS-40trk $249.
TM55-4 DS-80trk $299.

COLOR COMPUTER DRIVE 0

Complete drive 0 including case and controller card $449.00

64K COCO KIT $62.95

NEW! COCO DRIVE 0 $399.

with a Tandon Thinline
SPECIAL INTRODUCTORY PRICE

COMPUKIT

16206D Hickory Knoll Houston, Texas 77059

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

ordering information
We accept Visa, Mastercard, Wire Transfers, and Certified Checks for quickest shipping. Orders received on personal checks are held for clearance.

COMPLETE MODEL III HARD DRIVE SYSTEM $1295.

THIS IS NO JOKE. We have a large quantity contract to bring you the highest quality system at the lowest price available. The combination of Tandon Hard Drives and Western Digital's error checking and correcting drive controller board create the backbone of the Hard Drive Specialist System. The balance of the interfacing is by (the) oldest engineering teams in the Model III/ Hard Drive business. Unlike other hard drive companies, we rate a hard drive AFTER format (a 15 Meg drive is actually 19.1 MB before format). These units are fully assembled and tested ready to plug into your computer, all that you need to add is software. Power required 105-130 volts AC 60hz
Dimensions 8-1/4"x6-1/2"x13" (just a little bigger than two regular disk drives)

Model III/ 4 HARD DRIVE SYSTEMS

5 MEG.....$1295.
10 MEG.....$1495.
15 MEG.....$1695.

Model I/ LNW/ MAX80 SYSTEMS

5 MEG.....$1345.
10 MEG.....$1545.
15 MEG.....$1745.

IBM HARD DRIVE SYSTEMS
(note specs differ from above units)

5 MEG.....$1395.
10 MEG.....$1595.
15 MEG.....$1795.

SECONDARY DRIVES
(Ready to plug into any HDS system for added storage capacity)

5 MEG.....$ 895.
10 MEG.....$1095.
15 MEG.....$1295.

HARD DRIVE PATCHES
Hard drive patches are available for DOSPLUS, NEWDOS, and LDOS, for the Model I,III,4 priced at $50. each.

NOW! ONE YEAR WARRANTY

NOW! HD POWER SUPPLY

NOW! HD COOLING FAN

FREE SHIPPING IN THE 48 STATES

NO CHARGE FOR CREDIT CARDS

DEALER INQUIRES INVITED

YES! WE SUPPORT NEWDOS 80 MODEL I,III,&4

HARD DRIVE SPECIALIST

a division of Compukit ✓455

ordering information
We accept Visa, Mastercard, Wire Transfers, and Certified Checks for quickest shipping. Orders received on personal checks are held for clearance.

1-713-480-6000 order line 1-800-231-6671
16206D Hickory Knoll , Houston , Texas 77565

✓See List of Advertisers on Page 323

$39 and comes with a one-year warranty.

Reader Service ✓578

Multi-Mode Printers

The Model 8600 multi-mode dot-matrix printer offers you three combinations of speed and character resolution: near letter-quality at 60 characters per second, high-resolution at 90 cps, and high speed draft printing at 180 cps. Characters in all three modes have true descenders and support underlining.

With standard pica spacing of 10 characters per inch, the Model 8600 can print up to 80 characters per line, 96 characters per line with elite spacing, and up to 136 characters in the compressed mode. Proportional spacing is one of the printer's standard features. Line spacing is adjustable in increments of 1/120 inch.

The printer handles both folded and single sheets in widths from 4½ to 10 inches, and imprints an original and up to three carbon copies. Friction feed is standard, but an optional tractor feed is available.

The printer comes in two models: the serial-interface Model 8600 BR, and the parallel-interface Model 8600 BP with graphics capabilities. They are priced at $1,396 and $1,295, respectively. The Model 8600 BR includes a 4K input buffer. It is designed for asynchronous, half-duplex transmission at speeds of 110, 300, 600, 1200, 2400, 4800, and 9600 baud.

Both models are sold by Leading Edge Products Inc., 225 Turnpike St., Canton, MA 02021, 617-828-8150.

Reader Service ✓584

New Ribbon Life

Le Ribbonizer is a motor-driven fabric ribbon renewer that applies color and emulsion to your fading ribbons. Since you can control inking, your print quality can be better than before.

It takes 15 to 20 minutes to renew an average ribbon. You can ink fabric ribbons several times, until either the fabric or the cartridge wears out. On a letter-quality printer, ribbons have been renewed over 20 times; on a dot-matrix printer, 10 renewals are not uncommon.

Le Ribbonizer inks ribbons for Radio Shack Line Printers II, III, IV, V, VIII, and the DMP 500. It also inks ribbons for popular Epson, NEC, Diablo, Wang, Qume, Anadex, Ricoh, and Tally printers. It costs $39.95 including a bottle of the proper type of ink and a set of instructions. For more information, contact Ben Torres Ribbon Service, 416 East State St., Redlands, CA 92373, 714-792-0831.

Reader Service ✓571

Xidex Precision

Xidex's new 5¼- and 8-inch Precision Flexible Disks incorporate the quality features of a 96-track-per-inch (tpi) disk. They are made with a new magnetic particle and a proprietary coating formulation that achieves a magnetic signal strength 20 percent greater than the industry average. Other features include 50 percent tighter center hole tolerance and a protective jacket (10 mm) that is 33 percent thicker than the industry standard.

Disks are polished to an ultra-smooth surface and use lubricants and binders to avoid costly head wear and substantially extend disk life. Prices start at $60 for a box of 10, 48-tpi, double-sided, double-density disks. For more information, contact Xidex Corporation, P.O. Box 418, Sunnyvale, CA 94086, 408-739-4170, 800-538-1584.

Reader Service ✓577

The Buffer Box...

...is a 128K buffer that features text, data, and graphics compression, manual pause control, a Reset/Erase/RAM Test, remote pause, bypass or FIFO operation, copy function, and continuous paper and sheet feed mode. It also counts and makes up to 255 copies of text, and locates RAM failure positions exactly.

A front control panel has a receive status and data storage indicators to ensure that the computer properly sends data to the Buffer Box. Other test indicators sequence through all RAM locations and show which RAM is under test. RAM testing begins with power-up, or on reset. If a RAM should fail at any time, an LED not only indicates which RAM is at fault, but also indicates whether it is the upper or lower bank of RAM.

The Buffer Box is sold by Microtek Inc., 4750 Viewridge Ave., San Diego, CA 92123, 619-569-0900. Prices start at $299.

Reader Service ✓557

XIDEX's complete line of precision flexible disks.

Polished Life

Plast-N-Glas is a triple-function aerosol cleaning agent that acts as an anti-static cleaner and polishes your CRT or TV screen. One application not only dissipates electrostatic charges that build up on computer screens, but also removes dirt, grease, ink, fingerprints, and nicotine stains as well. The antistat properties eliminate dust attraction to give long-lasting clean surfaces that repel dust and remain static free for extended periods.

Because Plast-N-Glas is applied as a foam, it won't run or stain, streak, smear, or scratch your screen. The aerosol spray is clear and fast-drying, nonflammable, non-toxic, and odorless. Available in an 8-ounce aerosol spray container, it costs $3.05 from Chemtronics Inc., 681 Old Willes Path, Hauppauge, NY 11788, 516-582-3322.

Reader Service ✓560

Let Your Printer Stand

Ring King Visibles Inc. (P.O. Box 599, Muscatine, IA 52761, 319-263-8144) sells a 26½-inch high printer stand that features a slotted top for printout paper. Each unit is solidly constructed to

Baudy House
Computer Products

950 Scott Lake Road ● Pontiac, Michigan 48054
(313) 683-8388

UTILITYS MODEL 1 & 3

Super Utility Plus 3.1 ... **$59.95**
Lazy Writer still only... **$145.00**
Zorloff II word pro..... **$69.95**

COMPUTER & MODEMS

Model 4 complete with RS232
64K 2disk drives **$1699.00**
Model 100 8k with modem cable
and comuserve **$775.00**
Lynx modem..... **$245.00**
Hayes 300 modem **$245.00**
Hayes 1200 modem... **$545.00**

★ GAMES ★

Panik (disk)..... **$17.95**
Panik (cass) **$15.00**
Defiance (disk)..... **$19.95**
Hyper light patrol..... **$12.00**
Demon seed..... **$19.95**

PRINTERS

Epson FX-80 only **$549.95**
C. Itoh Prowriter 8510... **$375.00**
Epson Print Buffer..... **$139.95**
Epson ribbons 2 for..... **$12.50**

DISKETTES

Verbatim Data Life Diskettes
1 Box..... **$27.00**
2 Boxes **$25.00**
5 boxes or more..... **$24.75**
10 boxes **$24.25**
No name disks ss/dd... **$19.95**

SLIM LINE DRIVES

40 track single sided... **$205.00**
40 track double sided... **$275.00**
80 track single sided... **$315.00**
Single power/case..... **$45.00**
Double case/power..... **$65.00**

Mutildos 1/3 Operating system only **$85.00**
Newdos/80 1/3 Operating system only **$125.00**
Dosplus 3.5 Operating system only **$115.00**

Shipping add $3.00 to order in U.S. out of U.S. Add $5.00 Most orders shipped in 24 hours. Prices subject to change Visa/Master Card, Checks accepted. Checks need 10 days to clear C.O.D.s add $2.00 to order.

↙184

FLURP™

Mainframe Accuracy with a Micro

If you need a multilinear regresssion package with the accuracy of a number-cruncher, you need FLURP (Flynn Laboratory's Ultimate Regression Package). FLURP has easy data input, disk file archiving, and outputs a complete set of statistics. These include:mulitcollinearity diagnostics, hypothesis testing, an analysis and plot of the residuals, and more. FLURP is available for 8" CP/M (requires MBASIC), TRS-80 I and III, and soon for the IBM PC.

☐ My $99.95 is enclosed rush me FLURP (add $5.00 for foreign shipping)

☐ Enclosed is $29.95 for the manual (credit to the purchase of FLURP)

☐ Bill company (include purchase order)

☐ Charge my ☐ Visa ☐ MasterCard

Card Number _____ Expires _____

Name _____

Address _____

City _____ State _____ Zip _____

Signature (credit card orders) _____

Mail to: LEDS Publishing Co., Inc., PO Box 12847, Research Triangle Park, NC 27709 (919) 477-3690.

↙155

Trademarks IBM-IBM Corp FLURP-LEDS Publishing Co CP/M Digital Research TRS-80-Tandy, MBASIC-Microsoft

YORK 10™ CASSETTES DISKETTES

• LOWER PRICES
• LONGER LENGTHS

DATA TRAC C-06, C-12, C-24

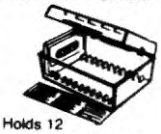
From the leading supplier of Computer Grade Cassettes, new, longer length C-12's (6 minutes per side) provide the extra few feet needed for some 16K programs.

Premium 5-screw shell with leader — BASF tape

Internationally acclaimed. Thousands of repeat users.

Error Free • Money back Guarantee

CASSETTE STORAGE CADDY



Holds 12 cassettes w/o boxes Includes edge labels and index card

TRACTOR FEED
• DIE-CUT BLANK CASSETTE LABELS

500 C-12's—38¢ each • w/labels
Shipping $17./500 add 4¢
500 Boxes 13¢ ea. • shipping $10./500

BASF Qualimetric Flexi-Disc—Lifetime Warranty. 5¼" Single Side. Double Density, Soft-Sectored.

***NEW!* MICRO CASSETTES in convenient short lengths.**
MC-10 | Same superior tape in premium shell
MC-20 | WITH LEADERS. Supplied complete with
MC-30 | box (fits Epson & Sharp micro drives).

Call: 213/700-0330 for IMMEDIATE SHIPMENT on Credit Card Orders

ORDER NOW . . . ***MAIL TO:*** **YORK 10™ Computerware**
9525 Vassar Ave. #80, Chatsworth, CA 91311

ORDER FORM

ITEM	1 DOZEN	2 DOZEN	TOTAL
C-06	☐ 7.00	☐ 13.00	
C-12	☐ 7.50	☐ 14.00	
C-24	☐ 9.00	☐ 17.00	
Hard Box	☐ 2.50	☐ 4.00	
Blank labels	☐ 3.00/100	☐ 20.00/1000	
Storage Caddy @ $2.95 ea. Qty _____			
Flexi-Disc	☐ 26.95/10	☐ 120.00/50	
MICRO CASS.	**1 DOZEN**	**2 DOZEN**	
MC-10	☐ 16.50	☐ 32.50	
MC-20	☐ 18.00	☐ 34.50	
MC-30	☐ 19.00	☐ 36.00	
		SUB TOTAL	
Calif. residents add sales tax			
SHIPPING/HANDLING Any quantity (except 500 special)			3.50
Outside 48 Continental States—Additional $1 per caddy; per doz. cassettes; per doz. boxes; per 10 discs			
		TOTAL	

Each std. cassette includes two YORK 10 labels only. Boxes are sold separately. We prefer to ship by UPS as being the fastest and safest. If you need shipment by Parcel Post, check here ☐

NOTE: Additional charges outside 48 Continental States. Shipments to AK, HI, and USA possessions go by Priority Mail. Canada & Mexico—Airmail. All others— Sea Mail

Check or M.O. enclosed ☐ Charge to Credit Card ☐ VISA ☐ MASTERCARD

☐ PLEASE SEND QUANTITY DISCOUNTS

#80

↙156

Card No. _____ Exp. _____

Name _____

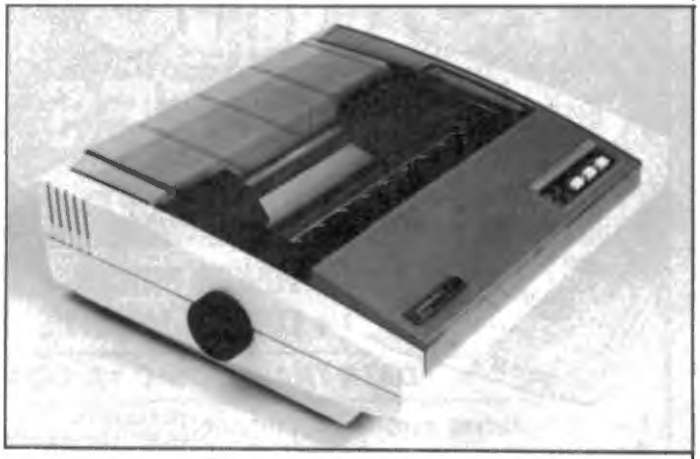
Address _____

City _____ State/Zip _____

Signature _____ Phone _____

Computer make & model _____ Disk? (y/n) ____

↙See List of Advertisers on Page 323



The Spirit dot-matrix printer offers full-space quality printing at low cost.

dampen vibration and support any printer. The thick solid horizontal surfaces are all non-glare neutral beige, and the steel connectors at all joints lock the components into a solid unit.

Available in work surfaces of 30 by 24 inches and 36 by 30 inches, the Printer Stand costs $179.95 and $204.95, respectively. Other furniture made by Ring King Visibles includes Stand-up Work Stations, Mobile Cabinets, Data Racks, and much more.

Reader Service ✓559

Mighty MITE

MITE is a powerful communications program that turns a CP/M-based computer into an intelligent data terminal compatible with online services like CompuServe and The Source. It also lets you use the computer as a Western Union TWX or Telex terminal.

MITE's menu-driven program supports many different protocols and provides full modem control with programmable auto log-on if required. In addition, you can transfer files between any two CP/M computers with error checking.

MITE retails for $150 including a comprehensive user's manual. For the name and address of your local dealer, contact Wordmovers Inc., 15818 Hawthorne Blvd., Lawndale, CA 90260, 213-542-7351.

Reader Service ✓568

Low Priced Printer

The Spirit dot-matrix printer from Mannesmann Tally Corporation (8301 South 180th St., Kent, WA 98031, 206-251-5500) uniquely uses its 9- by 8-dot matrix to produce higher print resolution and intensity than other dot-matrix printers. Its print head comprises square hammers that overlap to form more fully connected horizontal and vertical lines rather than a row of discrete dots.

It prints 80 characters per second, and comes standard with tractor and friction paper feeds. The Spirit has a quick-tear cutting edge within the lid that lets you tear off invoices and other forms immediately after printing.

The Spirit costs $399 including a Centronics parallel interface. An optional serial interface is available. Other optional features include an acoustical package that reduces sound to 53 decibels, far less that that of a standard typewriter.

Reader Service ✓573

Hard Disk Support

Pickles & Trout's adaption of CP/M 2.2 now runs Radio Shack's new 12-megabyte hard disk with Models II, 12, and 16. This lets you choose among a variety of available CP/M application programs, and take full advantage of the speed and capacity of the 12-Mbyte hard disk.

The CP/M 2.2 includes 12 utility programs designed to help make the most of your system. A system configuration program lets you optimize hard disk storage, and special back-up programs let you save and restore files up to 8 Mbytes in length onto multiple disks.

Other features of CP/M 2.2 include a type-ahead keyboard buffer, system date and time, full serial port support, full video display support, fast operation, low system memory usage, and more.

Fully compatible with other versions of P&T CP/M 2, the program costs $250 and is sold by Pickles & Trout, P.O. Box 1206, Goleta, CA 93116, 805-685-4641.

Reader Service ✓553

Clean Up Your Act!

The Copysource Printwheel Cleaning Kit protects fragile plastic and metal spokes while cleaning the typefaces of the printwheel. Spill-free cleaning wands each release 0.6 milliliters of a specially formulated solvent that dissolves caked magnetic dust, ink, and dirt build-up from tiny typeface crevices and rejuvenates printwheels by eliminating damaging plastic glaze. The kit's absorbent cleaning station provides balanced support and prevents spokes from bending or breaking during cleaning.

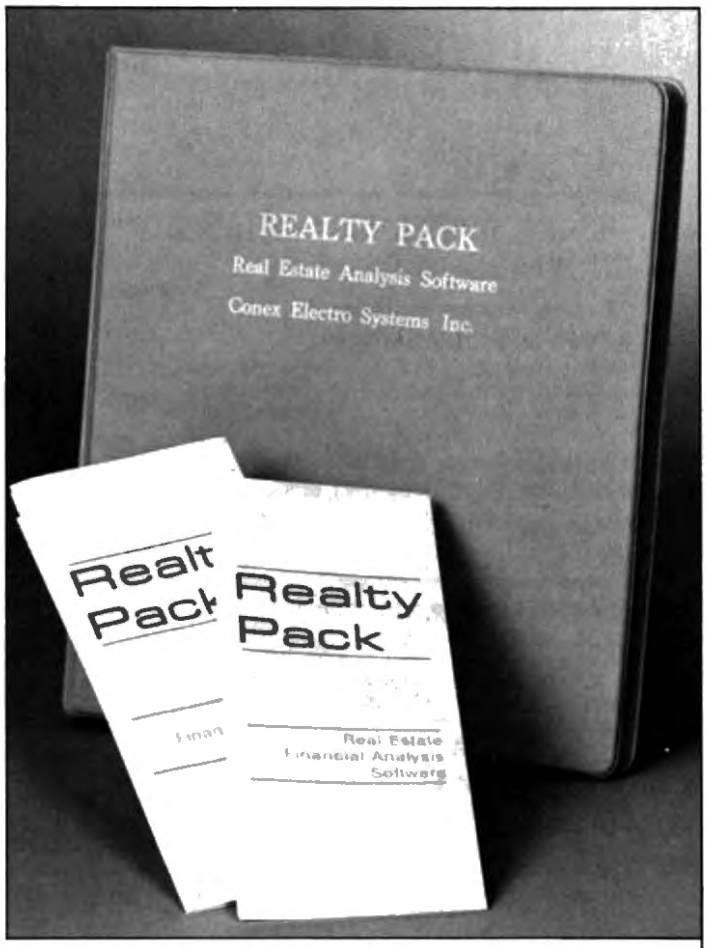
Each self-contained kit contains 10 cleaning wands, 10 lint-free dry wipes, cleaning station, and tray. Single kits cost $12.95; three kits $32.85; and 10 kits $89.50. To order, contact Chope-Stevens Paper Co., Dept. 114, 1800 18th St., Detroit, MI 48216, 313-237-0300.

Reader Service ✓565

Helping Government

The Work Management System is designed to aid local municipalities and governments in justifying capital expenditures, allocating resources, and developing effective work plans. It provides information in both work backlog and work performed in areas like streets, sanitation, parks, buildings, utilities, airports, and traffic. The program also helps field operations managers in scheduling, evaluating, and im-

Safe and easy cleaning for your printwheels.



Buying property? Let Realty Pack help you make a wise decision.

proving productivity.

Available from LWFW Inc. (12700 Park Central, Suite 1805, Dallas, TX 75251, 214-233-5561), the Work Management System is compatible with the Model II running CP/M. The package costs $3,950 including Management, Installation, and User's Guides, technical installation, and six months software maintenance.

Reader Service ✓561

Real Estate Analysis

Thinking about buying some property or a house? If so, let Realty Pack from Conex Electro Systems help you analyze potential real estate investments. The package includes Income Property Analysis, House Rent or Buy, Loan Amortization and Evaluation, Wrap-Around Loan Evaluation, and Investment Policy Analysis and Projection software.

Realty Pack provides professional reports with input and output values and provides the opportunity to include personalized identity information for the property, the analyst, and/or the customer. Each program accounts for current tax and depreciation laws, and you can perform what-if analyses to satisfy any curiosity.

Available for the Models II, III, and 4, Realty Pack sells for $149 from Conex Electro Systems (1602 Carolina St., P.O. Box 1342, Bellingham, WA 98227, 206-734-4323).

Reader Service ✓581

Pocket Graphics

Graphics for business and engineering applications are now available for use on the

OUR ISOLATORS FOR YOUR PROTECTION

Prevents:

diak drive woes, printer interaction, memory loss and damage due to lightning or AC power line disturbances.

Commercial Grade Isolators

ISO-1 3 Isolated Sockets	$76.95
ISO-2 2 Isolated Socket Banks, 6 Sockets	76.95

Industrial Grade Isolators

ISO-3 3 Double Isolated Sockets	115.95
ISO-11 2 Double Isolated Banks, 6 Sockets	115.95

Laboratory Grade Isolators

ISO-17 4 Quad Isolated Sockets	200.95
ISO-18 2 Quad Isolated Banks, 6 Sockets	169.95
Circuit Breaker, any model (Add-CB)	Add 10.00
Remote Switch, any model (Add-RS)	Add 18.00

ESP® Electronic Specialists, Inc.
171 South Main Street, Box 389, Natick, Massachusetts 01760 ✓159

Toll Free Order Desk 1-800-225-4878
MasterCard, VISA, American Express

EE/EPROM PROGRAMMERS & UV ERASERS

AFFORDABLE ★ RELIABLE ★ AVAILABLE

UV ERASERS
QUV-T8/1
$49.95
*HOBBY

QUV-T8/2N
$68.95
*INDUSTRIAL

QUV-T8/2T
$97.50
*WITH TIMER & SAFETY SWITCH

GANGPRO-8™
$1,295.00
(GANG PROGRAMMER)

RS-232 serial, STAND ALONE, INTELLIGENT

*EASY DUPLICATION *USER FRIENDLY *128K BUFFER

SUPPORTS MOST 8K, 16K, 32K, 64K, 128K, 256K EPROMS
PROMPRO-8 KEY PAD OPTION, EPROM SIMULATION MODE
Microcomputer Chips 8748 (H), 8749H, 8750, 8751, 8741, 8742, 8755A
SOFTWARE DRIVERS: MDS ISIS, TEKTRONICS 8002, IBM PC, ATARI, APPLE II, CPM, FLEX, TRS-80
DIRECT HOOK UP TO ANY DUMB TERMINAL OR COMPUTER

DISTRIBUTOR INQUIRY WELCOME.

LOGICAL DEVICES INC. ✓330
1321 E N.W. 65 Place, Ft. Lauderdale, FL 33309
Phone Orders (305) 974-0967 TWX 510-955-9496

ACCESS UNLIMITED

FREE

FREE! DOSPLUS 3.4 disk operating system with any Percom or 1st Drive System for the Model III***

PERCOM™ QUALITY FOR YOUR MODEL III™

Nothing but the best for your "Model III". Percom internally mounted drive systems: including 4 drive controller with gold edge connectors, double density disk drive or drives, all hardware and cabling. A free copy of DOS Plus 3.4 is also included with every first drive purchase.

TFD 340N1	one drive single sided double-density	**$449.00**
TFD 340N2	two drive single sided double-density	**$699.00**

Brand Spankin' New! SALE Dual Headed Drives for the Price of Flippies!

Now you can have a *dual headed "PERCOM" Drive System for your "Model III!!

TFD344N1	One drive dual headed double-density	**$560.00**
TFD344N2	Two disk dual headed double-density	**$860.00**

***completely compatible with programs existing on single sided or double sided diskettes.**

WE HAVEN'T FORGOTTEN THE MODEL I™!!

Upgrade your Model I™ to Double Density All for $129.95!!

You have a good system and you just don't want to sell out to a Model III – Upgrade with the Percom Doubler II, the overwhelming favorite double density adapter for over **2 years!** Simply plug the adaptor into your expansion interface and run either single or double-density programs. Comes complete with FREE DOS Plus 3.4 but will also run with LDOS NEW DOS 80 and TRS DOS.

PERCOM™ QUALITY FOR YOUR MODEL I™

TFD40-1	40 track single sided drive	**$275.00**
TFD44-1	40 track dual sided drive	**$350.00**

Percom™ Hard Disk — Quality for your System

- works with existing floppy drives — Reg. from $2495
- can be daisy-chained up to four hard disks
- **DOS Plus 4.0 or LDOS included FREE** **Now, From Only $1595.00**
- Now available for immediate delivery in 5 & 10 megabyte configuration
  Can be used for Model I*, II*, III*, "Apple II" or "IBM PC" computers.

DOS + 3.4 Reg. $159.00. Sale $99.95

MAKE SURE IT'S DONE RIGHT!
. . . Let Us Install Your First-Drive System

Purchase your Model III* Drives from us and for $79.95 plus shipping, you can have our experienced professionals perform a 48-hour burn-in of your Model III* computer, install the drive system, and check out your expanded system to make sure everything works correctly. Call for pricing of complete Model III* system with 2 to 4 Access Unlimited or Percom drives.

TRS-80™ MODEL 100 PORTABLE COMPUTER

"The Executive Micro Workstation"

- **Powerful Built-in Software:**
  - — Word Processing
  - — Terminal Communications
  - — Telephone Dialer
  - — Applications Software
  - — Extended Basic
  - — Address Book
  - — Appointment Scheduler
- **Retains Memory Data When "off"**
- **Self-contained Telephone Modern**

With 8K ..... ONLY **$799.00**
With 24K ..... ONLY **$999.00**

PowerSOFT Software from Breeze/QSD Inc.™

One disk "BOOTS" up on either machine. At PowerSOFT, we don't believe in making a customer buy a separate version for Mod I or III. We ALWAYS include BOTH versions on the SAME disk for your maximum convenience. 80 Track versions are available on request. All titles are for Mod I or III unless specified.

PowerSOFT Product Title	Retail Price
SUPER UTILITY PLUS/3.0	$ 79.95
SUPER UTILITY PLUS/3.0 for MAX80	$ 99.95
INSIDE SU + /3.0 MANUAL	$ 19.95
SU + /3.0 TECH MANUAL	$ 14.95
INSIDE SU + /2.2z MANUAL	$ 19.95
SU + /2.2z TECH MANUAL	$ 14.95
"THE TOOLBOX" for LDOS	$ 69.95
"MASTER MECHANIC SET" for LDOS	$ 39.95
POWERDRIVERS for SuperScripsit™ (printer drivers):	
POWERDRIVER/E (EPSON MX-80/100)	$ 29.95
POWERDRIVER/P (PROWRITER)	$ 29.95
POWERDRIVER/F (F-10 STARWRITER)	$ 29.95
POWERMAIL	$ 99.95
POWERMAIL PLUS* — Mod I, III, MAX80	$150.00
POWERMAIL PLUS* — Mod II/12/16	$150.00
POWERDRAW	$ 39.95
POWERDOT (EPSON or PROWRITER Only)	$ 49.95
POWERTERM Smart Terminal Pkge	$ 29.95
DOSPLUS II Operating System For Model II, 12, and 16/Z80	$249.95
SCRIPLUS 3.0	$ 39.95
THE BASIC/S COMPILER SYSTEM	$ 49.95
MAKE/80 (Mod I or III)	$ 19.95
SUPER UTILITY (Mod I ONLY!)	$ 29.95
QUICK-FIX (Mod I ONLY!)	$ 19.95

**Coming out very soon. Please inquire for shipping date.*

BIG DISCOUNTS ON PRINTERS

New! Brother HR1A™	Only **$ 899.00**
Microprism™	Only **$ 699.00**
C.itoh F-10™	Only **$1495.00**
Transtar 130™	Only **$ 875.00**
Transtar 140™	Only **$1695.00**
Okidata™	All Models **Call for our superlow prices!**
Star Micronics™	All Models **Call for our superlow prices!**

DIABLO™ MODEL 2300 MATRIX PRINTER
Close Out Special —

• Rugged, commercial duty • 7x9 dot matrix • High Speed! 200 CPS! • Top of the line, highest quality
Reg. Retail $2495.00 ***FOR LIMITED TIME ONLY!***
WHILE QUANTITIES LAST..... $999.00

the MICRO SHOPPING CENTER

We have added approximately $400,000.00 worth of brand new business and game software with more arrivals daily.
Call or write for our new FREE catalog.

Save $$ on our most popular items!

Percom Data Separator (reg. $29.95)	Now **$23.95**
Screens for Models I*, II*, III Green, Lt. Blue, Dark Blue, and Amber. Bronze for color video (reg. $24.95)	Now **$12.95**
Head Cleaning Kit (reg. $29.95)	Now **$19.95**
Drive Numbering Tabs, pkg. 0-3 (reg. $4.50)	Now **$ 3.95**
Flip-N-File 8" (reg. $54.95)	Now **$28.95**
NEW Style Smoke Grey File 5¼", Holds 75	Now **$24.95**

COLOR CODERS — 5 Cases (stores 10 disks ea.) — 5 different colors **$24.95**
Library Cases (holds 10) **$ 2.95 ea.**

MEDIA FOR LESS

SENTINEL™ complete with hub rings & lifetime warranty!

Single sided/Single density 5¼"	**$18.70** bx of 10
Single sided/Double density 5¼"	**$20.70** bx of 10
Double sided/Double density 5¼"	**$27.80** bx of 10
Single sided/Double density 8"	**$29.70** bx of 10
Double sided/Double density 8"	**$38.70** bx of 10

BUY DISKETTES IN BULK *AND SAVE $$$$$$$$$$*

These prices good by the case only —

Single sided/Single density 5¼"	**$179.00** case of 100
Single sided/Double density 5¼"	**$190.00** case of 100
Double sided/Double density 5¼"	**$225.00** case of 100
Single sided/Double density 8"	**$280.00** case of 100
Double sided/Double density 8"	**$340.00** case of 100

FREE! Source™ with SIGNALMAN™ MODEM

Mark I with RS232C Interface, 0-300 baud	**$ 99.00**
Mark II with Atari Interface, 0-300 baud	**$ 99.00**
Mark III with TI Interface, 0-300 baud	**$139.00**
Mark VI with IBM Interface, 0-300 baud	**$279.00**
Mark VII with RS232C Interface & auto answ./orig. 0-300 baud	**$159.00**

Anti-Static Mats — Colors: Russett, Blue & Gold, Natural Brown & Golden Brown.

3' x 5' — Reg. $75.60	Sale: **$57.00**
4' x 6' — Reg. $120.90	Sale: **$91.00**
4' x 8' — Reg. $161.30	Sale: **$122.00**

"PAGEMATE" Typing Easels — $14.95

SAVE on an "Arrick Quick Switch"

Changes a "TRS-80" printer port or a peripheral between computers instantly and easily. Available for "RS-232" and "Centronics." Plugs included.

Now from $99.95. Cables from $26.95

BEAUTIFUL CUSTOM FURNITURE

"Atlantic Cabinet" — Oak!

50" Split Level Desk	**$199.95**
50" Personal Computer Desk	**$126.00**
38" Personal Computer Desk	**$105.00**
Matching Printer Stand	**$89.00**

"O'Sullivan" Computer Furniture Also Available — Call For Details, Prices

Print Wheels & Thimbles — From **$8.50** each

Printer Ribbons — For Centronics, Diablo, C-Itoh, Star and Epson 80, 100 From **$5.95** each

• LIMITED TIME OFFER/LIMITED QUANTITIES •
• Prices subject to change without notice •

* Trademark of Tandy Radio Shack Corp
" " Reg. Trademarks • Prices do not include state taxes.

VISA **1 (800) 527-3475** master charge

Order by phone or by mail. We accept Visa, MasterCard, cashier's checks, certified checks, and money orders. With personal checks, allow additional time for bank clearance. Your bankcard will not be charged until your order is shipped. On orders over $1,000, we pay freight (surface only) and insurance; please add $3.00 shipping and handling over 50 lbs. Over 50 lbs., add $5.00 for orders under $1,000.00. Texas residents add 5% sales tax. Allow 2 to 4 weeks for delivery.

☐ Please send me a FREE catalog. I'm not ready to order at this time.
☐ YES, I'm taking advantage of your Sales prices.

Name _____
Company Name _____
Address _____
City _____ State _____ Zip _____
Phone Number ( ) _____

Quantity	Item	Unit Price	Subtotal

Subtotal
State Sales Tax (Texas residents only)
handling charge
Total

Check one:
☐ payment enclosed ☐ Visa ☐ MasterCard*

*If MasterCard, numbers above name:

Expiration Date: ☐☐ — ☐☐

Authorized signature, if charged

ACCESS UNLIMITED

DEPT. C-8/401 N. Central Expy./Richardson, Texas 75080
Tel. 1-800/527-3475 214/340-5366
214/690-0207 — Sat. and Evenings Only

Radio Shack PC-2. PocketGraph draws bar, line, and scatter graphs with the computer's four-color plotter. You can plot user-defined functions for any range of values. Enter data into a variable-size matrix ranging from 99 rows to 99 columns. You can draw, name, and print graphs and one- and two-dimensional tables from either the rows or the columns. And you can plot up to three variables on one graph.

The PocketGraph program sells for $29.95 on tape cassette including a user's manual. To order, contact PocketInfo Corporation, 7795 S.W. 184th St., Beaverton, OR 97007, 503-649-8145.

Reader Service ✓556

"Let's Cobol!"

Now you can express your computer-oriented thoughts to the whole world with Dimension 4's black silk-screened T-shirts. "I Speak Basic," "Programmer Power," "Hardware," and "Software" are just a few of the available computer jargon designs. The machine washable T-shirts come in four fashionable colors (green, light blue, red, and yellow) in small, medium, large, and extra large sizes (S, M, L, or XL).

Guaranteed for comfort and a good-looking fit, the T-shirts cost $7.95 each plus $1.50 shipping and are sold by Dimension 4 Design Group, 1018 Proprietors Road, Worthington, OH 43085, 614-846-1839. If you order six or more shirts, you'll save $1 on each one.

Reader Service ✓562

20/20 Bar Code Reader

Unlike existing wands, the Norand 20/20 Instant Bar Code Reader takes an electronic picture of a bar code without need for movement of, or contact with, a light pen device. Once positioned over the bar code, you press a button on the 20/20 and it not only reads the code, it also provides an LED readout and audible indications of a successful read. It has a 98 percent first-read rate and a 99.5 percent second-read rate.

Other features include the ability to read any UPC standard bar code color combinations and depth of field of up to 0.4 inches. The 20/20 reads from cardboard, foam, gloss paper, plastic, and metal surfaces. It costs $1,650 and is sold by Norand Corporation, 550 Second St., Cedar Rapids, IA 52401, 319-366-7611. An RS-232 interface is available on request.

Reader Service ✓570

Ready? Set!...Draw!

Draw is a graphics and text editing package that lets you create or design a graphics screen with your Model III and Grafyx Solution, a plug-in, clip-on board that gives you 98,304 points in a 512- by 192-dot matrix. By moving the cursor with arrow keys and entering one-letter commands, you can set, clear, or complement points, lines, circles, or boxes. You can change the size of the points at any time and invoke reverse video or shift the entire screen in any direction.

Once the picture is centered, labeled, and refined, save it on disk or tape or print it on one of 20 popular printers. You can implement all of these commands without leaving the Draw program.

Grafyx Solution costs $39.95 including 12 hi-resolution pictures and a user's manual. Contact Micro-Labs Inc., 902 Pinecrest, Richardson, TX 75080, 214-235-0915.

Reader Service ✓555

Safe and Sound

Protect your computer from theft, vandalism, and unauthorized use with the Computer Security Cabinet from Smith System Manufacturing Co. (P.O. Box 43515, St. Paul, MN 55164, 612-636-3560). The cabinet features a pull-out keyboard and adjustable monitor shelves. The keyboard shelf measures 18 by 24½ inches and pulls out to 11 inches. The monitor shelf is 16 by 26½ inches and adjusts vertically 10 inches.

The cabinet is made of strong welded steel and has a key lock on a recessing flip door. Measuring 23 by 27 by 23 inches, it can either rest on or be secured by your table top. It sells for $189. The security cabinet can become an ergonomic work station with the addition of one of Smith System's crank adjusting terminal tables. Contact them for further information and the address of your local distributor.

Reader Service ✓576

Computer Security Cabinet protects your computer from theft.

A New Compiler

SuperSoft (1713 South Neil St., Champaign, IL 61820, 217-359-2112) offers a new version of the SuperSoft C compiler compatible with CP/M-80 and syntactically compatible with UNIX and XENIX.

SuperSoft C is a multi-pass compiler that produces highly optimized code, making it possible to avoid Assembly-language coding for most tasks. The compiler is fast in both compilation and execution.

SuperSoft C retails at $275 for the CP/M-80 operating system and $500 for other operating systems.

Reader Service ✓579

Adding Computers

Connecting Multiplexer to your hard disk subsystem lets you add more computers to your system without having to buy additional subsystems. With it you can share programs and data present on the hard disk with other computers. The Multiplexer operates at a higher speed than the hard disk so there is no waiting time, and it offers the same data transfer rates as in a single computer to hard disk subsystem.

In a Multiplex system, any computer can run completely independent of the other computers. As such, each computer is unaffected by a hardware or software failure on another computer. Other features include single circuit board, no speed loss between CPU and hard disk, Multiplexers may be daisy chained, software independent, no ex-

UO-LISP

AN OPTIMIZING COMPILER AND ASSEMBLER
AN EXCELLENT SYSTEM FOR A.I., ROBOTICS, INTELLEGENCE SYSTEMS

FAST LOAD LIBRARIES:
COMPILED CODE CAN BE STORED IN RELOCATABLE FILES.

INTERPRETER:
OVER 125 FUNCTIONS IMPLEMENTED IN BASE INTERPRETER.

DOCUMENTATION:
THE MANUAL IS OVER 100 PAGES COVERING ALL ASPECTS OF THE SYSTEM. NUMEROUS EXAMPLES OF EACH FACILITY ARE INCLUDED.

SUPPORT SOFTWARE:
LITTLE META-TRANSLATOR WRITING SYSTEM IS A LISP PROGRAM WHICH PERMITS YOU TO SPECIFY THE SYNTAX OF A PROGRAMING LANGUAGE AND HOW IT IS TO BE INTERPRIETED.

REQUIREMENTS:
TRS-80 MODEL I OR MODEL III, 48K, DUAL DISKS ALSO AVALIBLE FOR CP/M.

ORDERING:
SYSTEM MANUAL....$20.
COMPLETE SYSTEM...$150.
LITTLE META MANUAL ONLY....$15.
LITTLE META TRANSLATOR....$40.
VISA and MASTERCARD
PLEASE INCLUDE EXPIRATION DATE and CARD No.

FAR WEST SYSTEMS, SOFTWARE, INC.
P.O. BOX 6582, PALO ALTO 94305
(415)941-0900

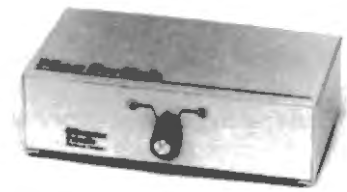
↙454

Re-ink any fabric ribbon for less than 5¢. Extremely simple operation. We have a MAC INKER for any printer. Lubricant ink safe for dot matrix printheads. Multi-colored inks, uninked cartridges available. Ask for brochure. Thousands of satisfied customers.

$54.95 +

Mac Switch lets you share your computer with any two peripherals (serial or parallel). Ideal for word processors—never type an address twice. Ask us for brochure with tips on how to share two peripherals with MAC SWITCH. Total satisfaction or full refund.

$99.00



Mac Inker & MacSwitch

Computer Friends
100 N.W. 86th Ave.
Portland, OR 97229
503/297-2321

↙357

Hello thayuh. This is Eben Flow, proprietor of the Fish or Cut Bait Company, buyer and seller of lobstah bait for 49 years. My hobbies are collecting linoleum samples, squashing flies and playing pac-person on my home computer.

But here on Martinicus Rock, off the coast of Maine, the power can be a tad erratic. So, to cure the brownout and blackout problems, and to keep them spikes and surges off my picture tube, I got me a **MAYDAY** Uninterruptible Power Supply from SUN RESEARCH. Them fellas fixed me up real good and real light on my pocketbook, too. Got me a **MAYDAY** for my mini-calcaputer with a voltage regulator and everything for only 325 clams. They even included the battery in a nice waterproof box. Handy out here, you know. Now, if **MAYDAY** would only keep them sea dogs out of my barrel. . .

MAYDAY - Protection even you can afford!

SUN RESEARCH, INC.
Box 210
New Durham, NH 03855
603/859-7110
TWX 5102974444

↙285

↙See List of Advertisers on Page 323

ternal power required, and four users per Multiplexer.

Supporting Models I, II, III, 4, and 12, the Multiplexer costs $795 and is available from Bi-Tech Enterprises Inc., 10B Carlough Road, Bohemia, NY 11716, 516-567-8155.

Reader Service ✓566

Lazy No More

Owners of the Lazy Writer Word Processing System can now create dramatic custom letterheads, logos, headlines, and illustrations with LazyFont from AlphaBit Communications Inc. (13349 Michigan Ave., Dearborn, MI 48126, 313-581-2896). LazyFont lets you make up your own type fonts, whether an entire alphabet or graphics symbols, such as logos. The program consists of two parts: one for drawing the characters, the other for printing the characters.

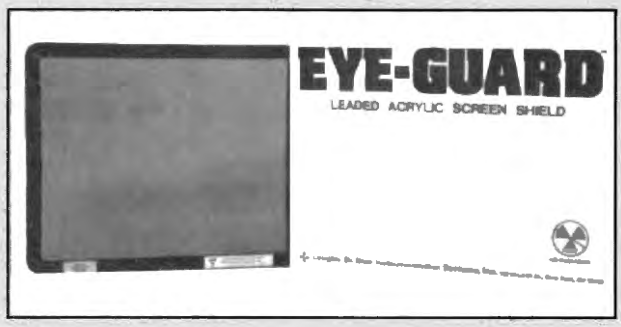
The fonts are stored on disk and don't use the memory while printing. Because of this, you can load long text files into memory and print them with the fonts. It also means that you can use any number of fonts in one document.

You can center, indent, or randomly position the fonts anywhere on the paper using Lazy Writer printer commands. The program generates fonts double-wide, compressed, emphasized, or double-struck for additional effect.

LazyFont works only in conjunction with Lazy Writer on Epson printers with Graftrax or Graftrax Plus. LazyFont costs $49.95; Lazy Writer $175.

Reader Service ✓569

Different Track



Eye-Guard protects you from irritating radiation.

Protected From the Unknown

Eye-Guard is the newest anti-eye-fatigue screen shield from Langley-St. Clair. What separates this shield from all the others is that it's made with lead-impregnated acrylic plastic, the same material used for windows in nuclear plants and hospital X-ray rooms. The new Eye-Guard is a 7-millimeter thick sheet of transparent plastic that contains 30 percent lead by weight. It affixes to the front of your computer with velcro tabs. The front surface is covered with a nylon-netting, anti-glare screen.

The Eye-Guard costs $129.95 and comes with a 100 percent money-back guarantee that it will stop even the worst case of eye-fatigue. It is available from Langley-St. Clair Instrumentation Systems Inc., 132 West 24th St., New York, NY 10011, 212-989-6876.

Reader Service ✓554

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.*

Time for a Test

Worried about your cables shorting out? There's no need to be with the Examiner, a microprocessor-based cable tester from Matra Technology Inc. (120 Albright Way, Los Gatos, CA 95030, 408-866-6606). It checks from one to 120 cable lines for proper contact, opens, shorts, and variations in resistance. A 16-key pad and a 16-character LED display communicate with the tester. A versatile mechanical interface unit allows you to connect a variety of cable connections, and you can use an auxiliary probe to detect opens and shorts and determine the approximate location of a short in the cable.

The Examiner is based on a 2MHz Z80 processor with 4K of ROM, 32K of RAM, and two parallel ports. It costs $2,650, and an optional 20-column printer that provides hardcopy output of test data or system status is available for an additional $196.

Reader Service ✓551

Test Your Peripherals

The Model CPU-1 Computer Emulator is designed to test and demonstrate computer peripherals such as printers, terminals, and modems. Measuring 3 by 5 by 1½ inches, it features a 16-button keyboard, a 3-digit LED display, and a customized 4K EPROM with data files that go to the peripheral undergoing testing.

Test computer peripherals with the Computer Emulator.

To operate the CPU-1, simply connect it to the device you want to test, enter a three-digit configuration code for the computer you want to emulate, and select a data file you want to send. The CPU-1 then sends the data file in a format identical to that of the emulated computer.

Since the CPU-1 emulates all possible data formats, baud rates, and handshake protocols, you can demonstrate and test a peripheral device to ensure its compatibility with your computer system.

Shipped with an accessory power supply module that plugs into any standard 117-volt ac outlet, an EPROM, and a universal cable assembly for interfacing, the CPU-1 costs $390 from Selectone Corporation (28301 Industrial Blvd., Hayward, CA 94545, 800-227-0376).

Reader Service ✓583

If you guessed that a Practical Peripherals Microbuffer™ printer buffer saves time, you're right. For the way it works, this inexpensive product is the most practical addition to your microcomputer system ever.

With Microbuffer, you don't have to wait for your printer to finish before you resume using your computer. Data is received and stored at fast speeds, then released from Microbuffer's memory to your printer. This is called buffering. The more you print, the more productive it makes your workflow.

Depending on the version of Microbuffer, these buffering capacities range from a useful 8K of random access memory — big enough for 8,000 characters of storage — up to a very large 256K— enough for 256,000 characters of storage.

Practical Peripherals makes stand-alone Microbuffers for any computer and printer combination, including add-on units especially for Apple II computer and/or Epson printers. Each has different features like graphics dumps and text formatting besides its buffering capabilities. You can choose one that's just right for your system.

Best of all, they're built to last and work exactly like they're supposed to.

If you're still guessing whether you can afford to have one, talk with any computer dealer. That's the best way to find out how practical a Practical Peripherals Microbuffer is.

PRACTICAL PERIPHERALS

31245 La Baya Drive
Westlake Village, CA 91362
(213) 991-8200

11

GUESS WHO HAS MICROBUFFER.™

That's what you get with the LNW80 Model 2—undoubtedly the most versatile, powerful and fully equipped microcomputer in its class today. A machine so superior in concept and design, that it will define the standards of microcomputer performance for years to come.

VERSATILITY

The LNW80 2 performs wonders with the most complete library of software available to any microcomputer on the market today. Every LNW80 2 comes complete with this outstanding library of Business Software. **LNW SMALL BUSINESS AND PROFESSIONAL ACCOUNTING SERIES™** General Ledger, Accounts Receivable, Accounts Payable, Payroll; **ELECTRIC SPREADSHEET™; ELECTRIC PENCIL™ WORDPROCESSOR; MICROTERM™ MODEM PROGRAM; CHART EX™ HIGH RESOLUTION BUSINESS GRAPHICS CHARTING PROGRAM; CP/M 2.2™; DOSPLUS™; LNW-BASIC™; MICROSOFT BASIC.™** In addition to a comprehensive line of LNW80 2 Software, it is also fully compatible with software from TRS80® (Models 1, 3, 4), CP/M® and Cromemco® worlds—a capability which gives you access to the most extensive and mature libraries of business, scientific, engineering and entertainment software applications. So no matter how far you expand into user applications, the LNW80 2 will expand right along with you.

POWER

The LNW80 2 performs miracles with the computing power of 96K RAM (standard) of user memory matched with a mass storage capability which handles 5¼" floppy disks and 5¼" hard disk drives. And while the unit comes with built-in controllers for 5¼" and 8" floppy disks (single/double sided, single/double density, up to 4.5 Megabytes capacity), the LNW80 2 also gives you the unique ability to read and write diskettes from a greater variety of other popular computers than does any other microcomputer. So regardless of how big you grow, you will never end up with thumb-twiddling down time while you expand to a more powerful system. The LNW80 2 will always have enough muscle to handle your biggest and toughest jobs.

FULLY EQUIPPED

The LNW80 2 was developed to anticipate the needs of both expansion and compatibility. So the computer was designed with enough built-in features to keep you from having to spend a small fortune as you move down the road to higher levels of user sophistication. Standard features include high and low resolution graphics in both color and black-and-white, an asynchronous serial communication channel, and a wide variety of tape, printer, monitor and hardware expansion ports. In addition, the LNW80 2 contains an array of quality construction features that fully justify its remarkable one-year limited warranty.

So if you're looking for a microcomputer that will satisfy your performance needs as you grow and develop, take a long, hard look at the LNW80 2. It's the one microcomputer built to meet the challenges of tomorrow—for a long time to come.

For more information and the name of the dealer nearest you, write or telephone:

LNW Computers 31
2620 Walnut, Tustin, California 92680
Telephone: 714/544-5744

STATE-OF-THE-ART ENGINEERING
STATE OF TOMORROW PERFORMANCE.

LNW COMPUTERS