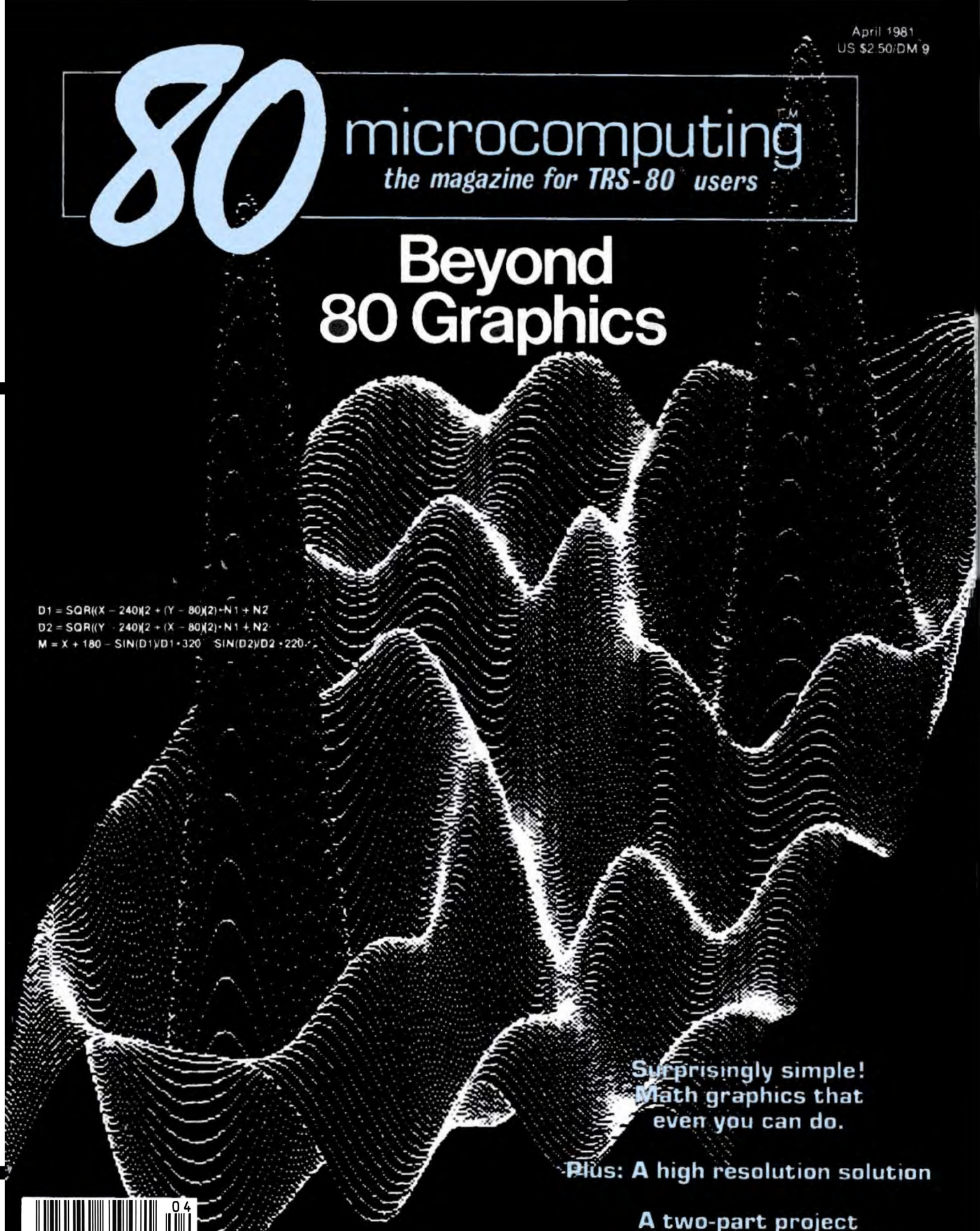
April 1981
US $2.50/DM 9

80 microcomputing™

the magazine for TRS-80 users

Beyond 80 Graphics



Surprisingly simple! Math graphics that even you can do.

Plus: A high resolution solution

A two-part project you can build and install.

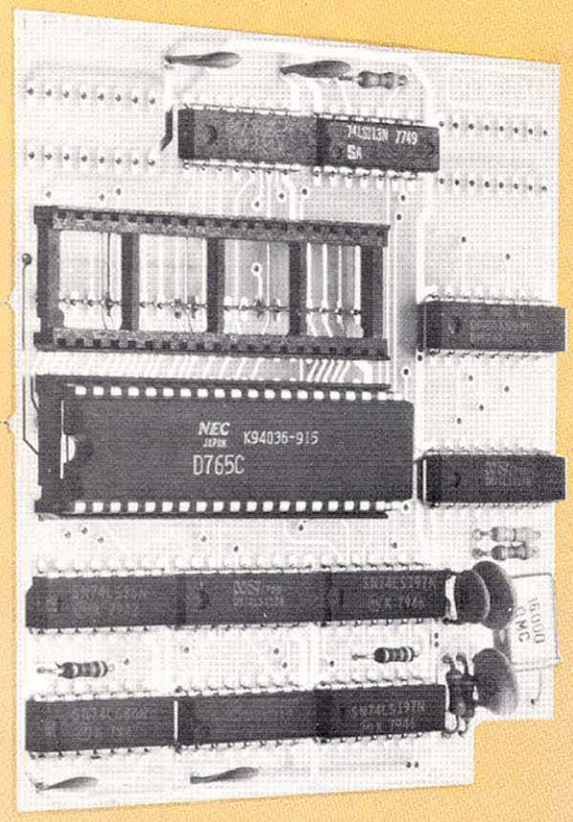
*trademark of Tandy Corp.

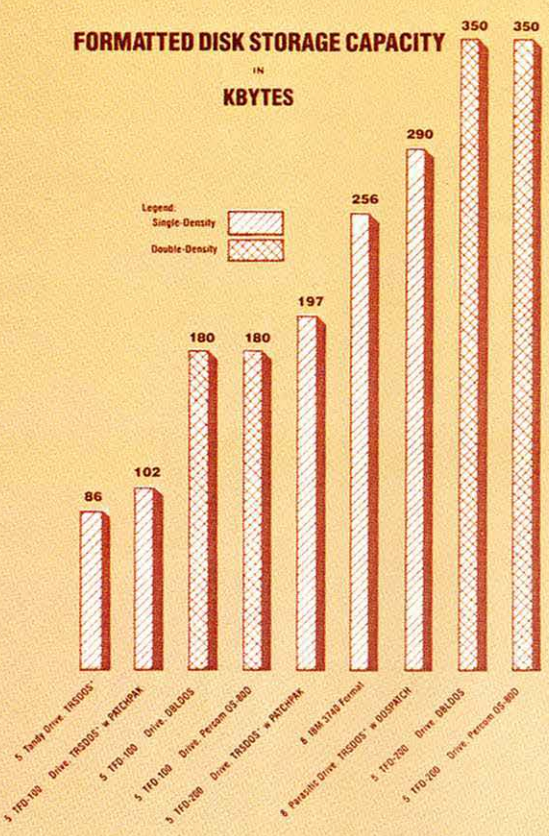
0 74470 65947 04

80 Microcomputing
4/81
#16

TRS-80* Model I Computer Owners . . .

Store Up to 350 Kbytes on a 5" Disk





The DOUBLER™. It packs almost twice the data on a disk track as your single-density system. Depending on the type of drive, you can store up to **four** times more data on one side of a minidiskette than you can store using a standard Model I mini-disk drive.

- The DOUBLER™ reads, writes and formats **either** single- or double-density minidiskettes.
- Proprietary design allows you to continue to run TRSDOS*, NEWDOS‡, Percom OS-80™ or other single-density software **without making any changes** to software or hardware. Switch to double-density operation at any convenient time.
- Includes DBLDOS™, a **TRSDOS* compatible** double-density disk operating system.
- CONVERT utility, on DBLDOS™ minidiskette, converts files and programs from single- to double-density or double- to single-density.
- The DOUBLER™ circuit card **includes high performance data separator, write precompensation** circuits for reliable disk read operations — even with 80-track drives.
- **Plug-in Installation** — The DOUBLER simply plugs into the disk controller socket of your Expansion Interface, requiring no strapping or trace cutting. Expansion Interface disk controller may be completely restored to original configuration by simply removing the DOUBLER™ and re-installing the original disk controller chip.
- Works with standard 35-, 40-, 77- and 80-track mini-disk drives rated for double-density operation.
- Introductory price, including DBLDOS™ and format conversion utility on minidiskette, **only** $219.95.

Mini-Disk Systems

More storage capacity, higher reliability — from Percom, the industry leader. One-, two- and three-drive configurations in either 40- or 77-track format. Fully burned-in. From only $399.

Double-Density Software

(On diskette — with instruction manual.)

OS-80D™ Double-Density Disk Operating System — This double-density upgrade version of Percom's acclaimed OS-80™ resides *entirely* in RAM — requiring only 7.5-Kbytes! A BASIC programmer's "dream operating system," even utilities are in BASIC.

DOUBLEZAP-II/80 This program modifies Apparat's NEWDOS/80‡ to run either double — or single-density programs — even to run a mix of the two formats on one system!

DOUBLEZAP-II/V This program modifies Virtual Technology's VTOS 4.0†† to provide the same capability as DOUBLEZAP-II/80 provides for NEWDOS/80.

Call toll-free, **1-800-527-1592**, for the address of your nearest authorized Percom dealer, or to order directly from Percom.

PERCOM

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

™ trademark of Percom Data Company, Inc.
* trademark of Tandy Radio Shack Corporation which has no relationship to Percom Data Company.
‡ trademark of Apparat Company, Inc. ††trademark of Virtual Technology, Inc.

PRICES AND SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE.
PRICES DO NOT INCLUDE SHIPPING AND HANDLING CHARGES.

Percom Mini-Disk Drive Systems for TRS-80* Computers...

Now! Add-On *and* Add-In Mini-Disk Storage for your Model III.

The industry leader in microcomputer peripherals, Percom not only gives you better design, better quality and first-rate service, but you pay less to *boot*.

New for the TRS-80* Model III

Patterned after our fast-selling TFD Model I drives. And subjected to the same reliability controls. These new TFD mini-disk systems for the Model III provide more features than Tandy drives, yet cost far less.

- **Flippy Capability:** Both internal (add-in) and external (add-on) drives permit recording on either side of a diskette.
- **Greater Storage Capacity:** Available with either 40- or 80-track drive mechanisms, Percom TFD mini-disk systems store more. A 40-track drive stores up to 180 Kbytes — formatted — on one side of a 5-inch diskette. An 80-track drive stores a whopping 364 Kbytes.
- **1.5 Mbyte On-line:** The Percom drive controller (included with the initial drive) handles up to four drives. With four 80-track mini-disk drives you can access over 1.5 million bytes of on-line file data.
  Moreover, the initial drive may be **either** an internal add-in drive or an external add-on drive. And whichever configuration you get, the initial drive kit comes complete with our advanced 4-drive controller, interconnecting cables, power supplies, installation hardware, a DOS and of course the drive mechanism itself.
- **First Drive Includes DOS:** OS-80™, Percom's fast extendable BASIC-language disk operating system, is included on diskette when you purchase an initial drive kit. Originally called MicroDOS, OS-80 was favorably reviewed in the June 1980 issue of Creative Computing magazine.
- **Works with Model III TRSDOS:** Besides being fully hardware compatible, Percom's Model III 40-track drive systems may be operated with Tandy's Model III TRSDOS — without any modifications whatsoever. And, TRSDOS may be easily upgraded with simple software patches for operating 80-track drives.

Percom TFD add-on drives start at only $399. Model III Drive kits start at only $749.95.

Quality Percom products are available at authorized dealers. Call *toll free 1-800-527-1592* for the address of your nearest dealer or to order direct from Percom.

Still #1 for Model I

As if greater storage capacities, exceptional quality control measures and lower prices aren't reasons enough to make Percom your first choice for Model I add-on drives, **all** Percom Model I drives are also rated for double-density operation.

Add our innovative DOUBLER™ adapter to your Model I Expansion Interface, and with Percom drive systems you can enjoy the same double-density storage capability as Model III owners.

The DOUBLER includes a TRSDOS*-like double-density disk operating system called DBLDOS™

We also offer a double-density Model I version of OS-80 as well as DOUBLEZAP programs for modifying NEWDOS/80 and VTOS 4.0† for DOUBLER compatibility.

Of course you don't have to upgrade your computer for double-density operation to use Percom mini-disk drive systems. In single-density operation, our TRS-80* Model I compatible 40-track drives store 102 Kbytes of formatted data on one side of a diskette, and our 80-track drives store 205 Kbytes. By comparison, Tandy's standard drive for the Model I stores just 86 Kbytes.

And like our Model III drives, Model I add-on drives are optionally available with "flippy" storage capability.

System Requirements:

Model III: 16-Kbyte system (min) and Model III BASIC. The second internal drive may be installed after the first internal drive kit is installed, and external drives #2, #3 and #4 may be added if either an internal or external first-drive kit has been installed. External drives #3 and #4 require an optional interconnecting cable.

Model I: 16-Kbyte system (min), Level II BASIC, Expansion Interface, disk operating system and an interconnecting cable. For double-density storage, a Percom DOUBLER must be installed in the Expansion Interface and DBLDOS (comes with the DOUBLER) or other double-density DOS must be used. For single-density operation, a Percom SEPARATOR™ adapter, installed in the Expansion Interface, will virtually eliminate "CRC ERROR — TRACK LOCKED OUT" read errors. Prices and specifications subject to change without notice.

PERCOM

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

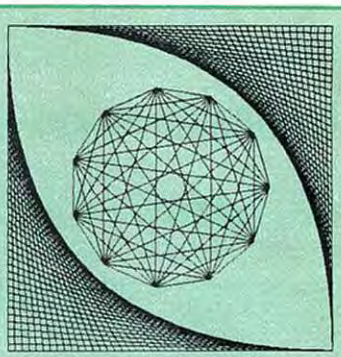
✓408

*Trademark of Tandy Radio Shack Corporation which has no relationship to Percom Data Company.
™DOUBLER, DBLDOS, OS-80 and SEPARATOR are trademarks of Percom Data Company, Inc.
†Trademark of Virtual Technology Corporation.

80 Contents

Part I 116
Advanced Graphic Techniques
by Bob Boothe

In the first of a three-part series on straightline graphics, Bob Boothe will show you what to expect from a TRS-80 and a dot matrix line printer. Part one deals with disk commands in ways you may never have thought of—especially in an 80 without drives.



A Turn of the Screw 117
by Bob Boothe

Some simple math programs by Bob Boothe produce some three-dimensional graphics that twist, turn and travel across your 80.

A High-Density Graphic Interface 134
by Dennis Murray and Paul Fowler, Jr.

Authors Murray and Fowler design a high-density graphics interface that will let you plot high-res graphics with no effort. The directions are here; you'll emerge with a better understanding of raster scan video concepts and more powerful graphics.

Programming for Education—Part 3 144
by Jerome I. Weintraub

This final installment in the Weintraub education series, tells you how to differentiate between types of educational programs and their objectives, while it offers some hints for clarity and keeping a student's interest up.

Rushing toward Courseware 74
by Pamela Petrakos

80 takes its first look at a new market trend. We surveyed a field of traditional book publishers to find out what their intentions were toward the burgeoning educational software market and how that industry will effect the textbook market in the future.

COMING NEXT MONTH

The May issue of *80* explores personal finance. Ever wanted a clear guide to the stockmarket? We've got an article which will guide you around the major pitfalls. We also have some sound advice on buying a new car and when to turn a profit on a new house. If that isn't quite what you need, another article will lead you through the whys and wherefores of sensible mortgage shopping.

PUBLISHER
Wayne Green

EXECUTIVE VICE PRESIDENT
Sherry Smythe

CORPORATE CONTROLLER
Charles Garniss, Jr.

ASSOCIATE PUBLISHER
Edward Ferman

ASSISTANT PUBLISHER
Jeff DeTray

ADVERTISING MANAGER
Kevin Rushalko

CIRCULATION MANAGER
(603) 924-7296
Debra Boudrieau

BULK SALES MANAGER
Ginny Boudrieau

ASSISTANT TO PRESIDENT
Matt Smith

ADVERTISING SALES
(603) 924-7138
Penny Brooks
John Gancarz

Manuscripts are welcome at *80 Microcomputing*, 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 Microcomputing*." Entire contents copyright 1981 by 1001001 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 Microcomputing (ISSN -0199-6789) is published monthly by 1001001 Inc., 80 Pine St., Peterborough NH 03458. Phone: 603-924-3873. Subscription rates in U.S. are $18 for one year and $45 for three years. In Canada, $20—one year only, U.S. funds. Canadian distributor: Micro Distributing, 409 Queen St. West, Toronto, Ontario, Canada M5V 2A5. Foreign subscriptions (surface mail), $28—one year only, U.S. funds. Foreign subscriptions (air mail), $60—one year only, U.S. funds. In Europe contact Monika Nedela, Markstr. 3, D-7778 Markdorf, W. Germany. In South Africa contact *80 Microcomputing*, P.O. Box 782815, Sandton, South Africa 2146. Australian Distributor: Electronic Concepts, Attention: Rudi Hoess, 55 Clarence Street, Sidney 2000, Australia. All U.S. subscription correspondence should be addressed to *80 Microcomputing*, Subscription Department, P.O. Box 981, Farmingdale, NY 11737. Please include your address label with any correspondence. Postmaster: Send form -3579 to *80 Microcomputing*, Subscription Services, P.O. Box 981, Farmingdale, NY 11737.

APPLICATIONS

179 **This Ain't No Party!** Pin friends and influence people. *Stewart E. Fason*
186 **Sans Disks** Data base management on cassette. *Stewart F. Hunter*
192 **Two Cents Worth** The TRS-80 old coin dealer. *Jack Clayton*
214 **Endorse It** It's easy to spend a million bucks. *Arthur J. Welcher*
252 **WHERZIT** Wonder what these titles *really* mean? *James H. Fox*
261 **Check Writer** Endorse a work of art. *Charles Z. Tzinberg*
266 **Exponential Smoothing** Smooth out your forecasting technique. *Len Gorney*

CONSTRUCTION

218 **The Model I½** Cut those cords. *Larry Fortna*
248 **Red Letter Day for Lowercase** A holiday modification story. *George C. Ferber*
228 **Lower Cost Lowercase** Ten bucks and some time will put you lowdown. *Philip M. Van Praag*

GAME

154 **Simul-80—A Weird Game** Surprise! Now you are a data bus. *Dennis Kitsz*

GENERAL

178 **The Unexpurgated Version** Real meanings of micro fables. *David D. Busch*
222 **Cost Effective Word Processing** Without disks and with class. *Larry M. Hewin, Ed.D.*

HARDWARE

262 **TRS-80 Joystick Control** Stick it to your 80. *Stephen Barker*
272 **TRS-80 Bus Conductor** Fox took what Radio Shack wouldn't give. *L. Joseph Fox*

INTERFACE

276 **The Model I As a Dumb Terminal** Talk to peripherals. *Jim Tallman*

RECREATION

210 **The Dot Game** Play games to learn programming. *Arthur J. Welcher*

REVIEW

195 **NEWDOS-80** Find out what it really is. *Allan J. Domuret*

STYLE

246 **Loops and Arrays** Two ways to streamline your programs. *L. Mitchell Wein*
297 **Block that Cursor** Stop your 80 from winking at you. *Ron Balewski*

TUTORIAL

240 **Fast Clock DOS** Teach your DOS to run races. *Allan J. Domuret*

UTILITY

271 **Compare** For identical twins. *William B. Everett*
298 **Smart Answers** How to hex your 80. *James F. Williams*

REGULARS

7 **Remarks** *Wayne Green*
8 **Inside 80** *Ed Juge*
12 **80 Input**
31 **Reviews**
44 **80 Applications** *Dennis Kitsz*
49 **80 Accountant** *Michael Tannenbaum*
52 **Education 80** *Earl R. Savage*
53 **The Assembly Line** *William Barden, Jr.*
61 **News**
70 **New Products**

PUBLISHER/EDITOR
Wayne Green

MANAGING EDITOR
Michael Comendul

TECHNICAL CONSULTANT
Jake Commander

PRODUCTION EDITOR
Clare McCarthy

NEWS EDITOR
Nancy Robertson

REVIEW EDITOR
Pamela Petrakos

ASST. TECHNICAL EDITOR
Chris Brown

ASSISTANT EDITORS
Chris Crocker
Debra Marshall

TECHNICAL CONTRIBUTING EDITOR
Dennis Kitsz

EDITORIAL ADMINISTRATION
Pat Graham
Nancy Noyd

DESIGN ASSOCIATE
Diana Shonk

MANUFACTURING MANAGER
Noel Ray Self

PRODUCTION MANAGER
Nancy Salmon

ASST. PRODUCTION MANAGER
Michael Murphy

AD GRAPHICS MANAGER
Robert Drew

AD COORDINATOR
Sue Symonds

ADVERTISING PRODUCTION
Steve Baldwin, Bruce Hedin, Maryann Metivier

PRODUCTION DEPT.
Joan Ahern, William Anderson Jr., Linda Drew, Bob Dukette, Kenneth Jackson, Ross Kenyon, Theresa Ostebo, Jane Preston, Patrice Scribner, Thomas Villeneuve

PHOTOGRAPHY
William Heydolph, Terrie Anderson, Bill Suttenfield

TYPESETTING
Barbara Latti, Sara Bedell, Michele Desrocher, Luann Keddy, Mary Kinzel, Linda Locke, Karen Stewart

---

Cover by Diana Shonk

MODEL III* for 320.00

PROGRAMS AVAILABLE NOW FROM MICRO-SYSTEMS SOFTWARE INC.

MODEL III DOSPLUS READY NOW! That's right! DOSPLUS 3.3 for the MODEL III is available now. We have our MODEL III, and now you can have our DOS. All the great features of our popular MODEL I DOS, plus Single or Double Density Operation. The best gets better! Order now, and soon your MODEL III will be all the computer it can be. Experience excellence. Experience DOSPLUS. **Introductory Offer $49.95**

DOSPLUS 3.2 or 3.2D The flagship of the Micro-Systems line. This is the BEST disk operating system currently available. It offers you all the features you could ever use, speed, reliability, and much more! Full support of variable length records. No more internal errors during file handling due to poorly written operating systems. Allows use of ISAM technique. Supports 35-80 track drives. The two operating systems are basically the same. However, Dosplus 3.2D will operate double density. The double density DOS has some differences peculiar to double density operation. Both systems offer DOS commands from BASIC, BASIC renum, and BASIC program compressor. DOS utilities include a sector display/modify program, a utility to purge files, AND a utility to restore purged or killed files. Free space map and the most comprehensive directory on the market. Try it and you'll never use anything else. All this and much more for only **$99.95** either system.

DISKZAP 2.3 A single or double density disk editor. Works with any number of tracks. It is track and sector oriented, and offers total access to all parts of the diskette. It has it all. It will even include a disk formatter. With DISKZAP 2.3 it is even possible to convert your single density disks to double density. Priced at only **$19.95** for Model I or III

MASTER DISK DIRECTORY 1.1 One of the most useful programs ever conceived. It will read the directories of up to 320 diskettes (or 5000 files). You can then search for a disk name, a filespec (or piece of a filespec), free space, or an extension. No more looking for programs that are "around here somewhere." Master directory will read any diskette directory, works to either the video or the line printer, will operate on either single or multiple drive systems, and is now available in Spanish. Retail price is **$29.95.**

ACCOUNTS RECEIVABLE 1.0 (including inventory package) A point of sale, invoice-generating and based accounts receivable program. Including INVCO 1.3 (a comprehensive manufacturing inventory program), this program will meet the specialized needs of almost anyone engaged in the wholesale or distributing business. The fastest and best program of it's type available anywhere. Requires a Model I, 32K, twin drive system. Also requires DOSPLUS 3.2. For speed, accuracy, and convenience, it can't be beat! Price quoted on request due to the custom configuring necessary in any business software.

SUPERBAK Any disk that will boot-up in your computer, this program will back-up. It will scan any disk created by the TRS-80 Model I, and create an exact copy of the disk. Retail price is **$19.95.** Single density only.

MOTHER PACKER A string packing graphics generator for the TRS-80 Model I. Offers you graphics like you never thought you'd have. Draw maps, reports, anything, with lightning speed. Re-draw the screen so fast that you can present the illusion of continuous motion. Cost is only **$9.95** on cassette. **$19.95** on disk.

*__2.2 meg__ on Model I with our Doubler Board and Drives. Blank 5¼" Diskettes

VISA

master charge

Micro Systems Software Inc. 384

Specializing in the Tandy Line

MS Inc.

(305) 983-3390

5846 Funston Street
Hollywood, FL 33023

CALL TOLL FREE FOR FAST SERVICE
(800) 824-7888, OPERATOR 193
FOR VISA/MASTERCHARGE/C.O.D. ORDERS
California dial (800) 852-7777, Operator 193
Alaska and Hawaii dial (800) 824-7919, Operator 193
TOLL FREE LINES WILL ACCEPT ORDERS ONLY!
For Applications and Technical information, call (305) 983-3390 or drop us a card.

Dealers inquiries invited

80 REMARKS

by Wayne Green

"One of the. . . benefits of being over fifty is the ability to put things into. . . perspective; other than that, I'd sell the privilege. . ."

The Home Revolution

I get a bit annoyed at the term "home computer," or even "personal computer." To my mind, a computer is a computer, and it is your use for it that determines which kind it is—not the size or the price. Yet I can see the day coming when we will indeed have some home computers. . . and their impact may be far beyond anything so far predicted.

Let's go back and look at the changes we've had in home life over the last 50 years. One of the very few benefits of being over fifty is the ability to put things into some perspective; other than that, I'd sell the privilege in a minute. Fifty years ago most families had one wage earner and they spent a good deal of their time at home. Wives, for the most part, devoted their time to keeping the home in good shape, bringing up the kids, and providing a good meal for the breadwinner when he came home in the evening.

We joke about that formula now, but it was a comfortable one and it resulted in kids getting a lot of attention (and love) from their mothers. While feeling the home to be a place of love and protection, they also got more home education as a result.

When the war came and most of the men had to join the armed forces, the women had to go out and do much of the work. They learned to get along with automatic washing machines, automatic dishwashers, frozen foods and other means for cutting down on the needs of the home. They also cut back on teaching and supervising their children, which may have something to do with the change in our family relationships, as well as the growth of disrespect for almost everything.

After the war the men returned, but the women kept on working. This gave more and more families two incomes, so house prices quickly rose to accommodate them. This, in turn, forced the one wage-earner families to get another wage earner out there, with the result that the non-working wife today is the exception rather than the rule.

When I was young my mother had an art studio, but the family came first, and I was raised with her reading to me during lunch. I developed an interest in reading which has stayed with me since. We spent many evenings playing games. I'm rather good at most of them. I enjoy a good jigsaw puzzle, a crossword puzzle, cryptograms and card games.

It may just be that the microcomputer will bring about some fundamental changes in home life. Firstly, the increased ability to communicate with anyone almost anywhere may allow many people to do most, or even all, of their daily work at home.

As the use of computers in education evolves beyond the simple things being done today, it may be easier for kids to learn at home. It may even be better for them. Schools may continue, complete with teachers, but more devoted to providing skill training than memorization. This will reduce the hours of use for the schools—perhaps only a couple days a week.

There is little question that computers are going to simplify the job of running and maintaining a home. Most grocery and other shopping should be computerized, thus making it possible for people to spend far more time at home than has been the practice during the last two generations. With much of the time devoted to both work and school being focused back on the home, perhaps children will get the attention and love they need.

Even movies are coming into the home via cable and video cassettes or disks. This may not be the best time in the world to buy restaurant stock.

If such a change does come about, I wonder if it will result in changes in the next generation? Will we see a drop in vandalism? In graffiti? Perhaps even in crime?

The new lifestyle will be much more energy efficient, with far fewer short trips for groceries and other local shopping. We may see a growth in the size of the number of malls, where families can go out to eat and look through a number of stores.

Our schools may get away from the usual classroom and tend to have labs and workshops where people can learn skills such as woodworking, sculpture, metalworking, foundry, electronic repairs, swimming, and a hundred other skills which require both skilled teachers and equipment.

That there has been a major change in children is certain. The reasons for this change are a bit more difficult to pin down.

We know that there has been a change in the home: We also know that the change was concomitant with the development of television, so that medium gets much flack. We also had the rising influence of Dr. Spock encouraging parents to give their children much more freedom than before. We can add in other factors, such as the impact of the Viet Nam war and perhaps even the war in Korea, neither of which were perceived with the patriotic fervor of WWII. I guess Hollywood let us down on our most recent wars. . . and television too. ■

Keying in Programs

Since it is a lot of work to key in a program from a magazine and one single error can (and usually does) screw up everything, we are preparing monthly dumps of the programs from *80 Microcomputing*. They'll be available on cassettes.

There seems to be some question in the minds of many readers about the legality of keying in a program and then providing a copy of this to a friend. Sorry to say, this is absolutely illegal. The material in this magazine is copyright. This means that you can read it and use the material for your own benefit, but you are not permitted to make copies and send them to friends without the specific permission of the publisher (me).

This is also true when it comes to passing along copies of these programs at clubs, over the telephone, via bulletin boards, etc. These are all copyright violations.

Yes, I agree there seems to be little harm in saving someone all the work of keying in a program—particularly when they, too, are a subscriber to the magazine. But if you take the seat of the pro-

Continues to page 10

INSIDE 80

by Ed Juge, director of computer merchandising, Tandy Radio Shack

"I'd like to thank those of you who responded to my request to let us hear your comments and suggestions. This time, you wrote."

This month, I'm taking a lesson from Jon Shirley, our Computer Merchandising VP. I'm starting my column at 35,000 feet over Plainview, Texas, enroute to beautiful Scottsdale Arizona for a three-day industry conference.

I'd like to thank those of you who responded to my request to let us hear your comments and suggestions. This time, you wrote! Our product managers have lots to work on, and it helps.

Model III Program Compatibility

Here's a subject which needs to be put to rest! Rumors have the compatibility figure between Models I and III running between 10-90 percent. A list follows of every Model I program which we know is not directly compatible or convertible to Model III. If the Model I program you're concerned with is *not* listed, you may assume it will run on or convert readily to Model III. (There may be incompatibilities we haven't found yet).

Programs which require program changes before use (your Model III comes with detailed instructions for changing, or you may order a modified version through your store at no charge, if you own the Model I package):

Cassette Portfolio	Budget Management
Tape Mail List	Lvl II Course-II
Real Estate III	Real Estate IV
Dancing Demon	Casino Games

The following programs cannot easily be converted. We will furnish a Model III compatible version at no charge to owners of the Model I version. (Model III versions are being included in future packages):

Mailgram	Scripsit Cassette
Scripsit Disk	Versafile
Profile	Microfiles
Fortran	S&P Stockpack
Business Mailing List	Micro Movie

Scripsit Disk, Fortran, and Stockpak Model III versions are not completed as of the date I'm writing, but we hope they will be by the time you read this.

Following are the only programs which will not run on or convert to Model III:

Space Warp	RS-232 Comm Pack
MicroChess	RS-Term
Editor/Assembler	Tiny Pascal
Visicalc—Model I	Renumber
Disk Instruction Course	Disk EDTASM
T-Bug	

Similar packages for the Model III are in the works for all of these except Renumber, which will work on Model III. In-Memory Information 26-1502 has already been replaced with 26-1508, same name, Model III compatible.

All programs not listed will run on or convert to Model III, using the Model III TRSDOS convert utility.

Scripsit and Line Printer IV

I want to correct a misunderstanding regarding the Line Printer IV. When we advertise a printer, of course we advertise the capabilities of the hardware. All of you aren't using all Radio Shack software, most of you have some programs you've written, and some (perish the thought) non-Radio Shack programs you've bought. Some of you bought one of our printers to use on someone else's computer. (See . . . we do admit there are other computers!)

We told you LP IV is capable of several different software-selectable type sizes or fonts, including high-density proportional spaced type—and it is. Unfortunately, our Scripsit packages do not support all the printer's capabilities. For example, Scripsit currently can't send the control codes to the printer for the change of type sizes. From BASIC or from a short user-supplied machine language program, but *not* Scripsit, you can command LP IV to go into proportional spacing.

Scripsit cannot justify proportionally-spaced type (our experts tell me there are maybe a half-dozen very expensive word processors which do offer this feature). Proportionally spaced type (on LP IV or Daisy Wheel II) looks great, but you can't use it with Model II Scripsit features like underlining, bold face, or decimal alignment tabs. Proper line length is also hard to judge, since different proportional characters occupy different widths.

We've never indicated in a Scripsit ad or story that these things could be done. Some folks misunderstood and expected to do things with LP IV that couldn't be done. We're sorry, there was no intention to mislead you.

Model II Scripsit offers three methods of justification. Space insertion works fine on LP-IV, and inserts full spaces between words. The other two methods are word increment and character increment, which insert fractions of spaces between words or characters to justify the line. Leave them for the Daisy Wheel II owners!

LP-IV is a dot-matrix printer, so the head must be travelling at a specific speed to print a character. If the printing is interrupted to process a command like backspace or space insertion, the head must return to the left margin and start over to print the next character. The result is that in these last two justification modes, the head will go "home" between every word or every character. Needless to say, throughput suffers.

Model II Owners Note

Two items: There seems to be some question about backing up Model II Scripsit disks. You can only do it with Scripsit's own backup utility. It won't backup using TRSDOS's backup command.

Secondly, a fair number of disk error reports from the field are still turning out to be eight-inch diskettes manufactured to single-density standards. They cause problems on a double-density system. You should weigh the cost saving carefully against your budget for disk errors.

Line Printer III/V Tips

The first of this year we got some bad ribbons for LP III and V. They have all been replaced, and should be out of our system now. One fact that many people don't realize is that these printers will lay about 500,000 characters on paper in an hour of continuous printing. The rated ribbon life is two million characters. That's only four hours of hard use!

Pushing a ribbon for more service can cause it to tear. When this happens, the torn ribbon can hook one of the print wires and destroy the head. That's expensive—on anybody's dot-matrix printer!

To help you extend your LP III or V head

META TECHNOLOGIES

26111 Brush Avenue, Euclid Ohio 44132

CALL TOLL FREE 1-800-321-3552 TO ORDER

IN OHIO, call (216) 289-7500 (COLLECT)

20

FILE BOX

DISKETTE STORAGE SYSTEM

$24.95 for 5¼" disks

$29.95 . . . for 8" disks

MTC brings you the ULTIMATE diskette storage system, at an affordable price. Storing 50 to 60 diskettes, this durable, smoke-colored acrylic unit provides easy access through the use of index dividers and adjustable tabs. Unique lid design provides dust-free protection and doubles as a carrying handle.

'RINGS' & THINGS

Help prevent data loss and media damage due to improper diskette centering and rotation with the FLOPPY SAVER™ reinforcing hub ring kit. 7-mil mylar rings install in seconds. Kit is complete with centering tool, pressure ring, 25 adhesive backed hub rings and instructions.

HUB RING KIT for 5¼" diskettes . $10.95
REFILLS (50 Hub Rings) . . . . . $ 5.95

Protect your expensive disk drives and your valuable diskettes with our diskette drive head cleaning kit. The kit, consisting of a pair of special "diskettes", cleaning solution and instructions, can be used for 52 cleanings. Removes contamination from recording surfaces in seconds without harming drives.

CLEANING KIT for 5¼" drives $24.95

PLASTIC LIBRARY CASES

(not shown)

An economical form of storage for 10 to 15 diskettes, and is suitable for your bookshelf! Case opens into a vertical holder for easy access.

5¼-inch diskette case $3.50
8-inch diskette case $3.95

Single Sided, Soft-Sectored 5¼-inch, (for TRS-80™) Mini-floppy

DISKETTES

$21.95 box of 10

These are factory fresh, absolutely first quality (no seconds!) mini-floppies. They are complete with envelopes, labels and write-protect tabs in a shrink-wrapped box.

PLAIN JANE™ DISKETTES

The Beautiful Floppy with the Magnetic Personality™

Thousands of people have switched to this low-cost alternative. These quality diskettes are packaged in a plain white box . . . no fancy printing, fancy names or fancy labels, not even our own (labels cost money). Trust us.

PLAIN JANE™ Diskettes $21.95
10 boxes of 10 (each box)$21.50

VERBATIM'S PREMIUM DISKETTES AT AFFORDABLE PRICES

DATALIFE™

Seven data-shielding improvements mean greater durability and longer data life. These individually, 100% error-free certified diskettes feature thicker oxide coating, longer-lasting lubricant, improved liner, superior polishing and more! Meets or exceeds IBM, Shugart, ANSI, ECMA and ISO standards. Reinforcing HUB RINGS help prevent data loss and media damage, reducing errors.

Buy the best . . . buy DATALIFE™

VERBATIM DATALIFE™ DISKETTES

5¼-inch (box of 10)
MD525-01 $26.95
10 boxes of 10 (each box)$25.95

8-inch FLOPPIES
Single-Density, FD34-1000 . . $33.95
Double-Density, FD34-8000 . $43.95

MICROPARAPHERNALIA

DISKETTES (box of ten)

5¼" PLAIN JANE™ $21.95
5¼" DATALIFE™ MD 525-01 . . $26.95
8" DATALIFE™ FD34-1000 . . . . $33.95
8" DATALIFE™ FD34-8000 . . . . $43.95

NEWDOS by APPARAT

NEWDOS/80 ★ SPECIAL $129.95
NEWDOS + to
NEWDOS/80 UPGRADE . . . . . CALL
NEWDOS + with ALL UTILITIES
35-track $69.95
40-track $79.95

BOOKS

TRS-80™ DISK
AND OTHER MYSTERIES . . $19.95
MICROSOFT™ BASIC DECODED $29.95
1001 THINGS TO DO WITH YOUR
PERSONAL COMPUTER . . . . $ 7.95

Let Your TRS-80™ Test Itself With

THE FLOPPY DOCTOR & MEMORY DIAGNOSTIC

by THE MICRO CLINIC

A complete checkup for your Model I. THE FLOPPY DOCTOR completely checks every sector of 35- or 40-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.

SYSTEM DIAGNOSTICS $19.95

An improved version of the SYSTEM DIAGNOSTICS above. Designed for single or double density, 35-, 40-, 77-, or 80-track disk drives. Includes new and modified tests. Features THE FLOPPY DOCTOR, Version 3.0.

SYSTEM DIAGNOSTICS-V3 . . $24.95

MORE PRODUCTS →

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation. DATALIFE is a trademark of VERBATIM. PLAIN JANE, AIDS-I, AIDS-III, CALCS-III, CALCS-IV, MERGE-III are trademarks of MTC.
1981 by Metatechnologies Corporation, Inc.

MOST ORDERS SHIPPED WITHIN ONE BUSINESS DAY

Products damaged in transit will be exchanged.

PRICES IN EFFECT April 1, 1981 THRU April 30, 1981.

Prices, Specifications, and Offerings subject to change without notice.

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

8104

- Add $3.00 for shipping & handling
- $3.00 EXTRA for C.O.D.
- Ohio residents add 6½% sales tax.

life, we have a head cleaning kit available, specifically for these printers. Your local Radio Shack store should order Cat. No. 700-3010. Though not usually a store-stocked item, they're readily available. Simple instructions are included.

Computerama '81

I hope you'll watch for this Radio Shack computer show when it hits your area. We're putting on shows in major cities again this year until June. We're showing all the new computers, Model III, Pocket Computer, Color Computer, and, of course, Model II. The format is a little different this time, and after a shorter main show, you can visit individual display areas for Scripsit, Visicalc, home uses (including Videotex), accounting applications, computers in education, and the Pocket Computer. In each room, there is a ten minute videotape presentation, followed by a chance to ask questions. I think you'll enjoy the show, and find there's lots of new material to see.

One new item at the show is Radio Shack's new Extended Color BASIC for the Color Computer! You must have 16K RAM to use Extended BASIC. Space is required for BASIC to operate, for graphics, and for video; a maximum of about 14.5K is user-available.

"One fact that many people don't realize is that those printers will lay about 500,000 characters on paper in an hour of continuous printing."

You'll see one-line instructions to draw a line from point A (x,y) to point B (x,y), make it either the foreground or background color. You can set foreground and background colors or draw a box by designating the coordinates of opposite corners in a single command.

You can draw a circle by specifying center and radius or just start and ending points, if all you want is part of a circle. You can also specify a height/width ratio to squeeze the circle. There's even a color parameter, if you're in a more-than-one-color mode.

With Extended Color BASIC you can load and save machine language tapes. You can specify an offset address to add to the loading address if desired. You can specify loading machine language programs at 300 or 1200 baud.

Modem I Specs Changed

Now for the bad news! It's more embarrassing than bad: Our newest computer catalog—RSC-5—and a few magazine ads list our new low-cost modem as 300/600 baud. The art and copy had such long lead times, we couldn't correct a last-minute change in specs. Modem I will be 300 baud only. In final Q.A. testing of production units, we found an unacceptable error rate at 600 baud. Sorry for any inconvenience. Model I owners will find a listing of a software package (and cable) which let you connect the Modem directly to your cassette port, for half-duplex operation without an expansion interface!

New, Low-Cost Line Printer VII

LP VII is an 80-column wide, tractor-feed line printer which uses plain paper and a ribbon that sells for $399. Its tractors are adjustable from 4½ to 9½ inches. Printing can be 80 or 40 characters wide on an eight-inch print line, upper and lowercase, at 30 cps. There's also a graphics mode for fully dot-addressable graphics.

We've provided both a serial (color computer) and parallel (other 80s) interface. I'm going to take my life in my hands and say it's available now. (Remember, *your* "now" is April, mine is early February, and there are two months in between for Murphy and his law to play with.)

Well, time flies when I'm having fun. I'm late again, so until next month... ■

80 REMARKS

gram's author, your perspective will change substantially. The author has a deep interest in getting the most from his hard work. The money he receives for one time publication really isn't enough, especially when his is a particularly useful program. This is why we are going to provide all of the *80 Microcomputing* listings on cassettes, with the royalties going to the authors.

In some cases, where a program is particularly valuable, it may also be issued by Instant Software as a separate package, or as part of a package. In this case the royalties may escalate surprisingly.

We're aiming at making the cassette dumps of the programs available for each issue of *80* as the magazines come out. They will hopefully be in stock in the computer stores carrying the magazine ...and eventually they will be available by subscription. As soon as everything is ready to go, you'll be seeing announcements of the service and the cost. ■

Programmer Demands

If one were to try to judge from the letters and phone calls, it is a jungle out there for programmers, with rip-offs right and left. Well, what should a programmer be looking for if he wants to get his program distributed?

A programmer needs to look into several aspects of program publishing before making a decision. He needs to know about the distribution the firm has set up, the royalty arrangement, the reliability of the firm and the advertising backup his program is going to get.

It stands to reason that a firm is going to be able to do a better job of selling a program if it is able to get it into almost every computer store in the U.S. and also, translated into other languages, into computer stores in other countries. A fundamental fact of life in sales: the more outlets you have, the better your likelihood of selling. This is why Instant Software has not only instituted a rep sales organization to cover the entire United States, but is also developing sales in 22 other countries.

Royalty Percentage

Your royalty is important too. Instant Software pays 20 percent and this seems to be both the standard and the top royalty being paid by any of the major software publishers. This is a good deal higher than book royalties, but then the idea was to encourage software writing—*good* software writing.

Another serious problem for the programmer is connecting with a reliable firm. One after another, program publishers have been going out of business, or selling out to other firms. This can raise hell with programmer contracts. Large ads do not a reliable firm make, unfortunately; so programmers should be wary.

Broad-based Advertising

Even the best of software won't sell if it is not advertised, so the ability of the program publisher to back up your program with ads is important. If your program is being sold only by mail order, you will have to make do with a fraction of the sales that you might expect if it were also sold through dealers.

More and more firms are developing their own distribution and advertising, so keep your eyes open and make sure that you connect with a good firm. ■

META TECHNOLOGIES

26111 Brush Avenue, Euclid Ohio 44132

CALL TOLL FREE 1-800-321-3552 TO ORDER

IN OHIO, call (216) 289-7500 (COLLECT)

H.C. Pennington

TRS-80 DISK & OTHER MYSTERIES

The perfect supplement for your NEWDOS, from IJG, Inc.

"TRS-80™ DISK AND OTHER MYSTERIES"

by Harvard C. Pennington

132 pages written in PLAIN ENGLISH packed with HOW TO information with details, examples and in-depth explanations. Recover lost files and directories, remove file protection, make BASIC programs unlistable. How to use SUPERZAP, recover from DOS errors and MORE!

TRS-80™ DISK $19.95

"OTHER MYSTERIES" VOLUME II

foreword by

H.C. PENNINGTON

James Farvour

MICROSOFT BASIC DECODED & OTHER MYSTERIES for the TRS-80

Call now and place your order for this new book, "MICROSOFT™ BASIC DECODED & OTHER MYSTERIES for the TRS-80™", from IJG, Inc. A primer for cassette and disk BASIC on the TRS-80™, the information provided applies to similar MICROSOFT™ BASIC interpreters. Features include definition of terms, an overview of BASIC and DOS, explanation of exits, error codes, verb actions, "cold" and "warm" restart procedures and examination of system utilities, arithmetic support and I/O driver routines, and the communications region in RAM. Individual routines are explained in detail, with an index provided for easy access. Appendixes include tables for BASIC and DOS vectors, stacks and interrupt locations, PLUS thousands of comment lines for the complete MICROSOFT™ BASIC.

MICROSOFT™ BASIC DECODED .. $29.95

Let your TRS-80™ Teach You

ASSEMBLY LANGUAGE

REMSOFT's unique package, "INTRODUCTION TO TRS-80® ASSEMBLY PROGRAMMING" includes ten 45-minute lessons on audio cassettes, a display program for each lesson providing illustration & reinforcement, and a text book on TRS-80® Assembly Language Programming. Includes useful routines to access keyboard, video, printer and ROM. Requires 16K - Level II, Model I.

REMASSEM-1 ..... $69.95

FOR DISK SYSTEMS $74.95

Let Your TRS-80™ Teach You

ASSEMBLY LANGUAGE DISK I/O TECHNIQUES

REMSOFT does it again! REMDISK-1 is a concise, capsulated supplement to REMASSEM-1. Package consists of two 45-minute lessons on audio cassettes, and display programs providing illustration and reinforcement. Provides specific track and sector I/O techniques, and sequential and random file access methods and routines.

REMDISK-1 ..... $29.95

MICROPARAPHERNALIA

DISKETTES (box of ten)

5¼" PLAIN JANE™ $21.95
5¼" DATALIFE™ MD 525-01 .. $26.95
8" DATALIFE™ FD34-1000 .... $33.95
8" DATALIFE™ FD34-8000 .... $43.95

NEWDOS by APPARAT

NEWDOS/80 ★ SPECIAL ★ $129.95
NEWDOS+ to
NEWDOS/80 UPGRADE ..... CALL
NEWDOS+ with ALL UTILITIES
35-track $69.95
40-track $79.95

BOOKS

TRS-80™ DISK
AND OTHER MYSTERIES .. $19.95
MICROSOFT™ BASIC DECODED $29.95
1001 THINGS TO DO WITH YOUR
PERSONAL COMPUTER .... $ 7.95

1001 THINGS TO DO WITH YOUR PERSONAL COMPUTER

BY MARK SAWUSCH

333 pages

$7.95

333 pages, written in simple terms, of "what-to-do" and "how-to-do-it". Suitable not only for microcomputers, but for programmable calculators as well. Includes program listings, formulas, a glossary of computer terms and more! Definitely a MUST BUY!

A PARTIAL LIST OF APPLICATIONS

Electric Memorandum
Energy Efficiency Computation
Test Your Typing Speed
Statistical Analysis
Options Analysis
Logic Circuit Analysis
Antenna Design
Carpenter and Mechanic's Helper
Income Tax
Speed Reading
Check Digit Generator
Personality Test
Morse Code
Finances and Investments
Biorythm
Letter Writing
Calculation of the Number of Days Between Two Dates
Simultaneous Equation Solver
Real Estate Evaluation
Astrology
General Purpose Clock/Timer
Recipe Index/Calculator
RPN Calculator

MORE PRODUCTS ⟷

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation. DATALIFE is a trademark of VERBATIM. PLAIN JANE, AIDS-I, AIDS-III, CALCS-III, CALCS-IV, MERGE-III are trademarks of MTC.
©1981 by Metatechnologies Corporation, Inc.

MOST ORDERS SHIPPED WITHIN ONE BUSINESS DAY

Products damaged in transit will be exchanged

PRICES IN EFFECT April 1, 1981 THRU April 30, 1981,

Prices, Specificiations, and Offerings subject to change without notice.

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

8104

- Add $3.00 for shipping & handling
- $3.00 EXTRA for C.O.D.
- Ohio residents add 6½% sales tax.

80 INPUT

"A little got to the printer but most just spilled right out on the floor. It was horrible— wall-to-wall alphabet soup!

Oh, Really?

I recently acquired a printer for my TRS-80 and wished to produce a hard copy duplicate of the monitor screen. Although I am not very proficient at programming, I could think of several possible ways to do this. However, as I am not too ambitious, I resorted to the yearly index in your December issue and came upon several articles detailing this very nicely.

Having made my selection, I carefully entered a screen printer subroutine from the March issue. I listed the program and proofread it carefully. I was all ready to go.

I hurriedly filled my screen with Quick Brown Foxes and several Lazy Dogs along with a couple of Now is the Times, and turned on my new toy. This is where the fun began.

While the program apparently ran perfectly as I GOSUBed 20000, I had failed to tighten the printer cable sufficiently and, as you have probably guessed by now, nearly all the screen's contents were dumped right on the carpet. A little got to the printer but most just spilled right out on the floor. It was horrible—wall-to-wall alphabet soup!

I am only glad that it was not the large print, for the vacuum cleaner may not have gotten it up.

I. T. Phoolesme
TaWorrie, NW 01313

Prechilling the interface cable generally slows this type of overflow to the point where you can catch it in a bowl if it occurs.—Eds.

CROSSREF Complication

D. N. Ewart's CROSSREF in the January issue immediately struck me as a very valuable utility—if only I could get it to work. After two attempts to key it in, I still couldn't get it to output the right line numbers.

Closer inspection showed that the computation is done in an absurdly complicated way: The program DIMs an array of the powers of two, and does successive additions to sum up the line number.

I recommend that others who've had problems with this try deleting lines 65520-65522, and insert: 65520 Y = PEEK(I + 4)*256 + PEEK(I + 3):RETURN.

The wasteful B( ) array can be omitted altogether from line 65504, and all the non-string variables can be DEFined at the integer level. These are helpful tips since the program can be quite useful for very long programs.

Dr. S. C. Mills
Wittenberg University
Springfield, OH 45501

Betrayed

On page 185 of the February, 1981 issue of *80 Microcomputing*, I see an ad for a PMC-80 computer.

I thought *80 Microcomputing* was for "TRS-80 users". As a TRS-80 user who is proud of his computer and his magazine, I feel betrayed by this ad for a competitor's machine.

Let PMC-80, PET, Apple, and the like advertise in their own users magazine.

If the ads in my magazine cannot support my machine, I am not interested.

David C. Mauldin
Hickory, NC 28601

Will you feel betrayed by our coverage of the Color Computer? The Model II or III? The Pocket Computer?

The PMC-80 bears a closer resemblance to the Model I than any of these.—Eds.

Deathmaze, Anyone?

"To Everything There is a Season" says Debra Marshall, as she explores Deathmaze 5000 (Med Systems Software). Upon reading the review by Ms. Marshall, I became very excited about this particular software program. Well, I looked up in the list of advertisers for Med Systems Software, and lo and behold, page 49 was to be my salvation (or destruction??). It was 2:00 pm on a Saturday and I thought I would have to wait until Monday to give MSS a ring (Rats!). I gave it a try anyway and they answered. A very polite gentleman informed me that my phone order for Deathmaze 5000 would be in the mail Monday. I asked him if he had read the review by Ms. Marshall and he said he had. He also said that if she likes Deathmaze 5000, she would "fall out of her chair" over Asylum.

By means of this letter I am offering to supply Ms. Marshall with a seat belt for her chair. After all, if she isn't getting any work done due to Deathmaze 5000, she will get even less done on the floor!!

See you in the Mental Ward!

Jeffrey Machusak
Joseph City, AZ 86032

I will take your kind offer under advisement, and add the seatbelt to my collection of crystal balls, rotten sneakers, and magic rings.—Debra Marshall, 80 Editorial

Programma Review

I appreciate your review (80 Reviews, February 1981, Bruce Douglass) of the 80-Grafix board from Programma International, Inc., but I hope you'll give me the opportunity to clear up some minor misunderstandings the reviewer may have had concerning our product.

Mr. Douglass' review may leave the misconception that our use of the cassette port may somehow interface with normal cassette operation. Use of the 80-Grafix board does not interfere with either normal or high-speed cassette operation. There is no external connection to the cassette port; the interface is entirely internal to the TRS-80. None of the port outputs affect cassette operation in any way.

Mr. Douglass seems to feel that programming our board requires a great deal of memory. He points out that programming the board requires up to one full K of memory, and video memory at that. There are advantages to this method. For example, to obtain an effective resolution of 384 x 192 pixels, it would take a memory-mapped screen of 9K; we require only 1K!

META TECHNOLOGIES

26111 Brush Avenue, Euclid Ohio 44132 ~20

CALL TOLL FREE 1-800-321-3552 TO ORDER

IN OHIO, call (216) 289-7500 (COLLECT)

MTC AIDS-III™

MODEL I . . .$69.95 MODEL II . . .$99.95

Introducing the latest addition to MTC's family of data management systems, AIDS-III. NO PROGRAMMING, easy to use. COMPLETE PACKAGE including demonstration application, documentation and MAPS-III (see below).

- Up to 20 USER-DEFINED FIELDS of either numeric- or character-type.
- CHARACTER-type fields may be any length (total: up to 254 characters).
- NUMERIC-type fields feature automatic formatting, rounding, decimal alignment and validation.
- Full feature EDITING when adding or changing records:
  - ENTER FIELD (can't type-in more characters than specified).
  - BACKSPACE (delete last character typed).
  - DELETE FIELD contents.
  - RESTORE FIELD contents.
  - RIGHT-JUSTIFY FIELD contents.
  - SKIP FIELD (to next or previous field).
  - SKIP RECORD (to next or previous record).
- SORTING of records is MACHINE CODE assisted.
  - 200 RECORDS (40 characters) in about 5 SECONDS.
  - ANY COMBINATION of fields (including numerics) with each field in ascending or descending order.
- SELECTION of records for Loading, Updating, Deleting, Printing and Saving is MACHINE CODE assisted.
  - Specify up to 4 CRITERIA, each using one of 6 RELATIONAL COMPARISONS.
  - LOAD or SAVE selected records using MULTIPLE FILES.
  - Example: Select records representing those people who live in the state of Colorado, but not in the city of Denver, whose last names begin with "F" and whose incomes exceed $9000.00.
  - Example: Select records representing those sales made to XYZ COMPANY that exceed $25.00, between the dates 03/15 and 04/10.

MAPS-III (MTC AIDS PRINT SUBSYSTEM), included at no charge, has the following features:

- Full AIDS-III SELECTION capabilities.
- Prints user-specified fields DOWN THE PAGE.
- Prints user-specified fields in titled, columnar REPORT FORMAT, automatically generating column headings, paging and (optionally) indentation.
- Can create a single report from MULTIPLE FILES.
- Prints user-defined formats for CUSTOM LABELS, custom forms, etc.

BELOW ARE TESTIMONIALS from owners of AIDS systems. These are absolutely authentic statements and are typical of the comments we receive.

"This program will do more for my business than all the other programs I have, combined."
David Wareham, Vice President (EDP), National Hospital and Health Care Services Inc.

"We have 32 different Data Base Management packages for the TRS-80. AIDS-III is easily the best. It also makes it easier for us to step up to our Model II since the package is available for both computers."
Jack Bilinski, President, 80 Microcomputer Services

"Your AIDS program is far and away the finest information management system that I've ever seen. I am currently using it to maintain a clear picture of the demographic data on all the kids in our residential treatment program and it is working for me superbly."
Frank Boehm, Director, Front Door Residential Treatment Program

MTC AIDS CALCULATION SUBSYSTEM-III™

MODEL I . . .$24.95

MTC's most popular AIDS subsystem. Use for report generation involving basic manipulation of numeric data. Features are:

- User-specified page title
- Columnar Headings
- Optional Indentation
- Use for accounting, inventory, financial and other numeric-based information systems.

MODEL II . . .$39.95

- Columnar subtotals generated when there is a change in a user-specified column.
- User-specified Columnar Totals
- Columnar values computed using constants and/or column values
- Balance forward calculations (Ex: Gross sales equals previous gross sales + sale amount + sales tax).

Compare AIDS-III™/CALCS-III™ with any other data management package under $100!

CALCS-III™ REQUIRES THE PURCHASE OF AIDS-III™

AIDS OWNERS! WE HAVE WHAT YOU'VE BEEN WAITING IV. . .

MTC CALCS-IV™, that is.

- **More Computations**
- **Save Report Formats on Disk**
- **Faster, and more!**

CALL FOR DETAILS and CALCS-III UPGRADE PRICING

MTC AIDS MERGE-III™

This subsystem will combine up to 14 AIDS-created data files into a single, large file. An optional purge capability removes duplicate entries while performing the merge operation (can even be used to eliminate duplicates in a single file). Machine-code assisted for high-speed performance, MERGE-III™ properly handles files sorted by any combination of fields, including numerics, with each field in ascending or descending order.

MTC AIDS MERGE-III™ $19.95
For Model II $29.95

MICROPARAPHERNALIA

DISKETTES (box of ten)

5¼" PLAIN JANE™ $21.95
5¼" DATALIFE™ MD 525-01 .. $26.95
8" DATALIFE™ FD34-1000 .... $33.95
8" DATALIFE™ FD34-8000 .... $43.95

NEWDOS by APPARAT

NEWDOS/80 ★ SPECIAL ★ $129.95
NEWDOS+ to
NEWDOS/80 UPGRADE ..... CALL
NEWDOS+ with ALL UTILITIES
35-track $69.95
40-track $79.95

BOOKS

TRS-80™ DISK
AND OTHER MYSTERIES .. $19.95
MICROSOFT™ BASIC DECODED $29.95
1001 THINGS TO DO WITH YOUR
PERSONAL COMPUTER .... $ 7.95

MORE PRODUCTS ⟷

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation. DATALIFE is a trademark of VERBATIM. PLAIN JANE, AIDS-I, AIDS-III, CALCS-III, CALCS-IV, MERGE-III are trademarks of MTC.
©1981 by Metatechnologies Corporation, Inc.

MOST ORDERS SHIPPED WITHIN ONE BUSINESS DAY

Products damaged in transit will be exchanged.

PRICES IN EFFECT April 1, 1981 THRU April 30, 1981.

Prices, Specificiations, and Offerings subject to change without notice.

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

8104

- Add $3.00 for shipping & handling
- $3.00 EXTRA for C.O.D.
- Ohio residents add 6½% sales tax.

Once the board is programmed, it remains programmed until the mode is changed again. You can program the board from DOS, or System, or from another BASIC program, and never use any space in an application program at all. This unique programming method allows you to design high resolution graphics characters for programs designed for Radio Shack's standard low-resolution graphics.

We do state that you can use both high resolution and low resolution graphics after our system is installed—and you can. Our experience answering telephone inquiries has shown that users don't mind not having them both at the same time. They generally want either the old (for their old programs), or the new. But if you must have some of each, there's no reason you cannot program Radio Shack's low resolution graphics into our high resolution 80-Grafix board.

Though I suppose there is somewhere a firm distinction between lowercase and a graphic character that only looks like lowercase, in general use, I cannot find such a difference. Programma's lowercase includes the ability for both DOS and BASIC input in lowercase. The problem with the printer substituting uppercase for lowercase and vice versa is directly a fault of the internal design of the TRS-80; the shift-key was designed by Radio Shack to operate backwards. We fixed it for the screen.

You can still use SET and RESET with low resolution characters, while using the high resolution characters elsewhere at the same time. All you have to do is program each of Radio Shack's low resolution single-pixel characters into the same positions in the high resolution mode. Then SET and RESET (and POINT) work as before.

I don't really see any reason for berating the demonstration software included with the board. True, one of the programs is a rather lengthy ad for our own product. What better way to show off lowercase, inverse video, high resolution and extensive graphics, than by using them to explain themselves? The program is, after all, a demonstration program; looking at the listing (simple, straightforward, and well commented) demonstrates more than adequately how to get the features in your own programs.

The character generator you get does appear different from the one in the ad. The one in the ad hadn't been invented yet when the photograph had to be taken. The programmer just programmed the screen, for the convenience of the photographer, due to the long lead times involved in advertising photography. When the character generator was finally programmed, there were differences between the original conception and the final program. But the character generator we supply is more convenient to use, as it supplies data statements which can be used directly in your own BASIC program, instead of having to use separate machine-language drivers.

If you do prefer working with machine-language files, we have reasonably priced systems which manipulate pre-defined and custom character sets in disk and tape files.

Jeff Lasman
TRS-80 Project Coordinator
Programma International, Inc.
Burbank, CA 91504

ZBUG Thanks

Your ZBUG article in the January '81 issue forced me to take pen in hand and thank you and Lt. John B. Harrell, because it really is a super Debug monitor.

I enjoy programming in BASIC and have only dabbled at assembly language, having only EDTASM but no T-BUG or facsimile. ZBUG worked the first time I loaded it and I am now more enthusiastic about writing some assembly language subroutines for my BASIC programs.

I did find a minor flaw in the ZBUG listing in Part 4 which I corrected to clean up the screen display. Line 406 needs seven more blank spaces between CONTENTS and MODE for the TITLE.

Many thanks to the authors throughout the country making my family's hobby more fulfilling and enjoyable.

Bob Clark
Plainfield, IN

Shack Statistical Fix

Thank you for Robert P. Johnson's review, "STATS," in the December issue of *80 Microcomputing*. It is a thoughtful evaluation of the Radio Shack and Creative Computing statistical programs, and it helps in making a choice between these two packages.

Radio Shack has issued corrections for a few errors in their statistical programs, but there is a bug in their chi-square program that has not been mentioned in any Radio Shack literature that I have seen. The error occurs only in chi-square problems involving one degree of freedom, for which the Yates' correction for continuity is applied. The Yates' correction is supposed to reduce the chi-square value, but in the Radio Shack program it has the opposite effect. The program can be fixed by changing the last statement in line 280 to: CS = CS + (ABS(O(I,J)) – E(I,J)) – CC†2/E(I,J).

The error resulted from the simple omission of the ABS term in the original statement. The error (and the fix) would be obvious to anyone with fair knowledge of both programming and statistical inference—if one suspected a problem and checked the program.

Cynicism may be an unappealing trait, but "suspecting problems" is almost a virtue for the software user. The old advice still holds: Conduct trial runs of a new program and compare the results with results that are known to be correct, before relying on the program for any serious application.

Alfred L. Brophy, Ph.D.
West Chester, PA 19380

Packing Color Strings

If you have a Color Computer, you have noticed that SET and RESET graphics are just as slow as they are on the Model I. With the Model I you have an alternative by using VARPTR to pack strings with graphic characters, but that command was left out of the 8K Color BASIC.

As a software author, I wanted to get the Color Computer and see what I could do with high resolution color graphics, but Tandy hasn't released the information on how to get into HI-RES yet. I started to search for an alternative method to produce graphics until I became more adept at the 6809 instruction set.

The Color Computer stores variables in much the same method as the Model I. Strings are stored as follows:

NAME1/NAME2/LEN/MARKER/ADDR1/ADDR2/MARKER

Name1 = first character of variable name

Name2 = second character's ASCII value + 128

LEN = length of the string

MARKER = is apparently a delimiter (00)

ADDR1 = first byte of string's address

ADDR2 = second byte of string's address

MARKER = another delimiter (00)

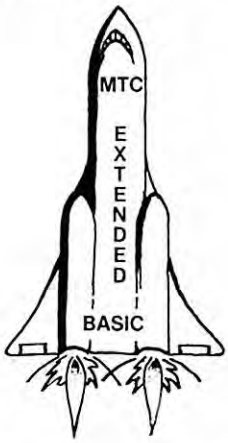
Because the 6809 doesn't store numbers backward, you can find the string's address with the formula ADDR = ADDR1 •256 + ADDR2.

Non-SET graphics on the Color Computer are even simpler than I first imagined by using this information:

META TECHNOLOGIES

26111 Brush Avenue, Euclid Ohio 44132 ⌐20
CALL TOLL FREE 1-800-321-3552 TO ORDER
IN OHIO, call (216) 289-7500 (COLLECT)

TAKE YOUR MODEL II TO NEW HEIGHTS



MTC is proud to announce MTC EXTENDED BASIC for the Model II, by R. Ryen. Features include "fixes" to existing BASIC, multi-line functions, extending an existing sequential file, PEEK, POKE, greatly enhanced screen control and expanded editing capabilities. The contents of variables are NOT CHANGED when editing, deleting, inserting or merging lines, allowing continued program execution! All this and much more.

MTC EXTENDED BASIC..... $ 99.95

80 - 20 = 129.95

THE ORIGINAL NEWDOS/80
WITH MTC QUE CARD

★ **SPECIAL PRICE** ★

SAVE $20 **$129.95**

Apparat's long-awaited successor to NEWDOS+ is here! This is not an enhanced version of NEWDOS, but a completely new product. Simplified DOS commands can be instantly executed from BASIC, even within a program, without disturbing the resident code. System options, such as password protection, number and type of disk drives, BREAK key enable/disable and lowercase modification recognition, can be quickly and easily changed. Five new random-access file types allow record lengths of up to 4096 bytes, and no FIELDing! A powerful CHAIN facility allows keyboard INPUTs to be read from a disk file. An improved RENUMBER facility permits groups of statements to be relocated within program code. Diskettes may even be designated as RUN-ONLY! Features all NEWDOS+ utilities (SUPERZAP 3.0, etc.) and much more! One MTC technical staff member said having NEWDOS/80 is "better than sex" (you'll have to judge for yourself!). Includes 180-page instruction manual and MTC QUE card.

NEWDOS/80 # SPECIAL # $129.95
MTC QUE Card only ..... $ 7.50
CALL REGARDING OUR NEWDOS+ UPGRADE PRICING

MICROPARAPHERNALIA

DISKETTES (box of ten)

5¼" PLAIN JANE™ $21.95
5¼" DATALIFE™ MD 525-01 .. $26.95
8" DATALIFE™ FD34-1000 .... $33.95
8" DATALIFE™ FD34-8000 .... $43.95

NEWDOS by APPARAT

NEWDOS/80 ★ SPECIAL ★ $129.95
NEWDOS + to
NEWDOS/80 UPGRADE ..... CALL
NEWDOS + with ALL UTILITIES
35-track $69.95
40-track $79.95

BOOKS

TRS-80™ DISK
AND OTHER MYSTERIES .. $19.95
MICROSOFT™ BASIC DECODED $29.95
1001 THINGS TO DO WITH YOUR
PERSONAL COMPUTER .... $ 7.95

Let Your TRS-80™ Test Itself With

THE FLOPPY DOCTOR & MEMORY DIAGNOSTIC

by THE MICRO CLINIC

A complete checkup for your Model I. THE FLOPPY DOCTOR completely checks every sector of 35- or 40-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.
SYSTEM DIAGNOSTICS..... $19.95

An improved version of the SYSTEM DIAGNOSTICS above. Designed for single or double density, 35-, 40-, 77-, or 80-track disk drives. Includes new and modified tests. Features THE FLOPPY DOCTOR, Version 3.0.
SYSTEM DIAGNOSTICS-V3.. $24.95

Complete for Model I with all utilities
Plus exclusive MTC QUE card!

NEWDOS +

$69.95 by Apparat

Includes REF, RENUM, SUPERZAP, EDITOR/ASSEM., DISASSEM., DIRCHECK, and more! This is the original NEWDOS with all of Apparat's utility programs. Includes exclusive MTC QUE (Quick User Education) card.

40-Track Version $79.95
MTC QUE Card only ..... $ 1.50

← MORE PRODUCTS

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation. DATALIFE is a trademark of VERBATIM. PLAIN JANE, AIDS-I, AIDS-III, CALCS-III, CALCS-IV, MERGE-III are trademarks of MTC.
© 1981 by Metatechnologies Corporation, Inc.

MOST ORDERS SHIPPED WITHIN ONE BUSINESS DAY

Products damaged in transit will be exchanged.

PRICES IN EFFECT April 1, 1981 THRU April 30, 1981.

Prices, Specificiations, and Offerings subject to change without notice.

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

8104

- Add $3.00 for shipping & handling
- $3.00 EXTRA for C.O.D.
- Ohio residents add 6½% sales tax.

basis (see TRSDOS technical information in TRSDOS & Disk BASIC Reference Manual). This facility seems to consistently drop the last sector, so I have found it necessary to pad my files at the end. Check out the LOF function—I haven't tried it on these files.

Bill Bunn
Covelo, CA

BASIC Doodle

In the article "Doodlebug," I felt the unexperienced programmer without machine language orientation was left out. I have developed an 11 second, BASIC, reverse video program for Level II:

```
5 ON ERROR GOTO 120
•
•
•
100 FORB 15360TO16383:POKE B,319 – PEEK(B):NEXT
110 RETURN
120 RESUME NEXT
```

One word of warning: The program will demolish any letters on the screen.

Mike Case
2304 Lakeview Dr.
Melbourne, FL 32935

TC-8 Cassette Interface

I am the owner of an early model TRS-80 microcomputer, which has a CTR-41 cassette recorder instead of a CTR-80.

A few weeks before Christmas I purchased a TC-8 Cassette Interface unit from JPC. I assembled the unit at a friend's home, following the very well written assembly instructions. The system tested flawlessly and just as advertised. I was extremely pleased and delighted with my new hardware and software.

I later connected my TC-8 to my CTR-41 cassette recorder after modifying it in the manner explained in the TC-8 Cassette Operating System users manual. I was surprised to find that the recorder motor control function was not working. The CTR-41 motor ran whenever any of the control buttons were depressed. This malfunction made it impossible to make use of one of the TC-8's nicest features; the ability to position to various program and data files on the tape. After ascertaining that the required modification had been performed correctly, I decided to call the folks at JPC.

I was introduced to a Mr. Bruce Kernodel and we exchanged information to establish exactly what my problem might be. Mr. Kernodel was highly knowledgeable of the inner workings of both the TC-8 and CTR-41. He explained that the CTR-41 modification is designed to connect system ground to power supply ground directly while bypassing the remote jack. He also explained that this leaves only the motor to be switched by the remote jack and thus reduces the amount of current that the TC-8 and TRS-80 must handle in turning the cassette recorder off and on. Mr. Kernodel also mentioned that in the past all of the CTR-41 recorders they had seen were wired exactly the same with regard to the wires connecting the remote jack to the circuit board. He did say, however, that if for some strange reason they were not wired that way in my recorder I would need to reverse them.

I followed Mr. Kernodel's advice and reversed the two wires. I was relieved to discover that the TC-8 now functioned beautifully.

If you have followed all of JPC's instructions correctly and have the problem I have had, locate the two small white wires connected to the remote jack and try reversing them.

My thanks to Mr. Kernodel and the folks at JPC. Their product and support is first rate and deserving of praise.

J. P. Richmond, Jr.
St. Albans, WV 25177

Short Stuff

This short utility grew out of a competition between my son and myself, with Jeffrey finally getting the last word when he got it down to 28 characters (including the line number). At that point I thought it just interesting enough that you might want to pass it on to your readers to elaborate on.

Robert F. Vavasour
St. Johns, Newfoundland A1A 385

The World's Shortest Wordprocessor:
Written by Jeffrey Vavasour, 11 years old

```
1 PRINTCHR$(14);INKEY$;:GOTO1
```

The program could be further shortened to remove the cursor, by only typing "PRINT INKEY$:GOTO1". Clearing the screen, either in whole or in part, is performed by first positioning the cursor by using SHIFT and one of the arrows, then pressing the CLEAR key which will erase the screen from the cursor position to the bottom of the screen.

Printer output is obtained by using the JKL feature of NEWDOS.

END Your Programs

Your December issue more than paid for the first year's subscription. "Assemble It Yourself" by Richard Koch makes Radio Shack's Editor/Assembler usable for the first time. The article is quite clear, and the Program Listings gave no problems. Well done!

I also found Richard Halloran's "Printer Pagination" quite useful, and lost no time in using it. No one-upsmanship intended with the enclosed listing of my version of Mr. Halloran's program.

```
10  CLEAR500
20  OPEN"I",1,"PROGRAM"
30  CLS:PRINT@320,"LOADING THE PROGRAM IN-
    TO MEMORY
40  PRINT:PRINT"IN CASE YOU FORGOT, FILE
    NAME IS 'PROGRAM' "
50  PN = PN + 1:LPRINTSTRING$(70," ") "PAGE
    "PN:LPRINT" ":LPRINT" "
60  IFPEEK(16425) = 50 THEN LPRINTCHR$(12)
    :GOTO 50
70  LINEINPUT #1,R$
80  LPRINT R$
90  IF RIGHT$(R$,3) = "END" CLOSE ELSE 60
100 LPRINTCHR$(12)
110 END
```

I would like to offer your readers the following suggestions: Call the last line of the program to be LLISTed "END". Then it is not necessary to count (or remember) the number of lines in the program. The printer will stop when the program line is "END" and do a last top-of-form. Line 50 of the new version automatically prints the page number at the top right corner of each page of the listing.

Finally, be sure that the number of characters in each line of your program does not exceed the number of characters per line of the printer, otherwise the pagination will become skewed. My Line Printer II (Centronics 730) will issue a carriage return/linefeed automatically at the end of 80 characters, while the TRS-80 updates location 16425 only when the program calls for a linefeed.

Gary Himler
Granada Hills, CA

Two ROM Improved?

The change by Radio Shack from the three ROM version of the TRS-80 to the two ROM improved (?) system blocks reading tapes on the second cassette connected to the interface. They can be written to, but not read. This arbitrary change is contrary to the claims and technical data on the interface, and Radio Shack should be pressured into putting the feature back. In fact, the read function is the most useful aspect of having a second cassette recorder, since it can be used as a software ROM to load utility programs into protected memory. Included in those programs is the printer driver, etc.

Readers should take appropriate steps if they are considering buying an interface with the intention of using all the stated facilities.

I'fan Gwyddno Hall
Pickering, Ontario

When DecisionMaster™ speaks everybody listens.

Let's face it. We all have to make decisions. Decisions that can change our lives. Decisions that can make us happy or unhappy. Decisions that could win us fame or fortune. Now, DecisionMaster can help you make the best decisions of your life.

Use Bayesian theory to peer into the future...even if you've never heard of the Bayes' Rule. Do a complete weighted factor analysis...without knowing what one is. Use discounted cash flow to compare investment alternatives without bothering with present value tables. These and other sophisticated theories that were once the exclusive domain of professors and top business executives are *built into* DecisionMaster's algorithms... so you can use them at the touch of a key!

DecisionMaster is easy to use. It features:

- A fully documented manual developed by an authority in the field.
- A unique program-controlled cross reference system.
- A powerful formatted-screen data entry system.

You'll use DecisionMaster in hundreds of routine decisions, as well as more important ones such as • Buying a house • Changing jobs • Selecting investment • Evaluating insurance policies • Expanding product lines • Leasing vs. purchasing.

If you buy only one computer program this year, make it DecisionMaster. And when it speaks, *listen.*

DECISION? MASTER™

To order, see your software dealer or return this form with your check to: DecisionMaster, Dept. 80, 10635 Richmond, Houston, Texas 77042 Add $1.50 for shipping and handling

Diskette for: ☐ Apple II* (32K) $29.95 ☐ TRS-80** (Level II-32K) $29.95 ☐ TRS-80** (Model III) $39.95

Name

Address

City State Zip

CHARGE by phone toll-free: **1-800-231-5768 Ext. 306**
(In Texas: 1-800-392-2348) or return this form:
☐ VISA ☐ MasterCard Bank Code

Account No.

Signature

Expiration Date

*Apple II is a registered trademark of Apple Computers, Inc.
**TRS-80 is a trademark of the Radio Shack Division of Tandy Corp.

-302

point is 1AF8H, and it returns with HL pointing to the two bytes of zeros which mark the end of the program. Code to use this routine would go at the end of the compression process, and might look like:

```
CALL   1AF8H          ;RESET THE FORWARD CHAIN
INC    HL             ;BUMP HL PAST
INC    HL             ;THE ZERO BYTES
LD     (40F9H),HL     ;PARK IT AS END OF PROGRAM
```

Anyone who compresses their programs should be warned to save the original. The first reason is obvious: After a program has been compressed, it is hard to read, and future updates would then be more difficult. The second is more subtle: Removing blanks from a 'tokenized' BASIC program will not cause any immediate problems, but if the program, or part of it, were converted to ASCII, and then re-tokenized, the meaning of the code can change. There are probably hundreds of situations where this will occur, and simply EDITing a line, even if you don't change anything, can do the damage. An example of such a line is:

```
10 IF S = T AND U = V THEN W = X
```

After compression, it would be:

```
10 IFS=TANDU=VTHENW=X
```

This causes no problem until, for example, the program is SAVEd in ASCII. When reloaded, BASIC would see (Blanks and ?? added for clarity):

```
10 IF S = TAN ?? DU = V THEN W = X
```

BASIC will misinterpret this line, believing that the keyword TAN is incorrectly used.

Bill's approach to deleting REM lines only goes halfway to doing the job correctly. An example of coding you will see time and time again follows:

```
  10 GOSUB 1000
  20 END
1000 'THIS IS THE CALCULATION SUBROUTINE
1010 A=B+C
1020 RETURN
```

In this case, if line 1000 were deleted, the BASIC program would be broken. The complete solution is to analyze the entire program and determine which lines are referenced by other lines, and not to delete referenced lines. Numbers which follow ELSE, THEN, GOTO, RUN, RESTORE, GOSUB, RESUME, LIST, LLIST, DELETE, and ERL tokens are line number references. This is a lot of trouble, and a much easier solution is not to remove the entire line, but to remove only its contents. This results in saving five fewer bytes per line, but eliminates the above problem.

Bill's code also does not take into account the potential problems in compressing FIELD statements. The pitfall here is that the AS keyword is *not* tokenized, but remains in the program in ASCII. An example of a dangerous FIELD statement is: `10 FIELD 1, 2 AS C$`
If the blank is removed between the AS and the C$, the interpreter will incorrectly read it as ASC, another keyword. The easiest solution is to leave FIELD statements alone.

A word of caution is in order for anyone who might attempt to implement Bill's suggestion for further processing which involves consolidating lines: You can not merge a 'referenced' line into the preceding line, so it will be absolutely necessary for you to perform the comprehensive analysis described above to determine which lines are the target of referencing statements.

Robert F. Snapp, President
Snapp, Inc.
Cincinnati, OH 45242

Light Pen

A number of people have been writing to us lately to ask if we still sell the Light Pen and Light Pen kits which were described in "Build a Light Pen," April 1980, *80 Microcomputing*. Please tell your readers that we are still gladly shipping both assembled Light Pens ($29.95) and Light Pen kits ($19.95). We are very sorry to say that we cannot sell individual components used in building the Light Pen, but we consider the kit at $19.95 a very good value. Thank you for your fine publication.

Wayne Holder
Oasis Systems
San Diego, CA 92103

Two-chip ROM

Ever since the Model I two-chip ROM came out I have been watching for installation hints but have not seen any. Therefore, my experience may be of value. For the newer "G" printed circuit boards the proper ROM Level II kit is part number 263-1120.

The new ROM marked "NEC K01049-004" goes in the ROM A position marked Z33 on the printed circuit board, and the ROM marked "SCM 91609P" goes in the ROM B position marked Z34 on the board. The DIP shunt in socket Z3 is replaced with the new one provided in the kit, but it must be programmed first. All connections remain intact except for the pin 1 to 16 connection which is opened for the 16K RAM configuration.

That is all there is to it, except you should take the normal precautions when handling CMOS ICs (i.e. ground the circuit board, yourself, and the IC insertion tool). Make sure the ROM and the DIP shunt are properly oriented as well.

So far I have had no problem running old Level II tapes with the new ROM.

Ronald O. Anderson
Dayton, OH 45431

Programmer Review Notes

In reference to the review of our program "Programmer" that appeared in the January '81 issue of *80 Microcomputing* I would like to make two statements:

(1) The bugs reported by Mr. Thurlow have been corrected; Programmer is, so far as we can tell, completely free of bugs.

(2) Anyone owning a copy of Programmer, version 1.6 or earlier, can obtain a new, bug-free copy without charge by returning their original to Rational Software along with their name and address.

Tom Little
Rational Software
963 E. California Blvd.
Pasadena, CA 91106

CMD Functions

The following CMD functions are available on Model I TRSDOS 2.2 and 2.3. (Don't call Ed Juge, just try them.)

1. CMD"E" Display most recent disk error
2. CMD"#"# Display MICROSOFT copyright notice
3. CMD"A" Same apparent function as CMD"S" but goes through 4030 whereas CMD"S" goes through 402D and 4400.

TRSDOS 2.2 and 2.3 also allow for relative record random access with records smaller than 256 strung into 256 byte blocks. When asked "How Many Files?", reply nV. This will allocate an extra 256 byte buffer for each file. Note that this will reduce your available memory. To open a file for short record access, OPEN "R",n, file descriptor, record length. GET and PUT will then operate on a relative record

I started by selling programs, and a year later they said I was "the standard of the industry."

Now I'm selling the whole computer.

I'm Irwin Taranto, the one who changed the TRS-80* into a serious business computer.

Thousands of businesses tried my programs in the last year and a half, and sometimes it seems like every one of them has called me on the phone. With every call, I get another idea. I polish, alter, upgrade and correct these programs constantly.

By now I know how they work best, and exactly what they need in the way of peripherals. It's only logical that I should sell the whole computer system, not just the program diskettes.

So if you look at the computer in the picture, you'll see it says "Taranto" on it, not "TRS-80." The keyboard and CRT unit are a Tandy II* (that's what the manufacturer calls TRS-80 Model II when it's not sold through the Radio Shack). If it fits your needs better, though, we'll get the disk drive or the line printer somewhere else.

When you buy one of these Taranto computers, you get some serious advantages.

Some serious advantages.

You get hardware that's absolutely tailored to my programs. This means you'll be able to use every bit of the capability that's built into these systems.

You get my backup, down the line. If something goes wrong, we tell you how to fix it over the phone. If the problem's tough enough, I get on the phone myself. If we find out it's a hardware problem, you can get it fixed at any Radio Shack Service Center, even though it says "Taranto" on the machine. If you want to be completely covered, we'll arrange a service contract that takes care of everything.

In a lot of cases, we can help you set it up, too. I'm putting a group of authorized dealers together. Before long, they'll be all over the country, able to bring the equipment and programs right to your business. They'll spend a day or so with you helping you shake it down. It'll cost a little more, but it's good insurance.

The programs.

When you buy a Taranto computer, you're also buying these systems — any or all — each custom-tailored to your own needs, all interacting with each other, all integrated with the General Ledger.

General Ledger/Cash Journal
Accounts Payable/Purchase Order
Open Items Accounts Receivable/Invoicing
Balance Forward Accounts Receivable (new)
Payroll/Job Costing
Inventory Control (new)

Of course, if you already own a TRS-80 (any model), all our programs are available without the hardware.

Put it all together, and you have a truly serious, truly supported computer, software and hardware included — for as little as $8000.

I think they just might decide I've moved that "standard of the industry" up a notch or two.

Taranto
& ASSOCIATES, INC. ↙45

The Total System Store™

121 Paul Drive, San Rafael CA 94903.
Outside California, phone toll free (800) 227-2868.
In California (415) 472-2670.
Authorized dealers throughout America.

*Trademarks of the Tandy Corporation

↙See List of Advertisers on page 306

ΩMEGA SALES CO. ✓389

"WHOLESALE COMPUTER PRICES" DIRECT TO THE PUBLIC

East Coast: 12 Meeting St., Cumberland, RI 02864
West Coast: 3533 Old Conejo Rd., #102, Thousand Oaks, CA 91320

Intertec Superbrain
32K Ram - $2449
64K Ram - $2649

NEC spinwriter
5510-5530 - $2449

Apple II - 16K, 48K
Call for Price

Epson MX-80 - $599

Diablo 630 - $1995
(with tractor feed) $2195

Televideo
912 B or C — $699
920 C — $769

PRODUCT SPECIAL of the MONTH!!

Products are NOW IN STOCK AT ΩMEGA Sales Co.

Atari 800 16K - $749
32K - $849

Atari 850 Interface Module $159
Atari 825 Printer $695

Okidata Microline 80 - 525

Centronics - Ltd. quan.	
730-3	$ 525
737-1	$ 625
704-9	$1250
730-1	$ 525
753	$1750
703-9	$1550

ΩMEGA OFFERS THE BEST DELIVERY AND PRICE ON:
APPLE • ATARI • TRS-80 Model II • INTERTEC • DIABLO • EPSON • HEWLETT—PACKARD • SOROC • COMMODORE • NEC • QUME • CENTRONICS

CALL TOLL FREE FOR ΩMEGA'S PRICE!
EAST COAST: 1-800-556-7586

ΩMEGA sells only quality merchandise to our customers.
ΩMEGA will try to match any current advertised price with similar purchase conditions.
Before you buy anywhere else — be sure to call ΩMEGA Sales Co.
WEST COAST: 1-805-499-3678 EAST COAST: 1-401-722-1027

ΩMEGA ships via UPS, truck, or air. COD's.
Visa, Mastercharge accepted, with no service charge.

VISA **Telex: 952106**

master charge

128 = green
144 = yellow
160 = blue
176 = red
192 = buff
208 = cyan
224 = magenta
240 = orange

The pixels are numbered: 28/4
2/1

To determine what code to use, first determine the color's number from above, add the number(s) of the pixels you wish to set and you have the code to be printed (i.e.; to set the upper left corner to red, the code would be 176 for red plus eight for the upper left corner, or 184). Using graph paper and colored pencils, plot your graphics and compute their codes, turn on your Color Computer and put them in data statements.

The start of variable storage is at 27D and 28D and the end of variable storage is at 31D and 32D. If you haven't guessed by now, we're going to start packing strings.

Determine the names of the variables you will use for your graphics. Here's my program to pack strings. If you are adventurous you could do all your strings at once.

```
10 AA$ = "AAAAAAAAAA":  'or whatever
1000 X = PEEK(27)*256 + PEEK(28):  'start of variable storage
1010 W = PEEK(31)*256 + PEEK(32):  'end of variable storage
1020 FOR Y = X TO W:  'all bytes in variable storage area
1030 IF PEEK(Y) = 65 AND PEEK(Y + 1) = 193 AND PEEK(Y + 2) = 10 THEN V = Y + 4 ELSE NEXT Y:  'if both letter and the length are correct you have a hit
1040 L = PEEK(V)*256 + PEEK(V + 1):  'actual address of string
1050 FOR Y = L TO L + 9:  'loop to poke codes
1060 READ A:  'get code
1070 POKE Y,A:  'shove it in
1080 NEXT Y:  'do it again
1090 PRINT AA$:  'check it out
1100 END:  'done
9900 DATA:  'store your codes here
```

There it is; simple enough. I like my Color Computer, and when Tandy releases more information, it will be nicer still.

William Sias, Vice President
REMarkable Software
Muskegan, MI 49443

Radio Shack and Model I

In view of my letter voicing strong criticism of Tandy's level of customer support from Fort Worth, and equally strong remarks about the computer store in East Hanover, New Jersey, which you published earlier, I would be remiss and irresponsible if I did not again take pen (or Scripsit) in hand, to state publicly that there has been a vast improvement in customer service at both locations.

The first improvement is that I can get through to Tandy on the 800 line. The next improvement is that I am answered by somebody both courteous and knowledgeable, and if this individual is unable to answer my problem, he usually follows up with a note or piece of printed material.

The present management of the computer store in East Hanover is courteous, professional, patient, and extremely helpful. The service department similiarly demonstrates a professional attitude and a prompt response, both on the telephone and with respect to carry-in equipment. In my opinion it is quite unusual to see such rapid changes in attitude and efficiency in a large company, and the management of Tandy and of the East Hanover store deserves to be congratulated on their rapid response to customer needs.

On another note, I was somewhat taken back by the sudden withdrawal of the Model I from the marketplace. My own plan had been to develop office uses for the microcomputer and to put them on line one by one, with a dedicated computer system at each operating station, rather than working on a larger main frame. I intended to use the Model I because of its modular arrangement. This cannot be so easily accomplished with the Model III, where the basic unit with disk drives costs almost $2,500, and the keyboard, screen expansion interface and two disk drives are not modules, but are one unit which all must be taken in together to the repair shop. I feel that we are losing something by the more handsome integrated package which the Model III provides.

Robert A. Goldstone, MD
Paterson, NJ

Missing Drives

Radio Shack boasts that it delivers what it promises. When I bought my TRS-80 three months ago, they promised the disk drive "would be out soon." Indeed, today it is out, but it is not available to customers like me who have already bought our TRS-80 computers and ordered the disk drives separately.

I invested several thousand dollars in the Radio Shack Computer, printer and some programs. In order for my investment to be useful in any way I must have the disk drive capacity to operate the programs I need for my business.

I feel I purchased the Radio Shack under false pretenses. My back order for the disk drive is more than 90 days old and no one can tell me when it will be filled. Yet, I am galled each time I see a new TRS-80 complete with disk drive on the shelf ready to ship to any person who has not yet made an investment in Radio Shack equipment.

I hope other Radio Shack customers in a similar predicament will write to the president of Tandy Corp. as I have done. Perhaps with some pressure, Radio Shack will deliver on its promise.

Barry D. Mason
Los Angeles, CA 90069

Radio Shack Responds

Mr. Mason should be able to get a disk kit installed through his local store in very short order. Although the repair center could be out of stock, they should be able to get him one in a matter of three to four days at most.

Drives were a little slow in coming through for us, and when they were scarce, we had to commit the majority of them to computer systems where the majority of the demand was.

Drive kits should be readily available with little or no wait on a continuing basis. At least we won't see the six month backorder conditions we had in the early Model I days. I'm sorry for any inconvenience Mr. Mason experienced.

Ed Juge, Director
Computer Merchandising
Tandy-Radio Shack
Ft. Worth, TX 76102

Program Compression

We really enjoy reading Bill Barden's column, "The Assembly Line." His kind of creative thinking helps keep us on our toes. We found his program for compressing BASIC source code (Jan '81) particularly interesting, since it parallels a recently completed development project by our staff. Bill is absolutely correct, in that the process of correctly compressing BASIC source code does not lend itself to a 'short and easy' solution. Since we invested about 250 man hours in this project, we thought we would pass along to your readers some of what we learned in the process.

Bill's concern for keeping the forward chain pointers accurate as he compresses the source code is admirable, but more work than necessary. There is a ROM routine (which I don't think is ever used, except by Disk BASIC) which will reset all the chain pointers so they accurately contain the required forward chains. The call

80 DEBUg

CAL81

Reference my CAL81 program on page 128 of the December, 1980 issue of *80 Microcomputing:* I have received several letters about problems and I would like to clarify a point. Be careful when keying in lines 1570, 1600, 1640, 1960 and 2130 because the numbers in the data statements are carried on to the next line. For example, the 1 in line 1570 mates with the 0 in line 1580 to make the number 10 and not the numbers 1,0. You must have an even number of numbers between the 1's (which signal end of line). If you do not, this may lead to the (almost) famous illegal function call in 1530.

John F. Strazzarino
1500 Dundee Dr.
South S.F., CA 94080

The Third Dimension

In my article, "The Third Dimension 3-D Tic-Tac-Toe)" in the July, 1980 issue, an inadvertent error has been found. It permits easy wins because the computer fails to check certain winning combinations.

This was brought to my attention by Irwin Eckert of Warren, MI. He pointed out that two of the pointers in the D1 array are reversed. This is easily remedied by editing the following lines and changing each 53 to 54 and each 54 to 53: 5020, 5040, 5100, 5130(2), 5160(2), and 5190.

Without these changes, there are eight entry positions that are not checked properly by the computer for possible winning combinations.

D. R. Dillehay
107 Ashwood Terrace
Marshall, TX 75670

Holiday Cheer Bug

Concerning the Address List Program published as part of my article "Holiday Cheer" in the December, 1980 issue:

On page 134 a line has been omitted which must be distressing novice programmers: 3110 CLS: II = I.

The program will obviously seem not to operate without this line, as a list retrieved from cassette will not be able to be displayed on the CRT.

Norman S. Kerr
1571 Burton St.
St. Paul, MN 55108

Serial Clank

The article "The Serial Clank on the Printer" by William O'Brien (Oct. 1980) has an error in the BASIC program data on line 100. The number 248 should be inserted between 230 and 246. This will eliminate the message "Out of data in line 50."

The assembly listing (number 3) has the top part and the bottom part of the listing exchanged. This might lead to some confusion as well.

Theo. F. Staniec
Des Plaines, IL

Level II ROM Mysteries

Reference: "Mysteries of the Level II ROM" in the December, 1980 issue of *80 Microcomputing:* There were several typesetting errors in the article. The major errors are:

Near the end of the second paragraph on page 150, the pointers referred to are line pointers.

Near the end of the fifth paragraph on page 150, "two-byte addressed jumps"-"the two-byte jump addresses."

On page 152, the reference to Program 3 should be to Program 4. On page 156, the reference to Program 4 should be to Program 5, and the reference to Program 5 should be to Program 6. On page 158, the reference to Program 4 should be to Program 5.

At the top of page 158, "beginning of any program" should be "beginning of any program *line*," and "positioning the program pointer" should be "positioning the beginning-of-program pointer." In the second paragraph on page 158, "position of the table" should be "relative position of the table (with respect to the end of the program)."

The specifications and usage notes under Program Listing 4 should be under Program Listing 5. The specifications and usage notes under Program Listing 5 should be under Program Listing 6.

A section of Table 4 was omitted. The part of the table from "Double Prec. Number" to "Numeric or String Array" should read:

Double Number:	*Prec.:*	byte 1—identification code 08H
		byte 2—second character of variable name
		byte3—first character of variable name
		byte 4-11—double precision value
String		byte 1—identification code 03H
		byte 2—second character of variable name
		byte 3—first character of variable name
		byte 4—string length (0-255)
		bytes 5-6—location of first character of string (LSB, MSB)

Victor Griswold
20 Fieldcrest Dr.
Jackson, TN 38301

Z-BUG Spaces

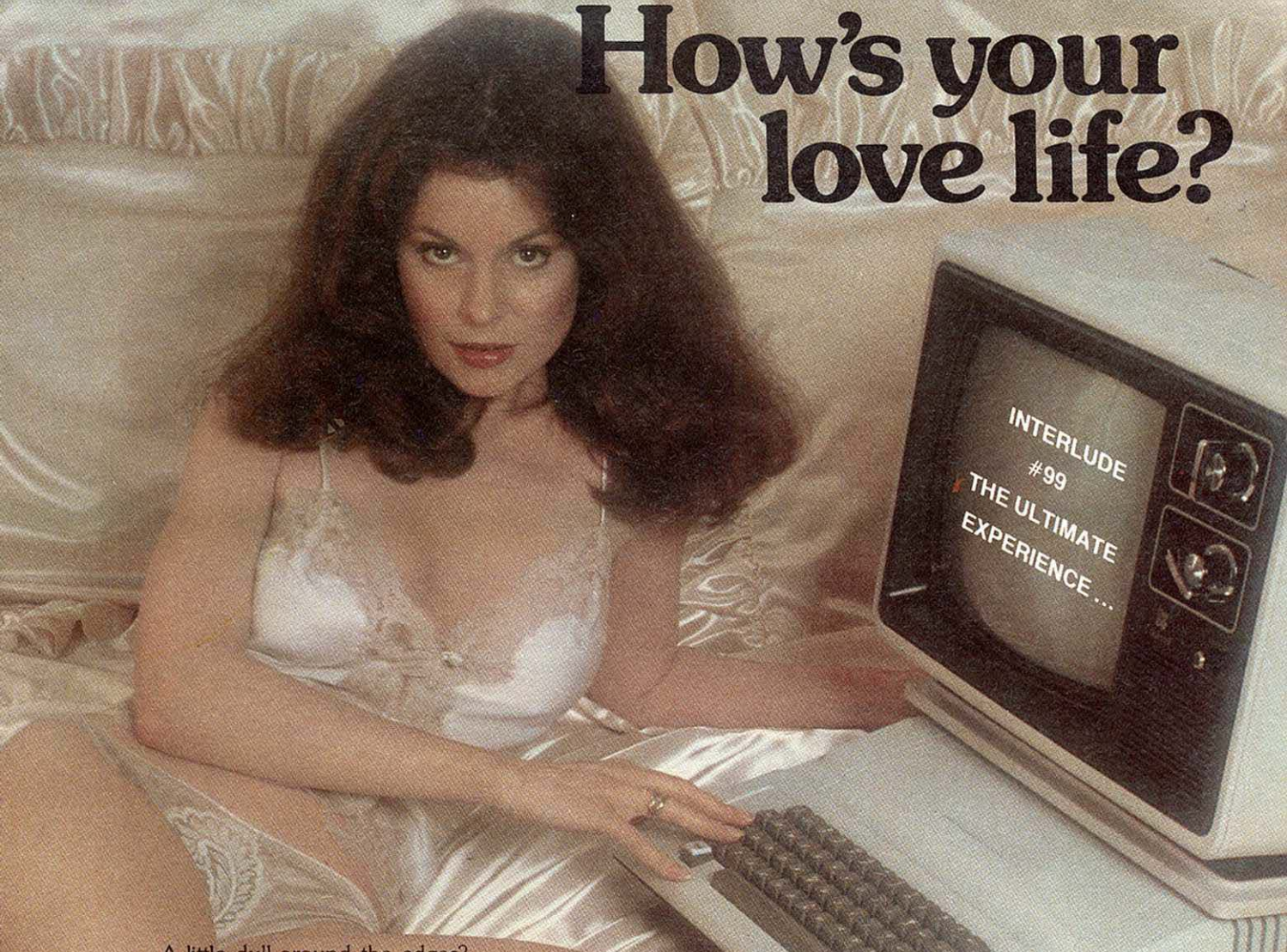
I especially enjoyed assembling and debugging Z-BUG, Jan. 1981. All the bugs were my typing errors, except line 406, page 160 which needs an additional seven spaces inserted just after 'Registers Addr( ), so the rest of listing 1D will assemble correctly.

Richard Musick
1426 Oakbrook
Lancaster, TX 75134

Kitsz Column

Eds. Note: The Program Listing captions in the February "80 Applications" (page 40), were inadvertantly reversed.

How's your love life?



A little dull around the edges? Routine? Predictable? Boring? Maybe all it needs is a little Interlude. Interlude is the most stimulating computer game ever conceived. It combines a computer interview, an innovative programming concept, and a one-of-a-kind manual to turn your love life into exciting, adventurous, delicious fun!

Interlude is: romantic... playful... outrageous... a fantasy. Interlude is: ■ A Bed of Roses (Interlude #1) ■ Mata Hari (Interlude #49) ■ The Chase (Interlude #7) ■ Rodeo! (Interlude #71) ■ The King and I (Interlude #60) ■ Some Enchanted Evening (Interlude #84) ■ Caveman Caper (Interlude #82) ■ From Here to Ecstasy (Interlude No. 30) ■ Satin Dreams (Interlude #72).

More than 100 Interludes are included in the program. Most are described in detail in the accompanying manual, but several surprise Interludes are buried in the program awaiting that very special time when your interview says you're ready. (When you learn secret Interlude #99, your love life may never again be the same!) Interlude can give you experiences you'll never forget. Are you ready for it?

Interlude™ ⌐287
The Ultimate Experience.

INTERLUDE, 10635 Richmond, Houston, Texas 77042. I'm really ready. Send my Interlude today.

Apple II (16K)*
☐ Cassette ($16.95)
☐ Diskette ($19.95)
☐ Diskette—Pascal or DOS 3.3 ($19.95)

TRS-80 (Level II-16K)**
☐ Cassette ($16.95)
☐ Diskette ($19.95)

Poster
☐ 20"x 24" reproduction of this ad without ad copy ($4.95—includes shipping charges)

Add $1.50 for shipping and handling.

Available for immediate shipment.

Please enclose your check payable to INTERLUDE or complete the charge information:

☐ MASTERCARD ☐ VISA All charge customers must sign here._____
Account No. _____ Expiration date _____ MasterCard Bank Code _____

CHARGE CUSTOMERS: Order by phone toll-free! **1-800-231-5768 Ext. 306** (Texas: 1-800-392-2348 Ext. 306)
Name _____ Age _____
Address _____
City _____ State _____ Zip _____

*Apple II is a registered trademark of Apple Computers, Inc. **TRS-80 is a registered trademark of Radio Shack, a Tandy Co.

80 AID

Upper/Lowercase Troubles

Purchasers of an upper/lowercase modification from Radio Shack received with it a program tape containing two versions of a software driver for the upper/lowercase mod. On one side of the tape is ULCDVR/CMD for those who are using their Model I with disk. On the other side is ULCBAS for those who use the lowercase mod, with Level II BASIC.

The instructions don't say that after this program is loaded and sets and protects its own memory size, the user is prevented from loading and using any other utility programs. Expanding the protected memory doesn't change the fact that "ULCBAS" has somehow write-protected the protected memory so that even a direct POKE statement cannot implant a value in an unused location within that area. One obvious solution is to buy a disk drive and TRSDOS, as this problem doesn't exsist with TRSDOS.

My problem is that in order to use my printer, I must run a software driver which is fully relocatable and is POKEd into high memory from a BASIC program which then self-destructs. So, I must settle for upper/lowercase or use of my printer.

Neither calls to my local computer center nor calls to Fort Worth have yielded a solution. Those I have talked to have tried to help, but just don't know what to do about it, short of buying a disk drive and TRSDOS or other DOS. Eventually I will, but for now that just is not practical.

I must not be the only user to have encountered this problem. I might add that my knowledge of assembly language is zilch. Therefore, debugging or modifying ULCBAS or my own without step by step instructions is out of the question.

A solution would be most welcome.

Joe Brandiner
426 Grace St.
Pittsburg, PA 15211

Line Printer I

Here is a fix for owners of the Line Printer I (Centronics 779) that have skipping problems. Change R24 on the circuit board, which is an 18K ¼W resistor with a 39K ¼W resistor. Refer to the Service Manual that comes with the unit in locating R24. It is somewhere near ME2.

Domingo S. Ang
IC Systems
Manila, Philippines

Binkhurst Aid

In response to Michael Binkhurst's call for help ("80 Aid," February, 1981), I sent him a letter stating the following solutions:

You want to expand the character display to 80 characters per line. This would require major changes in the video drive circuitry and probably a new character generator and more video memory. While these modifications are possible, they would be very complicated to construct and expensive to build; also, since it would not be a Radio Shack approved modification, you could run into major repair bills if you ever returned the computer for repair (I had to pay over $80 for a repair because of a lowercase mod I installed which was not the cause of the problem).

The problem with the program line is easier to explain, but almost impossible to fix. The problem with the line is the way the computer handles the numbers. When a number is stored, it must be converted to binary: 0.01 cannot be accurately represented in binary; the bits would eventually repeat after about two bytes. When the integer portion is large, the display routine will print the number apparently correctly; when the integer portion is removed, however, the inaccuracy may show, as it does here. The only possible way to correct this is to round off the result to two places after the decimal point, either by INT(X*100)/100 or PRINT USING "####.##";X, where X is the result. There is no problem when using the value, though; it will be as accurate as possible.

Joe Sewell
6776 Sheridan Rd.
Melbourne, FL 32901

Solid Graphs

The January issue has an article on histograms: "Get High On Histograms" by Daniel Lovy (p. 211). If you use the program as written you get an open graph. However, if you own a printer which prints graphic characters, you can produce a solid graph by changing line 1280 from:

```
1280 IFPOINT(ZP,Z*3+ST)=-1 THENA$(Z)=A$(Z)
+"#"ELSEA$(Z)=A$(Z)+" "
```

To:

```
1280 IFPOINT(ZP,Z*3+ST)=-1 THENA$(Z)=A$(Z)
+CHR$(191)ELSEA$(Z)=A$(Z)+" "
```

Carl Reek
11624 NE 74th
Kirkland, WA 98033

Telex Messages

I would like to obtain information on how to go about using my TRS-80 to send messages to a Telex Machine. I have a TRS-80 48K, one disk drive. Any information would be helpful.

Rick Thompson
Box 2617
Grand Forks AFB
North Dakota 58205

Interface Aid

I am looking for information about how to interface a Control Data Corporation Impact Printer, Type 0769-06-00 to a TRS-80?

I am willing to pay for the cost of copying any materials and/or postage needed for this information.

Jon Presley, WD0EAO
Route 3
Lebanon, MO 65536

Adventure INTERNATIONAL
SOFTWARE PUBLISHING DIVISION OF Scott Adams INC.
ADVENTURE INTERNATIONAL BOX 3435 LONGWOOD, FL 32750 (305) 862-6917

Yes, You Can Increase Your Programming Productivity

SNAPP II EXTENDED BASIC

SNAPP II EXTENDED BASIC A family of enhancements to the Model II BASIC interpreter. Part of the package originated with the best of APPARAT, INC.'s thoughts in implementing NEWDOS BASIC. The system is written entirely in machine language for SUPER FAST execution. The extensions are fully integrated into Model II BASIC, and require NO user Memory, and NO user disk space. The package is made up of the following six modules, each of which may be purchased separately.

XBASIC—Six single key stroke commands to list the first, last, previous, next or current program line, or to edit the current line. Includes quick way to recover BASIC program following a NEW or system or accidental re-boot. Ten single character abbreviations for frequently used commands: AUTO, CLS, DELETE, EDIT, KILL, LIST, MERGE, NEW, LLIST, and SYSTEM. $40

XREF—A powerful cross-reference facility with output to display and/or printer. Trace a variable through the code. Determine easily if a variable is in use. $40

XDUMP—Permits the programmer to display and/or print the value of any or all program variables. Identifies the variable type for all variables. Each element of any array is listed separately. $40

XRENUM—An enhanced program line renumbering facility which allows specification of an upper limit of the block of lines to be renumbered, supports relocation of renumbered blocks of code, and supports duplication of blocks of code. $40

XFIND—A cross reference facility for key words and character strings, also includes global replacement of keywords. $40

XCOMPRESS—Compress your BASIC programs to an absolute minimum. Removes extraneous information; merge lines; even deletes statements which could not be executed. Typically saves 30-40% space even for programs without our REM statements! Also results in 7-10% improvement in execution speed. $40

ENTIRE PACKAGE ONLY $200

PL/B

What do you get when you take out the weakest components of BASIC and add the most powerful components of the PL/I language? Snapp, Inc. has the answer . . . PL/B. Snapp's development of PL/B resulted in an unbeatable structured programming facility that can increase programmers productivity up to 50%. PL/B is fully integrated into the BASIC interpreter. Two modes of operation are available. (Transparent hidden) or (Compile mode). Increase your productivity and save time with PL/B. $200

SUPERSNAPP X

You can sort fast using your present facilities, or you can do it faster with Racets' superb facilities, or you can use the fastest: SUPERSNAPP X. The heart of SUPERSNAPP X is a SUPER FAST in-memory sort routine that has been benchmarked against everything on the market and beats them all . . . hands down.

SUPERSNAPP X is the most important component of SNAPP X EXTENDED BUILTIN FUNCTIONS which is a much needed set of additions to the Model II BASIC interpreter that will put time saving power at your fingertips. Let's compare (using random data) SUPERSNAPP X and Racet's GSF SORT for speed:

SORT	SUPERSNAPP X	RACET GSF
10,000 integers	39 seconds	59 seconds
5,000 Singles	22 seconds	34 seconds
2,000 Strings	10 seconds	15 seconds

SUPERSNAPP X is guaranteed to be the FASTEST in memory SORT on the market or your money back. With it you also get these EXTENDED BUILTIN FUNCTIONS: PEEK, PEEKW, POKE, POKEW, XDATS, XTIMS, ETIMS, FILES, AND THE SPECIAL SCMD (SNAPP___COMMAND). PLUS: open "E" Set SCROLL PROTECTION, ERASE all ARRAYS in one command. Specify size and Blink rate of CURSOR. Long ERROR messages. Read from Video Screen Read. Diskette ID's and more! If you want the FASTEST SORT on the market, you want SUPERSNAPP X. $100

AUTOMAP

Save time creating a formated screen with our Extended Basic Mapping Support system. The programmers task of communicating and displaying information with the user operator is completely automated with simple SEND and RECEIVE statement commands. Many different types of information can be sent and received from the operators with the use of a single command. Many hours of programming time are saved and cost efficiency is truly realized using Automap. $75

AUTOFILE

Another big time saver from Snapp, Inc. Autofile offers all programmers much needed time saving tools to use when working with direct files. Eliminate tedious commands such as LSET's, MKI$'s, MKD$'s, MKS$'s, CVD's, CVI's and CVS's. When used in conjunction with Automap an update program can typically be reduced by as much as 90%. $50

DIAL

USR 330D Auto Answer/Auto Dial, Direct Connect Modem, 300 baud, originates/answers 103J compatible. When used in conjunction with our DIAL, software is capable of complete origination of communications with remote locations without operator intervention. Special combination price, modem and software. $420

Software only $50

BREAKOUT

With Breakout you can learn the internal workings of TRSDOS 2.0 using any standard disassembler. Find your way out of the maze and save programming time by eliminating the unneeded steps in TRSDOS 2.0. This is a must product for all advanced TRS80 programmers. $200

MASTER/SLAVE

This software package was designed to support the transferring of files from one Model II to another, via direct connection or modem/phone line connection. ALL kinds of files, and baud rates up to 9600 are fully supported. Transfer files in either direction, even with the SLAVE Model II UNATTENDED! $150

HOSTII/TERMII

Allows remote control of a Model II from another Model II, or any ASCII terminal. Our Host system, unlike the one supplied with TRSDOS 2.0, supports accurate screen positioning on the Term station. Without this feature, formated displays appear on the screen looking like randomly placed garbage. Requires NO user memory! This system is designed to provide software support to our customer locations without ever leaving the office. Custom versions are now available for most nationally distributed terminals as a $25.00 option. Call for details. $50

SPOOLER Model I, Model II and Model III

Our workhorse! Unlike the one supplied with TRSDOS 2.0, ours requires no special knowledge or training on the part of the operator. Additionally, ours performs much better. On the Tandy SPOOLER, every time a disk is accessed, the printer stops dead! This package is available for Model I, in the TRSDOS/NEWDOS 80 versions, or for the Model II or Model III. Greatly enhances system performance when running typical business applications. Many applications have been benchmarked to run nearly TWICE AS FAST with the SPOOLER installed. Installs in minutes and no changes are required to your programs. The Model II version requires NO user memory. If purchasing more than one system, call for price quote. $100

DOUBLETAKE 3741

This is not a football play but the way to play ball fast in converting IBM 3741 and similar formated diskettes to Radio Shack formated disks or vice versa. Fast is the name of the game. $200

SNAPP SCREEN

Another dependable product from Snapp, Inc. Using rigid plastic, Snapp, Inc. designed the ultimate green screen at the lowest price. The Snapp Screen installs in a Snapp with the use of pressure sensitive tape. Reduce user fatigue with the Snapp Screen. $10

2.00 shipping and handling—waived with the purchase of any software.

BPRINT
Allows you to access a serial printer simultaneously with the standard parallel printer. Easy interface to BASIC. Drive two printers at once! $75

ULTRA PPD
This the ultimate Proportional Printer Driver that does the job the others do not. Add to the Electric Pencil and your print will look like its copy has been typeset. No word processor should be without this enhancement. Now available for the DWII and the LPIV. $100

ITOII
A helping hand when converting BASIC programs from the Model I to the Model II. Automatically adjusts PRINT @. and PRINT USING to compensate for differences in the language. Advises you where adjustments are necessary for PEEK. POKE. etc. $25

DOSFIX
A collection of patches to TRSDOS and BASIC to enhance their usability and function. Includes our well known BREAK7E patches and facilities to disable and verify detect which will increase average disk speed by 30%. Free with any Model II Software Package. Purchased separately. $10

3M SCOTCH DISKETTES
Double density certified 8" Floppies for the Model II. Better quality is not available at any price. Ten diskettes to a box.

3M

Quantity (boxes)	Price Per/Box
1	$34
5	$33
10	$32
20	$31

$3.00 shipping charge. This charge is waived if software is purchased on same order.

TERMS OF SALE:
Credit card customers, add 2% plus freight. C.O.D. customers pay freight. Prepaid orders are shipped prepaid. Ohio residents add 5½% sales tax. Shipments normally made the same day we receive your order. Credit granted to governmental agencies, educational institutions and D & B rated business firms. Please include purchase order number when ordering.

OUR GUARANTEE:
If your diskette arrives damaged, we will replace it without charge. If you ever accidentally damage it, we will replace it for a $10 handling charge. For a period of one year, we will provide you with any enhancements or updates for a $10 handling charge. For a period of one year, if errors are discovered in the programs, they will be corrected without charge. In the event we cannot correct an error, you may return the program material for a refund. Electric Pencil is a trademark of Michael Schrayer Software, Inc. TRS-80 and TRSDOS are trademarks of the Radio Shack division of Tandy Corporation.
NEWDOS and NEWDOS/80 are trademarks of Apparat, Inc.
RACET GSF is a trademark of Racet Computes

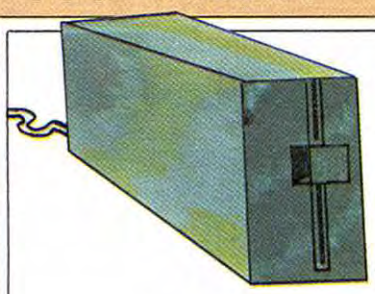
NOW ALL PRODUCTS AVAILABLE FOR THE MODEL III

SNAPP, INC.
SNAPP, INC.
SNAPP, INC.
SNAPP, INC.
SNAPP, INC.
SNAPP, INC.

Call our toll free number: 1-800-543-4628
Ohio residents call collect: (513) 891-4496

SNAPP, INC. 232
8160 Corporate Park Dr.
Cincinnati, Ohio 45242

ALPHA BYTE IS NE



NEW SHUGART 40 TRACK DRIVE AND APPARAT'S NEWDOS + 40 TRACK

INTRODUCTORY SPECIAL

$320

This package includes Shugart's new 40 track drive, case, power supply, and Apparat's famous NEWDOS + 40 track operating system. 102K Bytes of storage per disk.
We also have the new MPI 80 track drives in stock and ready for immediate delivery.

$18.95

ALPHA DISKS

We looked all over the country for a quality, low price disk. Each disk is certified for Double Density drives, AND Guaranteed to format. We bought a huge quanitity and we're passing the savings on to you! We also have a huge inventory of Verbatim Datalife diskettes:

Verbatim Datalife Diskettes

5¼" MD525-01	$26.50
10 boxes of 10	[each box] $25.00

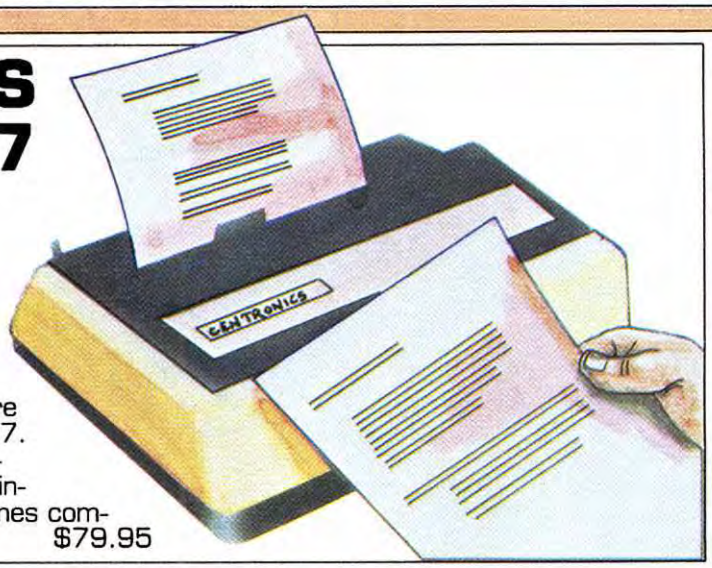
EPSON MX-80

The hottest selling printer on the market. Bidirectional, logic seeking, 80 cps, true decenders, adjustable tractor feed, disposable print head, plug compatible with the TRS-80. IN STOCK AND AVAILABLE FOR IMMEDIATE DELIVERY. CALL FOR LOWEST PRICE IN THE COUNTRY. WE PROMISE!

CENTRONICS 737

Same as the Line Printer IV at a much better price. N x 9 proportional spacing, underline, superscript, and subscript capabilities.

$725



'PROSOFT' Word processing software is written for the TRS-80 and the 737. Takes full advantage of all the capabilities available on this amazing printer including true proportional spacing. Comes complete with a 110 page users manual. $79.95

Color in the illustrations do not represent the products actual color. Prices do not include shipping. Visa and Master Card accepted. All prices featured on these pages are subject to change without notice. School purchase orders gladly accepted. Quantity discounts available. Never undersold offer good as supply lasts. Please add $4 for all COD orders. Please call for items not listed. Express service offer good until terminated by Alpha Byte Stores.

VER UNDER$OLD. . . .

NEVER UNDERSOLD

If you can find a lower price in this magazine on any of the items listed in this ad, deduct 5% from our competitors price. THATS OUR PRICE!!! But if you don't see what your looking for, call for it, we WILL beat anybody.

Special 1

If you purchase the "TRS-80 DISK AND OTHER MYSTERIES" Book for the regular price of $22.50, you can buy 10 Verbatim Datalife diskettes and a plastic library case for $22.00 for a total of:

$44.50

Special 4

If you purchase the new book "MICROSOFT BASIC DECODED AND OTHER MYSTERIES" for the regular price of $29.95 you can buy 10 Verbatim Datalife diskettes and a plastic library case for $22.00 for a total of:

$49.95

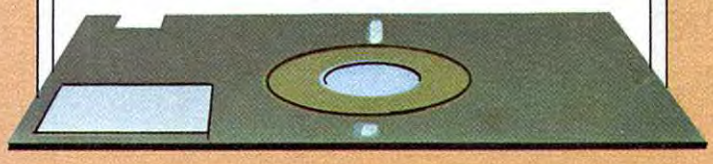
Special 5

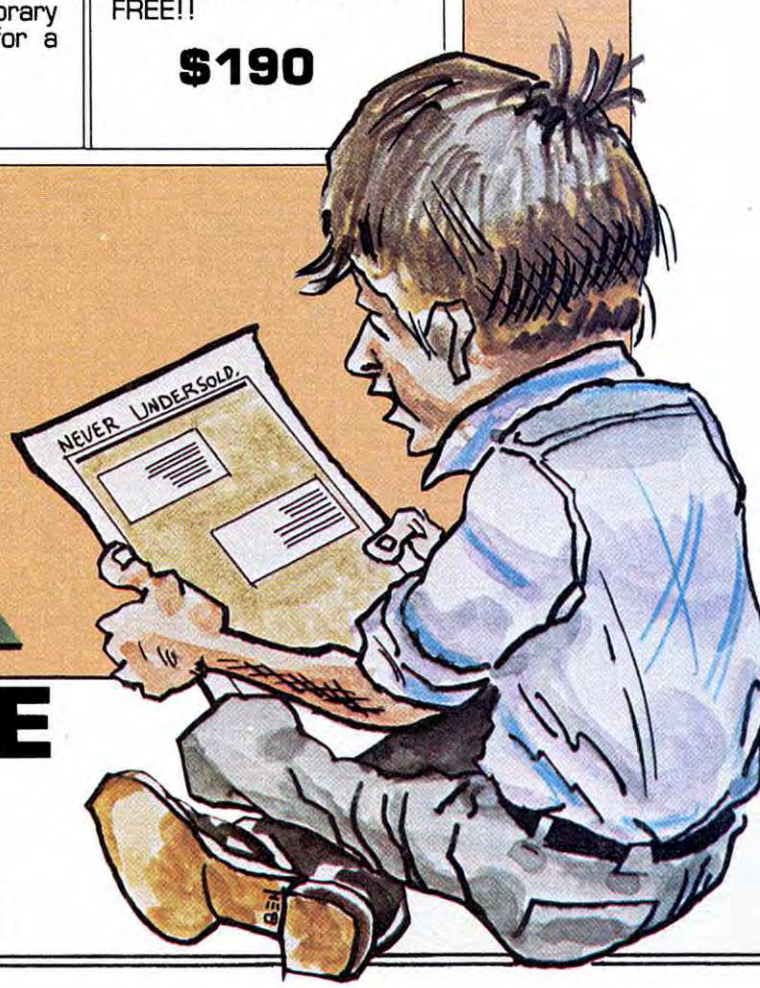
If you purchase the MICROSOFT BASIC COMPILER for the reduced price of $190 we will give you a box of Verbatim Datalife diskettes and a plastic library case FREE!!

$190

Special no. 3

Not our normal Special #3 !!!
For the month of April, you will receive Aparat NEWDOS/80, a box of Verbatim Datalife diskettes, and a mini flip sort. For the incredible price of: **$149**





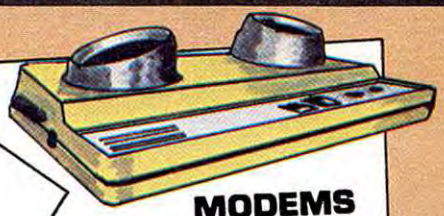
TURN PAGE for more SPECIALS

NEVER UNDER$OLD.

The PROTECTOR

Alpha Byte brings you the ultimate diskette storage unit at the best price ever!! This file box holds 50 to 60 diskettes and provides easy access to the diskettes you need. Index dividers are included.

$19.45



MODEMS

We found a great acoustic coupled modem and are selling it for an unheard of price! This modem is the LEXICON LX-11 that sells normally for about $169. Alpha Byte's got them in stock and there going for:

$125

We also have the Novation Cat for $145 and the D-Cat for $155.

MICROPOLIS

We have done it again! Alpha Byte broke the price barrier on Micropolis 77 track drives. In stock and available for immediate delivery! Fully guarenteed, complete with case and power supply.

$399

16K RAM

$19.95

These kits are NEC 200ns fully tested, fully guaranteed, and include instructions on how to upgrade your 16K or 32K TRS-80's to 48K in one inexpensive easy step. All it takes is 10 minutes and a screwdriver. For keyboard 4K upgrades add $4 for dip shunt.

HEAD CLEANERS

Protect your expensive equipment and valuable diskettes from contamination with a head cleaning kit. The FD-05 kit comes with two special diskettes and cleaning solution that will last a full year. This is a must for the care and feeding of your disk drive.

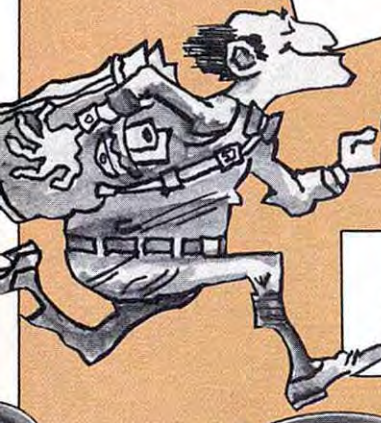
$24

TRS-80 MODEL III

The're here and we have got them!!! 48K, 2 Drive Systems are in stock and ready for delivery. Call us for the price of the system you are looking for...you won't be sorry you did!! We also carry the Model II and lots of add-on hardware, software, and utilities.

INTRODUCING ALPHA BYTE'S 24 HOUR EXPRESS SERVICE..

It's fast and reliable. Just dial our number. If the product is in stock, it's sent on it's way—ALWAYS WITHIN 24 HOURS—If we don't ship it within 24 hours you get a 10% discount. Guaranteed. We are out to be YOUR one stop shopping place.



213-883-8594

ALPHA BYTE STORES ~69

5115 Douglas Fir Road
Suite B
Calabasas, Calif.
91302

SEND FOR OUR NEW FREE CATALOG

80 REVIEWS

Edited by Pamela Petrakos

"We are not inundated with technical information. We learn how *and* why *the machine does what it does."*

Pascal
Paul M. Chirlian
Matrix Publishers, Inc.
Interscholastic Book Service
Forest Grove, OR
Softcover, 211 pp.
$9.95

by Dennis Thurlow

Pascal Spoken Here! You see it on T-shirts, bumper stickers, and store windows. Recent magazine polls indicate that it may soon be spoken everywhere!

The phenomenal growth of this language is due, at least in part, to its incredible flexibility as a structured language. Syntax is kept to the barest minimum, which is a help to the novice.

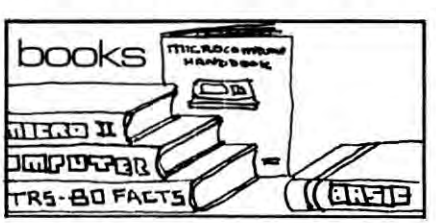
Grasping the Basics

Professor Chirlian has made every effort to keep this textbook simple. The professor explains how a computer works, how to use a flowchart, and the differences between working from a terminal and preparing a program for a batch operation. Debugging is well covered, as well as the idiosyncrasies in the language as it is used in different makes of computers.

Once the basics of programming in any language are grasped, understanding a new language involves only recognizing limitations and syntax.

The book is loaded with syntax flowcharts so the experienced programmer can quickly skim through them. The limitations of the language are found in the text, but an index makes the job easier.

The teacher's edition includes answers and example solutions to problems provided at the end of each chapter. ■



The Creative Kid's Guide to Home Computers
Fred D'Ignazio
Doubleday&Co., Inc.
Garden City, NY
Hardcover, 130pp.
$9.95

by Chris Crocker
***80* Staff**

To a novice, the computer is at first nothing but a toy. Getting beyond that stage is the trouble.

The Creative Kid's Guide to Home Computers is a good starting point. D'Ignazio attempts to take you beyond the fun-and-games stage with a computer. He inspires you to become more than just a user.

A caution: This is not a how-to book. It is, as D'Ignazio says, a "What if?" book—a *creative guide.*

"What if?" asks D'Ignazio. "What if I did my math homework on the computer?... What if I composed my own music?... Used it to draw a picture?...Used it to help a friend of mine who's deaf?"

A Whirlwind Tour

The book is divided in four sections. The introduction develops a cursory understanding of how microcomputers work. Here D'Ignazio teaches us some vocabulary, and talks about what a computer is, and how to make it work. It is, as he calls it, "A Whirlwind Tour." This is where the book proves itself. We are not inundated with technical information. We learn *how* and *why* the machine does what it does.

The next section is entitled "Games." Here we learn about the many computer games (including both the hand-held and the microcomputer) available. While we

57 Practical Programs and Games in BASIC
Tandy/Radio Shack
Ft. Worth, TX
Softcover, 204 pp.
$3.95

by Merrilyn Ferris

When I purchased my TRS-80, the salesman recommended this book. There is nothing more disappointing than to have a new computer and have nothing to do with it.

Certainly one can buy the various programs on tape, but it would quickly run up a bill. Eventually, I hope to write my own programs.

57 Practical Programs and Games in BASIC is well organized and written. Each chapter begins with formulas and a flowchart or diagram. A sample run lets you see what the program does, and then gives the program in BASIC.

At the beginning of the book, the author lists all the BASIC statements that he uses. My Level II BASIC has them all and I suspect that they can be translated easily to other versions.

Although there is a good selection of programs, the author fails to organize by subject in his index. The book only offers two rather simple financial programs, a compound interest program and a depreciation program. I would have preferred the inclusion of more comprehensive programs, however, the ones included can serve as guides to writing your own. There are also programs that do simple electronics calculations.

The games programs intrigued me and served as an easy introduction to computing. I don't think these programs compare with the more expensive cassette versions but the price is right.

My only misgiving is the typing in of 133 lines for the first Space Wars game, or worse yet, 287 lines in the second version.

I found this book useful. It allows me to use my computer right away and gives me models to base my program writing on. My complaints are: an inadequate index, and the lack of extensive financial programs. However, I recommend this book to anyone new to microcomputing. ■

read about all of these fun and exciting games, we stumble upon a chapter entitled "You're Trapped!"

And we are. D'Ignazio led us right into it. The program "Trapped!" is a simple BASIC program listed opposite a flow chart. The program demonstrates commands such as RANDOM, PRINT, LET, INPUT, IF, GOTO, GOSUB, FOR...NEXT, END and RUN.

The listing is set up with guidelines which describe what each section of the program does. D'Ignazio uses a game to help us learn BASIC.

The next section, entitled "Projects," is about other possible uses for the microcomputer, from robotics to aiding the handicapped.

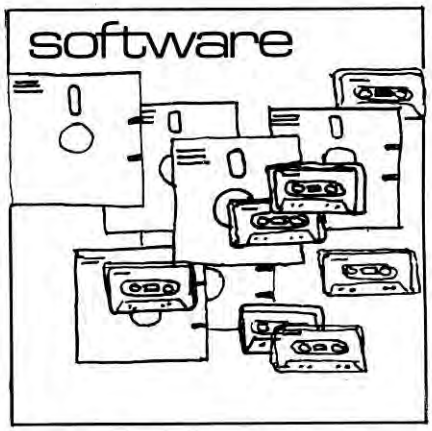
None of the projects are particularly simple. However, even some of the most complex, such as those in robotics, are projects that have been done by teenagers and high school students.

The final section, the appendicies, lists a limited number of books, magazines and catalogs, a checklist for the first-time computer buyer, an ASCII coding chart, a decimal to binary chart and a glossary.

I'm not entirely sure of what grade level D'Ignazio is trying to reach with this book. It seems too complex for most grammar school students (but not for a grammar school teacher). At times, it seems too simple for adults.

I found most of it to be enjoyable reading, however, and I think that it could be used on the junior high and high school levels, as well as for beginning adults attempting to understand the microcomputer. "Kid's," then, is perhaps a misnomer.

The Creative Kid's Guide to Home Computers is not the be-all and end-all microcomputer resource guide. D'Ignazio is telling us that microcomputers are not answer machines, "they are tools to help you build models." This is, as I said, a starting point—and a good one. ■



Master Directory 1.1
Micro Systems Software
Hollywood, FL
$29.95 on disk

by James B. Penny

Programs written for the TRS-80 seem to be getting better all the time. The program MASDIR 1.1 from Micro Systems Software in Florida seems to be one of the goodies. All of my disks and files are now organized so that I can find what I want without a hassle.

The program, as furnished, requires one or more disk drives. It doesn't seem to care how much memory (above 16K) you have in the system. It contains its own bootstrap routine and operating system. When loaded, the program begins with a date query. The date entered is appended to all directory files entered in this particular session. This date is also used in the heading of the printout, if one is requested.

After the data entry, the program menu will allow you to enter numbers 1 through 9 or the single letter E (EXIT). Even though the documentation doesn't indicate it, your first entry should be number three or READ DISK DIRECTORY. Obviously, you must put something on the disk in order for the program to have something to do. The E is the only orderly way to close files and exit the program. Removing the diskettes before exit by the E command could cause a disaster.

A single disk drive system requires that you do some disk swapping, while a multiple drive system will read the directory information off the diskette contained in drive number one. The program is smart enough to know how many drives are available, and will prompt you accordingly.

You must now enter the number assigned to the target diskette. This number may be subscripted with the letter A, B or the command -I. Subscript letters may be used to indicate a diskette side (if you use both sides of your diskettes) or they may be used to differentiate between master and backup diskettes. The latter is probably what the author had in mind, since only the B subscript is printed in the listings. The -I command causes the system to read and list files with the invisible attribute.

The number of diskettes and the total number of files entered are tallied in the upper right hand corner of the screen. Once entered, the directory entries may be recalled to the screen or printer in one of the following formats:

- Individual diskette directory, by assigned diskette name or number.
- Master listing of all diskettes in numerical order.
- Master listing of all files in alphabetical order.
- Listing of all files with a common extension (e.g. /CMD).

In addition to the above, you may perform a search for a particular file by name. The program responds by listing every occurence of that file. You also get lots of other data such as program length in granules, file type, protection level, etc. The search feature is enhanced by allowing the use of the question mark as a "wild card." The search entry of B??????? will list every file beginning with the letter B. Another search feature will also locate diskettes which have more than a specified number of free granules.

Of course, you may add or delete diskette directories at will. It seems that these folks thought of everything. Well, not quite. Here's the bad stuff:

- There is no way to annotate files with your own file description.
- There is no provision for anything other than the standard Radio Shack parallel port printer.
- There is no provision for modifying the internal print format in case you want other than 66 lines per page.
- Some directory files written by NEWDOS 80 cannot be read or listed by MASDIR.
- MASDIR 1.1 won't read directories formatted for CP/M.

However, directory files written by NEWDOS 80 can be read and listed if you make use of SUPERZAP which, fortunately, comes with NEWDOS 80. Change relative byte EC (Hex) in MASDIR relative disk sector 13 (decimal) from the current value of 40 (Hex) to 00. This ZAP fixes the directory read problem but, at the same time it changes the action of the -I command so that it picks up all of the system files along with the invisible files.

Also if you write your own print driver and formatter that solves another problem. Relative bytes 3F to 4D (Hex) in relative sector 3 are used to locate top of memory. The next three bytes store it at the address 4C1D (Hex). You can use these byte locations to protect memory for your printer driver and/or load the stan-

dard printer DCB (at 4026H) with the address of your driver. Relative sector 13 (Hex), bytes 72 through FF (Hex), are not used by the program. They will load into memory, on boot, beginning at address 5372 (Hex). You can use this space for your printer driver if you are careful. While you are zapping away in there, you might also correct the word "CATEGORY" found twice in the program.

The formatting problem also can be dealt with. The byte 3D (Hex) at relative sector 4, relative byte AA (Hex) gives the number of lines plus one (in Hex), which will be printed before each new page header is printed. A form length of 66 lines is set by relative byte 5 in relative sector 3.

All Things Considered

The program author makes extensive use of lowercase characters in the ASCII parts of his program. You may want to subtract the necessary 20 (Hex) from these character bytes if they drive your particular printer "up the wall." Some of these print as control characters in typical Radio Shack fashion, due to the missing bit.

All things considered (even the painful modifications described above), MASDIR 1.1 is one of the most useful programs in my entire library. My copy of MASDIR 1.1 currently holds listings for 108 diskettes and 860 files. With that many files, additions and deletions of file directories gets a little slow because of all the sorting going on. Once stored on disk, however, the display or printing times are perfectly acceptable.

At every computer session, the first and last program used is MASDIR 1.1. First, the program is used to find the file that I want to work on. When finished, I delete and re-enter the diskette(s) which I have updated during the session. ■

VARKEEP
Jim Stutsman
The Circle J. Software Ranch
Carollton, TX
$29.95 cassette + disk

by Tom Andrews

Here's a typical situation: You have worked hours, developing an elaborate symphony of a program (complete with lots of arrays containing precious data) then, suddenly, an error message appears on the screen and you find yourself automatically thrown into Level II's editor.

The trouble is probably some little bug you can repair in just a few seconds, but you realize dolefully that editing the program will also erase the data stored in all arrays and variables. You'll have to start your program run all over again. Frustrating, isn't it? If all this sounds familiar, hang on friend, because help is on its way! It's called VARKEEP, and it's like giant relief for a very bad headache.

VARKEEP is the brainchild of Jim Stutsman, who is also responsible for Percom's reliable TRS-80 disk operating system OS-80 (formerly Microdos). The author calls VARKEEP a utility, but it is really an incredibly powerful extension of BASIC, that works with either cassette or disk. With VARKEEP, annoyances that have sometimes made Microsoft BASIC frustrating to use simply disappear. VARKEEP also adds powerful new features to Level II's already impressive arsenal.

Using VARKEEP, it is possible to do many things without affecting data stored in arrays and variables. VARKEEP makes it possible to delete an array during program execution to gain memory without destroying data stored in remaining arrays and variables. VARKEEP makes it possible to instantly zero or null an array without time and memory consuming FOR-NEXT loops. Even more amazing, with VARKEEP it is now possible to do the unthinkable: String space allocation can be changed on the fly, during program execution, with all stored data preserved without change. This is a great help when a program presents a varying need for string space.

Besides all the goodies just described, VARKEEP provides one additional feature that is (by itself) worth the price of admission. With VARKEEP, true program chaining is possible. Using cassette or disk, programs can be moved in and out of RAM without disturbing stored data. This multiplies the power of the computer by making possible elaborate systems of related short programs that use a huge data base stored in RAM! Every one of the features just mentioned is useful and powerful. With all it will do, it's amazing that VARKEEP occupies little more than 700 bytes!

VARKEEP differs from most other machine language programs because it resides in low memory. The loader program is a bit unusual as well. Written in BASIC, the loader quickly pokes VARKEEP into RAM just above whatever else has been loaded into low memory, including BASIC, and any other low memory programs including the disk operating system. VARKEEP is fully compatible with every available DOS.

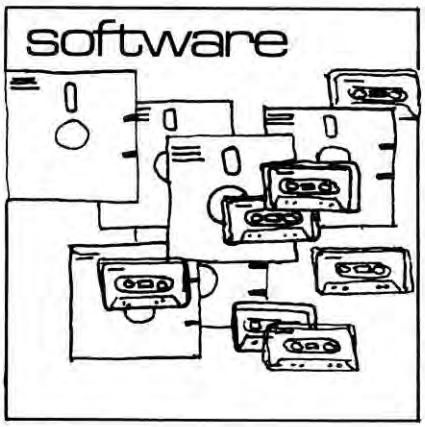
Loading VARKEEP is easy. The loader program is simply brought in from cassette or disk, and run like any other BASIC program. A display is presented on the screen with a copyright notice, and a flashing asterisk "comfort" display to indicate that something is indeed happening. Within a few seconds, VARKEEP is installed and the loader, having done its job, modestly erases itself. It can also be set up to immediately chain in another program from cassette or disk. It's all so very neat and quick that I have set up my system so that it always loads in VARKEEP from disk, immediately after booting in DOS.

Once loaded into memory, VARKEEP becomes an integral part of BASIC. VARKEEP commands are invoked through the NAME vector, which is already built into the Level II ROM. Of course, this means that with VARKEEP in residence, it is impossible to use BASICR in TRSDOS 2.3 without first saving the affected BASIC program, and re-entering DOS. I believe most users will find this an acceptable trade-off because VARKEEP will always be used more frequently than the renumbering feature of BASICR.

VARKEEP has four commands: NAMESAVE, NAMERESTORE, NAMEDELETE, and NAMECLEAR. All VARKEEP commands can be invoked from the command mode, or as part of a BASIC program. The documentation is excellent and the commands are simple to use. After using VARKEEP only a few hours, I found myself asking, "how did I ever program without it?"

VARKEEP has saved me hours of frustration. The ability to edit program lines without demolishing data has greatly reduced program development time, and markedly reduced the need for driver programs to load and test data. The abiliity to chain from program to program has permitted previously impossible program systems.

In my opinion, VARKEEP is essential for any serious TRS-80 programmer. In many applications, it easily doubles the power of any Level II or disk machine. I think other *80* readers may find VARKEEP the answer to their prayers. In fact, I think it would be selfish of me not to share the good news. ■



Aids II
$49.95 Model I
$79.95 Model II
Aids III
$69.95 Model I
$99.95 Model II
Meta Technologies Corp.
Euclid, OH

by David E. Wareham

About five months ago, after taking over the job of bringing an insurance agency on line, I discovered a genuine need for a data base management system. My company had already spent over $2,600 for a custom written billing program, and we didn't want to spend a lot of money for the further software needs of the company. At that time, we were using a TRS-80 Model I with 48K, three drives and a Line Printer III. I had been using this computer at home for about two years prior to bringing it to work.

We needed to input, store, and retrieve data for report forms, mailing lists and labels. Primarily, we needed to write new programs and reuse existing data. After several weeks of trying to define what I needed, I discovered that I needed a program that wrote programs.

After purchasing the mailsort routine from Meta Technologies and finding that it was even better than advertised, I decided to take a chance and order the Aids II system. I had been burnt a few times by purchasing through the mails and it was with some trepidation that I waited for it. I received the Aids II software along with a 36 page manual. The manual was clear and concise with explanations of the various functions of the Aids II system. The disk also contained a sample program that gave me hands-on experience with the system without risking valuable real data.

As the weeks went by, I created a number of programs with the Aids II systems. At that time I found a need for more than the original 12 user defined fields.

Meta Technologies came out with Aids III, which upgraded Aids II from 12 fields to 20. There were many other improvements such as machine language sort, search and delete. It also included Maps, which can produce custom reports either horizontally or vertically and a label routine which is so flexible that I am using it for many other uses now. This was what I was looking for.

A few weeks later, Calcs was released by Meta Technologies. It could be used for most any type of numeric manipulation. The combination of Aids III, Maps, and Calcs satisfies my need for a data base management system.

What impressed me most about the Aids system was its flexibility. By changing only a few lines I could write any program I desired and manipulate the data quickly. The machine language sort could sort by any combination of five fields in ascending or descending order, or in any combination. For instance, a mailing list could be sorted by zip code, state, city, name and address. The Aids III system can also save these records by any combination of four fields to enable the user to create specific data files. Aids III was also compatible with files created under Aids II, so there was no need to re-enter these files.

Territory Book is a system I created for the use of salesmen as a tickler/prospecting system. For example, I am able to split the entire Chicago area by zip code and coding the companies by interest in our product. We presently have about 18 separate programs built on the Aids III system and all of them work perfectly. An example of the savings that can be realized from the Aids III/Calcs system is the fact that I was able to pinpoint an $11,000 dollar monthly deficit in cashflow by using this system—a substantial savings to any business.

Many data base systems presently marketed run well over $100 with some of them over $200. M.T.C.'s price as of September was about $70 for the Aids III system. The Calcs sub-system is well worth the $24.95 presently being charged. The Aids III system has out performed the others that I have seen demonstrated. The only thing that they are not offering now is word-processing, which they say will be out in the next few months. The Aids III system is worth every dollar, not only for business use, but also for personal use. ■

Scrip232 (Scripmod)
Small System Software
Newbury Park, CA
$14.95

by John A. Records

Having trouble using your non-Radio Shack printer with Scripsit? SCRIP232 (also advertised as SCRIPMOD) is a program that customizes Scripsit for use with your serial printer.

When I purchased my TRS-80 I also wanted a printer. At that time Radio Shack's only printer interface was contained in the expansion interface which I couldn't afford. I bought the Small System Software TRS232 Printer Interface instead. The TRS232 is a software driven serial output port for use with the serial printer. I've used the TRS232 with my Integral Data IP-125 printer for about two years with no problems.

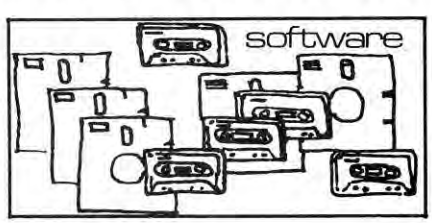
Enter disk drives, an expansion interface and Scripsit. The printer wouldn't work with Scripsit, although I was still able to use it with BASIC. I had depressing visions of setting up my typewriter next to the computer, with me as the interface.

I first saw an ad for Scrip232 in July, and decided to order it immediately. All in all, it took about two months for delivery of the software. I found the wait very annoying, and I hope Small System Software has straightened out this problem.

Scrip232 was worth the wait, however. It arrived on cassette with six pages of thorough documentation. Scripsit finally worked with my TRS232.

Additionally, Scrip232 is said to add handshake control, automatic linefeeds and characters to the serial driver contained in Scripsit.

Installation is straightforward. Detailed instructions tell the user how to use the tapedisk utility to create a file called Scrip232/CMD. On execution, the program asks eight questions which it uses to cus-



tomize Scripsit to work with your particular printer.

First, you decide whether to modify the uppercase or lowercase version of Scripsit. The selected version of Scripsit is loaded into memory by Scrip232. Next, you can modify Scripsit for use with either the TRS232 or RS232-C interfaces.

If the TRS232 modification is chosen you can select a baud rate ranging from 110 to 4800 baud (I use 600 baud with my IP-125). If the RS232-C modification is chosen, the user enters a "printer ready handshake code," based on the requirements of the printer. The rest of the questions asked by Scrip232 are common to both modifications.

Since some printers require a line feed to advance paper, and since Scripsit sends a carriage return but no linefeed at the end of each line, Scrip232 will modify Scripsit to add a linefeed after each carriage return. Some printers also require null characters after carriage returns to allow time for the carriage to travel, and Scrip232 lets you select the number of nulls transmitted. The documentation encourages experimentation.

Finally, you are given an opportunity to alter your modifications, and to choose the drive to which the customized Scripsit, now called Scripsit/CMD, is written. Scrip232 can then be rerun, to create different version of Script/CMD for different printers.

After modification, SCRIPSIT WITH TRS232 DRIVER is displayed on the screen area reserved by Scripsit for commands. As far as I can tell, the customized version of Scripsit occupies the same amount of memory as the original. On my 32K computer, both display 16224 CHARACTERS FREE before text is loaded.

After customization, Scripsit functions and commands seem to work pretty much as they were originally intended to.

The documentation contains detailed suggestions on what to do in case of problems. However, I didn't need these; Scrip232 worked the first time.

In summary, I'm very pleased with Scrip232. I think it's a real bargain. Judging by reader letters in the computer magazines, many people are having trouble getting Scripsit to work with non-Radio Shack printers. If you have a serial printer and either a TRS232 or an RS232-C interface, Scrip232 may solve the problem.■

Wordo
Micro-Fantastic Programming
New York, NY
$14.95

by Debra Marshall
***80* Staff**

For all you wordmongers with an affinity for games and an uncontrolled urge to flaunt your verbosity, this is the game for you. A cross between Scrabble, Jumble and Hang Man, Wordo provides more than ample opportunity to test your skill in the five-letter-word category.

Wordo can be played by one or two persons. The program provides the computer with a list of over 1,000 five-letter words, from among which it randomly chooses one word for each play. The player is asked to enter a five-letter guess word. The computer adds this word to the player's list and indicates how many of its letters are also in the game word. It does not indicate *which* letter in your word is contained in the game word.

After each guess, the player is able to enter or eliminate letters known to be or not to be in the game word on the "scratch card" at the top of the screen.

Each play is limited to 30 guesses, after which the word is displayed on screen.

If the player wants to end the game prior to reaching this point, entering the word "quit" as a guess produces the same result. If the player correctly quesses the game word, Wordo will flash on the screen.

The scoring method is determined by the number of players and is based on either accumulated points or on an average number of words entered per game. The score is carried over and modified from game to game.

Wordo is not a cinch. You'll be surprised at how many five-letter words you don't know, or at least don't commonly use. To win the game, your challenge is to find several words with letters that are not in the game word; this is not always as easy as it sounds.

In desperation, you may be tempted to cheat, as I was. The computer accepts nonsense words that are in the form of true words. It rejects any nonsense word which does not follow an English vowel-consonant pattern. It also rejects any guess word of less than five letters.

Wordo is not geared for children. There is no way to direct the computer to select words appropriate for a child. As a matter of fact, there is no way to direct it to select words appropriate for any adult who has a low frustration threshold, either.

Those of you without that problem will find this game interesting and challenging. veaH fnu!■

DDT (Disc Drive Timer)
Disco-Tech Microcomputer Products
Santa Rosa, CA
$19.95 on disk

by Howard M. Berlin

The DDT (Disc Drive Timer) program by Disco-Tech is a versatile software utility for the TRS-80.

It allows the user to check if the disc drives are running at correct speed. DDT then is really a graphic display tachometer. This can be important since one may not be able to FORMAT or BACKUP diskettes if the motor speed is out of range. Incorrect motor speed can also cause data to be lost when loading or saving programs and files.

Disco-Tech's advertisement indicated that DDT is available on cassette tape and diskette. When I phoned in my order, however, I was told that the tape version was no longer offered.

My disk copy came with a well documented 18-page instruction manual. It states the DDT diskette cannot be copied. It is automatically loaded when inserted into drive 0. The system is booted (similar to Microsoft's "Adventure" game).

However, my DDT diskette would not load. I realized it was because of a previously installed speed-up mod that allows my CPU to run 50 percent faster when powered up. To prevent this, I placed the DDT diskette in drive one and booted the system with one of my modified high-speed operating system diskettes in drive 0. For those using any of the advertised high-speed modifications, the CPU will have to be operated at the standard 1.77 MHz clock speed in order for the program to function. For those who have not changed the speed of your TRS-80, the above would not apply.

When the DDT program is executed, it automatically loads BASIC and runs.

The menu selection consists of three basic options: The first option analyzes all the disk drives in your system which are ready. It displays on the video screen the motor speed in RPM and the percentage error from the required 300 RPM speed.

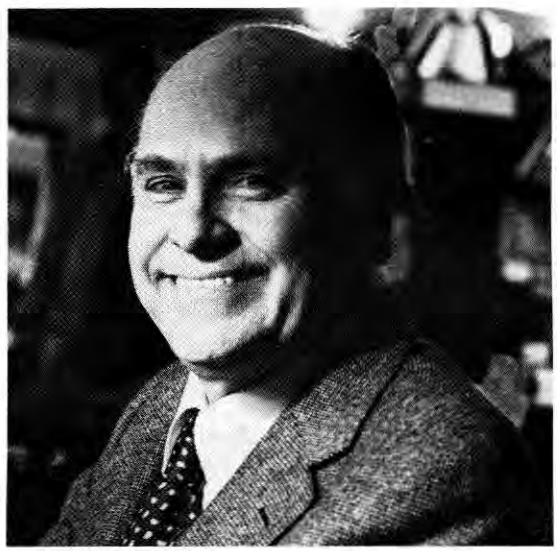
The second option is essentially the same as the first, except that the user specifies the drive to be analyzed.

The last option is the paramount feature which makes DDT so useful as a diagnostic and maintenance software tool. Using this option, a linear horizontal scale is displayed near the bottom of the screen with a graphics block indicating the motor speed of the specified disk drive, which is

Why should you read 80 Microcomputing?

80 MICROCOMPUTING is the best thing that ever happened to the TRS-80.* Through the articles and ads in *80* TRS-80* owners are able to keep up to date on the latest in everything to do with the system. Indeed, if there is any one factor which may carry Radio Shack through the coming blitz from Japan it will be their superiority of support information and programs. . . provided by *80.*

Be sure that you have a subscription to *80* and that every TRS-80* owner you know has one too. The more readers *80* has, the more material can be published each month so you have a vested interest in helping *80* to grow. Send in your subscription. . . and one for a good friend.



What is the one thing which makes your TRS-80* many times more valuable than any other computer? It's the wealth of information which is available for it. Through *80 MICROCOMPUTING* you have an incredible resource: far more information than is available for any other computer in the world. . . information that is available to you on a monthly basis. This information is priceless.

And what is the second thing which makes the TRS-80* more valuable than any other computer ever sold? It's the growing number of increasingly better programs written for it. You'll find *80* a continuing source of programs for your system. . . and through the ads, a key to the unfolding world of microcomputers.

*TRS-80 is a trademark of Tandy Corporation.

☐ YES, bill me for one year of 80 Microcomputing—$18.00

Name _____

Address _____

City _____ State _____ Zip _____

Canadian $20.00 US funds, 1 year only Foreign $28.00 US funds, 1 year only
Please allow 4 to 6 weeks for delivery
80 Microcomputing • PO Box 981 • Farmingdale NY 11737 314B8

updated approximately once a second.

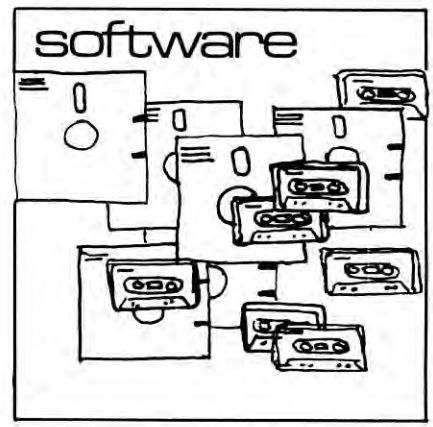
It is not enough that Disco-Tech gives you software to determine the motor speed of your disc drives. They must also include detailed instructions on how to take your TRS-80 disc drive apart and adjust the speed using only two screwdrivers. If you have purchased non-Radio Shack disc drives, there are helpful suggestions and instructions for adjusting PERTEC, MPI, and VISTA units. They are idiot-proof! All adjustments are made using the graphic tachometer option which speeds up things.

As I mentioned earlier, the DDT manual states that the DDT diskette cannot be copied, as it has experienced a lot of software pirating (so what else is new!).

Each DDT diskette contains three copies of the program: DDT/CMD, DDT1/CMD, and DDT2/CMD. If one copy of the DDT program somehow becomes damaged, just kill the damaged file and then rename one of the other two copies as DDT/CMD (pretty good, huh?).

On the other hand, if you really got lucky and messed up the entire diskette, Disco-Tech will replace if for an $8 handling fee. Anyhow, after a little experimenting I was able to copy the DDT diskette so that the clone runs exactly as advertised. Sorry, I can't share the secret with you.

If you want to save some money as well as time, the DDT is a worthwhile investment. ■



Ultra-mon
Interpro
Manchester, NH
$24.95 on cassette

by Dennis Thurlow

Radio Shack has been blasted quite a bit recently, however, there are two excellent products from their computer division. One is the Level I BASIC Manual and the other is the DOS monitor DEBUG.

DEBUG's display of the Z-80 chip structure was a mystery to me, but once I got used to it, I found it indispensable. It's also free! I was determined to write an article explaining its wonders. Then before I got to writing about it, someone at Interpro handed me a copy of Ultra-mon.

Calling Ultra-mon "Son of DEBUG" would not be missing the mark. Like DEBUG, it can execute when an error or breakpoint is encountered and also when a set boundary is overstepped. Like DEBUG, it shows the content of each Z-80 register pair; the next 16 bytes at the relative address in ASCII and Hex; displays a full page of memory; executes single steps or calls; and allows the user to modify memory or registers.

Unlike DEBUG, it shows a disassembly of the next instruction to be executed, disassembles a block of memory, or does a dynamic trace at the rate of eight steps per second. All the data from a disassembly or a trace goes to the printer automatically, if one is available.

Ultra-mon relocates itself, relocates a block of memory (changing all internal addresses), or just moves the block.

The execute mode allows a program to run with Ultra-mon in control. Breakpoints can be set in ROM. It can even execute BASIC, to see how the interpreter handles the text.

In my opinion, the biggest problem with DEBUG: It is not a separate piece of software. You can't run it without DOS.

Ultra-mon, on the other hand, comes on tape and runs in standard 16K Level II. What more could you ask? ■

The Datestones of Ryn
Automated Simulations
Mountain View, CA
$14.95 on cassette
$19.95 on disk

by Debra Marshall
***80* Staff**

Creeping stealthily along the passage, magic sword at my side, I rounded a corner and entered a room. A chest was against the far wall: Should I open it? No sign of a trap. I opened the chest: Spiders!! Thousands of them! I slashed blindly, killing some and finally going down under a swarm. As my strength began to fade, something came crashing down on my head. Everything went dim.

In this bloody manner, I, the nearly invincible Brian Hammerhand, passed out of this life during the 12th of my excursions into the den of the dreaded Rex the Reaver, hidden far from the view of men, deep in the bowels of the Haunted Mountains.

It was an ignominious defeat. I had already despatched Rex himself and his robber lieutenant, as well as other beasties I found lurking in the passages. I had even evaded the dreaded slime, all for naught. The Duchy of Ryn would have to go without its datestones again.

Datestones, the most precious treasure of the Duchy, have been stolen by the brigand Rex and hidden in his mountain lair. You, as the player of Datestones of Ryn, (a.k.a. Brian Hammerhand, mercenary at large), must retrieve and return the stones to the grateful Rynians.

Datestones requires Level II, 16K RAM. I understand there is a version available for Apple and PET as well.

The game comes with a slick looking booklet which introduces the user to the theory behind the game (this is one of a series of more extensive games called Dunjonquest). It explains the player's character variables, equipment, scoring and commands. The scene is set for the game in a short tale of how Rex got the stones and why the Rynians want them back.

The Adventure Begins

As the game begins, you find yourself in a room at the cave's entrance. You may search for traps, examine the walls for hidden doors, or pass into a corridor and move into new rooms or hallways. At any point you may encounter and be challenged by a beastie: robbers, centipedes, wolves, spiders, skeletal bats and slime. Some of the critters are stationary, others move about and pop up unexpectedly.

The game is timed; you have 20 minutes to roam about the cave, find and recover the datestones, defeat or successfully flee from the cave's many horrors. You may enter and leave the cave as often as you wish in that time period.

Scoring is based on the number of stones recovered and brought outside, the number of foes vanquished, how long you survive, and whether you escape from the cave at the end of the 20 minutes. The experience you gain in each game increases your ability to stay alive in the next.

There were a few things I did not like about the game. The ability and strength chart, which appears while the program is loading, does not remain on the screen long enough for more than a very cursory

scanning; this chart contains potentially important information concerning Hammerhand's strength, intelligence, weaponry, skill, experience, intuition, etc. I did not notice that these qualities changed in degree from game to game, as I understood they would.

Computer response to fight and flight commands is sometimes too slow to avoid impending disaster. It's very frustrating to watch yourself being engulfed in slime while you keep punching the button that should get you out. Conversely, I have watched beasties die without my lifting a finger to aid in their demise.

What happens during a swordfight is also a bit of a mystery; the messages which appear during these sequences are obscure enough to make it difficult to determine whether Hammerhand or the beastie is getting the worst of the battle. I have been fighting lustily, fully certain all the while that I was winning, only to discover I was suddenly all but dead. I have also fought long and hard and walked away unscathed.

The game is limited in scope and area, but it is a microquest rather than a full-fledged Donjonquest, and you are fully warned of this distinction by Automated Simulations. It is best viewed as an introduction to their larger fantasy games.

If this game is an indication of the quality of the larger quests published by Automated Simulations, I hope they send me a copy of a long one to review. ■

Eliza
Tandy/Radio Shack
Fort Worth, TX
$14.95

by John Warren

Danger! This program can be dangerous to your mental health. This warning should be emblazoned across Eliza's instruction pamphlet.

Radio Shack's copy of Doctor (as Eliza has come to be known) is relatively faithful to Dr. Weizenbaum's original program, with one disturbing addition. When the user signs off, the program presents a diagnosis that ranges from relatively harmless, "As best as I can determine you have no psychological problems besides a normal amount of paranoia," to this one: "I'm afraid that I must conclude that you are dangerously psychotic and should be locked up."

These predictions seem to be selected randomly. Radio Shack's disavowal (three lines at the bottom of the last page of instructions) is nothing more than a cheap out.

Intelligence Exercise

Aside from this flaw, Eliza is an interesting exercise in primitive artificial intelligence. The program simulates (or as Dr. Weizenbaum prefers, "parodies") a Rogerian, or a non-directive, psychotherapist during an initial interview with a patient.

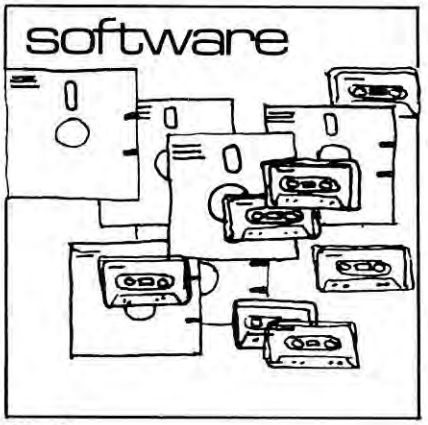
HOW DO YOU DO? PLEASE STATE YOUR PROBLEM.
i hate my brother.
WHY DOES THAT ANNOY YOU?
i think that i should love the members of my family.
IN WHAT WAY?
i should love them, well, like family.
YOU SAY THAT YOU SHOULD LOVE THEM.
yes, but i do not love them.
DON'T YOU REALLY LOVE THEM?
i do not know that, how can i tell?
PERHAPS YOU DON'T WANT TO TELL?
why did you say that to me?
WHEN HAVE YOU ASKED SUCH QUESTIONS BEFORE?
i am constantly asking questions.
WHY DO YOU BELIEVE IT ISN'T NORMAL TO BE CONSTANTLY ASKING QUESTIONS?

Eliza picks up on keywords and sentence phrases. As the keywords increase, the conversation gets more personal until many feel as if they are communicating with another person instead of with a structured collection of bytes in a computer.

Several scientists, including Dr. Carl Sagan, have predicted that Eliza is the forerunner of an automated form of psychotherapy; however, Dr. Weizenbaum disputes that. In fact he is disturbed at the tendency of people to humanize it.

The program tape's flip side contains an Eliza that routes its output through the Radio Shack Speech Synthesizer and I swear that the synthesizer develops a Viennese accent when Talking Eliza is running.

Eliza is about 10K and makes her home at hex 5000 to 7800 with the entry point at 77F2 right above the Level II reserved RAM and also where a disk-operating system is stationed. Disk operators will have to relocate the program before use. ■



Pinball
Space Invaders
Acorn Software Products, Inc.
Washington, DC
$14.95 each

by Dan Keen
and Dave Dischert

All you pinball freaks who have been bitten by the microcomputer bug can now enjoy the best of both worlds!

We went to our local Acorn vendor and came home with a whole stack of their games. The Pinball game stood out among them all. Here's a program that realistically simulates the feeling of being in the finest pinball palace. The action is so real you find yourself rocking the keyboard. It's a good thing the program doesn't say TILT!

The board is drawn and animation begins even before the program finishes loading, similar to Radio Shack's Microchess, where the instructions are loaded directly into the video memory.

The game board has some sequential flashes, even when idle, similar to a real machine beckoning you to play.

Hitting the space bar shoots the ball just like the plunger. The length of time you hold down the bar determines the speed at which the ball enters the playing area.

Ball travel is extremely natural, and even accounts for the slight gravitational effect of the machine being at an angle. In fact, you can even catch the ball by the tip of the flipper to deflect it.

Sound effects are not fancy but are more than adequate. The right hand side of the screen displays your score, bonus points awarded, and the best score of the games played during the session.

This simulation resembles pinball play in every respect except that the ball is square instead of round, but then with the TRS-80 graphic limitations we anticipated that.

NAME THAT SONG

A revolutionary sound program for the 32K TRS-80 disk system co-authored by the musical director of Broadway's "Annie." The game comes with over 100 tunes and you can add your own using the provided utility. This multi-player game has fast action and machine language subroutines. Just like the popular TV show– even has commercials! ONE OF THE MOST ENJOYABLE GAMES I'VE SEEN AND HEARD FOR THE TRS-80"– Richard Taylor, author of TRS-Opera. 32K disk $19.95

STELLAR ADVENTURE

Explore the galaxy and fight the deadly Kyraxans in this real-time graphic game with sound.

Level II 16K tape $14.95
32K disk $19.95

CITY ADVENTURE

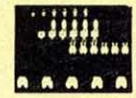
Travel from a peaceful suburb to the hustle and bustle of the big city. Standing in your way are muggers, runaway cars and numerous other obstacles. A knowledge of the program "Interludes" is helpful. Rated PG.
Level II 16K tape $9.95
32K disk $14.95

MICRONOPOLY

A full scale version of the famous board game Micro-nopoly is the only program we know of that plays by the rules, allows trading and doesn't require you to have a board.
Level II 16K tape $9.95
32K disk $14.95

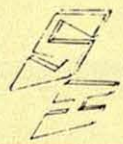
BREAKOUT

In this machine language game with sound you must destroy the graphic blocks with your bouncing ball. This simulation of the popular arcade game has 64 variations.
L 2 16K tape $9.95 32K disk $14.95



ALIEN INVASION

Shoot down the space invaders as they pass over your laser cannon. This is a new improved version available only from Software Innovations. With sound.
Level II 16K tape $9.95
32K disk $14.95



Software Innovations
320 Melbourne Rd. ↙478
Great Neck, NY 11021
(516) 482-6004
MNET-70330,205

Add $1.00 for shipping.
Free catalog available.
Terms: Check, M.O, VISA, MC.
NY res add sales tax.
Dealer Inquires Invited.

ELECTRONIC ORDERING IS HERE

↖ INNOV-80 CBBS (516) 482-8491

↙ CONNECTION-80 CBBS (516) 588-5836

COMMUNICATE!!

MICROCONNECTION– $249.00
For Model I or III, decodes the TRS-80 buss and creates an RS-232 port. Eliminates need for expansion box and/or RS-232 board. Provides serial printer output. Requires software written for port 208. Requires adapter cable for Model III.

RS232CONNECTION– $199.95
Works with virtually any computer or terminal having an RS-232 serial I/O port. Replaces obsolete acoustic coupled modems. Compatible with all TRS-80 terminal software. Requires RS-232 cable.

COLORCONNECTION– $199.95
Converts Radio Shack Color Computer into a communications terminal. Provides serial printer output. Does not require any additional memory or extended basic. Complete with cables.

AUTOCONNECTION– $79.95 (option)
This option permits CONNECTIONS (except Color) to answer the telephone and/or dial numbers automatically. Supplied with a dialer demonstration program.

EUROPEANCONNECTION– $20.00 (option)
This option modifies the above units for European Standards.

MODEL III ADAPTER– $29.00
Cable converts Model III 50 pin buss to 40 pins used by Model I peripherals.

RS-232 CABLE– $24.00
Four-foot ribbon cable terminated with 25 pin male DB25 plugs.

SMART-80 and SMART III
By Dick Balcom

Smart Terminal Programs for the TRS-80+ Model I and Model III Computers! This is the ONLY Smart Terminal Program available for the Model III as of this printing! These programs are available in either cassette or disk versions for the Mod I and Mod III. These programs allow you to up AND down text and programs to your TRS-80+ from other users, Timeshare Systems (source, MicroNET), and free public BBS (CONNECTION-80, etc.). This software represents the State Of the Art in terminal software for the TRS-80+.

Smart-80(C), Smart III(C) automatically converts basic programs saved on Tokens to ASCII code, and back again. EDTASM tapes can also be loaded thru the terminal!

Smart-80(D) is the Disk based version of Smart-80 with the ability to transfer diskfiles to another user over both phone and radio with the use of a modem. These programs support Auto Log-on, as well as other features not found in other programs.

Smart-80 (C) Model I	$79.00
Smart III (C) Model III (1500 Baud Tape)	$99.00
Smart-80 (D) Model I	$79.00
Smart III (D) Model III	$99.00

B.T. Enterprises ↙380
171 Hawkins Road
Centereach, New York 11720
Dealer Inquiries Welcome

Add $2.00 S & H
NYS res. add appr. tax

(516) 981-8568 (Voice)
(516) 588-5836 (Data)
MNET-70331,105

↙See List of Advertisers on page 306

Acorn's PINBALL is one of their latest releases, a company spokesman told us. We find it refreshingly different.

Space Invaders

We've played all of the invader-type games and this one, without question, comes closest to duplicating the arcade game on a TRS-80.

The format stays close to the arcade version, with invader munchkins descending down the screen to attack your bases.

The player determines several variables, including: the number of bases, game speed, the number of shots that you can have on the screen at any one time, the number of bombs fired back at you, and their accuracy.

The program computes these variables to create a weight factor; that is, a number from one to 99 by which your score is multiplied. The high score, if more than one game is played, is kept and displayed.

Graphics are very good despite the well-known shortcomings of the TRS-80. The sound effects have that familiar ring of Acorn products (remember their "Alien Invasion"?—similar, though these are superior).

The movement of the base station is extremely fast; we feel it's a little too fast. The left and right arrows move it back and forth horizontally. You barely touch an arrow key and the base darts to the opposite side of the screen. With some practice, you can position it fairly accurately.

We like the range of game speeds available. A young child can play well with the slow selection and the fast setting is unnerving!

To beat the invaders you must score 655,350, a figure which we haven't been able to attain in several days of play.

Since buying this game we can't tell you how many quarters we've saved! ■

Invaders Plus
Level IV Products, Inc.
Livonis, MI
$19.95 cassette
Level II, 16K

by Owen Linzmayer

Anyone who has spent time in or around an arcade hall will recognize the name, Invaders Plus, as coming from one of the most popular video games ever, Space Invaders. I had been eagerly awaiting a good TRS-80 imitation of Space Invaders, and Invaders Plus is a great one.

The game begins by explaining the controls and point ratings. Moving your laser-bases is accomplished through the arrow keys and firing is controlled by the space bar. Rapid machine gun style firing is possible by simply holding the space bar down. The scores range from 50 points for hitting a large invader to 150 points for shooting a bomb down in mid-air. Failure to hit anything with a shot results in a 20 point deduction.

If you hook your aux plug into an audio amplifier before starting the game you will listen to a fine rendition of the theme song from *Star Wars*. This is amusing the first few times, but since it cannot be bypassed, it soon becomes a nuisance.

There are nine levels of play, which graduate in difficulty from level one to level nine.

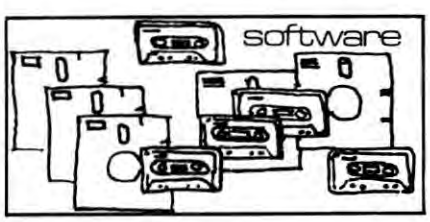
After picking your level of play, the screen fills with the first wave of 49 invaders. Each of these marauding meanies is depicted complete with blinking eyes and animated movements.

The object of the game is to terminate the lives of all the invaders before they send you to an early grave. You can meet your maker in one of two ways: by letting the invaders reach the bottom of the screen, or by letting your laser-base get hit by a lethal rain of bombs.

Should you be successful clearing a wave of invaders, you are treated to a screenful of even deadlier demons. These attackers drop more bombs and move more quickly, making them harder to kill than the preceding group.

Unlike Space Invaders, where the number of screens is only hindered by the player's skill, Invaders Plus offers you only four waves of persistent pests. After killing all four groups, you have the title of Hero bestowed upon you via the computer.

I have purchased other invader programs and have found Invaders Plus to be far superior to any I've seen. This is a truly magnificent programming effort by Larry Ashmun, and well worth the asking price. ■



Dancing Demon
16K Level II
Tandy/Radio Shack
Ft. Worth, TX
$9.95

by Dan Keen & Dave Dischert

Upon entering our local Radio Shack store we saw a crowd of people hovering around the computer. What was the attention-getting program being displayed? Dancing Demon, Radio Shack's latest entry in the world of computer games.

Friends sometimes ask, "What can your computer do?" Telling them it keeps track of the checkbook, helps the kids with their homework (when we let them use it), manages mailing lists, figures loan amortizations, and tracks Amway earnings, just doesn't seem to impress them. Now here's something that will put them in stitches.

This is a good demonstration program for the TRS-80, and shows off some of its animated graphic capabilities.

With Dancing Demon, you enter individual notes to compose a song, then type in dancing instructions and choreograph a tap dancer to the music.

Letters correspond to notes. Each note is followed by a click to simulate the dancer's tap shoes. Extra clicks can be inserted by entering the letter Z when programming the music.

The machine writes the timing, while you select the tempo. Range extends from very fast to extremely slow. Speed selection goes from one to 255.

Once your song has been typed in, you can create a dance routine by entering various letters and numbers which represent different steps and their counts. The dancer can be made to move left or right, jump, stomp left or right, squat, stand, even spin.

Dancing Demon is another brilliant display of string packing. The master of string packing techniques, Leo Christopherson of Android Nim fame, wrote this program too.

The game is in BASIC, and we had no trouble putting it on disk. It runs fine in DOS Plus Disk BASIC also.

Two demonstration programs are included. We enjoy the big production it puts on. The curtain rolls up and the figure dances to the music, taking a bow or two at the end of his performance.

The audio is not high quality sound, but adequate for the needed effects.

Sit back and let your computer entertain you! ■

Pensadyne
Bringing Word Processing Power to the People

Performance. At a price that *you* can afford. The basis on which our company has built a reputation that spans hundreds of software sales in seven countries world wide. We're here to stay, providing the TRS-80 software you want, the service and support you need, and a price tag that a shrinking budget can keep up with.

PENSA-WRITE 2 — A new generation word processing system that conforms to your needs and requirements. It's flexible, versatile, lightning quick, and includes system features unparalled in the industry. Editor features include...

- in memory capacity of over 19,000 characters (approx. 3500 words), automatic chaining of files during printing and all in just 32K of memory!
- full editing capabilities including: global search and replace, fully controlled transparent cursor, selective insert and delete functions, keyword searches, non-printing comments, forward and backward scrolling, visible linefeed characters, complete word wrap around and much, more more...
- user orientation features included on screen. Three screen lines are constantly dedicated to communicating information to the user, or to allow the user to communicate with the program. These features include: constant read out of date and time, program location, the number of characters that have been used in the text buffer, and the number of characters that remain to be used, automatic word counts, free disk space (on all drives), and a storage indicator that will tell you if what you have in memory has been stored on disk.
- directories for all drives available on screen without exit to DOS
- full error descriptions as well as up to eight possible suggestions as to what might have gone wrong
- sophisticated program structure that will allow the addition of program modules in the future, to further enhance your PENSA-WRITE 2
- complete system and user documentation written in plain English, and supplied in its own three ring binder, so any program updates can easily be added to the documentation.

Your initial purchase of the PENSA-WRITE 2 will include the editor, and at no additional charge, a general purpose printing program. In the future, as they become available and as you require them, you will be able to add options that fully interlock with your editor (with no software modifications). Enhancement modules will include a mailing list, basic file editor, report printer, as well as printing modules for special printers (such as the Centronics 737) and for other special applications. But there's more. Pensadyne Computer Services maintains that after sales services are vital to the full implementation and support of our programs. In the unlikely event that a problem should arise with one of our products, we maintain a 24 hour service department where you can call and get your questions answered. Software support — we guarantee it. **In writing.** We want you to like what we do. Because if you do, then you will come back again in the future. And that's the name of the game.

The price of the PENSA-WRITE 2 word processing system at our special introductory price... **$79.95**

Pensa-write 1 and mailing list, the industry standard BASIC word processor, still available on disk for the low, low price of just **$19.95.**

Mastercharge and Visa Welcome. Order by phone or write.

Dealer Inquiries Invited.

PENSADYNE. Giving *you* the power to think.

PENSADYNE

COMPUTER SERVICES

4441 WEST FIRST AVE., VANCOUVER, B.C. V6R 4H9 TELEPHONE: 604-224-3107

↙207

↙See List of Advertisers on page 306

Now Your Child Can Learn More . . . At a Faster Pace

NEW!

GEOGRAPHY EXPLORER: U.S.A.

This program allows your child to travel the country and learn vital facts about each of our 50 states. Geography Explorer offers the most fascinating way of learning yet. Learn each state's name, capitol, largest city, nickname, etc. As a bonus, this package offers the capability of light pen use. **Order No. 0071RD $49.95**

NEW!

MATH MASTER

MATH MASTER is an educational package designed to help your child understand the mathematical concepts of addition, subtraction, multiplication and division through problem solving. This package also instructs the student in fraction problem solving. MATH MASTER will "walk" your child through the developmental concepts of mathematics with never-ending patience. **Order No. 0257R $9.95**

WORDWATCH

Wordwatch consists of 4 different programs, each designed to enhance your child's understanding of word relationships—this results in an improved vocabulary. In WORDRACE, the student must choose the proper definition for a given word. HIDE 'N SPELL asks the student to find misspellings. In SPELLING BEE, the student takes a pre-recorded quiz in which words are played aloud! Completing the package is SPELLING TUTOR, where words are jumbled, reversed or otherwise altered, and it's up to the student to straighten them out! Together, these four programs will help decrease dictionary dependency! **Order No. 0111R $7.95**

NEW!

OMNI-CALCULATOR

This package is a brilliant solution to the problems involving the complex world of different units of measure. It provides rapid means of conversion from one unit of measure to another in any of 10 categories: length, volume, mass, velocity, area density, power, energy, pressure/stress and temperature. Omni Calculator will give your child a great learning advantage, a head start in understanding the complex relationships between different units of measure. **Order No. 0211RD $19.95**

NEW!

THE ELEMENTS

This program can be used to introduce students to the periodic table of the elements, or for review by students and adults who want to refresh their memory in chemistry. It includes each of the elements' name, atomic number, weight and symbol, as well as its acid/base and normal physical state. Enrich your child's knowledge of science with the help of THE ELEMENTS. **Order No. 0216R $9.95**

LIFE

Even if you've only been involved with computers for a short while, you're sure to have heard of LIFE. This program is the computerized simulation of the life cycle of a colony of bacteria. It is based on a few simple concepts, but the results are captivating, animated graphics and an enlightening introduction into the world of biology and genetics. The LIFE program may be just the motivation your child needs to pursue an interest in the sciences. **Order No. 0078R $9.95**

TO ORDER: For the TRS-80*

See your local Instant Software dealer. If these packages are unavailable, order direct or

CALL TOLL FREE
1-800-258-5473

(We ship within 48 hours)

We Guarantee It!

Instant Software Guarantee

OUR PROGRAMS ARE GUARANTEED TO BE QUALITY PRODUCTS. IF NOT COMPLETELY SATISFIED YOU MAY RETURN THE PROGRAM WITHIN 60 DAYS. A CREDIT OR REPLACEMENT WILL BE WILLINGLY GIVEN FOR ANY REASON.

"The microcomputer will be a powerful tool in education. One of its greatest advantages is its interactive nature—the student becomes an active participant in learning, and the computer can give immediate feedback. The student does not have to wait until the lesson is complete or the teacher is free to check his work; the computer can evaluate the work immediately, and reward him if it is correct or explain why if the work is incorrect. The computer can then determine, on the basis of his work, whether the student is ready to go on to the next lesson or needs to review the present one.

"Educational computer programs will be available for students at all levels—from pre-school to post-college, from remedial to gifted—and in any subject. These programs can give a child a headstart in school; they can reinforce and provide practice in concepts from hand-eye coordination to Math to English or even Health. A computer can individualize a program to a child's level and pace. Programs will challenge the gifted child, allowing him to advance at his own pace. Best of all, educational computer programs can make learning fun."

Mary Shooshan, Educational Software Editor and former teacher

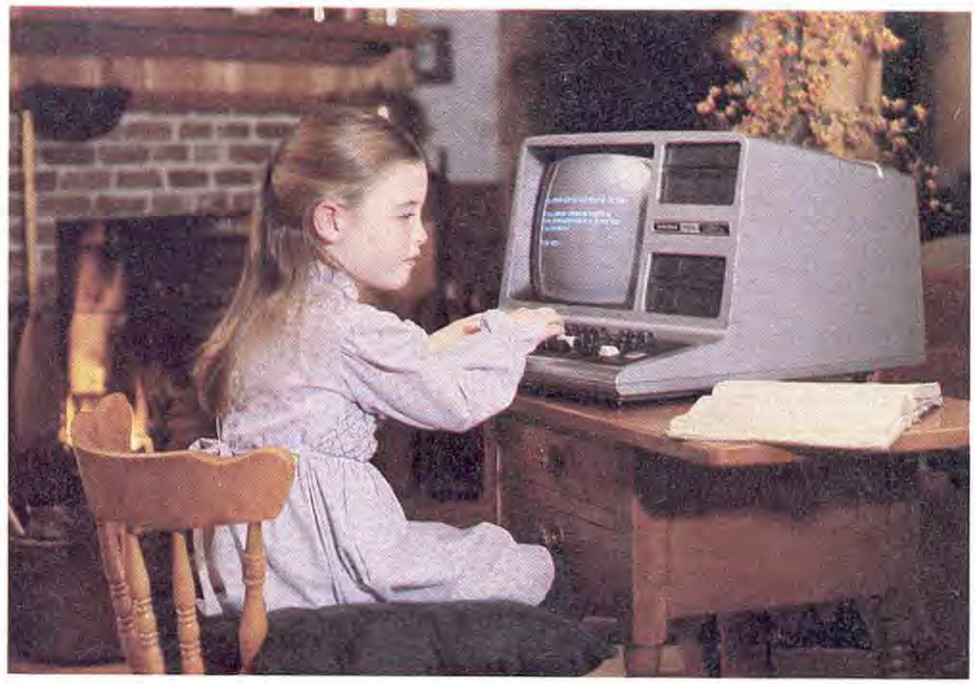
*TRS-80 is a trademark of the TANDY CORPORATION.

Instant Software™

All packages are on cassette except for Geography Explorer: USA, Omni-Calculator and Teacher's Aide which are on disk.

PETERBOROUGH, N.H. 03458
603-924-7296

At 5½, she's reading and thinking at a 4th grade level.



Is she a prodigy? Not at all! When learning is fun, your child can rapidly increase reading comprehension and reasoning power beyond current age level.

Now you can advance your child's educational level—without coaxing or hiring an expensive tutor. Everyone knows the best student-teacher ratio is 1:1. In modern classrooms, this is impossible. But in your own home, it's as easy as C.A.I. (Computer-Aided Instruction). Without the distractions of a crowded classroom, students can progress, without pressure, at their own pace.

Computers are fun, and once the fun is introduced, studying becomes a pleasure—instead of a chore. The ability to interact with the computer will motivate your child to learn much more than from a book that cannot respond—a book that is too easily closed. These Instant Software programs will guide and teach each lesson with the infinite patience only a computer can provide. Each of the twelve packages have been written and edited by professional educators who know what it takes to make a child want to learn. You can introduce your child to the world of learning by computer with Instant Software's Educational Software Series. All 12 packages are available now.

ARCHIMEDES' APPRENTICE

Archimedes Apprentice is a geometry package that will teach your child the formulas used to find the volume of any solid object, including parallelopipeds (cubes and rectangular solids), prisms, pyramids, cylinders, cones and spheres. It will even quiz the student on how well the lesson was learned. Give your child the advantage of learning these concepts at home, before being faced with them in a classroom. **Order No. 0092R $9.95**

TYPING TEACHER

A complete seven-part package that guides you from familiarization of the keyboard through typing words and phrases to mastery of touch-typing. Your video monitor becomes a bottomless page for typing practice, and your own private TYPING TEACHER, ready to teach when you're ready to learn. **Order No. 0099R $9.95**

TEACHER'S AIDE

Now you can have the benefit of Computer Assisted Instruction (CAI) in your own home. The Teacher's Aide program allows you to create tailor-made lessons for your child. The features of this program include the ability to review material before taking the lesson, a provision for hints to help answer questions and graphic displays as a reward for answering all questions correctly. Once you've created a lesson, you can save it and create an entire sequence of lessons.

The Teacher's Aide package is perfect for parents, teachers, and students who need the unlimited patience only a computer can provide. **Order No. 0214RD (disk-based) $39.95**

VIDEO SPEED READING TRAINER

With this package, students can increase their reading speed and comprehension. How? With practice! This three part program will flash characters, words and phrases onto the monitor screen. You must then type what you saw on the keyboard and enter it. You can begin at a relatively slow speed. As your speed and comprehension increase, the computer will automatically advance your speed. **Order No. 0100R $9.95**

IQ TEST

Are you smart enough to buy this package? IQ TEST will administer and score an intelligence test in 30 minutes. There are three equivalent tests, each consisting of 35 questions, designed to test your general knowledge and problem-solving abilities. Most of us claim a "touch of genius"—here's your chance to prove it! **Order No. 0157R $9.95**

VOCABULARY BUILDER

One of the most valuable tools your child can possess is a comprehensive vocabulary. With Instant Software's VOCABULARY BUILDER package, you can help your child develop a better understanding of the English language—and the fun is in the learning! The crossword puzzle format of these programs will hold the attention of the most reluctant student. The first program in this package is "Polonius," offering 140 crossword puzzles. The second is "VeeBeeGee," a program that provides the letters and allows the student to construct a puzzle on the game board. The VOCABULARY BUILDER package is educational entertainment for all ages—and it's never at a loss for words. **Order No. 0198R $9.95**

Instant Software™

Prices subject to change without notice.

PETERBOROUGH, N.H. 03458
603-924-7296

See List of Advertisers on page 306

80 APPLICATIONS

by Dennis Kitsz

". . . the Professor folded and smoothed the aluminum foil over the CPU, plugged in the computer, and answered 'PRETTY BIG' to the MEMORY SIZE question."

Many of you who are audio enthusiasts as well as computer buffs will recognize the name of Dr. I. Lirpa, best known for his regular feature contributions to *Audio* magazine. I recently had the pleasure of speaking with Professor Lirpa, and was surprised to discover that he has been experimenting with an imported TRS-80 at his villa in Tóltótt-Káposta. The good Professor invited me for a visit, and we spent very few enjoyable hours sharing our latest developments for the TRS-80.

This month's Applications will deal with some of the Professor's remarkable hardware and software discoveries. Although I have not had the opportunity to verify all his designs and programming, there is no reason to doubt the competence of Professor Lirpa's work. His successes with a new hybrid breed of swine for soccer ball linings (as well as the early success of the renowned Lirpa-1 power amplifier—see *Audio*, April 1977) are more than enough to recommend him.

Readers may not find it surprising to discover that the tightly controlled socialist government of Transylvania looks askance at information-oriented high technology brought to private citizens from outside its national boundaries. It was with that in mind that Professor Lirpa demonstrated the measures he had taken to keep his TRS-80 a secret.

"Za number von problem of zis mazhine is za problem of juice excretion," he said, referring to RFI as juice, "because za certain Party leaders haff very tiny radio receivers implanted in zer molars. I haff to be very careful."

Photo 1 shows Dr. Lirpa's solution to RFI interference, which, although it is specifically designed to block spurious emissions to European-band receivers, can be modified to American standards by varying the thickness of the aluminum foil used to cover the CPU. The professor explained, "I have used vith great success vat I learned on my last visit to America; zis is called za 'delicatessen fold'. It keeps za juice in, like za Faraday cage."

Quietly, almost as an aside, Dr. Lirpa turned to me and vhispered, "Faraday spent a good deal of time in prison vith me, you know, vhich is vhere I learned his technik." I was struck with the poignancy of the Professor's intellectual plight, but before I could comment he took me quickly toward his piazza workbench where we powered up his TRS-80 for a demonstration.

When his unit began to exhibit typical Model I data instability, the professor reached for a new product exported clandestinely from the West German electronics market. There is a scarcity of reliable integrated circuitry from the West in his country, so marginal ICs must be restored to their original specifications whenever possible. We used an oscilloscope to trace the computer's problem to a balky buffer, and then applied a quick shot from an aerosol can marked "Schmittspritz" (loosely translated as "Schmitt Trigger Spray"—Photo 2). It immediately cleaned up the waveform. The Professor's computer again worked like new.

With the preliminaries finally over, Professor Lirpa led me to his basement laboratory. A few faded photos of Bela Lugosi (autographed "to Prof from Bel") hung on the walls, and a distinct, tangy, and certainly unexpected aroma of southern fried chicken hung in the atmosphere. With a professional air, the Professor folded and smoothed the aluminum foil over the CPU, plugged in the computer, and answered "PRETTY BIG" to the MEMORY SIZE question.

Dr. Lirpa then loaded his own exceptional keyboard bounce program, KKBBBBBBXX, which he has allowed me to reprint in this column (Listing 1). Since the Professor is a very fast typist, he has eliminated what he considers the unwarranted delays in the original Radio Shack so-called "fix" program, producing a keyboard routine for the light-fingered. Although originally written for his 29K TRS-80, I have modified it for standard 16K machines. To use it, set memory size to 32640, and load the program as folows:

```
SYSTEM          <ENTER>
*? LIRPA        <ENTER>
```

The program will patch itself in place, clear the screen, and start automatically.

Photo 1a.

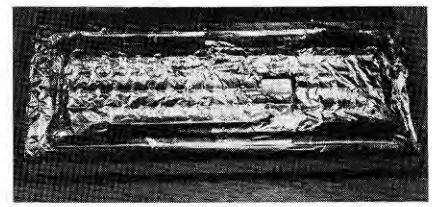
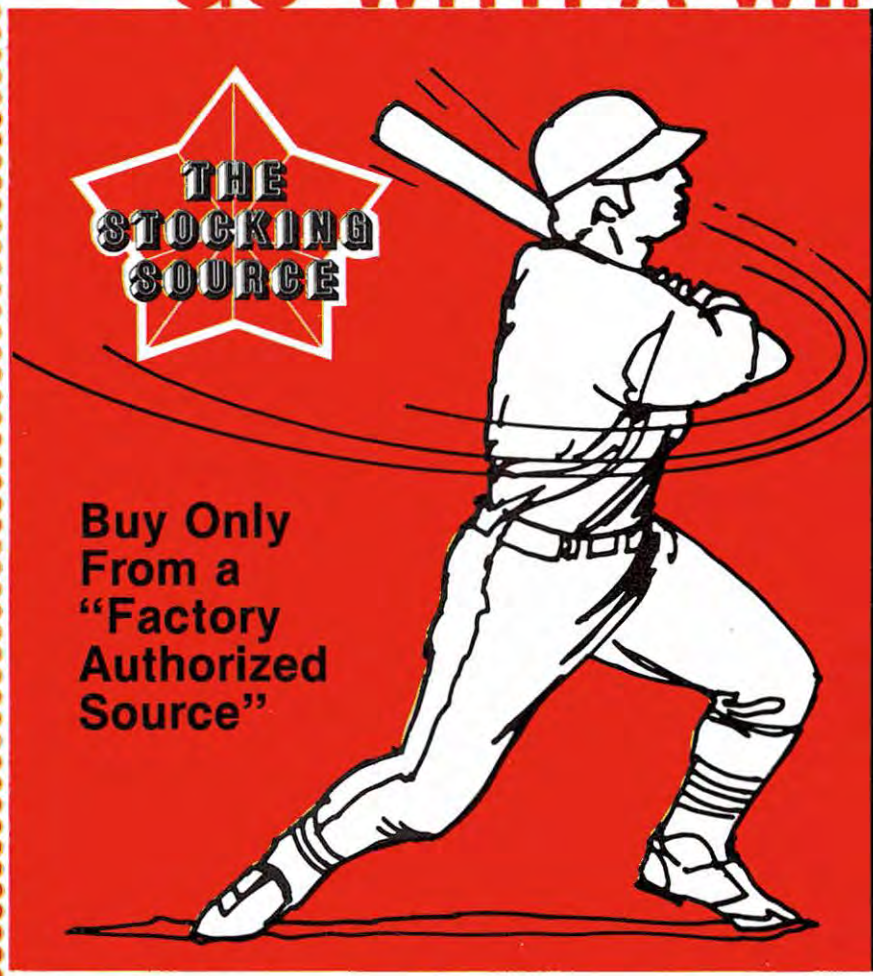


Photo 1b.

Photo 2.

GO WITH A WINNER!



Buy Only From a "Factory Authorized Source"

EPSON MX-70

EPSON MX-80

ANADEX DP-9500

PRINTERS

Okidata Microline 82

	List Price	Your Cost
NEW — Okidata Microline 82	$ 799.	$769 Ask For Our Price

Features: 80 C.P.S.; Bidirectional; Full forms Control; Choice of Parallel or Serial Interface as Standard; Buffered Serial Optional

	List Price	Your Cost
Epson Model MX-70	$ 495.	Ask For Our Price

Features: 80 C.P.S.; Unidirectional; Bit Plot Graphics; Adjustable Sprocket from 4" — 10"

	List Price	Your Cost
Epson Model MX-80	$ 645.	Ask For Our Price
Okidata Microline 80	$ 599.	$550 Ask For Our Price
Okidata Microline 83	$1260.	Ask For Our Price
Anadex DP-9500 & DP-9501	$1650.	Ask For Our Price
Anadex DP-8000	$1095.	$895 Ask For Our Price

INTERFACES —

Epson Apple Plug-in Interface & Cable ..... $110.
Epson Serial Interface & Cable ..... $ 90.
Epson IEEE 488 Interface & Cable ..... $ 80.
Model TRS-80 Expansion Interface Cable ..... $ 35.
Model 232 Universal CA Cable, Universal Serial Interface ..... $ 25.

Okidata Microline 80 Tractor ..... $100.
Okidata Microline 80 RS-232 Interface with 256 Character Buffer ..... $170.

SYSTEMS FURNITURE —

We stock Systems Furniture tables.

PRINTER STANDS —

We stock Universal printer stands for most printers.

COUPLERS & MODEMS —

We handle the broad Tek-Com line.

BREAKOUT BOX

	List Price	Your Cost
NEW — HAYES TECHNICAL	$195	Ask For Our Price

Full RS 232 Breakout and Patching Interface Box

master charge VISA

ASK FOR OUR INSTANT DISCOUNT From Roy Hawthorne Talk To Bill Tokar On Applications

CALL TOLL FREE
U.S.A.
1-800-521-2764
MICHIGAN
1-800-482-8393

Reminder:
We are open
8:30 AM to 5:00 PM EST
Monday through Friday

WRITE TO:
"The Stocking Source" ✓438
NEW 24069 Research Drive
Farmington Hills, MI 48024
313-474-6708

Announcing "Hellfire Warrior", a fantastic new Dunjonquest™ computer game... that's really not for everybody: Beginners are likely to be gobbled up in the first room...and there are over 200 rooms on four levels

"Hellfire Warrior." Really not for everybody: newcomers to Dunjonquest should begin with something easier. Here the monsters are deadlier, the labyrinths more difficult, the levels far more challenging...

But for the experienced Dunjonquest game player there are more command options, more potions (131), more magical items (including—at last—magical armor), more special effects, more surprises. And an innkeeper, an armorer, apothecary and magic shops.

In part a sequel to The Temple of Apshai, up until now the greatest of all the Dunjonquest games, Hellfire Warrior can also be played completely on its own.

Now the character you've created, representing the highest level of role-playing to date, can explore the four new lower levels:

Level 5—"The Lower Reaches of Apshai." With the giant insects and other nasties that swarmed through the upper levels of Apshai. With rooms your hero can get into, but not out of.

Level 6—"The Labyrinth." The only exit is hidden within the Labyrinth. And man-eating monsters can thwart your hero.

Level 7—"The Vault of the Dead."...And of the undead—skeletons, ghouls, mummies, specters... invisible ghosts—lurking in the rooms, doors, secret passages, ready to reduce your hero to a pale shadow of himself. Permanently.

Level 8—"The plains of Hell." In an Underworld of lost souls and shades of dead, of dragons and fiery hounds, of bottomless pits and blasts of hellfire, our hero must rescue the beautiful warrior maiden lying in enchanted sleep within a wall of fire. And bring her past unbelievable dangers and monsters... even Death itself...to sun and air and life itself.

Hellfire Warrior. The most exciting game yet from Automated Simulations, the leading producer of computer fantasy games.

Guaranteed: If it's not the most exciting computer game you've played, return it within ten days for a complete refund.

Available on disk for the Apple II and Radio Shack's TRS80, or on cassette for the TRS80 and for the Commodore PET. **The cassette or disk: $39.95.** Boxed with a magnificent instruction manual. Some of the drawings in the manual are reproduced here (in greatly reduced scale).

Hellfire Warrior. From the people who design and make some of the very, very best computer games, games that thinkers play. Including the great role-playing Dunjonquest series—The Temple of Apshai, Datestones of Ryn, Morloc's Tower, and now Hellfire Warrior. And Invasion Orion and Starfleet Orion. And more.

Hellfire Warrior. Like every EPYX computer game from Automated Simulations, it has the unique EPYX triple no-questions-asked warranty.

Hellfire Warrior. Now available on disk or cassette for TRS80, the Apple and the PET. At better computer stores everywhere. If you can't find it at your local friendly dealer, insist he order it for you.

Or you may order directly from Automated Simulations. **If you want to use your MasterCard or VISA, use our toll-free phones:** In the United States: operator 861 **(800) 824-7888;** In California: operator 861 **(800) 852-7777;** In Hawaii and Alaska: operator 861 **(800) 824-7919.** We'll also send you our new catalogue, hot off the press.

Or write Department F2, P.O. Box 4247, 1988 Leghorn St., Mountain View, CA 94040.

Please specify if you wish the **Disk** for TRS80 (32K, TRSDOS) and Apple (48K with Applesoft in ROM or the **Cassette** for the TRS80 (16K, Level II) or the Commodore PET (32K, old or new ROMs). Only $39.95, disk or cassette.

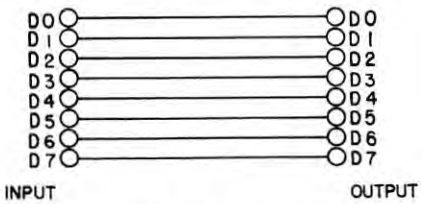
TRIPLE WARRANTY

10 DAY FULL MONEY BACK GUARANTEE: If you don't like the game for any reason whatever, return it intact within 10 days of receipt for a complete refund. No questions asked.

30 DAY DEFECTIVE WARRANTY: Cassette or disk not functioning within 30 days of receipt: return it for exchange. No charge, of course.

FOREVER—LIMITED LIFETIME WARRANTY: No matter what happens to your cassette or disk: the dog chewed it...you left it out in the rain...whatever. No matter **when** it happens. Return the remains to us (with $5.00 to cover all handling and shipping) and we'll send you a brand new cassette or disk.

COMPUTER GAMES THINKERS PLAY EPYX



DR. LIRPA'S B/B CONVERTER

Fig. 1

Simple Hardware Projects

Dr. Lirpa's expertise is by no means limited to software; indeed, some of his audio hardware is world famous, and his recent computer accessories are certain to follow that electrifying path to notoriety.

Among the Professor's first computer peripherals was the eight-bit B/B (binary-to-binary) converter. The circuit (Fig. 1) is straightforward enough to be completed and tested in a single evening. Lead dress is not critical, it may be soldered or wire-wrapped, and depending on the application, nearly any size wire may be used. It is self-powered, (as the Professor had the insight to guess correctly the state of energy needs in this part of the Twentieth Century) and virtually foolproof.

The second of Dr. Lirpa's TRS-80 peripherals was a remarkably sophisticated coalescing of work in two distinct fields, and

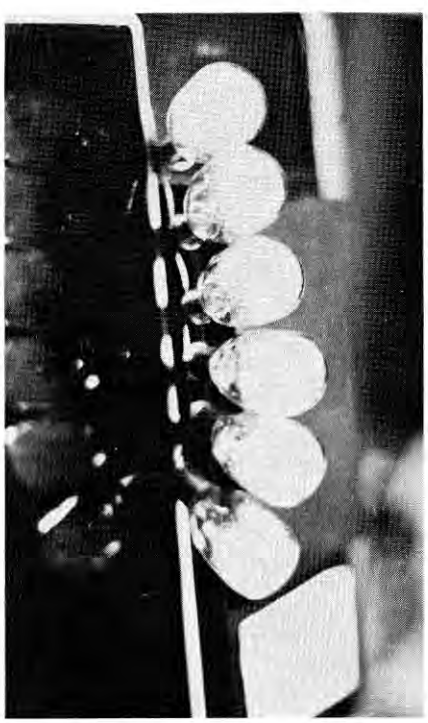


Photo 3a.

```
                    00100 ; DR. I. LIRPA'S KBBBBBBXX
                    00110 ; REVISED KEYBOUNCE ROUTINE
                    00120 ; FOR THE LIGHT-FINGERED
                    00130 ;
4016                00140          ORG     4016H
4016 807F           00150          DEFW    START
7F80                00160          ORG     7F80H
7F80 213640         00170 START    LD      HL,4036H
7F83 010138         00180          LD      BC,3801H
7F86 1600           00190          LD      D,0
7F88 0A             00200 CHKKEY   LD      A,(BC)
7F89 5F             00210          LD      E,A
7F8A A3             00220          AND     E
7F8B 2018           00230          JR      NZ,CKPREV
7F8D 77             00240          LD      (HL),A
7F8E 14             00250 INCD     INC     D
7F8F 2C             00260          INC     L
7F90 CB01           00270          RLC     C
7F92 79             00280          LD      A,C
7F93 D680           00290          SUB     80H
7F95 20F1           00300          JR      NZ,CHKKEY
7F97 0607           00310          LD      B,7
7F99 2D             00320 DECL     DEC     L
7F9A 86             00330          ADD     A,(HL)
7F9B 10FC           00340          DJNZ    DECL
7F9D A7             00350          AND     A
7F9E 3E00           00360          LD      A,0
7FA0 C0             00370          RET     NZ
7FA1 321A40         00380          LD      (401AH),A
7FA4 C9             00390          RET
7FA5 A6             00400 CKPREV   AND     (HL)
7FA6 2818           00410          JR      Z,STORE
7FA8 3A9940         00420          LD      A,(4099H)
7FAB A7             00430          AND     A
7FAC 20E0           00440          JR      NZ,INCD
7FAE 3A1A40         00450          LD      A,(401AH)
7FB1 3C             00460          INC     A
7FB2 321A40         00470          LD      (401AH),A
7FB5 FEFF           00480          CP      0FFH
7FB7 2802           00490          JR      Z,DECA
7FB9 18D3           00500          JR      INCD
7FBB 3D             00510 DECA     DEC     A
7FBC 321A40         00520          LD      (401AH),A
7FBF 7B             00530          LD      A,E
7FC0 73             00540 STORE    LD      (HL),E
7FC1 0A             00550          LD      A,(BC)
7FC2 A3             00560          AND     E
7FC3 C8             00570          RET     Z
7FC4 C3FB03         00580          JP      03FBH
06CC                00590          END     06CCH
00000 TOTAL ERRORS
```

Program Listing 1.

was the immediate result of a period of study at Harvard University's Department of Psychology and Social Relations under the tutelage of a famous behavioral psychologist. Called the Electronic Flash Error Flag (Photo 3a), this peripheral is used

See List of Advertisers on page 306

for data entry training; it has two potential results, depending upon the skills of the trainee.

Photo 3b.

The first result of the EFEF is illustrated in Photo 3b, taken as a typical trainee enters complex scientific data into Dr. Lirpa's TRS-80. Photo 4 is the operator's view of the computer the moment an error is made. Finally, Photos 5 and 6 demonstrate one of the few unavoidable (but fortunately temporary) side-effects of this peripheral device.

The second potential result of the EFEF is shown in Photo 7. Particularly inept but determined data entry students have this view of the TRS-80 after a few weeks of training.

At this writing, neither the National Institute of Health nor the Food and Drug Administration has approved the EFEF for commercial sale in the United States, but the Professor has arranged with *80 Microcomputing* to make a complete set of plans available. Note that this is a five-volt device, making it entirely compatible with the TRS-80's internal circuitry. (See the end of this column for ordering information.)

Photo 4.

Homage to Colonel Sanders

Biological experiments have rarely been a part of the TRS-80 experimenter's repertoire, but Dr. Lirpa has begun to make advances in this field. He presented me with a paper entitled, "Recent Progress in the Development of High-Speed, Full-ASCII, Biodegradable Interfaces for Eight-Bit Microprocessors Running At or Near 1.7 MHz".

The depth of thought amongst personal computer pioneers can be astounding, and Dr. Lirpa's paper left me speechless. The fried chicken aroma I had noted earlier began to make sense as I paged through his report.

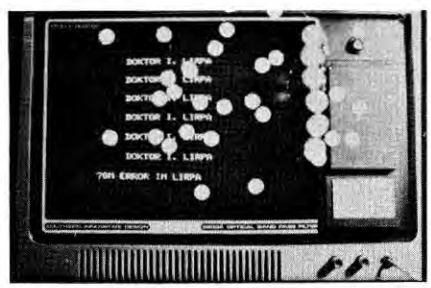


Photo 5.

With pride, the Professor unlocked a special refrigeration unit. Inside was revealed a line of biological interfaces complete enough to stock a delicatessen: the five-volt salami (see Photo 8), read-only head cheese, chicken in ASCII, random-access mutton, corned beef modems, disk-based pork chops, bank-select spare ribs, and direct-connect meatballs.

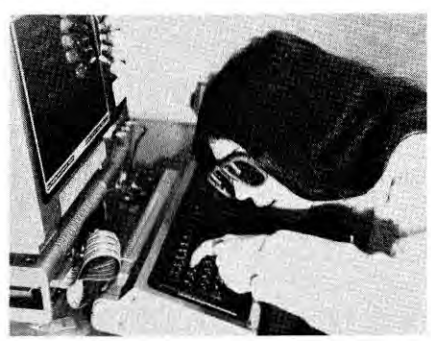


Photo 6.

Needless to say, I had the distinct feeling that I was in the presence of a dedicated but eccentric scientist. Obviously, Dr. Lirpa sensed my feelings, for he drew me aside. "You see," he explained, "our computers are sophisticated but clumsy devices. Biological devices, on ze other hand, are multi-layered in zer responses. Look here." He drew out a frog's leg as I slapped at flies. "Observe as I connect zis leg onto zis cable."

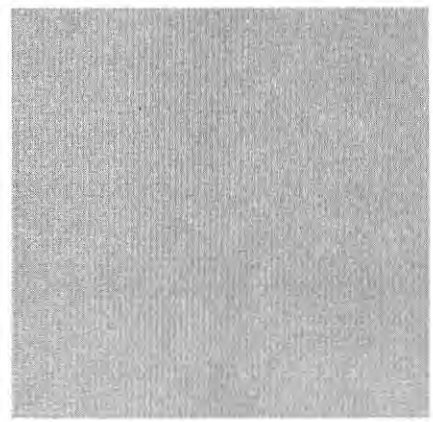


Photo 7.

The good professor entered a quick program, and the TRS-80 screen glowed in its coarse graphics with Renaissance musculature designs like those of Leonardo da Vinci. Then, amazingly, the frog's leg began to write the first line of a restaurant menu: "H-U-S L-E-V-E-S".

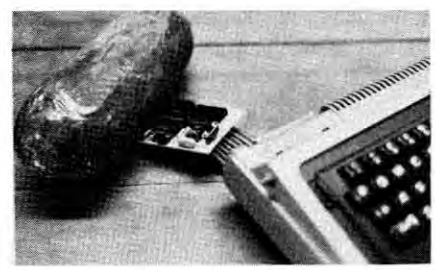


Photo 8.

Dr. Lirpa turned slowly, smiling and eyeing me with an indecipherable gleam. "Tell zem. In American zey will know zat ze computer is of two dimensions, but ze body and brain is of three. Maybe four. Tell zem."

With that, Dr. Lirpa took my arm and directed me back to the piazza, where we parted company. As I flew back to America, I discovered myself inadvertently fondling the plastic pack of transistors and chicken feathers that Dr. I. Lirpa had proferred to me in the final moments of our visit.

Think about it, dear readers. The biodegradable interface. Servos. ■

80 ACCOUNTANT

by Michael Tannenbaum C.P.A.

". . . the future is always based on the past. If the past has been a disaster, a disaster will be projected."

As an advocate of microcomputer business systems I am frequently accused by my colleagues of being a "solution looking for a problem." I usually respond that my solution has an application in *any* size business. Naturally, my associates have not been surprised that I can usually find some way of proposing the use of a microcomputer in most firms that I have visited.

No doubt this is because most firms require functions such as planning, recording financial activity, and the analysis of operating results. With the exception of accounting recordkeeping, these functions are best accomplished at the highest management level. Even though the planning and analysis procedures are done informally, it's always good to document the business plan.

An excellent example of such a management planning tool is Oracle 80, a program for the Model I which is available from Instant Software, Inc., Peterborough, NH. Oracle 80 is a business analysis and forecasting program. Using "time series" statistical methods it can store and analyze up to ten years of monthly data, 30 years of quarterly data or 60 years of annual data.

Time series analysis methods examine a body of data to define the relationships between units of data. This procedure unearths questions which must be answered if a good plan is to be developed. For example, if the January sales are ten percent higher than December, is that a seasonal variation, inflation or the result of a super effort by the sales department?

When using Oracle 80, any data base can be entered. The program provides an easy to use data entry and edit method. This data can later be stored on disk. The program is menu driven and self-promting; as a result, it is quite easy to use.

The data can be displayed on the screen, graphed or printed. The graph and print routines are set up in an interesting way. Once the data has been displayed, a flashing square appears on the screen. This announces that a graph and printing routine called "Scribe" has been activated. Pressing "G" creates a graph of the data. Pressing "P" prints a copy.

From the data entered, Oracle 80 will compute moving averages and rate of change information. If three years of data is present, you can calculate seasonal indices, a deseasonalized series and cycle factors. From this data, forecasts of future activity can be derived; hence the name Oracle. If desired the forecasting method can be applied to the data base to develop a table of predicted versus actual values.

You can influence these projections by entering cycle factors. These factors should be used if it is suspected that future activity might differ significantly from past performance. Generally, Oracle 80 assumes the future will resemble the past.

This is, of course, the main difficulty when using statistical techniques for forecasting. . . the future is always based on the past. If the past has been a disaster, a disaster will be projected. Because of this fact, the methods employed in Oracle 80 should be used with *extreme* care.

Improved General Ledger

One of the most important functions of the general ledger is to serve as a history of accounting transactions during a fiscal year.

As a record of past activity, it is most valuable if your figures can be subdivided into months rather than merely a year-to-date total. Abnormal relationships could indicate mispostings or other accounting irregularities.

Unfortunately, most microcomputer general ledger programs don't segregate monthly totals. A year-to-date and the current period is displayed, but nothing else. If you request a report of account status, the information displayed will not be informative.

There is however, a general ledger package that displays and retains a separate total for each month during a fiscal year. This package, the TCS general ledger, was originally only available on the CP/M operating system. It has been converted to TRSDOS and is now available for a two drive Model II from the Micro Architect, Inc., Arlington, MA.

In this system, current activity and the previous year's month-end totals are retained. The system also maintains a current and a prior year-to-date total. When a month has been completed, the system shifts each month down one position and adds the month to be dropped to the prior year's year-to-date total. The current month's total is placed into the vacant position and the current year-to-date total is updated.

When an income statement is requested, the system prints comparative data for the month for the current and prior year. No other system previously reviewed does this.

Although Osborne general ledger has provisions for a quarterly and prior year total, it does not maintain monthly totals and, therefore, cannot print as much detail as the TCS system. The Radio Shack ledger contains only the current month and year-to-date totals.

The TCS financial reports have other features that are unusual for a microcomputer general ledger system. In the TCS system you can group accounts for printing, even though the underlying account structure remains quite detailed.

It is normal practice to set up a separate general ledger account for each bank to facilitate reconciliation procedures. With some systems all the detail is displayed when a balance sheet is printed out. With the TCS system you can set up a master account for cash and designate the detail accounts as subsidiary accounts. All the detail will be retained but only the master total will appear on the financial report.

The report printing program also skips over the account code number when printing the income statement and balance sheets. Thus the financial reports have only the account amounts which add greatly to the appearance of the reports.

The account structure can prepare departmental reports. These reports can be prepared after the main income statement is printed. If there is more than one department, the account activity for all the departments is printed in summary on the income statement and by cost center on the departmental statement.

These provisions create management reports that are both readable and super-

ior to either the Osborne or Radio Shack general ledger packages. However, TCS offers yet another feature that appears to be unique. This system allows you to enter and display an annual budget on the income statement.

If it sounds like I really liked the system, you are right. The real acid test, however, was a client demonstration. Despite some of the packages weak points, such as its data input modules, the superior management reports sold the TCS system.

In the data input modules, the TCS system shows its age. This system was written for the Altair computer and first released in 1978. At that time, data input and output used either a separate "dumb" serial CRT or a slow speed printer. If a CRT was used, cursor control was usually limited. The best a programmer could expect was a clear screen feature.

With today's intelligent devices, full cursor manipulation is possible. This feature is characteristic of the Radio Shack accounting programs and makes data entry and edit very convenient. Unfortunately, since the designers of the TCS system could not even be sure of the I/O devices to be used, they designed the system for the lowest common denominator: a teletype. As a result, data input and editing is cumbersome compared to the Radio Shack system.

Another shortfall is its inability to perform an interactive edit of account numbers as data is entered. The account numbers are not compared against the master file until a data entry batch summary report is printed out. Thus it is quite possible to enter an invalid account number and not be advised of the error until a report is completed.

The system still traps an incorrect account number and the files cannot be updated with an improper account. The only inconvenience is that the error is not reported instantly to the operator. This is not necessarily a deficiency. Many data processing professionals believe interactive edits are undesirable.

With an interactive data entry procedure, the operator must look at the screen after each item is entered to verify it. This causes a marked increase in data entry time. Studies indicate that the highest data entry rate is achieved with a blind data entry method.

MARIS Files

All of the TCS software systems use a MARIS (Multi ARray Indexed Sequential) file system. In this system, keys to the file are stored in an array in memory. When a request is made to examine or update the file, the array is referenced and the data file required is located on the disk. Although this system works quite well, it effectively limits the number of accounts which can be accommodated in the general ledger to 400.

Since this file method also limits the number of customer and vendor accounts, evaluate your application *before* you install the system. It is also important to note that a data compression algorithm is used to reduce the size of the data files. As a result of this data compression, when you store amounts greater than $20 million, a problem results when you retrieve the number from the file.

Before concluding the review of the sys-

While they last . . .

the complete year of 1980 80 Microcomputing (in its own shelf box . . . a $2.00 value—Free) for only $25.00.*

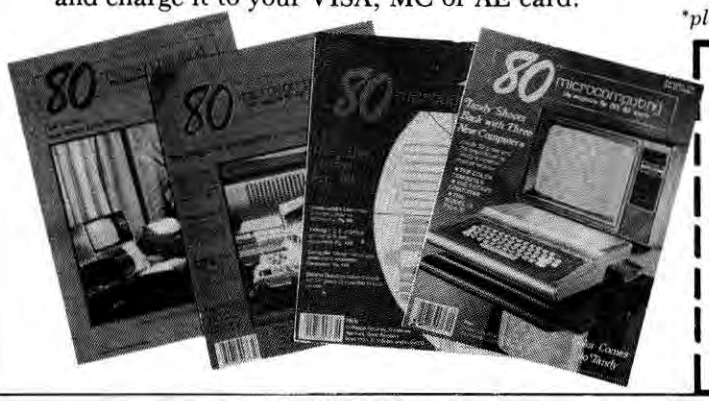
Did you miss the 2,256 pages of useful information published for your TRS-80** in *80 Microcomputing* last year? Now is the perfect time to catch up for only $25.00.*

In the first year of *80 Microcomputing* here were 335 articles on your TRS-80—2½ times more than any other computing magazine. Also in 1980 there were new product reviews, news and columns and best of all hundreds of dollars worth of useable programs.

So to unlock the key to your TRS-80 and double its value. . .send in today for the complete year of 1980. *80 Microcomputing* (in its own shelf box) for only $25.00.*

We have a limited number of these complete sets so send in the card today or call our toll free #800-258-5473 and charge it to your VISA, MC or AE card.

*plus shipping and handling ($3.00) **TRS-80 is a Trademark of Tandy



Yes, I want a year of *80 Microcomputing* for $25.00 plus $3.00 for shipping and handling. Plus I'll receive a shelf box to store them in.

☐ Check enclosed for $_____

Name _____

Address _____

City _____ State_____ Zip_____

Please allow 4 to 6 weeks for delivery

80 Microcomputing • 80 Pine Street • Peterborough, N.H. 03458

Toll free ordering number 800-258-5473 314B8

PRINT OFF-LINE

Increase throughput. Put printers, plotters, and other slow peripherals off-line with a MicroCompatible Print Buffer. Continue processing without waiting. Save time by entering data while the printer is printing. The MicroC Print Buffer accepts data from the host computer(s) as fast as the host computer(s) can output through a parallel port, user selected 110 to 9600 baud RS-232 port, or IEEE-488 port. This data is stored and transferred to the printer(s) through a parallel port, user selected 110 to 9600 baud RS-232 port, or IEEE-488 port as fast as the printer(s) can accept it. Run times are reduced because the computer doesn't wait on the printer and the printer doesn't wait on the computer. There are no software changes to make. The Print Buffer is transparent to the user. This hardware solution is superior to a spooler because it is faster, uses none of the host computers' memory, and allows linking one or more host computers to one or more printers for better allocation of resources.

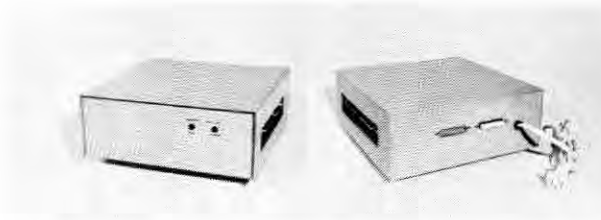
SEE US IN

★ ★ **BOOTH 38** ★ ★

NATIONAL TRS-80 MICROCOMPUTER SHOW

MAY 21, 22, 23

NEW YORK



Model PB1B, 1 pair parallel I/O and 1 pair RS-232 ports

STANDARD MODELS*

Computer	Ports
TANDY	Parallel ports Edge connectors gold plated
APPLE	Centronics standard connectors
PET	IEEE-488
RS-232	RS-232, 110-9600baud

*16K memory with one pair of ports

STANDARD OPTIONS
available upon request

1. 32K Memory
2. A second pair of I/O ports; parallel, IEEE-488, RS-232. May be different from first set.
3. Automatic AC power control for printer.
4. 220 volt, 50-60 Hz. operation.

Other configurations available upon request.

The Print Buffer is a communications processor containing a microprocessor, ROM, 16K or 32K RAM, and parallel and/or serial I/O ports. The host computer(s) and printer(s) are constantly monitored. Data is rapidly accepted from the host(s), stored in an appropriate FIFO stack, and outputted from the appropriate stack when a printer requests a new line. In buffers with more than one input port, storage is dynamically allocated between users such that the faster user gets more storage. A special command code allows users to program the buffer. In program mode, data (object code) is received and stored in RAM, but the data is not outputted to a printer. Control is passed to the object code now residing in RAM. Suggested uses include code conversions, e.g. conversion of ASCII to IBM correspondence code to drive Selectrics, or the equivalent of PRINT programs of a word processor that prepares edited files for printing.

Having used the Print Buffer in my day to day operations, I am impressed with the time it saves my operators. The program that we use for general ledger posting first prints the ledger information and then posts the information by storing it on disk. Using the Print Buffer, the information is quickly transferred from the CPU to the Buffer. Before the printer stops printing the posting is usually completed. That means my girls don't waste a lot of time waiting on the line printer and then again on the posting. Both operations are usually done simultaneously. The Buffer handles the printer, my girls handle inputting information — and now they don't waste time in the process.

Graham C. Bethel
Certified Public Account

ASK YOUR LOCAL COMPUTER STORE FOR A DEMONSTRATION

OR ORDER DIRECT

MicroCompatible Inc., P. O. Box 106, Scaly Mountain, N. C. 28775, Phone (704) 526-2782

Master Charge, VISA, C.O.D., or prepaid

458

See List of Advertisers on page 306

tem, I would like to comment on the customer support offered by the Micro Architect. During the volume test of the system, I discovered a bug the day before a major client demonstration. The bug resulted from the differences between the Microsoft BASIC interpreter on CP/M and on the Model II under TRSDOS.

I called the Micro Architect at 11:00 AM and had the fix at 8:00 PM. That's service!

In addition, the Micro Architect offers his customers a newsletter, free for the first year. The newsletter advises customers of bugs and details programming changes. The General Ledger system is priced at $129 and comes with a 100+ page reference manual, installation guide, 15 programs and sample data files on an eight-inch disk. It requires a 132-column printer and a *dual* disk system.

Visicalc for the Model II

By now, most Model II owners have been advised of the Model II version of Visicalc. I have only just received a preliminary copy without documentation. At first glance it appears to be identical to the Model I version with the exception of the worksheet display which uses the reverse print features of the Model II to outline the edges.

If you are not familiar with its features I recommend that you visit your neighborhood computer center and see a demonstration. To whet your appetite, let me describe some of its outstanding features.

Imagine a worksheet 64 columns wide and 256 lines deep. Although such a worksheet, if it could be fabricated, would be impossibly cumbersome to manipulate, the electronic worksheet is easy to use. When data is entered or examined the Model II serves as a magic window. Through clever programming, the cursor control keys allow any portion of the worksheet to be displayed, changed or printed. Once you complete your data entry or examination, the large worksheet can be stored on disk, chopped up or modified in any way that the user deems necessary.

Imagine making a change in one number and having every number on the whole worksheet dependent on that number automatically adjust itself. This includes column totals, row totals, and dependent numbers such as percentages. Sounds exciting? It's only the start.

Using a special replicate command, values can automatically be generated with a single keystroke. A good example of this is the development of expense spreads used in budgeting. When budgeting, it is frequently necessary to schedule the same number in each of 12 months. With the replicate command, only the first month's value need be entered. Visicalc will spread it over the remaining 11 months automatically.

Replication is not limited to values. Formulas can also be replicated. If a relationship can be established between columns or rows, the same relationship can be duplicated horizontally or vertically. As a practical matter, with the use of this function it is possible to create a 12-month budget with the entry of only one-month's data.

Further, the program provides a means for fixing the horizontal and vertical column headings. These are continually displayed regardless of where you are on the worksheet.

The program is supplied with a multilesson tutorial. A detailed explanation of each command and the syntax to be followed concludes each tutorial. In addition, a useful pocket reference card is supplied, which briefly outlines program commands.

Though I am still learning how to use Visicalc, the payback has already been self-evident. I just completed a detailed system design in two days using this program. It should have taken me two weeks. ■

EDUCATION 80

by Earl R. Savage

Most of you are probably too young to remember when "programmed instruction" first hit the educational scene. It made quite a splash and then faded away.

In those days, programmed instruction meant printed material consisting of sequential frames of instruction, questions, and answers. Sequences were linear and/or branching. Students moved from frame to frame at their individual paces.

Does that description sound familiar? Of course there are differences, but in broad perspective it is quite similar to Computer Assisted Instruction (CAI). If we knew why programmed instruction failed to achieve a place in education, we might avoid a similar fate for CAI.

Programmed Potential

My personal opinion is that programmed instruction (PI) had significant potential—a view shared by many educators.

A number of factors contributed to the demise of PI, but I believe that three major mistakes were made.

Many proponents of PI let their enthusiasm get ahead of them. They over-sold others on the merits and potential of this new instructional technique. PI was touted as *the answer* to all learning problems.

When PI was proven not to be the one final answer, reactions turned quite negative.

The second major mistake was also committed by overly zealous proponents who presented PI as a method to be used exclusively. Other instructional techniques were not needed to supplement PI—no lecture, no discussion, no anything else.

This was directly contrary to the well-established principle that no instructional method is suitable for all students or at all times. PI proved to be no exception to the rule and fell into further disrepute with more educators.

Perhaps the most serious mistake was in not refuting the idea that PI would replace teachers. It is unfortunate that some proponents agreed with this position and few denied it emphatically.

An ancient axiom in education is that nothing will be successful if it is opposed by teachers. Teacher reaction was quick and sure to PI, a teaching method designed to "do them out of jobs": PI bit the dust.

We certainly don't want CAI to suffer the same fate as did PI!

Significant Differences

The similarities between these two instructional methods are striking. There are, of course, several fundamental and significant differences.

CAI programming is interactive with the student. The student cannot simply sit passively; he must do something. The student's progress is controlled. The programmer, through his program, determines when the next frame is to be presented, the number of times answers can be wrong, and the branch (if any) to which the student should move.

These and other differences greatly increase the potential of CAI over PI. How-

ever, the basic similarity is so evident that there is a real danger of repeating old mistakes.

Proponents must not even imply that CAI is the answer to all learning problems of all students. We must not suggest that CAI can do the job alone. Especially, we must refute any notion that CAI can or will replace teachers.

The idea that CAI can replace a teacher is obviously false. Nothing mechanical can replace a competent teacher. Recognizing that, we must prevent opponents from raising this particular red herring. CAI is just another instructional tool that can be extremely effective in the hands of a competent teacher.

One further point: in spite of all that has been said, CAI has one great weakness that PI did not have. The material form of PI was that of the familiar printed page. CAI, on the other hand, requires the use of an unfamiliar machine—a piece of "technology."

Those of us who are technically oriented frequently lose sight of the fear many folk have for every new mechanical thing, especially if it is electronic. Teachers are like the general population in this regard. Many of them are suspicious of computers.

We would do well to introduce our new instructional technology gently to non-technically oriented teachers. Pushing too hard or too quickly will only solidify their opposition.

The ultimate role of microcomputers in education is in the hands of you and me and other folk like us. If we are not careful, we'll throw the game without knowing how it happened. What a loss that would be for the future improvement of education.

Swiss Cheese

Hanson House (55 Hanson Place, Stratford, CT 06497) has several very useful utility programs. There is one especially for all of us who LLIST programs for anything more than our own files. When listings are made for student use, they should be neat and well formatted.

It's hard enough for a student to study a program when it is laid out in decent form; don't make him study in a maze. And when you send one of your programs to a publisher, you want to give him as few reasons as possible to reject it. A congested listing can cause problems to everyone not already familiar with the program.

Hanson's Swiss Cheese is a listing formatter. It produces a clear and pleasing LLIST. Of course, Swiss Cheese doesn't improve your program—just its appearance!

The procedure for using Swiss Cheese is quite simple. With the program to be LLISTED in your 80, you must key in a couple of PEEKs and POKEs which are given in the instructions. You then CLOAD Swiss Cheese and answer several questions. Swiss Cheese and your printer do the rest.

You may be wondering why this handy program is called Swiss Cheese. The name is quite appropriate but I'm not going to tell you why. You'll find out when you run it the first time!

New Text

If you are teaching or planning a programming course, there is a new textbook which you should consider. It is the second (1981) edition of *Computer Programming in the BASIC Language* by Neal Golden (Harcourt, Brace, Jovanich, NY).

This textbook begins with program design by means of flow charting and tracing. It progresses from simple commands to the complex. The text includes plenty of programs and program fragments to illustrate and explain each point discussed. One of its strongest points is that each chapter contains a large number of exercises, projects and programs for assignment to students.

Do not expect the BASIC to match exactly the BASIC in your 80. There are minor differences, most of which are pointed out and should cause no confusion. My most serious criticism concerns the printing of the letter O and the zero. The author has reversed the normal convention and used the crossed O for the letter instead of for the zero. This is a minor annoyance.

Golden's textbook is very well done. I urge you to examine it before making a final decision on a text for your course. If you are using another text, this one will be a good resource book for you. It can be very helpful, also, for the student who is "going it alone." ■

THE ASSEMBLY LINE

by William Barden, Jr.

Ever wanted to convert a slow-speed sort of string arrays into assembly language? Ever done it? I'll bet that not too many of you have.

There's are a couple of good reasons for this. First of all, the structure of string arrays is not too well defined in any documentation. Sure, there are some nebulous references in the Level II manual about the format of string arrays, but there's not enough to go on. Secondly, it seems like it might be an imposing task.

I'll give you a definitive description of one-dimensional string arrays (the most commonly used kind) and show you that, yes, it is an imposing task! Actually, strike that last comment—in spite of my wife's divorce action, I had fun doing it...

Variable List

BASIC program execution creates a list of variables, as shown in Fig. 1. There are two sections to this list: simple variables and array variables. Location 40F9H in working storage defines the location of the start of the simple variables, while location 40FBH contains the location of the start of the array variables.

Variables in the first part of the list are simple and string variables. These are non-array variables. In the case of simple variables—integer, single-precision, and double-precision numeric variables—each variable is held in its entirety in the list. Associated with each variable is a code of 2, 4, or 8, a two-letter name in reverse order, and the value of the variable. Note that the code corresponds to the length (number of bytes) in the variable, as shown in Fig. 2.

The variables are arranged on a first-come, first-entered basis; they are not in alphabetic order. String variables have a code of 3, a two-letter name, and a block of three bytes. The first byte of the block is the length of the string, while the remaining two bytes are the address of the string, as shown in Fig. 3.

The location of the string is in one of two areas, either the BASIC program itself, or in the string working storage area in high RAM, just below the area reserved for system programs with the MEMORY SIZE? parameter.

If the BASIC statement defining the string is something like

```
100 A$="PETERBOROUGH? AH YES...I SPENT A
    WEEK THERE ONE DAY..."
```

then the address in the string location points to the actual location of the string in the BASIC statement.

If processing of a string is involved,

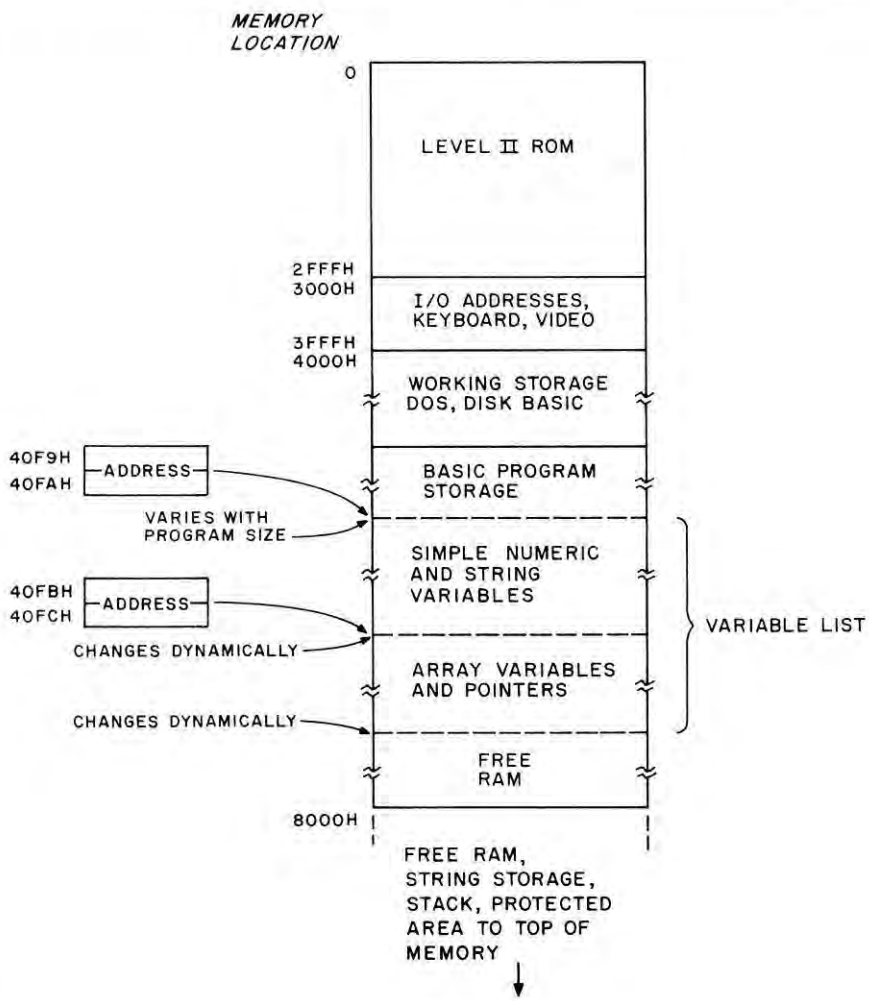


Fig. 1.

then the address in the string location points to a string working storage location. The strings build down in the working storage area.

```
100 A$ = "FORT WORTH?" + "AH YES...TWO WEEKS..."
```

Now for the second part of the list. The second portion of the list contains definitions of arrays. These are entered as the arrays are encountered, either by DIM statements, or by references to an array such as

```
100 AZ$(0) = "2ND PRIZE IS *TWO WEEKS* IN MISSION VIEJO!"
```

The numeric and string arrays are defined as shown in Fig. 4. A type code (3 for strings, 2, 4, 8 for numeric) is followed by a two-character name, an offset to the next array variable definition, the number of dimensions, and the maximum value of each dimension. For numeric arrays, the elements of the array follow. For string arrays, three-byte blocks defining the length and location of the elements of the string array follow.

We'll confine our discussion to string arrays of one dimension since these are the most common strings we have to deal with. A typical string array in the second part of the variable list appears in Fig. 5.

There are several interesting things to note about the string array. First of all, unused elements of the array have 0 length and 0 address pointers. Secondly, the string array definition moves! As new simple variables are defined, the entire array section of the variable list slides downward to make room for the new variable.

In order to write an assembly language program to sort a string array, then, we've got to handle these null entries. We also must pin down the location of the array definition just before any machine language call.

VARPTR with String Arrays

You've probably used VARPTR to get the location of strings for embedded machine language. VARPTR can also be used for finding the location of the string array parameter block. Using

```
100 A = VARPTR(AZ$(0))
```

for example, will set A equal to the location of parameter block AZ$(0) in the second part of the variable list. Since this is the first element of the string array and the remaining elements follow in consecutive order, this is a good start in designing an assembly language sort.

Here's the rub, however: If you use VARPTR followed by another dummy variable in a USR call, the VARPTR address will no longer be valid. Using

```
100 A = VARPTR(AZ$(0))
110 B = USR0(A)
```

will compute the location of AZ$(0) all right, but the next statement introduces a new (possibly) variable B, which is added to the first part of the variable list and moves the array definitions down! Make certain to use any VARPTR call immediately before a USR call without introducing new variables, as in

```
100 B = USR0(VARPTR(AZ$(0)))
```

We now know enough to really get in trouble. There's absolutely no reason in the world why we can't now design and implement an assembly language sort that will take any given one-dimensional string array of any size and sort the elements in a few minutes to replace hours of BASIC sorting.

Bubble Sort

Use a bubble sort to change the three bytes in each array element. The bubble sort is one of the slowest sorts, but it does have the advantage of using the same buffer, which is important for large arrays. Also, since this is machine language, it should be very fast compared to BASIC.

The machine language code would be called from a BASIC program with VARPTR pointing to the first element of a one-dimensional string array. The address of this element would be passed in HL by the USR call. The SABUBL (String Array Bubble Sort) would then do its thing and return with the parameter blocks in the array definition arranged in order of the

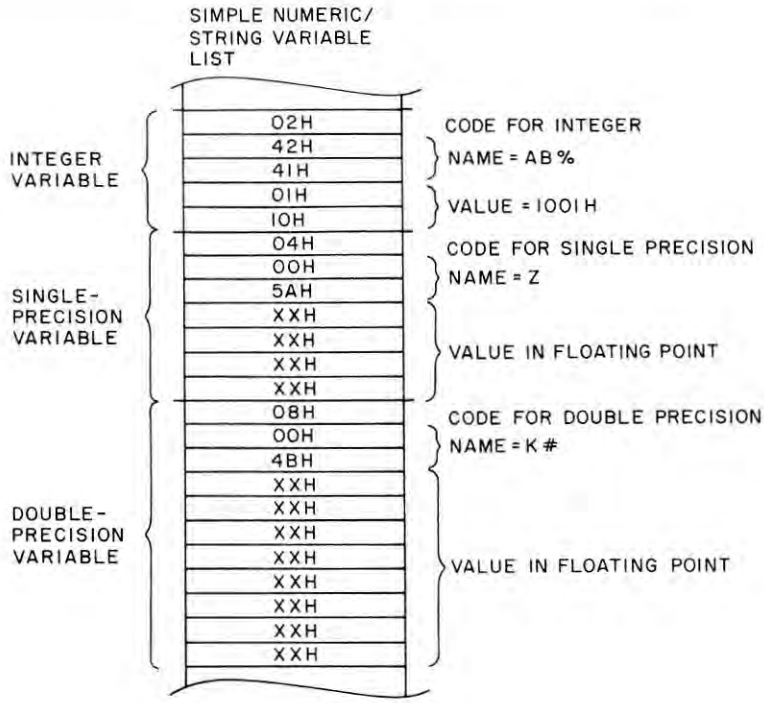


Fig. 2.

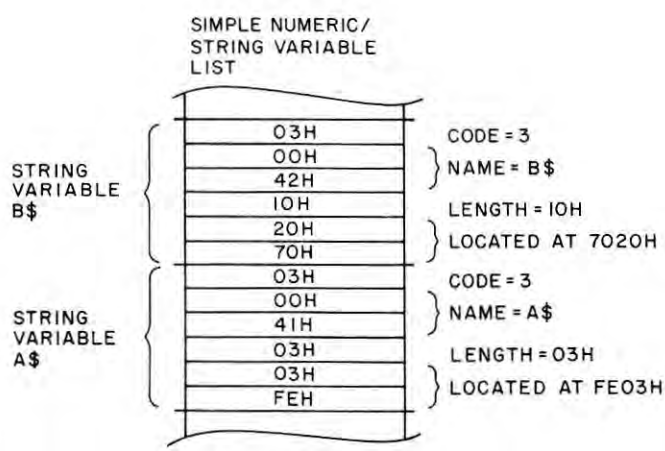


Fig. 3.

strings they represent. An example is shown in Fig. 6. Null entries would be moved up to the start of the array definition.

A bubble sort works by scanning the array from beginning to end. During each scan, the current entry is compared to the next entry in order. If the current entry is smaller or equal in weight to the next entry, the scan moves to the next entry. If the current entry is larger in weight to the next entry, the two entries are swapped—the next entry moves up, while the current entry moves down. In effect, the lighter entries bubble to the top, lighter entries being those that start with ASCII characters that are closer to the beginning of the alphabet or that have a lesser ASCII code.

Each pair of entries is compared. When the last pair of the array (the next to last and last) is compared, another pass is made through the array. A variable number of passes is done until no two elements have been swapped, indicating that the array is in order. The minimum number of passes is one. The maximum number of passes is n, the number of elements in the string array. This worst case occurs when the array has an order of something like Z, Y, X, W . . . A.

The Program

The final program is shown in Program Listing 1. It is arbitrarily located at location 7F00H. You may reassemble it at any location and call it by conventional Level II or Disk BASIC USR calls.

Since this is a big chunk of code to pick up and follow, I'll give you some guidelines. A is used as a working register. B generally holds a DJNZ count. C generally holds the comparison of the entry lengths. DE and HL are used to hold the address of the current entry and the next entry in the array, respectively. IX points to the current entry in the array definition. IX is incremented by three after each comparison. IY holds a flag that is initially 0, but is set to 40H if a swap occurs. When IY is still 0 at the end of a pass, the array is sorted. The stack holds the number of entries left to be compared on top, with the initial value (VARPTR value) in the next position.

SABUBL is entered from a USR call. A call is first made to 0A7FH to put the VARPTR value in HL. This is then transferred to IX by a PUSH HL, POP IX.

The code from SAB010 through line 840 is the outermost loop of the sort. This path is followed for each pass through the array until the flag value IY is 0, indicating that no change (swap) has occurred. We should explain one tricky portion of the test of IY. IY is set to 40H when a swap occurs. When IY is PUSHed and a POP AF is done, the contents of IY goes into AF. The one bit in 40H goes into the Z flag. If a swap has occurred, therefore, the Z flag is set, and the JR NZ,SAB090 falls through to the JR SAB010.

Each time a new pass is initiated, the number of elements in the array is picked up from (IX-2) and (IX-1) and put into BC. This is decremented by one count, as the last comparison is to the last entry-1 and the last entry in the array. IY is set to 0 at the beginning of the pass.

The next outermost loop (note the indented comments) is from SAB020 through line 790. The code here processes the complete array from beginning to end. First, the number of pairs to process in BC is pushed onto the stack.

Next, the length of the current entry is put into A. If this entry is zero (null) the string is a null string and no swap has to be made as the entry is already in the higher position. A JR is made to SAB070 in this case. The code at SAB070 POPs the number of entries from the stack, increments IX by three to point to the next

entry, and then decrements the count in BC. If the count is not 0, the end of the array has not been reached and SAB020 is executed again to compare the next pair.

If the length of the current entry is not 0, the length of the current string is put into B and the length of the next string into A (lines 310, 320). A SUB and NEG is then done with the result going into C. If the result is negative, the length of the current entry is less than the next. If the result is positive, the length of the current entry is greater than the next, and the length of the next is put into B. At SAB030, the smaller string length is in B. The smaller string length is used so that comparison of the strings beyond the end is not done.

The "sense" of string lengths is used in the case of both strings containing the same data, but one being longer than the other. In this case the shorter string is moved to the top of the array. An example of this is the set of strings ABC and ABCAA; ABC is placed before ABCAAA in the sort.

The code at SAB030 gets the addresses of the current string and the next and puts them into HL and DE. These two addresses are saved in the stack, as HL and DE are incremented in the comparisons.

The length of the next entry is tested for zero. If the next entry is a null string, then no comparison will be (or could be) made and a JR to SAB060 is made to swap the entries after the stack is reset.

The code from SAB040 through line 560 is the innermost loop of SABUBL. It compares the string defined by the current entry to the string defined by the next entry. The string addresses are in HL and DE, respectively. The comparison is handled this way: starting from the left byte, a comparison is made of each of the two strings. If any byte does not compare, the strings are unequal, and a JR to SAB050 is made. B contains the number of bytes in the smallest string. If it can be decremented down to zero, the characters compared are equal and the code at line 570 is executed. The LD at line 570 picks up the sense of the two strings. The longer string will follow the shorter string in this case.

At SAB050, A contains the sense of the comparison or the lengths. The starting addresses of the two entries are restored in DE and HL from the stack. If the strings are equal, A contains a zero, and a JR to SAB070 goes on to the next comparison with no swap.

If the current string is less than the next string (minus), no swap is required, and a JP is made to SAB070. If the comparison fell through, but the strings are of unequal length, A will be minus if the current string is of shorter length than the next, and SAB070 will be entered. If the current string is greater than the next, or if the current string is longer than the next but contains the same data, the three bytes in the variable table entries are swapped to reorder the strings, and bubble up the lighter string to the top of the array.

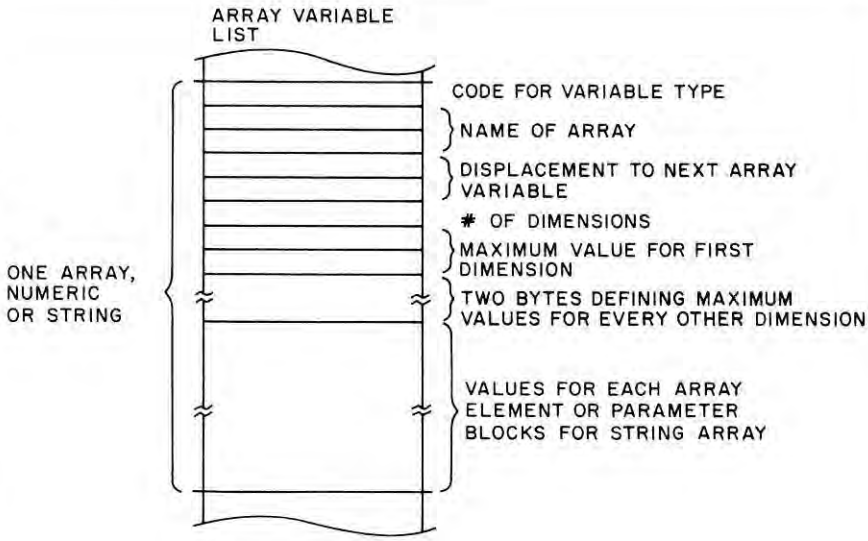


Fig. 4.

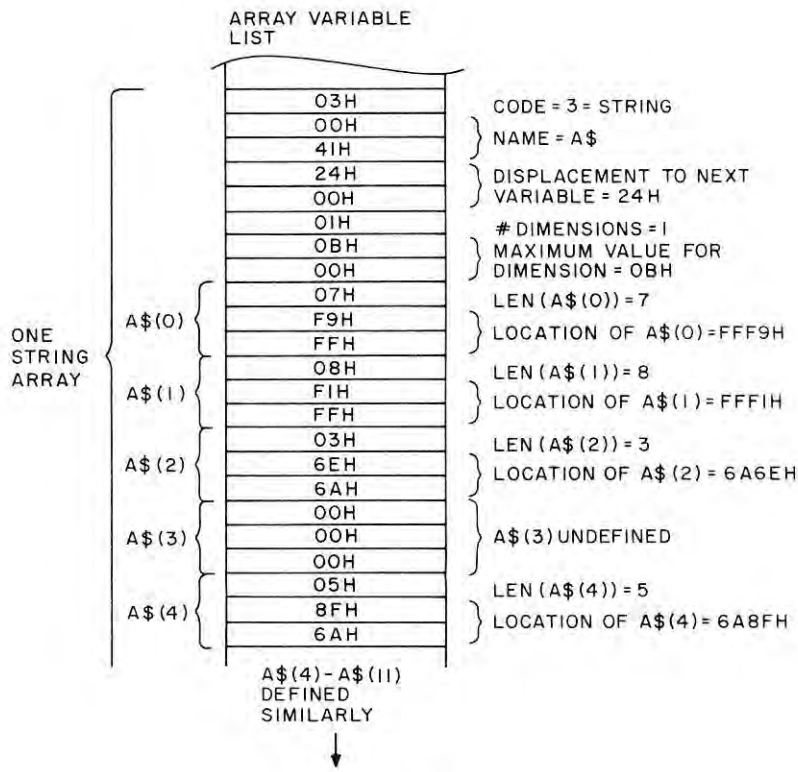


Fig. 5.

If a swap occurs, IY is set to 40H, indicating that a change occurred.

SAB070 continues the comparisons.

Testing the Bubbles

Now for the easy part (heh, heh)—testing the code. Program Listing 2 shows the BASIC program we used in the test. Sub-

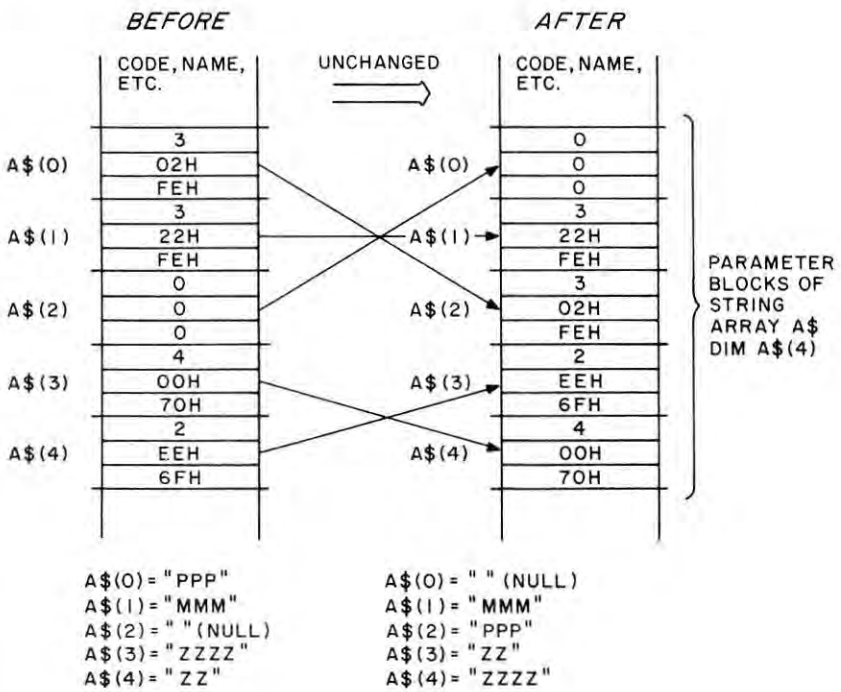


Fig. 6.

Program Listing 1.

```
7F00            00100          ORG     7F00H
                00110 ;*****************************************************
                00120 ;* STRING ARRAY BUBBLE SORTER. SORTS A ONE-DIMENSIONAL  *
                00130 ;* STRING ARRAY OF ANY LENGTH                           *
                00140 ;*     ENTRY: HL=PNTR TO ELEMENT 0 OF STRING ARRAY      *
                00150 ;*            OBTAINED FROM VARPTR(A$(0))               *
                00160 ;*     EXIT:  STRING ARRAY SORTED                       *
                00170 ;*****************************************************
                00180 ;
7F00 CD7F0A     00190 SABUBL   CALL    0A7FH          ;GET POINTER
7F03 E5         00200          PUSH    HL             ;TRANSFER TO IX
7F04 DDE1       00210          POP     IX
7F06 DDE5       00220 SAB010   PUSH    IX
7F08 DD4EFE     00230          LD      C,(IX-2)         ;GET # OF ELEMENTS
7F0B DD46FF     00240          LD      B,(IX-1)         ;MIGHT BE BIG SOMGUN
7F0E 0B         00250          DEC     BC               ;MINUS ONE FOR PAIR COMP
7F0F FD210000   00260          LD      IY,0             ;ZERO CHANGE FLAG
7F13 C5         00270 SAB020   PUSH    BC                 ;SAVE # ELEMENTS-1
7F14 DD7E00     00280          LD      A,(IX)             ;GET LENGTH OF S1$
7F17 B7         00290          OR      A                  ;TEST FOR ZERO
7F18 2857       00300          JR      Z,SAB070           ;IF NULL DO NOTHING
7F1A DD7E03     00310          LD      A,(IX+3)           ;GET LEN(S2$)
7F1D DD4600     00320          LD      B,(IX)             ;GET LEN(S1$)
7F20 90         00330          SUB     B                  ;GET SENSE
7F21 ED44       00340          NEG
7F23 4F         00350          LD      C,A                ;SAVE
7F24 FA2A7F     00360          JP      M,SAB030           ;GO IF LEN(S1$)<LEN(S2$)
7F27 DD4603     00370          LD      B,(IX+3)           ;USE SMALLER LENGTH
7F2A DD6E01     00380 SAB030   LD      L,(IX+1)           ;GET ADD S1$
7F2D DD6602     00390          LD      H,(IX+2)
7F30 DD5E04     00400          LD      E,(IX+4)           ;GET ADD S2$
7F33 DD5605     00410          LD      D,(IX+5)
7F36 E5         00420          PUSH    HL                 ;SAVE
7F37 D5         00430          PUSH    DE
7F38 DD7E03     00440          LD      A,(IX+3)           ;GET LEN(S2$)
7F3B B7         00450          OR      A                  ;TEST FOR ZERO
7F3C 2004       00460          JR      NZ,SAB040          ;GO IF NOT NULL
7F3E D1         00470          POP     DE                 ;RESTORE ADDRESSES
7F3F E1         00480          POP     HL
7F40 1813       00490          JR      SAB060             ;GO TO SWAP
7F42 1A         00500 SAB040   LD      A,(DE)               ;GET S2$ BYTE
7F43 96         00510          SUB     (HL)                 ;S2$-S1$
7F44 ED44       00520          NEG                          ;S1$-S2$
7F46 2005       00530          JR      NZ,SAB050            ;GO IF NOT EQUAL
7F48 13         00540          INC     DE                   ;BUMP S1$ POINTER
```

program continues

routine 1000 through 1050 generates a string of random characters in the range A-Z. Each string is from two to five characters long. Typical strings generated might be AS, VRF, XXGTT, and so forth. The generated string is equated to A$.

The main body of the code first clears string space of 5000 bytes; reduce this if required. Next the screen is cleared and an array called AZ$ is allocated. At this point, all of the entries in AZ$ will be null.

Now, each of the 500 entries in AZ$ is filled with a random string generated by the 1000 subroutine. At the same time (actually a little later) the entry number and string are displayed on the screen.

After the AZ$ array has been filled with random strings, a DEFUSR0 defines the machine language subroutine at 7F00H. The USR0 call calls the subroutine to sort the string. After the sort, a RETURN is made to print all of the entries in AZ$, which will now be in sorted order.

The sort itself takes a little over a minute. I tried a BASIC version of this, but turned it off after several passes (yawn).

To use SABUBL, reassemble it as required for your system. Load SABUBL before loading BASIC, and then protect the SABUBL area. Call SABUBL using the standard Level II or Disk BASIC calling sequence. Use VARPTR to point to the first element of your one-dimensional string array.

Rotate Into ROM?

Sorry about the first paragraph in the February column on interrupts. I couldn't make sense out of it either. Here's an updated list of material erroneously deleted in previous articles:

```
;*CAUTION—DO NOT USE DISK BASIC WITH THIS
LDIR        ;MOVE TO POUGHKEEPSIE
;***DELETE THIS CODE IF REQUIRED***
```

Insert as required.

This infallibility business is difficult . . . in the same column I stated that interrupt acknowledge is not available on the TRS-80 bus. Of course, it is, as INTAK*. Jonathan Titus of the excellent Blacksburg Press *TRS-80 Interfacing* books caught me on this and also pointed out that some CPU hardware mods are possible to utilize interrupt modes 0 and 2.

Now, the results of the Mini-Contest in the February issue. First, the answer: In debugging I had forgotten that it's rather difficult to shift ROM memory with an RLD instruction!

There was an overwhelming response to this question. I selected five at random from the first three days as I now realize that readers should not be penalized by

```
7F49 23        00550          INC     HL                ;BUMP S2$ POINTER
7F4A 10F6      00560          DJNZ    SAB040            ;GO IF NOT DONE
7F4C 79        00570          LD      A,C             ;GET SENSE
7F4D D1        00580 SAB050   POP     DE              ;RESTORE S2$ ADDR
7F4E E1        00590          POP     HL              ;RESTORE S1$ ADDR
7F4F B7        00600          OR      A               ;TEST A
7F50 281F      00610          JR      Z,SAB070        ;GO IF STRINGS EQUAL
7F52 FA717F    00620          JP      M,SAB070        ;GO IF S1$<S2$
7F55 DD7504    00630 SAB060   LD      (IX+4),L        ;SWAP ADDRESSES
7F58 DD7405    00640          LD      (IX+5),H
7F5B DD7301    00650          LD      (IX+1),E
7F5E DD7202    00660          LD      (IX+2),D
7F61 DD7E00    00670          LD      A,(IX)          ;SWAP LENGTHS
7F64 DD4603    00680          LD      B,(IX+3)
7F67 DD7703    00690          LD      (IX+3),A
7F6A DD7000    00700          LD      (IX),B
7F6D FD214000  00710          LD      IY,40H          ;SET CHANGE FLAG
7F71 C1        00720 SAB070   POP     BC              ;RESTORE # ELEMENTS
7F72 DD23      00730 SAB080   INC     IX              ;BUMP PNTR TO NEXT EL
7F74 DD23      00740          INC     IX
7F76 DD23      00750          INC     IX
7F78 0B        00760          DEC     BC              ;DECREMENT # OF ENTRIES
7F79 78        00770          LD      A,B             ;GET COUNT
7F7A B1        00780          OR      C               ;TEST FOR ZERO
7F7B 2096      00790          JR      NZ,SAB020       ;GO IF MORE ENTRIES
7F7D FDE5      00800          PUSH    IY            ;TEST CHANGE
7F7F F1        00810          POP     AF
7F80 DDE1      00820          POP     IX
7F82 2002      00830          JR      NZ,SAB090       ;GO IF NONE THIS TIME
7F84 1880      00840          JR      SAB010          ;BACK FOR ANOTHER PASS
7F86 C9        00850 SAB090   RET                   ;BACK TO BASICS
0000           00860          END
00000 TOTAL ERRORS

SAB010  7F06    SAB020  7F13    SAB030  7F2A    SAB040  7F42    SAB050  7F4D
SAB060  7F55    SAB070  7F71    SAB080  7F72    SAB090  7F86    SABUBL  7F00
```

slow mail delivery. The reader who sent the telegram is, however, included in the five! Winners receiving a copy of my Howard W. Sams *Z-80 Microcomputer Design Projects* are: Tom Pappas, Scottsdale, AZ; SNAPP Inc., Cincinatti, OH; Lee Cole, Cary, NC; Paul Ketrick, Arleta, CA; and Calvin Dodge, Lakewood, CO.

```
100 CLEAR 5000
105 CLS
110 DIM AZ$(499)
120 FOR I=0 TO 499
130 GOSUB 1000
140 AZ$(I)=A$
145 PRINT @ 540,I;A$;"     ";
150 NEXT I
160 DEFUSR0=&H7F00
170 B=USR0(VARPTR(AZ$(0)))
180 FOR I=0 TO 499
190 PRINT AZ$(I),
200 NEXT I
210 END
1000 A$=""
1005 C=RND(4)
1010 FOR J=0 TO C
1020 B=RND(90):IF B<65 GOTO 1020
1030 A$=A$+CHR$(B)
1040 NEXT J
1050 RETURN
```

I'm planning a puzzle session for a later column; many of you seem to be interested.

Thanks also for comments regarding column content—they've been very informative. If you have comments, please send them to William Barden, Jr., Department Z-80 Hacker, 28182 Palmada, Mission Viejo, CA 92692. ■

Dragonquest!

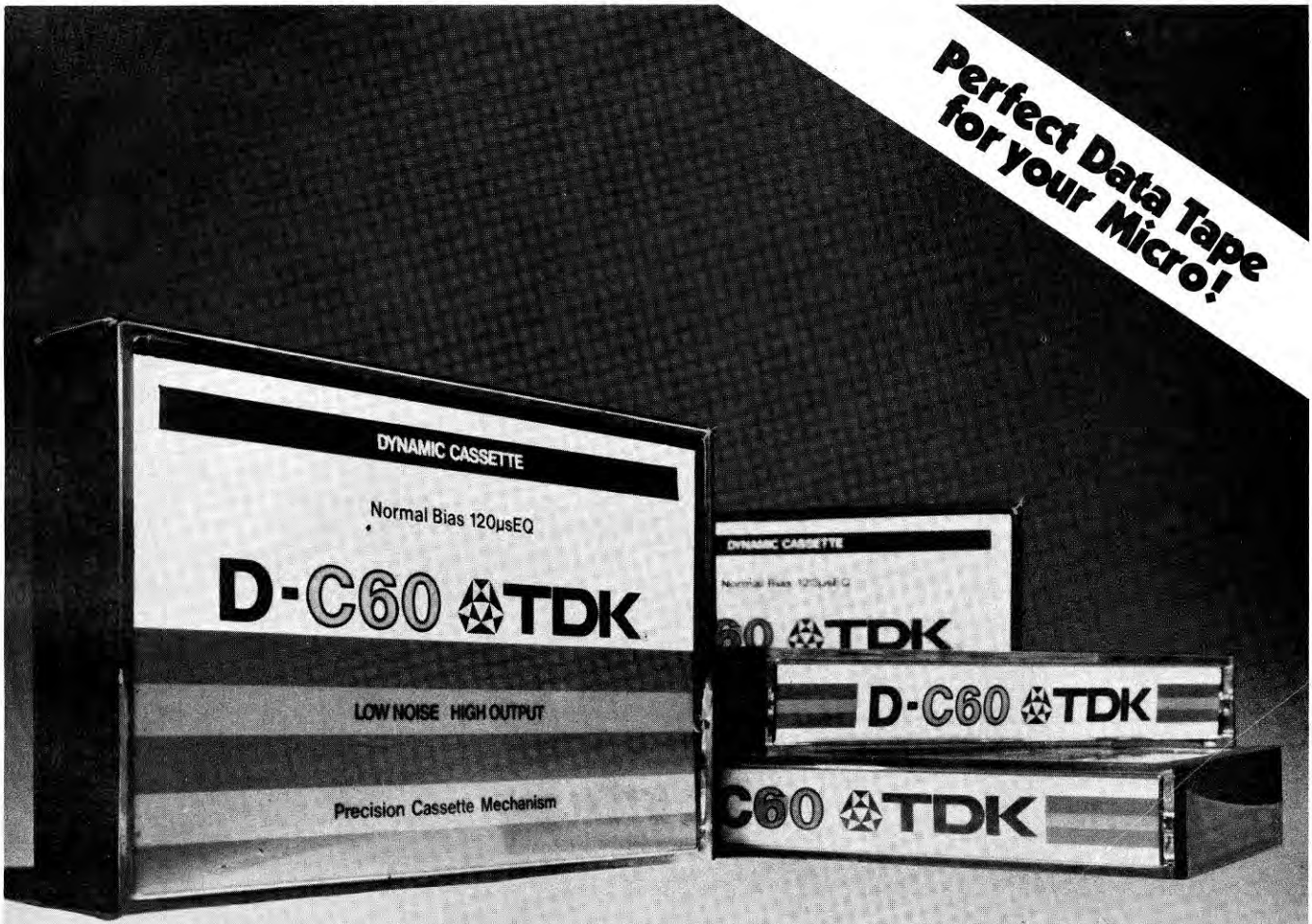
In a desperate race against the sun you search for SMAEGOR Monarch of Dragonfolk, who has kidnapped the Princess of the Realm and holds her in a distant and unknown place. In a quest for Honor and glory, you must search the land, seeking out the tools needed for the ultimate confrontation. On The River Delta, in the abandoned Temple of Baathteski, Goddess of the Blade, everywhere, clues abound. But WHERE is the Princess?

Now, as never before, the genius of CHARLES FORSYTHE shines in this new machine language ADENTURE. DRAGONQUEST! Can YOU save M'lady from the iron clutches of SMAEGOR?

TAPE $15.95 **Dealer Inquiries Invited** **DISK $21.95**

The Programmer's Guild ✓364
Box 66, Peterborough, N.H. 03458
(603) 924-6065 After 6 PM EST

master charge VISA



A Dynamic Discount

on famous TDK® Cassettes Less than **$1.50** ea. (quantities of 10)!

Dialogue concerning the high quality and outstanding performance of TDK recording tape for micro computers as well as audio would be superfluous . . . what IS important to point out is that these are genuine TDK tapes and their regular LIFETIME WARRANTY applies

TDK Full Life Time Warranty

In the event that this product ever fails to perform due to a defect in materials or workmanship, TDK will replace it free of charge. Simply return it to TDK Electronics Corp. New York office or your local dealer. NOTE: TDK will not be liable for any injury, loss or damage, direct or consequential, arising out of the use of, or the inability to use this product.

LIFE DATA INC.

Compare these Low Prices & Order Now!

10 D-C60	Cassettes	**$14.95**
10 D-C90	Cassettes	**$16.95**

Add $2.50 per case of 10 to above prices for shipping and handling

We accept check, money order, Visa or Master Charge. (With credit card orders, include card number and expiration date.)

C.O.D. shipments, $2.00 additional. Direct mail orders to LIFE•DATA INC. at either address below.

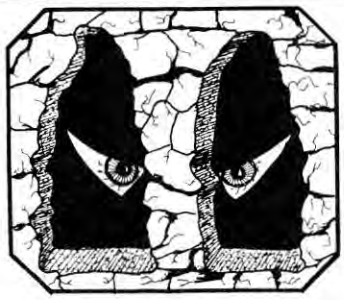
24 Hour phone Order Line 1-303-575-8518

P.O. Box 1567 Wheat Ridge, Colorado 80033
Colorado Residents add 3% Sales Tax
P.O. Box 1017 Medina, Ohio 44258
Ohio Residents add 5 1/2% Sales Tax

Visa/Mastercharge

See List of Advertisers on page 306

THE PROGRAM STORE



DEVIL'S PALACE

By Greg Hasset from Adventure World
Find the Devil's Palace somewhere in the deep, dark forest. You will have to use all your wits to enter the palace and conquer the evil which stalks the dismal corridors. This adventure (#10) is written in machine language for super excitement and suspense.

Level II 16K...$14.95

ASYLUM

from Med Systems
You are sitting alone. It is 2 am. Your eyes are bloodshot. You peer into yor computer screen and suddenly scream, "I must be crazy!" If this has ever happened to you, or the men in white coats from "Deathmaze 5000" have hauled you away, it's time to try Asylum, the most ambitious 3 D graphics adventure yet offered by Med Systems.

Asylum features the 3 D perspective graphics that have made Deathmaze 5000 and Labyrinth bestsellers. You actually see where you are and where you are going!

Asylum places you on a cot in in a small room. Periodically, a janitor lobs a hand-grenade through the window of your locked door. What you do next could mean survival or escape!

Level II 16K...$14.95

DRAGONQUEST

By Charles Forsythe from Programers Guild
It's a desperate race as you search for SMAEGOR, who has kidnapped the Princess of the Realm and holds her in a distant and unknown place. In a quest for honor and glory, you must search the land, seeking out the tools needed for the ultimate confrontation. Clues abound on The River Delta, in the abandoned Temple of the Goddess of the Blade — everywhere! But WHERE is the Princess? Order this new machine lanuage adventure now. You may never find the Princess, but you'll have fun trying!

Level II 16K tape...$15.95 32K disk...$21.95

TRS-80 Level II 16K unless otherwise noted

COSMIC FIGHTER

By Hogue & Konyu from Big Five
Terrific sound, graphics and unique challenges mark this new space game a winner! While fighting off the alien convoys, each more powerful than the last, you must keep track of your rocket fuel or risk explosion as you maneuver toward the mothership to refuel. Can you dock immediately, or is the station overrun by aliens? Find out by ordering Cosmic Fighter today.

Level II 16K tape...$14.95
32K disk version...$17.95

MISSILE ATTACK

By Philip Oliver from Adventure Int.
Closely patterned on the latest king of the arcade games, you must use your twin silos of ABM's to fend off barrage after barrage of enemy missiles that rain down toward your cities. As your skill increases so does the difficulty and speed of this ever machine language arcade game! Watch the skies and may your aim be true! Missile Attack has sound and fast moving graphics.

Level II 16K tape...$14.95
32K disk...$20.95

TECHNICAL SOFTWARE

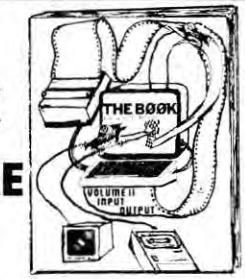
By Howard Berlin from Sams SOS
A series of seven different packages designed to increase your aid your technical knowledge and skills:

PLOTTING GRAPHS FOR LINE PRINTER
ACTIVE FILTER DESIGN
DESCRIPTIVE STATISTICS & REGRESSION ANALYSIS
ELECTRONICS I
ELECTRONICS II
ELECTRONICS III
PLOTTING GRAPHS FOR VIDEO DISPLAY

Both educational and useful, these programs include thorough and well-written documentation.

Level II 16K...$24.95 each

THE BØØK VOLUME II



From Insiders Software
Everything you want to know about video, keyboard, cassette, and print driver routines. Learn to write your own! Remarkably detailed listings illustrate well commented source code. Complement Volume I, now.

$14.95

SUPERscript

By Rick Wilkes from Acorn
Using your SuperScript modified Scripsit Word Processor and a compatible printer, you can now underline, boldface, insert text during printout, slash zeros, subscript, set type pitch, and of course SuperScript! You can even read your disk directory and kill files without leaving Scripsit.

SuperScript comes with drivers for popular serial and parallel printers, and easy instructions for patching to your Scripsit program (does not include Scripsit).

Level II 32k Disk...$29.95

QUICK-FIX

By Kim Watt from Breeze Computing
Finally — a disk repair and modification utility that doesn't require a PhD to use! Quick Fix is a stand alone program that has its own I/O routines and does not use any ROM or DOS calls. As a result, it will operate on standard and "CP/M" machines and does not even require that the disk be in any drive after initalization.

Quick-Fix does just about everything Apparat's "Superzap" does, and so much more: Eliminate system files, kill files with common extensions, zero unused filenames and sectors, repair boot and directory automatically, change or eliminate all passwords, compute the master password, read non-standard disks, compare disk sectors, do string or sector searches.

With Quik-Fix, you can even reformat disks without losing existing files and data! Great for repairing damaged disks and refreshing old ones. Order this essential utility today.

Level II 32k Disk...$34.95

Visit Our New Store: W. Bell Plaza – 6600 Security Blvd · Baltimore, MD

VISA master charge **TO ORDER CALL TOLL FREE 800 424-2738** For information Call (202) 337-4691

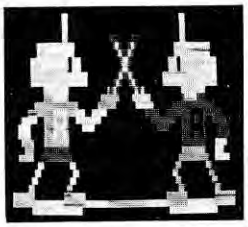
THE PROGRAM STORE ✓17
4200 Wisconsin Avenue NW, Dept. K10 Box 9609
Washington, D.C. 20016

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

Get the most from your micro with software and accessories from one of the world's largest selections.

The Program Store

CALL TOLL FREE 800 424-2738



new

DUEL «N» DROIDS

By Leo Christopherson from Acorn
Your 'droid has already learned NIM, so now it's time to teach it how to wield a laser sword! Leo Christopherson, author of "Android NIM," "Dancing Demon" and other animations, has developed a new type of animation and high-quality sound in his latest work.

Your 'droid starts out as a lowly clown. You teach it how to use a laser sword by controlling its movements. After training it to be a "Grand Master," you enter the tournament against the program's skilled 'droid! Entertainment for all ages.

Protected Tape...$14.95
Protected Disk...$20.95

DEATH-MAZE 5000

from Med Systems
A new breed of adventuring! Venture through a graphically represented 3-D maze, with halls that could dead end -- or recede to infinity. Step through the doors or drop into the pits. Will you encounter monsters and mayhem, or will you be treated to useful objects and information? Will you ever get out alive?

You may never find your way out of Deathmaze 5000, but you'll keep trying!

16K TRS-80, 32K APPLE II...$12.95

Unbelievable Realtime 3-D Graphics!

FLIGHT SIMULATION

From Sub-Logic
The wait is over! If 3-D graphics seem impossible on the low resolution TRS-80, you haven't seen this brilliant program. During FLIGHT SIMULATION, you instantly select instrument flight, radar, or a breathtaking pilot's-eye-view. But be sure to strap yourself in -- you're liable to get dizzy!

Once you put in some air time learning to fly your TRS-80, head for enemy territory and try to bomb the fuel depot and airstrip while fighting off five enemy warplanes. Good Luck!

Level I or II Tape...$25.00

SUPER NOVA

By Bill Hague from Big Five
Asteroids surround your ship. You must shoot the asteroids, as well as any alien spaceships. Written in fast machine code, this game is GREAT!

You may encounter five different kinds of alien ships, including the very deadly flagship. You shoot from your ship's position, rotate it, use your thrusters to move -- if you are overwhelmed, you can even get away to hyperspace. Fast and exciting.

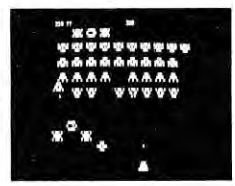
Tape....$14.95

SPACE WAR

By Device Oriented Games from Acorn
A two-player, real-time action game that lets each player control a spaceship with rotate, thrust, fire, and hyperspace. Five game options (including gravity) and three playing speeds. In fast machine language.

Tape...$9.95

GALAXY INVASION



By Hogue & Konyu from Big-Five
"The rage of the arcades" is now available for TRS-80! Exciting sound effects add to the action as the invaders swoop down to destroy your base. Even while you have your hands full battling the aliens, you have to watch out for the Flagship! Super graphics, super action, super fun!

Level I or II, tape...$14.95

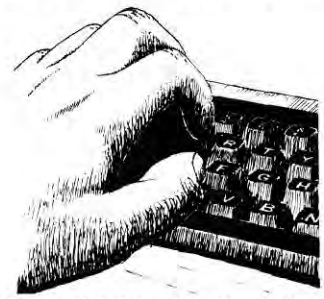
PINBALL

By John Allen from Acorn
Get your flipper fingers ready for action in this real-time, machine language game.

Lots of sound and flashing graphics make this fast action game so much like the real thing that you'll have to remind yourself not to shake your TRS-80. Choose from five playing speeds to match your skill. Can you beat your friends' scores? Will you avoid the dreaded "Bermuda Square?" Get PINBALL today and find out.

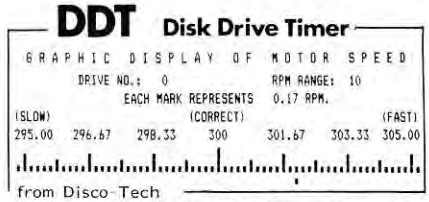
Protected tape...$14.95
Protected disk...$20.95

TYPING TUTOR



By Ainsworth & Baker from Microsoft
Speed up your programming and word processing with this excellent touch-typing instructional program. Divided into two sections, the program first teaches proper finger positioning. You practice keying various characters, the program adding new ones as you progress. In the practice paragraph section, you are evaluated for accuracy and rated in words per minute. The program continuously adjusts to your increasing skill, telling you which characters you miss and where you are slow. One of the most practical programs we know of for TRS-80.
$14.95

DDT Disk Drive Timer



from Disco-Tech
Analyze and adjust your disk drive motor speed with a real-time graphic display. Manual details use for Radio Shack, Shugart, MPI, Pertec and Vista drives, and DDT can be used with any drive. All you need is DDT, two screwdrivers and five minutes.

Disk.....$29.95

INVADERS FROM SPACE

by Carl Miller from Acorn
A fast machine language approach to this classic (and addictive) space game. As you play, the aliens drop bombs, move from side to side, and try to overrun your bases. Hold them off -- and score -- by shooting them down. But, just as you think you've got it all under control, the action speeds up.

Choose the game speed, enemy bomb frequency and accuracy, shots on screen and the number of your bases. Move your base and simultaneously fire at the invaders -- you cannot do this in most similar games. Full sound effects add even more excitement to the incredible speed and action of INVADERS FROM SPACE. Fun for all ages and skill levels.

Protected tape....$14.95
Protected disk....$20.95

THE PROGRAM STORE · Dept K10 Box 9609 · 4200 Wisconsin Ave, NW · Washington, D.C. 20016

Item _____ Price _____

Postage $1.00
Total _____

name _____
addr _____
city _____ state __ zip _____

□ CHECK □ VISA
□ MASTERCARD MC Bank #____ Card # _____ Exp ____

See List of Advertisers on page 306

80 NEWS

Edited by Nancy Robertson

"He says that the FCC is not interested in putting anyone out of business; solutions . . . will . . . be hammered out by the bureaucracy."

A Backyard Tinkerer and Tenured Bureaucrat on the RFI Circuit

Milt Mobley is a healthy mix of irascible southern gentleman, backyard tinkerer and tenured bureaucrat. He's retired now but he's still working hard. This month he is on the seminar circuit. He travels from Hilton to Ramada to Holiday Inn telling computer equipment manufacturers all they want to know about radio frequency interference and how to measure it in their products. Milt knows alot about radio frequency interference (RFI).

Milt enjoys being able to speak freely. "This time, I think the commission may have bitten off more than it can chew, or more than it can swalla, anyhow." Milt is responding to a question from someone in his seminar audience. The questioner, an engineer from Digital Equipment Corporation, is wondering how the hell his company can continue to sell its systems in view of the new Federal Communications Commission's (FCC) limitations on conducted and radiated RF emissions. It seems that while each component (card reader, CPU, terminal, mass storage unit, printer, etc.) individually meets RFI limitations, the system fails when put together in certain electrical or physical configurations. The engineer is worried.

Life is Getting Tough

Life got tough for the engineer from DEC when the FCC decided to set some limits on the amount of radio frequency interference that his computer could legally generate. Three classes of computers exist and interference limits are based on the setting in which the machine is likely to be operating. The classes are commercial, Class A; residential, Class B; and if the computing device uses modulated RF for video, Class I. (See the tables of regulations included with this article.)

Milt counsels him to stay calm. He says that the FCC is not interested in putting anyone out of business; solutions for these problems will somehow be hammered out by the bureaucracy.

Milt should know. He has over 30 years of civil service behind him. He is the retired Assistant Chief Engineer of the FCC, and in his time he has seen alot of RFI problems come and go in the commission's central lab in Laurel, MD.

Exo Facto

When he worked at the FCC an informal understanding among staff members prevented them from discussing the ins and outs of day-to-day business with members of the industries that they regulated. It is the same today. The understanding is known as exo facto and its point is the prevention of conflicts of interest between commission members (some of whom are industry veterans) and their cronies in business. While in principle a good idea, a negative aspect of exo facto is that it makes it very hard to get any information at all out of the commission—information like how to conduct and pass RFI tests.

Since his retirement, Milt can speak freely about these matters—and does. His services have been retained by R&B Enterprises of Plymouth Meeting, PA. R&B is one of several firms in the relatively new field of electromagnetic compatibility testing (EMC). It operates a test facility that specializes in the performance of esoteric tests for government and military radiation specifications.

FCC Testing

As the overhead projector whirs away late in the afternoon in the stuffy function room, transparency after transparency slides across the screen. Milt is attempting to show 100 computer engineers and technicians just what is expected of them when they submit their test data to the commission for certification. Both the power line conducted emission measurement and the radiated emission measurement that these people must make neces-

(Continues to page 63)

Technical Standard for Radiated Emissions

Device	Frequency (MHz)	Distance (meters)	Field Strength (uV/m)
Class A:	30-88	30	30
	88-216	30	50
	216-1000	30	70
Class B:	30-88	3	100
	88-216	3	150
	216-1000	3	200
Class I TV:	30-47.7		15
	47.7-1000		15

Regulations of Power-line Conducted RFI Emissions

	Frequency (MHz)	Maximum RF Line Voltage (uV)
Class A Devices:		1000*
		3000*
Class B Devices:	0.45-30	250*
Class I TV Devices:	0.45-25	100#

Is the Z-80 Shouldering Zilog's Burdens?

That tiny plastic inlay in all that dental bridgework under your keyboard, the Z-80 chip, has drawn much speculative press attention.

80 Microcomputing contacted Zilog, Inc. of Cupertino, CA makers of the Z-80 microprocessor, to assess the impact on the microcomputer industry of reported financial reverses.

The Z-80, which is the central processor for the TRS-80 Model I, II and III, as well as Heath/Zenith's micro, the Personal Micro Computer, Sinclair Electronics' ZX-80 and other microcomputers, has generated an estimated $50 million in unit sales for Zilog. According to a study by Dataquest, a San Francisco area research firm, growth is expected to continue at the rate of 20 to 30 percent over the next two years.

However, reports in the trade papers indicate that Zilog has suffered reversals in the marketplace and that it has scrapped its MCZ-2 multiprocessor project. Company spokesmen label the press coverage misleading half truths.

Bill Carrico, director of marketing for Zilog components, could not comment directly on reports by *Computer Systems News* that Zilog had lost a $1.5 million contract with ITT for MCZ-1 distribuon and its $1 million contract with Ontario Hydro for a Canadian Z-Net. He did say that "when IBM loses a contract, it never makes the papers."

Carrico explained that Zilog is divided into two distinct divisions: component manufacture and systems manufacture. Both the MCZ-1 and Z-Net are systems projects.

These system projects, said Carrico, are aimed at the electronic office systems of the future. These are microprocessors used in dedicated environments and do not effect chip manufacture for the microcomputer market.

Components Market Strong

Twice in the last year and a half, threatened shortages of microcomputer chips have caused the marketplace some consternation. But, according to Carrico, Zilog's component manufacture, including a new "Ethernet chip that will allow you to access the Xerox net," couldn't be stronger.

In addition to the Z-80 eight-bit microprocessor, Zilog's Z-8000 16-bit microprocessor has found wide acceptance. A new entry for Zilog, the Z-80B is an improved six-MHz version of the Z-80.

Further, a Z-8 chip will offer Tiny BASIC, 2K of ROM and 128 bytes of RAM. This, Carrico explained, "is a single-chip environment for hand-held games, sewing machines" and other dedicated uses.

"We are generally selling and shipping more (Z-80s) than ever," said Carrico. He rebutted the idea of a chip shortage attached to Zilog reversals by saying that the Z-80 is also licensed by Mostek, SGS in Italy and Sharp Electronics of Japan.

According to Carrico, Nippon Electric Corp. (NEC) of Japan is also making their chip, "but they're not licensed. They did a straight copy."

The market continues to show steady growth for the Z-80 eight-bit microprocessor and Carrico is confident that growth rate is secure. He argues that the Z-80 has found a "price-performance niche" that solidifies its future.

"He rebutted the idea of a chip shortage. . . saying that the Z-80 is licensed by Mostek, SGS and Sharp. . ."

Though it's true that the 16-bit microprocessor offers more computing power and speed, it is also more costly. This extra power is unnecessary for some users, said Carrico. "A Cadillac is still more expensive than a Ford," Carrico said, and "you don't put a V-8 in your lawnmower."

Carrico compared the price of computing to the price of calculators. While it's true, he argued, that "the price of a four-function calculator has fallen to $10. . . a scientific calculator with 20 or 30 functions. . . will never be $10." Both price points will be constant for years.

The additional capability of the 16-bit processor is not an easy transition. "There is a schism that has taken place . . . when you go from a Z-80 to a Z-8000. They are not binary of source compatible. When you go to the 16-bit machines you will go into another strata (of computing)." This transition, said Carrico, brings with it, "a major software challenge."

Though conversion software may be the answer, the key to the original success of Zilog and the Z-80 was the chip's compatibility. According to *80 Microcomputing*'s Technical Consultant, Jake Commander, the Z-80 was a compatible superset of the 8080 chip by Intel Corp.

Zilog, too, has recognized this. Their response is Z-80B, an eight-bit chip that offers 50 percent more computing speed than the Z-80. "The Z-80B" said Carrico, "will offer. . . six as opposed to four megahertz."

Network Microcomputers

Despite the health of Zilog's component market, Zilog's systems reversals cannot go unnoticed in a company that is dedicated to what is called a Z-Net. Z-Net is cable-connected network of microcomputers, all time-sharing with larger units. Locally, Zilog is using such a net to connect its Cupertino office mail. There is no doubt, said Carrico, that "distributed computing is the name of the game."

That commitment is precisely the source for speculative rumors that emerged recently in the trade press. Over a year ago in March, Exxon Enterprise, Inc., NY, Zilog's parent company, purchased Summit, Zilog's own research and development arm. Exxon merged that company with several other research organizations and their Vydec word processing machine, the Qyx electronic typewriter and the Qwip facsimile transmission unit into Exxon Office Systems, Co. This reportedly gave Exxon the third largest office distribution network, after IBM and Xerox, in the industry.

Summit's link to a national network was viewed by some trade press members as having an adverse effect on Zilog's own Z-Net plans.

Carrico, however, reported that "Summit was a project internal to Zilog that was spun off" well before Exxon picked it up. "It had nothing to do with Zilog for two years" before that time.

Component support of such networks continues and is manifest in Zilog's "Ethernet chip." Though he admitted to over simplifying an eventual Ethernet peripheral, Carrico said that such a general purpose device will become available and it will be compatible with the national Xerox system and Z-80 based machines.

"Software is the more complex issue," said Carrico, who did not volunteer a market date for such a peripheral.

Zilog's own experiments have been with interoffice file sharing, but Carrico did not discount the use of Zilog developed equipment for the "remote user," that is the owner of a home microcomputer. ■

by Michael Comendul
80 Staff

Tracing Roots: Who Is Making Which Micro Products?

When Alex Hailey set out to find his "roots," back in the dense jungles of Africa, he understood that it would be a difficult task. Today it seems no less easy to trace just where a microcomputer product truly originates.

It has long been rumored that the TRS-80 Pocket Computer is really a product of Sharp Electronics of Japan, and that Centronics Data Computer Corp. of Hudson, NH makes some Radio Shack printers.

In the software industry, too, many products bear a copyright notice on their labels hinting at their true beginnings.

People at Tandy feel that it should be of no concern to consumers just where a product originates. So long as the Radio Shack label is on it, it is a Radio Shack product, says Ed Juge, director of computer merchandising.

Becoming the Rule

Radio Shack is not the only company that markets the products of another company under its own label. The practice is fast becoming the rule rather than the exception in the microcomputer industry. Competing firms worldwide are entering agreements through which one manufacturer allows another to market its products.

In some cases, the original manufacturer is recognized on the package. In few cases is the manufacturer acknowledged in the advertising.

What are the benefits to such agreements between manufacturers?

Consider the business management and planning program Visicalc, written for Personal Software by Software Arts of Cambridge, MA. According to Jeff Walden at Personal Software, Sunnyvale, CA, the program was very successful from the start. When Radio Shack agreed to market the program for the TRS-80, Visicalc was then available in 8,000 additional stores worldwide, a distribution that Personal could not hope to obtain on its own.

It is to Tandy's advantage to market the program, as well. According to Walden, "It took the equivalent of 10 man-years to produce Visicalc—a sizable investment and risk." Radio Shack, unwilling to invest the time or money to produce a business package of equal scope, found it more reasonable to add Visicalc to their own product line.

Bill Schroeder of Galactic Software in Mequon, WI suggests another benefit. He points out that a company like Tandy specializes in hardware; they need software to support their computers. Schroeder feels they contract with another company to produce software in order to boost their own computer sales. Or, as in the case of Visicalc, they buy a program that is already on the market and sell it.

Often in the hardware industry, a company will "farm out" projects that it is not prepared to handle on its own. For example, Centronics Data Corp. makes two of the Radio Shack line printers (Line Printers II and IV), and Sharp Electronics makes the TRS-80 Pocket Computer, according the Radio Shack's Ed Juge.

"People at Tandy feel that it should be of no concern to customers just where a product originates."

Standards and Support

"Radio Shack's 26 (as of 1980) plants build about 42 percent of the products we sell," stated Juge. "Our products, however, must adhere to the same standards whether the vendor is an outside company, or one of our facilities."

The question of product support depends upon the agreement. When Instant Software in Peterborough, NH markets a Galactic Software program, according to P. T. Wolfe, director of marketing, Galactic supports the product.

Contracts and Agreements

The agreements between companies vary and hinge upon who owns the patent or copyright to a product, according to Schroeder. If a company approaches Galactic Software and requests that a program be written to specifications, the company that requests to have the program written usually obtains the copyright. In that case, the marketer need not recognize the original manufacturer on the packaging.

If, on the other hand, a company labels software that is already copyrighted, then the original publisher's name usually appears on the packaging in a copyright notice.

Unless specified by contract, a firm that markets another's products is not obligated to recognize the original publisher in advertising. Sometimes, however, the reputation of the original manufacturer or publisher lends prestige to advertisements. Radio Shack touts Standard and Poor's on Stockpack, for example. Juge comments, "It was designed by an acknowledged leader in the industry, and they want the exposure, too."

A few difficulties do arise from labeling practices. In one case, a consumer was unpleasantly surprised to find that he bought the same program from both Tandy and Personal Software under two different titles. (See "80 News," Jan. 81.)

In the process of labeling the Personal Software game Time Trek, Tandy requested to have the title of the program changed to Space Warp. According to Ed Juge, the request was made to avoid copyright conflicts with the producers of Star Trek. Tandy's Bill Walters termed the incident "unfortunate," and added that "what has happened here will not happen again."

In another case, Taranto and Assoc., San Rafael, CA, filed a lawsuit against Advanced Computer Products, Inc. of Santa Ana, CA, for advertising Taranto and Assoc., Inc. TRS-80 Model I and Model III software products without any authorization or rights to do so, according to a Taranto press release. Taranto obtained a preliminary injunction ordering Advanced Computer Products "not to sell or offer for sale computer products infringing Taranto and Assoc. copyrights, nor to use, display, or advertise" their trademarks or trade names.

Whether a case of survival or cooperation, most attribute the labeling practices to the rapid growth of the computer industry. Companies are under tremendous pressure to maintain their product lines. If a firm fails to produce a new product or an updated version quickly enough, they jeopardize their standing in the industry.

Bill Schroeder states simply, "If a company has limited resources and they want to stay ahead, they need the help of another company." ■

by Chris Crocker
80 Staff

Educational Testing on the Model II

The Educational Testing Service (ETS) of Princeton, NJ has reached an agreement with Radio Shack to offer a career guidance program for college level students using Shack's Model II microcomputer.

ETS, best known for the creation and administration of the widely used, and lately controversial, Scholastic Aptitude Tests (SATs), is the leader in the field of educational testing and measurement. They have now developed a microcomputer-based career guidance program to help students make the right choices at graduation time.

ETS' System of Interactive Guidance Information (SIGI) is a large database program comprised of six modules which are designed to help the student clarify career values, identify career alternatives and understand the implications of a specific career choice. Originally developed by ETS for use with a PDP-11 minicomputer in the 1960s, SIGI has undergone many revisions and updates.

"The Model II version represents the first application of SIGI to a microcomputer."

This self-prompting program is designed to lead the student through the various stages of career decisions. First, the student's values are identified. Then, careers that can satisfy these values are located in the SIGI database. Several career choices are examined, predictions of success are made based on the student's interests and abilities; planning for the career is then discussed. Finally, a strategy for attaining the career is outlined.

The First SIGI Microcomputer

The Model II version represents the first application of SIGI to a microcomputer. SIGI program director PHd. Martin Katz told *80 Micro* that the Model II was chosen "only after an exhaustive survey of the microcomputer industry." He added that ETS's choice of the Model II was predicated upon many factors, some of which were Radio Shack's comprehensive network of retail and service outlets, the relatively low price of the system ($5,000), the large storage capacity of the Model II (64K RAM), the quality of the video display and the availability of the computer and all peripherals such as printer and disk drives from the same vendor.

SIGI's conversion from mainframe to micro was accomplished by Ehrlich Assoc. of San Francisco, CA. The efficient use of code was the major software design criteria and Ehrlich's conversion employs elaborate packing and data compression techniques in order to squeeze the SIGI database into the Model II. A CP/M operating system is used and the package requires the presence of an external eight-inch disk drive in addition to the Model II's on-board drive.

To acquire the use of the SIGI package a college or university must apply for a license from ETS. When the license is granted, the institution receives the two-disk SIGI database and operating system, and full program documentation. Each additional SIGI disk pack costs $600. Annual updates of the database are also available.

Expanding the Market

At present, 800 colleges and universities around the country are using SIGI on mainframes and minicomputers. ETS hopes that their affiliation with Radio Shack, and the availability of SIGI on a microcomputer, will increase that number substantially. While reluctant to deal in hard figures for first year projections, ETS's Martin Katz did indicate that the availability of SIGI on the Model II could result in a five-fold increase in the number of SIGI licenses granted in the next two years.

To insure success of the venture various sales incentives are being offered to institutions who consider acquiring the SIGI/Model II package. The most significant of these is a 15 percent price reduction on hardware given to any SIGI licensee by Radio Shack.

Though not sought by Radio Shack, its affiliation with the Educational Testing Service is likely to be beneficial. The prestige ETS enjoys within the educational community can only help the Shack's own image in this market.

Charles Phillips, senior vice-president in charge of educational marketing for Radio Shack, told *80 Micro*, "We are flattered to be chosen by ETS for the SIGI project. I think it speaks well of our hardware and we are looking forward to a mutually beneficial relationship."

by Chris Brown
80 Staff

CAI Information Exchange

Looking for a source for information exchange concerning computer based instructional systems?

The Association for the Development of Computer Based Instructional Systems (ADCBIS) may be your answer. It is an international nonprofit organization with members in the United States, Canada and Europe. Its membership consists of diversified groups such as banks, medical colleges, insurance companies, school districts, teachers and college professors.

ADCBIS began in 1964 as ADIS, the Association for the Development of Instructional Systems. It was started by a small group of IBM 1500 system users who were looking for a forum to informally exchange courseware and information. From these humble beginnings, it has developed into an association with 950 members and publishes a bi-monthly newsletter, a quarterly journal, and hosts an annual conference which is open to the public.

ADCBIS members are users of all kinds of systems, from mainframes to micros. Most micro users are members of elementary school systems.

Interested persons should contact the ADCBIS national office at this address: ADCBIS, c/o The Computer Center, Western Washington University, Bellingham, WA 98225.■

Tandy to the Rescue

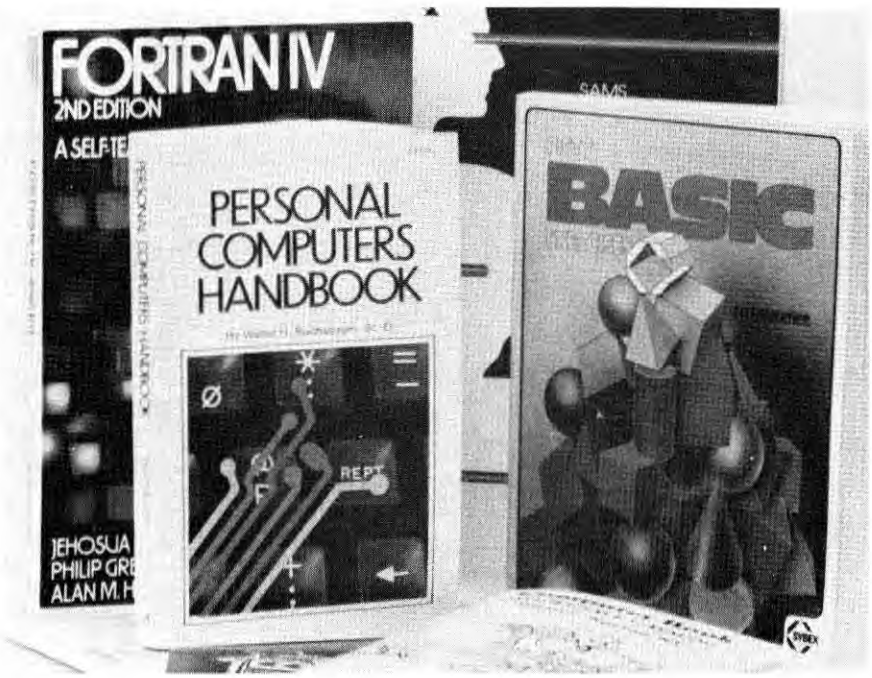
In February *80 Micro* reported on the North Carolina School of Science and Math, a public school which is doing some interesting things with micros in its curriculum. As you remember, the school is using several Apples, and has one TRS-80. Despite the efforts of local Radio Shack dealers, the TRS-80 has not worked since the school opened.

After talking with Dr. Steve Davis at the school and writing the February story, *80 Micro* wrote to Ed Juge at Radio Shack to tell him about the problems the school is having with its 80. Ed wrote back saying that someone from Fort Worth was looking into the problem.

A few days after contacting Juge, Dr. Davis called the magazine. Things were really hopping in North Carolina! He had received several calls from Tandy execs, and soon after, help arrived in person. The fickle 80 is now in working order.

We hope that the students at NCSSM are enjoying their TRS-80 for the first time.■

Microcomputing Titles Take Sales Lead in the Technical Market



If you can't judge a book by its cover, you can judge a book market by the number of covers published and sold. Although the market is only a few years old, a good guess suggests that there are already thousands of microcomputing titles in print. So far no independent organization has measured the scope of the market. Yet several publishers have reported first year press runs of over 100,000 copies for certain microcomputing titles. Reportedly, Tab Books Inc., Blue Ridge Summit, PA has two titles approaching a quarter million copies sold.

The possibilities of a publishing market based on microcomputing topics emerged in the mid seventies. Between 1974 and 1976 several people grasped the impact of microprocessors and coupled their insight with publishing rather than manufacturing. Adam Osborne and Rodnay Zaks who started Sybex were among those who foresaw the future in terms of books.

The Early Days

Zaks recalls the time and the climate that spurred him to begin Sybex. Project Genie at the University of California's Berkeley campus was bringing academics together with industry to explore the potential of microprocessors. From Paris, Zaks brought the equivalent of doctorates in math and engineering to Berkeley where he had a fellowship to study computer science.

"Because I had knowledge of both hardware and software and a great interest in the chips, I began lecturing and also working at the university." The demands for lectures began to take all the time Zaks could spare. In an attempt to ease the burden, he documentd his knowledge and reproduced the visual aids he used during his talks. The material was bound in a book and 10 to 15 thousand copies were printed: All the copies sold within 10 days. Zaks says that besides seeing the potential of the market from first-hand experience, "I found I liked book writing."

Rudolph Langer, managing editor of Sybex, recalls early problems that were shared by all microcomputing publishers. "It's a lamentable fact that most technical writers know their field well, but can't represent that knowledge either visually or verbally." The problem was compounded by the lack of copy editors who comprehended the topic. Langer says many publishers had to "depend on the literacy of the academics who wrote for them and then did not edit the work at all."

Although problems communicating the material have endured, the microcomputing market continues to grow. At Micromedia Marketing, Inc., of Pasadena, CA, Zachary Bovinette says they cull the most successful books from various publishers and sell to book store chains, computer chains and electronics outlets nationwide. The company is a wholesale distributor.

Analyzing Sales

In order to keep track of which titles are most lucrative, Micromedia maintains a list of their best sellers. Although it is not meant to be a guage of the overall market, it is the only overview that considers titles from a group of publishing houses. However, books from companies that do not deal through Micromedia, such as Radio Shack and Tab, are not evaluated. The sales that are considered represent only a portion of any book's sales, since most microcomputing publishers market their books independently as well.

Micromedia's current best seller has been on the market since November. In its first three months, it sold approximately 4,000 copies through Micromedia Marketing distribution. Bovinette guesses that that number may account for a third of the copies actually sold.

Considering the enthusiasm shared by publishers, Bovinette's estimate may be conservative. While publishers such as Sybex, Dilithium, Matrix, Osborne, Wayne Green, Winthrop, Reston, Tab, John Wiley, Howard Sams and Hayden all report some press runs as low as five to 10 thousand, most also report titles that are selling close to the 100,000 mark in their first year.

The Quarter Million Mark

At Sybex, Zaks says *Programming with the Z-80* sold "well over 100,000 in its first year and has been translated into at least three foreign languages." Several other Zybex titles reportedly sold close to 80,000 copies their initial year.

According to Anthony Curtis, managing editor of Tab Books, *The BASIC Cookbook* and *57 Programs & Games in BASIC* are each approaching a quarter million copies in print. Within the next year, Tab expects to have 100 titles on microcomputing for hobbyists and small businessmen. Curtis says the initial press run of all of their microcomputing titles is at least 10,000 now.

At Howard W. Sams, an electronics book publisher that is a subsidiary of International Telephone and Telegraph (ITT), Don Harrington was more guarded in

his response to questions. But he confirmed the strength of the market by saying that microcomputing books "at the present time are our fastest moving titles and the best selling area of our line."

Both Curtis and Harrington stress the importance of their companies' marketing divisions. At Tab, Curtis says titles are sold "wholesale to book stores worldwide through our network of 250 sales reps." Direct mail also accounts for a large share of the market with advertisements running concurrently in about 40 magazines. Book clubs, such as Tab's own Computer Book Club and the Electronics Book Club, provide another route to consumers.

Tab Books may have a longer marketing reach than other companies in the field, but the complexity of the network is typical. Besides book stores, direct mail and book clubs, many companies distribute their microcomputing titles through electronics stores. For instance, Microcomedia Marketing distributes titles to Computerland and MicroAge. Some companies, such are Prentice Hall's subsidiaries Winthrop and Reston, are also selling titles in schools.

The complexity of the market has so far prevented any organization from attempting to judge best selling technical books. Conversations with *New York Times* staff who help compile the best sellers lists indicate that the *Times* has begun to appreciate the magnitude of the technical publishing business but has no plans to monitor its sales at this time. Currently the *Times* tracks sales "based on computer-processed reports from book stores and representative wholesalers with more than 40,000 outlets across the United States." The chore of tracking best selling technical titles could be more grilling.

Belief in the Market

Despite the inability to get concrete figures on the overall market, major publishing houses such as McGraw-Hill, Hougton Mifflin and Random House are beginning to stick their fingers in the pie.

Publishers experienced with the market all project enduring strength and growth. Tab Book's Curtis said, "It's really hard to talk in dollars, especially with inflation, but I think there is something approaching a half a million microcomputers out there now, and by the end of 1982 there will be over a million. It's going to keep increasing, say at 50 percent a year, and, well, we can't keep the stuff in stock now."

At Winthrop manager Charles Durang sees a unique strength in microcomputing books. "In our normal book market there are certain life patterns. After a certain time everybody will have read a book that's going to read that book. In this market worries of obsolesence are mitigated because there's going to be a whole new audience every year," until microcomputers become as common as televisions.

Confirming the strength seen by Durang and Curtis, Ed Ferman, associate publisher of Wayne Green Inc. of Peterborough, NH, compares the book market to the magazine market. The company currently publishes three magazines and an industry newsletter as well as books. Ferman predicts that "Books will eventually be the largest gross revenue in our publishing venture."■

by Nancy Robertson
80 Staff

CONVERT YOUR TRS-80 MODEL-I 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 programs 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, with software, power supply, emulation cable, TRS-80 cable, and "universal" personality module, is ONLY $329!
The PROM PROGRAMMER is available *separately* for ONLY $239

VISA

ORION INSTRUMENTS ↙376
172 Otis Avenue, Dept. M, Woodside, CA 94062
(415) 851-1172
Master Charge and Visa phone orders accepted.
California residents please add 6% sales tax.

master charge

Check our book pages for the latest books about microcomputers.

↙See List of Advertisers on page 306

RFI Circuit

(Continued from page 62)

sitate the use of elaborate and expensive test gear and fixtures. Spectrum analyzers capable of operating at 1GHz (1,000 MHz) are only the beginning. Three, 10 or 30 meter test sites may be used providing they meet the site attenuation requirements the FCC deems appropriate. There are separate tests to determine if the test site is certifiable. Complete test records must also be kept, just in case the government wants to recreate the test to check the accuracy of the data.

What if the companies these engineers work for are unwilling or unable to conduct the RFI tests they need to get their new equipment certified for sale? In that case, R&B Enterprises is capable of doing the testing for them. Robert Goldblum, President and Technical Director of R&B told *80 Microcomputing*, "Rates vary depending on the complexity of the test, and the type of unit under test. A ball park figure is around $1,000 a session (day). Most micros or their peripherals can be tested in one or two sessions."

As the fatigued engineers file out of function room six at the end of the first day's seminar and head for the lounge, they talk of microvolts and meters. An intense core of people surround Mobley and barage him with questions.

"Which rotor is best to use in a turntable?"

"CDE's Ham M."

"Are there any alternatives to expensive, commercially calibrated dipole antennas?"

"No."

"Is $20,000 a realistic figure to spend on a good quality spectrum analyzer for the 1GHz range?"

"Yes."

"In this new era of deregulation, why is the FCC sticking its nose in our business?"

"Heck, when the boys started building computers that interfered with Land Mobile, commercial, amateur and TV communications you got yourselves involved in our business. The commission is just tryin' to keep a lid on interference complaints. That's all."■

by Chris Brown
80 Staff

Milt Mobley at the Podium

80 CALENDAR

May

May 4-7 the **1981 National Computer Conference** will be held at McCormick Place, Chicago. Microcomputing exhibits and the **Personal Computing Festival** will be included in the main exhibit area.

Professional Development Seminars, Arlington, VA is offering 21 seminars at McCormick Inn in conjunction with the conference. For more information, call (703) 588-3610.

The **National TRS-80 Microcomputer Show** will be held at the New York Statler Hotel Exposition Hall in New York City **May 21-23**.

Sponsored by Kengore Corp., Franklin Park, NJ and by *80 Microcomputing*, Peterborough, NH, the show will focus on the Radio Shack Model I, II, III, Color Videotex and Pocket Computers. There will be daily user-group seminars as well as a number of guest speakers. Contact Kengore Corp. for more information.

May 20-22, the **Videotex 81 Conference and Exhibit** will be held at the Royal York Hotel, Toronto, Canada. Sponsored by Informat, a Canadian videotex service organization, and by Online Conferences Ltd. of London, the conference will review topics under the headings of International Review, General & Business Interest and Industry. International videotex designs and equipment will also be displayed.

Videotex is a generic term referring to screen formatting of information that is transmitted via electronic networks.

For more information on the conference, contact Pam Carter, Videotex '81, Infomart, 122 St. Patrick St., Toronto, Ontario M5T 2X8 Canada.

June

The National Forum on Computers and Health, Alexandria, VA is offering a workshop called **Minicomputers and Microprocessors in Medical Practice Management**. It will be held **June 4-5** in Philadelphia. To register call (703) 549-8020 collect. The toll free number for Virginia residents is (800) 336-4776.

June 30 is the deadline for submissions for **The Johns Hopkins First National Search** for personal computing devices, programs and designs to aid the handicapped. The search is designed to "discover existing applications and to inspire new ideas for the application of personal computing to meet the needs of the handicapped," according to a press release from Johns Hopkins University.

A $10,000 grand prize is offered along with 100 other awards. The three submission categories are defined as 1) Computer Based Devices which includes "hardware invented or modified for the purpose, or working hardware and software which can demonstrate a new application," 2) Computer Programs which means "specialized software and concepts for existing computers," and 3) System Concept/Design, which is "written descriptions of ideas not yet implemented."

The competition is being sponsored by grants from The National Science Foundation and by Radio Shack.

For more information, write Personal Computing to Aid the Handicapped, The Johns Hopkins University, P.O. Box 670, Laurel, MD 20810.

SOFTWARE UNLIMITED

presenting the LARGEST SELECTION OF SOFTWARE EVER ASSEMBLED...

the best available on the market today for TRS-80® Computers

at SUPER DISCOUNT PRICES!

AVALON HILL

- ☐ MIDWAY 13.50
- ☐ NUKE WAR 13.50
- ☐ PLANET MINERS 13.50
- ☐ CONVOY RAIDER 13.50
- ☐ B1 BOMBER 13.50
- ☐ LORDS OF KARMA 18.00

PROGRAMMERS GUILD

- ☐ DREADNAUGHT 13.55
- ☐ DREADNAUGHT [D] 17.95
- ☐ DUTCH GOLD [D] 17.95
- ☐ DUTCHMANS GOLD 13.55
- ☐ ELECTRA DRAW 2.0 . . . . . 17.95
- ☐ SPIDER MOUNTAIN 13.55
- ☐ SPIDER MOUNTAIN [D] 17.95
- ☐ THUNDER 13.55

APPARAT

- ☐ NEWDOS/80 . . . . . 125.00

ADVENTURE INTERNATIONAL

- ☐ ADVENTURE HINT BOOK 7.95
- ☐ ADVENTURE #0 . . . . . 6.25
- ☐ ADVENTURE (1,2,3) [D] 35.95
- ☐ ADVENTURE (4,5,6) [D] 35.95
- ☐ ADVENTURE (7,8,9) [D] 35.95
- ☐ ADVENTURE #10 [D] 18.95
- ☐ ADVENTURE (specify 1-10) 13.55
- ☐ MEAN CHECKERS MACHINE 17.95
- ☐ MEAN CHECKERS MACHINE [D] 22.95
- ☐ DR CHIPS 13.55
- ☐ DR CHIPS [D] 17.95
- ☐ INTER FICTION SAMPLER [D] 13.55
- ☐ INTER-LOCAL CALLS [D] 17.95
- ☐ INTER-TWO HEADS [D] 17.95
- ☐ INTER-IMPETUOUS [D] 17.95
- ☐ KID-VENTURE 1 . . . . . 13.55
- ☐ STAR TREK 3.5 . . . . . 13.55
- ☐ STAR TREK 3.5 [D] 17.95
- ☐ ZOSSED IN SPACE 13.55
- ☐ MACES #1, BARLOG 31.00
- ☐ MACES #1, SISYPHUS 31.00
- ☐ LUNAR LANDER 13.55
- ☐ LUNAR LANDER [D] 18.95
- ☐ POKER 13.55
- ☐ GALACTIC TRILOGY [D] 35.95

ACORN SOFTWARE

- ☐ ATERM 17.95
- ☐ SYSTEM SAVERS 13.55
- ☐ TING-TONG 8.95
- ☐ DISASSEMBLER 13.55
- ☐ DISK/TAPE UTILITY 17.95
- ☐ CHECKBOOK [D] 22.95
- ☐ STAR TREK SIMULATION 8.95
- ☐ CODEBREAKER 8.95
- ☐ OPERA THEATER 8.95
- ☐ GAMMON CHALLENGER 13.55
- ☐ BLACKADE 8.95
- ☐ PIGSKIN 13.55
- ☐ STRUCTURED BASIC [D] 26.95
- ☐ ULTRA TREK 13.55
- ☐ SPACE WAR 8.95
- ☐ WARP/LANDER 8.95
- ☐ BASKETBALL [D] 18.95
- ☐ BASKETBALL 13.55
- ☐ DUEL-N-DROIDS [D] 18.95
- ☐ DUEL-N-DROIDS 13.55
- ☐ INVADERS FROM SPACE 13.55
- ☐ INVADERS FROM SPACE [D] 18.95
- ☐ PIGSKIN [D] 18.95
- ☐ PINBALL 13.55
- ☐ PINBALL [D] 18.95
- ☐ QUAD 13.55
- ☐ QUAD [D] 19.95
- ☐ SUPERSCRIPT [D] 28.95

HAYDEN

- ☐ SARGON II 25.00
- ☐ SARGIN II [D] 30.00

AUTOMATED SIMULATION

- ☐ STAR WARRIOR [CASS, OR DISK] 35.95
- ☐ THREE PACK [D] 45.00
- ☐ STARFLEET [CASS, OR DISK] 22.50
- ☐ INVASION [CASS, OR DISK] 22.50
- ☐ APSHAI [CASS, OR DISK] 26.95
- ☐ RYN [CASS, OR DISK] 17.95
- ☐ MORLOC [CASS, OR DISK] 17.95
- ☐ RIGEL [CASS, OR DISK] 22.50
- ☐ HELLFIRE [CASS, OR DISK] 26.95

BIG FIVE SOFTWARE

- ☐ ATTACK FORCE (MODEL 1 OR 3) . . . 14.55
- ☐ GALAXY INVASION (MODEL 1 OR 3) . . 14.55
- ☐ METEOR MISSION (MODEL 1 OR 3) 9.95
- ☐ SUPER NOVA (MODEL 1 OR 3) 14.55
- ☐ COSMIC FIGHTER (MODEL 1 OR 3) . . . 14.55

COMPUTER SIMULATIONS COMPANY

- ☐ BATTLE OF BULGE-BASTGONES 17.95
- ☐ D-DAY INVASION OF FRANCE 17.95
- ☐ DARK KINGDOM 11.75
- ☐ DOG RACE, COLOR ONLY [C] 5.95
- ☐ ELECTRIC ALARM 4.95
- ☐ EMPIRE STRIKES BACK 13.55
- ☐ GREAT DICTATOR 7.25
- ☐ JEDI KNIGHT 11.75
- ☐ LUNAR ENCOUNTER 11.75
- ☐ MERCENARY 8.95
- ☐ MICRO ARCADE 13.55
- ☐ SHARK, COLOR ONLY [C] 5.95
- ☐ SLOT MACHINE 7.25
- ☐ BATTLE OF BULGE-ST. VITH 13.55
- ☐ STAR CRUISERS 13.55
- ☐ TYPE WRITERS 17.95
- ☐ U-BOAT, COLOR ONLY [C] 5.95
- ☐ ORION WAR, COLOR ONLY [C] 5.95
- ☐ POLARIS, COLOR ONLY [C] 5.95

INSTANT SOFTWARE

- ☐ AIR FLIGHT SIMULATION 7.25
- ☐ AIRMAIL PILOT 8.95
- ☐ ALL STARS [D] 31.55
- ☐ ASTEROIDS [D] 17.95
- ☐ ASTEROIDS 13.55
- ☐ BASIC PROGRAMMING ASSISTANT . . 13.55
- ☐ BALL TURRET GUNNER 8.95
- ☐ BATTLEGROUND 8.95
- ☐ CHECK MANAGEMENT [D] 36.55
- ☐ CHESSMATE-80 . . . . . 17.95
- ☐ THE COMMUNICATOR 8.95
- ☐ COSMIC PATROL 13.55
- ☐ COSMIC PATROL [D] 17.95
- ☐ DAREDEVIL 8.95
- ☐ DISASSEMBLER 8.95
- ☐ DISK EDITOR [D] 36.55
- ☐ DISK SCOPE [D] 17.95
- ☐ DLDIS [D] 17.95
- ☐ DEVICE DRIVERS 17.95
- ☐ ENHANCED BASIC 22.50
- ☐ ELEC REPRT GEN 8.95
- ☐ FLIGHT PATH 8.95
- ☐ FLYING CIRCUS [D] 36.55

INSTANT SOFTWARE

- ☐ GEOGRAPHY [D] 45.00
- ☐ I.Q. TEST 8.95
- ☐ INVADERS 8.95
- ☐ INVESTORS PARADISE 8.95
- ☐ IRV 22.50
- ☐ IRV [D] 27.55
- ☐ JET FIGHTER PILOT 13.55
- ☐ MIND WARP 8.95
- ☐ MONEY MADNESS 8.95
- ☐ NIGHT FLIGHT 8.95
- ☐ ONE-D MAILING LIST [D] 22.50
- ☐ OTHELLO 8.95
- ☐ PROGRAMMER'S CONVERTER 8.95
- ☐ QSL MANAGER [D] 17.95
- ☐ SANTA PARAVIA FIUMACCIO 8.95
- ☐ SKIRMISH-80 . . . . . 8.95
- ☐ TERMINAL-80 . . . . . 22.50
- ☐ TLDIS 13.55
- ☐ UTILITY I 7.25
- ☐ UTILITY II 7.25
- ☐ WINNERS DELIGHT 8.95
- ☐ WORDSLINGER 26.00

PERSONAL SOFTWARE

- ☐ CCA MGMT-TRS-80 . . . . . 65.00

QUALITY SOFTWARE

- ☐ DEBUG 13.55
- ☐ FASTGAMMON 17.95
- ☐ LOWBALL POKER 10.45
- ☐ BANKSHOT 8.95
- ☐ POKER PETE 10.45
- ☐ RUMMY MASTER 10.45
- ☐ 3D TIC TAC TOE 13.55
- ☐ QS LIGHT PEN 17.95
- ☐ SKETCH 80 . . . . . 13.55

STRATEGIC SIMULATIONS

- ☐ COMPUTER BISMARCK [D] 51.50
- ☐ COMPUTER BISMARCK 42.00

SUB-LOGIC

- ☐ T80-FS1 FLIGHT SIMULATOR 22.00
- ☐ 3D GRAPHICS 26.50

BOTTOM SHELF

- ☐ ANALYSIS PAD [D] 90.00
- ☐ BASIC TOOLKIT 17.80
- ☐ BUSINESS MAIL [D] 100.00
- ☐ CHECKBOOK II [D] 44.50
- ☐ CHECK REGISTER [D] 67.00
- ☐ DATA MANAGER [D] 67.00
- ☐ HEAD CLEANER [D] 17.00
- ☐ INFO SYSTEM [D] 44.50
- ☐ LIBRARY 100 . . . . . 44.50
- ☐ SYSTEM DOCTOR [D] 35.50
- ☐ SYSTEM DOCTOR 26.00

MICROSOFT SOFTWARE

- ☐ ADVENTURE [D] 25.50
- ☐ ASSEMBLY DEVELOPMENT [D] 80.00
- ☐ BASIC COMPILER [D] 175.00
- ☐ EDITOR/ASSEMBLER 25.00
- ☐ FORTRAN COMPILER [D] 80.00
- ☐ LEVEL III BASIC 44.00
- ☐ MuMATH [D] 64.00
- ☐ OLYMPIC DECATALON [CASS. OR DISK] . . 20.00
- ☐ TYPING TUTOR 13.55

If you don't see it listed, write...we probably have it in stock!

Check program desired.
Complete ordering information and mail entire ad.
Immediate Shipments from stock.

KEY:
C-TRS-80 Color
D-on Disc
If not marked - Cassette

Ship the above programs as checked to:

Mr./Mrs. _____

Address _____

City _____

State _____ Zip _____

I have a _____ (name of Computer)

with _____ K memory

Number of Programs Ordered . . . _____

Amount of order . . . . . _____

N.Y. residents add Sales Tax . . . . _____

Add shipping anywhere in the U.S. **2.00**

Total amount enclosed . . . . . _____

Charge my: ☐ Master Charge ☐ Visa

Signature _____

Card No. _____ Expires _____

Mail to: **DIGIBYTE SYSTEMS CORP.**

31 East 31st Street, New York, N.Y. 10016

(212) 889-8975 ⌐222

TRS-80 is a registered trademark of TANDY CORP.

Prices subject to change without notice.

NEW PRODUCTS

Edited by Chris Crocker

Terminal Program Provides Local Functions

Omniterm is an intelligent terminal program that lets the TRS-80 perform all necessary translation when connected to other computers. The program provides local functions, such as the ability to review text that has scrolled off the screen and single-key automatic sign-on.

Omniterm runs on a 32K TRS-80 with one disk drive and RS232-C interface. The program costs $95. For more information contact Lindbergh Systems, 49 Beechmont St., Worcester, MA 01609.

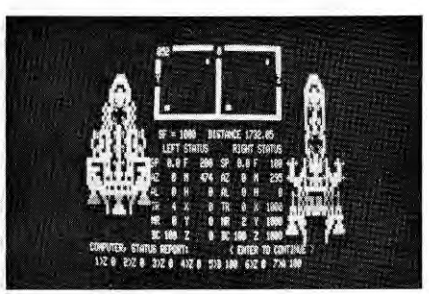
Reader Service ↙341

Ships Combat in Space

Space Ace 21 is a space combat simulator in which two opponents design their own space fighters. The craft start at a distance and then maneuver and attack. The program requires a 16K Model I or III and Level II BASIC, and costs $19.95.

In Parsector V, you and your opponent must navigate ships through space and capture parsectors—units of space owned by an intelligent entity. The program requires 16K Level II on Model I or III and costs $20.95.

For more information contact Synergistic Solar Inc., P.O. Box 560595, Miami, FL 33156.



Space Ace 21

Program Formats Text

TEX Version 2.0 is an updated edition of the TEX Text Formatting Program. A TEX input file contains text interspersed with commands. From this, the program outputs a paginated document file whose format is determined by the user's commands. TEX 2.0 can generate an index and table of contents, produce super and subscripts, accept insertions, and chain source files.

TEX 2.0 is compatible with all versions of CP/M. A text editing program is required to produce the input file. No prices were released. For more information, contact Digital Research, P.O. Box 579, 801 Lighthouse Ave., Pacific Grove, CA 93950.

Reader Service ↙331

Gospel Quiz

Questions and Answers from the Gospel of Luke provides four groups of ten questions. Each answer elicits a corresponding explanation.

A printed reference is included, listing the scriptural source of each question, answer and explanation. A cassette for 16K Level II TRS-80 costs $5 from Next In Line, Inc., P.O. Box 10295, Tampa, FL 33609.

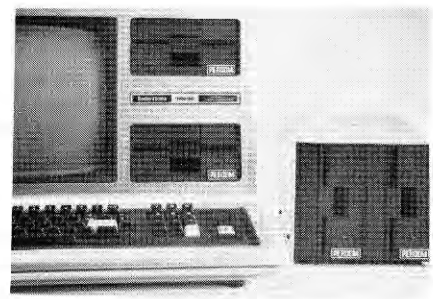
Reader Service ↙332

Leadership Analysis Software

The Leadership Analysis Program is an automated analysis that reveals character traits, including areas of potential leadership and areas of potential conflict. The program administers a battery of exercises, performs the analysis, and prints a personalized report with graphs.

The Leadership Analysis Program requires a 48K Model I with one disk drive and costs $995 from Citation Group, 13 Langhorne Rd., Chalfont, PA 18914.

Reader Service ↙336



Percom Drives for Model III

Drives Install In Model III

Mini-disk storage systems for the Model III from Percom may be ordered with either 40 or 80 track drives. Two Model III drives mount inside the computer; drives three and four connect externally.

The first internal drive system costs $749.95 in the 40 track version and $914.95 in the 80 track version. The second internal drive costs $315 for 40 tracks and $474.95 for 80 tracks. For more information contact Percom Data Co., 211 N. Kirby, Garland, TX 75042.

Reader Service ↙162

Analog and Digital Port Interfaces

The Design Solution Model AN-538 analog port interface provides both analog to digital and digital to analog converters. The unit also houses a mini-digital port interface with latched eight-bit data output to the digital to analog converter and eight decoded device control lines.

The Design Solution Model AN-511 digital port interface provides eight bits of input and output data to the TRS-80, eight device control lines and an eight bit data bus. Using the IN and OUT commands, information can be transferred to and from

The New Products section is intended to inform our readers of new products on the market. All information in the section is taken from product releases sent by manufacturers. Because of the volume of product releases, we cannot attest to the quality of the products listed.

Design Solution Analog Port Interface

the TRS-80.

Each model costs $79.95 from the Design Solution Facility, P.O. Box 1225, Fayetteville, AR 72701.

Reader Service ✓340

Inventory Records, Tapes

Audiophile Library System (ALS) inventories collections of records or tapes. Selections are stored by record number, tape number, title of selection, composer, artist(s), conductor, orchestra and source.

ALS operates on Models I and III with TRSDOS and at least one disk drive. The system costs $20.95 from GB Assoc., P.O. Box 3322, Granada Hills, CA 91344.

Reader Service ✓342

COBOL Information Bulletin

The American National Standards Institute (ANSI) has a committee evaluating COBOL. COBOL Information Bulletin (CIB) 20 is available from the institute to explain the latest standard considerations.

CIB 18, 19 and 20 are all being sold by ANSI, a nonprofit organization. CIB 20 costs $7; 18 and 19 cost $6 each. Checks should be made payable to X3 Secretariat, and mailed to CBEMA, 1828 L Street, N.W., Suite 1200, Washington, DC 20036 along with a stamped, self-addressed envelope.

Program Charts Stocks

Stockchart-I is a stock charting program for the Model I Level II with 16K. The program enables generation of a stock price chart using the high, low and close stock prices. Stockchart-I also has a routine which will signify price trend reversal.

The cassette version costs $30 and the disk version costs $50 from Micro-Investment Software, 9621 Bowie Way, Stockton, CA 95209.

Reader Service ✓170

Package Plots Graphs

Plot-80 is a software plotting package for both dot matrix and daisy wheel printers. Plot-80 is for use with the TRS-80 Model I with 48K, one disk drive, and one of several graphics printers. The system is geared towards the plotting of graphs and histograms with numbered and labeled axes.

Plot-80 is available on a formatted disk (specify track format). Single drive owners must supply a disk with operating system or add $15 to the package cost for a TRSDOS disk. The program operates with Base-2, Paper Tiger (with graphics option), Gencom, Qume, Xerox, Diablo and NEC Spinwriter. Printer and interface must be specified when ordering. The program costs $99.95 from Microcomputer Specialists, P.O. Box 11295, Elkins Park, PA 19117.

Reader Service ✓171

Color Computer News

The Color Computer News is a publication for users of the Radio Shack Color Computer. The newsletter will feature news, software tips, and will provide a forum for Color Computer users. Publication will be bi-monthly until the volume of information requires more frequent release.

The subscription rate is $9 per year or $2 per issue, from REMarkable Software, P.O. Box 1192, Muskegon, MI 49443.

Reader Service ✓173

Word Processor Has 19 Commands

Word-M3 is a text processing program for the Model III that accepts lines of text with lines of format control information included. The program formats text into a document. There are 19 commands.

Word-M3 operates on TRSDOS for the Model III and costs $49. For more information contact Micro Architect, Inc., 96 Dothan St., Arlington, MA 02174.

Reader Service ✓348

Software for Special Needs

A series of microcomputer educational programs from Interpretive Education are designed for special needs audiences. Included in the series of programs are: Poison Proof Your Home, Income Meets Expenses, You Can Bank On It, Home Safe Home, Money Management Assessment Series and Job Readiness Assessment and Development.

The programs are available on cassette for TRS-80 Model I, Level II with 16K. The packages contain from four to eight cassettes and range in price from $125 to $340 per program. For more information, contact Interpretive Education, Dept. NR, 2306 Winters Dr., Kalamazoo, MI 49002.

Reader Service ✓343

Special Needs Software

Utility Speeds BASIC Programs

Faster is a software speed-up utility for TRS-80 Model I Level II and Disk BASIC programs. It analyzes programs, and then displays or prints information enabling the user to change programs to reduce execution time.

Faster is available from Prosoft, Box 839, N. Hollywood, CA 91603.

Reader Service ✓166

Space Game, Role-playing Adventure

Hellfire Warrior is a fantasy role-playing sequel to Temple of Apshai in which the player rescues a maid from a four-level dungeon. Star Warrior is a program in which the player must fight a planetary force of storm troopers and nine military vehicles.

Star Warrior and Hellfire Warrior are

available on cassette for 16K Level II, and on disk for 32K. Star Warrior is also available on disk for 16K Level II. The programs cost $39.95 each from Automated Simulations, P.O. Box 4247, Mountain View, CA 94040.

Reader Service ↙330

Color Computer Software

CBUG Monitor Tape is a software package for exploring the Color Computer at the assembly language level. The package allows you to examine or change memory using a formatted hex display, save areas of memory to cassette in binary, and send or receive RS232 at up to 9600 baud.

The monitor has 19 commands in all, and is relocatable. The monitor costs $29.95. CBUG Monitor ROM is an identical program supplied in ROM that costs $39.95.

The 80C Disassembler runs on the Color Computer and allows you to generate a source listing of the BASIC interpreter ROM. The 80C Disassembler requires 16K and costs $49.95. For more information contact The Micro Works, P.O. Box 1110, Del Mar, CA 92014.

Reader Service ↙350

CBASIC Runs Under TRSDOS

CBASIC 2.27 provides users with the same features as CP/M, but operates under TRSDOS for the TRS-80 Model II. The system includes files supporting unlimited length records and full format control of printed reports.

CBASIC will be available on a TRSDOS disk with a text editor for $250. For further information contact Compiler Systems, Inc., P.O. Box 145, Sierra Madre, CA 91024.

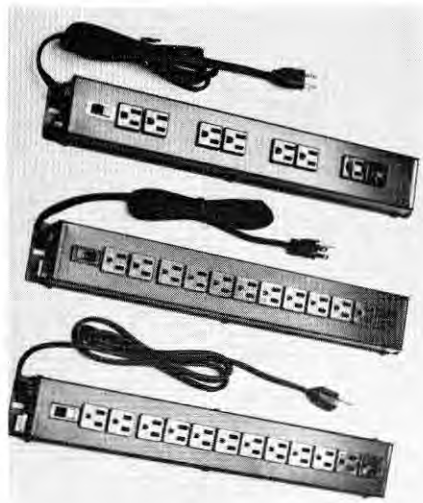
Reader Service ↙167

Port-addressed Clock

The 80 Clock is a real-time hardware clock with battery back-up. The clock connects to the expansion or screen printer port without restricting use of that port. The clock gives the day of the month, day of week, the month, and time to thousandths of a second.

The 80 Clock costs $70, and with optional output, $80. For more information contact P and A Electronics, 921 Montclaire, Olathe, KS 66061.

Reader Service ↙347



MFJ Multi-outlet ac Power Strips

Multi-outlet ac Power Strips

Multi-outlet ac Power Strips from MFJ eliminate interaction caused by power-line coupling between floppies, printers, processors and other peripherals. The power line strips also eliminate power-line spikes that cause memory loss, errors, and erratic operation.

The MFJ-1107 has eight sockets. Three pairs of sockets isolate the computer and peripherals from each other and from the power line, each pair with double pi rfi filters. The MFJ-1106 with varistor voltage spike protection is like the MFJ-1107, except that it has 12 sockets and one rfi filter for all sockets. The MFJ-1105 is like the 1106 except without rfi protection.

The MFJ-1105 costs $43.95, the MFJ-1106 costs $53.95, and the 1107 costs $73.95. For more information contact MFJ Enterprises, P.O. Box 494, Mississippi State, MS 39762.

Reader Service ↙349

Educational Game Programs

Galactic Guardian and Guillotine are additional activities to supplement the Individual Study Center from TYC Software. Galactic Guardian presents questions and answers in a space game format. The student is asked to save the galaxy from invading spacemen by correctly responding to questions on the Subject Data Tape.

Guillotine is a variation of the game hangman. The student's job is to save the man on the screen by correctly answering the questions presented.

Both programs are on a single cassette, and can only be used with the Individual Study Center's Subject Data Tapes. The programs are for 16K TRS-80. For more information contact TYC Software, 40 Stuyvesant Manor, Geneseo, NY 14454.

Reader Service ↙163

Business Systems Produce Reports

Mailbase 80 from Bourrut Consulting Corp. is a mailing system that permits entry in any sequence. The program produces such reports as Entry Report, Entries Added to Master Report, and a New Key Report. The program costs $229.

Oilman, also from Bourrut Consulting, handles functions and produces reports for the oil industry. It can work off degree days, will calls and/or dated accounts. Oilman costs $5500.

The programs operate on the Tandy II or Model II and are available from Bourrut Consulting Corp., 21 Friendly Rd., Smithtown, NY 11787.

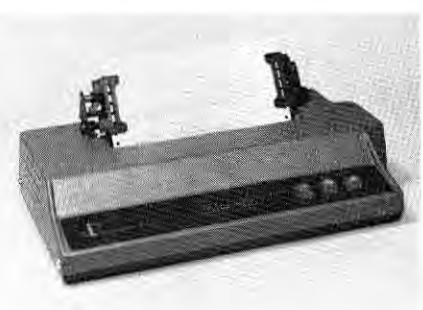
Reader Service ↙346

Printer Features Six Character Sizes

The model DIP-85 Data Impact Printer features 7 × 7 or 14 × 7 dot matrix, six different character sizes and 100 character per second print speed. The printer has variable line density and continuous form length controls, and will print in upper and lowercase.

The DIP-85 will accept parallel or RS-232-C communications. For more information, contact DIP, Inc., 745 Atlantic Ave., Boston, MA 02111.

Reader Service ↙335



DIP-85 Data Impact Printer

Print Lowercase Without Modification

Lazy Writer is a word processing program that permits uppercase and lowercase output to the printer (if printer accepts lowercase) without computer modification. One command will capitalize the first letter of all sentences and the pronoun I.

The package is available for TRS-80 Model I with 32K and at least one disk drive. Lazy Writer costs $125 and is available from Soft Sector Marketing, Inc., 6250 Middlebelt, Garden City, MI 48135.

Reader Service ↙165

Operating System Offers Keyed File Access

The Oasis version 5.5 operating system is a multi-user time sharing system for Z-80 microcomputers. The operating system features keyed file access and media independent back-up, and lets up to 15 users share a single printer with its spooler.

The new version includes BASIC with reentrant run-time module, compiler and interpreter, EXEC interactive job control language, text editors, relocating macro assembler, debugger, linkage editor and diagnostic conversion programs.

Oasis 5.5 costs $500 for single-user and $850 for multi-user options. For more information contact Phase One Systems, 7700 Edgewater Dr., Suite 830, Oakland, CA 94621.

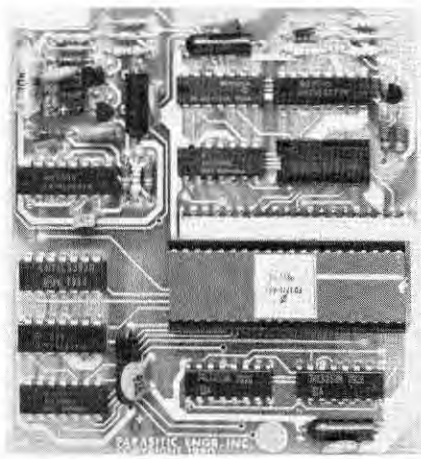
Reader Service ↙344

Scientific Subroutines

The Scientific Subroutine Library (SSL) is a collection of 72 subroutines for scientific, statistical, and engineering applications. The package includes routines to do multiple and polynomial regressions, Fourier transforms, solutions to differential equations by the fourth order Runge-Kutta method, matrix inversion, and solutions to Eigenvalue problems.

The programs come on a single disk in the form of relocatable object code, and can be used with several of Microsoft's high-level languages and assemblers. The package costs $99.95. For information contact American Computer Development, Inc., 1735 Briarcrest Dr., Suite 200, Bryan, TX 77801.

Reader Service ↙160



5" Data Separator

Disk Error Protection

The Five-inch Data Separator helps eliminate disk errors, including track locked out and disk I/O errors. The data separator uses a phase locked loop circuit. The circuit adjusts itself to match the data from the disk drive, according to Parasitic Engineering.

The Five-inch Data Separator plugs into the expansion interface, and costs $250. For more information contact Parasitic Engineering Inc., 1101 Ninth Ave., Oakland, CA 94606.

Reader Service ↙169

Directory Lists Pre-college Software

School Microware is a directory of educational software for the Apple, Pet and TRS-80. The directory describes programs for use in teaching and learning most pre-college subjects at all grade levels.

School Microware is available for $20 per year (September full directory and three updates) from Dresden Assoc., P.O. Box 246, Dresden, ME 04342. Add $5 per year for foreign subscriptions.

Reader Service ↙334

Voice Entry Terminal

The Scott VET/2 is a voice entry terminal for the TRS-80 Model I that connects to the screen printer I/O port. The VET/2 recognizes words or phrases by comparing the pattern and features of the words entered in analog form with the digitized vocabulary in storage.

The terminal requires an expansion interface, 16K of additional memory and a disk drive. No prices were released. VET/2 is available from Scott Instruments, 815 North Elm, Denton, TX 76201.

Reader Service ↙168

Power Line Protection

The Spike-Spiker Mini-I features two grounded outlets and plugs directly into a 120 volt wall outlet. The Mini-I provides protection from most power line transients. The Spike-Spiker Mini-II is also a two grounded outlet wall-mounted unit that provides rf hash filtering of conducted interference, in addition to protecting against power line surge.

No prices were released. For more information, contact Kalglo Electronics Co., Inc., Colony Drive Industrial Park, 6584 Ruch Rd., East Allen Twp., Bethlehem, PA 18017.

Reader Service ↙338

Model I BASIC Enhancement

NEWBASIC adds new commands and utilities to TRS-80 Model I Level II or Disk BASIC. Utilities included are BASIC keyword entry, blinking block cursor, auto key repeat, and enabling of lowercase display. Also included are new graphics commands, ability to input from or output to the RS232-C interface, a video to printer echo, and GOTO and GOSUB to expressions or labels.

The Disk BASIC version of NEWBASIC costs $29.95, while the Level II cassette version costs $19.95. Both are available from Modular Software Assoc., 3533 Prospect Ave., Glendale, CA 91214.

Reader Service ↙333

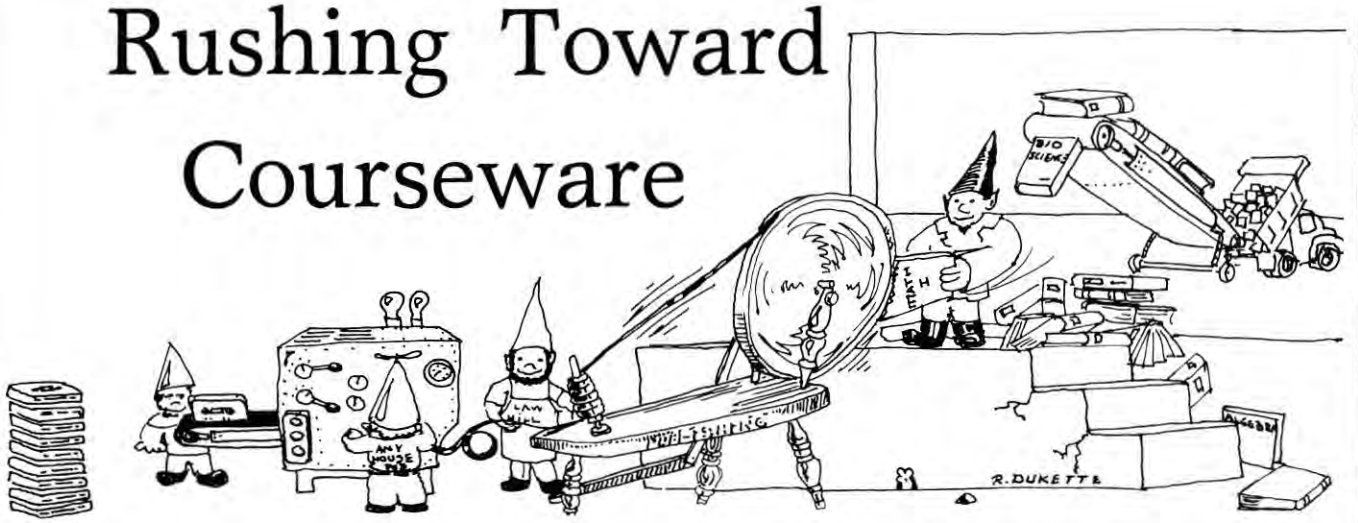
Utility Catalogs Disks

DISCAT is a disk cataloging and indexing utility. The utility keeps track of programs in a categorized library. A 48K system can provide indexes of nine categories, each containing 1900 entries, according to Racet Computes.

DISCAT operates with TRSDOS, NEWDOS+, and NEWDOS 80. The program is available from Racet Computes, 1330 N. Glassell, Suite M, Orange, CA 92667.

Reader Service ↙161

Rushing Toward Courseware



by Pamela Petrakos
***80* Staff**

Computerized instruction is taking its seat in the American classroom. And it's bringing its own sort of course materials—magnetic.

At the same time large publishing companies are taking aim on an unfamiliar target in hopes of maintaining a market for its bread and butter mainstay, the textbook. Traditional publishers are anxiously testing their new wares from spelling and sound packages to management packages that will do the teacher's homework.

But computerized instruction stands on very uncertain ground. Publishers and educators alike know an educational revolution is here, but can only speculate as to how large an impact it will have in the traditional classroom.

Marketing statistics also convey the same kind of uncertainty. An increasing number of schools across the country are experimenting with computerized instruction but is there a high-volume market for educational software specialists?

Tandy Bargain

When Tandy Corporation recently struck its bargain with publishing giant Random House to distribute both software and Tandy hardware to school systems nationwide, *80 Microcomputing* tracked down a number of other publishing executives to assess their commitment or even awareness of the magnetic publishing market. What were their dollar projections for the computerized instruction market; not only software, but accompanying texts and documentation?

80 found a surprising level of activity among most book publishers, but few verifiable statistics about the depth of this new market. No one seems to know how much the educational software market will grow. Studies have been done, but, on the whole, the market is ill-defined. Figures of projected courseware sales and speculations as to the number of micros that are expected to be in the schools vary widely.

Publishers' commitments varied from a "wait and see" attitude, to one company that has created an electronic publishing division. Yet another company, Boston's Houghton Mifflin, has invested in an electronic subsidiary, Time Share Corporation. Originally charged with creating classroom courseware for Houghton, TSC has just recently introduced the first microcomputer specifically designed for the classroom. What has motivated these traditional publishers to become involved in what appears to be a huge market, but at the same time, such an illusive one?

Partially because they are already in the education business and are committed to being a part of its growth. Robert Bowen, group vice president of the school division of McGraw-Hill said, "As a publisher, we see the responsibility and need to service the technology that is out there."

Bowen said he has heard predictions that by 1985 a million microcomputers will be in our schools; similarly courseware sales are projected at $100 to $150 million by 1985. However, Bowen said, he has a hard time accepting those particular figures.

"A $150 million market would mean that the courseware market would be roughly equivalent to what we are spending now for basic math programs. That is a very sizable market; I really think that by 1985 a more realistic estimate would be in about the $30 million range," he said.

Varied Statistics

Classroom Computer News, a periodical dedicated to computers in education, in their January/February issue cites an educational technology consultant Harvey Brudner, who says that "Schools now spend three and a half percent of their learning materials budget for computers and accompanying software." He predicts a "400 percent growth over the next five years, bringing computer-related sales to schools to $300 million or 14 percent of the total learning materials budget."

Yet, another report done in 1980 at the Center for Information Processing at the California State University in Fresno says, "Some form of computerized learning programs are presently utilized in 54 percent of the school districts in the United States and are projected to increase to 74 percent utilization in five years, at which time they will be the leading application of computers in education."

Creative Strategies International, a marketing firm, said in a report on microcomputers in education in October 1980, that "The educational microcomputer market will grow substantially by 1985, with an overall compound annual growth rate in excess of 30 percent per year. Some sectors will grow more rapidly than others. By 1985 retail value of educational microcomputer sales will approach $350 million per year, up several hundred percent from its current level. The potential market for microcomputers is estimated at more than 1.4 million units, with market saturation presently low."

Continue to page 79

PMC-80 MODEL I

MISSILE ATTACK. By the Cornsoft Group. New for the PMC-80. This program is a machine language imitation of the arcade game called Missile Command. This real-time machine language game (with sound effects) pits your twin silos of ABM's against a barrage of enemy missiles trying to destroy your cities. As your skill increases so does the difficulty of this ever popular arcade game! Watch the skies and may your aim be true. TRS or PMC-80, cassette, 16K. **$14.95**
TRS, disk, 32K. ..... **$20.95.**

TAPE COPY 1. ©1981 S.S.M., Inc. New for the PMC-80. This program is to solve the problem that has caused problems for all PMC-80 owners. **Problem:** A machine language program will not load in the cassette player provided in the machine and you can't load a machine language program on the second cassette port. **This is a problem no more!:** This program will load a machine language program from the second cassette player and saves it in the built-in cassette player. Loads and saves most all TRS-80 readable tapes that load at 500 baud (the standard speed). PMC-80 only, cassette **$14.95.**

CONQUEST. ©1981 by Lake Front Software. This program is based on the popular board game called **'Risk'.** (The names have been changed to protect the innocent.) This game is for one or more people. It is a game that demands attack strategy and, if yours is the best, you will be the 'Lord and Master' of the planet. MOD I, III or PMC-80. Requires 16K memory, cassette, ... **$14.95.**

FLIPPY. Ver. 1.3. ©1981 by J. Limkemann. This is a machine language program that plays "the best game of Othello on the TRS-80 that I have seen, and I play a lot of Othello". (Victor Andrews) MOD I or III. Requires 16K memory. ..... **$14.95.**

Just because I can sell something is not a reason for a product to appear in my ad; I must believe in it myself.

The following pages contain new items that I believe in. I am not after only one sale; I want return business, and that means I must give you quality products every time.

I believe I sell only quality products. If you have a problem, send your comments addressed to me. We support every product we sell.

Victor Andrews

COLOR

ANIMATED HANGMAN. Color. ©1981 S.S.M., Inc. This outstanding new program will thrill you for hours. He moves, groans and makes sounds. 16K. **$12.95**

DISASSEMBLER. Color. ©1981 S.S.M., Inc. This program displays hex on left side of screen and ASCII on right side of screen. For screen or printer. 16K. ..... **$14.95.**

MODEL I

TRS SUPER INVADERS. ©1980 S.S.M., Inc. This is the same as Super Vaders except it is for only one player at a time. MOD I only with mono sound, cassette. **$19.95.** MOD I with stereo sound, disk only. ..... **$24.95.**

HYRES. ©1981 by D. Lewandowskl. This is a patch program for the programs called: Invaders Plus and TRS Super Invaders; so they can be run on the Programma Graphix-80 board. MOD I, cassette programs only. **$9.95.**

MODEL III

TAPE COPY 2. New for the TRS MOD III. This program will load most any TRS-80, 500 baud system tape (standard MOD I speed) and load it into memory and save it at 1500 baud on the MOD III. No knowledge of machine language needed. Now it gives you a way to backup programs that load at the slower speed and makes cassette loading into your new MOD III a much faster and more reliable process. MOD III only, cassette. **$19.95**

SUPER VADERS. (with sound) ©1981 S.S.M., Inc. This is the MOD III version of the popular program called TRS Super Invaders. One of the finest space invader type games written for the TRS-80 machine. Monsters march down the screen and fire as they approach the bottom of the screen. 1 or 2 players. 10 levels of play. Can you stop them? MOD III only. Requires 16K free memory. (please state cassette or disk.) **$19.95.**

MODEL III/ BOOK

MOD III ROM COMMENTED. For the programmer that needs those answers about the MOD III ROM . . . Now! This is a complete list of locations in MOD III ROM and comments on each. All 14K of the ROM. There is no other book out that gives you the detail that this book has. Don't miss it. In order to respect Tandy's copyright the actual disassembled code is not printed, but the book is in a 3 ring binder format so you can put your own listing in between the pages for easy reading. Only **$22.50.**

SOFTSECTOR MARKETING
INCORPORATED

✓495

✓See List of Advertisers on page 306

POSTMAN DATA HANDLER. By Alger Software. ©1980 S.S.M., Inc. A machine language mailing list program that will do the following: 650 labels on a 35 track disk drive, 750 labels on a 40 track disk drive, 1534 labels on an 80 track disk drive, 10 fields (2 user defined), fast sorts (500 records in 30 seconds), fully usable on one (1) drive system (capacities shown are for a single drive system), most any label stock that is one up can be used (you save no money buying labels that are more than one up anyway), print one label at a time or a sequence of labels, purge duplicates with or without user assistance, 9 digit zip code, super fast search on any field -3 second average, easy screen editing.

Now Postman Data Handler has been upgraded with many new features. Now this very popular mailing package is not just the best way for most people and small businesses to do their mailing lists, but now we give you a way to uncramp, convert, and formletter your mailing list. You need this package if one of the following is true: If your mailing package is memory dependent. This means that you must have more memory to handle more names in your machine; If you need a way to get rid of duplicate names in your mailing list; If you want to sort on more than just name or zip. (our package can sort on any or all 10 fields at once.);If you are waiting more than one minute for your sort to finish. (our package is in all machine language so it runs very fast); If your present program will not handle the 9 digit zip code; If your program doesn't have full screen editing. This package is a machine language program, this is the reason for the super fast speed of all functions!

This is a random access disk based program and any name can be called to read, write, print or update in 3 seconds or less. Now along with it you get utilities that permit you to do the following: CONVERT 1; takes all the files from your old mailing list and converts them to our system. (Why should you change to our system if we made the change hard?) CONVERT 2; convert from our package back to ASCII files if you want to do something with them (like send them to another computer over the phone). MOD I (coming soon for the MOD III). This program runs on all quality operating systems. Requires min. 1 disk drive and 32K memory. . . . . only **$125.00**

✓494

POSTWRITER. ©1981 S.S.M, Inc. Now there is, at extra cost, a formletter package that permits inserting any of the 10 fields of information into any part of the letter, (yes even in the body of the letter), and right and left justify the letter. This program is made to be used with only the Postman program and one of the following word processing packages: Lazy Writer or Electric Pencil. . . . **$49.95.**

SPECIAL – If you purchase both Postman and Lazy Writer at the same time, at list price, (or if you already own one of the packages above and now want to purchase the other), we will at no extra cost include the Postwriter package FREE. There are 2 ways to purchase this package. The first way is to say "I want the best package on the market so send me the full system at one time". This includes the Postman Data Handler, Convert 1 and Convert 2. The package works on all quality operating systems based on the Tandy disk format (TRSDOS, VTOS, NEWDOS, NEWDOS-80 etc.) **$250.00.** This price is only good till June 1, 1981. Save **$49.95.** If purchased separately **$299.95**

or:

MINI POSTMAN. Sample Package. For you people who have a small mailing list (max 26 names) and/or you can't believe that Postman is the best package and we must be overstating how this program runs; try our sample package called Mini Postman. It comes as a full up and running program and shows you how good our package really is. This package can be upgraded to the full package within 30 days of purchase by calling and saying "I want the full package", and paying the difference between the mini and the full package. Note: Mini Postman does not include the convert utilities. If not everything you expect, return sample disk for full refund (less shipping). You can't lose. . . . . **$25.00.**

CHAIN MAKER. By Steve Skindell. ©1981. This program makes writing chain files on NEWDOS-80 a breeze. This is not only a program that just creates chain files but it also is an editor of the file. A file can be removed from the disk and edited and saved back to the disk quick and easy. Outstanding program and a must for every NEWDOS-80 owner. Comes with complete easy to read manual. Puchaser must own NEWDOS-80. . . . . **$14.95.**

THE CREATOR. ©1980 C.B.S., Inc. The Creator is a new type of program for the microcomputer operator - yes operator! Easy enough for the person just getting into the market. Use and create a program that is very sophisticated that programmers will comment highly about. The program will create error free basic programming code. Not almost ready to run but ready to run, when you are finished. Yes, gives birth to a program. Just answer simple questions and have a simple background in the disk system of your computer (if you read your basic manual when you have questions you will have no problems). This program is not a data base!

Now in the package comes the report generator that is in the same concept as the Creator. It is called **Reporter.** This program creates report output for the Creator for either screen or printer. This is the most outstanding programming package available from anywhere. Now you can create inventory systems, payables and receivables, check register and expense register, and much more! The system requirements are one of the following: MOD I 32K disk, MOD II 64K disk, Apple II 32K disk. (please state system when ordering). These 2 programs are on one diskette and are available complete for only . . . . . **$295.00.**

GRAPHX. By Steve Skindell ©1981. This is a program that is for the person who does reports or requires some sort of plotted output to show gains or losses, or any type of output that needs graphs. This program puts to the screen or to a printer the plotted points in bar graph format and plots the mean, average of plotted input. This is a very important program for accountants, CPA's, or the average businessman to evaluate, at a moments glance, where he is, was, or maybe where he is going. The files save to disk and can be recalled at any time to be reexamined, modified, or just reprinted. An extra feature is: if you have the Microline 80 printer, by Okidata, your output is in true graphics. Information is supplied for the user so he can modify this program for a special printer. Comes complete and ready to run. Requires MOD I or MOD III 48K disk. Printer optional (132 col.) only . . . . . **$49.95.**

SPECIAL – Receive this program for only **$25.00** if you purchase an Okidata Microline 80 or 82 this month from us.

An innovative word processing system for TRS-80* MOD I

©1980 by David Welsh

It is time to put your word processing program away and use a **Word Processing System**

*Lazy Writer is the product of ABC Sales

LAZY WRITER Takes on Scripsit© by Radio Shack® and Electric Pencil©®

Has all the things that other word processing programs should have. Easy to use, written all in machine code. / It permits the inserting and deleting by characters, words, sentences, and paragraphs / Page scrolling up and down / Search ahead of the cursor or behind the cursor for any character / The cursor can be moved up, down, left and right / You can seek top of file and bottom of file / Block move of text, block delete of text/ Search and replace or search delete / Unlimited insert (to the limit of your machines memory) / Permits use with lower case /

Has things that other programs should have, but don't. Upper and lower case output to your printer (if your printer accepts lower case) without having your computer modified. ON UPPER CASE ONLY MACHINES: This program marks the capital letters so you can see which letters are CAPITALS and which are not. / Will change all upper characters text to lower case or all lower case to upper, A SINGLE COMMAND / Will capitalize the first letter of all sentences and all proper noun I's, WITH A SNGLE COMMAND / LOADS ANY ELECTRIC PENCIL / FILE, ASCII SAVED FILES, EDTASM FILES or BASIC PROGRAMS SAVED ASCII / Permits installing special control characters in your text for your printers special features, like double wide or condensed print / Definable screen length and definable print length to 255 characters wide / Screen editing that is not final till your command. This means that you can edit your file on the screen and if you don't like how it reads you can cancel and leave it the way it was / You can append files (which means that you can put one file to the end of another file) / No lost characters at the end of the line, even for the fastest typist / A directory of all your files is available to the user without leaving the program / Saving programs to disk easy enough for the non-computer user / To save memory, not all the program modules are in memory at one time but are called from the disk as needed / You can set tab positions like on a typewriter / 10 CUSTOM COMMAND KEYS for the experienced user there is a command file that permits many special functions that are all user defined (not enough space for better explanation in ad, send for complete overview) / Program has HELP file that is a short review of the commands that are available /

Standard Printer Module. This printer module is provided for the user as a standard feature. Optional special printer routines for custom printer will be available in the near future. In this original release, it has the following printer drivers and will support the following printing devices: RS232, TRS232 and PARALLEL printer ports. You have the following format commands: Justifies Text, Centers Text, Centers Title, Line Spacing, Line Length from 3-255 characters and Set Margins / Also send any ASCII code to any printer from the text / Save formatted text to the disk for spooling later / Information for customer to load his own special printer driver / Printing can be stopped and started by the user at any time and then restarted where you left off / You can print entire file or just print to bottom of the page /

Communication Package. RS232 COMMUNICATION TERMINAL PROGRAM permits you to communicate with other computers. Transfer files from one machine to another. Permits dumping memory across the phone lines. Receive files from other TRS-80's and "Shake Hands" with larger computers. This is the complete system called LAZY WRITER. There is no package written for the TRS-80* that is as comprehensive. This package is available for the TRS-80* MOD I, 32K or larger with at least a single disk drive. List price is from

$125.00

Dealer Inquiries Invited

VISA* master charge

✓434 **SSM** SOFT SECTOR MARKETING, INCORPORATED
6250 Middlebelt • Garden City, MI 48135
(313) 425-4020

C.O.D - Certified Check, M.O. or Cash only. Sorry, no C.O.D. over $150.00! Most orders shipped next day. All orders must have shipping included. Please add 2% or $2.50, which ever is higher for shipping. Michigan residents, please add 4% tax. Add extra $1.50 for C.O.D. Personal checks take 3 weeks to clear. Send $1.00 for catalog - get $2.00 credit on next order.

Future Plans

Some additions will be for no additional charge and others will be at optional cost.

Complete support for Spinwriter, Diablo, Qume & 737 Centronics Printers, to use all of the features these printers offer.

Hanging Indents

Newsletters for users of this system to keep them informed of any questions, problems and special products made for use with this system.

Modify this package for TRS MOD III

Program to do form letters.

✓See List of Advertisers on page 306

SUPER UTILITY. © 1980 by Kim Watt of Breeze Computing, Inc. Sold on protected media only. **Main program list:** Zap Utility; display sector (disk, file), display memory, compare disk sectors, copy disk sectors, verify disk sectors, zero disk sectors, string search, sector search, single or double density diskettes (if your machine works normally with double density). Purge Utility; kill selected files, get disk directory, zero unused directory entries, zero unused granules, remove system files, kill by category, change name, date, password, auto command, change file parameters, remove passwords. Disk Format Utility; standard format, format without erase, special format, read address marks. Disk Copy Utility; standard copy with format, standard copy without format, special copy (to back up many protected disks) - purchaser use -only for his own personal disks. Tape Copy Utility; this program is to make backup of any TRS-80 tape, no matter how it is recorded (note again this program is for the use of the original purchaser for his own programs only). Disk Repair Utility; repair gat table, repair hit table, repair boot, read protect directory track, recover killed files, check directory. Memory Utility; move memory, exchange memory, compare memory, zero memory, test memory, input byte from port, output byte to port, memory to disk, disk to memory. MOD I, protected disk only. ..... **$49.95.**

QUICK FIX. ©1981 by Kim Watt of Breeze Computing, Inc. The sister program to Super Utility "the Grand Master" of utility programs, does Master" of utility programs, and has the ability to do all the things that have made Super Utility great, except: it does not have the following features; it doesn't have the Special Copy that backs up most TRS-80 readable protected diskettes, it does not have Tape Copy feature that copies any TRS-80 MOD I readable tapes, the Zap program does not go to double density diskettes, it does not have the Special Format feature.

Main Program List: Quick Zap; display sector (disk, file), display memory, compare disk sectors, copy disk sectors, verify disk sectors, zero disk sectors, string search, sector search, examine address marks. Quick Purge; kill selected files, get disk directory, zero unused directory entries, zero unused granules, remove unused system files, kill by category, change name, date, password, auto command, change file parameters, remove passwords. Quick Format; standard format, format without erase. Quick Backup; standard copy with format, standard copy without format. Quick Repair; repair gat table, repair hit table, repair boot, read protect directory track, recover killed files, check directory. Quick Memstuff; move memory, exchange memory, compare memory, zero memory, test memory, input byte from port, output byte to port, memory to disk, disk to memory. The one extra feature it has is: you can put Quick Fix on all your diskettes. MOD I. On nonprotected diskette, ... only **$34.95.**

OTHER THINGS from Kim Watt of Breeze Computing, Inc.:

MAKE 80. ©1980 AM Electronics. Written by Kim Watt. This program is for people who have 80 track disk drives and do not wish to keep that old 40 track drive just to load their 80 track system. Make 80 is loaded into your machine when it is placed in your 0 drive in an 80 track drive and then the reset button is pressed. It loads automatically and asks for 35 or 40 track diskette. When you insert your diskette in the drive the program reformats the diskette so your 80 track disk system can read all of the information from the diskette without having to have a 40 track drive. This program works on standard NEWDOS, TRSDOS, NEWDOS-80 diskettes. Does not work on any disk that has any funny sectors (VTOS) or with the LOBO interface. 80 track disk only. ..... **$14.95.**

SPACE COLONY. by Kim Watt. Space Colony is a space invaders type game for TRS 80 MOD I and with Programma Graphix 80 board. One level of play, single player, with sound. MOD I, 16K. ..... **$14.95.**

CAPTURE/SYMON. By Breeze Computing, Inc. Capture is a 2 person game of Blockade for the MOD I. With sound this game comes alive with fast action. MOD I, 16K. Cassette $12.95, Disk ..... **$17.95.**

This Month Only.

Microline 80 Printer . . . only **$499.00**
Microline 82 Printer . . . only **$699.00**
Tractor Feed **$125.00**

Both printers have the ability to do single sheet letterhead, run roll paper, 9½ fan fold paper and has an optional tractor feed for running mailing labels. (Compared to the MX-80 that can't run single sheets or roll paper.) This makes these 2 printers an outstanding buy. But if you want an MX-80 or MX-70 call for a price.

OTHER SMALL ITEMS OF INTEREST

Reset Buttons **$3.99**
Disk Drive Labels (0, 1, 2, 3) with stick on backs, set of 4 ..... **$3.99**

SSM 1496
SOFT SECTOR MARKETING, INCORPORATED

6250 Middlebelt,
Garden City, MI 48135
1 (313) 425-4020

Dealer inquiries invited.

C.O.D. – certified check, M.O. or cash only. Sorry, no C.O.D. over $150.00! Most orders shipped next day. All orders must have shipping included. Please add 2% or $2.50, whichever is higher for shipping. Michigan residents, please add 4% tax. Add extra $1.50 for C.O.D. Personal checks take 3 weeks to clear. All hardware must be prepaid. No hardware shipped collect.

*TRS-80 is a product of Radio Shack, division of the Tandy Corporation.

The figures show educational computing materials to be a more than substantial market. However, success in this market is not guaranteed. Other factors hamper an all-out investment among publishers.

One factor that makes the market so unstable is that both publishers and educators are unsure as to where the funding will come from for technological materials. Lloyd Prentice, publisher and editor of *Classroom Computer News*, said that the education market is a huge market that has become decentralized because of severe economic pressure. Prentice said that it is hard to determine what this means; will it reduce the buying tendency or increase it? No one is sure, and many publishers that were surveyed expressed the same concern. Bowen said, "When you look at the technology, there's some exciting things and great potential. . . but there is a money problem in education. With enrollments down, inflation, the cost of energy and all the other economic factors effecting school budgets, it becomes hard to perceive where all this money is going to come from for the materials. I think this is the great reservation we all feel right now."

Bowen also questioned whether educators would be able to justify the expense of the materials. "In business where a new technology can improve productivity, obviously then, it can be justified as an additional expenditure, however, this is not the case in education."

Perfection Is Essential

Creating good educational software also has its problems. Perfection is essential for traditional publishers because, first, long-standing reputations are at stake. Secondly, how and what we teach our children will be somewhat changed by computerized instruction. Publishers cannot afford to have a program crash, especially after months of expensive research spent creating the program.

A company spokesperson for CBS said, "Any time your program doesn't work, then every publication you have will be called into question." Most educators will not accept anything less than high quality programs. Publishers know this, consequently, the objective of creating high quality programs for the classroom automatically becomes more difficult.

Such quality software will have a direct relation to market growth, according to Charles Phillips, senior vice president in charge of special markets for Tandy Corp. "The market will grow in proportion to the quality of instructional material available. That's why publishers are spending a lot of time and money on it."

Bowen said McGraw-Hill has been investigating the area for 18 months. Three types of programs concern them: management, computer literacy and computer assisted instruction.

McGraw-Hill will aim its packages toward the elementary through two-year college market, including technical instructions. They plan to start test-marketing their courseware at those levels sometime this year.

Most of the packages will not be specifically designed for use on a single microcomputer. Again Bowen stressed McGraw-Hill's commitment to producing a variety of software to meet the needs of different schools.

"Right now we know that there are actually more micros at the secondary and post secondary level than there are at the elementary level. That doesn't mean that two years from now that will be the case; consequently, we will look to see what the interest is on a variety of levels," said Bowen.

McGraw-Hill has developed four prototypes and presented them to focus groups —educators, community leaders and school administrators—in five regions of the country.

The first is a management system which demonstrates how the micro and related components can be used by teachers and administrators. It records a student's progress, diagnoses particular problems a student may be having and provides teachers with a rundown of a student's level of competency in the curriculum.

Another prototype develops learning concepts and includes an audio component giving a student verbal feedback from the computer. The third is a drill and practice package, and the fourth is a simulated application in which the student has to apply a skill or concept that he has learned.

The focus groups were asked about the packages' appropriateness, and their need for them; would they be interested in purchasing such packages, if they were on the market? Were the programs a good value?

Currently, McGraw-Hill is working with outside contractors who are creating and producing their educational software, but have not eliminated the possibility of developing it in house.

A spokesperson for CBS Educational and Professional Publishing Division said that they, too, are preparing for the advent of computerized instruction. However, they have finalized no plans as of yet for two reasons. First, said our source, there are only a few microcomputers on the market that have the durability to be used in a school environment. And secondly, the schools are not computer literate except for one state. (Minnesota has had a state run computer consortium for over a decade.)

The spokesperson said, "Other than that, most states and most school districts are only computer literate in the sense that they bought a microcomputer and it's sitting somewhere in the school system."

CBS will primarily focus on the elementary school level because they feel it is the greatest market base. Their programs concentrate mainly on reading skills.

CBS has been researching the area since 1979 and has developed prototypes that are designed for use on the TRS-80. They include a spelling program, spelling test and vocabulary builder, a grammar program and text editing program. In order to test these prototypes, CBS provides a TRS-80 for a classroom over a period of eight to 15 weeks. Later, they test children to determine if they are learning effectively with the aid of a computer. This method of testing is expensive and time consuming; however, one major concern of CBS, said the spokesperson, is whether the use of a computer really does help a child to learn.

"There is such a rush for products now that the quality and what is good for the children has not been explored," he said.

"It doesn't take very long to develop a good program," he continued, "the question is: Is there a market for it? We're not sure how long it's going to take. Secondly, the program has to be validated so it doesn't crash. . . these publishers can't just publish programs and hope they work 99 percent of the time—they must work 100 percent of the time. We know from past experience, you can't afford to publish bad products."

Courseware Catalog

Random House is extremely interested in the education market. So interested, that they just released a microcomputer courseware catalog that includes 28 programs.

The programs (K through 12th level) cover the subjects of mathematics, reading, language arts and management—all of which will be available by the end of the year.

According to George Rosato, vice president and general manager of the school division, the products were created in-house with Random House funds to their specifications. At present, they are available for the TRS-80 (Models I and II) and the Apple II. "We are prepared to adapt them to other microcomputers as the market indicates, but presently we think

these two brands have the necessary capabilities," he said.

Rosato said that he had been studying the education market for two and half years. He decided, after visiting a number of manufacturers, that the TRS-80 had the most features and functions. The next step was to enter into discussions with Tandy and come to an agreement on distribution.

Science Research Associates (SRA), a wholly owned subsidiary of IBM, is also getting into the educational software market, emphasizing computer literacy programs.

SRA had designed courseware in three areas thus far: math, reading and computer literacy.

Their math program is broken down for grades one through three, four through eight, and a mathematics drill program for grades one through six. This latter program automatically measures a student's current performance and moves him ahead or backward as appropriate.

Fact Track is an SRA timed drill application of addition, subtraction, multiplication and division for grades one and above, which is supposed to build speed and accuracy in the four areas. They also offer a set of six arithmetic games for one or two elementary school players.

SRA's reading courseware in an instruction and practice program in the major phonic elements for grades one through three.

Their computer literacy package is a program to introduce students in grades six through twelve to basic computer concepts.

SRA also offers a package entitled the Computer Discovery Program on three learning levels: elementary, high school, and the college adult education level.

The student workbooks accompanying two disks are written on two levels, one at the sixth grade level and the other at the ninth grade level. The workbooks are broken down into four chapters. Chapter one describes important turning points in the history of the field of computer science; chapter two, Analysis and Programming, introduces you to programming techniques; chapter three, Computer Concepts, discusses computer hardware and software along with familarizing students with binary numbers; and chapter four, Impacts and Applications, discusses the social and economic impacts of the computer.

SRA's educational courseware, as of this date, is available only under a license agreement. Customers must pay a licensing fee and abide by SRA's contract stipulations. They use a license agreement rather than direct sales because "it provides extra assurance of material security," said Glen Phillips, product development administrator. The license fee is equivalent to the price of the software, which may be kept as long as agreement is abided by.

Their courseware is designed for use on the Apple II or the Atari computer. *Computer Retailing* reported in December 1980 that an agreement between SRA and Atari enables SRA to market Atari's line of microcomputers to the domestic educational market. SRA, in exchange, writes courseware for Atari to sell through its regular distribution channels.

Although SRA has a technical staff that has been creating the software in house, Phillips said one of the major problems is finding authors to write good educational software.

Phillips also expressed his uncertainty of the education market. "No one has any kind of idea as to how many dollars are going to be spent on software. There is no statistical information on this subject simply because commercial publishers, like ourselves, have not been selling software long enough for there to be any kind of statistical analysis. It's a very high risk."

Scott, Foresman and Co., another traditional textbook publisher, set up an electronic publishing division last November. Thus far, they have introduced a courseware series in reading skills for grades one through three (all of which will be available before Sept. 1981) and a mathematics courseware series for grades one through eight which will be available by the end of April.

They have also developed a school management program made up of 14 packages that handle administrative duties, scheduled for release this summer.

The packages are designed to run on the Texas Instruments 99 microcomputer (TI 99). Foresman has a nonexclusive agreement with TI; the programs can be purchased separately or as a package with the TI 99.

Dale La Frenz, manager of the electronic publishing division, said that they are using their own technical people including subject matter experts and instructional design people to develop their software. Also, they, like other publishers, receive a large amount of unsolicited material from people interested in publishing for the education market.

The Dolphin

Houghton Mifflin has made the most bold advance into educational courseware. They have swallowed Time Share Corp. (TSC), a software publisher. Stride, developed in 1979 by TSC, includes a math program for grades one to eight and a reading program for grades four to six. The programs are designed to be used either as drill and reinforcement exercises or as remediation exercises by the teacher. Stride also provides a management routine that classifies a student's progress.

Houghton has also recently come out with an algebra program for grades eight to 10, an individualized computation skills program for grades seven to 12 and three books; one an introductory book, one on programming and a computer resource book for algebra students.

Originally, Stride was designed for TSC's own hardware system, the TSC 200/300. Though the software for Stride was recently adapted for use on their first microcomputer, the Dolphin, it is still available for the TSC 200/300.

Robert Yo, Sr. Vice President of TSC, said that the Dolphin, introduced last January was specifically designed for classroom use. Among its features are provisions for eight terminals and a memory of 20 million characters. In essence, it has the power of a minicomputer but is small and compact. Yo said that any software that Houghton creates in the future will be adaptable to the Dolphin.

Houghton Mifflin also distributes a hardware-software system called The Answer, an instructional support system for teachers. TSC developed the software for The Answer and the hardware was purchased from Basic Four. The Answer is capable of a number of duties; it scores tests, diagnoses skill weaknesses for an individual student, shows class progress, indicates how much a class has learned toward each objective of a test, and also handles basic clerical duties.

TSC also produces a package for use in guidance offices which lists higher education institutions and career opportunities under a number of categories. Originally designed for the large mainframes, TSC has recently adapted it for use on their micro.

Addison Wesley, another well-known textbook publisher, also has an interest in the software market. They have a number of math packages that are planned for marketing next fall. They include: high school algebra and analysis, and junior high school and upper elementary arithmetic. Originally written in Apple BASIC, they will also be available for the TRS-80 and Commodore PET.

Basically, Addison Wesley is still researching the area, and was unwilling to comment specifically on what direction they will take. Carl Hesler, general manager of the business and professional division (a part of the higher education

division) said, "because we've been in the computer science area since the mid-60s we know that the market is there and is reasonably large. More of our activity is centered around asking various questions about the direction of the market."

Hayden Book Co. is perhaps the most involved of all of the publishers contacted. They have been serving the general computer market for the past ten years. Consequently, the people at Hayden are feeling secure.

Currently they only market two software packages that are aimed at the elementary and secondary school level—Crossbow, which familiarizes children with fractions, and Programming in Apple Integer BASIC.

Hayden's market objective is to publish software for the computer hobbyist. However, they do plan to direct more of their material to the educational market, said Karen Nelson, chief editor of the computer science division. For example, a book called *I Speak BASIC* is directed to the high school level and will be used initially with the TRS-80 and then the Apple.

Nelson expressed many of the same sentiments as other publishers about the education market. It is difficult to get good education programs, Nelson said "People either know how to teach or they know how to program; it's very difficult to get the right combination. Many of the people who are trying to write educational software are not really making use of what the machines can do. Many of the programs we see. . . look like book pages on the screen and in many cases they aren't much more than that."

Some Groundless Fears

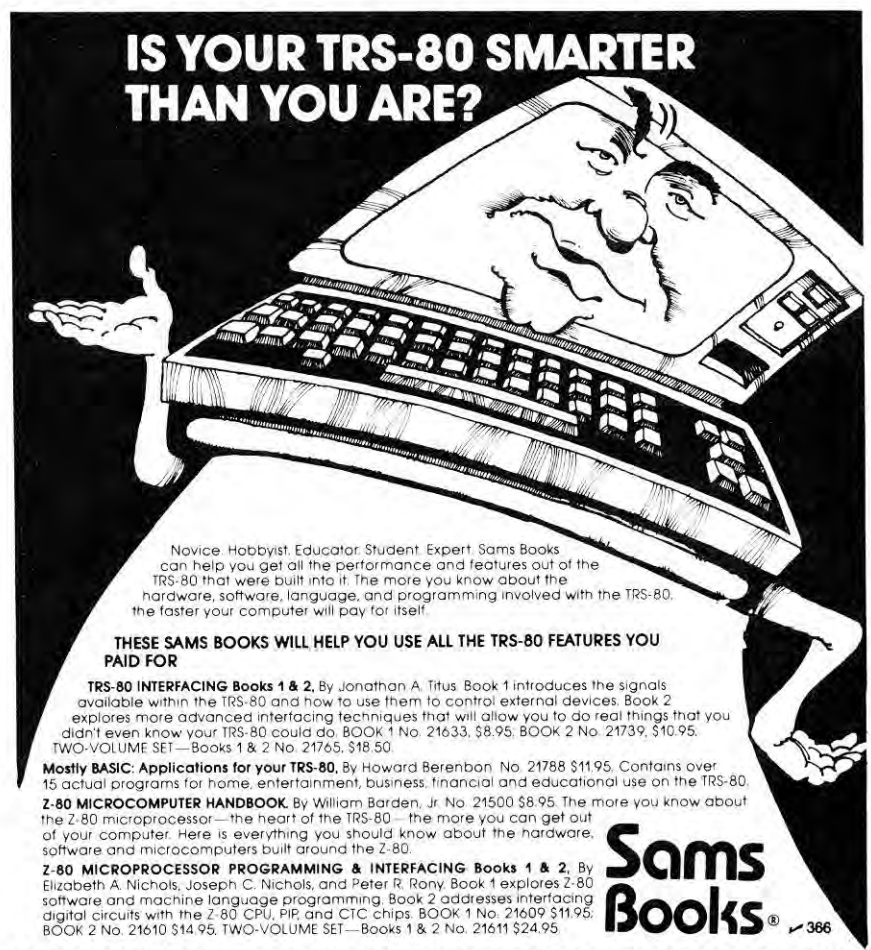
Perhaps an unspoken concern of many educators is the fear of being replaced by a computer. And there has been much comment directed towards the teacher who has a micro in his classroom and doesn't know how to use it, or feels threatened by it.

Of the publishers surveyed, most see the micro as a tool to help the teacher. Firstly, computers can perform clerical duties that consume a large percentage of a teacher's time. And secondly, the computer's daily reports on students' performance can leave more time for individual teacher-student interaction.

Bowen of McGraw-Hill doesn't think that the textbook will ever be replaced. He sees the microcomputer as a tool rather than something that will supplant traditional education methods. "For instance," said Bowen, "we know that textbooks work very well for a large body of students. We also know that some students need additional assistance or need more challenge. This technology can be used to better identify those students and gear teachers toward more individualized instruction."

The spokesperson for CBS was quick to stress that the computer can't teach something that the student doesn't already know; it can only reinforce. He went on to say that there hasn't been much change in classroom techniques since the 1800s. "People keep forgetting that the chief goal in going to school is learning how to get along with people and to learn something about the world around you—hopefully reading, how to count and something about being a good citizen. Of course the rest is important, but has never been ranked as do or die."

Rosato of Random House thinks that the micro will become as common as the typewriter. However, "much of its significance," said Rosato, "depends on good publishing, that is, designing good programs and marketing them effectively. It depends on what we will allow educational software to do." ■



Novice. Hobbyist. Educator. Student. Expert. Sams Books can help you get all the performance and features out of the TRS-80 that were built into it. The more you know about the hardware, software, language, and programming involved with the TRS-80, the faster your computer will pay for itself.

THESE SAMS BOOKS WILL HELP YOU USE ALL THE TRS-80 FEATURES YOU PAID FOR

TRS-80 INTERFACING Books 1 & 2, By Jonathan A. Titus. Book 1 introduces the signals available within the TRS-80 and how to use them to control external devices. Book 2 explores more advanced interfacing techniques that will allow you to do real things that you didn't even know your TRS-80 could do. BOOK 1 No. 21633, $8.95; BOOK 2 No. 21739, $10.95. TWO-VOLUME SET—Books 1 & 2 No. 21765, $18.50.

Mostly BASIC: Applications for your TRS-80, By Howard Berenbon. No. 21788 $11.95. Contains over 15 actual programs for home, entertainment, business, financial and educational use on the TRS-80.

Z-80 MICROCOMPUTER HANDBOOK. By William Barden, Jr. No. 21500 $8.95. The more you know about the Z-80 microprocessor—the heart of the TRS-80—the more you can get out of your computer. Here is everything you should know about the hardware, software and microcomputers built around the Z-80.

Z-80 MICROPROCESSOR PROGRAMMING & INTERFACING Books 1 & 2, By Elizabeth A. Nichols, Joseph C. Nichols, and Peter R. Rony. Book 1 explores Z-80 software and machine language programming. Book 2 addresses interfacing digital circuits with the Z-80 CPU, PIP, and CTC chips. BOOK 1 No. 21609 $11.95; BOOK 2 No. 21610 $14.95. TWO-VOLUME SET—Books 1 & 2 No. 21611 $24.95.

Sams Books® ✓366

Mail to: **Howard W. Sams & Co., Inc.,** 4300 West 62nd Street, P.O. Box 7092, Indianapolis, IN 46206. (317) 298-5400

			Quantity
TRS-80 Interfacing—Book 1	No. 21633	$ 8.95	
TRS-80 Interfacing—Book 2	No. 21739	$10.95	
TWO-VOLUME SET—TRS-80 Interfacing Books 1 & 2	No. 21765	$18.50	
Mostly BASIC: Applications for your TRS-80	No. 21788	$11.95	
Z-80 Microcomputer Handbook	No. 21500	$ 8.95	
Z-80 Microprocessor Programming & Interfacing, Book 1	No. 21609	$11.95	
Z-80 Microprocessor Programming & Interfacing Book 2	No. 21610	$14.95	
TWO-VOLUME SET—Z-80 Microprocessor Programming & Interfacing Books 1 & 2	No. 21611	$24.95	
		Amount of order	$
		Add local sales tax where applicable	$
		Shipping & handling costs	$ 2.00
		Total amount of order	$

☐ Payment Enclosed ☐ Check ☐ Money Order
☐ VISA ☐ Mastercard Interbank No. _____ (minimum credit card purchase $10)
Account No. _____ Expiration Date _____
Name (print) _____ Signature _____
Address _____
City _____ State _____ Zip _____

Prices subject to change without notice. All books available from Sams Distributors, Bookstores, and Computer Stores. Offer good in U.S.A. only. In Canada, contact Lenbrook Industries Ltd., Scarborough, M1H 1H5, Ontario, Canada. Offer expires 6/30/81.

AD078

✓See List of Advertisers on page 306

Now NRI takes you inside the world's most popular microcomputer to train you at home as the new breed of computer specialist!

NRI teams up with Radio Shack to teach you how to use, program and service microcomputers...make you the complete technician.

It's no longer enough to be just a programmer or a technician. With microcomputers moving into the fabric of our lives (over 200,000 of the TRS-80™ alone have been sold), interdisciplinary skills are demanded. And NRI can prepare you with the first course of its kind, covering the complete world of the microcomputer.

Learn At Home in Your Spare Time

With NRI training, the programmer gains practical knowledge of hardware, enabling him to design simpler, more effective programs. And, with advanced programming skills, the technician can test and debug systems quickly and easily.

Only NRI gives you both kinds of training with the convenience of home study. No classroom pressures, no night school, no gasoline wasted. You learn at your convenience, at your own pace. Yet you're always backed by the NRI staff and your instructor, answering questions, giving you guidance, and helping you over the tough spots.

Training includes TRS-80 computer, transistorized volt-ohm meter, digital frequency counter, and the NRI Discovery Lab with hundreds of tests and experiments.

(TRS-80 is a trademark of the Radio Shack division of Tandy Corp.)

Explore the TRS-80 Inside and Out

NRI training is hands-on training, with practical experiments and demonstrations as the very foundation of your knowledge. You don't just program your computer, you introduce and correct faults ...watch how circuits interact...interface with other systems...gain a real insight into its nature.

You also build test instruments and the NRI Discovery Lab, performing over 60 separate experiments in the process. You learn how your trouble-shooting tools work, and gain greater understanding of the information they give you. Both microcomputer and equipment come as part of your training for you to use and keep.

Send for Free Catalog... No Salesman Will Call

Get all the details on this exciting course in NRI's free, 100-page catalog. It shows all equipment, lesson outlines, and facts on other electronics courses such as Complete Communications with CB, TV and Audio, Digital Electronics, and more. Send today, no salesman will ever bother you. Keep up with the latest technology as you learn on the world's most popular computer. If coupon has been used, write to NRI Schools, 3939 Wisconsin Ave., Washington, D.C. 20016.

NRI McGraw-Hill

NRI Schools
McGraw-Hill Continuing Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016
NO SALESMAN WILL CALL
Please check for one free catalog only.

All career courses approved under GI Bill.
☐ Check for details.

- ☐ Computer Electronics Including Microcomputers
- ☐ TV/Audio/Video Systems Servicing
- ☐ Complete Communications Electronics with CB • FCC Licenses • Aircraft, Mobile, Marine Electronics
- ☐ CB Specialists Course
- ☐ Digital Electronics • Electronic Technology • Basic Electronics
- ☐ Small Engine Repair
- ☐ Electrical Appliance Servicing
- ☐ Automotive Mechanics
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Refrigeration, & Heating including Solar Technology

Name (Please Print) Age

Street

City/State/Zip

Accredited by the Accrediting Commission of the National Home Study Council 179-041

THE CATALOG 1981

Apparat, Inc.

"TOTAL COMMITMENT TO QUALITY, SATISFACTION AND SERVICE"

Apparat, Inc. is a dedicated group of professionals who manufacture, distribute and support many different hardware and software products for microcomputers. Selling Apparat manufactured products and brand name merchandise for many years, Apparat has grown at a dynamic pace, to become one of the leaders in the industry.

From its inception, Apparat has emphasized Quality, Satisfaction, Service and Dependability, plus price consciousness, maintaining a reputation respected industry wide.

Our continuing goal is to provide high quality products, technical support, equipment service and a total commitment to serving you, the microcomputer user; all at the best value possible for your money.

We would like to thank each and every customer for making Apparat a leader in the industry and for allowing us to serve you.

MOST ORDERS SHIPPED UPS SURFACE - FREE

All orders shipped within 2 business days -
We will notify you if out of stock

Use our free Order Desk number 1-800-525-7674 (except Co, Ak, Hi)

TABLE OF CONTENTS

TRS-80 Model II, III, Color, Pocket, PMC80 Computers 4-5
NEWDOS/80 6
Dual 80 Track Mini-Floppy Drive 7
Disk Drives and Accessories 8-9
Printers 10-11
Apple Hardware/Software, Printer Interfaces, Monitors 12-13
Blue Book Series - New TRS-80/Apple Hardware and Software Products from APPARAT 14-15
MICROPERIPHERAL CORP. Communication Hardware/Software 19
Multi-User Network Systems for the TRS-80/Apple 20
NAS TRS-80 Model II Integrated Business Software 21
PICKLES & TROUT CP/M 22
BUSINESS MICRO PRODUCTS Filetran 23
TRS-80 CP/M Software 24
SOFTWARE AFFAIR TRS-80 Orchestra 80 25
Micro Club 26
Apex 26
Apple Business Software 27
Apple CP/M 27
TRS-80 Software/Utilities 28
Micro Accounting System 29
Reference Books 29
Supplies: Diskettes, Head Cleaners, Flip Sorts, Paper, Ribons, Thimbles, Memory Kits, Power Filters 30
Terms and Conditions, Trademarks, Order Forms 31
TRS-80 New Hardware/Software Products 32

APPARAT SERVICE CENTER*

Since the opening of our Denver Retail Store in late summer of 1980, APPARAT's highly trained, qualified service personnel have quickly developed and maintained a reputation for fast, thorough service without sacrificing quality. Our Service department takes pride in having equipment repaired, tested and back on its way to you within 48 hours of receipt, at reasonable rates for parts and labor, with customer satisfaction guaranteed. A partial list of equipment which APPARAT's service staff specializes in repairing contains such names as:

- APPLE
- ANADEX
- CENTRONICS
- COMMODORE PET
- DIABLO
- EPSON
- GENERAL ELECT.
- HAZELTINE
- HEATHKIT
- LEAR SIEGLER
- MICROPOLIS
- MICROTERM
- MPI
- NEC SPINWRITER
- OKIDATA
- PERCOM
- PERSCI
- PERTEC
- SHUGART
- SIEMENS
- SOROC
- TANDON
- TEAC
- TEXAS INSTRUMENTS
- TRS-80
- WANGCO

IMPORTANT: Prior to shipping, call APPARAT to get a Return Authorization Number, which greatly expedites your order. Be sure to display prominently.

*Whether you purchased equipment from Apparat or elsewhere, let us solve your repair problems with fast, efficient, guaranteed service.

The TRS-80® Model III is Radio Shack's exciting new personal and business computer, replacing its highly successful Model I.

This fully expandable completely self-contained desk-top unit starts with a 4K Level I system and expands with your needs and with plenty of room for more memory.

RS-232 communications interface (forLevel I) plus 1500 baud tape input under the Model III BASIC are some of the many features. Most Model I application software will run directly on the Model III under NEWDOS/80.

Level I or Model III BASIC in ROM includes:

- 4-48K memory
- 1500 baud Model III BASIC only and 500 baud cassette interface
- Parallel Printer Port
- RS-232 allows up to 4 mini disk drives providing up to 700K new bytes of storage each
- Z80, 1.8 MHz Processor and
- 64X16 Screen

4K Model III, Level I
Cat# 1-308 ..... $665.00
16K Model III, BASIC
Cat# 1-174 ..... $949.00

48K Model III with two 40 track disk drives
Cat# 1-155 ..... $2370.00

The **TRS-80® Color Computer** offers vivid color graphics for exciting visual displays covering a wide range of applications from personal finance to fast-moving action games via instant-load program pacs.

Attaches easily to any color TV. Programming is in COLOR BASIC or the very powerful EXTENDED COLOR BASIC. Disk storage and other additions are available. The Color Computer features:

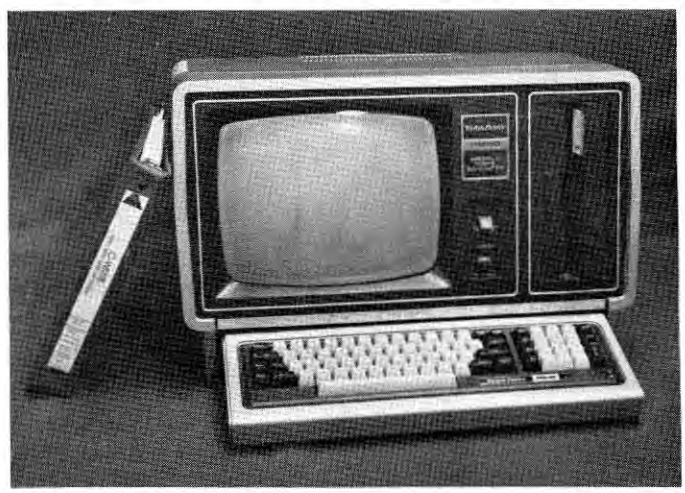
- Color BASIC or Extended Color BASIC in ROM
- 4K to 16K memory
- 1500 baud cassette interface
- RS-232 serial port
- Joysticks, printers, disk expansion
- 6809E microprocessor and
- 32X16 screen

Cat#1-004 ..... $375.00

TRS-80® Model II, Radio Shack's top-of-the-line small business computer, includes an 8" floppy disk, and twice the operating speed of Model I. Inexpensive business related software and accounting functions, plus SCRIPSIT® lets you put Model II to work immediately. ASSEMBLER, COBOL, FORTRAN, and BASIC compilers allow in-house programming. Can operate under CP/M and MP/M as a slave or single/multi-station master. Features include:

- 32K or 64K memory
- 1 to 4, 8" Disk Drives (500K each, 600K each with CP/M)
- Parallel Printer Port
- Two RS-232C Serial Ports
- Processor - Z80A; 4MHz and
- 80X24 Screen

Cat# 1-002 ..... $3510.00



Radio Shack announces a battery-operated fully programmable personal computer that fits in the palm of your hand! The **Pocket Computer** loads programs from cassettes, or by using a modified, feature-packed BASIC allows you to write your own, keeping memory intact with the power off. An invaluable tool for today's professional and business persons, the Pocket Computer features:

- BASIC Language in ROM
- 1.9K Continuous Memory
- Cassette storage with expansion interface
- Two Chip Set - Processor and
- 24 Character LCD Display

Cat# 1-006 ..... $225.00

PMC-80 MICROCOMPUTER

An alternative to the TRS-80 Model I, Level II Computer. The PMC-80 Computer uses the 12K BASIC ROM from Microsoft which means it can run any BASIC program for the Model I from Radio Shack as well as programs from other software suppliers for the Model I.

The PMC-80 comes with 16K RAM and a built-in cassette player. Its expansion bus is fully compatable with the peripherals available for the Model I such as the Expansion Interface which allows for RAM memory up to 48K, disk controller, disk drives, RS-232 and printer interfaces.

The PMC-80 will run Apparat's NEWDOS/80 and other Model I operating systems. This new version of the PMC-80 now incorporates a complete set of arrow keys (left, right, up, down) and a clear key. **Making the keyboard completely compatible with** the Model I.

FEATURES

- Software compatible: Level II BASIC and SYSTEM tapes.
- Hardware compatible: with PMC 40-pin Interface Adapter
- Video output for both TV monitor and TV set (ch. 3)
- Unitized construction - just plug into power outlet and TV.
- Integrated cassette recorder has automatic volume control.
- Complete operating, instruction and programming manuals.

PMC-80
Cat# 1-034 ..... $625.00
Lower Case Model
Cat# 1-035 ..... $75.00
Printer output
Cat# 1-044 ..... $95.00
S-100 Bus Expander with disk, printer & RS-232 interfaces
Cat# 1-045 ..... $399.00
Fast load cassette Interface to 8000 baud
Cat# 1-046 ..... $149.00

- RS-232 and IEEE SWITCHING and MONITORING UNIT by Giltronix, Inc. Interface three to five devices to a single computer or terminal. Units maybe cascaded allowing interfacing of more than five devices. Optional monitoring of the basic handshaking signals is available.

GRS-8 (Switch 8 common lines)
Cat# 1-614 ..... $139.00
GRS-24 (Switch 24 lines)
Cat# 1-615 ..... $179.00

MODEL I: HARDWARE

- Model I Expansion Interface with 32K memory, increase your memory and add interfaces for printers and disk drives.
Cat# 1-008 ..... $449.00
- RS-232 Interface, for use with modems and serial printers.
Cat# 1-035 ..... $99.00
- Lower Case Modification, generates word processor type characters.
Cat# 1-036 ..... $59.00
- Level I to Level II ROM, upgrades the BASIC in ROM to the powerful Level II BASIC.
Cat# 1-037 ..... $150.00
- Numeric Keypad, adds calculator style keys for fast entry of numeric data.
Cat# 1-038 ..... $79.00
- Model I Carrying Case, protect your computer while transporting it.
Cat# 1-039 ..... $75.00

MODEL I OR MODEL III: SOFTWARE

- VISICALC
Cat# 2-081 ..... $99.95
- PROFILE
Cat# 2-129 ..... $79.95
- MICROFILES
Cat# 2-130 ..... $99.95
- VERSAFILE
Cat# 2-131 ..... $29.95
- SCRIPSIT
Cat# 2-066 ..... $99.95

MODEL II: SOFTWARE

- PROFILE II
Cat# 2-132 ..... $179.00
- VERSAFILE
Cat# 2-133 ..... $69.00
- SCRIPSIT II
Cat# 2-134 ..... $299.00

Apparat, Inc.
introduces

NEWDOS/80

**For the 80's—
an enhanced NEWDOS
for your TRS-80™
Model 1.**

NOW AVAILABLE FOR MODEL III

Apparat, Inc., announces the most powerful Disk Operating System for the TRS-80®. It has been designed for the sophisticated user and professional programmer who demands the ultimate in disk operating systems.

NEWDOS/80 is upward compatible with NEWDOS 2.1 and is supplied on Diskette, complete with enhanced NEWDOS + utility programs and documentation. Some of the NEWDOS/80 features are:

- New BASIC commands that support files with variable record lengths up to 4095 Bytes long. Mix or match disk drives. Supports any track count from 18 to 96. Uses 35, 40 or 80 track 5" mini disk drives or 8" disk drives, or any combination.
- A security boot-up for BASIC or machine code application programs. User never sees "DOS READY" or ">READY" and is unable to "BREAK", clear screen, or issue any direct BASIC statement including "LIST".
- New editing commands that allow program lines to be deleted from one location and moved to another or to allow duplication of a program line with the deletion of the original.
- Enhanced and improved RENUMBER that allows relocation of subroutines.
- Powerful chanining commands.
- Print Spooler.
- DFG function; simultaneous striking of the D, F and G keys will allow the user to enter a mini-DOS to perform some DOS commands without disturbing the resident program (e.g. DIR while in Scripsit.)
- Includes machine language Superzap/80 and Apparat 2.1 utilities. New Disassembler
- Enter debug any time by pressing 123 keys. Also allows disk I/O.
- Diskette "Purge" command.
- Specifiable system options (limited sysgen type commands).
- Increased directory capacity.
- Copy by file commands.

MODEL I

NEWDOS/80 with all of the NEWDOS + utility programs, many of which have been enhanced, is priced at just $149.00 and is available at most TRS-80 dealers.

Cat# 2-010 ..... $149.00

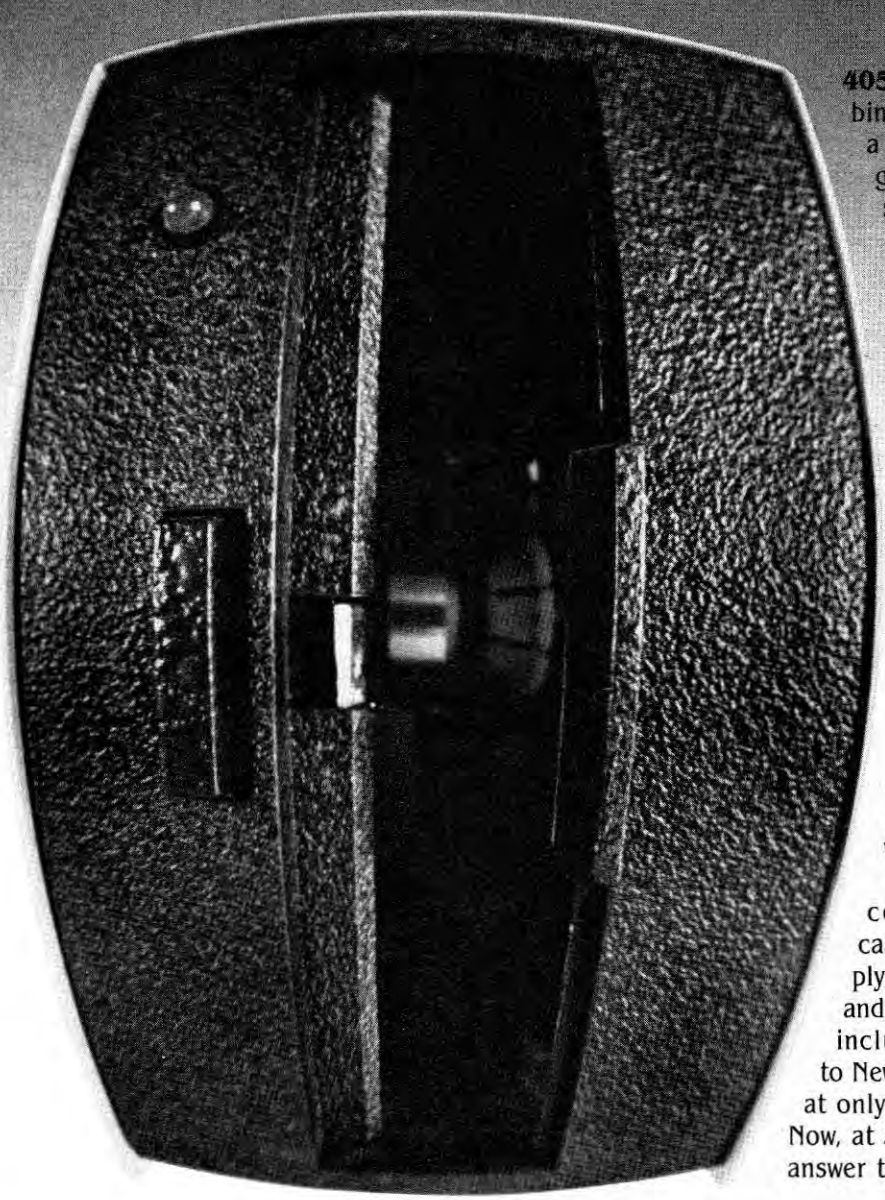
MODEL III

- The features of Model I on the Model III.
- Offers double density for twice the storage capacity of the Model I, NEWDOS/80 allows any mix of single or dual sided 40 or 80 track drives.
- Most BASIC and many assembly language programs written for the Model I will run without modification on the Model III. Includes a copy utility to convert Model I single density to Model III double density.

Cat# 2-001 ..... $149.00

NEWDOS/80 relies on the TRSDOS and Disk Basic Reference Manual published by Radio Shack. NEWDOS/80 documentation supports its enhancements and upgrades only.

APPARAT INTRODUCES
Now even more bytes per buck

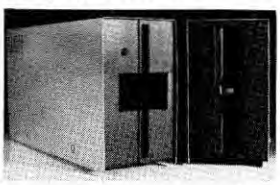


405 K/bytes of storage. Apparat has combined its Newdos/80 operating system and a dual-sided 80 track mini-floppy drive to give you 405,000 bytes of storage in a single volume. Modification patches to Newdos/80 expands the capability of single density drives, so you'll have greater applications for your TRS-80 model 1.®

Drives plug directly into an expansion interface with no modification required so you can now have over 1 megabyte of storage on-line with standard mini-floppy diskettes. Each drive has 316 free grans, for a total of 948, on a maximum of three 80 track drives, which can be added to a TRS-80.

Upgrading to double density is possible by running under most double density controllers, (e.g. Percom's Doubler).

These drives can "read" standard 35 or 40 track diskettes with special software that skips every other track.



Drives come complete with case, power supply, interface cable and documentation including patches to Newdos/80. The drive mechanism is priced at only $699 (Cat. No. 1-705, specify I or III). Now, at 579 bytes per buck, it just might be the answer to your storage problems.

Apparat, Inc.

4401 So. Tamarac Parkway, Denver, CO 80237 (303) 741-1778

VISA

Now available for model III, 728K bytes of storage.

DISK DRIVES

- The TANDON TM 100 5¼ INCH FLOPPY DISK DRIVE is the drive mechanism used by Radio Shack in the TRS-80 model I and III computers. The patented double sided read/write head is the acknowledged industry standard, being used in more mini-floppy drives than any recording head. The TM 100 has field-proven dependability with over 200,000 drives performing with unparalleled read/write reliability and data integrity. Apparat is pleased to offer these drives with power supply and chassis, fully checked out on the TRS-80 Models I and III.

MODEL I DISK DRIVES

with power supply and chassis:

40 TRACK

Tandon single sided
Cat# 1-702 ..... $339.00
Shugart single sided
Cat# 1-701 ..... $339.00
Tandon double sided
Cat# 1-703 ..... $499.00

80 TRACK

Tandon single sided
Cat# 1-704 ..... $549.00
Tandon double sided
Cat# 1-705 ..... $699.00

Two drive standard cable
Cat# 1-714 ..... $29.95

Four drive standard cable
Cat# 1-715 ..... $39.95
Extender Cable
Cat# 1-744 ..... $16.95

MODEL III DISK DRIVES

with external power supply, chassis and controller:

40 TRACK

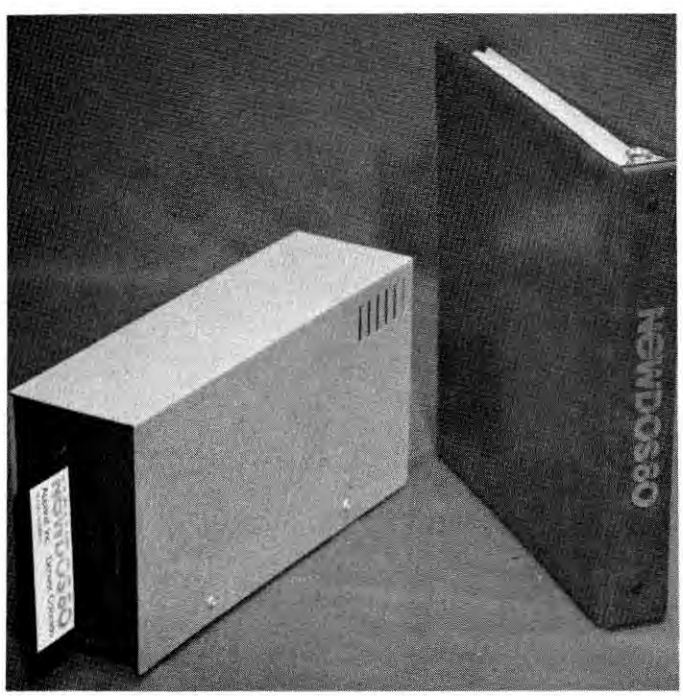
Tandon single sided
Cat# 1-732 ..... $699.00
Shugart single sided
Cat# 1-733 ..... $699.00
Tandon double sided
Cat# 1-734 ..... $759.00

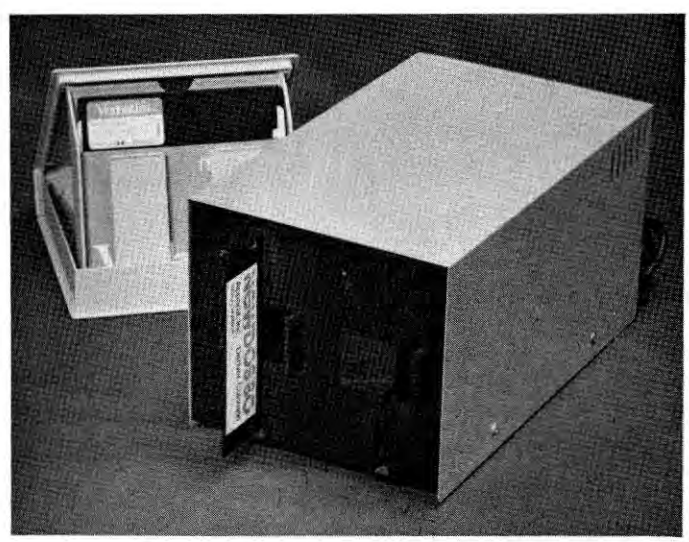
80 TRACK

Tandon single sided
Cat# 1-735 ..... $849.00
Tandon double sided
Cat# 1-736 ..... $949.00

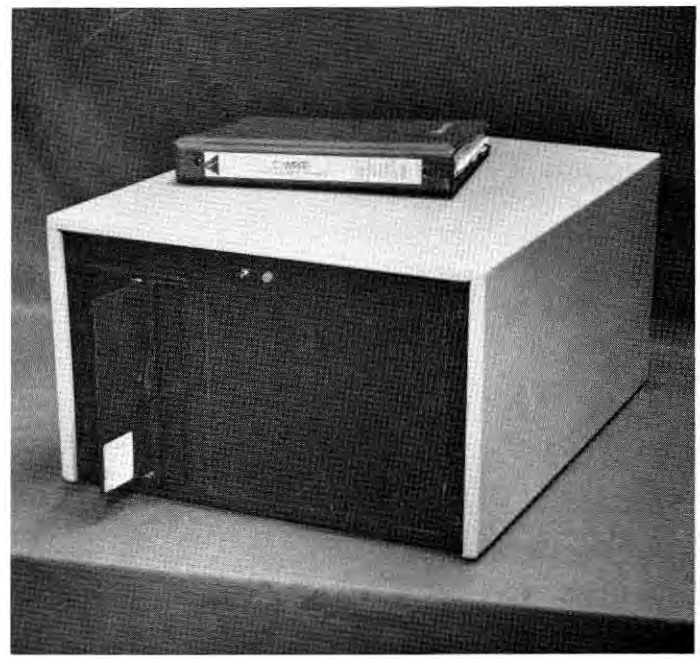
Drive is mounted in a dual drive cabinet. Includes drive cable.

Optional four drive cabinet with power supply
Cat# 1-730 ..... Additional $59.00





DISK DRIVES



Additional drives without chassis or power supply:

Tandon single sided 40 Track
Cat# 1-737 ..... $259.00

Shugart single 40 Track
Cat# 1-738 ..... $259.00

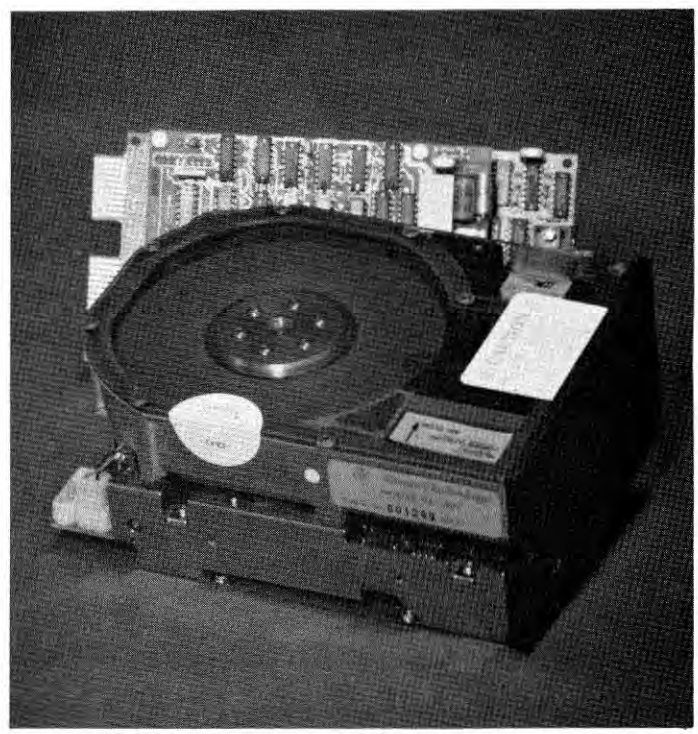
Tandon dual 40 Track
Cat# 1-739 ..... $379.00

Tandon single 80 Track
Cat# 1-740 ..... $399.00

Tandon dual 80 Track
Cat# 1-741 ..... $499.00

Internal disk drive kit. Includes chassis, controller, mounting hardware and cables.
Cat# 1-731 ..... $449.00
(Does not include disk drives. Select drives of your choice from those above.)

- SINGLE DRIVE EXPANSION/TRIPLE CABINET - The Model II's attractive Shugart SA801 drive housed in a triple drive cabinet. (May also be used in a Model I 8" floppy disk) Self-contained power supply and cabling accommodates expansion to full complement of drives.
  Cat# 1-725 ..... $1095.00



- DOUBLE DRIVE EXPANSION/TRIPLE CABINET Same as above with two Shugart eight inch drives.
  Cat# 1-726 ..... $1545.00

- TRIPLE DRIVE EXPANSION/TRIPLE CABINET- Same as above with three Shugart eight inch drives.
  Cat# 1-727 ..... $1995.00

- ADDITIONAL DRIVES for the EXPANSION/ TRIPLE CABINET. Power supply, cabling, case not included.
  Cat# 1-728 ..... $479.00

WINCHESTER DISK DRIVES

- HARD DISK EXPANSION SYSTEM - CAMEO 10 megabyte fixed/removable hard disk expansion system for the Model II. Includes hard disk, hardware interfacing, cabinet, and modifications for TRSDOS
  Cat# 1-729 ..... $6800.00

- Watch for our 5¼ Winchester Disk System with Controller, available in Spring/Summer 1981. Optional tape or floppy disk back-up.

PRINTERS

EPSON

(Free Cable with every Printer - Specify Computer Type)

MX-80

- The EPSON MX-80 is not only one of the least expensive of the parallel printers available from APPARAT, it is one of the most powerful! Compare the MX-80's features with other printers around and you won't find another printer that offers so much for so little! The MX-80 has a 50 million character life print head and can be replaced by the user for less than $30.00. It prints 96 ASCII, 64 TRS-80 graphic, and 8 international characters in a crisp 9×9 matrix which provides lower case descenders. The user can software select 40, 80, 66, or 132 column character sizes and the printer puts them on paper at a fast 80 CPS bidirectionally with logic seeking! The MX-80's built in tractor feed mechanism will adjust from mailing label size up to 10" wide paper. All of that plus front panel line and form feed control and a built in self-test mode. A new option soon to be available is an upgrade allowing high resolution dot matrix graphics!! Hard to believe that a printer that offers so much for so little is available! It is at APPARAT for only:

  Cat# 1-403 ..... $645.00

MX-70

- If the low price of the MX-80 is still over your budget, try the new MX-70. Many of the same features of the MX-80 such as 64 TRS-80 graphics blocks and dot matrix graphics are still offered but it prints a 5×7 matrix character at 80 CPS unidirectionally. EPSON removed the front panel line and form feed switches and lowered the price even more!! Available from APPARAT for only:

  Cat# 1-416 ..... $449.00

- Watch for the announcement of a new "full size" printer from EPSON in the late spring. It will have all the features of the MX-80 but will accept up to 15" wide paper!! Price expected to be under: $1000.00

ANADEX

DP-9500/DP-9501

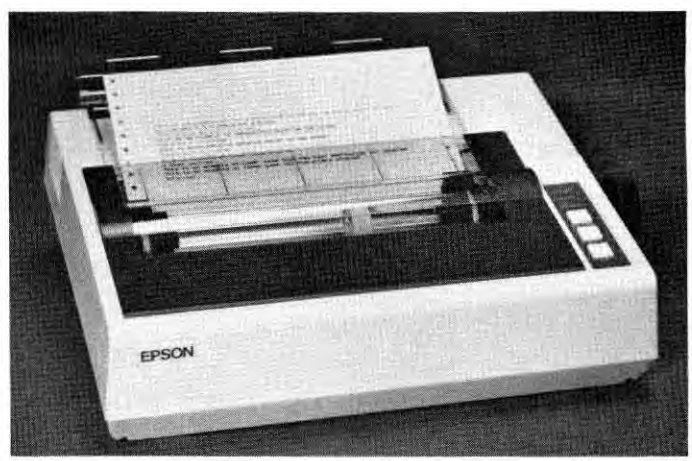
- The DP-9500 and DP-9501 printers offer 132/158/176 and 132/165/198/220 column printing, respectively, featuring the full standard ASCII 96 character set as well as high-resolution graphics. The 650 million character life print head zips across the paper at a rate up to 200 CPS and the printer offers a standard 600 character FIFO buffer with an additional 2K plug in buffer option available. The three ASCII compatible interfaces (parallel, RS-232-C, and 20 ma current loop) are standard providing fully software controllable features such as: 1.)6 or 8 lines per inch vertical spacing; 2.)Form length and width; 3.)Skip-over-perforation; 4.)Auto line feed (on/off); 5.)Vertical and horizontal tabs; 6.)Underlining; 7.)Character size; and much much more. Tractor feed is adjustable from 1.75 to 15.6 inches. Featuring front panel control of line and form feed, top-of-form setting, and a self-test feature that prints out a complete statis of all selectable functions. All of this and more, available from APPARAT for only:

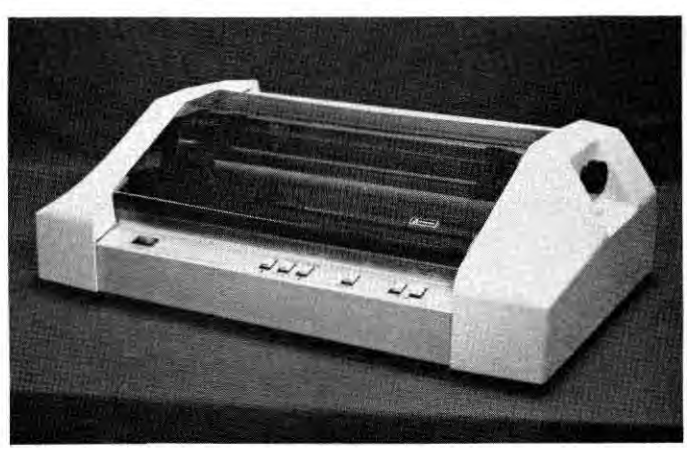
DP 9500

  Cat# 1-400 ..... $1399.00

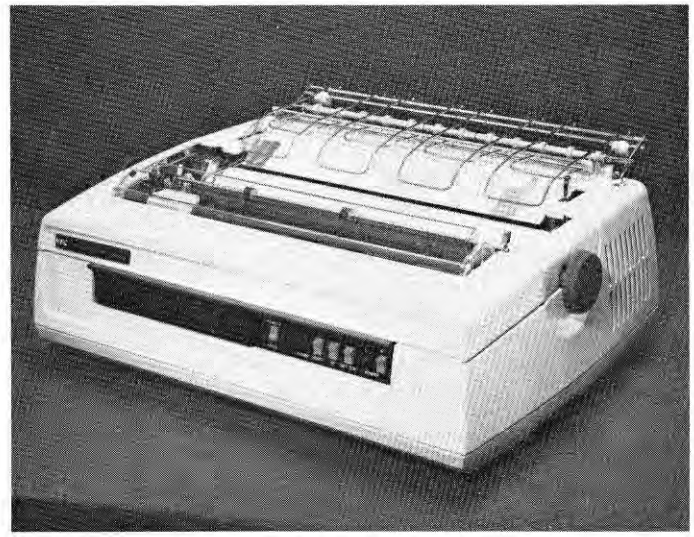
DP 9501

  Cat# 1-401 ..... $1399.00





NEC SPINWRITER

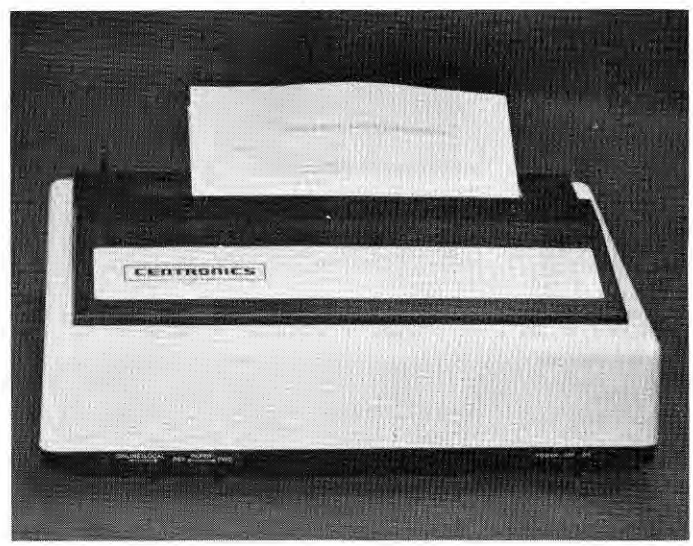


- For the person looking for a high quality word processing printer, APPARAT offers the perfect solution - the NEC Spinwriter! The Spinwriter is available as a serial (Model 5510) or parallel (Model 5530) printer that prints at up to 55 CPS. The Spinwriter's unique light-weight printing "thimble" is made of fiberglass reinforced plastic consisting of 64 cylindrically arranged fingers. There are over 30 easily changeable thimbles available as well as an all black multi-strike film ribbon. If you are looking for the best in word processing printers, look no further. Available at APPARAT for only:

  Cat# 1-405 ..... $2549.00

CENTRONICS

737-1

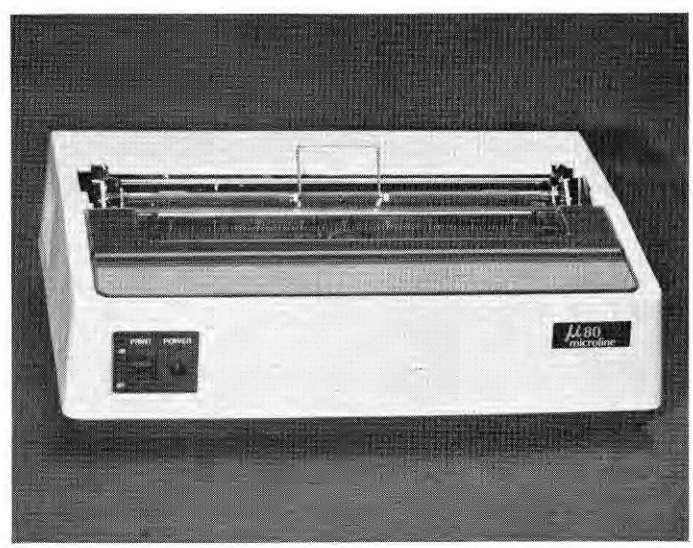


- Why not get the "Line Printer IV" at an APPARAT price? The 737-1's 7X9 dot matrix produces a quality print at a much lower price that approaches the quality provided by an impact printer. This parallel printer offers up to 80 CPS with four character sizes including underlining and bidirectional line feed control. The 737 offers friction feed or 9½" pin feed paper handling. The right margin justification mode allows near typeset quality at a low cost. See the FLEXTEXT ad for a sample print example. This highly popular printer is available from APPARAT for only:

  Cat# 1-402 ..... $839.00

OKIDATA

MICROLINE 80



- Okidata's MICROLINE 80 offers a quality 9X7 dot matrix head that is warranted for 200 million characters. It prints the full ASCII 96 character set and the full TRS-80 64 character graphics set at 80 CPS. The MICROLINE 80 offers software controllable features such as 6 or 8 lines per inch as well as four character sizes. Paper can be either friction fed or pin fed and an optional tractor feed is available. It comes standard with a parallel port but an optional serial RS232 interface is available. The Microline 80 is available for only:

  Cat# 1-404 ..... $525.00

  Tractor feed option

  Cat#1-408 ..... $130.00

  MICROLINE Model 82 adds bidirectional printing capabilities to the Model 80

  Cat# 1-417 ..... $699.00

  MICROLINE Model 83 has 120 CPS bidirectional printing, 15 inch wide carriage and includes tractor feed.

  Cat#1-418 ..... $1049.00

APPLE ADD-ON HARDWARE/SOFTWARE

APPARAT 40X2DISK DRIVE

- The APPARAT 40X2 DISK DRIVE is uniquely designed to deliver more than twice the storage capacity (205K) of a standard Apple disk drive while remaining compatible with the Apple II. At the hardware level by simply plugging into the standard Apple disk controller card . At the software level any Apple software will operate the Apparat 40X2 in exactly the same manner . At the media level any disk written on an Apple drive can be read by the Apparat 40X2 and vice-versa . Therefore, DOS, PASCAL, FORTRAN, Z80 softcard, Visi-calc, etc., are applicable instantaneously. The Apparat 40X2 has its own integral power supply, reducing power drain and heat buildup -- two factors which seriously affect Apple's performance. It has a double headed drive with 40 tracks per diskette side, the first 35 tracks corresponding to Apple's standard tracks. In order to use these extra tracks and the other side of the disk, special firmware is required, developed by Apparat, for use with Apple DOS 3.3. Firmware for use with DOS 3.2 and PASCAL is optional.

Cat#: 1-724 ..... $675.00

* Also available:
40 track single sided (102K)
Cat# 1-742 ..... $499.00
80 track double sided (410K)
Cat# 1-743 ..... $839.00

LANGUAGE SYSTEM

- This package includes the Language Card, which allows apple users to take immediate advantage of the powerful Pascal Language as well as the Integer and Applesoft BASIC interpreters. The Language Card's 16K bytes of RAM memory electrically replaces the ROM firmware built into each Apple. Upon start-up, the RAM memory is automatically loaded from disk with the user's choice of language, then electrically protected from change. Includes diskettes containing a language selection "Hello" program, Pascal, Applesoft BASIC, and all reference manuals.

Cat# 1-203 ..... $495.00

APPLESOFT FIRMWARE CARD

The Applesoft Firmware Card provides access to the library of programs written in the extended BASIC language. It contains hardware and software controls to allow it to electrically replace the existing Integer BASIC firmware in Apple II computers.

Cat# 1-205 ..... $200.00

INTEGER BASIC FIRMWARE CARD

This card provides access to a library of programs written in the Integer BASIC language. It contains hardware and software controls to allow it to electrically replace the existing Applesoft BASIC firmware in Apple II Plus computers.

Cat# 1-204 ..... $200.00

PROGRAMMERS AID #1

- Apple developed this set of ROM-based program routines to make it even easier for you to program in integer BASIC. The Programmer's Aid #1 includes Renumbering, Merging, Tape Verification, Memory Test, Musical Note Generation, and High-Resolution Graphics routines. An added bonus is the ability to relocate 6502 machine-language programs. This ROM is available for the original Apple II only. Apple II Plus owners must purchase the new Integer BASIC Firmware Card which includes the Programmer's Aid #1.

Cat# 1-277 ..... $50.00

DOS 3.3 TOOL KIT

- Includes the Applesoft Tool Kit and the Assembler/Editor to help utilize the full capabilities of the Apple II. This Kit is intended for the Experienced DOS 3.3 user (will not work on DOS 3.2). Also has the Hi-Res Character Generater, the Relocating Loader, and three demonstration programs.

Cat# 2-411 ..... $75.00

CENTRONICS PARALLEL INTERFACE

- The Centronics Parallel Interface Card includes cable and connector. Will interface with almost any printer that uses the Centronics parallel interface.

Cat# 1-207 ..... $225.00

PARALLEL PRINTER INTERFACE

- Designed to be used with printers that have parallel interfaces, it can also be used as a general 8-bit parallel output port. Selection from 40 to 255 column output and simultaneous output to printer and screen.

  Cat# 1-206 ..... $180.00

COMMUNICATIONS INTERFACE

- Allows the Apple to be connected to a modem for use as a terminal in either full or half-duplex modes at either 110 or 300 baud. A perfect mate for the Novation CAT modem, the Com Card allows you to transfer programs over the phone.

  Cat# 1-224 ..... $225.00

RS232 SERIAL INTERFACE

- Designed specifically for high-speed printers, though it can also be used for half-duplex communications at rates from 75 to 19,200 baud. It can automatically add a line feed to a carriage return or a carriage return delay to aid in interfacing almost any printer with serial interface. Input for the Apple II can be taken either from an external device, or from the Apple's keyboard, or from both simultaneously.

  Cat# 1-223 ..... $39.95

WIREWRAP PROTOTYPING INTERFACE CARD

- Construct your own custom-designed interface circuits to plug into the Apple II bus.

  Cat# 1-225 ..... $39.95

MICROSOFT RAM CARD

- Add 16K RAM to you Apple II with the addition of this card. Used in conjunction with the Microsoft Softcard, this card allows usage of 56K CP/M. Also allows loading of Integer BASIC from standard DOS 3.3 System Master, just as if there was a Language Card.

  Cat# 1-218 ..... $195.00

MICROSOFT SOFTCARD

- Add the capabilities of running Z80 Microprocesssor programs on your Apple. Includes CP/M 2.2 and Microsoft BASIC 5.0 which meets the ANSI qualifications for BASIC. CP/M is the most widely supported operating system available for personal computers. With the addition of the softcard, CP/M application programs can easily be run on the Apple.

  Cat# 1-217 ..... $349.00

VERSAWRITER DRAWING TABLET

- VersaWriter is an inexpensive alternative to the Apple Graphics Tablet that allows for creation of full-color, high resolution graphic images. Images may be stored on disk, rotated, shrunk, enlarged, or even imbedded in programs. Includes two diskettes containing plotting and applications software. Requires at least 32K.

  Cat# 1-226 ..... $252.00

LEEDEX MONITORS

- Three different 12" B/W monitors and a Color monitor that are designed for professionals and priced for the hobbyst. These highly reliable monitors feature a 12 MHz bandwidth for an 80 X 24 line display capability. The solid state circuitry assures a sharp, stable, and trouble free picture.

  VIDEO 100: Sturdy, lightweight plastic cabinet
  Cat# 1-609 ..... $169.00

  VIDEO 100-6: Same as the 100 but Green Phosphor
  Cat# 1-610 ..... $189.00

  VIDEO 100-80: Rugged metal cabinet with mounting capability for a floppy disk drive and space for an 11" X 14" PC board for custom designed electronics.
  Cat# 1-611 ..... $199.00

  COLOR MONITOR: 13" High Resolution Solid State monitor
  Cat# 1-612 ..... $399.00

SUP R MOD II

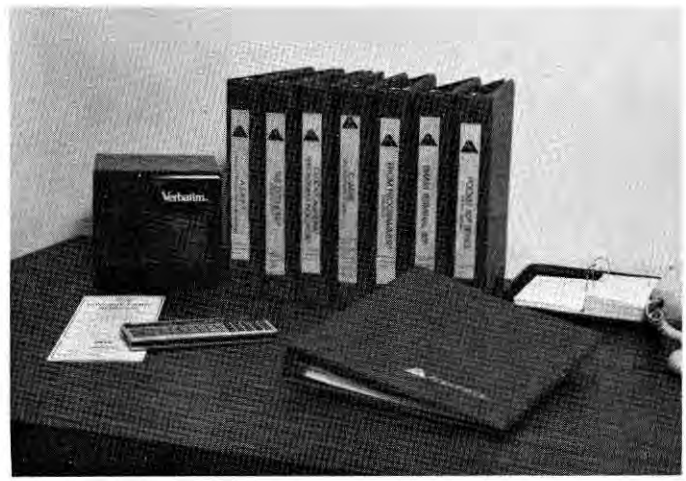
- The Sup R Mod II TV Interface plugs directly into your Apple II or Apple II Plus and allows you to use a standard color or B/W TV for your display. Operating on UHF channel 33, the package includes a coaxial cable and antenna transformer to insure safe isolation with a standard home TV set. Requires assembly

  Cat# 1-208 ..... $29.95

BLUEBOOK SERIES

QUALITY

That elusive essence of professionalism which takes years to acquire has been captured once again by APPARAT's quest for excellence in an innovative series called BLUEBOOK. Reasonably priced hardware and software packages including advanced word processing, intelligent software packages and professional accounting systems (to illustrate just the tip of the iceberg) proudly stand beside NEWDOS/80 and APEX as powerful tools for TRS-80, APPLE, CP/M and MP/M systems. APPARAT is QUALITY. And we're proving it everyday with products presented in the BLUEBOOK series.



- TRS-80 BUS EXTENDER provides six slots supporting cards up to 3×5 inches. Can be connected to the TRS-80 Models I and III, enabling optional hardware additions. Connectors, 5 and 12 volt power supply, and an attractive metal case are provided. Specify Model I or III for appropriate cables. (NOTE: Most APPARAT hardware add ons for the TRS-80 can be plugged into the Bus Extender).
  TRS-80
  Cat# 1-025 ..... $169.00

- DATA SEPARATOR eliminates disk data errors which can occur on the TRS-80 Model I, especially in the densely packed inner tracks. One reason for these errors is the inability of an internal circuit in the FD1771 disk controller chip to function properly under some circumstances. APPARAT'S DATA SEPARATOR simply plugs into the expansion interface and solves the problem. No modifications are required to your Model I hardware or software.
  TRS-80
  Cat# 1-027 ..... $29.95

- PROM BLASTER programs 25XX and 27XX parts in the 1 to 4K range as well as single (5V) and multi-voltage types by using a 16 pin jumper which configures the programmer to the appropriate PROM type. A zero insertion force socket is provided for the PROM. Utility routines are provided for each PROM type to read, write and verify from/to any range of memory. Only a portion of a PROM may be written enabling programming even if it is not blank.
  TRS-80
  Cat# 1-022 ..... $149.00
  Apple
  Cat# 1-220 ..... $149.00

- CLOCK CALENDAR/APPOINTMENT SCHEDULE provides clock/calendar functions of hr/min/sec in a 12 hr format (AM or PM) and mo/day/yr/day of week, with (and here's the difference!) user's choice of two output modes, program requesting time/date, or time/date can be DMAed and automatically displayed. ALSO includes capability of setting approximately 100 time/dates which cause an interrupt upon matching time/date of theclock/calendar. A BASIC program can maintain an appointment schedule for one or more people, or alert persons to perform certain tasks.
  TRS-80
  Cat# 1-021 ..... $169.00
  Apple
  Cat# 1-219 ..... $169.00

- REAL TIME EXPERIMENTOR MULTI-PROCESSOR contains a National COPS 402 processor with 20 I/O lines, serial I/O, counter, 2716 PROM with 2048 bytes for program instructions and 1064 nibles (4 bits) of RAM. Included is a cross assembler and sample program source showing utility routines which handle I/O, memory, and other features. The COPS 402 may be read from or written to, may interrupt, or DMA (on Apple) to any place in the memory of the processor. May be used for any real time or process control requirements by incorporating a clock/timer routine.
  TRS-80
  Cat# 1-023 ..... $159.00
  Apple
  Cat# 1-221 ..... $159.00

- SPEECH I/O HARDWARE MODULES which allow speech (using a phoneme generator), Morse code, or alphanumeric data to be entered, digitized, stored, and reproduced will soon be available with applications for games, business, communications and many other activities. Support software is included with many application software packages available. Watch for announcements concerning applications and availability (for TRS-80 and Apple). Custom programming of voice output for commercial use will be offered.

- APPARAT'S SCIENTIFIC ARITHMETIC PROCESSOR (ASAP) provides faster processing of scientific functions when volume of calculations (number crunching) is beyond the computer's capacity during an acceptable time period. Handles interger or floating point numbers to 9½ digits of accuracy. Available are the following scientific functions: sin, cosin, tangent, logs, square root and many more.

  Software designed to interface ASAP functions into BASIC or assembly language programs are provided.

  TRS-80
  Cat# 1-024 ..... $399.00
  Apple
  Cat# 1-222 ..... $349.00

- INTEGRATED SALES & INVENTORY: A total Manufacturer's Inventory Control System. Easy to use modular construction allows interfacing with Invoicing and Accounts Receivable. Manages inventory, sales and receivables with ease. Comfortably handles inventory as products comprised of components contained in the inventory. The system consists of the following modules which may be purchased separately:

  Invoicing and Sales Subsystem
  Model I/III
  Cat# 2-188 ..... $175.00
  Model II
  Cat# 2-119 ..... $250.00
  Apple Model II
  Cat# 2-427 ..... $175.00

  Manufacturing Inventory Control Subsystem
  Model I/III
  Cat# 2-120 ..... $175.00
  Model II
  Cat# 2-121 ..... $250.00
  Apple Model II
  Cat# 2-428 ..... $175.00
  Accounts Receivable with Labeling Subsystem
  Model I/III
  Cat# 2-122 ..... $200.00
  Model II
  Cat# 2-123 ..... $300.00
  Apple Model II
  Cat# 2-429 ..... $200.00
  Integrated Sales and Inventory System
  Model I/III
  Cat# 2-124 ..... $500.00
  Model II
  Cat# 2-125 ..... $700.00
  Apple Model II
  Cat# 2-430 ..... $500.00

- PASCAL LEDGER is a collection of programs that allows the user to have a complete computerized General Ledger system. It performs most of the tasks usually associated with computerized versions of the General Ledger system including: Up to 250 User Definable Accounts - Financial Reporting - Transaction Entry - Automatic Posting - Password Protection - Customization of Printer and Screen Characteristics for Turn-Key operation.

  Included in the PASCAL LEDGER are the two system diskettes and complete documentation that shows step-by-step useage of the Pascal Ledger including Normal Daily Cycle, End-of-Week Cycle, End-of-Month Cycle, End-of-Quarter Cycle, End-of-Year Cycle. This General Ledger system is completely menu driven and does not require ANY computer programming knowledge. Comes already personalized with the user's company name installed on the system disks.

  Cat# 2-431 for Apple II $149.00

- C-WRITE is a CPA Client Write-Up System designed for use by professional accountants. Not a "warmed over" in house accounting system; this is a full accountants system designed for client batch entry. CP/M 8" standard disk.
  Cat# 2-821 ..... $799.00

- "BIONIC BASIC" selectively implants modules directly into your Basic, significantly increasing its power and usefulness. You may choose any of the following implants or use all, as you see fit.

BASIC STARTER PACKAGE, FEATURES

A flashing and/or repeating cursor, with user-definable repeat rate & cursor character, and ability to switch the cursor and repeat on and off.

Move information from one area of memory to another, such as from screen to protected memory.

Chain programs - Run or load a new program with previous program variables intact.

Labels and numeric instructions with GOTO or GOSUB statements.

Change strings from upper to lower case and vice-versa.

Alter the "RESTORE" command allowing specific line reading instead of the program's first data statement.

Two other BIONIC BASIC packages are also available:

"Editing Features" package allows you to: Search program text for a specific string or Basic keyword, move blocks of lines within a program, and compress resident programs by deleting unwanted spaces and remarks.

"Array Features" package allows you to: Redimension arrays, search an array for a specific entry, and sort any one-dimensional array, numeric or string, in ascending or descending order. (This sort is fast - one hundred items in less than a second!)

But the best feature of BIONIC BASIC is its modularity. You need only install those modules you want to install. If you find you do not need a particular module you can "pull" it at any time.

BIONIC BASIC starter package
Cat# 2-100 For TRS-80 Model I..... $49.95
Editing Package
Cat # 2-101..... $19.95
Array Package
Cat# 2-102 ..... $19.95
Special Offer - all three packages only
Cat # 2-103..... $74.95

STOCK ANALYSIS is a user oriented set of programs for analyzing the following:

- The potential new and probable risk ratio of specific stocks
- The overbought/oversold condition of specific stocks.
- The overbought/oversold condition of the market in general.
- The running averages for specific stocks or for the Dow Jones Averages.

These routines will help you select stocks which meet your investment objectives.

Cat# 2-127 For TRS-80..... $49.95

- TRS-80 VOCAL SYNTHESIZER generates sounds from data files for the TRS-80 Synthesizer. Three output modes are available: Morse code, Spelled (both operate character by character), or Spoken (pronounces English or foreign language). Amazing results, considering the limitations of spelling versus pronunciation. (NOTE: Will also work with the Apparat synthesizer to be announced early summer.)
  Cat# 1-026 ..... $49.00

- NEWTRIEVE replaces your BASIC sequential search with a machine language program. NEWTRIEVE is designed to be installed in any BASIC program that requires sequential searching of random access files for a particular string. NEWTRIEVE can search through 25,000 characters from the disk file to locate the string in question and identify the disk file record in which it is located in less than a second. Includes all documentation and sample programs. Also includes a utility program which simplifies installing NEWTRIEVE into your BASIC programs.
  Cat# 2-090 For TRS-80..... $49.95

- SMART TERMINAL 80, an advanced, flexible,and unique program to make your TRS-80 an intelligent terminal for communicating with another TRS-80, FORUM 80's™, THE SOURCE™, MICRONET™, or any sophisticated mainframe system available to you.

  Manuscripts, documents, etc., may be prepared for off-line transmission on-line in block form or in prompted line-by-line form.

  SMART TERMINAL 80 will transmit and receive BASIC programs and Editor-Assembler files. It transmits not one but two auto log-on messages and incorporates a lower case driver which may be toggled on or off. It will open or close your buffer automatically or manually for storage of incoming data or for transmission generation, detect key-bounce, and you may format your screen for the line length YOU desire without regard for the line length tranmited by the other system.

  SMART TERMINAL 80 can store more than 30K bytes of data in your memory depending on your system size. You may redefine keys in order to send special codes required by some systems such as the square brackets required by MICRONET. Everything coming in or going out may be sent to your printer when you command it. Communications protocol and parameters are at your fingertips and may be selected at will, including full or half duplex.

SMART TERMINAL 80 stands alone as a unique communications package and when combined with THE APPARAT CONNECTION will end your communication problems.

Cat# 2-104 ..... $79.00

- FLEXTEXT II supports the NEC 5510/5520 Serial and the NEC 5530 Parallel Spinwriters while implementing all of the SCRIPSIT II special printing features, such as: space, word, and character justification, boldface, superscript, subscript, multi-column printing, single and double underlining, overstrike, strike-through, and SWAP. Also, FLEXTEXT II allows alternate character sets (such as italics) available on some Spinwriter print thimbles, and switching between 10 and 12 pitch spacing during printing. FLEXTEXT II is self contained, requiring no modification to SCRIPSIT II while it performs the initialization of the TRSDOS parallel or serial (also configuring the Model II, Channel B, RS232-C) printer drivers. Available for the Model II and Spinwriter.

  Cat# 2-106 ..... $29.00

The TRS-80 Pocket Computer has been described as a solution looking for an application. Apparat announces the first in a series of application packages for the TRS-80 Pocket Computer - its Pocket-80® series.

The first offering in the Pocket-80 series is a games package. Games are not only fun, they are an introduction to what a computer - any computer - can do. The Pocket-80 Games Package will include:

- Guess - Guess the secret number. Not a sophisticated game by any means, Guess is included mainly to show how to simulate random numbers on the Pocket Computer.

- Hamurabi - The classic game where you rule the kingdom of Sumeria. This program, which will fit snugly into a 4K TRS-80 Model I, Level I, shows just how much you can get into a pocket computer!

- Safecracker - Another "Guess the Number" type game, this one has a twist; your mission is to open a safe, which could contain anything from the secret plans you came for to officer O'Malley of the FBI!

- Pig - A dice game that's fun, but watch out! The pocket computer is hard to beat!

- Psych - This one is also hard to beat; the Pocket Computer begins by randomly choosing "heads" or "tails", but as it goes along it begins making its decisions based on what you have guessed before.

  Cat# 2-107 ..... $14.95

- CMDX PROCESSOR functions as an extension to the TRS-80 Model I and III 16K computers. Although it is usable on disk systems, it is especially designed for cassette only units.CMD (X) adds 10 commands to Level II or BASIC III systems; string search, hexdecimal conversions, memory & variable displays, renumber, alter RAM, etc.

  Cat# 2-128 ..... $24.95

THE EXTENDER by Scott Knaster. With Apparat's new Apple software package, The Extender, you can use the full power of PRINT USING from Applesoft, determine the amount of free space remaining on a diskette from within your programs, generate automatic line numbers, and much more.

The Extender provides 15 powerful statements and functions to make Applesoft programming easier. These commands add to your capability in business applications, graphics, debugging, disk management, and advanced programming.

Here is a brief description of some of the commands provided by The Extender:

- PRINT USNG - Easily formats output in columns, with automatic rounding, floating dollar sign, asterisk fill, preceding or trailing sign, and more features than any other similar system.
- AUT - Provides computer-generated automatic line numbers.
- DEC and HEX - Provide built-in conversion between hex and decimal. These functions can be used with POKE, PEEK, and CALL statements for easy programming.
- DISKFR - Instantly computes the amount of disk space free on any standard DOS 3.2.1 or 3.3 diskette.
- EDIT - Allows easier editing of Applesoft program lines by providing full-width listings. Eliminates typing POKE 33,33 to eliminate spaces.

The Extender works with your Applesoft programs by using the '&' command. Just boot with the Extender disk, the run, edit, or change your programs as usual, with all the power of these 15 additions at your fingertips.

The Extender comes on a 3.2.1 diskette and is fully compatible with both DOS versions 3.2.1 and 3.3. The Extender requires an Apple II or Apple II Plus with at least 32K, Applesoft in ROM or Language System, and a minimum of one disk drive.

Complete documentation is included with examples of usage for clarity and ease of implementation.

Cat# 2-410 ..... $49.00

APPARAT ANNOUNCES A MERGER

THE 737 LINE PRINTER AND SCRIPSIT™

Do you own a TRS-80™ Model I computer and the SCRIPSIT™ Word Processing System? Do you own a Radio Shack LP IV (Centronics 737-1) line printer? Are you frustrated because you are unable to utilize the diverse capabilities of your 737-1 line printer with SCRIPSIT™?

If your answer is "yes" to all of the above, APPARAT has a nearly perfect solution. APPARAT introduces FLEXTEXT, a product that brings SCRIPSIT™ and the 737-1 printer together.

FLEXTEXT is a software appendage to SCRIPSIT™ that supports the use of all SCRIPSIT™ provided print formats while exercising many expanded features of the 737-1 printer. Together, SCRIPSIT™ and FLEXTEXT make possible the dymamic selection of:

* The proportional character set in normal and **extended** modes.

* The compressed character set in normal and **extended** modes.

* Right justified formatting using the proportional or compressed character sets (normal or **extended** modes).

* Underlining in any of the SCRIPSIT™ selectable formats, and FLEXTEXT selectable character sets.

* Your choice of superscripts or subscripts in any supported character set.

* The intermixing and combining of the expanded 737-1 features anywhere within a document.

This SCRIPSIT™ and 737-1 line printer merging is possible now through APPARAT. FLEXTEXT can be purchased for:

$29.95

Note: You must own SCRIPSIT™ to use FLEXTEXT. FLEXTEXT is a stand-alone program activated by a modified SCRIPSIT™ "PRINT" command (the modification is programmatically performed - no accident prone manual "zapping" is required). No SCRIPSIT™ documentation is provided.

FLEXTEXT use requires at least 1 disk drive and a TRS DOS type operating system (preferably NEWDOS/80 with its MINI DOS feature, allowing DIR and other DOS commands while the resident SCRIPSIT™ file remains undisturbed).

This advertisement was produced using SCRIPSIT™ and FLEXTEXT, driving a Centronics 737-1 line printer.

™A registered trademark of The Tandy Corporation.

Use our free Order Desk number 1-800-525-7674 (except Co, Ak, Hi)

MICROPERIPHERAL CORPORATION
SERVING YOUR COMMUNICATION NEEDS

THE CONNECTION

A series of direct connect modems with auto answer, receive and/or dial capabilities

- The Apparat Connection (Microconnection) eliminates need for an expansion interface and/or an RS232 board by decoding the TRS-80 bus and creating an RS232 port. Provides serial printer output. Requires software written for Z80 port 208, and an adapter cable for the Model III.
  Cat# 1-028 ..... $249.00

- RS232 CONNECTION replaces obsolete acoustic coupled modems on any system having an RS232 serial I/O port. Requires RS232 cable.
  Cat# 1-029 ..... $199.95

- COLOR CONNECTION converts Radio Shack Color Computer into a communications terminal providing serial printer output. Additional memory or extended BASIC not required. Cables provided.
  Cat# 1-030 ..... $199.00

- AUTO CONNECTION (option) permits CONNECTIONS (except Color) to answer the telephone and/or dial numbers automatically. Dialer demonstration program provided.
  Cat# 1-031 ..... $79.95

- EUROPEAN CONNECTION (option) modifies above units for European Standards.
  Cat# 1-032 ..... $29.00

- MODEL III ADAPTER cable converts Model III 50 pin bus to 40 pins, used by Model I peripherals.
  Cat# 1-033 ..... $29.00

- RS232 CABLE, four foot ribbon cable terminates with 25 pin male DB25 plugs.
  Cat# 1-720 ..... $24.00

Microperipheral Corp. offers one of the most complete lines of communication hardware and software available in the microcomputer industry.

Besides the above Connections, other models are available for the Apple, Atari and other micro computers.

CONNECTION SOFTWARE SUPPORT

MANUAL TERMINAL PROGRAMS (Specify Model I or III, with or without RS232, or Color)

- KEYCOM permits communications between your TRS-80 and virtually any other computer. Converts Level I, 4K, and Level II, 48K.
  Cat# 2-112 ..... $19.95

- AUTOCOM is a user modified or expanded BASIC program with autodial routine (N/A for Color Computer).
  Cat# 2-113 ..... $14.95

- TYPER routes LIST and LPRINT commands to serial printer connection for APPARAT/MICRO-CONNECTION or Color Computer.
  Cat# 2-114 ..... $19.95

- SMART TERMINAL 80 is a flexible, unique program making your TRS-80 an intelligent terminal for communicating with any sophisticated mainframe system. Messages, manuscripts, documents, etc., may be prepared off-line for transmission, on-line in block form, or in prompted line-by-line form. Some of the many features are: Transmit and receive BASIC programs and Editor-Assembler files, transmit two auto log-on messages, automatic or manual storage of incoming data or transmission, auto repeat key, the ability to format line length you desire disregarding the transmitted line length, storage of more than 30K bytes of data in your memory (depending on system size), redefinable keys in order to send special codes, printer accessability to incoming and outgoing data, and communications protocol and parameters, including full or half duplex, at your fingertips. The SMART TERMINAL 80 is a stand alone communications package, or can be combined with THE APPARAT CONNECTION for all your communication needs.
  Cat# 2-104 ..... $79.00

COMPUTING POWER

MULTI- USER NETWORKING FOR THE TRS-80 AND APPLE
****A COMPLETE, YET ECONOMICAL SYSTEM****
($6,999 for a system having 1.2 megabytes of disk storage and four 64K user stations)

IF YOU NEED ANY OF THE FOLLOWING, OUR MULTI-USER NETWORKING SYSTEM IS FOR YOU

- *** MORE THAN ONE COMPUTER**
- *** COMMON ACCESS TO THE SAME DATA FILES**
- *** PROGRAM DEVELOPMENT WHILE PERFORMING ONGOING APPLICATIONS**
- *** ACCESS TO DIVERSIFIED APPLICATION SOFTWARE PACKAGES**
- *** MINIMUM COST FOR MAXIMUM PERFORMANCE AND CAPACITY**

FEATURES

SOFTWARE

- MP/M™ with CP NET™ provides mult-user network system control.
- Each user station operates CP/M (Note: a Model I or III TRS-80 may also operate in a standalone mode under NEWDOS, TRSDOS™ or any comparable operating system.)
- Since MP/M and CP/M are the most widely used network and single user operating systems, respectively, an extensive selection of commercial quality application software packages are available.

HARDWARE

- The network control station is a 4 megahertz Z80 based system. Using MP/M, the controller shares disk and printer resources (the most costly elements of a microcomputer) among all users providing immediate access to common data files. Exceptionally useful in an interactive environment such as order entry or inventory control.
- Disk storage capacity may be easily increased at any time, meeting a wide range of budgetary and information requirements, to the following limits:
  - •• Mini-Floppy Disks. Up to four 5¼ inch mini-floppy drives. Double density mode operations with a 3.2 megabyte maximum capacity. Available in 40 track, single sided (200K per drive), 40 track, double sided or 80 track single sided (400K), or 80 track double sided (800K)
  - •• Floppy Disk. Up to four 8 inch floppy drives, Double density mode operations with a 5 megabyte capacity.
  - •• Winchester disks. Up to four 5¼ inch mini-Winchester disk drives with a 40 megabyte maximum capacity. Also available with tape backup option.
- The network control station can control one or more printers operating either Centronics parallel or RS 232 serial (optional). The printer spooling program, with MP/M, efficiently shares the printer(s) among several users via a priority scheme.
- The network control station can simultaneously manage up to eight user stations. Each user station connects to the control station on its own parallel port, eliminating contention problems found in most polled network systems.
- User stations may be any Z80 based computer capable of running CP/M. The TRS-80 models I, II, and III, and Apple computers can be easily and inexpensively configured to run CP/M (allowing disk and/or printer peripherals for local use), or MP/M (for shared peripheral use by all users).
- CP/M User Station featuring 24 lines of 80 characters, attributes (inverse, blink, etc.), 64K RAM, full keyboard with numeric pad and function keys in an attractive, detached keyboard case out performs and under prices the Apple and TRS-80 computers. Attachable to any video monitor capable of 12 megahertz bandwidth, or may be purchased with a high quality 9, 12 or 15 inch video monitor.

PRICES

- Network Control System from $1,499 (200K disk) to $24,900 (43 megabyte disk)
- CP/M User Station $899 (monitor not included)

Use our free Order Desk number 1-800-525-7674 (except Co, Ak, Hi)

NAS

COMMERCIAL GRADE SOFTWARE FOR **TRS-80 MODEL II™** RUNS ON 2 MEG FLOPPY OR OUR 10 MEG HARD DISK SYSTEM RUNS UNDER **TRSDOS™** UTILIZING **INTERACTIVE PACKAGES** 25 MAN YEARS OF FIELD TESTING **READY FOR YOU NOW**

ORDER ENTRY WITH SALES ANALSIS/SINGLE LEVEL BILL OF MATERIALS INVENTORY
ACCOUNTS RECEIVABLE WITH INTERFACING WORD PROCESSING
ACCOUNTS PAYABLE
GENERAL LEDGER FULL YEAR DETAIL

PACKAGE PRICES FOR FLOPPY ..... $850.00 EACH
OR OUR HARD DISK ..... $950.00 EACH

ALL SYSTEMS INCLUDE EXTENSIVE SITUATION ORIENTED USER MANUALS
WITH NAS CUT AN INVOICE THEN AUTOMATICALLY UPDATE

- •SALES ANALYSIS
  - CUSTOMER ITEM
- •GENERAL LEDGER
  - SALES ACCOUNTS
  - INVENTORY ACCOUNTS
  - RECEIVABLES ACCOUNTS
  - COST OF GOODS ACCOUNTS
- •INVENTORY QUANTITIES
  - RAW MATERIALS EXPOSION
  - FINISHED GOODS
- •ACCOUNTS RECEIVABLE
  - BALANCE FORWARD
  - OPEN ITEM

WHAT IS ON THE HORIZON?
HARK! A **VOICE**
YES FROM **NAS** SOFTWARE PACKAGES
FIRST TALKING TO YOU
LATER TALKING WITH YOU

EARLY 2nd QUARTER '81 SCHEDULED RELEASE
ALSO NAS WILL BE CONVERTING TO CP/M MID '81

FOR FURTHER INFORMATION CALL
APPARAT 1-800-525-7674 OR RS-WARE LTD.
NATIONAL DISTRIBUTORS OF N.A.S. 314/739-2030
Distributor Inquires Welcomed-Suite 202C
3550 McKelvey Road • St. Louis, MO 63044

Apparat Customer Service 1-303-741-1778

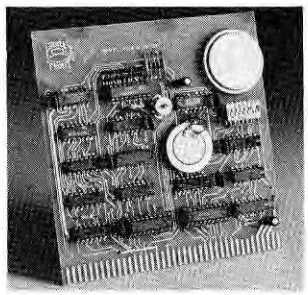
PICKLES & TROUT

P.O. BOX 1206, GOLETA, CA 93116, (805) 967-9563

FOR THE TRS-80 Model II

CCB-II

The CCB-II provides the following functions for a TRS-80 Model II:



A CLOCK
hour, minutes, second

A CALENDAR
day, day of week, month, year

AN AUDIO ALARM

INFORMATIONS: The CCB-II mounts in the TRS-80 Model II and provides a machine readable clock/-calendar and an audio alarm. The clock and calendar are powered by a long-life lithium pacemaker battery which will give about 8 years of continous operation.

The CCB-II is fully supported by P&T CP/M 2 - The system date and time are synchronized to the CCB-II each time the system is reset and the audio alarm can be sounded by sending an ASCII BEL character (control-G) to the console. For TRSDOS users, software is available which sets the system date and time by the CCB-II when the system is reset.

The CCB-II can be accessed directly from any language that allows direct port input and output. The user's manual for the CCB-II includes sample programs written in Microsoft Basic, CBASIC, Pascal/M, TRSDOS Basic, and assembler for directly accessing the CCB-II.

PRICES:

CCB-II
Cat# 1-042 ..... $175.00
TRSDOS software diskette
Cat# 2-126..... $5.00

PLEASE NOTE: The installation of the CCB-II requires opening the Model II, which may void its warranty. We suggest that you wait until the warranty has expired before installing the CCB-II.

P&T CP/M 2

P&T CP/M 2 is an adaptation of the popular CP/M operating system for the TRS-80 Model II. P&T CP/M 2 has been carefully designed to utilize the hardware facilities of the TRS-80 Model II to maximum advantage. In addition to improved system performance, P&T CP/M 2 opens the door to using hundreds of currently available software packages that have been written for CP/M.

DISK STORAGE: P&T CP/M 2 supports standard single sided floppy drives (596K bytes of usable storage at double density), double sided expansion drives (1.2M bytes per disk), and the Cameo Electronics hard disk controller (10 - 80M bytes).

CRT CONTROL: The following built-in functions make console interaction easy: erase to end of line/screen, insert/delete line, cursor addressing, reverse video, split screen mode, read cursor location, and many more. The display capabilities are accessed by control codes, escape sequences, or simple system calls.

SERIAL I/O: The serial ports are tied into the normal CP/M I/O structure or can be accessed directly by programs with special I/O requirements. ETX/-ACK, XON/XOFF, and clear-to-send handshaking are fully supported. A special utility routine is provided to display the current status of the serial ports and allow the various parameters to be changed at will.

PARALLEL I/O: Options are provided for the Centronics port so that a printer with automatic line feed can be used with CP/M programs.

USEFUL SYSTEM FUNCTIONS: Also included are type-ahead buffer for keyboard input, automatic program execution, system time-of-day clock, system date, and access to the CCB-II.

UTILITIES: The standard CP/M utility programs are augmented by 14 utility programs that have been written specifically for the Model II.

DOCUMENTATION: P&T CP/M 2 comes with the standard Digital Research manuals plus the P&T CP/M 2 User's Manual which contains over 150 pages of information about CP/M and the additions and special utilities supplied by Pickles & Trout.

PRICES for P&T CP/M 2:

Single sided floppy version
Cat# 2-805 ..... $185.00
Double sided floppy version
Cat# 2-822 ..... $220.00
Cameo Hard disk controller version
Cat# 2-809 ..... $250.00
Manuals only (for evaluation)
..... $35.00

DEALER INQUIRES ARE WELCOME

Distributed By: Apparat, Inc.

Use our free Order Desk number 1-800-525-7674 (except Co, Ak, Hi)

FILE TRAN

HIGH SPEED TRANSFER

Filetran is the fast, effective, easy to use file translation system that allows you to generate CP/M or TRSDOS compatible files. Filetran operates on a single computer system and trasfers files bi-directionally between CP/M and TRSDOS operating systems using high speed disk-to-disk transfer techniques.

POWERFUL AUTOMATED FEATURES

- Filetran does much more than just transfer files. The lines function automatically finds and displays the program lines that contain incompatibilities between Level II BASIC nad Microsoft's MBASIC 5.2 Making conversion to the more powerful MBASIC fast and easy. The lines function also allows the scan of any text file for all occurrences of any selected string. This provides the powerful capability of identifying any string sequence cross reference. The disk and MEM functions provide high-speed machine code disk sector and memory page displays in parallel HEX/ASCII format virtually at memory speed. The dir and files functions allow examination of both CP/M and TRSDOS directories without time-wasting system reload and the attendant disk switching operations. and for standard CP/M systems. A terminal configuration program is supplied which automatically configures filetran for use with the console terminal.

FEATURES

THE SOFTWARE PROFESSIONAL'S CHOICE

Selected sector disk displays

- Memory Displays
- Software Conversion Cost Analysis
- Program Conversion Aids

MANY POWERFUL APPLICATIONS

BASIC, FORTRAN, COBOL source language transfers to the operating system of your choice:

- Expand the Marketplace for Your Software to Include the "Other" Operating System
- If you're in the printing or typesetting business, expand your marketplace to include word-files made by the "other" operating system.

THE WORD PROCESSOR USERS SOLUTION

Use the Word Processing (WP) software of your choice and Filetran to meet your Client's needs:

- If you're doing "overflow" work then you can remain compatible with your client's system without additional equipment.
- If you're moving to new equipment, then Filetran your existing data to the new system.
- Take advantage of new WP developments without large transiton costs!
- With Filetran you are able to pick the WP system that meets your needs and your pocketbook without limiting your potential customer base.

SPECIFICATIONS

- Single or bi-directional byte for byte file transfers of word processing files, high order language program files, assembly language source files, and data files.
- Transfers CP/M files to TRSDOS.
- Transfers TRSDOS files to CP/M.
- High speed machine code for disk & memory displays using video RAM capabilities.
- Special purpose disk I/O for TRSDOS MOD I directory compatibility.
- Terminal configuration feature for non-TRS80 terminals.
- Versions available for most CP/M based machines.
- Special versions available for TRS-80 MOD I & MOD II.

DISK ASSUMPTIONS

Assumptions are used primarily for warning.

- Filetran assumes standard TRSDOS formats for both TRS-80 Model I & Model II.
- For Model I, A & B are standard 5¼". 35 track, 10 or 18 sectors 128 or 256 bytes/sector.
- Drives C & D are standard 8", 77 track, 26 sector, 128 bytes/sector
- Custom disk configurations available on request
- Compatible with Omikron and Parasitic engineering hardware for mixed drive, standard CP/M systems.

REQUIREMENTS

CP/M operating system is mandatory (version 2.2 is recommended for systems other than TRS-80 Model I).

- Filetran is a machine language CP/M "COM" file.
- File transfers require dual disk.
- The system requires 48K of RAM (minimum).

Verson 1.2 - Model I to CP/M only:
Cat# 2-823 ..... $99.00
Version 1.4 - Model I both directions
Cat# 2-824 ..... $149.00
Version 1.5 - Model II to CP/M only:
Cat# 2-825 ..... $99.00

BUSINESS MICRO PRODUCTS
609 S. Livermore Ave.
Livermore, CA. 94550
(415) 449-4412

Distributed By: Apparat

MICROSOFT

- BASIC-80 is probably the most extensive implementation of BASIC for CP/M. Release 5.0 supports new functions such as 40 character variable names, protected files, dynamic string space allocation, WHILE/WEND statements, chain and common, and variable length random file records.
  (CAT # 2-810) $350.00

- BASIC COMPILER, following the same syntax as the BASIC-80 INTERPRETER, allows writing of programs in interpretive BASIC for later compiling, and relocatable file mixing with FORTRAN-80, COBOL-80, and MACRO-80. Includes MACRO-80 Macro Assembler, CREF-80 Cross Reference Utility, and a BASIC library manager.
  (CAT # 2-811) $395.00

- COBOL-80 is a high speed COBOL compiler compatible with other Microsoft compilers, featuring MACRO-80, ANSI standard COBOL with STRING, UNSTRING, COMPUTE, SEARCH, PERFORM, ACCEPT/DISPLAY, and more.
  (CAT # 2-812) $750.00

- FORTRAN-80, a full ANSI FORTRAN X3.9-1966 FORTRAN, except COMPLEX data type, is compatible with other Microsoft Compilers. Includes MACRO-80.
  (CAT # 2-813) $500.00

- MACRO-80, an 8080 and Z80 Macro Assembler, including CREF-80 Cross Reference Facility and LINK-80 Linking Loader, is compatible with Microsoft Compilers.
  (CAT # 2-814) $200.00

- muLISP-80 is an Artificial Intellegence Development System, including muSTAR utility package and sample programs.
  (CAT # 2-815) $200.00

- muMATH/muSIMP. This symbolic math package computes to 611 digits with an exact solution of algebraic equations. Includes muSIMP symbolic and semi-numerical processing language.
  (CAT # 2-816) $250.00

CPAids

- NOTE: CPAids requires a small royalty fee for the use of Microsoft Compiled Code in their programs.
- MASTER TAX PROGRAM includes schedules A, B, C, D, E, F, G, R/RP, SE, TC, AND ES, plus forms 2106, 2119, 2210, 3468, 3903, 2441, 4625, 4726, 4792, 4797, 5695, and 6521, and features batch processing, input sheets and proforma.
  (CAT # 2-817) $995.00
- STANDARD TAX PROGRAM includes schedules B,C,D,E,F,G,R/RP, SE, TC and ES, plus forms 2106 and 2441.
  (CAT # 2-818) $495.00
- Apparat can supply nearly any CP/M software. If you don't see what you want, please call.

MICROPRO INTERNATIONAL

- WORD STAR is one of the most versatile word processors on the market today. Superscript, subscript, underline, boldface, strikeout and much more! Completely menu driven, simple to learn command set. Supports most video devices and printers automatically, with easy to use patch facilities for any others.
  (CAT# 2-801)..... $495.00

- MAILMERGE,an add-on utility package for Word Star, allows insertion of variables from data files into form letters and mailing lists. Insertion from files into other text with rejustification. Requires Word Star.
  (CAT# 2-802)..... $150.00

- DATASTAR is a completely menu driven database manager provides for quick and easy data entry, retrieval, and updating. Files fully compatable with Word Star.
  (CAT# 2-807)..... $350.00

- SUPERSORT is a sophisticated high-speed data sorting utility. Multikey, compatable with Microsoft Relocatable files.
  (CAT# 2-800)..... $250.00

PLAY IT AGAIN . . . MAESTRO?
WITH TRS-80 ORCHESTRA-80

- With no musical knowledge at all, you can now enjoy the sweet strains which soothes savage beasts on any 16K TRS-80 microcomputer. ORCHESTRA-80 is a music synthesis system written by Jon Bokelman, manufactured by SOFTWARE AFFAIR, and distributed by APPARAT.

- SOFTWARE includes:

  • • DIGITAL SYNTHESIZER producing up to four simultaneous voices in a six octave range allows a trumpet, oboe, clarinet and organ to perform four part harmony. Or, alterations could modify any of the voices to imitate other instruments.

  • • MUSIC LANGUAGE COMPILER lets you enter your favorite written music in any key or time signature with a simple and easy to use system language. Whole notes to sixty-fourth notes, single, double or triple dotted, triplets, single or double accidentals, staccato, pizzicato, repeats, second endings, retard and modulation are all possible.

  • • FULL SCREEN EDITOR with blinking cursor provides easy entering of insert/delete characters, insert/delete lines, global character search, and automatic error detection/display.

  • • FILE MANAGER stores and retrieves named program files on tape or disk. Sequential ordering for automatic loading and playing lets you jump up to the conductor's stand.

  • • INITIALIZATION allows you to alter voices, selecting the standard four voice synthesizer, or a special high resolution, three voice version, or choose standard (1.77 MHz) or enhanced (2.66 MHz) clock rate.

- HARDWARE for ORCHESTRA-80 is a 1½x2 inch PC board containing the electronics necessary to convert the computer output into a high fidelity audio signal. Simply plug into the expansion interface connector, then connect your "orchestra" into the aux/tape/tuner input of any audio amplifier, and voila, music. No external power supply required.

- INCLUDED is tape and disk versions on cassette, completely assembled PC board, detailed instruction manual, and sample music programs.

- Available from APPARAT
  (CAT# 1-020) $79.95
  MANUFACTURED BY:
  SOFTWARE AFFAIR
  SUNNYVALE, CA

MICRO CLUB MEMBERSHIPS

"How would you like to be one of the first to obtain new applications for your TRS-80® or Apple® and SAVE MONEY???

A vast array of software, especially games, exists for your microcomputer, but software alone can only partially fulfill the power and usefulness of your computer.

You probably own a disk and a printer—hardware which also enhances the usefulness of your computer. Other than these common peripherals, relatively little hardware exists in comparison to software, and most of the hardware available is prohibitively expensive.

The MICRO CLUB has been established to meet this need for a variety of inexpensive hardware devices—tools which will help you get more satisfaction from your computer.

Each month the MICRO CLUB will announce one or more new hardware products complete with complementary software and comprehensive documentation. Some products to be offered in coming months include a DATE/TIMER event timer, an energy efficiency MEASURING INSTRUMENT, and a PROM BLASTER. Best of all MICRO CLUB members will usually pay less than $100.00 for products which will eventually retail for $150.00 or more.

Membership in the MICRO CLUB costs $10.00 for 12 issues of our new products newsletter describing our product of the month as well as other hardware and software specials available exclusively to MICRO CLUB members. Even the membership is fully refundable i.e.: you will receive a $10.00 discount on your first selection. Although there's no obligation to purchase any product, you need make only two selections during the 12 month period to have your membership automatically extended for another year.

APEX - A NEW DISK OPERATING SYSTEM FOR THE APPLE

- After two years of extensive development, APPARAT is proud to announce APEX, a completely professional, programmable, file maintenance disk operating system for the APPLE II. Some of the multitude of disk operations are: a command structure similar to CP/M and mainframe operating systems, containing 20 command words, plus the ability to treat external programs as transient commands to the operating system, simple communication channels between operating system and user program allowing easy interfacing, capability of handling both 5 and 8 inch disks on the same system, safety features which include back-up files and directory, read-after-write and size limit checks protecting against data loss, speed 4 times faster than CP/M, automatic default structure eliminating tedious typing by automatically setting up command strings, file names and extensions, fully functional on single and multi-drive systems, with utilities for single or multi-drive file copy, and a device handler structure for interfacing non standard peripherals.

  The basic APEX package includes a high speed (1900 line/minute) two pass resident assembler which generates an alphabetized symbol and cross reference table, a powerful macro editor with 18 commands, 10 text buffers and the capability of performing complex editing tasks, plus all the necessary tools for a complete assembly language development system.
- The complete APEX package inludes operating system, assembler, editor, user manuals, and a complete utility set to maintain files on single or multi-drive systems. Supplied on 5" diskette requiring a minimum of 48K and 1 disk.

  Cat# 2-404 ..... $99.00

Some related software development tools available for the APEX system are:

- XPLO - A block structured PASCAL-like system language, now with floating point.

  CAT# 2-405..... $79.00
- HANDY DISK #1 containing scrolling editor, disassembler and new set of handlers and system utilities.

  Cat# 2-406 ..... $39.00

- A complete brochure detailing the APEX system and support software packages is available on request.

Use our free Order Desk number 1-800-525-7674 (except Co, Ak, Hi)

SOFTWARE FOR THE APPLE II

VISICALC

- Personal Software's Visicalc is a most exciting and popular business software package because of it s extraordinary power, and the fact that you can configure it without previous computer experience. Visicalc allows you to construct a table of figures, define relationships between different rows and columns, and then modify these figures and relationships with simple commands. It's perfect for sales forecasting, engineering, real estate, accounting and countless other applications.
  Cat# 2-416 ..... $149.00

DESKTOP PLAN

- This problem solving tool for the Apple II can be used for the development and analysis of budgets, cost and price analysis, sales forecasts, cash flow planning, capital budgeting, profit and loss projections, and a myriad of similar types of analyses. No knowledge or skills in computer programming are required to develop customized business planning and analysis systems.
  Cat# 2-417 ..... $99.95

CCA DATA MANAGEMENT SYSTEM

- This database management system stores and retrieves information, sorts and deletes records, and prints reports. Simple to learn and use, the power of this system will amaze you. Multiple diskette capability for larger files: Up to 85,000 characters per file.
  Cat# 2-418 ..... $99.95

APPLE CP/M SOFTWARE (Requires Microsoft Softcard)

- FORTRAN-80 is an enhanced version of Microsoft's CP/M FORTRAN.
  Cat# 2-804) $195.00
- COBOL-80. For more information on Microsoft's standard CP/M COBOL, check the CP/M software section.
  Cat# 2-803) $750.00
- BASIC-80 COMPILER. Release 5.2 of Microsoft BASIC for the Softcard. Available spring 1981.
  Cat# 2-819) $395.00
- ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM. Contains macro assembler and linking loader for APPLE CP/M. Available spring 1981.
  Cat# 2-810) $125.00

WORD PROCESSING SYSTEMS

All word processing systems that are listed here have the usual text editing capabilities to edit memos, letters, and programs, enter text, delete mistakes, search through the text and replace letters, words, or phrases automatically or manually. Only the differences and special functions of each will be specified. All are machine language systems.

APPLE WRITER

- Perhaps the easiest to use of the word processors this one is also the least expensive.
  Cat# 2-412 ..... $75.00

EASYWRITER

- This word processor by Captain Software has express tabbing and the ability to set up the print page for each application. Also configured so that all control characters that affect the print are visible.
  Cat# 2-413 ..... $99.00

SUPER TEXT

- Thought by many to be the best word processor for the Apple, Super Text has complete tab control as well as a Math mode for calculations within a file, or to act as a direct 15 digit calculator.
  Cat# 2-414 ..... $150.00

MAGIC WINDOW

- This word processor has two unique features found nowhere else: The ability to see the text EXACTLY as it is going to appear on the printer and keypressed sound. The Magic Window moves across the page as the text is typed, so the entire 80 columns are displayed as they will be printed, and the speaker on the Apple 'ticks' when a key is pressed, giving positive indication that a key has in fact been pressed.
  Cat# 2-415 ..... $150.00

Entertainment Software

- ABM -Muse Anti-Ballistic Missles
  Cat# 3-521 Disk $24.95
- SUPER INVADER - from Creative Computing
  Cat# 3-502 Tape..... $19.95 Apple
- FLIGHT SIMULATOR-Earn your wings courtesy of SubLogic
  Cat# 3-476 Disk ..... $33.50 Apple
  Cat# 3-475 Tape..... $25.00 Apple

TRS-80 SOFTWARE

RACET PROFESSIONAL SOFTWARE

- INFINITE BASIC - Expand the power of your TRS-80® by performing such functions as sorting, copying, simultaneous equations plus STRING and MATRIX functions.
  (CAT# 2-018) $49.95

- BUSINESS ADD-ON MODULE - Allows user to specify heading and footing lines for output to printers. Performs arithmetic functions and hash encoded index for file retrieval.
  (CAT# 2-020) $29.95

- COMMAND PROCESSOR "COMPROC" - Extends the DOS-AUTO Command to perform multiple steps at power-up time or single user system command. Executes sequence commands, changes and saves script easily using facilities of BASIC plus many other features.
  (CAT# 2-011) $19.95

- DOSORT simplifies time-critical tasks of sorting and data comparisons with a BASIC control program. Includes GSF which effectively interfaces control program with machine language routines, allowing versatile sort-merge, multi-volume, two mode and presort features.
  32K (CAT# 2-022) $34.95
  48K (CAT# 2-021) $34.95

- GENERALIZED SUBROUTINE FACILITY (GSF) standardizes multiple machine language programs for easy access by TRS-80 BASIC users. Eighteen machine language subroutines and sorts are easily expandable. Description of conventions used.
  16K (CAT# 2-012) $24.95
  32K (CAT# 2-109) $24.95
  48K (CAT# 2-110) $24.95

- COPSYS duplicates valuable system tapes before they become damaged by providing bit-for-bit verification and merging of independently assembled object tapes into one load module. Generated from Radio Shack Editor-Assembler Program.
  (CAT# 2-017) $16.95

- REMODEL automatically restructures and renumbers program lines, relocates blocks of lines from one spot to another enhancing program readability and documentation for rapid creation and organization of programs.

- PROLOAD avoids recreating commonly used routines by selectively storing and retrieving data statements allowing individual or combination loading of BASIC programs. Increases programming productivity by handling fixed data more efficiently.

- 16K, 32K or 48K versions of REMODEL and PROLOAD on same tape.

  16K (CAT# 2-014) $34.95
  32K (CAT# 2-015) $34.95
  48K (CAT# 2-016) $34.95

MICROSOFT SYSTEM SOFTWARE

- FORTRAN, popular language for science, math and engineering.
  (CAT# 2-050) $99.00
- ASSEMBLY LANGUAGE PACKAGE includes Macro Assembler, Link Loader, Text Editor, Cross Reference.
  (CAT# 2-052) $99.00
- LEVEL III BASIC
  (CAT# 2-071) $45.00
- muMATH, symbolic math, algebra, trigonometry, calculus.
  (CAT# 2-072) $74.00
- muMATH EXTENDED, symbolic math up to 611 digits. Exact solution of algebraic equations.
  (CAT# 2-111) $249.00
- ADVENTURE, a popular game
  (CAT# 3-112)) $29.00

UTILITIES SOFTWARE

- MICRO CLINIC FLOPPY DISK/MEMORY DIAGNOSTIC PACKAGE by Dave Stambaugh. Test 1 to 4 drives, single or double density and 35, 40. 77, or 80 tracks. Provides drive speed/alignment tests, and much more. Memory is tested by both conventional write/read and M-1 worm test.
  (CAT# 2-115) $24.95

- DDT-DISK TIMER for adjusting disk drive motor speed.
  (CAT# 2-029) $19.95

M. A. S. GENERAL LEDGER

- General ledger is very simple to use, with up to 200 accounts, detailed transaction files, trial balance reports, income statement and balance sheet. Outstanding features include: auto loading, batch up to 200 debit & credit entries and auto edit out-of-balance entries with unlimited daily entries. Compare periods and prepare your own depreciation schedules.

Cat# 2-088 ..... $159.00

ACCOUNTS RECEIVABLE

- The present system will handle up to 1600 customers with auto-billing, mailing labels, and many reports to help improve cash flow. Fast entry of charges and payments with discounting allowed, complete management reporting with true aging, bill-mail code, discount percent, total charges, payments, last payment date and amount, total discount and remaining balance, overdue account listings and many more features to assist you, including direct entry to general ledger.

Cat#2-087 ..... $159.00

ACCOUNTS PAYABLES

- Will handle up to 300 vendors with checkwriting, mailing labels, and full reporting. The same features as accounts receivable: fast entry of charges and payments, with discounting allowed, complete management reporting with true aging, and much more. Also, auto posting to general ledger.

Cat# 2-086 ..... $159.00

CHECK REGISTER

- Complete with reconciliation form. Has everything needed to keep an efficient checking account. Record checks written by hand, as well as writing checks automatically for Accounts Payable. Will handle up to 600 checks monthly. Record up to 200 separate checks or total deposits monthly. Print a check register with all checks and deposits, showing check numbers, payee memo, amount, and code. You can correct checks, make deposits, void checks, stop payment and more. Provides information as follows: amount of total checks, amount of total deposits, remaining balance, service charges and amount at beginning of month. Simple to use, with complete error detection and links to accounts payable.

Cat# 2-089 ..... $79.00

COMPLETE SYSTEM

- This is a complete accounting system for the small business. Trial balance, income statement, balance sheet, management report and complete transaction reports assure you full control of your cash flow and business position. All modules include full editing and complete prompting. The auto posting means all systems are fully integrated. Have your accounting information available at all times. Requires 48K and 3 disk drives for the Complete System. (Contains all modules)

Cat# 2-116 ..... $489.00

Call or write for more information including sample reports.

BOOKS

Learning Level II
Cat# 4-221 ..... $15.99

BASIC Handbook
Cat# 4-222 ..... $14.99

Microprocessors from Chips to Systems by Rodney Zaks
Cat# 4-119 ..... $10.95

Programming the 6502 By Rodney Zaks
Cat# 4-081 ..... $12.95

Introduction to Pascal including UCSD Pascal by Rodney Zaks
Cat# 4-071 ..... $12.95

Z80/8080 Assembly Language by Kathy Spraklen
Cat# 4-131 ..... $8.75

Pathways through the ROM
Cat# 4-084 ..... $19.95

TRS-80® Disk & Other Mysteries
Cat# 4-139 ..... $22.50

Microsoft Basic Decoded & Other Mysteries
Cat# 4-220 ..... $29.95

CP/M Handbook by Rodney Zaks
Cat# 4-001 ..... $13.95

Basic Computer Games
Cat# 4-006 ..... $7.95

More Basic Computer Games
Cat# 4-007 ..... $7.95

Katie & The Computer (for children 3-8)
Cat# 4-052 ..... $6.95

Microprocessor Interfacing Techniques
Cat# 4-109 ..... $17.95

Z80 Gourmet Guide
Cat# 4-115 ..... $14.00

6502 Gourmet Guide
Cat# 4-116 ..... $10.00

SUPPLIES

DISKETTES

Diskettes are cardboard boxed unless otherwise noted. First price indicates box of 10, second price indicates case of 100 diskettes. Note: all diskettes are soft sectored.

BLANK LABEL

- 5¼" single sided double density 40 track certified. In a plastic library case.
  Cat# 4-207 ..... $25.95 $210.00

- 5¼" single sided double density 40 track certified. In bulk packs of 100.
  Cat # 4-208 ..... N.A. $180.00

BASF FLOPPY DISKETTES

- 5¼ single sided double density BASF label 40 track certified.
  Cat # 4-206 ..... $24.95 $190.00

VERBATIM FLOPPY DISKETTES

- 8" FD34-9000 single sided, single density Datalife critical certification.
  Cat # 4-200 ..... $34.95 $320.00

- 8" FD34-8000 single sided double density Datalife critical certification.
  Cat # 4-201 ..... $44.95 $410.00

- 5¼" MD525-01 single sided double density Datalife 40 Track certified.
  Cat # 4-202 ..... $28.95 $240.00

- 5¼ MD550-01 double sided double density Datalife, 40 Track certified.
  Cat # 4-203 ..... $45.95 $420.00

- 5¼ MD577-01 single sided quad density Datalife 77 Track certified.
  Cat # 4-204 ..... $33.95 $320.00

- 5¼ MD557-01 double sided quad density Datalife 77 Track certified.
  Cat # 4-205 ..... $45.95 $420.00

Novation D-CAT Modem
Cat# 1-601 ..... $179.95

DISK HEAD CLEANER KITS

- 3M Brand - Eliminates build up to avoid repairs.
  5¼" Cat # 4-166 ..... $29.95
  8" Cat # 4-167 ..... $39.95

FLIPSORTS

- Holds up to 50 diskettes.
  5¼" Cat # 4-174 ..... $29.95
  8" Cat # 4-173 ..... $39.95

PLASTIC LIBRARY CASES

- Holds up to 10 diskettes.
  5¼" Cat # 4-172 ..... $3.95
  8" Cat # 4-171 ..... $5.95

PAPER

- 9½"×11" Blank white tractor feed 3500 sheets.
  Cat # 4-177 ..... $32.95

- 9½"×11" Carton blank white 1500 sheets.
  Cat # 4-177 ..... $22.95

- 14⅞× 11½" Greenbar tractor feed 3500 sheets.
  Cat # 4-178 ..... $42.95

PAPER SHIPPED FREE!

RIBBONS

- Complete line of Okidata, Anadex, Epson, Centronics, NEC, and MPI ribbons.
  Call For Price!

NEC THIMBLES

- (over 30 styles available) Call For Price!

16K MEMORY EXPANSION KIT

- Easily and quickly increase the memory of your TRS-80 or Apple microcomputer to 32 or 48K. Comes with complete instructions. Our dynamic RAM GUARANTEED 6 months against defects.
  Cat# 1-608 ..... $39.95

THE ISOLATOR POWER SOURCE

- Eliminate erratic errors and problems caused by "noise" on your electric lines. Filters out interference from air conditioners, electric motors, fluorescent lights, refrigerators and other electrcal appliances.
  Cat# 1-607 ..... $49.95

Novation CAT Modem
Cat# 1-600 ..... $159.95

TERMS AND CONDITIONS

Orders shipped U.P.S. surface free. (Does not apply to NEC Spinwriter, Anadex 9500/01, TRS-80 Model II, or 8" floppy drives in a triple cabinet which must ship motor freight collect)

Orders up to 10 lbs. can be shipped U.S. Mail. Add $5.00 extra for postage and handling.

Canadian orders contact for freight charges. Orders will not be shipped unless freight is prepaid or satisfactory arrangements are made.

Foreign orders shipped Emery Air Freight collect unless special arrangements are made.

All customs declared for invoiced amount and marked COMPUTER SOFTWARE/PRINTED MATERIALS.

All returned merchandise must have RMA number. Please call for a number and mark clearly on the outside of the package.

All returns subject to 15% restocking charge.

PASCAL/M® trademark of Sorcim

TRS-80® trademark of Tandy Corporation

Apple® and Applesoft® trademarks of Apple Computer

CP/M® MP/M® and CP/NET® trademarks of Digital Research

Magic Wand® trademark of Small Business Applications, Inc.

Most orders shipped in two business days or you will be notified.

Allow 14 days for domestic personal or company checks to clear. (Allow 45 days for foreign checks.)

Apparat, Inc.
4401 S. Tamarac Parkway
Denver, CO 80237
CUSTOMER SERVICE: 1-303-741-1778
TOLL-FREE ORDER LINE: 1-800-525-7674

RETAIL HOURS: 10-6 M-W-F, 10-8 T-Th, 10-5 Sat

Notice - Retail prices may be different than shown in this catalog.

All prices subject to change without notice.

Call for current competitive pricing.

DEALER INQUIRES INVITED

Please include full street address. A post office box is not sufficient.

Catalog Number | Description | Qty | Price | Total

Name

Address

Phone _____ Expiration Date _____

Credit Card # _____

Cardholder Name _____

Signature _____

Check ☐ VISA ☐

M/C ☐ M/O ☐

Subtotal

Co. Sales Tax

Shipping & Handling

Total

Catalog Number | Description | Qty | Price | Total

Name

Address

Phone _____ Expiration Date _____

Credit Card # _____

Cardholder Name _____

Signature _____

Check ☐ VISA ☐

M/C ☐ M/O ☐

Subtotal

Co. Sales Tax

Shipping & Handling

Total

Twenty new products for your TRS-80™ that are so hot...

Apparat introduces twenty powerful and economical add-ons for your TRS-80 system. Hardware and Software to increase your capabilities:

Software

SMART TERMINAL 80—Converts the Model I or III to an intelligent terminal.

NEWTRIEVE—Rapid search and retrieval of memory/disk for a character string of any length.

FLEXTEXT—Provides proportional spacing, compressed and extended characters, underlining and so on. Operates on the Centronics 737 printer in conjunction with SCRIPSIT for the Model I.

FLEXTEXT II—Provides proportional spacing, right justification and so forth, on the NEC Spinwriter 5500 series printers printing in conjunction with SCRIPSIT II®.

BIONIC BASIC—Add new functions to BASIC. Editing and array handling functions available.

POCKET 80 GAMES—For the Pocket Computer.

C-WRITE—Comprehensive client write-up system for the professional accountant.

NEWDOS/80—For the Model III—all the features available on the Model I plus double density.

VOCAL SYNTHESIZER—Provides Morse, Spelled and Spoken output of data files through the TRS-80® Vocal Synthesizer.

INTEGRATED SALES AND INVENTORY SYSTEM—Provides inventory, sales and receivables for manufacturers.

Hardware

CLOCK/CALENDAR/APPOINTMENT SCHEDULER—Time, date and up to 100 time/date appointment interrupts.

PROM BLASTER—Programs 25XX and 27XX 1 to 4K multi and single voltage PROM.

MULTI-PROCESSOR EXPERIMENTOR SYSTEM—Provides a COPS 402 processor with I/O RAM, and a cross assembler for real time or process control requirements.

ASAP (APPARAT SCIENTIFIC ARITHMETIC PROCESSOR)—Fast processing of scientific functions.

TRS-80® BUS EXTENDER—Allows up to six hardware products to be plugged into Models I or III bus. Has self-contained power supply.

DISK SEPARATOR—Improves floppy disk performance required because of insufficient data separation on the Model I.

SPEECH I/O MODULES—Voice and sound input and output for the Models I and III.

APPARAT CONNECTION—Adds auto answer and auto dial modem capabilities to your TRS-80®

MODEL III FLOPPY DISK SYSTEM—Add one to four drives plus controller to your Model III with up to 2.8 megabytes capacity under NEWDOS/80.

WINCHESTER DISK SYSTEM—Five to forty megabyte storage with optional tape or floppy backup.

If you're going to upgrade your system, call us about our twenty new TRS-80 Products, or our complete line of add-ons for the TRS-80. You'll find our products innovative and our prices hard to beat. Dealer inquiries welcome. For more information on Apparat's new products, send $1.00 (refundable on your first order) for our 1981 catalog, or call us at (303) 741-1778.

To order any product, call us toll-free (except Alaska, Colorado and Hawaii) at

800-525-7674.

VISA | master charge

Apparat, Inc. ⌐264

4401 So. Tamarac Parkway, Denver, CO 80237 (303) 741-1778

THE BØØK

Ac[illegible] TRS-80™ ROM

If you ever do Assembly language programming, or you just want to know more about your TRS-80 ROM, "THE BOOK"s are for you.

*TRS-80 is a trademark of Tandy Corp.

Each volume is priced at: $14.95 + $1.50 S&H = $16.45 ($17.05 in VA) Overseas add $2.50 for air shipment

Insiders Software Consultants, Inc. ✓305
P.O. Box 2441, Dept. SUM2
Springfield, VA 22152

☐ **Please send me Volume I of THE BOOK**

☐ **Please send me Volume II of THE BOOK**

NAME _____

ADDRESS _____

CITY, STATE _____ ZIP CODE _____

Check payable to Insiders Software Consultants, Inc.

MASTER CHARGE MC Bank Code

VISA Exp. Date _____ Card Number _____

Signature _____

Dealer Inquiries Invited

Volume I: The most comprehensive book yet on the math routines in Level II ROM, Models I & III. Includes a fully commented listing from 0708H to 1607H and an incredibly complete map of the ROM and reserved areas of RAM.

Volume II: Everything you want to know about the video, keyboard, cassette, and printer driver routines. Learn how to write your own! Remarkably detailed listings illustrate well-commented source code. Complement Volume I, now.

✓296

Orange Micro

"THE COMPUTER PRINTER SPECIALISTS"

CENTRONICS 737

Word Processing Print Quality

• 18 x 9 dot matrix; suitable for word processing • Underlining • proportional spacing • right margin justification • serif typeface • 50/80 CPS • 9½" Pin Feed/Friction feed • Reverse Platen • 80/132 columns

CENTRONICS 737-1 ..... (List $995) **$765**
CENTRONICS 737-3 .... (List $1045) **$815**

EPSON MX80/MX70

Low-Priced Professional Print Quality

• 9 x 9 dot matrix • Lower case descenders • 80 CPS • Bidirectional, Logic seeking • 40, 66, 80, 132 columns per line • 64 special graphic characters: TRS-80 Compatible • Forms handling • Multi-pass printing • Adjustable tractors

EPSON MX80 ..... (List $645) **$Call**
EPSON MX 70 Dot graphics, 5 x 7 matrix ..... (List $450) **$Call**

IDS PAPER TIGERS

Dot Resolution Graphics, quality print

• 7 wire printhead (445); 9 wire printhead (460) with lower case descenders • Over 150 CPS • bi-directional, logic seeking (460) • 8 character sizes; 80-132 columns • Adjustable tractors • High-resolution dot graphics • Proportional spacing & text justification (460).

IDS 445G 7 wire printhead, graphics ..... (List $895) **$ 750**
IDS 460G 9 wire printhead, graphics ..... (List $1394) **$1150**
IDS 560G 9 wire, wide carriage, graphics ..... (List $1794) **$1590**

QUANTITY PRICING AVAILABLE

TELEVIDEO CRT'S

PRICES SLASHED!

TVI 912C
TVI 920C
TVI 950

Please Call Toll Free Prices are too low to advertise

PRINTERS

ANACOM 150	150 CPS, wide carriage, 9 x 9 dot.	(List $1350)	$1150
ANADEX 9500	wide carriage, graphics	(List $1650)	$1350
VISTA V300 (C. ITOH)	Typewriter quality, daisy wheel	(List $1895)	$Call
OKIDATA MICROLINE 80	.....	(List $699)	$ 520
NEC 5530-5	letter quality, RO, parallel, tractors.	(List $2970)	$2599
MALIBU	Dot graphics, 132 Col, Letter quality		$ Call
QUME 5/45	Typewriter quality.	(List $2905)	$2559

INTERFACE EQUIPMENT

CCS APPLE PARALLEL	Interface card and cable	$ 150
SSM AIO BOARD	Serial/Parallel interface board ..... (List $225)	$ 175
TRS-80 CABLES	expansion interface or direct.	$ Call

TOLL FREE (800) 854-8275

CA, AL, HI (714) 630-3322

Call for FREE CATALOG

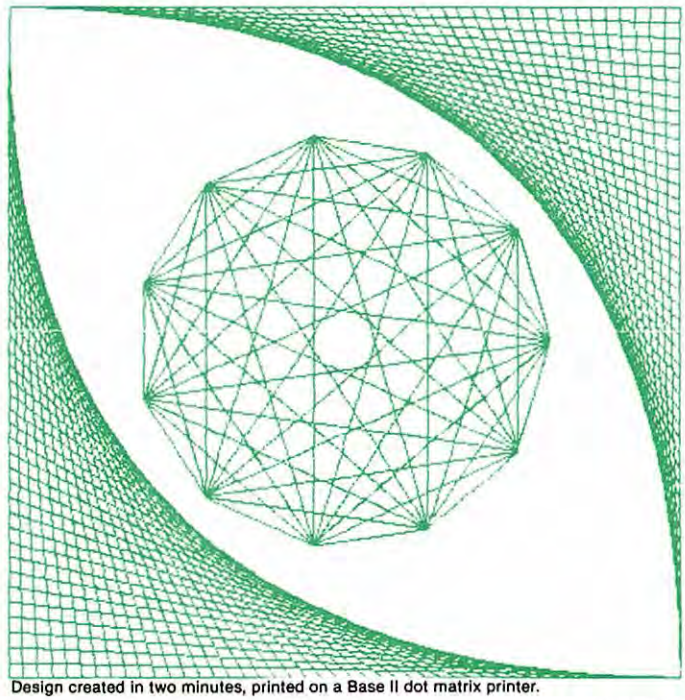
Phone orders WELCOME; same day shipment. Free use of VISA & MASTERCARD. Personal checks require 2 weeks to clear. Manufacturer's warranty included on all equipment. Prices subject to revision.

Orange Micro, Inc.
3150 E. La Palma, Suite I
Anaheim, CA 92806

In this first of a 3-part series, the author discusses using disk commands in unusual ways. . . without disks.

Advanced Graphic Techniques—Part I

Bob Boothe
4651 Browndeer Lane
Rolling Hills Estate, CA 90274



Design created in two minutes, printed on a Base II dot matrix printer.

You have probably looked through this article and concluded that other than one picture, this article has nothing to do with graphics. You're only partially right. This is the first article in a series of three in which I will explain how to make pictures, like the one shown, on a dot matrix printer.

Look closely; that picture was not made on a plotter, but on a Base 2 printer with a 32K Level II TRS-80. Furthermore, the entire design took only a couple minutes.

This month, I will tell you how to make the disk commands do anything you want, such as drawing lines on the video or the printer. In Part 2, I will explain the program which makes designs like this one, as well as ten other designs. In Part 3, I will rewrite the program to draw lines on the video and to manipulate representations of three dimensional objects.

The Search

Continuously I search for little tricks to enhance the capabilities of the TRS-80. Program Listing 1 is a simple routine that allows you to PEEK at any location in ROM or RAM. Type it in and run it. It asks for an address to start its PEEK. If you want to look where the program is stored, type 17129. This is the start of the program text according to the reference manual. (Of course, if you have one of the new ROM's, everything is going to be different.)

Next, the program asks for the address where it should stop PEEKing. To go to the end of 16K memory, type 32767. These are both default cases, if you simply press enter. The program will start displaying addresses followed by the contents of each address, four per line. Now, press C for change, and it will start over again.

If you type 16722 for the start address and 16805 for the end address. The computer should print 195, 45, 1, 195, 45, 1 through the entire block. Since this seemed odd to me, I took out my Z-80 book and looked up 195, 45, 1, which turned out to be JP 301. I then entered a machine language routine to jump to address 301 and got an L3 ERROR. This started me thinking: The only way to get an L3 error is to type in a disk command, and therefore, each disk command probably jumps to one of these addresses. If you don't own any disks, it jumps to the L3 error routine. However, we sly non-disk users can use the disk commands if we just change the address after the jump. In other words, change the (JP 301) to a (JP 32000), where we put our own routine.

What Goes Where

Now comes a problem: What command uses what address? If we mess this up, the SAVE routine might LOAD, the LOAD routine might clear the screen, and the KILL routine might short out the keyboard. This is where Program Listing 2 comes in.

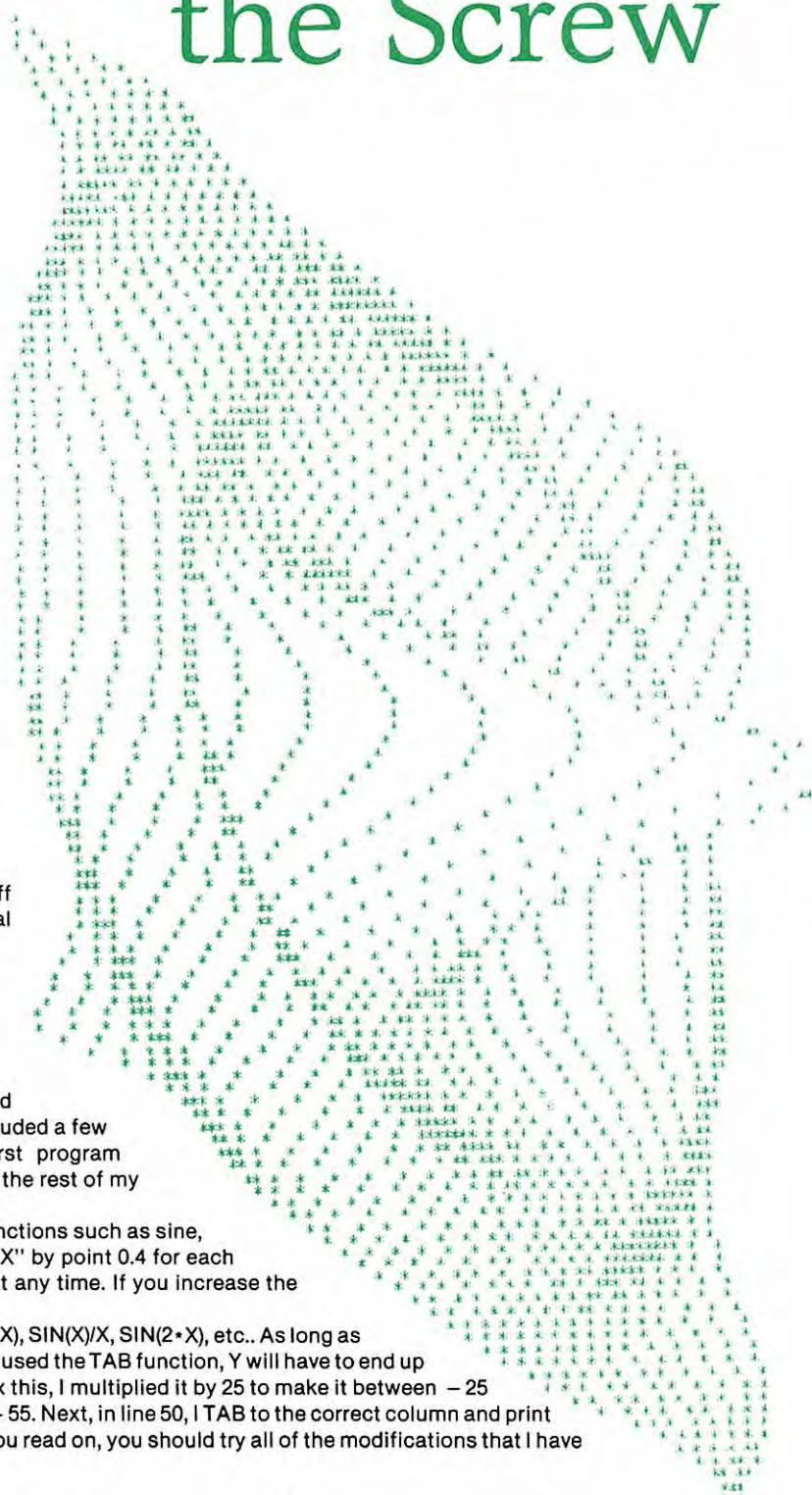
How can any program that short do anything? Well, all it does is start at the beginning of the ROM and print the contents of each address, if it is an uppercase letter. If an address contains a letter, the program prints it, otherwise it prints a space. When you run this program, (now would be a good time), it will print a couple of lines of garbage, and then print "MEMORY SIZE RADIO SHACK LEVEL II BASIC." On the machine with the new ROM the message has been shortened.

After it prints the message, it will continue printing garbage for sometime, until it hits the table of reserved words (Table 1).

Continued in page 126

Three dimensional, rotating graphics for printer and video.

A Turn of the Screw



Bob Boothe, 4651 Browndeer Lane, R.H.E. CA 90274

I have always envied the high resolution graphics of other computers. So, I decided to see what my 80 could do.

When I started to fool around with it, I discovered some amazing graphics capabilities. I began with some simple sine waves and then progressed from two dimensions to the third. After a lot of work, I finally developed a program that plots the beautiful surfaces you see in the pictures.

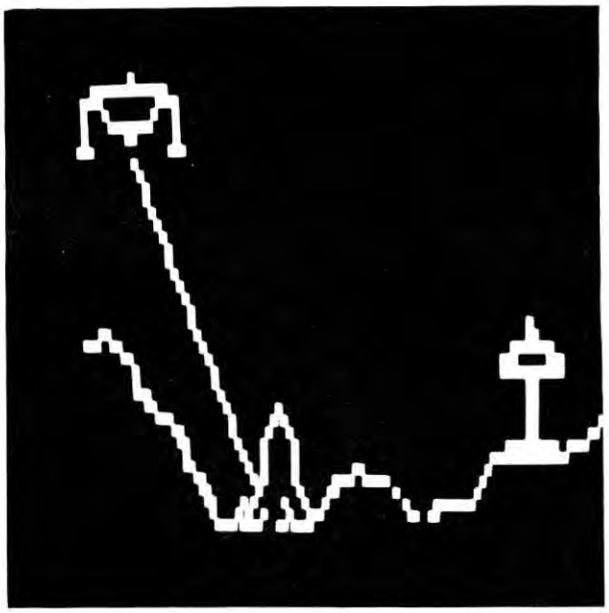
I have included a total of seven short programs. The nice thing about graphics is that most programs are very short, although usually not simple or fast. The first few start off fairly easy, but as you progress through the programs to the final program (which will draw a picture of a square thread screw horizontally on the screen) you will call a machine language routine to rotate it.

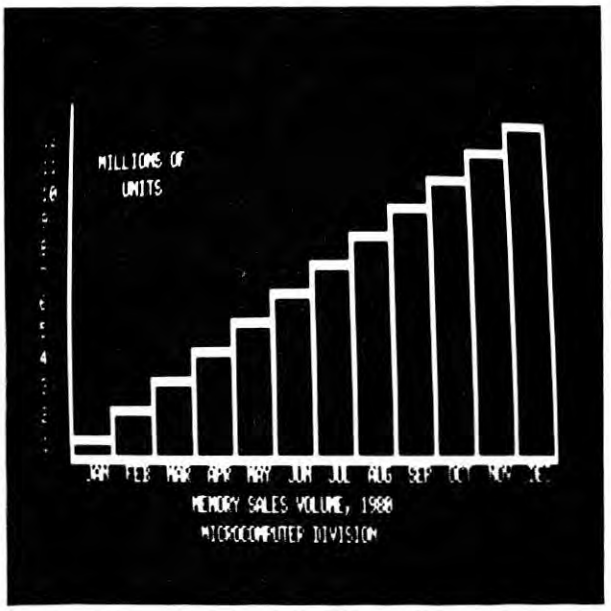
I hope that you are sitting at your TRS-80, because you are going to have to type in each program as we go along. If you don't, you will be totally confused by the end of this article. All right, type in the first program and experiment around a little. After the listings of many of these programs, I have included a few modifications which you should try. I will explain this first program thoroughly because the concepts in it will be used throughout the rest of my programs.

With the TRS-80, all trigonometric functions use radians. Functions such as sine, therefore, have a period of 2 pi. Line 20 increments the angle "X" by point 0.4 for each line printed. This results in roughly one period on the screen at any time. If you increase the point 0.4 there will be more than one period on the screen.

Line 30 finds the value of our function. You can also use COS(X), SIN(X)/X, SIN(2*X), etc.. As long as the value is between −1 and +1, any function will work. Since I used the TAB function, Y will have to end up between 0 and 63. After line 30, it is between −1 and +1. To fix this, I multiplied it by 25 to make it between −25 and +25, and then, I added 30 so that it falls between +5 and +55. Next, in line 50, I TAB to the correct column and print an X. Line 60 puts the program into a continuous loop. Before you read on, you should try all of the modifications that I have

ANIMATION!





ANIMATION **PROFESSIONAL**

GRBASIC OFFERS FULLY INTEGRATED **BASIC** GRAPHIC COMMANDS FOR THE MODEL I AND MODEL III! LINES! SHAPE TABLES! SCALING! ROTATIONS!

GRBASIC extends Level II or DISK BASIC to include an easy-to-use graphics command set. A single BASIC command allows the user to draw a line between *any* two **pixels** on the screen. The longest diagonal can be drawn in less than 7/100 second! Coordinates can be chained to allow complex figures to be drawn by a single BASIC program line in less than a second!

GRBASIC allows the definition of shapes. Once defined, a shape can be **rotated, scaled** up or down in size, drawn anywhere on the screen in less than a second, and can even be drawn totally or partially "off" the screen in extended space! And all with short, simple BASIC commands! Even multiple shapes are no problem!

GRBASIC is **not** a string-packer or machine-language USR-called utility. GRBASIC is fully integrated into Level II and DISK BASIC. There is nothing on the market that offers its graphic features, except possibly the Apple II computer!

TRS-DOS AND TRS-80 ARE REGISTERED TRADEMARKS OF TANDY CORP.
NEWDOS 80 IS A REGISTERED TRADEMARK OF APPARAT, INC.

GRBASIC will allow the professional user to produce data graphs and displays with unbelievable ease. The data graph pictured above was produced by a few simple BASIC statements and was drawn in under 1 second!

3-D animation from BASIC is now a reality! The game pictured above, taken from a demonstration program included with GRBASIC, pictures an alien ship attacking a moon base. This demonstration is written completely in BASIC and is superb!

GRBASIC is available for Level II BASIC on cassette. DISK versions support TRS-DOS 2.3 and NEWDOS 80 (please specify which!), including BASIC * recoveries and full DOS integration. Memory overhead is only 1.5K. Documentation is extensive, and includes numerous examples.

GRBASIC cassette — $19.95
GRBASIC diskette [TRS-DOS 2.3] —$24.95
GRBASIC diskette [NEWDOS 80] — $24.95

Med Systems Software ↙128
P.O. Box 2674-Y Chapel Hill, NC 27514
(919) 933-1990

GUARANTEE AND ORDERING INFORMATION ARE UNDER THE SLEEPING DRAGON ON THE NEXT PAGE. →

LABYRINTH!

Labyrinth is not easy. Waking a sleeping watch-dragon is the least of your troubles. Somewhere in this nightmare of tunnels lurks an evil minotaur. To escape, you must kill it. And survive.

Only the legendary light sabre of Dnev can kill the minotaur. It is secreted away in stygian darkness. To get it, you must deal with cave bears, gnomes, pits, wraiths, and much more. You must avoid the minotaur at all costs.

Alas! Once armed with your light sabre, the minotaur flees! What treasures must be found and used as bait? Why is the maiden so beautiful? What lies beyond the fog . . . .

3-D PERSPECTIVE GRAPHICS

Labyrinth features the full screen 3-D perspective graphic displays that have made Asylum and Deathmaze 5000 best sellers. You can actually see what you are doing and where you are going! The mazes and buildings are bit-coded. This allows us to store **gigantic** mazes in small amounts of memory. These programs are **not** just a series of stored pictures. Our mazes typically contain **over 600 locations.** Further, machine-language programming gives instantaneous graphics generation and game response!

LABYRINTH places you in a huge maze of tunnels inhabited by gnomes, ghosts, witches, and an evil minotaur. You must find the weapons and treasures needed to destroy the minotaur before he destroys you! There is food enough in the maze to hold out for months!

TRS-80 Level II 16K or Model III 16K $12.95

ASYLUM places you on a cot in a small room. Periodically, a janitor lobs a hand-grenade through the window of your locked door. What you do next could mean survival and escape! It could also mean permanent residence in the home for Deathmaze survivors! To leave, you will have to deal with guards, fellow survivors, doctors, the infamous Crazed Carpenter, and much, much more. Don't expect to get out any time soon! There are over 1200 locations!

TRS-80 Level II 16K or Model III 16K $14.95

DEATHMAZE 5000 places you in a gigantic five-story building. There is only one goal. **ESCAPE ALIVE!** Monsters, dogs, vampires, and other vile horrors will plague your every step as you struggle to survive one of the most challenging adventures ever written. As of December 20, only two people outside the Med Systems' staff were known to have escaped!

TRS-80 Level II 16K or Model III 16K $12.95

✓128

SATISFACTION GUARANTEED!

Asylum, Deathmaze 5000, Labyrinth, and GRBASIC are guaranteed to be the most incredible graphic packages you can buy. If for any reason you are not satisfied with these products, return your order within 14 days for a prompt and cheerful refund.

ORDERING INFORMATION

Orders are processed within five working days. We pay all postage and handling within the U.S., Canada, and U.S. territories. European orders please include $3.00 for air post.

☐ Asylum	($14.95)	$ _____
☐ Deathmaze 5000	($12.95)	$ _____
☐ Labyrinth	($12.95)	$ _____
☐ Adventures on Disk	(add $4.00)	$ _____
☐ GRBASIC Cassette	($19.95)	$ _____
☐ GRBASIC TRS-DOS Disk	($24.95)	$ _____
☐ GRBASIC NEWDOS 80 Disk	($24.95)	$ _____
	TOTAL	$ _____

Name _____

Street _____

City _____ State _____ Zip _____

Computer:
☐ TRS-80 LII 16K ☐ Model III 16K

☐ Mastercard ☐ VISA ☐ check

MC or VISA # _____

Expiration Date _____

Med Systems Software
P.O. Box 2674-Y Chapel Hill, NC 27514
(919) 933-1990

✓See List of Advertisers on page 306

"What I have done is create two sine curves. One is in the horizontal x direction, and the other is in the diagonal y direction."

listed and a few modifications of your own. If your screen displays an OS ERROR, execute a CLEAR 100.

For printing one sine wave, the TAB function is great, but it just doesn't work for several functions on the same line. This is the purpose of Program Listing 2. Type it in and try to figure out how it works before you read on.

Basically, what I have done is create an array which represents each line in the printout. Line 50 fills it with spaces and line 100 changes the character at the computed position for each of our three curves. Lines 70, 80 and 90 compute the three positions of the symbols. Finally, line 110 prints the array on the screen. Again, modify this program until you understand how it works.

Short not Simple

Program Listing 3 will allow you to make some neat looking plots. It is similar to Program Listing 2 except that it uses one 63 character string, and it can use words and phrases instead of just single characters. Type in the program and enter your first, middle and last names. A very good looking example is with a first string of 40 asterisks, a second string of 25 equal signs, and a third string of eight periods.

Up to this point, you have not seen a slow program. Program Listing 4 satisfies this condition. Type it in and run it while you continue to read. It should take about twelve minutes to finish.

What I have done is create two sine curves. One is in the horizontal X direction, and the other is in the diagonal Y direction. I multiply the value of these two curves and expand it so that it fills the screen. The real trick is to erase the portions of the surface which are hidden by the large lamp.

This is accomplished by starting at the base level of the plane and RESETting all of the points vertically until the correct height is reached. (H is the height variable.) Another important feature is the "IF X/2 = INT(X/2)" statement in line 90. This condition is true only for even X values, and it gives the surface a checkered appearance.

If you are starting to get confused, remember, these programs are short, not simple. Fortunately, you can still enjoy the programs and the graphics they generate even if you don't completely understand them.

```
10 REM   PROGRAM NO.   1    SINE WAVE
20 X=X+.4
30 Y=SIN(X)
40 Y=Y*25+30
50 PRINTTAB(Y)"X"
60 GOTO20
100 ' MODIFICATIONS

20 X=X+.2
30 Y=SIN(X)/X
40 Y=Y*10+45
50 PRINTTAB(Y)"TRS-80"
50 PRINTSTRING$(Y,"X")
50 PRINTSTRING$(Y," ");STRING$(63-Y,"X")
```

Program Listing 1. Sine Wave

```
10 REM   PROGRAM NO. 2   MULTIPLE SINE WAVES
20 CLEAR100
30 DIM P$(63)
40 D=2*3.14/3
50 FORQ=1TO63:P$(Q)=" ":NEXT
60 X=X+.3
70 Y1=SIN(X)*25+30
80 Y2=SIN(X+D)*25+30
90 Y3=SIN(X+2*D)*25+30
100 P$(Y1)="1":P$(Y2)="2":P$(Y3)="3"
110 FORQ=1TO63:PRINTP$(Q);:NEXT:PRINT
120 GOTO50
130 ' MODIFICATIONS

50 FORQ=1TO63:P$(Q)=".":NEXT
70 Y1=SIN(X)/X*25+30
```

Program Listing 2. Multiple Sine Waves

```
10 REM   PROGRAM NO. 3     USING WORDS
20 CLEAR1000
30 DIMS$(3)
40 D=2*3.14/3
50 FORQ=1TO3:PRINT"ENTER STRING NO.";Q:INPUTS$(Q):NEXT
60 FORQ=1TO3:L(Q)=LEN(S$(Q)):NEXT
70 A=A+.2
80 T$=STRING$(63,32)
90 FORQ=1TO3
100 Y=SIN(A+D*Q)*(30-L(Q)/2)+31-L(Q)/2
120 T$=LEFT$(T$,Y)+S$(Q)+RIGHT$(T$,63-Y-L(Q))
130 NEXTQ
140 PRINTT$
150 GOTO70
```

Program Listing 3. Using Words

Plotting Problems

After spending a few days plotting different surfaces on the video, I found two problems. The first problem was how to add more detail to the plots to make them look better. And secondly, if you hit BREAK your plot would be lost forever.

The solution to both of these problems is with a printer. I own a Base 2 Printer, and fortunately, it is better suited for graphics than most printers. I have found that the quality of a plot is directly proportional to the number of characters which you can cram into a certain area. The Base 2 Printer can not only print 132 columns per eight inch horizontal line, but can also print more than six lines per inch vertically. Line 15 is only for this printer since it outputs the numbers which select 132

Continues to page 124

This printer costs less than $450. Beat that... if you can.

Epson.

This is the Epson MX-70. The lowest priced dot matrix printer you can buy. Now, that in itself should make it very attractive to a lot of people. But you ain't heard the half of it.

To begin with, the MX-70 has a lot more in common with our now-famous MX-80 than just the name. Like unequalled Epson reliability. And technological breakthroughs like the world's first disposable print head. But frankly, the MX-80 packs a lot more power than some people need. So we built the MX-70 to be a no-frills printer. At a no-frills price.

But the MX-70 is still a great little printer. We give you 80 CPS unidirectional printing. Top-of-form recognition. Programmable line feed and form lengths. Plain paper printing. An easy-to-read 5x7 matrix. Self test. And an adjustable tractor feed.

That's what you'd expect from a basic little printer. But here's something you wouldn't expect: the finest graphics package on the market today. Free.

We call it GRAFTRAX II. And it means 480 dots across the page, resolution to 60 dots per inch, and a graphic image free of the jitter and overlap that plagues other printers. You get cleaner grays and finer point resolution.

So now you've got a choice. You want more power and extra functions, you buy the MX-80.

You want a basic little printer that prints, and keeps on printing, you buy the MX-70. They're both at your dealer now.

But at this price, you'd better hurry.

✓404

EPSON
EPSON AMERICA, INC.

23844 Hawthorne Boulevard • Torrance, California 90505 • (213) 378-2220

✓See List of Advertisers on page 306

THE LEAST EXPENSIVE PROGRAMS YOU CAN BUY.

Up to 77 high-quality programs for TRS-80, only $10.95

Income tax: Two Systems

PEOPLE's TAXMAN by SuperPIMx author Chick House will determine what forms are needed and request all necessary data, referring user to tax booklet page and paragraph. It then will print your completed forms, ready for signing. This is the program you would expect to get when you pay $190 or more (but would you really get it? You WOULD with People's Taxman).

Of modular design, People's Taxman asks all questions needed for forms and holds this on disk and in memory, and then will print your forms, using any paper (even silvered, and thermal). Two tax-form transparencies are included—Form 1040 page 1 & 2. Sandwich anvansparency between your printout and any copying machine and pick your filled-out tax form from the copy tray.

Fills out the following forms: Scheduals A, B, C, D, E, F, R, and RP; Form 1040, 2440, 2441, 2906, 3468, 3903, 4137, and 5695; as well as the worksheets for unemployment compensation and IRA. Additional transparencies are only $2 each. Distributed on cassette, for disk-versions Model I and 3 TRS-80s only, add $5.95 if you want it distributed on disk. ($31.75 CA). **$29.95**

PEOPLE's SOFTWARE TAPE 10 prints out or displays what you need to know to fill out Form 1040 pages 1 & 2, Schedules A, B, C, and Form 5695 (energy credit).

A complex of 11 modular programs called from a menu program, tape also contains a comprehensive checking-account system.

Both programs are by Frank H. Marz of Delavan, WI, and together fill a C48-length tape. Both Tape 10 programs are for disk only, and have been specially formatted to automatically save to disk from tape. Forty-track DOS recommended, available for $10 from CIE. **$10.95**

NewDOS-80—New Low Price!

Successor to NewDOS+, same package for which you pay $149 elsewhere, at CIE just... **$99.95**

TAPE 9: 25 programs!

People's Software Tape 9, just out, contains 25 programs, including:

Convert, by SuperPIMx author Chuck House. It changes number bases from hexadecimal, decimal, octal, binary—from any one to any other! House also contributed his disassembler, which is winner of the Richcraft Engineering (Disassembled Handbook for TRS-80) Fastest Footrace contest.

Disassembled Handbook author Robert M. Richardson contributed three Basic programs which allow transmitting and receiving Morse code at speeds to 40 words-per-minute, without clock speedup. Morse appeared in Disassembled vo. II and III.

Basic Page Lister was adapted by House, and prints beautifully-formatted program listings.

Allen R. Greenburg contributed a professional-quality amortization-schedule preparation program, and a Multiplication-Tables Tutor.

Also on Tape 9: Loan Payback by Dan Connors, Resonant Frequency by Steve Simcic, and Feedback System Stability Analysis by Phil Dunn.

Gary Petersen contributed Distance Formula for X-Y axis, and Bruno M. Larsen submitted a mailing list and sales-record-keeping program. Carey Tyler Schug contributed a parser routine.

Games include Solitaire, Boggle, an extremely fine Hangman, and a four-part quiz on American History, inventions, American wars and U.S. territories. The quiz is by Ronald N. Goulden, and is followed by one on presidents and states, which is so difficult the challenge is to answer at least half the questions correctly.

Piet & Jon Spiessens (Spiesoft) of Aartselaar, Belgium submitted Sherlock detective game and Word Search (guess opponent's word).

Also on Tape 9 is Motorcycle Jump by Russell Starkey and Robot by Wm. J. Schuler (original by W. Lappen), who also submitted Sea Search. **$10.95**

All orders charge card, check or m.o.
Calif. residents add 6 pct tax. Dealer inq. invited
Overseas, add $1.50 per tape postage

COMPUTER INFORMATION EXCHANGE
Box 159
San Luis Rey CA 92068 ✓22


```
10 REM   PROGRAM NO. 4     3-D SURFACE
20 CLS
30 PI=3.14
40 FORY=0TO29
50 FORX=0TO80
60 H1=SIN(Y/29*2*PI-PI/2)+1
70 H2=SIN(X/80*2*PI-PI/2)+1
80 H=H1*H2*7.7
90 FORQ=1TOH:RESET(X+Y,Y+18-Q):NEXTQ:IFX/2=
     INT(X/2)THENSET(X+Y,Y+18-Q)
100 NEXT X
110 NEXT Y
120 GOTO120
130 ' MODIFICATIONS

70 H2=SIN(X/80*4*PI-PI/2)+1
80 H=H1*H2*4
```

Program Listing 4. Three Dimensional Surface

```
10 '  PROGRAM NO. 5   3-D GRAPHS ON PRINTER
15 '  LPRINTCHR$(27);CHR$(52);CHR$(27);CHR$(98);
      CHR$(13)
16 '  LINE 15 IS FOR BASE 2  LINE PRINTER ONLY
17 '  IT SETS 132 CHARS/LINE, 11.08 LINES/INCH
18 '  IF YOUR PRINTER DOES NOT PRINT 132 COLUMNS, YOU
19 '  WILL HAVE TO REDUCE ALL NUMBERS PROPORTIONATELY.
20 CLS:CLEAR500
30 DEFINT H-Z
40 DIMA$(132)
80 FORX1=1TO121
90 H=0:L=200
100 FORQ=1TO132:A$(Q)=" ":NEXT
110 FOR Y=1TO80
120 X=(X1-Y)*2
130 IF X<1THEN260
140 IFX>80THEN250
150 C=SQR((X-40)*(X-40)+(Y-40)*(Y-40))+1
170 M=X+EXP(-.004*C*C)*75+5
180 IFM>H THEN210
190 IFM<L THEN230
200 GOTO250
210 H=M
220 IF M>L THEN240
230 L=M
240 A$(M)="*"
250 NEXTY
260 FORI=1TO132:LPRINTA$(I);:NEXT
270 NEXTX1
280 ' MODIFICATIONS

170 M=X-EXP(-.004*C*C)*75+40
170 A=C*.1213+.63:M=X-SIN(A+A*A/6)/A/SQR(A)*50+40
260 FORI=1TO131:LPRINTA$(I);:NEXT:LPRINT
```

Program Listing 5. 3-D Graphs on a Printer

```
10 REM          PROGRAM NO. 6     3-D SURFACE WITH SINGLE DOTS
20 REM          ONLY FOR USE WITH A BASE 2 PRINTER
30 LPRINTCHR$(27);CHR$(50);CHR$(27);CHR$(98);CHR$(14)
40 CLS
50 DEFINT H,L,M,I,Q,X,Y,F,A
60 DIM A(7,576)
70 A1=0
80 FORX1=1TO484
90 A1=A1+1
100 H=-2000:L=2000
```

```
110 N1=.09:N2=.0001
120 FORY=1TO320
130 X=(X1-Y)*2
140 IFX<1THEN270
150 IFX>320THEN260
160 D1=SQR((X-240)[2+(Y-80)[2)*N1+N2
170 D2=SQR((Y-240)[2+(X-80)[2)*N1+N2
180 M=X+180-SIN(D1)/D1*320-SIN(D2)/D2*220
190 IFM>HTHEN220
200 IFM<LTHEN240
210 GOTO260
220 H=M
230 IFM>LTHEN250
240 L=M
250 A(A1,M)=1
260 NEXTY
270 IFA1=7THEN290
280 NEXTX1
290 LPRINTCHR$(27);CHR$(99);:FORQ=1TO576
300 LPRINTCHR$(128+A(1,Q)+A(2,Q)*2+A(3,Q)*4+A(4,Q)*8+A(5,Q)
     *16+A(6,Q)*32+A(7,Q)*64);
310 FORA1=1TO7:A(A1,Q)=0:NEXTA1
320 NEXTQ
330 LPRINT
340 A1=0:GOTO280
```

Program Listing 6. 3-D Surface with Single Dots

```
10 '  PROG # 7   ROTATING SCREW
20 CLS
30 CLEAR500
40 DIM P(47)
50 A=0:XC=-1
60 PI=3.1416
70 A=A+PI/ 29.5:IFA>2*PI-.001THENA=0
80 XC=XC+1
90 FORQ=0TO47:P(Q)=0:NEXT
100 B=A-PI:IFB<=0THENB=B+2*PI
110 IF A<=PI/2 THEN P(COS(A)*16+24)=1
120 IF A<=PI OR A>=7*PI/4 THEN P(COS(A)*23+24)=1
130 IFB<=3.982661 THEN P(COS(B)*23+24)=1
140 IF B>=PI/2 AND B<=PI THEN P(COS(B)*16+24)=1
150 IF A<=PI THEN P(47)=1
160 IF A<= 2.300524 THEN P(8)=1
170 IF B>= 0.8410687 AND B<=PI THEN P(40)=1
180 IF A>PI THEN P(1)=1
190 FORQ=0TO47:IFP(Q)=1THENSET(XC,Q)
200 NEXTQ
210 IFXC<127THEN70
220 RESTORE:B$="":FORQ=1TO50:READA:B$=B$+CHR$(A):NEXT
230 W=VARPTR(B$)
240 POKE16526,PEEK(W+1):POKE16527,PEEK(W+2)
250 X=USR(0)
260 Z$=INKEY$:IFZ$=""THEN270ELSE ST=VAL(Z$)*40
270 FORQ=1TOST:NEXT
280 GOTO250
290 DATA 33,254,63,17,255,63,1,255,3,237,184,14,16,17,0,60,33,63
300 DATA 0,25,237,160,229,209,121,183,32,244
310 DATA 62,16,33,0,60,229,209,19,1,4,0,237,176,17,60,0,25,61
320 DATA 183,32,240,201
```

Program Listing 7. Rotating Screws

```
              00100 ;MACHINE LANGUAGE ROUTINE CALLED BY PROG # 7
              00110 ;
0000 21FE3F   00120         LD      HL,16382  ;1 BEFORE END OF VIDEO
0003 11FF3F   00130         LD      DE,16383  ;END OF VIDEO MEMORY
```


BUSINESS/ACCOUNTING SOFTWARE

'S'ERVICE 'O'RIENTED 'A'CCOUNTS 'R'ECEIVABLE

"SOAR" is a combined time reporting/accounts receivable system designed for service organizations. Transactions input to the system include charges to, and receipts from customer accounts. Employees charge time and/or dollar amounts against specific tasks codes. Pre-established inputs are employee rate, task hourly rate, task flat charge, and task rounding factor.

Outputs produced include:

- **updated customer file — including balance, last posting, and last receipt amounts*
- **statement summary — by customer and task code*
- **detail transaction report*
- **employee and task summary — with revenue & percent*
- **database reports — for employee, customer and task code databases*
- **statements (optional) — programmed to suit your forms (available at additional cost)*

Monitor and control your valuable resources with this system for only $395. (Order product code: SOAR)

GENERAL LEDGER/CLIENT WRITE-UP SYSTEM

Our General Ledger/Client Write-up System is a proven, quality product used by several Accounting firms and other Businesses.

- **features departmental financial statements*
- **contains budget provisions*
- **permits up to 500, user-defined chart of accounts*
- **allows for transaction editing*
- **retains standard journal entries*
- **accepts only balanced batches of transactions*
- **provides easy-to-follow audit trail*
- **uses conventional accounting symbols*
- **included user documentation easily understood by present employees*

Several reports can be generated by the system including:

- **transaction audit reports*
- **trial balance*
- **income statement (profit & loss statement)*
- **balance sheet*
- **budget report*
- **chart of accounts*

Incorporate speed and accuracy into your business record keeping by ordering our General Ledger System today for only $495. (Order product code: GLS)

TASK ✓147
Computer Applications Inc.
4810 LARCHVIEW DRIVE, DAYTON, OHIO 45424
(513) 233-5515

Product Code _____
Company _____
Representative _____
Address _____
City _____ *State* _____ *Zip* _____
Phone _____ *Computer Model (circle) 1 2 3*
Credit Card Number _____ *Exp.* _____

✓See List of Advertisers on page 306

"With the TRS-80, all trigonometric functions use radians. Functions such as sine, therefore, have a period of 2 pi."

characters per line and 13 half dot vertical line spacing (about 11 lines per inch). Pictures three and four were created with this program.

If your printer outputs exactly 132 characters per line and automatically prints when the buffer is full, this program should work as written.

However, printers vary, so I will warn you of two modifications which you may need to make. If your printer only prints when it receives a carriage return, use line 260 in the modifications section.

A more difficult problem is if your printer prints less than 132 columns. To fix this you will have to multiply all of the numbers by a certain ratio. For example, if you own an 80 column printer the ratio would be 80/132. The only items which would not be multiplied would be the line numbers and the "X = (X1 – Y)•2" statement in line 120. The important variables are X1, X and Y. X1 is the vertical line counter. X is the x coordinate, and Y is the y coordinate. I use the point (X,Y) and the center of the surface (40,40) to find the distance from the point to the center. Line 170 then uses this distance just as X was used in Program Listing 1 to compute the value of the function.

Next, I use a high and low counter to find out if a point should be hidden. If it falls outside of this range, I add it to my array just as I did in Program Listing 2. Now you see why I started out with the simple concepts.

We will cover Program Listing 6 very quickly because it can be used only by the Base 2 Printer or other printers that output single dot graphical data. The only difference between this program and Program Listing 5 is that this one stores seven lines and prints them all at once. (See pictures one and two.) The surface was created with two SIN(X)/X equations with different centers.

Picture two is the same surface as picture one except that the surface has been rotated 90 degrees by changing the centers in the two distance equations. Before any of you get to eager to try this one, I must warn you that these plots took eight hours and forty five minutes each. Don't run the program now, but, instead, run it before you leave for work, and it should be done when you get home.

Many of you don't have printers and are probably disappointed that you cannot use Programs 5 and 6. So that everyone is happy, I have included this last program that rotates a graphical presentation of a screw on the screen. Type it in and try it before I tell you how I cheated. Have you run it yet? I hope so, because then you will know what I am talking about.

It probably appears to you as if the screw is moving sideways on the screen. If this isn't how it appears to you, turn the contrast on your monitor down, and the brightness up. Stand back, squint your eyes, and try to imagine that it is turning. By the way, this program uses the numeric keypad as a throttle. Press 9 and it should almost stop. The 0 key is the fastest speed.

Program Listing 7 is very similar to Program Listing 2 except that I have used four sine waves and four straight lines. The large number of IF statements were used to print only the portions of these lines that would have been seen in an actual screw. The data at the end of the listing is for the machine language program. I included a listing of it in case some of you were interested.

I hope you have learned about plotting sine waves, and were able to modify Program Listing 5 to work with your printer. If you don't have a printer, you may want to modify Program Listing 5 so that you can avoid all of the RESETting time in Program 4.

If you have a compiler, this is the type of application where that extra speed will really count. ■

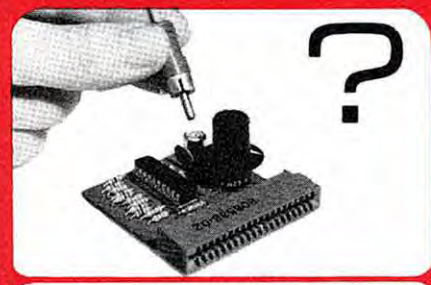
```
0006 01FF03    00140          LD      BC,1023    ;NO. OF BYTES TO MOVE
0009 EDB8      00150          LDDR               ;SHIFT VIDEO ONE BYTE UP
000B 0E10      00160          LD      C,16       ;LOOP COUNTER 16 LINES
000D 11003C    00170          LD      DE,15360   ;START OF VIDEO
0010 213F00    00180 LOOP     LD      HL,63      ;POSITION OF LAST CHAR.
0013 19        00190          ADD     HL,DE      ;FIND ADDRESS
0014 EDA0      00200          LDI                ;COPY EDGE. DEC C
0016 E5        00210          PUSH    HL         ;MAKE DE = HL
0017 D1        00220          POP     DE         ;
0018 79        00230          LD      A,C        ;GET COUNTER
0019 B7        00240          OR      A          ;IS COUNTER ZERO?
001A 20F4      00250          JR      NZ,LOOP    ;IF NOT, DO AGAIN
               00260 ;THIS NEXT PORTION DISTORTS THE LEFT EDGE
001C 3E10      00270          LD      A,16       ;LOOP COUNTER 16 LINES
001E 21003C    00280          LD      HL,15360   ;START OF VIDEO
0021 E5        00290 LOOP2    PUSH    HL         ;MAKE HL= DE
0022 D1        00300          POP     DE         ;
0023 13        00310          INC     DE         ;MAKE DE = HL + 1
0024 010400    00320          LD      BC,4       ;NUMBER BYTES TO REPEAT
0027 EDB0      00330          LDIR               ;COPY THEM
0029 113C00    00340          LD      DE,60      ;LENGTH OF REST OF LINE
002C 19        00350          ADD     HL,DE      ;HL = START NEXT LINE
002D 3D        00360          DEC     A          ;DECREMENT COUNTER
002E B7        00370          OR      A          ;IS A = 0?
002F 20F0      00380          JR      NZ,LOOP2   ;NO. DO AGAIN
0031 C9        00390          RET                ;YES. BACK TO PROGRAM
0000           00400          END
00000 TOTAL ERRORS


LOOP   0010 00180   00250
LOOP2  0021 00290   00380
```

Machine Language Routine Called by Program Listing 7

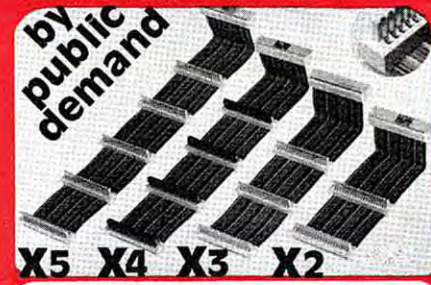
NEW

Joystick versions of the Fantastic Games by BIG 5 (see page 211) and Software Innovation (see page 39). Available on tape or disk, same price as plain version. One "Stick 80" works with all. Money back guarantee. In stock now.

STICK-80 MAKES KEYBOARD OBSOLETE.
Features the famous ATARI Joystick. 8 directions + fire control. Simple instructions to make joystick versions of most action games. Plugs into keyboard or expansion int... Price includes ATARI joystick with ALPHA interface and instructions. FREE "MAGIC ARTIST" program.....$139.95
Super Real Time Action Graphic Sound games for Stick-80 by Software Innovations: ALIEN INVASION.
COSMIC INTRUDERS BREAKOUT Each $9.95
STELLAR ADVENTURE: super action with sound $14.95
Software authors and distributors: contact us for joystick conversion package for your existing games.

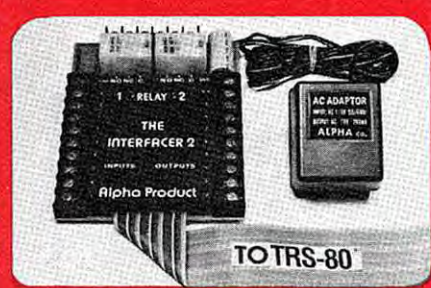


MUSIC-80 MUSIC-80 MUSIC-80 MUSIC-80 MUSIC-80
Use existing software
or write your own. With this low cost 8 bit digital to analog converter you can synthesize up to 5 music voices. Built-in volume control handy when stereo not near TRS-80. Simply plug the "MUSIC-80" into the keyboard or the E/I screen printer port and connect the output (RCA jack) to any amplifier. The Radio-Shack $12 speaker/amplifier works fine.
Fully assembled and tested, 90 day warranty $39.95



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.

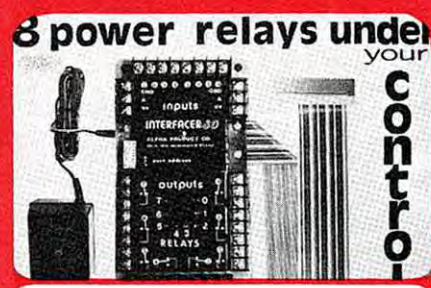


INTERFACER 2: LOW COST INPUT/OUTPUT MODULE.
Still the best value in sense/control devices. Use it for energy control, burglar alarm, darkroom, selectric drive, model trains, robots, Skinner box...
—8 latched TTL outputs. 2 relays SPDT 2A. 125V. contacts
—8 TTL/CMOS inputs. Input 0 and 1 are optically isolated.
—Neat and compact design, very easy to use:
10 A=INP(0) 'Reads the 8 inputs (if A=0: all inputs are low) 20 OUT 0,X 'Controls the outputs and the relays
Assembled & tested, 90 day warranty. Price includes power supply, cable to KB or E/I, superb user's manual, free phone dialer program: $95. Manual only: $5.

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

LET THE "CHAIN BREAKER" 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. Easy to install: just remove the drive cover, plug in the "CHAIN BREAKER" and replace the cover. Voila!!!
Now you can change and move your drives around without disassembly. Keep the cover on and keep the dust out. High reliability gold plated contacts, computer grade 34 conductor cable. Tested and guaranteed.
Get one for each drive.....only.....$13.95



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.

ALPHA Product Co.

✓210

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.

85-71 79 St. WOODHAVEN N.Y. 11421 ☎ Info and order: (212) 296•5916

"This month, I will tell you how to make the disk commands do anything you want, such as drawing lines on the video or the printer."

This table was produced with Program Listing 3. The way this table is stored in ROM is a much more compact and less readable form. In ROM, all the words are crammed together like sardines in one long block. In order to signify the start of each word, the ASCII code of the first letter, such as 69 for E in the word END, is added to 128, which makes 197, and is stored as the first letter. To decode this, I print letters until I get to one which has an ASCII number greater than 128, and then I tab to the next column and print the letter. I also included a counter, N, which is the number which the interpreter stores when you type one of these reserved words.

Now we have a list of reserved words, we can start filling in the addresses as we find them. Those I have found are in Tables 2 and 3. Table 2 is in numerical order, and Table 3 is in alphabetical order. I included USR even though it is not one of the disk commands.

Finding these addresses was a lot of work which few fools will want to repeat, especially since I already provided the addresses for you. However, this is basically how I found addresses: I took one address at a time which followed one of the 195s. Then I POKEd the address of my own routine into the two bytes which were occupied by the 45 and the 1.

I used the screen white out routine from Radio Shack's Editor/Assembler manual. Next, I started typing in disk commands and getting L3 errors until a word finally made the screen turn white. I continued this until I had gone through the section. For a few addresses, I could not find a disk command to go with it.

```
10 REM  PROGRAM NO. 1     PEEK ROUTINE
20 S=17129
30 E=32767
40 INPUT"START ADDRESS";S
50 INPUT"END ADDRESS";E
60 FOR A = S TO E
70 PRINT A;PEEK(A),
80 Z$=INKEY$
90 IFZ$<>"C" THEN NEXT A
100 GOTO20
```

Program Listing 1

```
10 REM  PROGRAM NO. 2     LOOK FOR WORDS
20 FOR A = 0 TO 13000
30 C = PEEK(A)
40 IF C>64 AND C<91 THEN PRINTCHR$(C);:ELSEPRINT" ";
50 NEXT A
```

Program Listing 2

128	END	129	FOR	130	RESET	131	SET
132	CLS	133	CMD	134	RANDOM	135	NEXT
136	DATA	137	INPUT	138	DIM	139	READ
140	LET	141	GOTO	142	RUN	143	IF
144	RESTORE	145	GOSUB	146	RETURN	147	REM
148	STOP	149	ELSE	150	TRON	151	TROFF
152	DEFSTR	153	DEFINT	154	DEFSNG	155	DEFDBL
156	LINE	157	EDIT	158	ERROR	159	RESUME
160	OUT	161	ON	162	OPEN	163	FIELD
164	GET	165	PUT	166	CLOSE	167	LOAD
168	MERGE	169	NAME	170	KILL	171	LSET
172	RSET	173	SAVE	174	SYSTEM	175	LPRINT
176	DEF	177	POKE	178	PRINT	179	CONT
180	LIST	181	LLIST	182	DELETE	183	AUTO
184	CLEAR	185	CLOAD	186	CSAVE	187	NEW
188	TAB(	189	TO	190	FN	191	USING
192	VARPTR	193	USR	194	ERL	195	ERR
196	STRING$	197	INSTR	198	POINT	199	TIME$
200	MEM	201	INKEY$	202	THEN	203	NOT
204	STEP	205	+	206	-	207	*
208	/	209	[	210	AND	211	OR
212	>	213	=	214	<	215	SGN
216	INT	217	ABS	218	FRE	219	INP
220	POS	221	SQR	222	RND	223	LOG
224	EXP	225	COS	226	SIN	227	TAN
228	ATN	229	PEEK	230	CVI	231	CVS
232	CVD	233	EOF	234	LOC	235	LOF
236	MKI$	237	MKS$	238	MKD$	239	CINT
240	CSNG	241	CDBL	242	FIX	243	LEN
244	STR$	245	VAL	246	ASC	247	CHR$
248	LEFT$	249	RIGHT$	250	MID$		

Table 1. Table created using Program Listing 3. All information is stored in the ROM in a more compact manner.

New Commands

The procedure for using these new commands is fairly simple. First, write a machine language routine. Second, decide on the word you want to use, and find its address in the alphabetical table (Fig. 3.) Third, POKE the LSB (Least Significant Byte) into the address, and POKE the MSB (Most Significant Byte) into the next higher address. That is all it takes to use one of the commands.

Program Listing 4 demonstrates exactly how to use the disk commands. The program is a Road Race game in which you must drive a car down a winding road filled with potholes. Naturally, if you hit a pothole or the side, that is the end of the road. There have been many of these games written; the problem with them all is that the car is always driving in reverse. It starts at the top of the screen, and the obstacles move up the screen at it because that is the way the vid-

GAME BREAKTHROUGH:

THE STICK 80

- ☑ FEATURES THE FAMOUS **ATARI JOYSTICK.**
- ☑ WORKS WITH ANY LEVEL 2 AND DISK SYSTEMS.
- ☑ PLUGS DIRECTLY INTO KB. OR E/I (SCREEN PRINTER PORT).
- ☑ INCLUDES SIMPLE, DETAILED INSTRUCTIONS TO MAKE JOYSTICK VERSIONS OF MOST ACTION GAMES.
- ☑ COMPATIBLE WITH **ANY** OTHER TRS-80 ACCESSORIES.
- ☑ FULLY ASSEMBLED AND TESTED. READY TO PLUG IN AND ENJOY.
- ☑ FUN TO EXPERIMENT WITH IN **BASIC:** SIMPLY USE INP(0).
- ☑ 90 DAY PART AND LABOR WARRANTY.

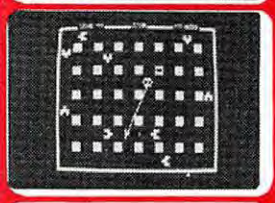
UNCONDITIONAL **MONEY BACK GUARANTY:** Try your STICK-80 for 14 days. If for any reason you are not delighted with it, return it for a prompt and courteous refund (including shipping and handling). PRICE INCLUDES ATARI JOYSTICK + ALPHA INTERFACE + DETAILED INSTRUCTIONS + DEMO PROGRAM. ONLY $39.95

MODEL 3 OWNERS: WE HAVE A **MODEL 3 TO MODEL 1 ADAPTER**

BIG FIVE SOFTWARE SUPER FAST MACHINE LANGUAGE ACTION GAMES

If you and your TRS-80 have longed for a fast-paced arcade-type game that is truly a challenge, then **SUPER NOVA** is what you've been waiting for. In this two player machine-language game, large asteroids float ominously around the screen. Suddenly your ship appears and you must destroy the asteroids before they destroy you! (But watch out because big asteroids break apart into little ones.) The controls that your ship will respond to are thrust, rotate, hyperspace, and fire. All right! You've done it! You've cleared away all the asteroids! But what is that saucer with the laser doing? Quick! You must destroy him fast because that guy's accurate! ◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆◆ **SUPER NOVA®**

The sound of the klaxon is calling you! Cruel and crafty invaders have been spotted in battle formation warping toward Earth at an incredible speed. Suddenly, your ship materializes just below the huge flock of invaders. Quickly and skillfully you shift right and left as you carefully fire your lasers at them. But watch out! A few are breaking out of the convoy and flying straight at you! As the whine of their engines gets louder, you place your finger on the fire button knowing all too well that this shot must connect—or your mission will be permanently over! With sound effects! ◆◆◆◆◆◆◆◆◆◆◆◆ **GALAXY INVASION®**



Your TRS-80 screen has been transformed into a maze-like playfield for this game. As your ship appears on the bottom of the screen, eight alien ramships appear on the top. All of them are traveling at flank speed directly at you! Quickly and boldly you move toward them and fire missiles to destroy them. But the more aliens you destroy, the faster the remaining ones become. If you get too good you must endure the wrath of the keeper of the mazefield: the menacing "Flagship". You must destroy him fast because, as you will find out, that guy's accurate! With sound effects! ◆◆◆◆◆◆◆◆◆◆◆◆◆◆ **ATTACK FORCE®**

With thousands of stars whizzing by you, your **SPACE DESTROYER** ship comes out of hyperspace directly under a convoy of aliens. Almost effortlessly, you skillfully destroy every last one. But before you can congratulate yourself, another set appears. These seem to be slightly more intelligent than the first set. Quickly you eliminate all of them, too. But your fuel supply is rapidly diminishing. You must still destroy two more sets before you can dock with your space station. All right! The space station is now on your scanners! Oh no! Intruders have overtaken the station! You must skillfully fire your neutron lasers to eliminate the intruders from the station before your engines run out of fuel and explode! With sound! ◆◆◆◆◆◆◆◆◆◆◆◆◆ **COSMIC FIGHTER®**

The second **Big Bang** has occurred and the galaxy is full of stray asteroids and meteors. As you look through your space port you see a belt of asteroids drifting across the screen blocking your path to the safety of the space station above. But be careful because meteor showers, exploding suns and invading aliens may strike your ship and send it hurtling back to ground level. How many times can you and your opponent maneuver through those obstacles before time runs out? With sound effects!◆◆◆◆◆ **METEOR MISSION II®**

SPECIAL

INTRODUCTORY OFFER:

Order the STICK-80 with one or more games and choose one:

•FREE ALPHA GREEN SCREEN
OR
•FREE MAGIC ARTIST PROGRAM

IN ADDITION YOU MAY:
ORDER 2 GAMES AND TAKE 10% OFF
ORDER 3 GAMES AND TAKE 15% OFF

All games are written in machine language and supplied on cassette.

EACH GAME IS AVAILABLE IN 2 VERSIONS

A SIDE 1: LEVEL II 16K FOR MODEL 1
SIDE 2: LEVEL II 16K FOR MODEL 3 $15.95

B SIDE 1: DISK 32K FOR MODEL 1
SIDE 2: LEVEL II 16K FOR MODEL 1
THE DISK VERSION SAVES THE HIGH SCORES ON DISK $17.95

• ALL THESE NEW JOYSTICK GAMES WILL ALSO WORK USING THE KEYBOARD WITHOUT ANY MODIFICATIONS.

GOOD NEWS: If you already have a non-joystick version of these BIG FIVE SOFTWARE games, send the original tape(s) with your STICK-80 order + $3 per game. We will send you a new Joystick version of your game(s).

ALSO AVAILABLE **DOUBLE-STICK 80:** 2 ATARI JOYSTICKS + ALPHA DUAL INTERFACE + INSTRUCTIONS + DEMO PROGRAM: $59.95

ALPHA Product Co.

262

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

85-71 79 St. WOODHAVEN N.Y. 11421 phone: (212) 296 5916

"The program is a Road Race game in which you must drive a car down a winding road filled with potholes."

16526	USR
16732	DEF
16756	CMD
16762	OPEN
16765	FIELD
16768	GET
16771	PUT
16774	CLOSE
16777	LOAD
16780	MERGE
16783	NAME
16786	KILL
16792	LSET
16795	RSET
16801	SAVE
16804	LINE

Table 2. Numerical listing of disk commands which can be used in a manner similar to USR calls. The address in front of the word is the location to POKE the address of your machine language routine.

eo display scrolls. To fix this, you have to turn the monitor upside down or write a machine language routine which moves the contents of the screen down instead of up. I prefer the second choice, since the first might damage the monitor.

The machine langauge routine is fairly simple, it uses only 27 bytes of memory. You don't need an assembler, since the BASIC program POKEs the program into high memory. The first thing the program does is to use the alternate register. Evidently, the interpreter uses some of the registers, and if you don't save them with a PUSH or an EXX, some strange and funny things will result. Next, the program moves the top fifteen lines of the video down one line. It then

CLOSE	16774
CMD	16756
DEF	16732
FIELD	16765
GET	16768
KILL	16786
LINE	16804
LOAD	16777
LSET	16792
MERGE	16780
NAME	16783
OPEN	16762
PUT	16771
RSET	16795
SAVE	16801
USR	16526

Table 3. Disk commands. Same as Table 2 except in alphabetical order.

```
10 REM  PROGRAM NO. 3    TABLE OF RESERVED WORDS
20 N=128:PRINT,,,
30 FOR A=5712TO6175
40 C=PEEK(A)
50 IFC>128THEN PRINT,N;" ";CHR$(C-128);:N=N+1:NEXTA:END
60 PRINTCHR$(C);:NEXTA
```

Program Listing 3

```
100 REM  PROGRAM NO. 4    ROAD RACE DEMONSTRATION
200 CLS:INPUT"DID YOU SET MEMORY SIZE TO 32741";Z$
300 IF LEFT$(Z$,1)="N"THENEND
400 CLS:PRINT@475,"ROAD RACE"
500 CLEAR100
600 DATA 217,17,255,63,33,191,63,1,192,3,237,184,33,0,6
    0
700 DATA 17,1,60,1,63,0,54,32,237,176,217,201
800 DATA 2608 : REM  THIS IS THE SUM OF THE PREVIOUS DA
    TA
900 FOR A=0TO26 : READ C : S=S+C : POKE 32741+A,C: NEXT
     A
1000 READ C :IF S<>C THEN PRINT"DATA INVALID. END OF RU
    N":END
1100 POKE16804,229:POKE16805,127
1200 PRINT:PRINT:PRINT"DO YOU WANT INSTRUCTIONS (Y/N) ?
    "
1300 Z$=INKEY$:IFZ$="N"THEN2400ELSEIFZ$="Y"THEN1400ELSE
    1300
1400 CLS:PRINTTAB(24)"*** ROAD RACE ***"
1500 PRINT:PRINT"THIS IS A SIMPLE ROAD RACE GAME."
1600 PRINT"THE OBJECT IS TO DRIVE YOUR CAR DOWN A WINDI
    NG ROAD."
1700 PRINT"HOWEVER, THIS IS NOT VERY EASY BECAUSE THE R
    OAD IS IN VERY POOR"
1800 PRINT"CONDITION.  YOUR CAR WILL LOOK LIKE THIS (
     :I:   ), AND IT CAN";
1900 PRINT"BE CONTROLED WITH THE LEFT AND RIGHT ARROW K
    EYS.  YOUR TURN ENDS";
2000 PRINT"WHEN YOU HIT THE SIDE OR ONE OF THE POTHOLES
    .  YOUR SCORE IS"
2100 PRINT"BASED ON THE LENGTH OF YOUR RACE.  MY RECORD
     IS 1058."
2200 PRINT:PRINT:PRINT:PRINT
2300 INPUT"PRESS THE ENTER KEY TO BEGIN";Z$
2400 CLS
2500 L=16353
2600 Z=0:T=0
2700 X=X+RND(0)/7
2800 T=T+1
2900 Z=Z+.05
3000 Y=SIN(X)*19+22
3100 W=SIN(Z)*5+15   : REM  W = WIDTH OF TRACK
3200 PRINT@0,STRING$(Y,146);STRING$(W,32);STRING$(63-W-
    Y,146);
```

"The main purpose of this program was to demonstrate how to use the disk commands, so there are few features in the game."

```
3300 POKERND(60)+15360,128+RND(63)
3400 POKERND(60)+15360,32
3500 P=PEEK(15168)
3600 IFP=32THENL=L-2
3700 IFP=64THENL=L+2
3800 LINE
3900 IFPEEK(L-1)>128ORPEEK(L)>128 OR PEEK(L+1)>128THENG
     OTO4200
4000 POKEL-1,58:POKEL,73:POKEL+1,58
4100 GOTO2700
4200 FORQ=1TO9:FORW=1TO30:NEXTW:PRINTCHR$(23);:FORW=1TO
     30:NEXTW
4300 PRINTCHR$(28);:NEXTQ
4400 CLS:PRINTCHR$(23)"     COLLISION":PRINT:PRINT
4500 PRINT"SCORE      :";T
4600 IFT>HSTHENHS=T
4700 PRINT"HIGH       :";HS
4800 G=G+1:TS=TS+T
4900 PRINT"AVERAGE    :";INT(TS/G)
5000 PRINT:PRINT
5100 PRINT"PLAY AGAIN (Y/N) ?"
5200 Z$=INKEY$:IFZ$="N"THEN5300:ELSEIFZ$="Y"THEN2400:EL
     SE5200
5300 CLS:END
```

Program Listing 4

fills the top line with spaces, gets the old registers back, and returns to the BASIC program. A return is used because the interpreter PUSHes the return address onto the stack before it jumps to our routine.

MEMORY SIZE 32741

First enter 32741 to the memory size question. Then type SYSTEM followed by /0. This should bring the memory size.

When you RUN the program, it will ask whether you set the memory size. If you did, press enter. The next section of the program reads in data for the machine language and POKEs it into memory. If also adds up all the data and compares it to a pre-determined sum. If the sums do not match, you blew it when you typed in the program, and it tells you so. This is a valuable feature; it keeps you from losing the entire program because of a common keyboard bounce.

Line 1100 is the one that enables our disk command. It POKEs the entry point of our machine language routine into the line address. Now, whenever you type LINE, even if you type new and erase the program, the contents of the screen will move one line down.

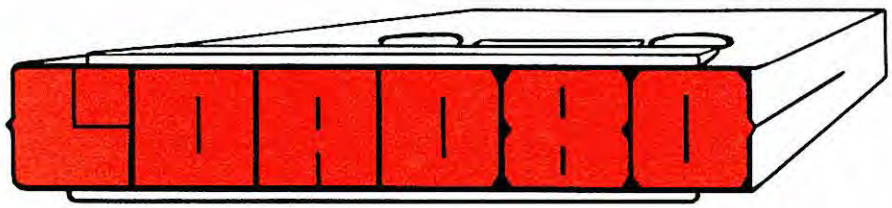
Lines 1200-2300 provide some simple instructions. The car is maneuvered by using the two arrow keys. I use the PEEK command to see if a key is down rather than INKEY$ because INKEY$ does not repeat if the key is held down. Table 4 shows the address to PEEK at for each key. For example, to detect whether the left arrow key is down, PEEK at location 15168. If bit 5 is on, or the value is 32, then the key is down.

Table 4 was formulated using a modified version of Program Listing 1. I changed the program so that it would continuously display the contents of memory from 14336-15359, which is the TRS-80 keyboard memory. If no keys are down, the entire block will contain zeros. Whenever any single key is pressed, a certain bit in a specific pattern of addresses comes on. For example, the A key should cause all add-numbered addresses in the keyboard memory to equal two, which is the value of bit one.

```
                00100 ; MACHINE LANGUAGE ROUTINE TO MOVE SCREEN DOWN
7FE5            00110         ORG     32741          ;START HIGH MEMORY
7FE5 D9         00120 START   EXX                    ;USE ALTERNATE REG'S
7FE6 11FF3F     00130         LD      DE,16383       ;BOTTOM OF VIDEO
7FE9 21BF3F     00140         LD      HL,16319       ;ONE LINE ABOVE
7FEC 01C003     00150         LD      BC,960         ;BYTES TO MOVE
7FEF EDB8       00160         LDDR                   ;MOVE IT DOWN
                00170 ;CLEAR FIRST LINE
7FF1 21003C     00180         LD      HL,15360       ;START OF LINE
7FF4 11013C     00190         LD      DE,15361       ;NEXT CHARACTER
7FF7 013F00     00200         LD      BC,63          ;LENGTH OF LINE
7FFA 3620       00210         LD      (HL),32        ;SPACE IN FIRST CHAR
7FFC EDB0       00220         LDIR                   ;CLEAR LINE
7FFE D9         00230         EXX                    ;GET OLD REGISTERS
7FFF C9         00240         RET
7FE5            00250         END     START
00000 TOTAL ERRORS
```

Machine Language Listing

80 MICROCOMPUTING ANNOUNCES...



. . . and saves you hours of typing and aggravation.

LOAD-80 is a monthly dump of the major program listings in 80 Microcomputing on cassette. Publisher Wayne Green tells you more. . .

"Frankly, after hundreds of hours of frustration, I seldom even try to keyboard a published program. Even if the magazine manages to get the program typeset correctly (which seems rare), I inevitably screw it up when I keyboard it. Who needs the aggravation?

"This is why I've started a new series of cassettes called **Load 80**. Each cassette will have program dumps of the listings in an issue of **80 Microcomputing**. These listings are direct from the authors and tested by the 80 staff. All but the very short program listings will be on these **Load 80** cassettes. Thus you will be able to save hours of inputting programs and even more of debugging your keyboarding errors.

"Though the authors of these programs will share the royalties from the sale of the cassettes, this will not preclude the better programs from being issued separately by Instant Software (with royalties) with full documentation and associated hoopla. The documentation for the **Load 80** programs will be entirely in **80 Microcomputing.**

"I originally was holding out for "Trash Dump" as a name for the cassettes, but cooler heads prevailed. If there turns out to be enough interest in **Load 80**, we'll set up a monthly subscription arrangement."

Wayne Green, Publisher

Send in the attached card and you will receive the cassette for the major programs in this issue (April 1981). If the card is gone, photocopy the coupon.

Please note there is no warranty expressed or implied that this program is going to do anything other than save you typing.

☐ Yes. . . send my LOAD 80 Cassette for only $9.95

☐ Check Enclosed Bill my ☐ AE ☐ MC ☐ VISA

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

CARD # _____ EXPIRE DATE _____

SIGNATURE _____ INTERBANK # _____

Please allow 4-6 weeks for delivery
80 Microcomputing Pine Street Peterborough NH 03458
Attn: Debra L. Boudrieau

314B8

"The machine language routine is fairly simple, it uses only 27 bytes of memory."

When more than one key is pressed simultaneously, the patterns will overlap and some addresses will contain the value of one key, some will contain the value of the other key, some will contain the value of both keys combined, and the rest will contain zero. I created the table in Table 4 by carefully noting the few addresses where the patterns do not overlap, in which there is only one key which can affect a specific bit in a certain memory location. If many keys are pressed down simultaneously, the table does not work perfectly; some combinations of keys affect other bits. Under normal use this peculiarity never causes problems.

There is also another set of memory locations which operate identically to this set, which start at 14337. I have always used the second set; both sets operate identically, and so I offer the table my program uses.

	BIT							
MEMORY	0	1	2	3	4	5	6	7
15105	@	A	B	C	D	E	F	G
15106	H	I	J	K	L	M	N	O
15108	P	Q	R	S	T	U	V	W
15112	X	Y	Z					
15120	0	1	2	3	4	5	6	7
15136	8	9	:	;	,	-	.	/
15168	ENTER	CLEAR	BREAK	↑	↓	←	→	SPACE
15232	SHIFT							

Table 4. Table of memory locations and bits used to sense depressed keys.

Back on the Road

The following describes how I made the road curve and shrink. L is the location of the car, which I put in the center so that no one can race off the edge of the screen and drive through reserved RAM. I could have put a wall along the side, but it was easier to put the car in the center and let it get smashed by the rapidly approaching wall just before it reached the edge.

T is the time counter, which is incremented each time the screen is moved down. This provides a simple scoring method, by using time as the score and by letting the driver race as long as he can. X and Z are used as angles in sine fuctions which determine the curve and width respectively. By increasing the increments in lines 2700 and 2900, the track can be made to bend and shrink faster. By changing values in lines 2700-3100, you can observe how each number affects the shape of the road.

Line 3200 prints a string of graphics drawing the left edge of the road, followed by some spaces and another string of graphics drawing the right edge of the road. If you don't like the graphic character which I used, change the 146 to a different number. Line 3300 POKEs a random graphic character into a random position on the top line. Sometimes it falls inside the road, in which case it is a pothole. Otherwise it simply adds texture to the road side. Texture is also the function of line 3400, which adds random blanks to break up the repetition.

RSGLMOD1 - $50 - Enhancements to Radio Shack General Ledger 1.1 Special feature - Copy ONLY ONE disk for back-up security.

Print features - General ledger with beginning balances; current month activity; ending balances ** Classified balance sheet.

Print Options - Omit current column on income statement ** Omit account numbers on balance sheet and/or income statement.

Input Display - Previous document name, number of entries/total entries permitted for current session, and dollar total of current document are always visible. These are nice anytime and just plain excellent after you return from an interruption.

Input Options - Set up an "automatic" account number. Touch ENTER to use. Change to another account anytime ** Re-do a document after it is balanced (Before starting next document) ** Change document name and entry date for each entry. One possibility is a check register with only one cash entry ** Automatic credits to liability, capital, and income accounts ** Others.

Supplied as program lines which must be MERGED into the original programs, or, send a disk copy of the original programs and the modifications will be installed on your diskette — no additional charge.

DDIR81 - $23 - Organize your disks. Creates program lines of directory contents using TRSDOS or NEWDOS. 32K/one drive.

CAT - $12 - You have to plan ahead to beat the computer or a friend. X's and O's advance with each human move. Fast graphics.

FTDEMO80 - $12 - Displays and EXECUTES the NEWDOS/80 Appendix A programs and keyboard entries. A real time saver. 32K. Disk only. Deduct $3 each for 2nd-3rd-4th program. Add 4% for MasterCard/Visa

NEWDOS/80 - $135 **DOUBLER - $215** **DOUBLE-ZAP II - $47** **DOUBLE-ZAP (2.1)- $37** **BASE 2 MODEL 850 - $760 w/Cable**
MODEL III DISK DRIVES **FIRST - $760** **SECOND - $350** **EXTERNAL - $430**

↙445 **AT-80** **3827 Dismount Dallas, Texas 75211 (214) 339-0498**

↙See List of Advertisers on page 306

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 at YOUR convenience.

Our unique package, "**INTRODUCTION TO TRS-80® ASSEMBLY PROGRAMMING**", will provide you with the following:

- Ten 45-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.
- A textbook on TRS-80® Assembly Language Programming.
- 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 ROM.

This course was developed and recorded by Joseph E. Willis and is 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. The minimum system required is a Level II, 16K RAM.

REMASSEM-1 only $69.95

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.

Using the same format as our extremely popular introduction to assembly language programming, this "**ASSEMBLY LANGUAGE DISK I/O PROGRAMMING**" 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.

This course was developed and recorded by Joseph E. Willis, for the student with experience in assembly language programming; it is an intermediate-to advanced-level course. Minimum hardware required is a Model I Level II, 16 K RAM one disk drive system.

REMDISK-1 only $29.95

Dealer inquiries invited

REMSOFT, INC.

571 E. 185 st.
Euclid, Ohio 44119
(216)531-1338

Include $1.50 for shipping and handling.
Ohio residents add 5½% sales tax.
TRS-80® is a trademark of the Tandy Corp.

✓70

The next three lines test for an arrow key and adjust the car location if a key is down.

And now: the thing we've all been waiting for: Our new LINE command, in line 3800. That one word moves the entire screen down, clears the top line, and pushes the car, which was on the bottom, of the screen. The LINE command can be put in the middle of a line or anywhere the CLS command could be used. Line 3900 looks at the three bytes forming the car, and if there is a graphic block in any of them, there must have been a collision. Line 4000 displays the car. I used a colon, followed by the letter I, followed by another colon for the car. The two dots on the colon are the wheels, and the I is the body. Finally, in the next line, the program loops back and makes the race an endless loop.

The rest of the program is the collision routine. Line 4200 makes the screen shake after a collision. It has a short time delay and then shifts the screen into expanded character mode with CHR$(23). It again delays and then shifts the screen back to normal character size with CHR$(28). (I bet that none of you have discovered that command yet because the manual says that a CHR$ (28) returns the cursor to display position (0,0)). The rest of the program is straight forward.

How to Enhance It

The main purpose of this program was to demonstrate how to use the disk commands, so there are few features in the game. The following are some modifications which you might like to add, to make the game interesting. The program is numbered in increments of 100 so that there is plenty of room to insert modifications.

There could be a finish line at a score of 500, and YOU HAVE WON could be displayed. Another method would be to have all races 500 time units long, start with a score of ten, and lose one point for each collision. Scoring could be enhanced by keeping track of scores for more than one person by asking for their initials at the start of each race. Another improvement would be to allow difficulty levels by changing items such as speed, width of the road, frequency and sharpness of curves, and number of potholes. The best improvement would be to write the entire program in machine language and move the screen down only one graphic block at a time instead of three.

Next month I will use the disk commands to create and print designs like the one shown with this article.■

QUALITY PRODUCTS FROM..... THE ALTERNATE SOURCE

SCREENEDIT: Easier to use than the normal EDIT command; more powerful too! To edit a Basic line, LIST it and type EDIT without an argument. You have now activated SCREEN EDIT. Simply typing a letter will change what was there (overwrite), shift left arrow deletes, shift right arrow inserts spaces. Shift down arrow is useful for combining lines. Changing the line number will duplicate that line. Will edit any line 255 characters or less. Enter ends the editing process and Break escapes from editing and cancels all changes. Also allows you to re-execute command lines without retyping them! Don't let the price fool you, this will be a much used utility!!

JUST $9.95

Model I or III Level II or Disk Basic

THE ALTERNATE SOURCE
1806 Ada Street
Lansing, MI 48910
517-487-3358
✓138 **517-485-0344**

Include $2.00 for crush-proof box and postage, $1.50 for COD, 4% for charge.

EDU-WARE EAST
P.O. Box 336
Maynard, MA. 01754
617-568-8641
✓477

MATH-PAK-1: MATH-PAK-2: MATH-PAK-3

Interactive drill programs where you enter the answers digit by digit, just like paper and pencil. With user selected difficulty levels, carryovers, reducing, simplification, pointing off, scoring, games, and more. Used by schools everywhere. Order MATH-PAK-1 for integers, MATH-PAK-2 for fractions, MATH-PAK-3 for decimals. (L2-16K) $14.95 ea.

H-O-R-K-S

Low cost, single entry accounting system for the home or office. With 66 user assigned account codes, auto audit trail, search with totals, 32 or 48K, 1 to 4 drives, credit and debit summaries with 3 options, up to 9200 entries. $24.95/cassette $29.95/disc

INVENTORY +

Why settle for just an inventory listing? Get aging reports with 2 options, reorder, total listings with purchase dates and amounts, total costs, items sold, profit/loss and more. Use as a stand alone system with daily updates, delete, change, and file packing routines. (32K - 1 disc minimum) $24.95/cassette $29.95/disc.

CASH REGISTER 80

Use your TRS-80 as a point of sale terminal with automatic inventory lookup, pricing, update, and more. Print sales slips with user adjusted formats, end of day reports with all cash, charge, and check sales by salesperson. CR80 requires INVENTORY+, 48K, and 1 disc minimum (2 drives recommended).
$24.95/cassette $29.95/disc.

Mass residents and 5% tax. VISA, M.C., AND PHONE ORDERS ACCEPTED. Dealer inquiries invited. Overseas orders add $2.00 for air shipment. TRS-80 is a trademark of Tandy Corp.

Poor Man's Floppy

HIGH SPEED CASSETTE SYSTEM

FOR TRS-80*

Now the widely acclaimed JPC Cassette System is available for your TRS-80* computer. The price is only $90.00

TC-8 Cassette System
JPC Products
Albuquerque, NM
Kit: $90
Assembled: $120

by Carl A. Kollar

[Reprint of June 1980 Review, *80 Microcomputing*]

I guess I don't have to tell any TRS-80 owners how frustrating the cassette system that comes with the computer can be. Even with the factory mod that's available, the annoyance of loading and checking programs becomes just barely tolerable.

If you're like me, after you've just plunked down a chunk of money for a Level II 16K machine, "you ain't got nuttin left" for even one disk drive at 500 bucks apiece. So you suffer.

A reasonable alternative is the Exatron Stringy Floppy (ESF). This will cost you about 250 bucks and totally eliminates your loading and saving problems, automatically and fast. I've had one of these for about six months and love it!

But, if the price is still too steep, have I got a device for you!

The Device

The February 1980 issue of *Microcomputing* had an ad that intrigued the hell out of me. It was a high-speed cassette system by JPC Products acclaimed as a "poor man's floppy." It made all sorts of seemingly ridiculous claims such as "loads five times faster," "stores 50,000 bytes on a 10-minute cassette," "less than one bad load in a million bytes with the volume control anywhere between one and eight."

All this for a measly [90] bucks? How could this be? A call to Albuquerque answered a few questions: Yes, it had its own power supply, and, it stored programs five times faster because it utilized higher density data. The computer outputs the information at a higher rate out of the rear keyboard connector.

The ad had even claimed anyone could build it even if you have never soldered before. JPC would make it work, if you couldn't—for free. I was sold. I placed my order, and it arrived about two months later (parts shortage).

I work in electronics, so I found the unit exceptionally easy to build. It took about an hour. The manual is superb. (That's better than great.) It was clear, concise and exact with no ambiguities. Important parts placements are stressed (polarity markings on electrolytics, bands on diodes, etc.).

JPC was right! With these instructions, you couldn't go wrong. The board quality is excellent. It is double-sided and parts locations are clearly marked on the component side of the board. There are no jumper wires to install. JPC utilizes PC traces and plated-through holes for connections to traces on the other side of the board.

Also, there are absolutely no adjustments or settings to bother with.

The documentation is a sheaf of 8½ × 11 papers stapled together. It is written in the nicest format I've seen in a while. Each command and/or subjects is covered on its own sheet in large type. All explanations are in easy to read English—not computerese.

Commands and Features

SAVE"filename": Saves your BASIC program on cassette.
LOAD: Reads the next BASIC program from the cassette.
LOAD"filename": Searches for and loads the specified file from cassette.
LOAD? and LOAD?"filename": Reads file from cassette, and compares contents to memory.
LOADN: Prints a list of all the programs on a cassette, until interrupted by the "break" key.
LOADN"filename": Same as above except the tape will stop at the end of the program named.
KILL: Removes the file manager program from memory so that the extra memory can be used by large programs.
RSET: Allows the operator to rewind and position the tape on tape recorders that have these functions tied to the motor control jack.
RUN"filename": TC-8 searches for a specified program and runs it immediately.
PUT"filename": Same as SAVE "filename", except it is for use with system tapes.
GET: Same as LOAD, except it is for use with system tapes.
GET"filename": Same as LOAD "filename", except it is for use with system tapes.
GET? and GET?"filename": Same as LOAD? and LOAD?"filename", except it is for use with system tapes.
GETN and GETN"filename": Same as LOADN and LOADN"filename", except it is for use with system tapes.
OPEN: Required before cassette input or output of a data file can be attempted.
CLOSE: Required to end a cassette data file.
PRINT#: Allows numerical or string data to be output to a cassette file.
INPUT#: Allows numerical or string data to be input from a cassette file.

I haven't counted them, so I don't know about the "one load in a million bytes" claim, but my son, Anthony (age 11), loaded about 30 of his programs from his Radio Shack format tape to a new TC-8 format tape. He's run them all and found no bad loads.

Unlike the standard tape system, you can position your tape anywhere before the program you want and not have to look for a blank spot between programs. The TC-8 patiently waits for the program you want and then starts loading without getting confused by the portion of the previous program you just fed it.

Try that on your regular cassette system; you'll wear out the reset button. ■

ORDER NOW

To order your TC-8 kit, send your check or money order for $90.00 plus $3.50 postage and handling to JPC PRODUCTS CO., 12021 Paisano Ct., Albuquerque, NM 87112 (New Mexico residents add 4% sales tax). Credit card orders accepted by phone or mail. Personal checks will delay shipment. We will otherwise immediately ship you the TC-8 kit, the cabinet, the ribbon cable, the power adapter, an instruction manual, and a cassette containing the software.

✓190
JPC PRODUCTS CO.
Phone (505) 294-4623
12021 Paisano Ct.
Albuquerque, N.M. 87112

✓See List of Advertisers on page 306

How does 192×26 sound?

A High-Density Graphic Interface

Dennis Murray
CompuTech
1005 Chestnut Dr.
Christiansburg, VA 24073

Paul Fowler Jr.
Enable Electronics
2103 Charlton Lane
Radford, VA 24141

Do you have the feeling that you are drawing pictures, plots, and graphs using a paint roller for a drawing pen? How would you like an interface that provides 192 dot positions horizontally and 96 dot positions vertically? That's over 18,000 separately addressable dot locations! You can have exactly that if you build this high density graphics interface.

This is not a programmable character generator with limitations and relative software complexity. It is a legitimate, one-dot-per-bit graphics interface.

The prerequisites for the design of a high density graphics interface for the TRS-80 are size and simplicity. Size is important to fit the circuit inside the computer case. Simplicity is important if relatively inexperienced TRS-80 owners are to install and maintain the interface. We feel that both objectives have been met due primarily to the philosophy of using as much of the existing (and debugged) TRS-80 video display hardware as possible, and use of 4K × 1 static RAM chips.

"The character generator (Z29) is really nothing more than a ROM whose memory is addressed by the ASCII representation. . ."

While this circuit should not be attempted by those with no hardware experience, it shouldn't be a difficult task.

Video Monitor Concepts

The TRS-80 monitor is really nothing more than a modified television set without a tuner or intermediate frequency (IF) section. This type of monitor sweeps the screen with a dot of light starting at the top left corner of the screen and proceeding across the screen from left to right and top to bottom (Fig. 1). The term for this technique is *raster scan*. A complete scan of the whole screen is called a frame and is composed of 264 lines. All 264 scan lines are not available for display, however, because approximately 72 are needed to provide proper margins for top and bottom and time for vertical retrace. This leaves 192 scan lines to display information. The screen is refreshed at a rate of 60 frames a second to minimize flicker and ac hum.

The horizontal and vertical sweeps are generated by free-running sawtooth oscillators. The natural frequency of oscillation is slightly lower than the desired sweep (See Fig. 2). These oscillators can be re-triggered early and start a new sweep by superimposing a reset signal (called SYNC) on the video signal transmitted to the monitor. Thus, if the computer provides a SYNC signal at a repetition rate slightly faster than the horizontal oscillator's natural frequency, the monitor's sweep will be pulled into synchronization with the incoming video signal. Once synchronization is established, it is easy to determine the exact location of the monitor's light dot at any instant. By turning the dot on or off at the right time, characters or graphics can be formed on the screen. (See Fig. 3.)

The operation of a video monitor is simple. It depends on the input video signal to provide all information to display data.

Generation of the video signal becomes the responsibility of the computer. The TRS-80 ac-

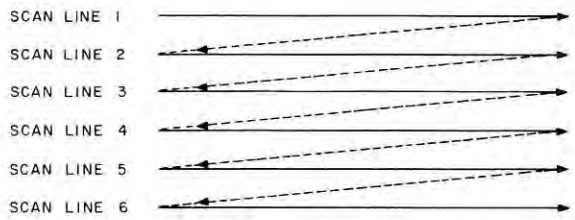


Fig. 1. Raster Scan. Arrows indicate display portion of scan. Dashed lines indicate blanked retrace.

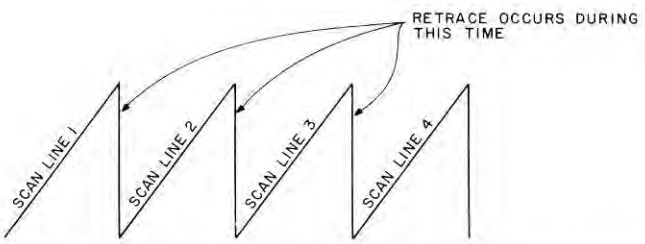


Fig. 2. This is an example of a signal generation by a monitor's horizontal output stage. Retrace occurs during the sharp vertical lines between scans.

complishes this with a specialized section of hardware.

TRS-80 Video Text Generation

This section is to familiarize the reader with the concepts of text generation as they apply to the TRS-80. A detailed description of the TRS-80 operation is also available from Radio Shack in a booklet entitled "TRS-80 Microcomputer Technical Reference Handbook."

Fig. 4 is a functional block diagram of the video display circuitry. For simplicity, only the 64 character-per-line mode will be presented.

The video clock generator is driven by the TRS-80 system clock and generates the three most critical clocks of the circuit: SHIFT, CHAIN, and LATCH. It is the responsibility of SHIFT to inform shift register Z10 and Z11 when to output the next dot. Its frequency is determined by the rate at which the dots are to be displayed; in this case, SHIFT operates at 10.6445 Megahertz.

CHAIN serves the dual purpose of driving the address counters and serving as the low order address line for the display RAMs (Z45-48, Z61-63). Note that for every complete cycle of CHAIN, two different locations are addressed: one is referenced when CHAIN is at logic 0 and another when CHAIN is at a logic 1. Thus, CHAIN would operate at a frequency equal to one-half the rate at which memory addresses change. Since the TRS-80 uses a five-by-seven dot matrix for character display and requires one "undot" (black dot) to separate characters horizontally, we need six dots per character. This means we must increment memory locations once every six dots and CHAIN must be one-half of that speed. Thus, CHAIN operates at a frequency of 887 kHz (SHIFT dot rate of 10.6445 MHz ÷ 6 dots/character ÷ 2 = 887 kHz).

The function of LATCH is to provide enough delay so that the RAM and character generator output can stabilize, and then load the shift register with that output (Fig. 5). Therefore, LATCH must operate at the rate *characters* are to be output to the screen, which is one-sixth of the dot rate, or 1.774 MHz.

The video RAM is addressed by the video refresh counters made up of Z65, Z50, Z12, and Z32. The counters provide a means of sequentially accessing memory while simultaneously producing horizontal and vertical sync. Integrated circuits Z65 and Z50 comprise a divide-by-32 counter that, when coupled to CHAIN, provides the low-order six address lines for the video RAM. The result is a maximum addressing range of 64 sequential locations, which happens to be the number of characters on a line. The last counter stage of Z50 is configured to provide a horizontal sync pulse and sufficient delay time to allow horizontal retrace blanking on the monitor.

A total of 12 scan lines is required to display one text (or graphics) line for the TRS-80. (See Fig. 3.) This means that once a horizontal scan is complete, we must re-address those character locations 11 more times before moving on to new text. This function is handled by Z12. Once Z12 has counted through 12 scan lines, it provides an output pulse to the text line counter made up of part of Z65 and Z32.

The text line counter serves two purposes: It provides a divide-by-16 counter to drive the high-order video RAM address lines and it provides a vertical retrace blanking for the monitor.

The insertion of four-bit multiplexors (Z64, Z49, and Z31) between the video refresh counters and the video RAM allows the system to access that RAM in order to read or change its contents.

The source of the video RAM's address is switched from the video refresh counter to the system address bus when VID* is pulled low. When this happens, the data output from the RAMs will not necessarily be valid for video display. Therefore, VID* sets a flip-flop (Z7) to ensure that the video display is blanked during that portion of the horizontal sweep disturbed by the CPU's access to the video RAM.

During normal screen refresh the output from the video RAM is captured after it is stable in a six-bit latch by a signal called, appropriately, LATCH. Once latched, the RAM address is incremented so that the next location can be accessed while the present data is being processed by the character generator or the block graphics generator (Fig. 5).

The character generator (Z29) is really nothing more than a ROM whose memory is addressed by the ASCII representation of the character to be displayed and the scan line currently being displayed. Its output is five bits wide, representing the array of dots necessary to build

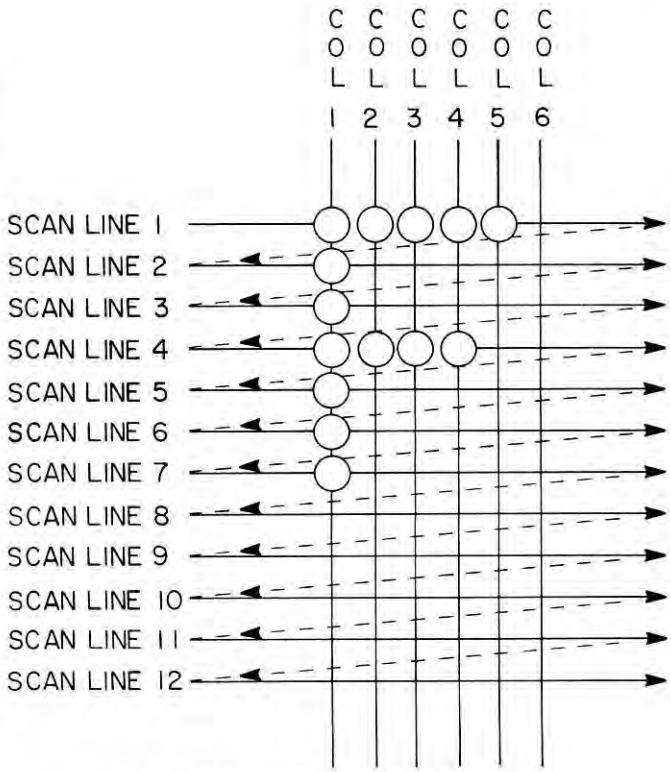


Fig. 3. Character Generation Using Raster Scan

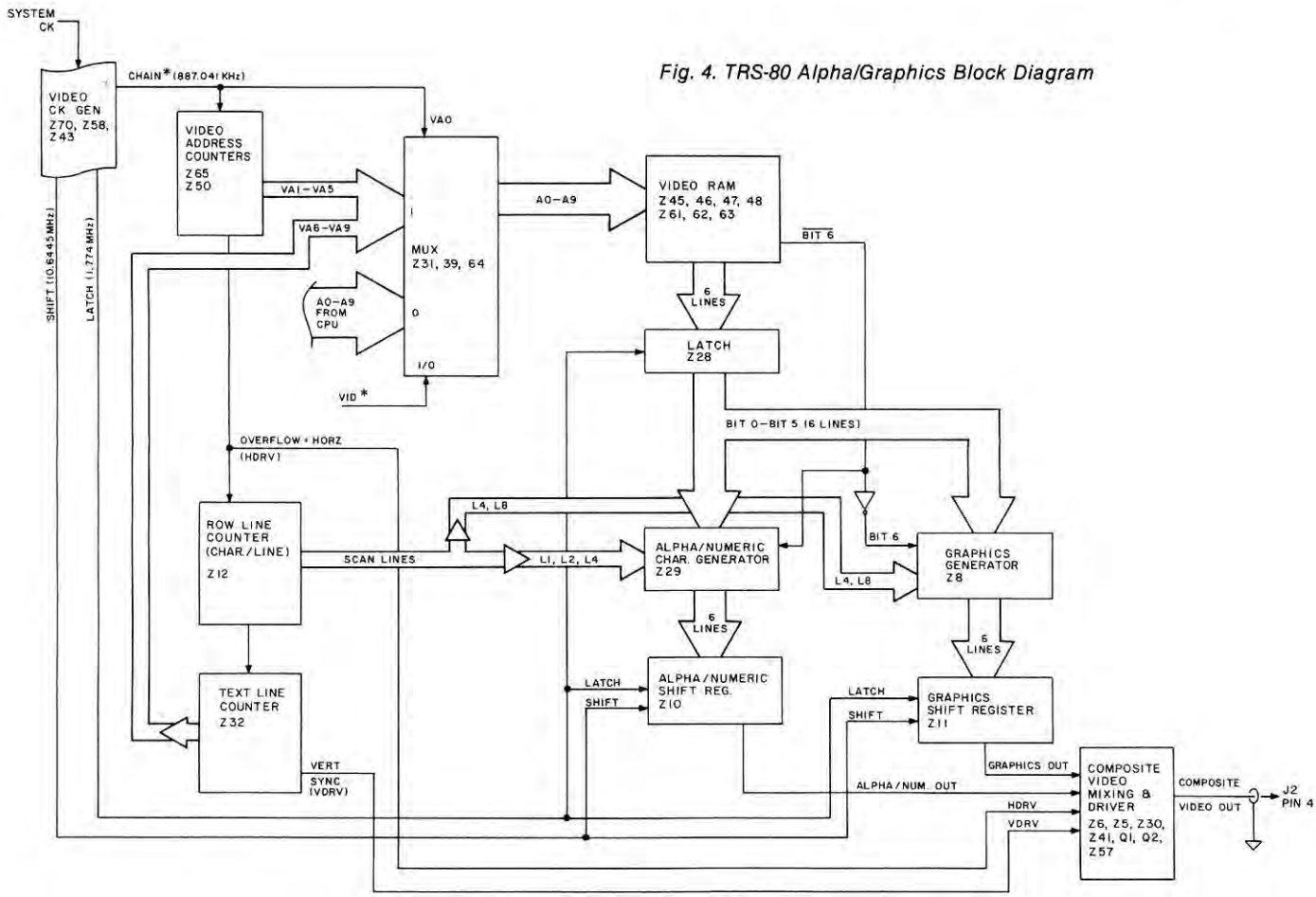


Fig. 4. TRS-80 Alpha/Graphics Block Diagram

a video image of that character (Fig. 3). These five bits are then fed to a shift register where a blank bit is added. The final six bits are shifted out, one bit at a time, to a video driver section where each is mixed with the horizontal and vertical sync signals, amplified, and matched to the impedance of the monitor (75Ω). The resulting signal, called composite video, is presented on J2 for connection to the video monitor.

The graphics generator is composed of a four-line to one-line multiplexer (Z8) and a shift register (Z11). The multiplexor routes two of the six data bits present on its input to its two output lines. Which input bits are selected is determined by the A and B inputs to the multiplexer. These inputs are driven by the two most significant bits of the scan line counter (Z12).

Since Z12 is configured as a divide-by 12, the information supplied to the A and B inputs will change on every fourth scan line. Thus, each pair of bits selected by multiplexer Z8 will be held for four scan lines, then another pair is picked. When all 12 scan lines for a character row have been completed, the multiplexer will have supplied three pairs of bits, thus the vertical stacking of three graphics blocks per character row.

The multiplexer's output pair is presented to shift register Z11, which is wired so that each bit represents a total of three dots. Since each character position is six dots wide, this technique will cause the monitor to display two blocks of dots, horizontally, for each character location. The result is a form of graphics where each character position is divided into a matrix two blocks wide and three blocks deep.

If the graphics mode is indicated for the character, Z63 will output a logic 1. This will result in the multiplexer's block graphics being loaded into shift register Z11 instead of the character generator loading its data into shift register Z10. Z11 will then shift its dots out, one at a time, to the video driver section. There it is mixed with the horizontal and vertical sync signals, amplified, and sent to plug J2 as composite video.

"The prerequisites for the design of a high density graphics interface for the TRS-80 are size and simplicity."

High-Density Graphics Interface

During the design of the interface, a compromise had to be reached between adequate screen resolution and excessive memory comsumption. The final decision was that the ability to resolve and display screen positions down to the size of the normal TRS-80 period would provide sufficient detail. This is, in reality, a small square two dots high and two dots wide.

The TRS-80 outputs a character block six dots wide by 12 dots high when operating in the 64 character/line mode. This translates to a total of 384 dots horizontally by 192 dots vertically. Thus, if a period is a small box two dots by two dots, we can display 192 dots horizontally and 96 dots vertically. That is 18,432 discrete, separately addressable positions.

In order to use as many of the TRS-80 provided signals as possible, the high-density interface should use a similar data latch and address update scheme. Use of the TRS-80 signals such as BLANK, LATCH, Dot 2, SHIFT/LOAD, and SHIFT simplifies the design of such an interface and provides a means of synchroniz-

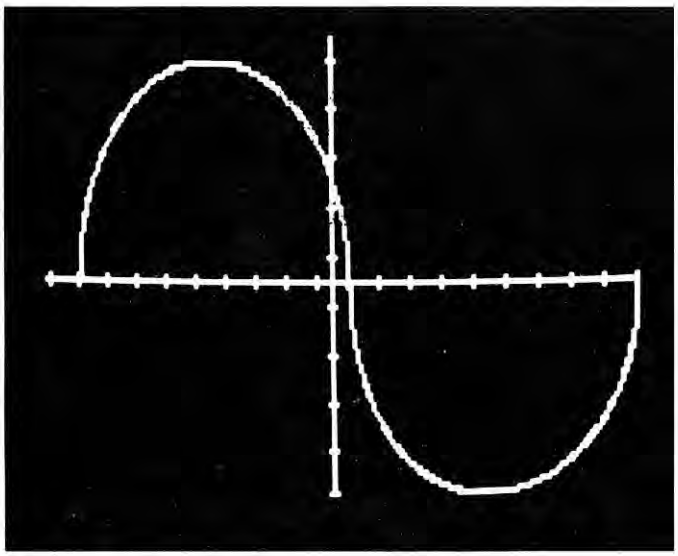


Photo 1. HR-1 High Resolution Graphics

ing the normal TRS-80 alphanumeric mode and the high-density graphics mode on a character-by-character basis without loss of synchronization. This feature is a requirement if graphic titling, legends, etc. are to be used.

Interface Operation

TRS-80 signals BLANK and LATCH are input to a 74LS74 D-flop (IC1). The output from IC1 will then indicate when a retrace (either horizontal or vertical) is taking place. The output is also used as a switch to reset the column address registers and to inhibit an undesired clock pulse present from Dot 2 immediately after the end of retrace blanking.

The Q output from IC1 and the input from Dot 2 are ANDed together in IC17b and inverted by IC16a to provide an input clock to the column address registers, IC2 and IC10. Therefore the column address registers can only be updated during a horizontal scan and not during retrace.

The high-density graphics memory is made up of six 4K × 1 bit static RAM chips organized as thirty-two six-bit bytes per line, 96 lines deep, with each bit representing a displayable box two dots square. Since Dot 2 will provide a clock pulse once every six dots and we want to display 12 dots per byte, Dot 2 must be divided by two before it can be used. That is the function of IC2a. The output of IC2a is used as the input clock to a divide-by-32 column address counter made up of IC2b and IC10b. It is also used as a bank select to determine which half of the divided memory is accessed—the high-order three bits or the low order three bits of a byte.

Assuming the high-density graphics interface is not being addressed by CPU the MEMORY SELECT will be low, and the BANK SELECT will work as follows:

- When BANK SELECT is low, both inputs to IC16d will be low, resulting in a high input level to the chip enable inputs ($\overline{CE}$) of IC7, IC8, and IC9. These memory chips are then effectively disabled. IC16b inverts the BANK SELECT signal and feeds it to IC16c, whose output will then go low. Thus, IC4, IC5, and IC6, representing the leftmost three bits of a byte, will receive a low on their $\overline{CE}$ line and will be selected.
- Upon receipt of another Dot 2 pulse, BANK SELECT will toggle, going high. When this happens IC16d will see a high level on one of its inputs and give a corresponding low output to the chip enable ($\overline{CE}$) input of IC7, IC8, and IC9. These RAM chips will thus be selected and will output the rightmost three bits of a byte. IC16b inverts the BANK SELECT signal and feeds it to IC16c. Since IC16c now sees a low logic level on both its inputs it will output a high logic level to the chip enable inputs of IC4, IC5, and IC6, thus deselecting them.
- BANK SELECT is initially low following a horizontal retrace due to the reset signal from IC1. Upon the next Dot 2 negative edge, BANK SELECT will toggle high; thus the alternate bank is selected. Therefore, BANK SELECT will operate at a frequency equal to Dot 2 ÷ 2 throughout the horizontal scan, at which point a retrace resets the counters.

The task of maintaining the proper row scan line address is handled by IC13 configured as a divide-by-two counter followed by a divide-by-96 counter. The output from the divide-by-two counter is ignored (IC13 pin 3) with the remaining seven counter outputs serving as the high-order seven RAM address lines for video refresh.

The counter is configured as a divide-by-128 counter which is reset on the 96th count. IC13 gets its input from the TRS-80 signal HDRV. HDRV occurs once for every scan line at the start of horizontal retrace, thus providing sufficient time for the RAM to stabilize on the new address.

The TRS-80 signal VDRV is used to synchronize the horizontal scan line counter with the

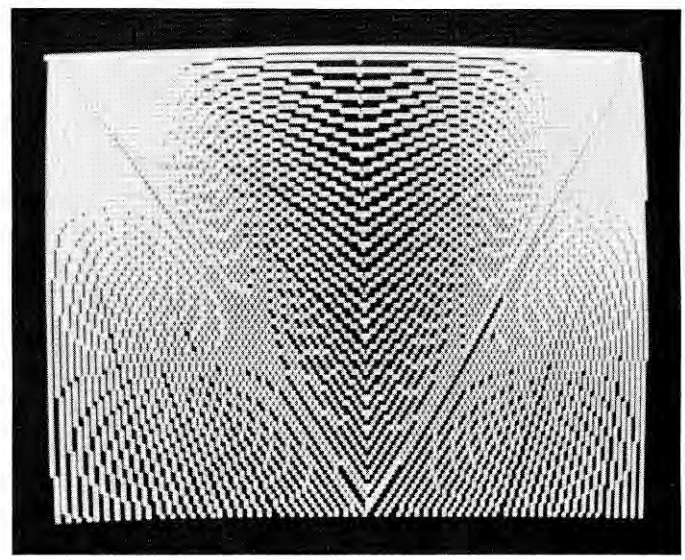


Photo 3. ALIEN Generated by HR-1

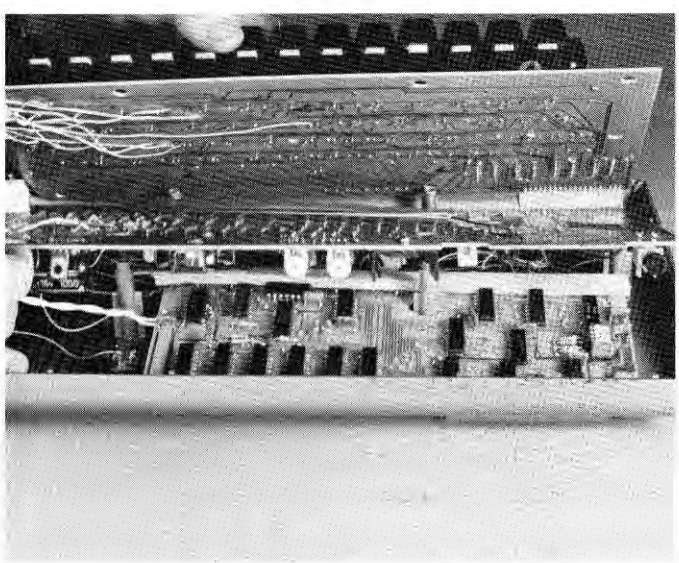


Photo 2. HR-1 Circuit Board Installed in TRS-80

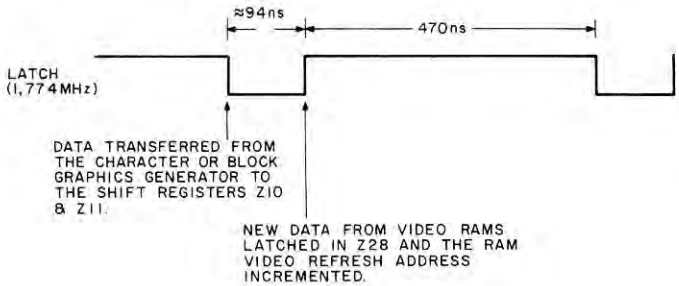


Fig. 5.

TRS-80 by resetting IC13 at the beginning of a vertical retrace. IC2, IC10, and IC13, therefore, provide all RAM addressing necessary to accomplish screen refresh.

In order to be useful, the RAM must be accessible not only by the screen address counters, but by the CPU address bus as well if data is to be read and written there. This is accomplished through the use of three four-bit multiplexers (ICs 3, 19, and 14) whose select line is driven by a four-bit comparator (IC12). IC12 compares the CPU address lines A12 through A15 against the setting of a four-position DIP switch. The DIP switch is set to represent the desired memory location for the high density graphics RAM. When IC12 finds a match between the DIP switch setting and the CPU's address line, it pulls MEMORY SELECT high. MEMORY SELECT high causes several things to happen:

- The output of the four-bit multiplexers (ICs 3, 19 and 14) will now reflect the address present on the CPU's address bus rather than the default condition of the screen refresh address.
- Both $\overline{CE}$ NOR gates (IC16c and IC16d) will give a low output, thus reflecting all six data bits as a complete byte.
- Pins 1 and 12 of IC15 (IC15a and IC15d) will be HIGH. If this is a READ command $\overline{WR}$ will be high, resulting in a LOW output from IC15a since both its inputs are now HIGH. At the same time, IC15d will output a HIGH since $\overline{WR}$ is inverted by IC15b resulting in a low condition to pin 13 of IC15. $\overline{WE}$ on all RAM chips will thus be HIGH, indicating a READ. All six RAMs will output their data (referencdd by the CPU address bus) to a hex buffer (IC11) which is now enabled since its enable lines are drawn LOW by IC15a. These data bits will then appear on the CPU's data bus as D0 through D5.
- If the command is a WRITE, the effect is reversed. $\overline{WR}$ is now low with the result that IC15a will output a HIGH since both its inputs are not HIGH and IC15d will output a LOW since both its inputs *are* HIGH ($\overline{WR}$ was inverted prior to input to IC15d). The LOW output of IC15d will pull the $\overline{WE}$ line of all RAMs low, resulting in the data present on the CPU's data bus to be written in the location specified by the CPU's address bus. IC11 will not be enabled since it sees a HIGH on its enable line from IC15a, thereby preventing a conflict on the data bus.
- IC15c will clear the shift register (IC18), resulting in the output of black dots for the duration of the access. Since the RAM is presently being addressed by the CPU rather than the screen refresh circuit, the data output by the RAMs will not be correct and therefore should not be shown on the screen.

During normal screen refresh the RAM's $\overline{WE}$ is held HIGH (indicating a READ) since MEMORY SELECT is low. BANK SELECT will determine which half of a RAM data location is output to the shift register (IC18). AND gates IC17a, c, and d effectively route the selected RAM data to the shift register. The left bit of each half goes to IC17d, the next bit of each half to IC17c, and the

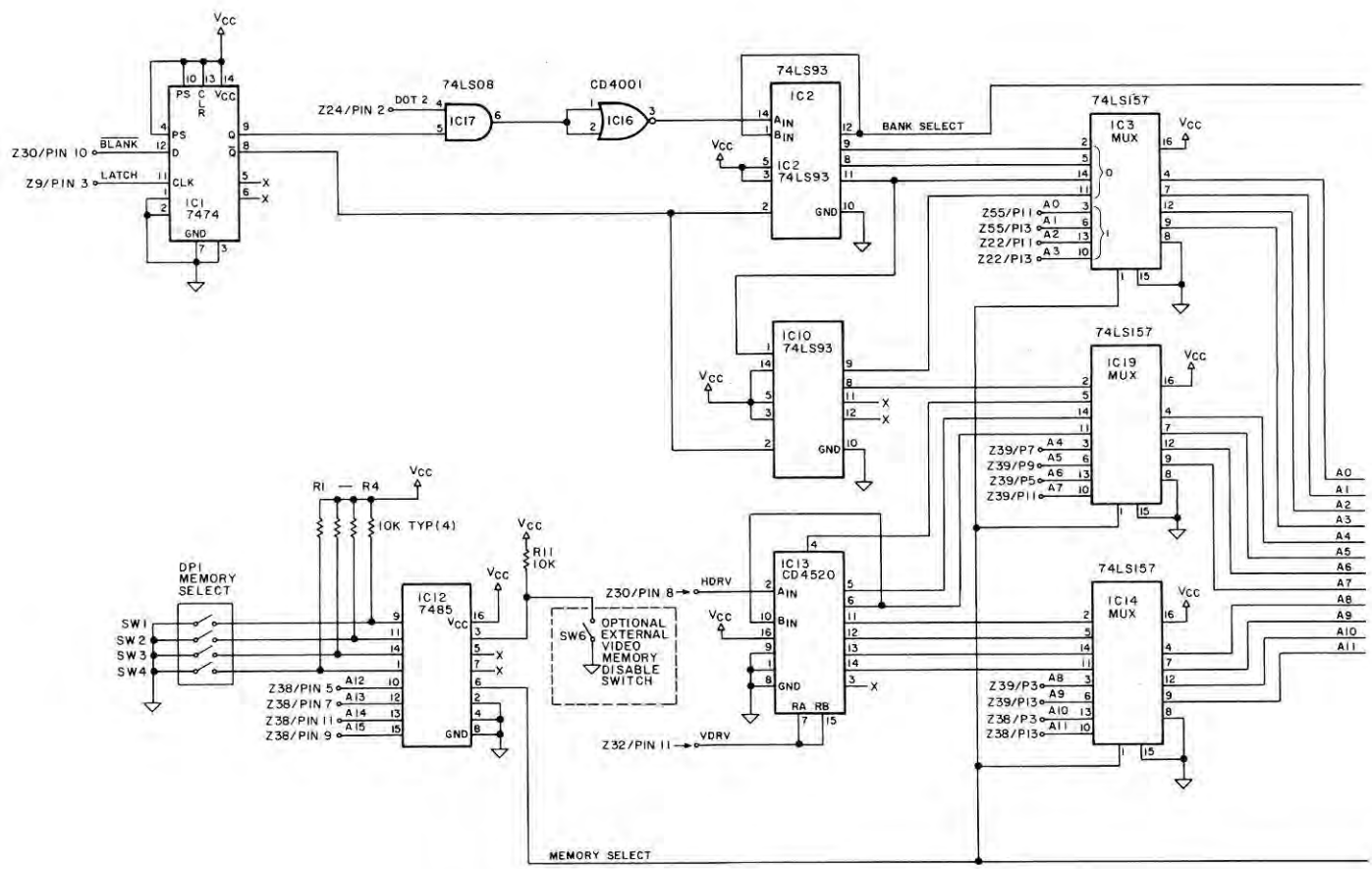


Fig. 6. Schematic of High Resolution Graphics Interface.

4MHZ, DOUBLE DENSITY, COLOR & B/W GRAPHICS . . THE LNW80 COMPUTER

COMPARE THE FEATURES AND PERFORMANCE

FEATURES	LNW80	PMC-80**	TRS-80* MODEL III
PROCESSOR	4.0 MHZ	1,8 MHZ	2.0 MHZ
LEVEL II BASIC INTERP.	YES	YES	LEVEL III BASIC
TRS80 MODEL 1 LEVEL II COMPATIBLE	YES	YES	NO
48K BYTES RAM	YES	YES	YES
CASSETTE BAUD RATE	500/1000	500	500/1500
FLOPPY DISK CONTROLLER	SINGLE/ DOUBLE	SINGLE	SINGLE/ DOUBLE
SERIAL RS232 PORT	YES	YES	YES
PRINTER PORT	YES	YES	YES
REAL TIME CLOCK	YES	YES	YES
24 X 80 CHARACTERS	YES	NO	NO
VIDEO MONITOR	YES	YES	YES
UPPER AND LOWER CASE	YES	OPTIONAL	YES
REVERSE VIDEO	YES	NO	NO
KEYBOARD	63 KEY	53 KEY	53 KEY
NUMERIC KEY PAD	YES	NO	YES
B/W GRAPHICS, 128 X 48	YES	YES	YES
HI-RESOLUTION B/W GRAPHICS, 480 X 192	YES	NO	NO
HI-RESOLUTION COLOR GRAPHICS (NTSC), 128 X 192 IN 8 COLORS	YES	NO	NO
HI-RESOLUTION COLOR GRAPHICS (RGB), 384 X 192 IN 8 COLORS	OPTIONAL	NO	NO
WARRANTY	6 MONTHS	90 DAYS	90 DAYS
TOTAL SYSTEM PRICE	$1,664.00	$1,840.00	$2,187.00
LESS MONITOR AND DISK DRIVE	$1,200.00	$1,375.00	---

When you've compared the features of an LNW80 Computer, you'll quickly understand why the LNW80 is the ultimate TRS80 software compatible system. LNW RESEARCH offers the most complete microcomputer system at an outstanding low price.
We back up our product with an unconventional 6 month warranty and a 10 days full refund policy, less shipping charges.

LNW80 Computer $1,200.00
LNW80 Computer w/B&W Monitor & one 5" Drive $1,664.00
All orders must be prepaid, CA residents please include 6% sales tax.
Shipping and handling charge of $15.00 must be included with every order.
* TRS80 Product of Tandy Corporation.
** PMC Product of Personal Microcomputer, Inc.

LNW80

- BARE PRINTED CIRCUIT BOARD & MANUAL $89.95

The LNW80 - A high-speed color computer totally compatible with the TRS-80*. The LNW80 gives you the edge in satisfying your computation needs in business, scientific and personal computation. With performance of 4 MHz, Z80A CPU, you'll achieve performance of over twice the processing speed of a TRS-80*. This means you'll get the performance that is comparable to the most expensive microcomputer with the compatibility to the world's most popular computer (TRS-80*) resulting in the widest software base.

FEATURES:
- TRS-80 Model 1 Level II Software Compatible
- High Resolution Graphics
  - RGB Output - 384 x 192 in 8 Colors
  - NTSC Video or RF MOD - 128 x 192 in 8 Colors
  - Black and White - 480 x 192
- 4 MHz CPU
- 500/1000 Baud Cassette
- Upper and Lower Case
- 16K Bytes RAM, 12K Bytes ROM
- Solder Masked and Silkscreened

LNW SYSTEM EXPANSION

- BARE PRINTED CIRCUIT BOARD AND MANUAL $69.95
WITH GOLD CONNECTORS $84.95

The System Expansion will allow you to expand your LNW80, TRS-80*, or PMC-80** to a complete computer system that is still totally software compatible with the TRS-80* Model 1 Level II.

FEATURES:
- 32K Bytes Memory
- 5" Floppy Controller
- Serial RS232 20ma I/O
- Parallel Printer
- Real Time Clock
- Screen Printer Bus
- On Board Power Supply
- Solder Masked and Silkscreened

KEYBOARD

LNW80 KEYBOARD KIT $84.95

The Keyboard Kit contains a 63 key plus a 10 key, P.C. board, and remaining components.

LNDoubler

- Assembled and Tested $149.00

Double-density disk storage for the LNW Research's "System Expansion" or the Tandy's "Expansion Interface". The LNDoubler™ is totally software compatible with any double density software generated for the Percom's Doubler***. The LNDoubler™ provides the following outstanding features.

- Store up to 350K bytes on a single 5" disk
- Single and double density data separation
- Precision write precompensation circuit
- Software switch between single and double density
- Hardware override into single density only
- Easy plug in installation requiring no etch cuts, jumpers or soldering
- 35, 40, 77, 80 track 5" disk operation
- 120 day parts and labor Warranty

*** Doubler is a product of Percom Data Company, Inc.

DOS PLUS 3.2D $95.00

Micro Systems software's double density disk operating system. This operating system contains all the outstanding features of a well developed DOS, with ease in useability.

LNW DATA SEPERATOR

- Assembled and Tested $17.95

The LNW Data Separator provides you with a reliable and inexpensive means of solving your disk data read error problems for your 5" single density drives. Compatible with both the LNW System Expansion and Tandy's Expansion Interface. Some soldering is required.

CASE

LNW80 CASE . Add $12.00 for postage $84.95

The streamline design of this metal case will house the LNW80, LWN System Expansion, LNW80 Keyboard, power supply and fan, LNDoubler™, or LNW Data Separator. This kit includes all the hardware to mount all of the above.

PARTS AVAILABLE FROM LNW RESERARCH
4116 - 200ns RAM
6 chip set $26.00
8 chip set $33.50
16 chip set $64.00
24 chip set $94.00
32 chip set $124.00

- LNW80 "Start up parts set" LNW80-1 . . . . . $82.00
- LNW80 "Video parts set" LNW80-2 . . . . . $31.00
- LNW80 Transformer LNW80-3 . . . . . $18.00
- LNW80 Keyboard cable LNW80-4 . . . . . $16.00
- 40 Pin computer to expansion cable $15.00
- System Expansion Transformer $19.00
- Floppy Controller (FD1771) and UART (TR1602) . . . $30.00

LNW RESEARCH CORPORATION
14661-C MYFORD RD.
TUSTIN CA. 92680

~53

VISA & MASTER CHARGE ORDERS & INFO. NO. 714-552-8946
ACCEPTED, Add $3 for postage SERVICE NO. 714-641-8850

right bit of each half goes to IC17a.

Since one-half of the RAMs will be tri-stated (due to a HIGH on their respective $\overline{CE}$ line) the pull-up resistors will pull those data lines high. As can be seen by the schematic, this means that one input to each AND gate will always be high. The output of these AND gates will then reflect the state of the other input line, which is driven by the selected RAM chips. The output of IC17d contains the most significant bit to be output. This bit is the first to be displayed and is, therefore, wired to the first two-bit locations of the output shift register.

IC17c contains the next most significant bit so it is wired to the next two locations to be shifted out. IC17a contains the least significant bit so it is wired to the fifth and sixth bits to be shifted. The remaining two bits of the shift register are not used so they can be ignored.

By wiring each data bit to two shift register bits, each data bit will be present on the shift register output line for two shift pulses. Therefore, each data bit will be displayed on the screen two dots wide.

Control for the shift register comes from three locations:

- MEMORY SELECT (IC15c), which has already been described;
- SHIFT, which is a TRS-80 generated signal used to inform the shift register when to output the next video dot;
- SHIFT/LOAD, which is another TRS-80 generated signal used to inform the shift register when to load new data from IC1 and when to allow shifting of dots to VIDEO OUT;
- SHIFT and SHIFT/LOAD were referenced earlier under the description of the TRS-80 Video Text Generation.

"This article should provide the reader with an understanding of raster scan video display concepts as they apply to the TRS-80. . ."

The output from the shift register is called VIDEO OUT and goes to a switch (SW5) which has been inserted in the TRS-80 line called GRAPHIC between TRS-80 Z11 pin 13 and TRS-80 Z30 pin 2. The position of this switch determines whether the normal TRS-80 block graphics mode is selected or the high density video graphics mode is enabled.

Summary

This article should provide the reader with an understanding of raster scan video display concepts as they apply to the TRS-80, and offers an alternative high density graphics interface that can be built at a reasonable cost. The quality of the graphics available with the interface allows the user to achieve a level of display sophistication not presently attainable with a TRS-80.

The second section of this article addresses construction and installation of the interface and driving software to make this a viable package. A complete printed circuit board of the interface designed to be installed inside the TRS-80 console is available for $26 from the authors. ■

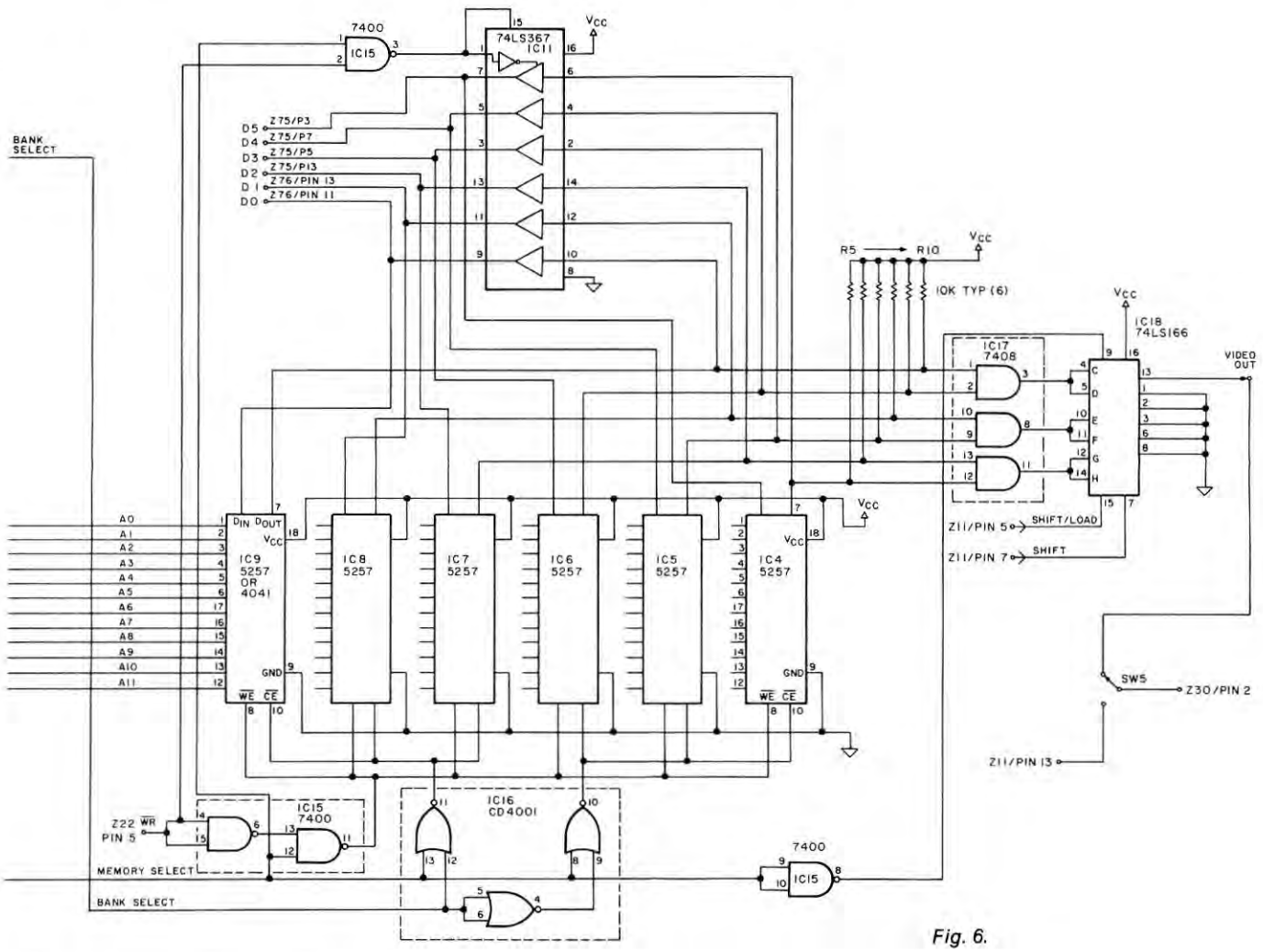


Fig. 6.

HARDWARE BREAKTHROUGH

DESIGN SOLUTION INC. presents the AN-SERIES DEVELOPMENT SYSTEM

DIGITAL SPEECH PROCESSOR

Experiment with digital speech synthesis and recognition, using a **BASIC** editor program provided with this system. Speech is entered, digitized and stored in memory or in disk files. Vocabulary files are construced using digital core images of your voice. Labeled and indexed sounds, words and phrases are then available for use in your **BASIC** programs. Different vocabulary files can be loaded for different **BASIC** Programs, etc. while the digital speech processor will operate on any model I, Level II **TRS-80*** system. We recommend a level II with disk drive to reduce voice image loading times. Experiment with data compression from **BASIC**, by increasing and decreasing sample rates. Develop your own voice recognition programs. Simulate low pass, band pass, and high pass filters, etc. This is truly a software man's dream-come-true. Enter a string of numeric data and let your **TRS-80** repeat it. Let your **TRS-80** dictate data files for error checking. The sky and your imagination are the absolute limit!

2716-2732 EPROM PROGRAMMER

At last! An affordable **EPROM** programmer for your **TRS-80***. Program either 2716 or 2732 **EPROMS** from a **BASIC** program in less than 300 seconds. With **DESIGN SOLUTION'S SOFTWARE** you are able to program (**BURN IN**) **EPROM** from **TRS-80** memory, **VERIFY** data transfer, copy **ROM** to **EPROM**, or load **TRS-80** memory from **ROM** or **EPROM**. **THE AN-551** is a must for all small system development packages. Unit comes complete with external power supply and operation manual. The 40-pin edge card connector is **GOLD** plated for extra long life. **ZERO INSERTION FORCE SOCKETS** simply plug into the front panel socket of the **AN-551** if quick changes are required. (ZIF socket not included.)

DIGITAL PORT INTERFACE

Now you can **BREADBOARD** your digital projects with ease. The **AN-511 DIGITAL PORT** provides all the hardware necessary to interface your digital projects with the **TRS-80***. From **MACHINE LANGUAGE** or **BASIC** programs you can now access and control:

- **8 BITS OF OUTPUT DATA FROM TRS-80**
- **8 BITS OF INPUT DATA TO THE TRS-80**
- **8 DECODED PORT ADDRESS (DEVICE CONTROL) LINES**
- **8 BIT DATA BUS FROM Z-80 IN TRS-80**

Using the **IN** and **OUT** commands in **BASIC** or their machine language counter-parts, 8 bit data values can be moved from external hardware projects into the **TRS-80** and vice-versa. With the 8 decoded port outputs up to 8 additional bytes of input or output data can be accessed. The **AN-511** is supplied with external power supply and complete operation and projects manual.

ANALOG PORT INTERFACE

The **SUPER BOX!** The **ANALOG PORT, MODEL AN-538,** is a very versatile **ANALOG TO DIGITAL AND DIGITAL TO ANALOG CONVERTER.** All conversion operations are under **TRS-80*** program control. Experiment with **MUSIC** and **VOICE SYNTHESIS.** From machine language or **BASIC** programs you can manipulate analog signals, digitize voltages and measure them with the **TRS-80.** Generate various waveforms, noise, speech patterns, etc., and output them as analog signals. The **AN-538** also provides a mini-digital port. The 8 bit output data to the D/A converter is accessable through the front panel connector, along with 8 extra decoded port (device control) lines. All conections are made using standard #22 solid wire. Lines push through the front panel, received underneath by special connectors, ensuring positive connection. The **AN-538** comes complete with external power supply and operation-project manual.

All connections made to **AN-SERIES** products from your breadboard are simply pushed through the front panel. Custom connectors on the P.C.B. provide super reliable connection for thousands of operations. All **AN-SERIES** products are warrented for a full **90-DAYS** under **DSI's** limited warrenty policy. Complete documentation is provided for each model in an attractive folder, including theory of operation, and special interest projects and applications. All units are supplied with external power supply modules that connect through a mini-jack on the front panel. A 40-conductor cable is required for connection with your **TRS-80** and is **NOT SUPPLIED** by **DESIGN SOLUTION,** but is available from your local **RADIO SHACK STORE.** (Components are 1(278-771) 40 conductor ribbon cable and 2(276-1558) edge card connectors.)

*TRS-80 is a registered trademark of RADIO SHACK, a TANDY COMPANY.

DESIGN SOLUTION INC. ↙123
BOX 1225, FAYETTEVILLE, AR 72701

C.O.D. add $3.00 — Other add $1.50 S/H.
Orders and Information: (501) 521-0281

↙See List of Advertisers on page 306

AMERICAN

118 SO. MILL STREET • PRYOR, OK 74361
PHONE (918) 825-4844

ALL LISTED PRICES ARE CASH DISCOUNTED. WE ACCEPT MC, VISA, AND COD (REQUIRES CERTIFIED CHECK, CASHIERS CHECK OR CASH). FOR CHARGE CARD ORDERS PLEASE ADD 3%. FOR COD SERVICE PLEASE ADD 5%. SHIPPING AND HANDLING ARE FREE ON ALL ORDERS. OKLAHOMA RESIDENTS PLEASE ADD 4% SALES TAX.

32K-EXPANSION INTERFACES

SPECIAL OFFERING.
Due to a very special purchase, American Business Computers is able to offer a limited number of Radio Shack* Expansion Interfaces at the lowest price ever.

For TRS-80*

Model 1

399.95

American Business Computers guarantees Expansion Interfaces to be Brand New—still in original documentation and in perfect working condition.

ALL CABLES AND DOCUMENTATION ARE INCLUDED WITH INTERFACES.

192

HARD DISK DRIVES

For TRS-80* Model II Users

Up and running —
and available for immediate delivery

AMERICAN BUSINESS COMPUTERS IS NOW ABLE TO OFFER HARD DISK (WINCHESTER) DISK DRIVES FOR SALE. THESE DRIVES ARE AVAILABLE FOR TRS-80 MOD II, TRS-80 MOD I, S-100, AND APPLE COMPUTERS.

SEVERAL DIFFERENT DRIVES AND CONTROLLERS ARE AVAILABLE FOR THE TRS-80 MOD II. ALL DRIVES ARE SUPPLIED WITH HARD DISK CPM OPERATING SYSTEMS. CAPACITIES RANGE FROM 5-66 MEGABYTES. CALL OR WRITE FOR PRICES.

317

TEAC DISK DRIVES

We are pleased to announce that we are now able to offer TRS-80 compatible mini disk drives. These drives are fully compatible with TRSDOS, NEWDOS, and NEWDOS 80 PLUS. The TEAC DRIVE is one of the first Japanese disk drives to appear on the American market. In many ways it is quite superior to its American made counterparts.

$295

Single Drive In Single Enclosure

$570

Duel Drive In One Enclosure (Cabinet)

Two Drive Cable - $29.95
Four Drive Cable - $39.95

A high-precision lead screw method is used for positioning the head to the correct track. Four motor steps are used for move the width of one track. This improved positioning accuracy greatly reduces the possibility of data error.

322

MAGIC WAND AND THE MOD II

The Magic Wand is the most powerful, most flexible, most reliable, most usable word processing software available for a CP/M-Based Model II Computer !

$295

* TM Digital Research Inc.

That's not bragging. That's just telling it like it is.
The MAGIC WAND is the best word processing software ever written for a microcomputer. It can do more work in less time with higher quality than any other product you can buy.
The MAGIC WAND is a rock solid piece of software. The command structure is simple and logical and complete. We have not tossed in features without thought to the overall design of the package. Nor have we included any feature that is not thoroughly implemented. The programs are crash-proof and completely reliable.
And the system is supported by what we are told is the best user's manual ever produced for microcomputer software. It contains a step-by-step instructional program designed for the novice. The trainee uses sample files from the system disk and compares his work to simulated screens and printouts in the manual.

396

BUSINESS COMPUTERS

WE HONOR master charge

*TM TANDY CORP.

THE MX-80 NOT ONLY DOES EVERYTHING, IT DOES EVERYTHING WELL.

This is the new Epson MX-80 dot matrix printer. It does just about everything you could ask a printer to do. Quickly. Quietly. Reliably. In fact, for OEM installations, the MX-80 may be the single best, all-round printer you can buy. But that's not the best reason to buy it.

The MX-80 prints bidirectionally at 80 CPS in a user-defined choice of 40, 80, 66 or 132 columns. And if that's not fast enough, its logical seeking function minimizes print head travel time. The MX-80 prints 96 ASCII, 64 graphic and eight international characters with a tack-sharp 9x9 matrix. For a long time. Epson printers are known for reliability and the MX-80 is no exception. But that's not the best reason to buy it either.

The print head has a life expectancy of up to 100 x 10^6 characters, and when it wears out, just throw it away. A new one costs less than $30 and the only tool you need to change it is attached to the end of your arm. The MX-80 is compact weighs only 12 lbs., and the whole unit, including the two stepper motors controlling carriage and paper feeding functions, is precisely controlled by an internal microprocessor. But even that isn't why you should specify the MX-80.

The best reason is this: because Epson makes more printers than anyone else in the world, we can afford to sell each one for a little less.

...Call For Unbelievably 'Low Price

✓397

OKIDATE MICROLINE 80 PRINTER - $479

The Microline is built on a rugged cast aluminum base to withstand the rigors of continuous business use. It is driven by two motors and will run all day with no duty cycle limitations. Microline printers use a dense 9 x 7 dot pattern to produce crisp, clean copies, first copy to last. The seven pins in the head are "fired" using energy stored in tension members. This technology permits the use of short, low mass pins made with an extremely hard alloy. The head produces less heat, thereby extending its life. ✓196

900 C.P.S. PRINTER

That's right nine hundred characters per second. That's the print speed that can be obtained using the new Florida Printer Model 600 C. The 600 C uses a unique "Stored-Energy" print head to obtain a print speed of 600 CPS in normal print font and 900 CPS in a condensed print font. This printer is not inexpensive but it is definitely the fastest dot matrix printer in the world. Call for prices...

✓211

AW...WHAT THE HECK
RAM Memory Chips for the TRS-80

It is the policy of American Business Computers to offer merchandise at the lowest price possible. Serveral months back we began selling RAM Memory Chips for the TRS-80 for $45.00 per set. Someone else sold chips for $44.00. We sold them for $38.00. They sold them for $37.95. So we say "AW ..... WHAT THE HECK!" Let's see the other guys beat this price.

$24

PER 16K SET

These chips are brand new "4116's". These 200 nanosecond chips are fully compatible with all TRS-80 produces. Instructions for insertion are included, however the dip shunts required for converting a 4K Model I to a 16K Model I are not included at this low price.

✓483

PAPER FOR YOUR PRINTER

9½ x 11 3200 Sheets - 15 Pounds **$32.00**	PRICES INCLUDES SHIPPING WITHIN CONTINENTAL UNITED STATES VIA UPS	9½ x 11 3000 Sheets - 18 Pound **$37.00**
14 x 11 3200 Sheets - 15 Pound **$46.00**		14 x 11 3000 Sheets - 18 Pound **$53.00**

✓484

INEXPENSIVE DAISY WHEEL PRINTER $1450

Incorporating the latest large scale integration technology, the Starwriter is built by one of the world's most respected computer peripheral manufactures. The printer is furnished complete and Read-To-Use, reguiring no hardware or software changes.

Using an industry standard 96-character print wheel, the Starwriter produces letter-quality printing on 3 sharp copies with up to 136 colmns. The Starwriter is backed up by a one-year warranty (3 months on parts and labor, 9 succeeding months on parts) and is further supported by a strong, fully trained and technically proficient service organization.

✓256

More hints and kinks for educational software authors.

Programming for Education—Part 3

Jerome I. Weintraub
690 Mtn. View Rd.
El Cajon, CA 92021

All educational programs are either teaching or testing programs. While it may be obvious that a teaching program teaches and a testing program tests,there seems to be a belief that testing programs also teach. Unless the program is actually a combined program, it is not possible to teach by testing.

There is also a theory that if you administer the same test twice to the same students they will do better the second time, because they remember the answers. I find it difficult to accept this theory. Unless a student looks up the answers to the questions in the interim, he has no better chance to get the answer correct the second time than he did the first, even if he can remember how he answered it. I recommend that you do not deliberately use a testing program as a teaching tool.

A program that tests can be identified by one or more of the following characteristics:

- When a student has responded to a question, the computer tells him whether his answer was right or wrong and goes on to the next question.
- If the response is correct, the program goes to the next item; if incorrect, the same item is repeated until the student responds correctly, or it is repeated a given number of times after which the correct answer is given. The program then moves to the next item.
- In multiple choice items, the wrong answer is dropped and the item repeated until it is answered correctly.
- A testing program gives the student no help or clue as to how to find the correct answer. Listing 1 is an example of a testing program.

A teaching or instructional program can be tutorial or remedial. A tutorial program presents information to the student and asks a question to find out if the student has mastered the information. If he has, the program goes on to new information; if not, the program provides more detailed information or a simpler version of it, based completely on the nature of the student's response.

A remedial program is similiar to a tutorial one, except that it usually doesn't present information in advance. When a student responds incorrectly, it provides the student with help of some sort to figure out what the answer should be.

It might break the question into simpler components: If the student cannot add a column of figures, it might present the individual addition problems that make it up. See Fig. 1, which illustrates a complete remedial program for the addition problem 79 + 62 + 34. The equation is continually simplified to the point where the student is asked to count stars to compute the sum of a basic two addend element of the original problem.

Basic elements are defined as irreducible learning tasks. Most fields of learning are based on certain elements that must be accepted without proof, or must be memorized. Such elements are not the logical result of other elements. The alphabet, for example, cannot be logically constructed, since it is an arbitary collection of symbols. The only way to learn the alphabet is to memorize it. The sounds of some of the letters are based on their names and can be derived from them, but most letter sounds must be memorized as well.

Number facts like 2 + 3 can be derived by counting; 1, 2,—3, 4, 5. But the names of the numbers and their sequence must be memorized. There is a pattern in number sequence, but it is not derived from something else. A child can learn the pattern only after he has a concept of the sequence.

A remedial program can also branch to the simpler, more basic concepts that underlie or support the concept in question. Fig. 2 shows how a program could move from a question about guide words in a dictionary through explanatory and simplified frames, ending with the alphabetical order of the letters of the alphabet.

A remedial program could give hints (Did you remember the period after the abbreviation?) or supply missing elements in increments leading up to the complete answer. If the student misspelled 'ceiling' you could ask, 'Did you remember to put the E before the I?'

A frequently used technique in remedial programs is to drill the student on an item he missed. Responding to 6 + 5 several times in succession will more effectively help him to remember than including the problem in a program containing several different problems. The spelling program in Program Listing 2 provides drill in each word missed. The math program in Fig. 1 can be written to note which errors the child is making. After having exposed the student to several problems that follow the same pattern, the computer can determine where the child needs help. You can then give the student a different problem with the same characteristics.

"All educational programs are. . . teaching or testing. . . There seems to be a belief that testing programs also teach."

Another type of drill program presents the same information in several forms, providing separate but equal repetitions. Each of the following statements would appear on the screen individually:

Olympia is the capital of Washington.
___ is the capital of Washington.
Olympia is the capital of ___
The capital of Washington is ___
What city is the capital of Washington?

If your computer has large memory, the program can automatically place the student into a remedial program and then return him to the main program when he exhibits mastery. This kind of program must also provide the teacher with an alert should a child make no progress after three or four tries. There are limits to the extent to which you can provide for the range of human variables that might require the attention of the teacher rather than the computer.

Testing programs are easier to write than teaching programs. A well-written teaching program can help a student move rapidly through a field that he understands easily. Correctly answered key questions may serve as evidence that this particular student does not need extensive details in order to master the objective of the immediate lesson. The student may then be able to skip the details until he reaches a level where he needs them.

Writing an effective teaching program requires knowledge of how students learn, knowledge of the subject in question and the elements that support the subject, and the sequence in which they should be presented in order to proceed from the simple to complex. The program must be designed to analyze errors and branch to a subroutine that presents the steps, the concepts, or the elements that the student must know in order to respond correctly to the original question. Once the student masters the ma-

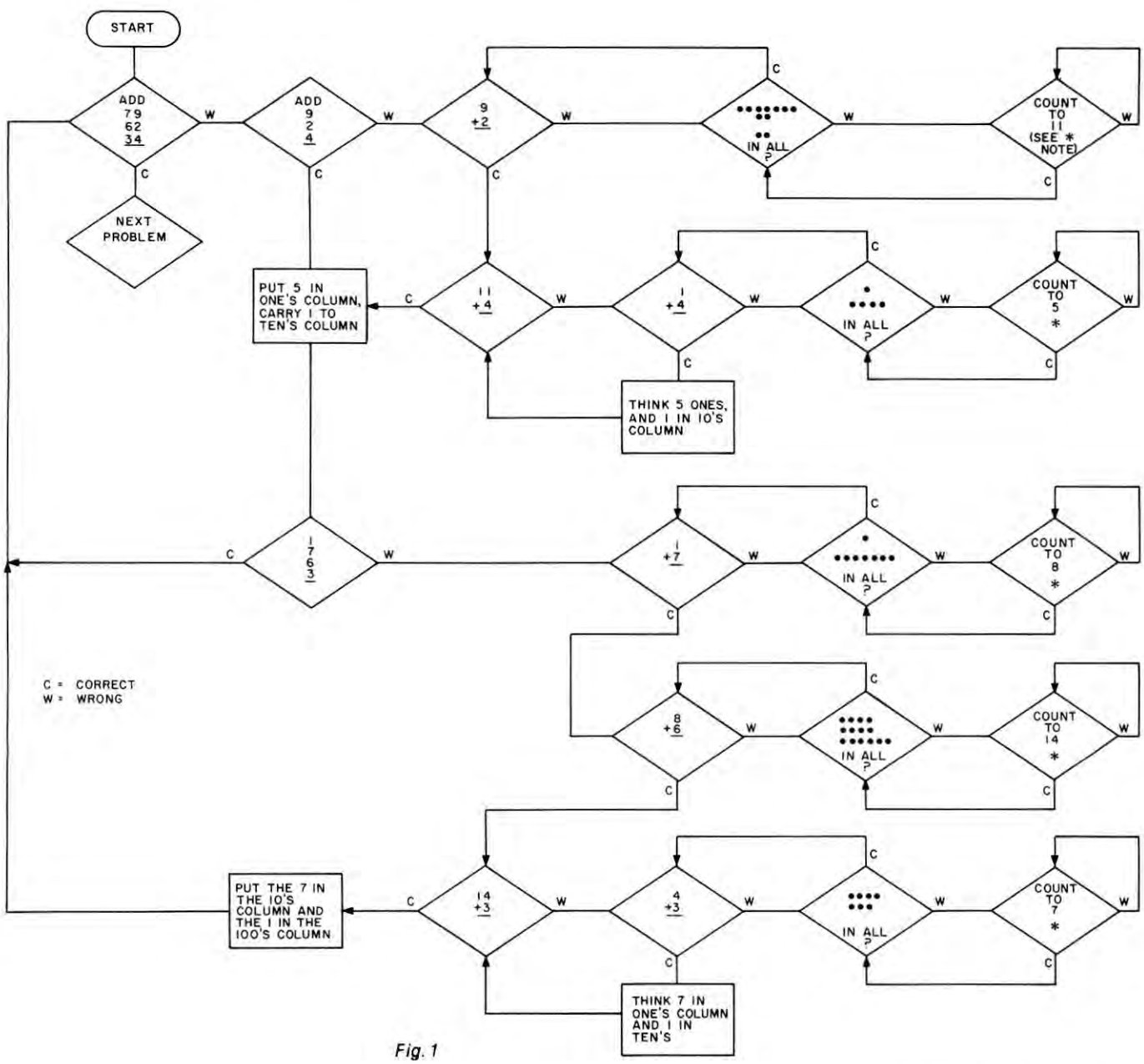


Fig. 1

terial in the subroutine, he returns to the original question and tries again. If successful, he is ready to go on to the next item.

Odds and Ends

The following are several short but important tips I would like to share with you in this section.

- Double-sized print.

One of the features of the TRS-80 best suited for educational programs is the availability of double-sized print. The command is PRINT CHR$(23). This size is especially appropriate for younger children who usually find it difficult to read smaller print. PRINT statements must be composed carefully when using CHR$(23), because you are limited to 32 characters per line. You will also find that CLS cancels this command, so it must be reentered in the program whenever you want to use it after a CLS. To avoid having to do this in a program where it appears several times, I suggest you place it in a subroutine, for example: CLS:PRINT CHR$(23):RETURN.

- Punctuation, grammar, vocabulary.

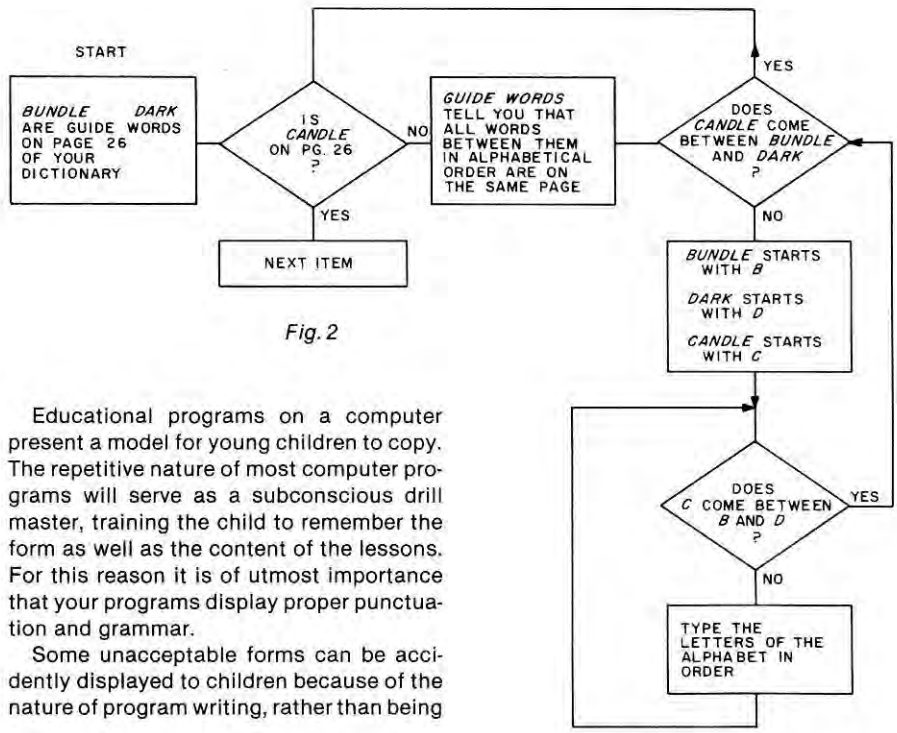


Fig. 2

Educational programs on a computer present a model for young children to copy. The repetitive nature of most computer programs will serve as a subconscious drill master, training the child to remember the form as well as the content of the lessons. For this reason it is of utmost importance that your programs display proper punctuation and grammar.

Some unacceptable forms can be accidently displayed to children because of the nature of program writing, rather than being merely the result of poor programming by the programmer. Some examples: Any INPUT statement on the TRS-80 wil automatically be followed by a question mark. INPUT "WHAT IS YOUR NAME";N$ will appear on the screen as, WHAT IS YOUR NAME? If you put a question mark in the input statement, INPUT"WHAT IS YOUR NAME?";N$, you will end up with two question marks on the screen.

On the other hand, INPUT"PRESS ENTER" will print as PRESS ENTER? This error can be avoided by saying, PRINT "PRESS ENTER.":INPUT A$. The question mark will then be on a line of its own, avoiding the impression that a question mark should follow a statement like 'Press enter.' Using INKEY$ instead of INPUT avoids any question mark.

Another very common error occurs when a string variable follows a PRINT statement, such as PRINT"VERY GOOD";N$. Most of you realize this will print as VERY GOODJOHN (no following punctuation as well as no comma or space between GOOD and JOHN). The statement must be written, PRINT"VERY GOOD, ";N$;".", using a comma and space after good and the period after the string variable N$.

You must keep in mind that these and other minor errors which mean nothing to an educated adult would be significant to a young elementary school child. Instructions must also be written in the vocabulary of the reader, if he is to be given the best

```
5 'LISTING NO. 4
10 CLEAR500
15 CLS
20 PRINT"LISTING 4"
25 PRINT STRING$(63,61)
30 PRINT"THE INKEY$ FUNCTION--EXAMPLE 3"
35 PRINT:PRINT"     VARIABLE LENGTH WORDS"
40 PRINT STRING$(63,61)
45 PRINT "PRESS <ENTER> TO BEGIN.":INPUT A$
50 I=0:J=0
55 FOR I=1 TO 5
60 READ Q$(I),A$(I)
65 NEXT I
70 B1$="":X=0:J=J+1: C$=INKEY$
75 CLS
76 E=LEN(A$(J))
80 PRINT@7*64, "(";J;")  ";Q$(J)
85 PRINT:PRINT"TYPE THE WORD THAT SHOULD COME FIRST"
86 PRINT"IN APLPHABETICAL ORDER."
87 FORE1=1 TO E
90 FOR X=1 TO 150
95 B$=INKEY$:IF B$=""THEN NEXT X
100 IF X>450 THEN 190
105 IF B$=CHR$(8) THEN 80
110 IF B$=CHR$(13) THEN 80
120 PRINT B$;
155 B1$=B1$+B$
160 NEXT E1
165 IFB1$<>A$(J) THEN 180
170 PRINT "     CORRECT!"
175 GOSUB 215: GOTO 70
180 PRINT "     WRONG ANSWER."
181 PRINT"THE ANSWER IS... ";A$(J);"."
185 GOSUB 215:GOTO 70
190 PRINT"     TIME'S UP!":GOSUB 215:GOTO 70
195 PRINT@7*64,"THIS IS THE END OF THE LESSON."
200 PRINT"GOOD-BYE FOR NOW."
205 PRINT "GO BACK TO YOUR CLASS.":PRINT:PRINT:PRINT:PRINT
210 FOR X=1 TO 2000: NEXT: RESTORE  'USE 9000 IN PRACTICE
211 J=0:GOTO 50
215 FOR X=1 TO 1000:NEXT
220 IF J>4 THEN 195
225 RETURN
230 DATA "COME   RAIN   WOOD","COME","MOTHER   BIG   AROUND"
235 DATA "AROUND","RUN   GO   SEE","GO","JUMP   JULY   JUNE"
240 DATA "JULY","BRING   BABY   BECAUSE","BABY"
```

Program Listing 1

WE WILL NOT BE UNDERSOLD

DISK DRIVES

FOR TRS-80* Model I

CCI-100 TEAC	5¼", 40 Track (102K)	**$314**
CCI-100 MPI	5¼", 40 Track (102K)	**$319**
CCI-280	5¼", 80 Track (204K)	**$429**

ADD-ON DRIVES FOR ZENITH Z-89

CCI-189	5¼", 40 Track (102K)	**$394**
CCI-289	5¼", 80 Track (204K)	**$499**
Z-87	Dual 5¼" system	**$995**

External card edge and power supply included. 90 day warranty/one year on power supply.

RAW DRIVES 8" SHUGART 801R **$425**
5¼" MPI, TEAC or TANDOM **$ CALL**

MORROW DESIGNS/THINKER TOYS™

DISCUS 2D	1 DRIVE	**$ 938**	2 DRIVE	**$1635**
DISCUS 2+2	1 DRIVE	**$1259**	2 DRIVE	**$2245**
DISCUS Hard Disk	M26	**$3990**	M10	**$2999**

DEI CARTRIDGE TAPE BACK-UP

For your hard disk. With either S-100 control card or piggy back board for single board Z-80 computers. ~~$3580~~ **$2995**

DISK OPERATING SYSTEMS

PATCHPAK #4 by Percom Data				**$8.95**
CP/M®	for Model I, Zenith	**$145**	for Model II, Altos	**$ 169**
NEWDOS	Plus 40track	**$ 79**	**NEWDOS 80**	**$ 135**

DISKETTES — Box of 10 with plastic library case

5¼"	**Scotch**	**$35**	**Maxell**	**$40**	**BASF/Verbatim**	**$24**
8"	**Scotch**	**$50**	**Maxell**	**$55**	**BASF/Verbatim**	**$36**

CLEAR PLASTIC CASE–Holds 50 5¼" diskettes **$19**

COMPLETE SYSTEMS

ARCHIVES				**$ CALL**
ALTOS	ACS8000 Series			**$ CALL**
APPLE	II-16K **$1075**		III-96K	**$3749**
	Call for other Apple products			
TRS-80*	II-64K **$3499**		III-16K	**$ 899**
ZENITH	48K, all-in-one computer			**$2395**
ZENITH	Z-19			**$ 795**
TELEVIDEO	920C **$ 748**		950	**$1049**
IBM	3101 Display Terminal			**$1195**
ATARI	400 **$ 479**		800	**$ 795**
APF	Game Only **$ 95**		System	**$ 489**
MATTEL	INTELLIVISION			**$ 229**
Used TRS-80* Model I Computers, tested and guaranteed				**$ CALL**

MONITORS

APF	9" B & W TVM-10		**$120**
BELL & HOWELL	9" B & W BHD911		**$220**
LEEDEX	12" B & W **$129**	13" Color	**$389**
SANYO	9" B & W VM4509		**$155**
SANYO	12" B & W DM5012		**$226**
SANYO	12" Green Screen DM5112		**$238**
SANYO	13" Color DMC6013		**$416**
ZENITH	13" Color		**$350**

TELECOMMUNICATIONS

LIVERMORE STAR MODEM 2-year guarantee	**$129**
UNIVERSAL DATA SYSTEMS UDS-103	**$179**
D-CAT HARD WIRED DIRECT MODEM	**$189**
AUTO-CAT Auto Answer, Direct Connect Modem	**$249**

PRINTERS

NEC Spinwriter
Letter Quality High Speed Printer

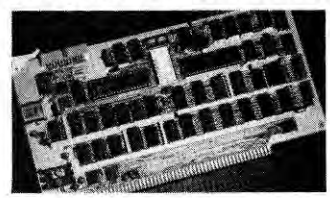
R.O.	**$2395**
R.O. with tractor feed	**$2595**
KSR with tractor feed	**$2895**

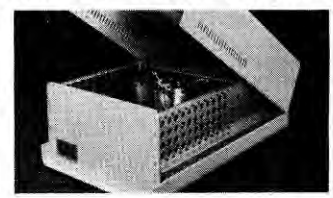
C.ITOH	Starwriter **$1795**		Starwriter II	**$1995**
EPSON MX-80				**$ CALL**
PAPER TIGER				
IDS 445	Graphics & 2K buffer			**$ 699**
IDS 460	Graphics & 2k buffer			**$1050**
IDS 560	Graphics			**$1599**
ANADEX	DP-8000 **$849**		DP-9500/01	**$1345**
OKIDATA				
Microline 80	Friction & pin feed			**$ 499**
Microline 80	Friction, and pin & tractor feed			**$ 599**
Microline 82	Friction & pin feed feed			**$ 719**
Microline 83	120 cps, uses up to 15" paper			**$ 995**
CENTRONICS	730 **$ 595**	737 **$ 780**	779	**$ 969**
EATON	LRC 7000 +			**$ 269**
TI-810				
TRS-80* software, compressed print & vert. form control				**$1865**

16K RAM KITS

2 for $56 **$30**
200 ns for TRS-80*, Apple II, (specify): **Jumpers** **$2.50**

S-100 CALIFORNIA COMPUTER SYSTEMS





MAINFRAME	Model 2200A	**$349**
Z80 CPU	Model 2810	**$269**
MOTHER BOARD	Model 2501	**$ CALL**
16K STATIC RAM, 200ns	Model 2016BC	**$309**
32K STATIC RAM, 200ns	Model 2032C	**$619**
64K DYNAMIC RAM	Model 2065A	**$599**
FLOPPY DISC CONTROLLER	Model 2422A	**$359**
EXTENDER BOARD	Model 2520	**$ CALL**
2P + 2S I/O	Model 2718	**$ CALL**

ACCESSORIES

Z-80 SOFTCARD	**$299.00**
SCOTCH HEAD CLEANING DISKETTE: Cleans drive Read/Write head in 30 seconds; specify 5¼" or 8".	**$ 25.00**
FLOPPY SAVER: Protection for center holes of 5¼" floppy disks. Installation tools and rings for 25 diskettes.	**$ 11.95**
Re-orders of rings only	**$ 6.95**
VIDEX BOARD 80 Column, U/L case conversion card	**$279.00**
CRT FILM: Helps eliminate external glare, 9"	**$ 29.00**
RF MODULATOR: Adapts video to TV	**$ 29.00**
TRS-80 & OTHER MYSTERIES	**$ 18.95**
NEC SPINWRITER THIMBLE **$11.95** **RIBBON**	**$ 6.00**
CCS CARDS: Parallel or serial printer interface cards	**$115.00**
RS232: For Radio Shack Interface.	**$ 89.00**
DISK-DRIVE EXTENDER CABLES: Fits all mini-disk drives.	**$ 16.95**
SIX (6) PRONG ISOLATOR: ISO-2	**$ 54.00**
AC FILTER/6 PRONG POWER STRIP	**$ 39.00**
DISK DRIVE CABLES: 2 drive **$29.00** 4 drive	**$ 35.00**

For fast delivery, send certified checks, money orders or call to arrange direct bank wire transfers. Personal or company checks require two to three weeks to clear. All prices are mail order only and are subject to change without notice. Call for shipping charges.

DEALER (NATIONAL/INTERNATIONAL) INQUIRIES INVITED **Send for FREE Catalogue**

The CPU SHOP ✓298

TO ORDER CALL TOLL FREE 1-800-343-6522
TWX: 710-348-1796 Massachusetts Residents call 617/242-3361

5 Dexter Row, Dept. M04M
Charlestown, Massachusetts 02129
Hours 10AM-6PM (EST) Mon.-Fri. (Sat. till 5)

Technical Information call 617/242-3361
Massachusetts Residents add 5% Sales Tax
Tandy Corporation Trademark/* Digital Research

master charge THE INTERBANK CARD

VISA®

✓See List of Advertisers on page 306

"One secret of maintaining interest is to keep the lesson shorter than the children would like it to be."

chance to understand them. Too many times directions seem to be written as a challenge to the reader rather than a guide! If you are not already familiar with the vocabulary of the age level you are programming for, be guided by the reading and math workbook materials published by textbook publishers.

● Introductory lessons.

I have found it helpful to write a program designed to introduce young students to the TRS-80. The teacher or an aide should be present during this lesson. It covers the following points:

How to use the ENTER key—that it tells the computer we have finished our turn; now it is the computer's turn to do something. Practice using the left arrow to erase.

Provide time for the child to become familiar with the keyboard; have him type his name, the letters of the alphabet, the numerals, and compositions of his own choice. Summarize the major directions so children will be familiar with them, such as: WHAT IS YOUR NAME? THIS IS THE END OF THE LESSONS. GO BACK TO CLASS.

"Too many times directions seem to be written as a challenge to the reader rather than a guide."

Be consistent in your directions. Use the same vocabulary in all of your programs. If your computer programs are to be effective, the computer itself must be eliminated as much as possible as a roadblock to learning.

When you use the INKEY$ function, tell children they will not have to use the ENTER key. If it is properly programmed it should not be a mechanical problem, but students may be confused by the way it works.

If your computer has the calculator keyboard, train the children to use it and the ENTER key on it.

Experiment with the use of POKE 16396,175 to disable the BREAK key. If you do use it, note that it will remain in command until you press RESET or turn the computer off.

Above all, be sensitive to the reactions of the children as they use the computer and your programs. The main reason I think my programs are successful is that I have revised them whenever I noted a child having difficulty due to computer use or programming technique rather than subject matter.

● Length of lessons.

My observation of elementary school youngsters reveals that long sessions at the computer are counter-productive. Even computer games that are intrinsically interesting cannot maintain the attention of the younger child for more than about twenty minutes. This phenomenon seems to hold true for everything they do, whether it's math or playing on the playground.

Aside from its educational content, a lesson must have two related qualities: it must be able to hold the student's interest during the lesson and be able to attract him to return to it with enthusiasm the next time. Without having to inject a lot of extrinsic enhancements, like fancy graphics or game-like contests, an easy way to achieve these objectives is to keep the lesson short enough so that the student's interest level is still high at the end of the lesson.

Unfortunately, many teachers practice the opposite technique! When the children are interested in their assigned tasks, the teacher is tempted to allow the lesson to continue in order to take advantage of the interest level. Eventually the interest level decreases, and the lesson comes to an end, but it is characteristic of human nature to remember the end rather than the beginning or the middle of an experience. There-

```
35 INPUT"HOW FAST";H1   'REPLACE THIS LINE WITH H1=7100
40 DIMA$(2800)
45 CLS:PRINT CHR$(23)
50 PRINT@6*64,"PLEASE REWIND THE CASSETTE TAPE."
55 PRINT"I'LL WAIT FOR YOU..."
60 OUT 255,255
65 FOR Z=1 TO H1:NEXT
70 OUT 255,0
75 CLS
80 PRINT CHR$(23)
85 PRINT@6*64,"TIME FOR SPELLING!"
90 PRINT:PRINT"TYPE YOUR NAME, PLEASE..."
95 INPUT E$
100 PRINT:INPUT"WHAT LESSON ARE YOU ON (1-11)";A
105 IF(A<1)OR(A>11)THEN 100
110 D=10*(A-1)+1
115 C=0:CLS:PRINT CHR$(23)
120 PRINT@6*64,"PRESS THE PLAY KEY"
125 PRINT"ON THE CASSETTE PLAYER."
130 PRINT:PRINT"PRESS ENTER WHEN YOU ARE READY.":INPUT A$
135 PRINT"TYPE THE WORD YOU HEAR"
140 PRINT"NEXT TO THE NUMBER"
145 PRINT"ON THE SCREEN."
150 N=0:F=D-1
155 FOR C=1 TO D+9
160 READ A$(C)
165 NEXT C
170 FOR E=D TO D+9:B$=""
175 F=F+1
180 OUT 255,255
185 FOR H=1 TO H1:NEXT
190 OUT 255,0
195 PRINT CHR$(23)
200 PRINT F;:INPUT B$:IF B$=""THEN 200
205 IF B$<>A$(E) THEN N=N+1:A$(N)=A$(E):GOSUB 325
210 IF N=5 THEN 270
215 NEXT E
220 PRINT"VERY GOOD, ";E$;"."
225 IF N>0 THEN 245
230 PRINT"YOU GOT A PERFECT SCORE!!!"
235 PRINT "10 OUT OF 10!!"
240 GOTO 260
245 PRINT"YOU GOT ONLY";N;"WRONG"
250 PRINT"OUT OF 10!!"
255 PRINT"STUDY...":FOR G=1 TO N:PRINTA$(G):NEXT G
260 PRINT"YOUR NEXT LESSON IS NO.";A+1;"."
265 GOTO 285
270 CLS:PRINT CHR$(23):PRINT"THAT'S ALL FOR TODAY."
275 PRINT"STUDY...":FOR G=1 TO N:PRINTA$(G):NEXT G
280 PRINT"YOUR NEXT LESSON IS NO.";A;"."
285 PRINT"TELL YOUR TEACHER."
290 PRINT"GOODBYE, ";E$;"."
295 FOR X=1 TO H1:NEXT
300 CLS:PRINT CHR$(23)
305 PRINT@6*64,"INSTRUCTIONS:"
310 PRINT:PRINT:PRINT"PLEASE TYPE RUN AND"
315 PRINT"PRESS <ENTER> KEY."
320 END
325 CLS:PRINT CHR$(23)
330 PRINT"THE WORD IS.....";A$(N);"."
335 PRINT:PRINT"TYPE IT ONCE"
```

program continues

Positional Mathematics

POSITIONAL MATHEMATICS was last used prior to 11035 B.C. Its revival began in 1970 A.D. The advent of the computer has permitted the most complex of all math systems to once again be a working tool in Man's quest to know himself. Positional Math, a system of numbers and words, provides a means of determining Man's experiences and when they will occur. The Programs offered are among the first to be published. A series of Lessons will be offered to introduce Positional Mathematics.

LESSON ONE is ready. Lessons Two - Seven will be offered as they are completed. The approximately 60K of Lesson One is in four parts and is a necessary beginning in using the Positional Mathematics Programs. For this reason **LESSON ONE** is offered in an introductory package with the Program, **INDIVIDUAL GROWTH.**

LESSON ONE — An Introduction to Positional Mathematics: Part I, *Words & Numbers, the Universe;* Part II, *The Name of Man;* Part III, *Numbers & Health;* Part IV, *Wealth & Love Balance.* Lessons are interactive with student's personal data input. Each Part Cloads in 16K, Level II.

INDIVIDUAL GROWTH — gives life position & intensity, crises & crises years, experience & years, balance & years, and indicates growth balance as positive or negative for wealth, work, sex, health, love, knowledge & success *(sold with Lesson One until June, 1981).*

LOVE & SEX FOR A COUPLE — gives love & sex balance & conflicts and comments for each person and positional dates for each with intensity & if positive or negative.

INDIVIDUAL LIFE WEALTH — gives the balance for wealth: balance, conflict, growth, success, experience & life wealth balance with summary.

WEALTH BALANCE — DATES — gives life wealth balance, balance for years, months and dates with balance for each of 90 years from birth . . . the 1-9 series positions balance for any year and the 1-9 series life wealth balance positions.

INDIVIDUAL LIFE SEX — gives life sex balance and balance for 1-9 series for balance, conflict, growth, success and experience.

INDIVIDUAL LIFE WORK — gives life work balance and balance for 1-9 series for balance, conflict, growth, progress, success and experience.

LIFE POSITIONS & EXPERIENCE YEARS — gives life positions & intensity and the balance for the 1-18 series of positions and experience years, positions and experiences for sex, love, wealth, work, health and sociability.

Programs are on cassette for TRS-80* Level II, 16K . . . introductory single program price **$19.95**

INTRODUCTORY OFFER — LESSON ONE and INDIVIDUAL GROWTH . . . for only $19.95.
A savings of $39.95 . . . Lesson One price after May 30, 1981 will be $29.95 . . . Most single programs will be $29.95 after July, 1981.

Order by Program Name . . . send check or money order . . . allow two weeks for checks to clear.

---

*TRS-80 is a Trademark of Tandy Corp.

SEE FUTURE TURTLE ADS FOR NEW PROGRAMS

402

Turtle Computer Software Corporation

10400 N. Central Expwy., Suite 307, Dallas, Texas 75231

See List of Advertisers on page 306

MORE FOR YOUR RADIO SHACK TRS-80 MODEL I !

THE DATAHANDLER

DATABASE MANAGEMENT SYSTEM IN MMSFORTH

Now the power, speed and compactness of MMSFORTH drive a major applications program for many of YOUR home, school and business tasks! Imagine a sophisticated database management system with flexibility to create, maintain and print mailing lists with multiple address lines, Canadian or the new 9-digit U.S. ZIP codes, and multiple phone numbers, plus the speed to load hundreds of records or sort them on several fields in 5 seconds! Manage inventories with selection by any character or combination. Balance checkbook records and do CONDITIONAL reporting of expenses or other calculations. File any records and recall selected ones with optional upper/lower case match, in standard or custom formats. Personnel, membership lists, bibliographies, catalogs of record, stamp and coin collections—you name it! ALL INSTANTLY, without wasted bytes, and with cueing from screen so good that non-programmers quickly master its use! With manual, sample data files and custom words for mail list and checkbook use.

Technical: Handles data as compressed indexed sequential subfiles of up to 25K characters (9K in 32K RAM). Access 1-4 data diskettes. Modified Quicksort. Optionally precompiles for 5-second program load. Self-adjusts for many routine mods. Structured and modular MMSFORTH source code ideal for custom modifications.

THE DATAHANDLER V1.1, a very sophisticated database management system operable by non-programmers (requires Disk MMSFORTH, 1 drive & 32K RAM); with manuals, ... **$59.95***

MMSFORTH

THE PROFESSIONAL FORTH FOR TRS-80 MODEL I

(Over 1,000 systems in use)

MMSFORTH Disk System V1.9 (requires 1 disk drive & 16K RAM) ..... just **$79.95***
MMSFORTH Cassette System V1.8 (requires Level II BASIC & 16K RAM) **$59.95***

AND MMS GIVES IT PROFESSIONAL SUPPORT

Source code provided
MMSFORTH Newsletter
Many demo programs aboard
MMSFORTH User Groups
Programming staff can adapt
THE DATAHANDLER to YOUR needs.

MMSFORTH UTILITIES DISKETTE: includes FLOATING POINT MATH (L.2 BASIC ROM routines plus Complex numbers, Rectangular-Polar coordinate conversions, Degrees mode, more), plus a full Forth-style Z80 ASSEMBLER; plus a powerful CROSS-REFERENCER to list Forth words by block and line. All on one diskette (requires MMSFORTH, 1 drive & 16K RAM), .. **$39.95***

FORTH BOOKS AVAILABLE

MICROFORTH PRIMER (comes with MMSFORTH) separately **$15.00***
USING FORTH — more detailed and advanced than above **$25.00***
THREADED INTERPRETIVE LANGUAGES—advanced, excellent analysis of MMSFORTH-like language **$18.95***
CALTECH FORTH MANUAL — good on Forth internal structure, etc **$10.00***

* — Software prices include manuals and require signing of a single-system user license. Add $2.00 S/H plus $1.00 per additional book; Mass. orders add 5% tax. Foreign orders add 20%. UPS COD, VISA & M/C accepted; no unpaid purchase orders, please.

Send SASE for free MMSFORTH information. Good dealers sought.

Get MMSFORTH products from your computer dealer or

MILLER MICROCOMPUTER SERVICES (M4) ↙112
61 Lake Shore Road, Natick, MA 01760
(617) 653-6136


```
340 PRINT"AFTER EACH ? MARK."
345 FOR L=1 TO 5:C$=""
350 INPUT C$
355 PRINT C$;:IF C$<>A$(N) PRINT" IS WRONG. TYPE ";A$(N);".":GOTO
    350
360 PRINT" IS RIGHT, ";E$;"!"
365 IF L=5 PRINT"READY FOR THE NEXT WORD..."
370 NEXT L
375 RETURN
380 END
500 DATA INK,OCTOBER,BRICK,ACT,MARKET,TICKET,ARITHMETIC
505 DATA BUCKET,STRIKE,BLANKET,SUBTRACT,INSECT,SUBJECT
510 DATA ACRE,ARCTIC,DRINK,THINK,CRICKET,THICKET
515 DATA BISECT,DISSECT,TRACTOR,ATTRACTIVE,ACREAGE
520 DATA ACTIVITY,SECTION,COUNTERACT,ANTARCTIC
525 DATA PEOPLE,FRIEND,SUIT,FRUIT,BUILT,MOVIE,BUILD
530 DATA FIELD,PIECE,JUICE,POEM,CHIEF,BRUISE
535 DATA SHIELD,POETRY,BUILDING,BRUISING,SHIELDING
540 DATA WIELD,YIELD,FRIENDLY,CHIEFLY,PEACE
545 DATA FIERCE,SUITABLE,JUICY,CRUISE,HANDKERCHIEFS
550 DATA SON,MONDAY,BECOME,OVEN,MONTH,FRONT,TON
555 DATA DOZEN,BOTTOM,APRON,DOCTOR,SECOND,RIBBON
560 DATA BUTTON,COMPANY,NAPKIN,PERSON,PRISON
565 DATA PHANTOM,COMPANION,ACCUSTOM,MILLION,WEAPON
570 DATA OPINION,DIAMOND,PIGEON,REASON,POISON
575 DATA EARTH,EARLY,GREAT,LEARN,WEATHER,DEATH
580 DATA HEALTH,THREAD,BREAK,BREAKFAST,INSTEAD
585 DATA HEAVY,STEAK,PEARL,HEARD,STAKE,BRAKE
590 DATA HEAVIER,WHETHER,EARN,EARNESTLY,ENDEAVOR
595 DATA BREATHTAKING,DEAFENING,DREADFUL,STEADILY
600 END
```

Program Listing 2

fore, when the subject comes up again the next day, the interest level at the beginning of the second lesson is lower than it was at the beginning of the first.

One secret of maintaining interest is to keep the lesson shorter than the children would like it to be. When students leave the computer reluctantly and ask when their next turn is, you know your lessons are the right length. Do not be tempted to allow the children to stay longer! I keep all of my computer sessions under ten minutes. See if it works for you.

● Inputting Math Responses.

When you do a math problem (with pencil and paper) do you write the answer from left to right or from right to left? The correct answer is, 'It depends.' Look at these eight problems:

```
1)   21      2)   493     3)   936     4)   500     5)    8
   + 52           567        - 489        - 200        × 7
  ----           462          ---          ---        ---
                 931
                ---

6)   415     7)   425     8)  73|917
   × 93           × 10
  ----           ---
```

You might say that in 1-7 the correct procedure is to enter the answer from right to left, but I would guess that in actual practice few of you would do number 5 that way; wouldn't you simply write '56'? I would further guess that many of you would write the answers to numbers 1, 4, and 7 from left to right. Number 8 must be done from left to right. Number 6 is a three-step problem, so the answer cannot be written directly in either direction.

When planning for input of the answers to these problems on the computer, there is no clear cut criterion to help you to decide whether to go right to left or left to right! It is possible to program the computer to accept answers in either direction, but it is not possible to predict the direction the student will decide to use when he is solving the problem. Requiring answers to be inputted according to a variable set of criteria will result in confusion.

I can see two reasonable solutions to this dilemma: allow the student to place the cursor wherever he decides to start inputting the answer or to input all answers from left to right, regardless of the method used to calculate the answer. The former method would still result in confusion among younger children, so I recommend the latter.

I consider writing educational programs for elementary school students a highly specialized field. Professional programmers who are not familiar with the characteristics of young children may produce programs that are structurally excellent but still do not achieve their objectives. This material should prove helpful to both professional programmers and school staff members who desire to write effective educational programs for elementary school students. ■

THE ALTERNATE SOURCE

TASMON

Written By Bruce Hansen

- Replace Registers
- Modify Memory
- Hex Memory Dump
- ASCII Memory Dump
- Disassembled Dump
- Disassemble to Printer
- Dump Screen to Printer
- Sum Hex Values
- Subtract Hex Values
- Find 1-4 Consecutive Bytes
- Skip Forward One Instruction
- Back Up One Instruction
- Clear Screen
- Relocate System Programs
- Move a Block of Memory
- Load a System Tape
- Load a /CMD Disk File
- Write a System Tape
- Write a /CMD Disk File
- Disassemble to Disk
- Disassemble to Tape
- ROM or RAM Breakpoints (9)
- Set Breakpoints
- Display Breakpoints
- Clear Breakpoints
- Single Step with CALL in full
- Single Step through CALLs
- Trace at Eight Speeds
- GO Execute Program

Disassembles with Labels!

TASMON is fully relocatable, file oriented, and excellently implemented. Comes with an extensive user manual complete with sample dialogues and command reference card. For use on Level II, Disk System or Model III. 32K recommended.

$29.95

(Specify disk or tape, please)

TRAKCESS

Written by Roxton Baker

- Analyze any TRS-80 disk
- Build your own disk formats
- Direct control of 1-4 drives
- Toggle between drives
- Pencil-like editing features
- Edit in hex or ASCII
- Handles sectors of any length
- Learn about disk structure
- Read and Write Sectors
- Take and Put Tracks
- Scan Track Sectors
- Locate Disk Sectors
- Copy Track
- Duplicate Disk
- Build Format Track
- Edit or Fill Memory
- Figure CRC's
- Hex or ASCII dump to Printer
- Will copy to a blank diskette
- Default values for most input
- Scrolls thru tracks & sectors
- No system DOS in drive zero
- Handles any number of tracks
- Breaks any 'protected' code
- Will copy any 'protected' disk

A Powerful Zap Utility!

Version 1.1 Now Available

- Highly Interactive
- Smoother Operation
- Full Error Checking
- Compatible with Newdos/80

TRAKCESS is approximately 25K of Basic and machine language code. It requires a Model I 48K Disk system; two drives are required for copy functions. Printer optional.

$24.95

KBE KeyBoard Editor

Written by Larry Kingsbury

PROGRAMMABLE KEYS

- Operable under DOS or Basic
- Operable under EDTASM
- Program 191 different keys
- Allows 'nested' softkeys
- Load softkeys from disk
- Save softkeys to disk
- Pre-defined softkeys included
- Toggle softkeys on or off
- Redefine any key at ANY time
- Softkey length unlimited

FULL SCREEN EDITOR

- Operable under Basic or DOS
- Operable under EDTASM
- Edits any line up to 255 chars.
- Softkeys work in Edit Mode
- Easy duplication of lines

DRIVER

- Keyboard debounce
- Auto repeat
- Lower case
- Typewriter keyboard
- Echo video display to printer
- E/P control key support
- Full graphics input
- Prevents printer hangup
- Sets lines per page

KBE is compatible with VTOS, NEWDOS, NEWDOS/80, and TRSDOS 2.3. KBE requires a 32K disk system for operation, and is supplied on diskette with user's manual. KBE is compatible with double density.

$39.95

Don't Forget a Subscription to TAS -- $12.00 for 6 issues!

1806 Ada Street
Lansing, Michigan 48910
517/487-3358
517/485-0344

Add $2.00 for crush-proof box and postage, $1.50 for COD orders, 4% for Master Charge or Visa orders.

( ) Send me TASMON ( ) 6 issues please!
( ) Send me TRAKCESS ( ) Send me KBE

Name: _____
Address: _____
City: _____
State, Zip: _____

MICROCOMPUTER TECHNOLOGY INCORPORATED

SPRING SALE

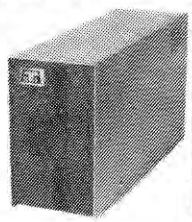
CLEARANCE SPECIAL
SHUGART SA400 (TF-3)

35 track disk drive
includes power supply
and chassis.
LIMITED SUPPLY

$299

FREE FULL YEAR WARRANTY

with purchase of new
SHUGART SA400 (TF-3L)
comes complete with
power supply, chassis,
cable & NEW DOS 80
ONLY **$439**



THE MICROCONDUCTOR™
the ultimate data base manager for your TRS-80®

The MICROCONDUCTOR™ is not just a file manager but a true Data Base Management System suitable for both the novice and professional users.

DATA FILES—No limit on the number of records a file can have.
FIELDS—Any type (string, interger, single, double). Eight entry modes (including defaults, counting, and suppress).
REPORTS—Four ways to generate reports. Total numeric column(s). Print on any paper in any format (statements, labels, etc.)
SORT—Any field(s) (i.e. multiple-key sort). Any size file, numeric or ASCII. Ascending or descending.
MAINT.—Command anticipation. Record duplication. Direct access and sequential search.
UPDATING/MERGING—Add, subtract, multiply, divide fields. Combine results from previous calculations. Test for any condition and take action.

TRS-80® MODEL I $159
TRS-80® MODEL II $399

NEW FOR TRS-80®

TF-8 80 TRACK DISK DRIVE by MPI

Double your capacity. Single head mini floppy. More than 200K bytes of storage. Complete with power supply and chassis.

$619

TF-9 DUAL 80 TRACK DISK DRIVE by MPI

Quadruple your capacity. 400K bytes of storage (like having 4-40 track drives in one unit). Complete with power supply and chassis.

$769

MOD II 8" Disk System

- 1 Drive System $949
- 2 Drive Expansion System $1,445

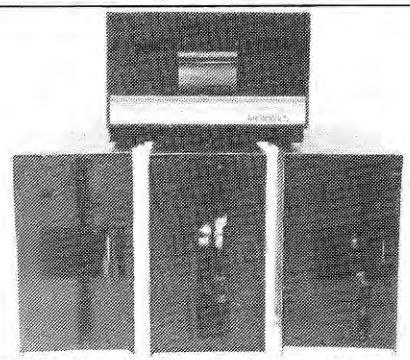
Disk Drive Sale!
with FREE power supply and chassis.

Shugart SA400L, 40 trk.	$329
Pertec FD200, 40 trk.	$379
TF-5 MPI B51, 40 trk.	$349
TF-7 Mircopolis, 77 trk.	$559
TDH-1 Dual sided drive, 35 trk.	$449
TF-3M Drive sys. 2 Shugart 40 trk.	$649

SOFTWARE SALE

NEWDOS 80			$149
NEWDOS+ 40 trk.	$110	30 trk.	$99
AJA Business Pkg.	$359		
The Source	$100	Basic Compiler	$195

MONTHLY SPECIAL
Shugart SA801 Bare Drive **$459**



MOD I Disk Expansion Systems

- 2 Shugart SA400 TF-3 ..... $658
- 1 Two-Drive Cable $26
- 1 Expansion Interface 32K $439
- 1 DOS+ $99

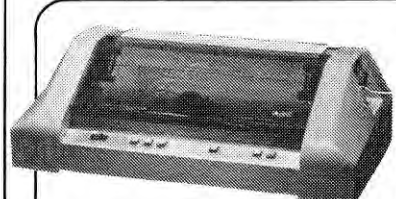
TOTAL LIST PRICE $1,222

SPECIAL PRICE ONLY $1,077

★BARE DRIVES FOR ANY MICROCOMPUTER

Pertec FD200	$282	FD250	$359
Shugart SA400 35 track	$269	SA400L 40 track	$279
MPI B51	$279	B52	$349
MPI B91	$399	B92	$525

Memory Kit (16K)	$43.00
AC Isolator (6 socket)	$49.95
Disk Head Cleaner	$19.95
Diskettes Verbatim (10) hard ring	$30.00



Anadex 9500 ... $1,449

Printers

Microline 82	$849
Microline 83	$1,060
Centronics 779	$1,069
Centronics 700	$1,129
Base 2	$649
Centronics 737	$839
Centronics 702-9	$1,995
Malibu	$2,093
Paper Tiger	$895
Daisy Wheel	$1,799

INTRODUCTORY OFFER
SAVE $300 LIST $949

Okidata
Microline 80
$599

EPSON PRINTER $595

® Registered trademark of Radio Shack

TRS-80® MODEL III OWNERS

We think our disk system for expanding your capacity is just as good as theirs - and we know it costs much less . . .

COMPLETE SYSTEMS AND COMPONENTS*

TRS-80® MOD III SYSTEM

with 2 disk drives, 48K*

SAVE $500 OFF LIST PRICE

$1,899

16K RAM, Model III Basic $899

MTI DISK DRIVES for MOD III

Internal Kits

Disk Drive 1 ..... $649

Disk Drive 2 ..... $279

External Add-on Kits

Disk Drive 3 ..... $379

Disk Drive 4 ..... $359

Model III DOS & Manual $21.95

16K RAM Kit $59

RS-232 Serial Interface $95

New low cost internal disk kit available to expand your storage capability. With this kit, now, you may expand your Model III computer up to four MTI 40 track disk drives, giving 175,000 bytes of storage per drive for a total of 700K.

The kit includes one 40 track disk drive, controller, power supply, cables, mounting hardware and installation documentation.

Manufacturer Direct Price ONLY..... $649

MICROCOMPUTER TECHNOLOGY, INC.

3304 W. MACARTHUR, SANTA ANA, CA 92704

★ PHONE (714) 979-9923 ★ TELEX #678401TAB IRIN

*Uses MTI Memory, Disk Drives & Components

® TRS-80® IS A REGISTERED TRADEMARK OF TANDY CORPORATION

M3-B

MasterCard VISA

ALL PRICES CASH DISCOUNTED
FREIGHT FOB FACTORY
ASK FOR FREE CATALOG

See List of Advertisers on page 306

Hey kids, don't be a Pepper, be a processor. Play Simul-80 today.

Simul-80-A Weird Game

Dennis Bathory Kitsz
Roxbury, VT 05669

How's your computer club doing with machine or assembly language programming? Are your advanced students chafing at the limitations of BASIC, but can't get a handle on the operation of the CPU? Then Simul-80 is for you! It is a frenzied, physically dangerous simulation of the internal operations of a mythical microprocessor similar to the TRS-80, in which every participant plays the role of a basic computer element.

Simul-80 was first attempted during a microprocessor seminar at the Vermont environmental engineering firm of DuBois & King, Inc., and lapsed into total confusion as the engineer in charge of adding two one-digit numbers came up with the wrong answer. Here's the game and the rules... good luck!

The Players

Fifteen people (including one human) are needed to play a complete round of Simul-80, although eight can play a serviceable game. If absolutely necessary, players marked with an asterisk can be replaced with props.

The Accumulator (A) performs simple addition and subtraction, and turns over a zero card and a carry card. This is the hardest intellectual task in the game, and the ability to count to ten is prerequisite.

The Program Counter (PC) keeps track of the current position within the program. The ability to count accurately up to one is essential.

The Memory (MEM) holds a great card of information—but can see only one number on it at a time. Roulette table experience is an added plus for this player.

The Instruction Decoder (ID) accepts numbers from MEM and looks up their meaning on a master list. Hire an accountant for this task.

The Address Bus runs from place to place informing other participants where they should be. Sneakers are recommended.

The Data Bus also runs from place to place with precious digits of information. This is the most strenuous physical task; sneakers are recommended, knee pads and helmets are required.

*Four Registers (B, C, H, and L) write down numbers when told to do so. Leg irons may be used to hold these players in place.

*Two drones, the Zero (Z) and Carry/Borrow (CY) flags hold up cards when told to do so. Avoid using Dr. Strangelove types here.

The Clock acts like a square dance caller and keeps the whole thing together. A crewcut is desirable, along with a touch of West Virginia twang.

An Input/Output Device (I/O) gives and accepts information at the beginning and end of the program. There will be enough time in between for this player to step out for a seven-course meal at the Lido.

For simplicity, this simulation does not provide for a stack pointer, nor any sort of interrupt functions, though it can easily be expanded to include them. A few other activities have been modified for sanity's sake...ordinary decimal numbers are used, not such nasties as binary or hex.

The Instruction Set

The instruction set is divided into simple groups, and code numbers are assigned to represent each of the individual instructions. The instructions include the following:

- Loads. The accumulator and the four registers may be given numerical information, which they hold on to until otherwise instructed. There are eight load commands in Simul-80.
- Increments and Decrements. The registers may change the positions of their wall cards by one (see Props, below). There are four such instructions in the game.
- Adds and Subtracts. The accumulator may perform simple addition and subtraction when instructed to do so. Comparisons are a kind of subtraction, but no result is obtained; only the flags are altered. Seven arithmetic functions are available.
- Jumps. The program counter shifts its current position in memory to a new one, and the program continues from there. Three jumps are used in this instruction set.
- Special Instructions. There are three: One clears everything out of the accumulator, another does nothing, and the last halts the operation of the program.

Listing 2 describes the instructions in numerical order. Since programs can actually be written in Simul-80 code, the instruction set can be expanded to include commands #6, 15 to 19, 21 to 24, 32, 35 to 39, and 41 to 98.

The Program

Listing 1 presents a complete program in

"Simul-80. . . lapsed into total confusion as the engineer. . . adding two one-digit numbers came up with the wrong answer."

Simul-80 numerical code and Simul-80 mnemonics. The first column contains the address the program counter will hold aloft for all to see; the second column contains labels for observers to identify segments of the program (the players never see these); the third column contains the machine's instructions which memory holds and the instruction decoder must interpret. The players do not see these last two columns either: The fourth column, containing the abbreviated descriptions of each instruction (the mnemonics), and the last column, presenting detailed comments about the program's operation.

The routine performed by this simulation is the addition and subtraction of a column of two-digit numbers. There are a few limitations which the human using the I/O device must respect when writing for this single-precision computer:

- Only two-digit numbers may be used. Two is written 02, seven is written 07, etc., and no numbers can be greater than 99.
- No subtotal may be negative, nor may the total be negative.
- No subtotal may exceed 999, nor may the total exceed 999.
- Addition (+) is indicated by using code 01, subtraction (−) by using code 02, and total or equals (=) by using code 03.
- Addition and subtraction may be performed in any order, but equals (=) must be the final command. For example, to produce the result of: 3 + 15 + 98 − 33 + 12 − 18 + 67 − 13 + 1, it is coded: 03 01 15 01 98 02 33 01 12 02 18 01 67 02 12 01 01 03.

The coding requirement for the human is to take the original problem, make sure every number is converted to exactly two digits, and replace the mathematical signs with their equivalent code numbers. Notice that it makes no difference that 1 + 1 is coded 01 01 01. It's the proper order that counts.

The Props

- A Coding Sheet. This is a lined sheet on which the controlling human lists the problem being computed. The I/O device requires these numbers, but is not capable of creating or correcting their order.
- Identification Tags. All performers must be properly identified so that the traveling address bus and data but can find them. The accumulator, zero and carry/borrow flags, memory and instruction decoder are seated; the program counter, four registers, and the I/O device should stand. The clock may be anywhere within hearing distance of all players.
- Information Sheets. Since players will hardly be able to memorize all their actions, information or instruction cards must be provided. The text for each card is present-

Program Listing 1.

Address	Label	Instruction	Mnemonic	Comment
01	START	01	LD A,(B)	;Get "tens" digit from input
02		10	LD (H),A	;Put it in "tens" subtotal register
03		02	LD A,(C)	;Get :"ones" digit from input
04		11	LD (L),A	;Put it in "ones" subtotal register
05	NXTINS	03	INC BC PTR	;Bump input pointer by one
06		02	LD A,(C)	;Get arithmetic code from input
07		20 01	CP 01	;Addition code = 1; is it?
09		31 21	JP Z, "ADD"	;Go to additon if code = 1
11		20 02	CP 02	;Subtraction code = 2; is it?
13		31 52	JP Z, "SUB"	;Go to subtraction if code = 2
15		20 03	CCP 03	;Equals or total code = 3; is it?
17		31 90	JP Z, "END"	;Go to end if code = 3
19		34 83	JP "ERR"	;Go to error trap if ≠ 1, 2, or 3
21	ADD	03	INC BC PTR	;Bump pointer to value to add
22		02	LD A, (C)	;Get "ones" digit from input
23		26	ADD A,(L)	;Add previous "ones" subtotal
24		11	LD (L),A	;Save new "ones" subtotal
25		33 39	JP NC, "HIBYT"	;Go if result not greater than 9
27		04	LD A,(H)	;If > 9, get "tens" subtotal
28		27 01	ADD A,01	;Let Tens = Tens + 1
30		10	LD (H),A	;Save new "tens" subtotal
31		33 39	JP NC, "HIBYT"	;Go if result not greater than 9
33		07	INC HL PTR	;If > 9, bump to "hundreds" place
34		05	LD A,(L)	;Get previous "hundreds" subtotal
35		27 01	ADD A,01	;Let Hundreds = Hundreds + 1
37		11	LD (L),A	;Save new "hundreds" subtotal
38		08	DEC HL PTR	;Bump pointer back to normal
39	HIBYT	01	LD A,(B)	;Get "tens" digit from input
40		25	ADD A,(H)	;Add previous "tens" subtotal
41		10	LD (H),A	;Save new "tens" subtotal
42		33 05	JP NC,"NXTINS"	;Go back (done) if not greater than 9
44		07	INC HL PTR	;If > 9, bump to "hundreds" place
45		05	LD A,(L)	;Get previous "hundreds" subtotal
46		27 01	ADD A,01	;Let Hundreds = Hundreds + 1
48		11	LD (L),A	;Save new "hundreds" subtotal
49		08	DEC HL PTR	;Bump pointer back to normal
50		34 05	JP "NXTINS"	;Done—go back for more input
52	SUB	03	INC BC PTR	;Bump pointer to value to subtract
53		05	LD A,(L)	;Get previous "ones" subtotal
54		28	SUB A,(C)	;Subtract new value from previous
55		11	LD (L),A	;Save new "ones" subtotal
56		33 70	JP NC,"HBT2"	;Go if result no borrow (> 0)
58		04	LD A,(H)	;If borrow, get "tens" digit subtotal
59		29 01	SUB A,01	;Let Tens = Tens − 1
61		10	LD (H),A	;Save new "tens" subtotal
62		33 70	JP NC,"HBT2"	;Go if result no borrow (> 0)
64		07	INC HL PTR	;If borrow, bump to "hundreds" place
65		05	LD A,(L)	;Get "hundreds" digit subtotal
66		29 01	SUB A,01	;Let Hundreds = Hundreds − 1
68		11	LD (L),A	;Save new "hundreds" subtotal
69		08	DEC HL PTR	;Bump pointer back to normal
70	HBT2	04	LD A,(H)	;Get previous "tens" value
71		30	SUB A,(B)	;Subtract new value from previous
72		10	LD (H),A	;Save new "tens" subtotal
73		33 05	JP NC,"NXTINS"	;Go back (done) if no borrow
75		07	INC HL PTR	;If borrow, bump to "hundreds" place
76		05	LD A,(L)	;Get "hundreds" subtotal
77		29 01	SUB A,01	;Let Hundreds = Hundreds − 1
79		11	LD (L),A	;Save new "hundreds" subtotal
80		08	DEC HL PTR	;Bump pointer back to normal
81		34 05	JP "NXTINS"	;Done—go back for more input
83	ERR	09	DEC BC PTR	;Bump input pointer back
84		12 09	LD A,09	;Get error code digit ready
86		13	LD (B),A	;Let "Tens" value = error code 9
87		14	LD (C),A	;Let "Ones" value = error code 9
88		03	INC BC PTR	;Bump pointer to bad code
89		99	HALT	;Halt program and report to human
90	END	05	LD A,(L)	;Get "ones" subtotal value
91		14	LD (C),A	;Put subtotal in output register
92		04	LD A,(H)	;Get "tens" subtotal value
93		13	LD (B),A	;Put subtotal in output register
94		07	INC HL PTR	;Bump pointer to "hundreds" place

Program continues

```
95    05    LD A,(L)      ;Get "hundreds" subtotal value
96    03    INC BC PTR    ;Bump output pointer one position
97    14    LD (C),A      ;Put "hundreds" subtotal in output
98    40    CLR A         ;Set A equal to zero
99    13    LD (B),A      ;Put zero in "thousands" place
00    99    HALT          ;Stop program and report to human
```

Simul-80 Program for Addition, Subtraction, and Total, with Error Trapping

Program Listing 2

NUMERICAL CODE	DESCRIPTION	ABBREVIATION
00	No operation (serves as a delay)	NOP
01	Load Accumulator with contents of Register B	LD A,(B)
02	Load Accumulator with contents of Register C	LD A,(C)
03	Increment the pointer position of B and C	INC BC PTR
04	Load Accumulator with contents of Register H	LD A,(H)
05	Load Accumulator with contents of Register L	LD A,(L)
06	No such instruction. . . computer reports error	----------
07	Increment the pointer position of H and L	INC HL PTR
08	Decrement the pointer position of H and L	DEC HL PTR
09	Decrement the pointer position of B and C	DEC BC PTR
10	Load H Register contents with Accumulator	LD (H),A
11	Load L Register contents with Accumulator	LD (L),A
12 NN	Load Accumulator with the value NN	LD A,NN
13	Load B register contents with Accumulator	LD (B),A
14	Load C Register contents with Accumulator	LD (C),A
15-19	No such instruction. . . computer reports error	----------
20 NN	Compare Accumulator with the value NN	CP A,NN
21-24	No such instruction. . . computer reports error	----------
25	Add contents of Register H to the Accumulator	ADD A,(H)
26	Add contents of Register L to the Accumulator	ADD A,(L)
27 NN	Add the value NN to the Accumulator	ADD A,NN
28	Subtract contents of Register C from Accumulator	SUB A,(C)
29 NN	Subtract value NN from the Accumulator	SUB A,NN
30	Subtract contents of Register B from Accumulator	SUB A,(B)
31 NN	If Z is set, change Program Counter to NN	JP Z,NN
32	No such instruction. . . computer reports error	----------
33 NN	If CY is not set, change Program Counter to NN	JP NC,NN
34 NN	In any condition, change Program Counter to NN	JP NN
35-39	No such instruction. . . computer reports error	----------
40	Clear the Accumulator to Zero	CLR A
41-98	No such instruction. . . computer reports error	----------
99	Program halts operation	HALT

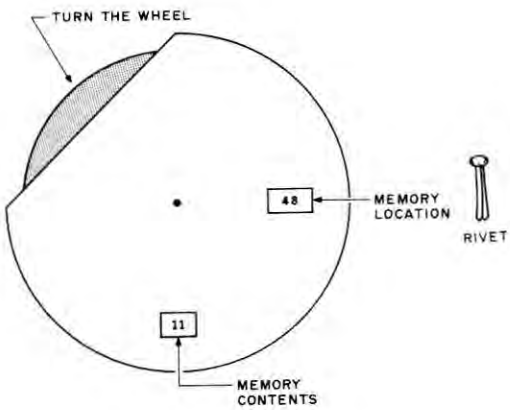


Fig. 1.

ed later in this article.

- The Program. Memory must have a complete listing of the program, but it should be made up in such a way that the contents of only one memory location are visible at a time; the wheel shown in Fig. 1 is ideal for this purpose.
- Wall Charts. Since the registers are not expected to be intelligent, they must have wall charts to refer to. Such charts usually consist of a pie-shaped figure with a movable arrow. The arrow points to blank spaces which may be filled with numbers as the need arises. See Fig. 2.
- Flash Cards. A pair of true drones are the Zero and Carry/Borrow flags, who are each given a card. One side reads "set," the other reads "not set."
- A Program Counter Booklet. This is a flip-book containing one hundred sequential numbers, 01 through 00. At each change in the program's position, the program counter flips to the proper number.
- Pencil and Paper. Every player should be provided with writing materials and enough scraps of paper to write down a value, should it be needed, during every step of the program.
- Shoulder and Knee Pads. This game is not approved under the Occupational Safety and Health Act (OSHA), and in a small room these pads will be essential.

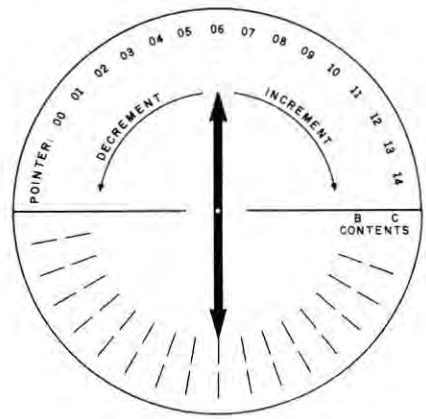


Fig. 2.

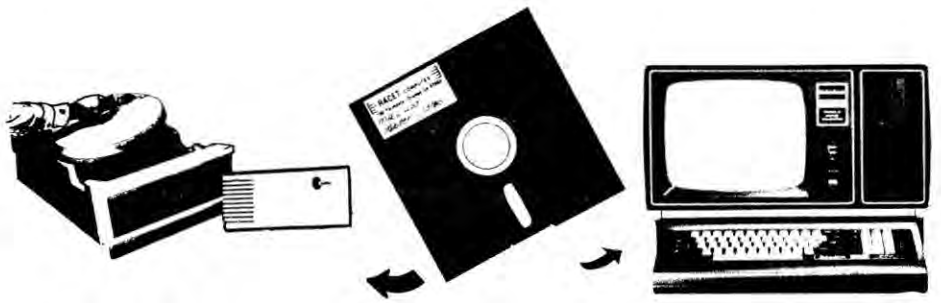
Program Details

Before looking at the rules of the game, let's have a look at the program itself and what it does; refer to Listing 1.

This program represents the operation of a theoretical microprocessor similar to the one which controls the TRS-80, although it makes a few assumptions which are unlike the Z-80's operation. Some commands perform the same functions, but the mnemonics are quite dif-

RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes

HARD DISK MULTIPLEXOR
FOR TRS-80* Mod II



NOW YOU CAN HAVE THAT LARGE COMMON DATA BASE!!

- Allows up to 4 Mod II's to connect to a single controller — up to 4 hard disk drives per controller. Users may access the same file simultaneously (first-come first-served).
- Uses Cameo controller and standard 10-megabyte cartridge (hard) disk drives along with RACET Hard/Soft Disk System (HSD) software. Removable Disk Pack Backup!
- Access times 3 to 8 times faster than floppy. Mixed floppy/hard disk operation supported.
- Compatible with your existing TRSDOS programs — you need only change filenames! All BASIC statements are identical.
- A single file may be as large as one disk. Directory expandable to handle thousands of files.
- Includes special utilities — XCOPY for backup and copies, XPURGE for multiple deletions, DCS directory catalog system, and Hard Disk Superzap. FORMAT utility includes options for specifying sectors/gran, platters/drive, logical disk size, etc.

HARD DISK DRIVE AND CONTROLLER $5995 **RACET HSD Software $400** Call for multiuser pricing. Dealers call for OEM pricing.

★ ★ **NEW** ★ ★ **DISCAT** (32K 1-drive Min) **Mod I, III $50.00**
This comprehensive Diskette Cataloguing/Indexing utility allows the user to keep track of thousands of programs in a categorized library. Machine language program works with all TRSDOS and NEWDOS versions. Files include program names and extensions, program length, diskette numbers, front and back, and diskette free space.

★ ★ **NEW** ★ ★ **KFS-80** (1-drive 32K Min — Mod II 64K) **Mod I, III $100.00; Mod II $175.00**
The keyed file system provides keyed and sequential access to multiple files. Provides the programmer with a powerful disk handling facility for development of data base applications. Binary tree index system provides rapid access to file records.

★ ★ **NEW** ★ ★ **MAILLIST** (1-drive 32K Min — Mod II 64K) **Mod I, III $75.00; Mod II $150.00**
This ISAM-based maillist minimizes disk access times. Four keys — no separate sorting. Supports 9-digit zip code and 3-digit state code. Up to 30 attributes. Mask and query selection. Record access times under 4 seconds!!

★ ★ **NEW** ★ ★ **LPSPOOL** (32K 1-drive Min) **Mod I $75.00**
LPSPOOL — Add multi-tasking to permit concurrent printing while running your application program. The spooler and despooler obtain print jobs from queues maintained by the system as print files are generated. LPSPOOL supports both parallel and serial printers.

BASIC LINK FACILITY 'BLINK' (Mod I Min 32K 1-disk) **Mod I $25.00; Mod II $50.00; Mod III $30.00**
Link from one BASIC program to another saving all variables! The new program can be smaller or larger than the original program in memory. The chained program may either replace the original program, or can be **merged** by statement number. The statement number where the chained program execution is to begin may be specified!

INFINITE BASIC (Mod I & Mod III Tape or Disk) **Mod I $50.00; Mod III $60.00**
Extends Level II BASIC with complete MATRIX functions and 50 more string functions. Includes RACET machine language sorts! Sort 1000 elements in 9 seconds!! Select only functions you want to optimize memory usage.

INFINITE BUSINESS (Requires Infinite BASIC) **Mod I & III $30.00**
Complete printer pagination controls — auto headers, footers, page numbers. Packed decimal arithmetic — 127 digit accuracy +, −, *, /. Binary search of sorted and unsorted arrays. Hash codes.

COMPROC (Mod I & Mod III — Disk only) **Mod I $20.00; Mod III $30.00**
Command Processor. Auto your disk to perform any sequence of instructions that you can give from the keyboard. DIR, FREE, pause, wait for user input, BASIC, No. of FILES and MEM SIZE, RUN program, respond to input statements, BREAK, return to DOS, etc. Includes lowercase driver software, debounce and screenprint!

GSF (Mod I & III Tape or Disk — Specify Memory Size) **Mod I $25.00; Mod II $50.00; Mod III $30.00**
Generalized Subroutine Facilities. The STANDARD against which all other sorts are compared! Machine language — fast and powerful! Multi-key multi-variable and multi-key character string. Zero and move arrays. Mod II includes USR PEEKS and POKES. Includes sample programs.

DSM (Mod I Min 32K 2-drive system. Mod II 64K 1-drive. Mod III Min 32K 1-drive) **Mod I $75.00; Mod II $150.00; Mod III $90.00**
Disk Sort/Merge for RANDOM files. All machine language stand-alone package for sorting speed. Establish sort specification in simple BASIC command File. Execute from DOS. Only operator action to sort is to change diskettes when requested! Handles multiple diskette files! Super fast sort times — improved disk I/O times make this the fastest Disk Sort/Merge available on the TRS.

UTILITY PACKAGE (Mod II 64K) **$150.00**
Important enhancements to the Mod II. The file recovery capabilities alone will pay for the package in even one application! Fully documented in 124 page manual! XHIT, XGAT, XCOPY and SUPERZAP are used to reconstruct or recover data from bad diskettes! XCOPY provides multi-file copies, 'wild-card' mask select, absolute sector mode and other features. SUPERZAP allows examine/change any sector on diskette including track-0, and absolute disk backup/copy with I/O recovery. DCS builds consolidated directories from multiple diskettes into a single display or listing sorted by disk name or file name plus more. Change Disk ID with DISKID. XCREATE preallocates files and sets 'LOF' to end to speed disk accesses. DEBUGII adds single step, trace, subroutine calling, program looping, dynamic disassembly and more!!

BASIC CROSS REFERENCE UTILITY (Mod II 64K) **$50.00**
SEEK and FIND functions for Variables, Line Numbers, Strings, Keywords. 'All' options available for line numbers and variables. Load from BASIC — Call with 'CTRL'R. Output to screen or printer!

DEVELOPMENT PACKAGE (Mod II 64K) **$125.00**
Includes RACET machine language SUPERZAP, Apparat Disassembler, and Model II interface to the Microsoft 'Editor Assembler Plus' software package including uploading services and patches for Disk I/O. Purchase price includes complete copy of Editor Assembler + and documentation for Mod I. Assemble directly into memory, MACRO facility, save all or portions of source to disk, dynamic debug facility (ZBUG), extended editor commands.

CIRCLE READER REQUEST FOR FREE 24-PAGE CATALOG
*TRS-80 IS A TRADEMARK OF TANDY CORPORTION

CHECK, VISA, M/C, C.O.D., PURCHASE ORDER
TELEPHONE ORDERS ACCEPTED (714) 637-5016

RACET COMPUTES
1330 N. GLASSEL, SUITE 'M', ORANGE, CA 92665

✓41

RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS — RACET UTILITIES — RACET computes — RACET SORTS **RACET SORTS — RACET UTILITIES —**

✓See List of Advertisers on page 306

ferent (in Z-80 language, there is no CLR A, but the function XOR A— exclusive OR the accumulator—has the same result).

In a real processor, the registers' pointers actually point to memory, and should also involve a trip through our MEM player. But for convenience, Simul-80 lets B, C, H, and L have their own anonymous block of memory. In actual practice, we would have to identify these registers and their positions as well.

The I/O device has accepted coded information from the human, and recorded it on the wall chart for registers B and C (the method is explained in the Rules of the Game). The first instructions command the accumulator to take what is in B (the "tens" digit) and give it to H; the same is done to transfer C (the "ones" digit) to L. In other words, registers B and C hold the two-digit input value, and, after the intervention of the accumulator, registers H and L will hold the running subtotal.

At NXTINS (next instruction), we move the pointer for B and C one position forward, and get the value pointed to by C, putting it in A. It is compared to 01, the code for add (+); if the result of the comparison is exact, it will set the zero flag. This is done because comparison is a kind of subtraction that leaves the minuend and subtrahend intact; no result is produced, only a flag is tweaked. It is like the statement A>B, where neither A nor B is changed, but an evaluative result is produced. If the zero flag is set, the program moves to the position marked ADD.

If the comparison is not exact, the program falls through to the next instruction in order, and checks the value against 02, the code for subtract (−); if an exact comparison sets the zero flag this time, a jump is made to SUB. Failing that test, the value is checked for the equals (=) code, and jumps to END if the comparison matches.

If all these tests fail—that is, if the code is neither 01, 02 nor 03—we do not have one of the three permitted instructions of the game, and the program as entered by the human must be in error. Therefore (we are now looking at address #19), the program jumps along to the position marked ERR, eventually halting the action.

Let's assume the code was that for addition. Moving to ADD at address #21, the program is told to increment the BC pointer once more. If you are following the BC pointer, you will see that it must now be pointing to the number we are to add, since the numbers and math codes follow each other in alternating sequence.

To effect this, the accumulator loads up with the value in register C (the "ones" digit of the value to add), and next adds to itself

Information Sheets

Address Bus

1. During cycle two, go where called, and accept the value given to you.
2. Perform the following actions:

IF THE INSTRUCTION YOU RECEIVE IS:	PERFORM THIS ACTIVITY
03	Advance the B and C pointer.
07	Advance the H and L pointer.
08	Decrease the H and L pointer.
09	Decrease the B and C pointer.
31	Wait for the next cycle two and get the next value from MEM. Ignore this value, but immediately check Z. If Z is SET, then give your value to PC at the beginning of the next cycle one. If Z is NOT SET, do nothing.
33	Wait for the next cycle two and get the next value from MEM. Ignore this value, but immediately check CY. If CY is NOT SET, give your value to PC at the beginning of the next cycle one. If CY is SET, do nothing.
34	Wait for the next cycle two and get the next value from MEM. Immediately give your value to PC at the beginning of the next cycle one.
IF NONE OF THE ABOVE	Do nothing . . . this is a machine failure that will lead to chaos.

Accumulator

1. During cycle one, give any value requested by the data bus.
2. During cycle two, receive any value given by the data bus.
3. During cycle three, perform calculations as follows:

IF THE VALUE YOU RECEIVE IS: — PERFORM THIS OPERATION:

Less than or equal to 9

Make this your current value

25, 26, 27

1. Wait until the next cycle three, then add the value you will receive to your current value. The result becomes your new current value.
2. Immediately do one of the following:

Result	Give to Z	Give to CY
< 9	NOT SET	NOT SET
= 10	SET	SET
>10	NOT SET	SET

28, 29 or 30

1. Wait until the next cycle three, then subtract the value you will receive from your current value. The result becomes your new current value. You may borrow a "phantom" one if needed to complete the subtraction.
2. Immediately do one of the following:

Result	Give to Z	Give to CY
>0	NOT SET	NOT SET
=0	SET	NOT SET
If borrow	NOT SET	SET

20

1. Wait until the next cycle three, then compare that value with your current value. Your current value remains unchanged.
2. Immediately do one of the following:

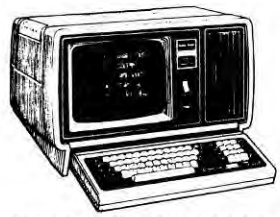
Result	Give to Z	Give to CY
C.V. is greater	NOT SET	NOT SET
C.V. is greater	SET	NOT SET
C.V. is less	NOT SET	SET

40

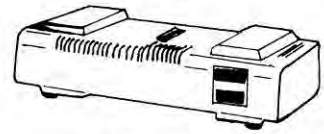
1. Set your current value to zero; give SET to Z, NOT SET to CY.

Remember: Your current value may only be 0 through 9.

meet a REAL PLUS

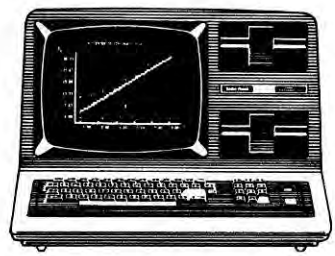


Model II 64K $3375



32K Exp. Int. $362

Color Computer 4K $310



Model III 16K $859

check out these unusual package values for price and warranty

MODEL I 32K E.I.,
1st. Drive, Line Printer IV,
10 Diskettes Pure R.S. $1875
combined warranty 1699

MODEL II 64K w/2 Disks,
Daisy Wheel II, Scripsit
Pure R.S. 6350

MODEL III 48K, 1st. Drive,
Line printer IV, Scripsit Word
Processor, 10 Diskettes
Pure R.S. 2800
combined warranty 2699

COLOR COMPUTER 16K CC
w/extended basic cassette
recorder, joy sticks, dust cover
Pure R.S. 569

POCKET COMPUTER w/interface
Pure R.S. 239

ATARI
48K Atari 800, Atari 825 Printer,
Atari 810 Disk Drive 2125

APPLE
48K Apple II & Apple II Disk
w/controller, D.O.S. 3.3,
Printer Card and Cable,
Epson MX80 Printer 2510

Here are just a few of our fine offers . . . call toll-free for full information.

COMPUTERS	
Model II 64K	$3375
Model III 4K LEV I	599
Model III 16K	859
Model III 32K	981.50
+ Model III 32K	915.50
Model III 48K	1104
+ Model III 48K	972
Model III 32K 2 Disc & RS232 c	2149
Color Computer 4K	310
Color Computer 16K	439.95
+ Color Computer 16K	366.50
Color Computer 16K w/extended basic	489
Pocket Computer	199
VIDEOTEX	329
APPLE 48K only	1279
ATARI 800 16K	789

PERIPHERALS	
Expansion Interface 0K	$249
Expansion Interface 16K	359
+ Expansion Interface 16K	305.50
Expansion Interface 32K	469.95
+ Expansion Interface 32K	362
16K RAM N.E.C. 200 N.S. chips	39
MODEMS	
Lynx Direct Connect	219
COMM 80 Interface	159.95
Chatterbox Interface	239
Telephone Interface II	169
PRINTERS	
Line Printer IV	849
Daisy Wheel II	1695
Line Printer VI	999
NEC Spinwriter 5530	2595
OKI DATA Microline 80	499
EPSON MX80	519
DISK DRIVES	
Model III 1-Drive	712
PERCOM TFD 100	389
TEAC 40 Track	319

+ Computer Plus New Equipment.
180 Day Extended Warranty

PLUS real back-up warrantees —

Pure Radio Shack equipment warranteed at any Radio Shack store or dealer. Factory warrantees on Apple and Atari equipment. Other equipment carries manufacturer's warranty or Computer Plus 180 day extended warranty. Combined warrantees carry Computer Plus 180 day warranty or original manufacturer's warranty.

DEALER INQUIRIES ARE INVITED (617) 486-3193

Prices subject to change without notice.
Not responsible for typographical errors.

TRS-80 is a registered trademark of Tandy Corp.

call TOLL FREE
1-800-343-8124

computer plus ↙130

Write for your free catalog ...

Dept. D
245A Great Road
Littleton, MA 01460

↙See List of Advertisers on page 306

"Fifteen people (including one human) are needed to play a complete round of Simul-80."

the value in register L (recall that this is the "ones" digit of the subtotal pair of registers). The result is a new subtotal.

The accumulator then takes its single-digit result (C plus L), and saves that sum in L. In the meantime, the carry flag may or may not have been set, depending on whether or not the total of C + L was greater or less than nine. If the total was less than or equal to nine, no carry would be generated, and the program moves directly to address #39, labeled HIBYT. A similar activity is performed with the "tens" digit, getting it from B, adding H to it, and putting it back in H. If once again no carry is generated, the program loops back to the address labeled NXTINS, and goes through its add/subtract/equals code-checking process once again.

What happens if a carry is produced? It can happen in several ways: if the ones digit carries into the tens digit; if the tens digit carries into the hundreds digit; and if, when the ones digit carries into the tens digit, it forces the tens digit to carry into the hundreds place. In principle, each is handled the same way: a carry value of one is added to the higher digit. For example, nine plus nine equals 18, or nine plus nine equals eight-carry-the-one.

Our registers are only two digits wide... so how do we get a hundreds place? Simply by moving the registers' pointer up one position, and stashing the carried value there. In other words, if it's too big for the box, get another box. This happens in instructions found at #44 through #49.

When the arithmetic is finished, the program will move back to NXTINS. If a code of 02 is found, it means a jump to position SUB. In this case, the accumulator must perform subtraction (start at position #52). The curious thing is that the carry flag serves double duty...since we are either adding or subtracting (never both at once) the flag can also signal a borrow. If the result of subtraction ends up being less than zero, the accumulator simply borrows an imaginary one to complete the subtraction, and sets the carry flag. The rest of the instructions take it from there, just as they do with addition. Follow through addresses #56 to #61, #62 to #69, and #75 to #80, and you can see that it works.

In a properly coded program, the computer will at last encounter code 03, which is the equals code and initiates a termination sequence to produce a correct answer. The jump is made to the position labeled END, found at address #90. The value of L is placed into C via A, the value at H is similarly placed into B. Both sets of pointers are moved forward, and the hundreds place is transferred from register L to register C.

The accumulator is cleared to zero at address #98, and that zero is placed into the B

Data Bus

1. During cycle two, go where called, and accept the value given to you.
2. Perform the following actions:

IF THE VALUE YOU RECEIVE IS:	THEN PERFORM THIS ACTIVITY:
01	Get value from B during cycle two.Give it to A during cycle three.
02	Get value from C during cycle two.Give it to A during cycle three.
04	Get value from H during cycle two. Give it to A during cycle three.
05	Get value from L during cycle two. Give it to A during cycle three.
10	Get value from A during cycle two. Give it to H during cycle three.
11	Get value from A during cycle two. Give it to L during cycle three.
12	Wait for next cycle two, and get value from MEM. Give it to A during cycle three.
13	Get value from A during cycle two. Give it to B during cycle three.
14	Get value from A during cycle two. Give it to C during cycle three.
20	Give your instruction to A during cycle two. Wait for next cycle two, get value from MEM and give it to A during that cycle.
25	Give you instruction (25) to A during cycle two, and immediately get value from H and give it to A during that cycle.
26	Give your instruction (26) to A during cycle two, and immediately get value from L and give it to A during that cycle.
27	Give your instruction (27) to A during cycle two. Wait for next cycle two, get value from MEM and give it to A during that cycle.
28	Give your instruction (28) to A during cycle two, and immediately get value from C and give it to A during that cycle.
29	Give your instruction (29) to A during cycle two. Wait for next cycle two, get value from MEM and give it to A during that cycle.
30	Give your instruction (30) to A during cycle two, and immediately get value from B and give it to A during that cycle.
40	Give your instruction (40) to A during cycle two.
IF NONE OF THE ABOVE	Do nothing...the machine has failed, and chaos will reign.

Instruction Decoder (ID)

1. During cycle one, accept a value from MEM, and check it against the master list that follows.
2. During cycle two, call for the appropriate person as indicated below:

IF YOU RECEIVE FROM MEM:	ASK FOR THE PRESENCE OF AND GIVE YOUR VALUE TO:
00	No one.
01	Data Bus.

Information sheets continue

02	Data Bus.
03	Address Bus.
04	Data Bus.
05	Data Bus.
07	Address Bus.
08	Address Bus.
09	Address Bus.
10	Data Bus.
11	Data Bus.
12	Data Bus. Then wait for the next cycle two and call for Data Bus again.
13	Data Bus.
14	Data Bus.
20	Data Bus. Then wait for the next cycle two and call for Data Bus again.
25	Data Bus.
26	Data Bus.
27	Data Bus. Then wait for the next cycle two and call for Data Bus again.
28	Data Bus.
29	Data Bus. Then wait for the next cycle two and call for Data bus again.
30	Data Bus.
31	Address Bus. Then wait for the next cycle two and call for Address Bus again.
33	Address Bus. Then wait for the next cycle two and call for Address Bus again.
34	Address bus. Then wait for the next cycle two and call for Address Bus again.
40	Data Bus.
99	Call out HALT.
IF NONE OF THE ABOVE	Call Address Bus, and give it 34. Wait for the next cycle two, call Address Bus again, and give it 83.

Program Listing 3.

```
0 GOTO110
1 GOTO3920
2 GOTO4000
3 GOTO4080
4 GOTO4160
5 GOTO4240
6 GOTO6280
7 GOTO4320
8 GOTO4400
9 GOTO4480
10 GOTO4560
11 GOTO4640
12 GOTO4720
13 GOTO4830
14 GOTO4910
20 GOTO4990
25 GOTO5170
26 GOTO5360
27 GOTO5430
28 GOTO5520
29 GOTO5630
30 GOTO5720
31 GOTO5830
33 GOTO5930
34 GOTO6030
40 GOTO6110
99 GOTO6180
100 GOTO3850
105 REM * COPYRIGHT 1980 BY DENNIS BATHORY KITSZ
110 OUT254,2:CLS:CLEAR2000: REM OUT254,2 = HI SPEED, NORM VIDEO
120 ONERRORGOTO6490:DIMIN$(3,101):DIMPR$(3,101):DIMCD$(2,101)
130 FORX=0TO99:READIN$(1,X):NEXT
140 FORX=0TO99:READIN$(2,X):NEXT
150 FORX=0TO99:READIN$(3,X):NEXT
160 CLS:PRINT"A SIMULATION OF SIMUL-80"
170 PRINT:PRINT"DENNIS BATHORY KITSZ":PRINT"OCTOBER, 1980"
180 FORX=1TO1000:NEXT:CLS
```

Listing continues

register, which, had the program been longer, might have held the thousands place. At instruction 00, the program finally halts. The I/O device may then read the values in BC; the final equal sign code will have been replaced with the lower two digits of the total, and the position following will contain the upper digit of the total. The human may then read that total from the I/O device; it should be the correct answer.

One additional case needs to be dealt with. If an error was found in the coding (address #19), the program will move to address #83. Here the B and C register pointers are decremented to a position previous to the offending code, and that value is changed to 99; the pointer is re-incremented to the offending code, and the program halts. The I/O device then retrieves the contents of the BC register pair list. The human reading the final list can then see by the 99 code and the position of the pointer that the program did not conclude properly, and that an offending code was the cause of the program's halt.

The Rules of the Game

At power-up, the program counter (PC) should set the flip-book to 01, the accumulator (A) is zero, the flags (Z and CY) both read not set, and all the register (B, C, H, L) arrows are in their first position. Memory (MEM) sets its card to position 01, to match that held by PC. The instruction decoder (ID), data bus, and address bus are quiet. The computer is now idling.

The game begins when the human completes coding the addition/subtraction problem and hands it to the input/output (I/O) device. For this simulation, the I/O device acts like a direct memory access (DMA) circuit, which is independently capable of placing information into memory while the microprocessor is halted. The column of numbers is split and transferred to the B and C registers' wall card.

If the input was 06 01 17 02 10 03 (6 + 17 – 10 =), the transferred items would read:

B REGISTER (tens digit)	*C REGISTER (ones digit)*
0	*6*
0	*1*
1	*7*
0	*2*
1	*0*
0	*3*

When this work is complete, the I/O device tells the clock "ready", which allows the processor, whose operation had been suspended during human input, to continue.

Critical to the operation of any microprocessor is the system clock, and this is true of the Simul-80 device as well. The clock must call out, for all to hear, "Cycle one!" At

FOR THE TRS-80 MOD I

DUALCASE*

UPPER/lowercase, full time from power-up; **NO** software; Standard typewriter keyboard operation (shift to UPPERCASE); Control characters can be displayed; 128 Total character set plus full graphics.

KEYBOARD DEBOUNCE*

Extra keyboard debounce, full time from power-up; **NO** software. If dirty keys are a problem, this is for you. No charge.

BLOCK CURSOR*

Replaces the underline style cursor directly. Easier to locate on a full screen. NO distracting blinking. No charge.

SHORT CASSETTE LEADER*

For tape based systems. Does NOT change baud rate. Only shortens recorded leader. Saves four seconds of waiting time. Great for data files! No conflict with high baud rate tape systems. $10.00 extra.

ELECTRONIC SHIFT-LOCK*

No extra keys or switches. Simply tap either shift key, UPPERCASE lock, normal shift unlocks. $30.00 extra.

SWITCHABLE*

Offers peace of mind. Toggles between original factory operation and "PATCH" enhanced. $25.00 extra.

Call Now (208) 883-0611

CECDAT, INC. ↙62
P. O. Box 8963
Moscow, ID 83843

Name .....

Street .....

City .....

State ..... ZIP .....

☐ Check, Money Order, Bank Draft

☐ VISA, MASTERCHARGE, Purchase Orders (add 3%)

Card/PO No. .....

Expiration Date .....

Today's Date .....

You must check one:

☐ "MEM SIZE" ☐ "MEMORY SIZE"

THE PATCH $69.97

TOTAL OPTIONS. . . ..

ID Sales Tax 3% (Id Res) .....

Ship. & Hand. @ 2.50 ea. .....

COD ADD $2.00 ea. . . ..

TOTAL ORDER . . . . .

Price valid through April 30, 1981

*TRS-80 is a trademark of Tandy Corporation.

"A crewcut is desirable, along with a touch of West Virginia twang."

```
190 PRINT"NOW PRINTING INSTRUCTION SET...":PRINT
200 FORX=0TO47:PRINTIN$(1,X)"  "IN$(2,X),:NEXT
210 PRINT:PRINT"PRESS ENTER TO CONTINUE";
220 X=PEEK(14400):IFX=1THEN230ELSE220
230 CLS:FORX=48TO99:PRINTIN$(1,X)"  "IN$(2,X),:NEXT
240 PRINT:PRINT"PRESS ENTER TO CONTINUE, CLEAR TO REPEAT"
250 X=PEEK(14400):IFX=1THEN920ELSEIFX=2THEN160ELSE250
260 DATA00,01,02,03,04,05,06,07,08,09,10,11,12,13,14,15
270 DATA16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31
280 DATA32,33,34,35,36,37,38,39,40,41,42,43,44,45,46,47
290 DATA48,49,50,51,52,53,54,55,56,57,58,59,60,61,62,63
300 DATA64,65,66,67,68,69,70,71,72,73,74,75,76,77,78,79
310 DATA80,81,82,83,84,85,86,87,88,89,90,91,92,93,94,95
320 DATA96,97,98,99
330 DATA"NOP       ","LD A,(B)  ","LD A,(C)  ",INC BC PTR,"LD A,(H)  "
340 DATA"LD A,(L)  ",**ERROR**,INC HL PTR,DEC HL PTR,DEC BC PTR
350 DATA"LD (H),A  ","LD (L),A  ","LD A,  ","LD (B),A  ","LD (C),A  "
360 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,"CP A,  "
370 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,"ADD A,(H) "
375 DATA"ADD A,(L) ","ADD A, ","SUB A,(C) ","SUB A, "
380 DATA"SUB A,(B) ","JP z,  ",**ERROR**,"JP NC, ","JP     "
390 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,"CLR A     "
395 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**
400 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**
405 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**
410 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**
415 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**
420 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**
425 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**
430 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**
435 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**
440 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**
445 DATA**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**,**ERROR**
450 DATA**ERROR**,**ERROR**,**ERROR**,"HALT     "
460 DATANO OPERATION - SERVES AS DELAY
470 DATALOAD ACC. WITH CONTENTS OF B
480 DATALOAD ACC. WITH CONTENTS OF C
490 DATAINCREMENT BC POINTER POSITION
500 DATALOAD ACC. WITH CONTENTS OF H
510 DATALOAD ACC. WITH CONTENTS OF L
520 DATANO SUCH INSTRUCTION ... ERROR
530 DATAINCREMENT HL POINTER POSITION
540 DATADECREMENT HL POINTER POSITION
550 DATADECREMENT BC POINTER POSITION
560 DATALOAD CONTENTS OF H WITH ACC.
570 DATALOAD CONTENTS OF L WITH ACC.
580 DATALOAD ACC. WITH NEXT VALUE
590 DATALOAD CONTENTS OF B WITH ACC.
600 DATALOAD CONTENTS OF C WITH ACC.
610 DATANO SUCH INSTRUCTION ... ERROR
620 DATANO SUCH INSTRUCTION ... ERROR
630 DATANO SUCH INSTRUCTION ... ERROR
640 DATANO SUCH INSTRUCTION ... ERROR
650 DATANO SUCH INSTRUCTION ... ERROR
660 DATACOMPARE ACC. WITH NEXT VALUE
670 DATANO SUCH INSTRUCTION ... ERROR
680 DATANO SUCH INSTRUCTION ... ERROR
690 DATANO SUCH INSTRUCTION ... ERROR
700 DATANO SUCH INSTRUCTION ... ERROR
710 DATAADD CONTENTS OF H TO ACC.
720 DATAADD CONTENTS OF L TO ACC.
730 DATAADD NEXT VALUE TO ACC.
740 DATASUB. CONTENTS OF C FROM ACC.
750 DATASUB NEXT VALUE FROM ACC.
760 DATASUB. CONTENTS OF B FROM ACC.
770 DATAIF Z IS SET THEN LET PC=NN
780 DATANO SUCH INSTRUCTION ... ERROR
790 DATAIF CY NOT SET THEN LET PC=NN
800 DATAUNCONDITIONALLY LET PC=NN
810 DATANO SUCH INSTRUCTION ... ERROR
820 DATANO SUCH INSTRUCTION ... ERROR
830 DATANO SUCH INSTRUCTION ... ERROR
840 DATANO SUCH INSTRUCTION ... ERROR
850 DATANO SUCH INSTRUCTION ... ERROR
860 DATACLEAR ACCUMULATOR TO ZERO
870 DATANO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO
880 DATANO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO
890 DATANO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO,NO
900 DATANO,NO,NO,NO
910 DATAPROGRAM HALTS OPERATION
920 CLS
```

Program continues

INCOME TAX SYSTEM
FOR TRS-80* MODEL I, II or III

Our system, for the magnificent line of TRS-80 Computers, is doing, right now, thousands of lightning-fast, error-free tax returns a day in accounting offices nationwide.

Why not in yours? The investment is minimal. Our system requires no special operator training. Runs on your TRSDOS, nothing else to buy.

Features no other tax system, for any computer, has—

1. Full interactive user control, in tax-form language only, line-by-line.
2. Screen display of full 1040 and all schedules, prior to printout.
3. All formats IRS and State approved.
4. Schedule amounts automatically entered on Form 1040.
5. Your Preparer's Information automatically printed at bottom of Page 2, Form 1040.
6. Built-in Validation Check tests entire system, hardware and software.
7. Special printer adjustment routines: Margin Offset, Text Position, etc.
8. Fills in pre-printed forms (we supply) or use overlays. Your choice.
9. AUTOMATICALLY COMPUTES: Tax — Earned Income Credit — Maximum/Minimum Tax — Least Tax Method —All Percentage of Income Limitations — All Fixed Limitations.

   DOES INCOME AVERAGING IN EIGHT SECONDS!
10. Full support through the tax season, no charge.
11. Inexpensive yearly updates in accordance with tax-law changes.
12. Modular construction—Lets you order the type and size system you need.

Prices start at $237.95 (1040 & Schedule A)

25-page Descriptive Manual - $7.50

(Refundable on order)

MINIMUM SYSTEM REQUIRED:

Model I, 48K, 1 Disk Drive

CONTRACT SERVICES ASSOCIATES

706 SOUTH EUCLID • ANAHEIM, CA 92802 ⌐10

TELEPHONE: (714) 635-4055

*TRS-80 is a trademark of Tandy Corp.

OURS WORK!

ACCOUNTING PROGRAMS

from the company with years of experience on small computers and thousands of customers

prices resulting from volume sales

PACKAGE OF 5 PRODUCTS **$395.**

PRODUCTS EACH **$95.**

MANUALS EACH **$20.**

GENERAL LEDGER
PAYROLL
ACCOUNTS RECEIVABLE
ACCOUNTS PAYABLE
DEPRECIATION

for

TRS-80*
MODEL I with TRSDOS*
MODEL II with CP/M†

OTHER CP/M† SYSTEMS

Product Info & License/Order Form.
FROM.....

DATA TRAIN INC.

PHONE (503) 476-1467

840 N.W. 6th STREET, SUITE 3
GRANTS PASS, OREGON 97526

*Trademark Radio Shack, Div. Tandy Corp.

†Product Digital Research, Inc.


```
930 PRINT"READY TO ACCEPT SIMUL-80 PROGRAM LISTING ... AN"
940 PRINT"ADDRESS WILL PRESENTED; ENTER THE MACHINE CODE."
950 PRINT"THE MNEMONIC WILL BE DISPLAYED.  TO TERMINATE THE"
960 PRINT"LISTING, ENTER 100 INSTRUCTIONS OR TYPE LETTER X."
970 PRINT"YOU MAY BEGIN ENTERING INSTRUCTIONS BELOW:"
980 PRINTSTRING$(64,95);
990 PRINT"ADDRESS:  CODE:  MNEMONIC:            DESCRIPTION:"
1000 PRINT"--------  -----  --------             ------------"
1010 Q$=INKEY$:FORN=1TO300:NEXT:X=522:Y=1
1020 A=0:X=X+57:PRINT@X,IN$(1,Y);:X=X+7
1030 PRINT@X,CHR$(95);:A$=INKEY$
1040 IFA$=CHR$(8)THENPRINT@X," ";
1050 IFA$=CHR$(8)THENA=A-1:IFA<0THEN1070ELSEX=X-1:GOTO1030
1060 GOTO1080
1070 A=0:GOTO1030
1080 IFA$=""THEN1030ELSEIFA$="X"THEN1170ELSEPRINT@X,A$;
1090 A=A+1:IFA=2THEN1100ELSEX=X+1:GOTO1030
1100 X=X-1:B$=CHR$(PEEK(15360+X)):C$=(CHR$(PEEK(15361+X)))
1110 D$=B$+C$:R=VAL(D$):FORN=0TO99
1120 IFIN$(1,N)=D$THENPRINT@X+7,IN$(2,N)"         "ELSENEXTN
1130 PRINT@X+20,IN$(3,N);
1140 PR$(1,Y)=D$:PR$(2,Y)=IN$(2,N):GOSUB1550
1150 IFX>900THENX=522:PRINT@X+62,STRING$(54,32);
1160 Y=Y+1:IFY=10THEN1170ELSE1020
1170 FORX=1TO500:NEXT:CLS
1180 PRINT"PROGRAM ENTRY IS COMPLETE; A LIST FOLLOWS."
1185 PR$(1,0)=PR$(1,100):PR$(2,0)=PR$(2,100):PR$(3,0)=PR$(3,100)
1190 FORY=YTO100:PR$(1,Y)="  ":PR$(2,Y)="           ":NEXT
1200 PRINT:X=1:FORY=1TO10
1210 FORX=XTOX+9:PRINT,IN$(1,X),PR$(1,X),PR$(2,X);PR$(3,X):NEXTX
1220 PRINT:PRINT
1230 PRINT"ENTER TO CONTINUE, CLEAR TO REPEAT, ";
1240 PRINTCHR$(94)" TO EDIT..."
1250 Q=PEEK(14400)
1260 IFQ=1THENNEXTYELSEIFQ=2THEN1265ELSEIFQ=64THEN1350ELSE1250
1262 GOTO1270
1265 CLS:PRINT:GOTO1200
1270 CLS:PRINT"THE PROGRAM IS ENTERED AND EDITED."
1280 PRINT"THE FOLLOWING CHOICES ARE AVAILABLE:":PRINT
1290 PRINT"1.  COMPLETE RESTART":PRINT"2.  RE-EDIT PROGRAM"
1300 PRINT"3.  RUN PROGRAM":PRINT"4.  END SIMULATION"
1305 PRINT"5.  SEND LIST TO PRINTER"
1310 PRINT:PRINT"PLEASE ENTER THE NUMBER OF YOUR CHOICE"
1320 A$=INKEY$:IFA$=""THEN1320
1330 X=VAL(A$):ONXGOTO110,1200,1660,3770,6400,1270
1340 GOTO1270
1350 A=0:B=1:K=128:FORC=1TO200:NEXTC:Q$=INKEY$
1360 PRINT@K,CHR$(32);:A$=INKEY$:IFA$=""THEN1370ELSE1380
1370 PRINT@K,CHR$(143);:GOTO1360
1380 IFA$=CHR$(13)THENCLS:PRINT:PRINT:NEXTY
1390 IFA$=CHR$(10)THENK=K+64:GOTO1360
1400 PRINT@K,A$;:K=K+1:A=A+1:IFA=2THEN1410 ELSE1360
1410 D=PEEK(15358+K):E=PEEK(15359+K)
1420 N=0:F$=CHR$(D)+CHR$(E):F=VAL(F$)
1430 G=VAL(CHR$(PEEK(15374+K))+CHR$(PEEK(15375+K))):PR$(1,G)=F$
1440 IFIN$(1,N)=PR$(1,G)THEN1450ELSEN=N+1:IFN=100THEN1450ELSE1440
1450 IFF=12ORF=20ORF=27ORF=29ORF=31ORF=33ORF=34THEN1490ELSE
1460 PR$(3,G)=""
1470 PR$(2,G)=IN$(2,N):A=0:K=K+62:B=B+1:IFB>10THEN1480ELSE1360
1480 CLS:PRINT:PRINT:NEXTY
1490 PR$(2,G)=IN$(2,N):K=K+2
1500 A$=INKEY$:IFA$=""THEN1500 ELSEPRINT@K,A$;:K=K+1
1510 A$=INKEY$:IFA$=""THEN1510 ELSEPRINT@K,A$;:K=K+123
1520 PR$(3,G)=CHR$(PEEK(15236+K))+CHR$(PEEK(15237+K)):A=0
1530 PR$(1,G+1)=PR$(3,G):PR$(2,G+1)="----------":PR$(3,G+1)=""
1540 B=B+2:IFB>10THEN1480 ELSE1360
1550 IFR=12ORR=20ORR=27ORR=29THEN1570
1560 IFR=31ORR=33ORR=34THEN1570 ELSERETURN
1570 A=0
1580 A$=INKEY$:IFA$=CHR$(8)THENPRINT@X+A+3," "
1590 IFA$=CHR$(8)THENA=A-1:IFA<0THENA=0:GOTO1580
1600 IFA$=""THEN1580 ELSEPRINT@X+A+3,A$;
1610 A=A+1:IFA>1THEN1620 ELSE1580
1620 PR$(3,Y)=CHR$(PEEK(15363+X))+CHR$(PEEK(15364+X))
1630 PRINT@X+7+LEN(PR$(2,Y)),PR$(3,Y);
1640 PR$(1,Y+1)=PR$(3,Y):PR$(2,Y+1)="----------":PR$(3,Y+1)=""
1650 Y=Y+1:RETURN
1660 CLS:PRINT"THE SIMULATION OF THE PROGRAM WILL BEGIN."
1670 FORX=1TO1500:NEXT:CLS
1680 PRINT@0,"HUMAN!  ENTER YOUR SIMPLE MATH PROBLEM....."
1690 PRINT"REMEMBER:  SUBTOTALS OR TOTALS > 0 AND < 999"
```

Program continues

SUPERSCRIPT

FOR TRS-80*

By Richard Wilkes

Now you can easily print **BOLDFACE**, underlined text, slashed Ø's, special characters, superscripts & subscripts (A^c X $\log_e[A_1-A_n]$) and more!

With this enhancement to Radio Shack's Model I Scripsit,* you will turn a good word processing system into a great one. SuperScript adds many of the features that Fort Worth left out, including:

Custom print drivers for:
Diablo (serial or parallel)
NEC Spinwriter (serial or parallel)
RS Line Printer IV*/Centronics 737
RS Daisy II*
Standard serial and parallel printers
User-defined custom drivers (serial or parallel)

You can call up the disk directory or kill files without leaving Scripsit—and without losing your text! Pause the printout to insert text from your keyboard or change type wheels, then resume printing where you left off.

Using any printer with backspace capability, you can underline text and produce computer-type slashed zeros. And on Diablo, Daisy II and NEC printers, you can superscript, subscript, underline, print boldface and select 10- or 12-pitch. With the Line Printer IV/737, you can underline, print elongated boldface, select 10 or 16.5 pitch, and use proportional spacing (unjustified).

The keyboard driver is now modified to correct for repeating key hangups. You may specify spacing requirements to eliminate awkward spacing of critical text. And, with SuperScript, you can now enter special characters (brackets, braces, etc.) that are not found on the TRS-80* keyboard.

All these capabilities, and more, are available when you add SuperScript to your Model I Scripsit program. Available for just $29.95 on disk, including easy instructions for patching to Scripsit and an enhanced lowercase driver.

SYSTEM SAVERS

By Tom Stibolt

If you ever type "SYSTEM" on your TRS-80,* this two-program package will make life easier for you.

One of the programs, FLEXL, lets you make backup copies of any system format tape. Using your own recorder usually means easier loading than with machine-duplicated original tapes, and you will be able to store your original safely away. Copies made using FLEXL display the filename of each program as it loads, making file searches easier.

Disk drive owners can use TDISK to save any system format tape onto disk. "Editor/Assembler", "Air Raid" and other programs cannot normally be loaded to disk, but with TDISK, they can. It will even load non-contiguous tapes. Why put up with slow tape loading? TDISK files will load from disk in seconds.

Get this two-program package now for only $14.95. Just one of Acorn's fine utility programs.

* trademark of Tandy Corp.

34

Acorn
Software Products, Inc.

634 North Carolina Avenue, S.E., Washington, D.C. 20003

These and other popular Acorn programs are available now at fine computer stores. Ask for them.

DEALER INQUIRIES INVITED

See List of Advertisers on page 306

FILETRAN
Transfers your TRS-80 Software to CP/M

- Machine language **COM FILE** directly compatible with your **CP/M** system.
- Automated terminal configurator.
- Memory displayed in both **HEX** and **ASCII.**
- Any disk Sector-Selected and displayed in both **HEX** and **ASCII.**
- Transfers both data and program files by file name byte by byte.
- Newly created files scanned for potential errors between level **II BASIC** and **MBASIC** 5.0 or later.
- **CP/M** files scanned for any selected string.
- Searches any program for all occurrences of any string.
- Generates a variable cross reference. Invaluable feature for any system level conversion and debugging.
- Displays both **CP/M** & **TRSDOS** directories.

FILETRAN Disk and Manual TRS-80 I or II $99
Transfer either way from CP/M TRSDOS for Model I $149
Manual alone (Price credited to purchase) $20
Add $2 shipping and 6% sales tax in California.

Order **FILETRAN** Today

☐FILETRAN Disk and Manual
☐2-Way Xfer feature for Model I
☐Manual alone
☐Send descriptive literature
My check is enclosed for $_____
Name _____
Street _____
City _____
State _____ Zip _____
☐VISA ☐M/C _____
4 digits above name
Card# _____
Signature _____

Send to

BUSINESS MICRO PRODUCTS
609 Livermore Ave.
Livermore, CA 94550 ✓382
(415) 449-4412


```
1700 PRINT"USE NORMAL ARITHMETIC SEQUENCE, I.E., 6+5-3=":PRINT
1710 PRINT"ENTER THE PROBLEM BELOW (7 OPERATIONS):":PRINT:X=512
1720 A$=INKEY$:Q=PEEK(X+15360):Q$=CHR$(Q)
1730 PRINT@X,Q$;:A$=INKEY$:IFA$=""THEN1740 ELSE1750
1740 PRINT@X,CHR$(143);:A$=INKEY$:IFA$=""THEN1730 ELSE1750
1750 IFA$=CHR$(13)THEN1790 ELSEIFA$=CHR$(8)THEN1760 ELSE1780
1760 X=X-1:IFX<512THENX=512
1770 Q$=" ":PRINT@X,"  ";:GOTO1730
1780 Q$=" ":PRINT@X,A$;STRING$(60,32);:X=X+1:GOTO1730
1790 PRINT@X,CHR$(93);:X=512
1800 A$=A$+CHR$(PEEK(X+15360))
1810 IF(PEEK(X+15360)<42)OR(PEEK(X+15360)>63)THEN1820 ELSE1840
1820 PRINT" "CHR$(93)CHR$(93)"ERROR IN CODING AS MARKED"
1830 PRINT@X+64,CHR$(91);:GOTO1680
1840 X=X+1:IFPEEK(X+15360)=61THEN1880
1850 IFPEEK(X+15360)=93THEN1900
1860 IFPEEK(X+15360)=32THENX=X+1ELSE1800
1870 GOTO1860
1880 A$=A$+"="
1890 IFLEFT$(A$,1)=""THENA$=RIGHT$(A$,(LEN(A$)-1)):GOTO1890
1900 CLS:PRINT"THE PROBLEM IS AS FOLLOWS:":PRINT:PRINTA$:PRINT
1910 PRINT"AND IS CODED AS FOLLOWS:":PRINT:H=LEN(A$)
1920 CD$(1,1)="03":B=2:FORX=H-1TO1STEP-2
1930 IFX=1THEN2030ELSEIFASC(MID$(A$,X-1,1))<48THEN1960ELSE1940
1940 CD$(1,B)=MID$(A$,X-1,2):X=X-1:IFX=1THEN2040 ELSE1970
1950 GOTO1980
1960 CD$(1,B)="0"+MID$(A$,X,1)
1970 IFMID$(A$,X-1,1)="+"THENCD$(1,B+1)="01"
1980 IFMID$(A$,X-1,1)="-"THENCD$(1,B+1)="02"
1990 IFMID$(A$,X-1,1)="="THENCD$(1,B+1)="03"
2000 B=B+2:NEXTX:IFB>16THEN2010 ELSE2040
2010 FORX=1TO500:NEXT:CLS:PRINT"CALCULATION TOO LONG...";
2020 PRINT"7 OPERATIONS (+,-,=) MAX.":FORX=1TO500:NEXT:GOTO1660
2030 CD$(1,B)="0"+LEFT$(A$,1)
2040 J=1:FORX=B-2TO1STEP-1:CD$(2,J)=CD$(1,X):PRINTCD$(1,X)" ";
2050 J=J+1:NEXTX:PRINT:PRINT:PRINT
2060 PRINT"CHECK THE PROBLEM AGAINST THE RULES FOR CODING."
2070 PRINT"IF THERE ARE ANY DISCREPANCIES, RECODE THE PROBLEM."
2080 PRINT"ERROR-CHECKING IS DELIBERATELY LEFT INCOMPLETE."
2090 PRINT:PRINT"PRESS ENTER TO CONTINUE, CLEAR TO RECODE..."
2100 Q=PEEK(14400):IFQ=1THEN2120 ELSEIFQ=2THENCLS:GOTO1690
2110 GOTO2100
2120 CLS:PRINT"INSIDE IS THE DORMANT SIMULATOR........."
2130 FORX=1TO400:NEXT:OUT254,6
2140 REM * SIMULATION BEGINS
2150 IX=0:IY=0:DA$="  DATA  ":AD$="ADDRESS":VL=0
2160 CLS:FORY=0TO47:SET(0,Y):SET(13,Y):SET(84,Y):SET(127,Y):NEXT
2170 SET(1,0):SET(2,0):SET(11,0):SET(12,0):PRINT@2,"B C";
2180 PRINT@50,"PROGRAM";
2190 FORX=84TO95:SET(X,0):NEXT:FORX=118TO127:SET(X,0):NEXT
2200 FORX=0TO13:SET(X,47):NEXT:FORX=84TO127:SET(X,47):NEXT
2210 FORY=0TO20:SET(16,Y):SET(29,Y):NEXT:PRINT@10,"H L";
2220 SET(17,0):SET(18,0):SET(27,0):SET(28,0)
2230 FORX=16TO29:SET(X,20):NEXT
2240 FORY=27TO34:SET(16,Y):SET(29,Y):NEXT:PRINT@586," Z ";
2250 FORY=39TO47:SET(16,Y):SET(29,Y):NEXT:PRINT@842," CY";
2260 SET(17,27):SET(18,27):SET(27,27):SET(28,27)
2270 SET(17,39):SET(18,39):SET(27,39):SET(28,39)
2280 FORX=17TO28:SET(X,34):SET(X,47):NEXT
2290 FORY=0TO12:SET(32,Y):SET(81,Y):NEXT
2300 PRINT@23,"ACCUMULATOR";:
2310 FORX=32TO81:SET(X,12):NEXT
2320 FORX=32TO41:SET(X,0):NEXT:FORX=72TO81:SET(X,0):NEXT
2330 FORY=15TO21:SET(44,Y):SET(81,Y):NEXT
2340 FORX=44TO81:SET(X,21):NEXT:PRINT@351,"ID";
2350 FORX=44TO58:SET(X,15):NEXT:FORX=68TO81:SET(X,15):NEXT
2360 FORY=39TO47:SET(44,Y):SET(61,Y):SET(65,Y):SET(81,Y):NEXT
2370 FORX=44TO61:SET(X,47):NEXT:FORX=65TO81:SET(X,47):NEXT
2380 FORX=44TO49:SET(X,39):NEXT:FORX=58TO61:SET(X,39):NEXT
2390 FORX=65TO68:SET(X,39):NEXT:FORX=78TO81:SET(X,39):NEXT
2400 PRINT@858,"PC";:PRINT@867,"MEM";
2410 FORY=24TO30:SET(65,Y):SET(81,Y):NEXT
2420 FORX=65TO81:SET(X,30):NEXT:PRINT@546,"CLOCK";
2430 SET(66,24):SET(80,24):PRINT@662,"BUS";
2440 BC=66:HL=74:AC=152:PR=108:ID=410:CL=612
2450 ZF=650:CY=906:PC=922:ME=932:BU=596
2460 QQ=1:GOSUB2650 :GOSUB2490 :GOSUB2540 :GOSUB2600
2470 GOTO6240
2490 REM*SUBROUTINE TO SET UP INPUT REGISTER AND CLOCK
2500 FORX=1TOJ:PRINT@(BC+(X-1)*64),LEFT$(CD$(2,X),1);
2510 PRINT@(BC+2+(X-1)*64),RIGHT$(CD$(2,X),1);:NEXTX
```

Program continues

More CFR Spectaculars!!!

ASCII Parallel Input *SELECTRIC Typewriter/Printer

TRS-80 COMPATIBLE

TYPE ELEMENT NOT INCLUDED

Only $699.00

- Compatible w/Printer Cable or Expansion Interface
- Refurbished Selectric Printer
- Parallel Input, 15" Frame, 132 Cols.
- Upper & Lower Case Typewriter/Printer
- Complete & Ready For Use
- Corresp. (Office) Code
- Data Included
- Fully Formed Characters, Approx 15 CPS

Add $20.00 for Handling & Packaging. Pay Shipping When Delivered.

This Month's Specials

SHUGART 901 8" Floppy Disk Drive
Used, whole untested. Data & Schematics included. ..... 2/$499.00 Plus Shipping

SHUGART SA400 5¼" Mini Floppy
Used, whole, untested. Data & Schematics included ..... 2/$299.00 Plus Shipping

CDC9400 (MPI BR-803) 8" Floppy Drive
Soft Sectored. Used, whole, untested. Data & Schematics included ..... 2/$399.00 Plus Shipping

12" VIDEO MONITOR Motorola #XM-351
80x24 or 16x64 Display. Requires only Composite Video input and 110/230 VAC, 50/60 Hz. Tested, functional & guaranteed. Data and schematics included. ..... $95.00ea. Plus Shipping

9" VIDEO MONITOR Motorola #XM-227
Same characteristics as above 12" video. Tested, functional and guaranteed. Data & Schematics included. ..... $79.00ea. Plus Shipping

Call For Our Bargain-Packed PERIPHERAL FLYER!!!
Prices Are Subject To Change On All Items

CFR Associates, Inc.

✓316

MAIL ORDERS: Box 144, Newton, N.H. 03858

PHONE ORDERS: 617/372-8536 (Sorry, No Collect Calls) Mastercharge & VISA Welcome

WAREHOUSE: 18 Granite St. Haverhill, Mass. 01830

FIXED ASSET ACCOUNTING

Stop paying high professional fees for clerical work. This extremely flexible system will maintain all records which are related to fixed assets and depreciation.

* Any method: straight line, declining balance, ADR, sum of the years digits
* Projects depreciation for current & future years
* Complete audit trail with detailed fixed asset ledger, acquisition and disposal reports
* Computes investment tax credit and additional first-year depreciation
* Provides reports summarized by general ledger account, asset group, department, and more

System requirements are 32K and two or more disk drives for Model I, 64K with one or more disc drives for the Model II, and 32K with at least one disk drive for the Model III. All versions require Disk Basic and will run under either TRSDOS or NEWDOS.

FAAS-1	For Model I	.....	$ 149
FAAS-2	For Model II	.....	$ 189
FAAS-3	For Model III	.....	$ 149

CASH FLOW PROJECTION

Get control over your personal finances. This easy-to-use system maintains a detailed analysis of your future cash requirements and estimated income, tracking the information you need to schedule payments, avoid minimum balance fees and forecast the amount of your uncommitted funds at any point in time for at least a year into the future. The tape versions require 16K & either Level II or Model III Basic. Disc versions require 32K, Disc Basic, at least one drive and will run under TRSDOS or NEWDOS.

Tape Versions		Disk Versions	
TCASH-1	For Model I . . . $ 19.95	DCASH-1	For Model I . . . $ 24.95
TCASH-3	For Model III . . $ 19.95	DCASH-3	For Model III . . $ 24.95

C.O.D. $2.50 ADDITIONAL — CONN. RESIDENTS PLEASE ADD SALES TAX

THE SYSTEMWORKS ✓473

P.O. Box 359 — Flood Road — Marlborough, Conn. 06447

✓441

PROSOFT T.M.

Dept.C / Box 839 / No. Hollywood, Ca. 91603 / 213-764-3131

Word Processing

*** SUBSCRIPT 5.0** — $79.95

With our software, your TRS-80® Model I or III and LINE PRINTER IV or CENTRONICS® 737 can easily produce right-justified, proportional spaced documents with this typeset look.

EPSON® MX-80 owners can underline and use all 12 fonts with this professional quality software.

With SELECTRICS® and most other printers, you can take advantage of our 100+ pages of excellent documentation and 90+ functions, including:

multiple top and bottom titles
line split, join, and duplicate
global search and change
visible control words
very large documents
block move and copy
right-justification
table of contents
form letters
underlining
centering
autosave
index
super scripts and sub scripts (some printers)

Epson MX-80 — Line Printer IV — Selectric

Version 5.0 incorporates all features of our earlier PROP, SUBEDIT, SUBSCRIPT, and MININIT components, and adds several user-requested new features. It is based on IBM's highly-regarded CMS Time-Sharing system, so if you've been looking for "mainframe" quality Word Processing, you've just found it.

*** DVORAK**

Keyboard translator with press-on labels:	$19.95
Typing Tutor (requires a translator):	$19.95
Special: Both DVORAK programs:	$34.95

Software Speedups

*** FASTER** — $29.95

Analyses executing BASIC programs, then identifies a simple program change to improve their execution speed. NO hardware changes are involved, works with packages as well as your own code and can reduce run-times by 10-50%. Example: "move selection" in "Othello" dropped from 48 to 32 seconds. This will be one of your most valuable utilities!

*** QUICK COMPRESS** — $19.95

Makes many Model I BASIC programs faster and 30-60% smaller by removing blanks and selected remarks at your option. Processes 800 multi-statement lines in 3 seconds, needs only 270 bytes.

*** XTEND40** — $14.95

Quickly upgrades Model I 35-track disks to 40 tracks with your 40-track drives and Operating System.

ORDERING

Models I and III, tape or disk:	FASTER, DVORAK
Models I and III, 32-48K disk:	SUBSCRIPT
Model I:	COMPRESS, XTEND40

Tape versions run on 16-48K Level II. Disk versions run with TRSDOS® 2.3, NEWDOS, NEWDOS/80®, and Model III TRSDOS 1.1 & up.

Please add $3.00 for postage & handling, and 6% tax in Calif. Checks, C.O.D.'s ok.

Spring Special: We pay handling on orders over $25.00.

BONUS: Model I orders over $50.00 will include a diskette "re-labeller" program FREE!

✓See List of Advertisers on page 306

FREE CATALOGUE WITH EVERY ORDER!

SCRIPMOD

By TERRY FIVEASH

Scripmod Features

- Allows you to use all those neat things your printer does from Scripsit!
- For use with any smart printer.
- Does not require special drives for your printer.
- Use with LP IV, DW II, IDS 440, IDS 460, NEC, DIABLO, QUME, and more!

UNDERLINING, SUPERSCRIPT, SUBSCRIP, BOLD TYPE, PITCHES.

YOU CAN EVEN UNDERLINE SPACES!

This Program is a must for every Scripsit user.

Scripmod is supplied on disc with full documentation.

$39.95

Print Central

A utility for those with smart printers. To send a control code to your printer, simply press the clean key and the appropriate letter key and see instant execution. Any code from 1 to 31 may be sent.

MODEL I — $24.95

80 KISMET
By Wendell Routon

Super version of this old game for your Model I or Model III TRS-80. Graphics, 16K Level II Minimum.

$14.95

THE BLACK BOX
By Ken Hayes

Shoot rays through black box, in search of hidden stars. Watch out! They're not always where they seem. Model I or III, 16K Level II Minimun. $14.95

BLACK BOX

THE TEMPLE OF RAH
By Dan Case

Rescue the fair princess from the clutches of the people of Rah before it's too late! Super adventure with **sound!** For Model I or III, 16K Level II minimun. $14.95

VIDEO SCREEN FILTER

Hard acrylic plastic screen that's easy to install—easy on your eyes.

GS 1 - Model I $14.95
GS 2 - Model II, III . $14.95
GS 3 - Leedex 100 . . $14.95
Special Size $16.95

THINK GREEN
VIDEO SCREEN FILTER

MasterCard VISA — MASTERCARD VISA
Add 3%

Oklahoma Residents add 2% tax.

C.O.D.'s WELCOME!

Case COMPUTER PRODUCTS CO
414 South Oak
Sapulpa, Okla. 74066

✓38

[918] 224-9588

```
2520 POKE15360+64,94:PRINT@CL,"1";
2530 RETURN
2540 REM*SUBROUTINE TO SET UP PROGRAM
2545 IFQQ>=100THENQQ=QQ-100
2550 FORX=QQTOQQ+13:X1=X:Q1=QQ:IFX1>=100THENX1=X1-100:Q1=Q1-100
2555 PRINT@(PR+(X1-Q1)*64),IN$(1,X1)" ";
2560 PRINTPR$(1,X1);:PRINT@(PR+8+(X1-Q1)*64),PR$(2,X1);
2570 PRINT" "PR$(3,X1);:NEXTX
2580 POKE15360+106,94
2590 RETURN
2600 REM*SUBROUTINE TO SET UP OUTPUT REGISTER AND PC
2610 FORX=74TO6*64STEP64:PRINT@X,"0 0";:NEXTX
2620 PRINT@ZF,"NOT";:PRINT@CY,"NOT";
2630 POKE15360+72,94:PRINT@PC,"01";
2640 RETURN
2650 REM*SUBROUTINE TO WRITE BLANK SPACES
2660 PRINT@AC,STRING$(10,32);:PRINT@ID,"    ";:PRINT@CL," ";
2670 PRINT@ZF,"    ";:PRINT@CY,"    ";:PRINT@PC,"  ";
2680 PRINT@ME,"  ";:PRINT@BU,"        ";
2690 RETURN
2700 REM * BC TO BUSREM*BUS TO BC
2710 FORX=14TO46:SET(X,23):NEXT:FORY=23TO26:SET(46,Y):NEXT
2720 FORX=14TO46:RESET(X,23):NEXT
2730 FORY=23TO26:RESET(46,Y):NEXT
2740 RETURN
2750 REM * BUS TO BC
2760 FORY=26TO23STEP-1:SET(46,Y):NEXT
2770 FORX=46TO14STEP-1:SET(X,23):NEXT
2780 FORY=26TO23STEP-1:RESET(46,Y):NEXT
2790 FORX=46TO14STEP-1:RESET(X,23):NEXT
2800 RETURN
2810 REM * HL TO BUS
2820 SET(21,21):SET(21,22):FORX=21TO46:SET(X,23):NEXT
2830 FORY=23TO26:SET(46,Y):NEXT
2840 RESET(21,21):RESET(21,22):FORX=21TO46:RESET(X,23):NEXT
2850 FORY=23TO26:RESET(46,Y):NEXT
2860 RETURN
2870 REM * BUS TO HL
2880 FORY=26TO23STEP-1:SET(46,Y):NEXT
2890 FORX=46TO21STEP-1:SET(X,23):NEXT:SET(21,22):SET(21,21)
2900 FORY=26TO23STEP-1:RESET(46,Y):NEXT
2910 FORX=46TO21STEP-1:RESET(X,23):NEXT
2920 RESET(21,22):RESET(21,21):RETURN
2930 REM * A TO BUS
2940 FORY=13TO23:SET(36,Y):NEXT:FORX=36TO46:SET(X,23):NEXT
2950 FORY=23TO26:SET(46,Y):NEXT
2960 FORY=13TO23:RESET(36,Y):NEXT
2970 FORX=36TO46:RESET(X,23):NEXT
2980 FORY=23TO26:RESET(46,Y):NEXT
2990 RETURN
3000 REM * BUS TO A
3010 FORY=26TO23STEP-1:SET(46,Y):NEXT
3020 FORX=46TO36STEP-1:SET(X,23):NEXT
3030 FORY=23TO13STEP-1:SET(36,Y):NEXT
3040 FORY=26TO23STEP-1:RESET(46,Y):NEXT
3050 FORX=46TO36STEP-1:RESET(X,23):NEXT
3060 FORY=23TO13STEP-1:RESET(36,Y):NEXT
3070 RETURN
3080 REM * MEM TO PC & BACK
3090 SET(72,37):FORX=72TO52STEP-1:SET(X,36):NEXT:SET(52,37)
3100 RESET(72,37):FORX=72TO52STEP-1:RESET(X,36):NEXT
3110 RESET(52,37):SET(52,37)
3120 FORX=52TO72:SET(X,36):NEXT:SET(72,37):RESET(52,37)
3130 FORX=52TO72:RESET(X,36):NEXT:RESET(72,37):RETURN
3140 REM * A TO CY & BACK
3150 FORY=13TO23:SET(36,Y):NEXT:SET(35,23):SET(34,23)
3160 FORY=23TO42:SET(33,Y):NEXT:SET(32,42):SET(31,42)
3170 SET(30,42):FORY=13TO23:RESET(36,Y):NEXT
3180 RESET(35,23):RESET(34,23)
3190 FORY=23TO42:RESET(33,Y):NEXT:RESET(32,42)
3200 RESET(31,42):RESET(30,42):RETURN
3210 REM * CY TO A
3220 SET(30,42):SET(31,42)
3230 SET(32,42):FORY=42TO23STEP-1:SET(33,Y):NEXT
3240 SET(34,23):SET(35,23):FORY=23TO13STEP-1:SET(36,Y):NEXT
3250 RESET(30,42):RESET(31,42):RESET(32,42)
3260 FORY=42TO23STEP-1:RESET(33,Y):NEXT:RESET(34,23)
3270 RESET(35,23):FORY=23TO13STEP-1:RESET(36,Y):NEXT
3280 RETURN
3290 REM * A TO Z & BACK
3300 FORY=13TO23:SET(36,Y):NEXT:SET(35,23):SET(34,23)
```

Program continues

Why use their flexible discs:

Ampex, Athana, BASF, Caelus, Control Data, Dysan, IBM, Inmac, K-Line, Maxell, Nashua, Scotch, Shugart, Syncom, 3M, Verbatim or Wabash

when you could be using

MEMOREX

for as low as $1.99 each?

Find the flexible disc you're now using on our cross reference list... then write down the equivalent Memorex part number you should be ordering.

Product Family	Product Description	Memorex Part Number (3201-)	CE quant. 100 price per disc ($)	Ampex	Athana	BASF	Caelus	Dysan	IBM	K-Line	Maxell	Nashua	Scotch 3M	Shugart	Syncom	Verbatim	Wabash	Inmac	Control Data
Flexible Disc 1s	IBM Compatible (128 B/S, 26 sectors)	3060	2.19	SFD-111110	473071	54428	CM-F11	600506	2305830	40013	FD1-128	FD-1	740-0	S/A 100	15002	FD34-1000	F111111X	7870-K	421602
	IBM Compatible (128 B/S, 26 sectors) w/ W P N	3062	2.24	–	–	–	–	–	–	–	–	–	740-0	–	–	–	–	–	–
	IBM Compatible (128 B/S, 26 sectors) w/ W P N & Hub ring	3064	2.55	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Single-Headed Drives	IBM Compatible (128 B/S, 26 sectors) REVERSIBLE	1729	3.35	SFD-112110	473072	54431	–	–	–	40015	–	FD-2	740-2-0	–	15150	FP34-2000	F171111X	7860-K	–
Single-Density Media	IBM System 6 Compatible	3066	2.19	–	473077	54461	–	600529	1569856	40014	–	–	740-0 DS6	–	15002	FD60-1000	F1161115	–	–
	IBM Compatible (256 B/S, 15 sectors)	3109	2.19	SFD-111210	473073	–	–	600584	7305845	40040	–	–	740-3600	–	15005	FD36-1000	F1121111X	7861-K	–
	IBM Compatible (512 B/S, 8 sectors)	3110	2.19	–	473074	–	–	600586	1569954	40044	–	–	–	–	15004	FD60-1000	F1131111X	7889-K	–
	Shugart Compatible, 32 hard sector	3315	2.19	SFD-211010	470801	53802	CM-F21	1011	–	40036	FH1-32	FD-132	740-32	S/A-101	15025	FD32-1000	–	7890-K	421322
	Shugart Compatible, 32 hard sector REVERSIBLE	3025	3.35	SFD-213010	–	–	–	–	–	40017	–	–	740-2-32	–	15151	FP32-2000	–	7880-K	–
	Wang Compatible, 32 hard sector w/Hub ring	3087	2.50	–	–	54491	–	–	–	–	–	–	740-32RM	–	–	–	F3TA411X	–	–
	CPT 8000 Compatible	3045	2.79	–	–	–	–	–	–	–	–	–	–	–	15226	–	–	–	–
Flexible Disc 1d	IBM Compatible (128 B/S, 26 sectors)	3090	2.95	SFD-121010	474071	54568	–	3740/10	–	40047	FD1-128/M2100	FD-1D	741-0	–	–	FD34-8000	F131111X	7857-K	423002
	Soft Sector (128 B/S, 26 sectors) REVERSIBLE	3093	3.99	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Single-Headed Drives	Shugart Compatible, 32 hard sector	3091	2.95	SFD-221010	470801	54596	–	101/10	–	40024	FH1-32D	–	741-32	S/A-103	15015	FD32-8000	F33A410X	7887-K	423322
Double-Density Media	Shugart Compatible, 32 hard sector REVERSIBLE	3094	3.99	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Wang Compatible, 32 hard sector w/Hub ring	3088	3.20	–	–	–	–	–	–	–	–	–	–	–	–	–	F32A411X	–	–
Flexible Disc 2s	Soft Sector (Unformatted)	3101	3.84	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	Soft Sector (128 B/S, 26 sectors)	3113	3.84	–	–	54428	–	600818	1766870	–	–	–	–	S/A-150	15152	FD10-4026	F121111X	–	–
Double-Headed Drives	Soft Sector (256 B/S, 15 sectors)	3106	3.84	–	473477	54226	–	600815	2736700	40043	FD2-256D	–	742-0	–	15154	FD10-4015	F122111X	7856-K	424812
Single-Density Media	32 Hard Sector	3108	3.84	–	–	–	–	–	–	–	FH2-32	–	–	–	–	–	–	–	–
Flexible Disc 2d	Soft Sector (Unformatted)	3102	3.49	–	473455	–	–	DY150	–	40028	FD2-XDM	FD-2D	743-0	–	15103	DD34-4001	–	–	425002
	Soft Sector (128 B/S, 26 sectors)	3115	3.49	–	–	–	–	–	–	–	–	–	–	S/A-150	–	–	–	–	–
Double-Headed Drives	Soft Sector (256 B/S, 26 sectors)	3103	3.49	–	473471	54329	–	600817	1766872	40019	FD2-256D	–	743-0/256	–	15101	DD34-4026	F144111X	7858-K	425602
Double-Density Media	Soft Sector (512 B/S, 15 sectors)	3114	3.49	–	473472	54479	–	600818	1669044	40039	–	–	743-0/512	–	15100	DD34-4015	F145111X	–	425612
	Soft Sector (1024 B/S, 8 sectors)	3104	3.49	–	473473	54495	–	600819	1669045	40020	–	–	743-0/1024	–	15102	DD34-4008	F147111X	7859-K	425622
	32 Hard Sector	3105	3.49	SFD-321010	470851	–	–	101/20	–	40021	FH2-32D	–	743-32	S/A-151	15125	DD32-4000	F34A411X	7881-K	425322
	Burroughs B-80 Compatible, 32 Hard Sector	3092	3.49	–	–	–	–	–	–	–	–	–	–	–	–	–	F34A611X	–	–
	Soft Sector (1024 B/S, 8 sectors) w/ Hub Ring	3116	3.75	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Flexible Disc FD																			
Memorex 651 or Equiv. Drive Compatible	FD VI (Vinyl Jacket)	3071-2003	2.95	–	470651	–	CM-F31	FDIV	–	A0002	–	FD-165	511-0	–	15026	FD65-1000	F61A111X	7910	–
Mini Flexible Disc 1s	Soft Sector (Unformatted)	3401	1.99	–	475001	54236	–	104/1	–	40500	MD1	MD 1	744-0	S/A-104	15300	MD525-01	M11A211X	7897	441002
5¼" Single-Headed Drives	10 Hard Sector	3403	1.99	–	475010	54257	–	107/1	–	40501	–	MD 110	744-10	S/A-107	15325	MD525-10	M41A211X	7898	441102
Single-Density Media	16 Hard Sector	3405	1.99	–	A75016	54258	–	105/1	–	40502	MH1	MD 116	744-16	S/A-105	15326	MD525-16	M51A211X	7899	441162
	Soft Sector (Unformatted) W/Hub Ring	3431	2.19	–	–	–	–	–	–	–	–	–	–	–	–	MD525-01	–	–	–
	10 Hard Sector, w/Hub Ring	3433	2.19	–	–	–	–	–	–	–	–	–	–	–	–	MD525-10	–	–	–
	16 Hard Sector, w/Hub Ring	3435	2.19	–	–	–	–	–	–	–	–	–	–	–	–	MD525-16	–	–	–
Mini Flexible Disc 1d	Soft Sector	3417	2.24	–	–	54648	–	104/10	–	–	–	–	–	–	–	MD540-01	–	–	–
5¼" Single-Headed Drives	10 Hard Sector	3418	2.24	–	–	54649	–	107/10	–	–	–	–	–	–	–	MD540-10	–	–	–
Double-Density Media	16 Hard Sector	3423	2.24	–	–	54652	–	105/10	–	–	–	–	–	–	–	MD540-16	–	–	–
Mini Flexible Disc 2d	Soft Sector	3421	2.74	–	–	54624	–	104/20	–	–	MD2-D	–	745-0	S/A-154	–	MD550-01	–	–	–
5¼" Double-Headed Drives	10 Hard Sector	3423	2.74	–	–	54627	–	107/20	–	–	–	–	745-10	S/A-157	–	MD550-10	–	–	–
Double-Density Media	16 Hard Sector	3425	2.74	–	–	54630	–	105/20	–	–	MH2-D	–	745-16	S/A-155	–	MD550-16	–	–	–

Memorex Flexible Discs...The Ultimate in Memory Excellence

Quality
Memorex means quality products that you can depend on. Quality control at Memorex means starting with the best materials available. Continual surveillance throughout the entire manufacturing process. The benefit of Memorex's years of experience in magnetic media production, resulting, for instance, in proprietary coating formulations. The most sophisticated testing procedures you'll find anywhere in the business.

100 Percent Error Free
Each and every Memorex Flexible Disc is certified to be 100 percent error free. *Each* track of *each* flexible disc is tested, individually, to Memorex's stringent standards of excellence. They test signal amplitude, resolution, low-pass modulation, overwrite, missing pulse error and extra pulse error. They are torque-tested, and competitively tested on drives available from almost every major drive manufacturer in the industry including drives that Memorex manufacturers. Rigid quality audits are built into every step of the manufacturing process and stringent testing result in a standard of excellence that assures you, our customer, of a quality product designed for increased data reliability and consistent top performance.

Customer-Oriented Packaging
Memorex's commitment to excellence does not stop with a quality product. They are proud of their flexible discs and they package them with pride. Both their packaging and their labeling have been designed with your ease of identification and use in mind. The desk-top box containing ten discs is convenient for filing and storage. Both box labels and jacket labels provide full information on compatibility, density, sectoring, and record length. Envelopes with multi-language care and handling instructions and and color-coded removable labels are included. A write-protect feature is available to provide data security.

Full One Year Warranty — Your Assurance of Quality
Memorex Flexible Discs will be replaced free of charge by Memorex if they are found to be defective in materials or workmanship within one year of the date of purchase. Other than replacement, Memorex will not be responsible for any damages or losses (including consequential damages) caused by the use of Memorex Flexible Discs.

Quantity Discounts Available
Memorex Flexible Discs are packed 10 discs to a carton and 10 cartons to a case. Please order only in increments of 100 units for quantity 100 pricing. We are also willing to accommodate your smaller orders. Quantities less than 100 units are available in increments of 10 units at a 10% surcharge. **Quantity discounts** are also available. Order 500 or more discs at the same time and deduct 1%; 1,000 or more saves you 2%; 2,000 or more saves you 3%; 5,000 or more saves you 5% and 10,000 or more discs earns you a 7% discount off our super low quantity 100 price. Almost all Memorex Flexible Discs are immediately available from **CE**. Our warehouse facilities are equipped to help us get you the quality product you need, when you need it. If you need further assistance to find the flexible disc that's right for you, call the Memorex compatibility hotline. Dial 800-638-8080 and ask for the *flexible disc hotline* extention 0997. In California dial 800-672-3525.

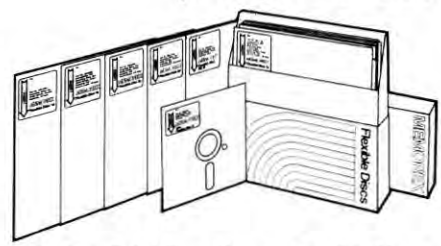
Buy with Confidence
To get the fastest delivery from **CE** of your Memorex Flexible Discs, send or phone your order directly to our Computer Products Division. Be sure to calculate your price using the **CE** prices in this ad. Michigan residents please add 4% sales tax. Written purchase orders are accepted from approved government agencies and most well rated firms at a 10% surcharge for net 10 billing. All sales are subject to availability. All sales are final. Prices, terms and specifications are subject to change without notice. Out of stock items will be placed on backorder automatically unless **CE** is instructed differently. International orders are invited with a $20.00 surcharge for special handling in addition to shipping charges. All shipments are F.O.B. Ann Arbor, Michigan. No COD's please. Non-certified and foreign checks require bank clearance.

Mail orders to: **Communications Electronics**, Box 1002, Ann Arbor, Michigan 48106 U.S.A. Add $8.00 per case or partial-case of 100 8-inch discs or $6.00 per case of 100 5¼-inch mini-discs for U.P.S. *ground* shipping and handling in the continental U.S.A. If you have a Master Charge or Visa card, you may call anytime and place a credit card order. **Order toll-free** in the United States. Call 800-521-4414. If you are outside the U.S. or in Michigan, dial 313-994-4444. **Dealer inquiries invited.** All order lines at **Communications Electronics** are staffed 24 hours.

Copyright ©1981 Communications Electronics™

MEMBER DIRECT MAIL MARKETING ASSOCIATION · CODE OF ETHICS · VISA · master charge

Order Toll-Free! (800) 521-4414



For Data Reliability—Memorex Flexible Discs

263

COMMUNICATIONS ELECTRONICS™

Computer Products Division

854 Phoenix □ Box 1002 □ Ann Arbor, Michigan 48106 U.S.A.
Call TOLL-FREE (800) 521-4414 or outside U.S.A. (313) 994-4444

SPECTACULAR OFFERS

BASF "FLEXYDISK"...
Superior Quality data storage medium.
Certified and guaranteed 100% error free.

SINGLE SIDED-SINGLE DENSITY

5¼" or 8" Diskettes ..... 10/$24
5¼" or 8" Vinyl Storage Pages ..... 10/$5

MAXELL- DISKETTES
The best quality diskette money can buy.
Approved by Shugart and IBM.
Sold only in boxes of 10

5", 1 side $3.30
8", 1-side $4.25
5", 2-side $3.90
8", 2-side $5.60

ALL MAXELL DISKETTES ARE DOUBLE DENSITY

LIBRARY CASE...
3-ring binder album.
Protects your valuable programs on disks
Fully enclosed and protected on all sides.
Similar to Kas-sette storage box.

Library 3-Ring Binder $6.50
5¼" Mini Kas - sette/10 ..... $2.49
8" Kas-sette/10 ..... $2.99

DISKETTE DRIVE HEAD CLEANING KITS
Prevent head crashes and insure efficient, error-free operation.

5¼" or 8" $19.50

SFD CASSETTES
C-10 Cassettes ..... 10/$7
(All cassettes include box & labels)
Get 8 cassettes,C-10 sonic and Cassette/8 library album for only $8.00
(As illustrated)

HARDHOLE
Reinforcing ring of tough mylar protects disk from damage

8" Applicator $4 5¼" Applicator $3
50/8" Hardholes $8 5¼" Hardholes $6

VISA • MASTERCHARGE • MONEY ORDERS CERTIFIED CHECK • FOR PERSONAL CHECKS ALLOW TWO WEEKS • C.O.D. REQUIRES A 10% DEPOSIT • CAL. RES. ADD 6% SALES TAX MIN $2 SHIPPING & HANDLING • MINIMUM ORDER $10 • SATISFACTION GUARANTEED OR FULL REFUND
Write for our free catalog

ABM ✓56
PRODUCTS
631 B ST.
SAN DIEGO, CA 92101
(714)235-6602


```
3310 FORY=23TO31:SET(33,Y):NEXT:SET(32,31):SET(31,31)
3320 SET(30,31):FORY=13TO23:RESET(36,Y):NEXT
3330 RESET(35,23):RESET(34,23):FORY=23TO31:RESET(33,Y):NEXT
3340 RESET(32,31):RESET(31,31):RESET(30,31):RETURN
3350 REM * Z TO A
3360 SET(30,31):SET(31,31):SET(32,31)
3370 FORY=31TO23STEP-1:SET(33,Y):NEXT:SET(34,23):SET(35,23)
3380 FORY=23TO13STEP-1:SET(36,Y):NEXT
3390 RESET(30,31):RESET(31,31):RESET(32,31)
3400 FORY=31TO23STEP-1:RESET(33,Y):NEXT:RESET(34,23)
3410 RESET(35,23):FORY=23TO13STEP-1:RESET(36,Y):NEXT
3420 RETURN
3430 REM * MEM TO ID
3440 SET(72,37):FORX=72TO60STEP-1:SET(X,36):NEXT
3450 FORY=36TO22STEP-1:SET(60,Y):NEXT:RESET(72,37)
3460 FORX=72TO60STEP-1:RESET(X,36):NEXT
3470 FORY=36TO22STEP-1:RESET(60,Y):NEXT:RETURN
3480 REM * ID TO BUS
3490 FORY=22TO26:SET(46,Y):FORN=1TO20:NEXTN,Y
3500 FORY=22TO26:RESET(46,Y):FORN=1TO20:NEXTN,Y
3510 RETURN
3520 REM * MEM TO BUS
3530 SET(72,37):FORX=72TO46STEP-1:SET(X,36):NEXT
3540 FORY=36TO33STEP-1:SET(46,Y):NEXT
3550 RESET(72,37):FORX=72TO46STEP-1:RESET(X,36):NEXT
3560 FORY=36TO33STEP-1:RESET(46,Y):NEXT
3570 RETURN
3580 REM * BUS TO PC
3590 FORY=33TO36:SET(46,Y):FORN=1TO5:NEXTN,Y
3600 FORX=46TO52:SET(X,36):FORN=1TO5:NEXTN,X:SET(52,37)
3610 FORY=33TO36:RESET(46,Y):FORN=1TO5:NEXTN,Y
3620 FORX=46TO52:RESET(X,36):FORN=1TO5:NEXTN,X:RESET(52,37)
3630 RETURN
3640 REM * Z TO BUS
3650 FORX=30TO39:SET(X,31):FORN=1TO5:NEXTN,X
3660 FORX=30TO39:RESET(X,31):FORN=1TO5:NEXTN,X
3670 RETURN
3680 REM * CY TO BUS
3690 FORX=30TO33:SET(X,42):FORN=1TO3:NEXTN,X
3700 FORY=42TO31STEP-1:SET(33,Y):NEXT
3710 FORX=33TO39:SET(X,31):FORN=1TO3:NEXTN,X
3720 FORX=30TO33:RESET(X,42):FORN=1TO3:NEXTN,X
3730 FORY=42TO31STEP-1:RESET(33,Y):NEXT
3740 FORX=33TO39:RESET(X,31):FORN=1TO3:NEXTN,X
3750 RETURN
3760 GOTO3760
3770 PRINT:PRINT"PRESS "CHR$(34)"Q"CHR$(34);
3780 PRINT" TO END PROGRAM, CLEAR TO RECOVER"
3790 Q=PEEK(14400):IFQ=2THEN1270 ELSE
3800 Q=PEEK(14340):IFQ=2THEN3810 ELSE3790
3810 CLS:PRINT"THIS PROGRAM WAS PART OF SIMUL-80,"
3820 PRINT"A GAME CREATED BY DENNIS BATHORY KITSZ"
3830 END
3840 REM * EXECUTION SUBROUTINES BEGIN HERE
3850 REM * 00 * NOP
3860 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"00";
3870 GOSUB3430 :PRINT@ID,"   NOP    ";
3880 PRINT@CL,"2";:FORN=1TO100:NEXT
3890 PRINT@CL,"3";:FORN=1TO100:NEXT
3900 QQ=QQ+1:GOSUB2540
3910 RETURN
3920 REM * 01 * LD A,(B)
3930 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"01";
3940 GOSUB3430 :PRINT@ID," LD A,(B) ";
3950 GOSUB3480 :PRINT@CL,"2";:PRINT@BU,DA$;
3960 GOSUB2750 :GOSUB2700 :VL=PEEK(15360+BC+IX)
3970 PRINT@CL,"3";:GOSUB3000 :PRINT@AC,CHR$(VL);
3980 QQ=QQ+1:GOSUB2540
3990 RETURN
4000 REM * 02 * LD A,(C)
4010 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"02";
4020 GOSUB3430 :PRINT@ID," LD A,(C) ";
4030 PRINT@CL,"2";:PRINT@BU,DA$;
4040 GOSUB3480 :GOSUB2700 :VL=PEEK(15360+BC+IX+2)
4050 PRINT@CL,"3";:GOSUB3000 :PRINT@AC,CHR$(VL);
4060 QQ=QQ+1:GOSUB2540
4070 RETURN
4080 REM * 03 * INC BC PTR
4090 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"03";
4100 GOSUB3430 :PRINT@ID,"INC BC PTR";
4110 PRINT@CL,"2";:PRINT@BU,AD$;
```

Program continues

WHY IS THE MICROCONNECTION™ A MODEM AND MUCH MORE?

Because it can dial the phone and answer it too, transcribe transmissions, decode busses, run printers, receive/send radio transmissions, answer/originate, and direct-connect to the phone system. Take a look at all the software support. That's why it's a modem and much more.

MODEMS....

MICROCONNECTION
For Model I or III, decodes the TRS-80 buss and creates RS232 port. Eliminates need for expansion box and/or RS232 board. Provides serial printer output. Requires software written for Port 208. Requires adapter cable for Model III—**$249.00**

RS232CONNECTION
Works with virtually any computer or terminal having RS232 serial I/O port. Replaces obsolete acoustic coupled modems. Compatible with all TRS-80 terminal software. Requires RS232 cable—**$199.50**

COLORCONNECTION
Converts RS Color Computer into a timeshare terminal. Provides serial printer output. Does not require additional memory or extended basic—**$199.50**

AUTOCONNECTION
This option permits modems (except color) to answer the telephone and/or dial numbers automatically. Supplied with dialer demonstration program—**$79.95 option**

EUROPEANCONNECTION
This option modifies above units for European Standards—**$20.00 option**

MODEL III ADAPTER
Cable converts Model III 50 pin buss to 40 pins used by Model I peripherals—**$39.95**

RS232 CABLE
Four foot ribbon cable terminated with 25 pin male DB25 connectors—**$24.95**

...AND MUCH MORE:

AUTOMATED SMART TERMINAL PROGRAMS WRITTEN BY DICK BALCOM

All smart terminal programs feature manual or automatic upload/download, two user defined messages plus auto "who are you" interrogation, autoprompt message entry, transfers EDTASM and Orchestra 80 files formatting of line length, speed selection, upper lower case drivers, autorepeat key, "beep" function for keystroke entry, buffered print output with page and perforation skipover, compatible with SCRIPSIT and PENCIL, built-in text generator for those who do not have a word processor.

DISK

SMART80D
The LEADING smart terminal program for Model I and at a popular price. Requires one drive and 32-48K. Compatible with all major disk operating systems including double density—**$79.95**

SMART IIID
The FIRST smart terminal program for the Model III. Offers popular features of SMART80D plus several new features associated with the Model III—**$99.95**

SMART/BAS
A simple basic smart terminal disk program that can be user modified. Adaptable for cassette based Level II systems—**$19.95**

CASSETTE

SMART80C
For Model I, additional features include ASCII-token-ASCII conversion for transferring basic programs. For Level II, 16-48K systems. Specify if for MICROCONNECTION or RS232 version—**$79.95**

SMART80E
The first and only smart terminal program for the Exatron "Stringy Floppy", similar to SMART80C—**$79.95**

SMART IIIC
The first cassette smart terminal program for the Model III. All the power of SMART80C plus numerous other features. Specify if for MICROCONNECTION or RS232 version—**$99.95**

HOST PROGRAMS

MESSAGE 80 *By Richard Taylor*
Now you can operate your own bulletin board, either public or private, with MESSAGE 80 and the AUTOCONNECTION. Requires TRS-80, 2 disk drives, 48K and RS232CONNECTION (with the AUTOCONNECTION option)—**$149.95**

MIMI-MSG
Even if you only have a Level II, 16K keyboard, you can operate your own bulletin board! Requires TRS-80 keyboard and MICROCONNECTION with AUTOCONNECTION option)—**$49.95**

SUPERHOST
Allows other computer operators complete access to your system after password validation. Numerous features—**$29.95**

MasterCard VISA

To order your MICROCONNECTION or for more information, write or phone:

BT Enterprises
171 Hawkins Rd., Centereach, NY 11720
(516)981-8568 (800)645-6038
Computer 300/1200 (516)588-5836

Level IV Products Inc.
32238 Schoolcraft, Suite F4, Livonia, MI 48154
1(313)525-6200 (Mich only)
1(800)521-3305 (Elsewhere)

Microperipheral Corp.
2643 151st Pl. N.E., Redmond, WA 98052
(206)881-7544

306

the microperipheral corporation

See List of Advertisers on page 306

Check our book pages for the latest books about microcomputers.

```
4120 GOSUB3480 :GOSUB2750 :POKE(15360+BC+IX-2),149:IX=IX+64
4130 POKE(15360+BC+IX-2),94:PRINT@CL,"3";
4140 QQ=QQ+1:GOSUB2540
4150 RETURN
4160 REM * 04 * LD A,(H)
4170 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"04";
4180 GOSUB3430 :PRINT@ID," LD A,(H) ";
4190 GOSUB3480 :PRINT@CL,"2";:PRINT@BU,DA$;
4200 GOSUB2870 :GOSUB2810 :VL=PEEK(15360+HL+IY)
4210 PRINT@CL,"3";:GOSUB3000 :PRINT@AC,CHR$(VL);
4220 QQ=QQ+1:GOSUB2540
4230 RETURN
4240 REM * 05 * LD A,(L)
4250 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"05";
4260 GOSUB3430 :PRINT@ID," LD A,(L) ";
4270 GOSUB3480 :PRINT@CL,"2";:PRINT@BU,DA$;
4280 GOSUB2870 :GOSUB2810 :VL=PEEK(15360+HL+IY+2)
4290 PRINT@CL,"3";:GOSUB3000 :PRINT@AC,CHR$(VL);
4300 QQ=QQ+1:GOSUB2540
4310 RETURN
4320 REM * 07 * INC HL PTR
4330 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"07";
4340 GOSUB3430 :PRINT@ID,"INC HL PTR";
4350 PRINT@CL,"2";:PRINT@BU,AD$;
4360 GOSUB3480 :GOSUB2870 :POKE(15360+HL+IY-2),149:IY=IY+64
4370 POKE(15360+HL+IY-2),94:PRINT@CL,"3";
4380 QQ=QQ+1:GOSUB2540
4390 RETURN
4400 REM * 08 * DEC HL PTR
4410 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"08";
4420 GOSUB3430 :PRINT@ID,"DEC HL PTR";
4430 PRINT@CL,"2";:PRINT@BU,AD$;
4440 GOSUB3480 :GOSUB2870 :POKE(15360+HL+IY-2),149:IY=IY-64
4450 POKE(15360+HL+IY-2),94:PRINT@CL,"3";
4460 QQ=QQ+1:GOSUB2540
4470 RETURN
4480 REM * 09 * DEC BC PTR
4490 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"09";
4500 GOSUB3430 :PRINT@ID,"DEC BC PTR";
4510 PRINT@CL,"2";:PRINT@BU,AD$;
4520 GOSUB3480 :GOSUB2750 :POKE(15360+BC+IX-2),149:IX=IX-64
4530 POKE(15360+BC+IX-2),94:PRINT@CL,"3";
4540 QQ=QQ+1:GOSUB2540
4550 RETURN
4560 REM * 10 * LD (H),A
4570 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"10";
4580 GOSUB3430 :PRINT@ID," LD (H),A ";
4590 PRINT@CL,"2";:PRINT@BU,DA$;
4600 GOSUB3480 :GOSUB3000 :GOSUB2930 :PRINT@CL,"3";
4610 VL=PEEK(15360+AC):GOSUB2870 :POKE(15360+HL+IY),VL
4620 QQ=QQ+1:GOSUB2540
4630 RETURN
4640 REM * 11 * LD (L),A
4650 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"11";
4660 GOSUB3430 :PRINT@ID," LD (L),A ";
4670 PRINT@CL,"2";:PRINT@BU,DA$;
4680 GOSUB3480 :GOSUB3000 :GOSUB2930 :PRINT@CL,"3";
4690 VL=PEEK(15360+AC):GOSUB2870 :POKE(15360+HL+IY+2),VL
4700 QQ=QQ+1:GOSUB2540
4710 RETURN
4720 REM * 12 * LD A,NN
4730 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"12";
4740 GOSUB3430 :PRINT@ID,"LD A,      ";
4750 PRINT@CL,"2";:PRINT@BU,DA$;
4760 GOSUB3480:VL=VAL(CHR$(PEEK(15360+PR+67))+CHR$(PEEK(15360+PR+1+67)))
4770 PRINT@CL,"3";:FORN=1TO500:NEXT:PRINT@CL,"1";:GOSUB3080
4780 PRINT@ME,STR$(VL);:GOSUB3430 :PRINT@(ID+6),STR$(VL);
4790 PRINT@CL,"2";:GOSUB3520 :GOSUB3000 :PRINT@CL,"3";
4800 PRINT@AC-1,STR$(VL);
4810 QQ=QQ+2:GOSUB2540
4820 RETURN
4830 REM * 13 * LD (B),A
4840 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"13";
4850 GOSUB3430 :PRINT@ID," LD (B),A ";
4860 PRINT@CL,"2";:PRINT@BU,DA$;
4870 GOSUB3480 :GOSUB3000 :GOSUB2930 :PRINT@CL,"3";
4880 VL=PEEK(15360+AC):GOSUB2750 :POKE(15360+BC+IX),VL
4890 QQ=QQ+1:GOSUB2540
4900 RETURN
4910 REM * 14 * LD (C),A
4920 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"14";
```

Program continues

KING OF THE HILL!

We've taken artistic license with our illustration in order to make a point: MYCHESS is the most powerful microcomputer chess program on the market, bar none.

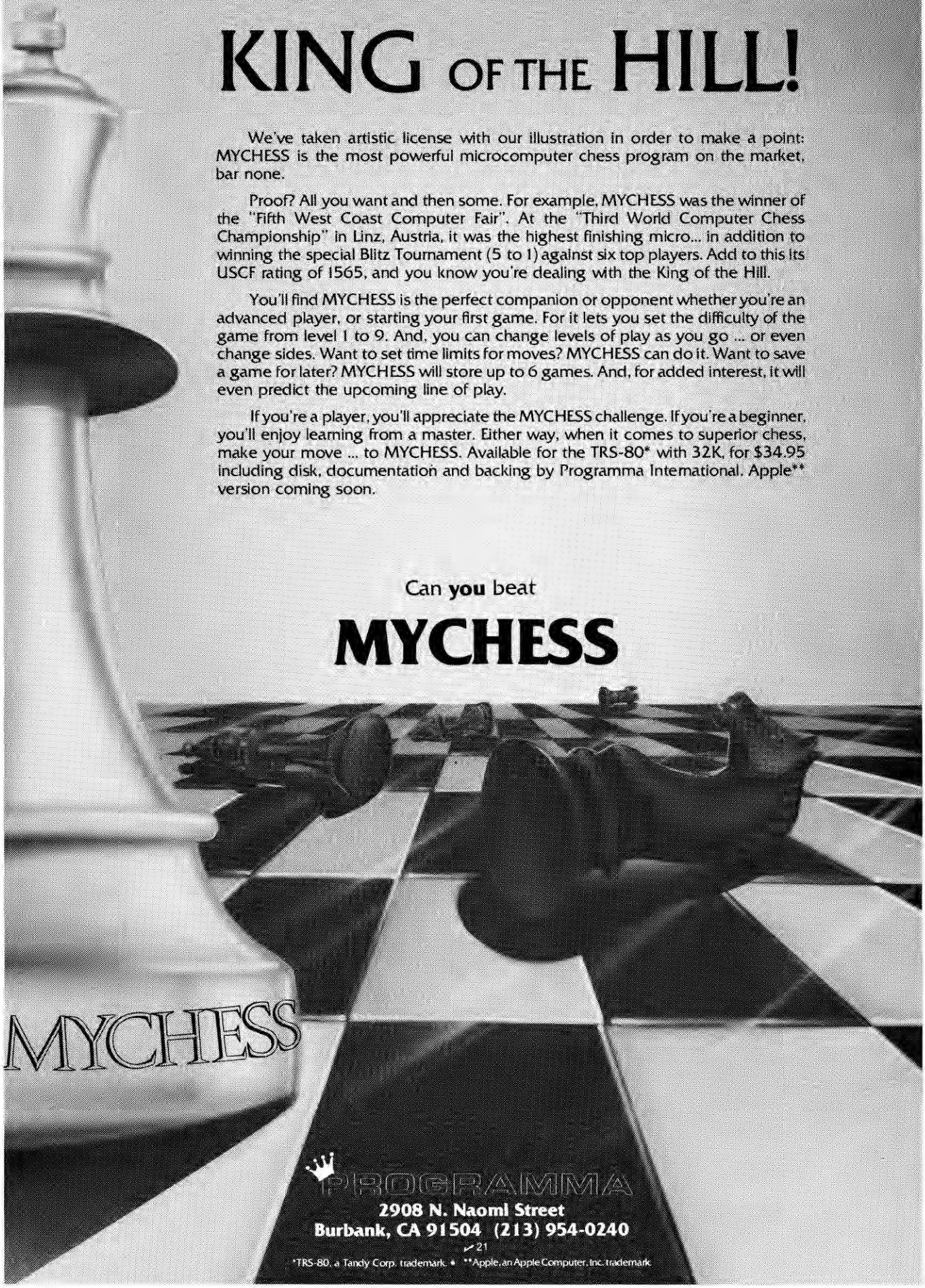
Proof? All you want and then some. For example, MYCHESS was the winner of the "Fifth West Coast Computer Fair". At the "Third World Computer Chess Championship" in Linz, Austria, it was the highest finishing micro... in addition to winning the special Blitz Tournament (5 to 1) against six top players. Add to this its USCF rating of 1565, and you know you're dealing with the King of the Hill.

You'll find MYCHESS is the perfect companion or opponent whether you're an advanced player, or starting your first game. For it lets you set the difficulty of the game from level 1 to 9. And, you can change levels of play as you go ... or even change sides. Want to set time limits for moves? MYCHESS can do it. Want to save a game for later? MYCHESS will store up to 6 games. And, for added interest, it will even predict the upcoming line of play.

If you're a player, you'll appreciate the MYCHESS challenge. If you're a beginner, you'll enjoy learning from a master. Either way, when it comes to superior chess, make your move ... to MYCHESS. Available for the TRS-80* with 32K, for $34.95 including disk, documentation and backing by Programma International. Apple** version coming soon.

Can **you** beat

MYCHESS



PROGRAMMA

2908 N. Naomi Street
Burbank, CA 91504 (213) 954-0240

✓21

*TRS-80, a Tandy Corp. trademark. • **Apple, an Apple Computer, Inc. trademark.

SCHOOLMASTER

Record Keeping Made Easy!

- Analyzes grade assignments
- Keeps a cumulative grade list
- Maintains current averages
- Prints class lists; progress reports

SCHOOLMASTER is designed to replace or supplement most of the functions of the gradebook. In addition, it serves the function of analysis of scores and grades, and automates the process of producing individual progress reports. Requires 32K disk system; is compatible with NEWDOS, NEWDOS/80 and TRSDOS. $24.95 on disk. Manual alone, $1.00.

☐ Please send Schoolmaster to:

Name: _____

Address: _____

City: _____

State, Zip: _____

THE ALTERNATIVE SOURCE

1806 Ada Street
Lansing, MI 48910
Ph. (517) 487-3358 or
(517) 485-0344

↙138

Add $2.00 for crush-proof box and postage; $1.50 for COD. 4% for Master Charge or Visa. PO's welcome.

Raise & tilt monitor
Cover the mess of cablin

Two Models
REGULAR "80-SHROUD"
$22.50 & $2.50 shipping
"80-LNW" SHROUD
to enclose LNW Interface
$25.50 & $2.50 shipping
N.Y.S. Residents add 7% tax

engineered module of structurally molded fiberglass

Fits under 80-monitor

coming soon-MDX-SHROUD

SYRACUSE R&D CENTER
Box 125, Dewitt, N.Y. 13214
"our 10th year in R&D" ↙358


```
4930 GOSUB3430 :PRINT@ID," LD (C),A ";
4940 PRINT@CL,"2";:PRINT@BU,DA$;
4950 GOSUB3480 :GOSUB3000 :GOSUB2930 :PRINT@CL,"3";
4960 VL=PEEK(15360+AC):GOSUB2750 :POKE(15360+BC+IX+2),VL
4970 QQ=QQ+1:GOSUB2540
4980 RETURN
4990 REM * 20 * CP A,NN
5000 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"20";
5010 GOSUB3430 :PRINT@ID," CP A,      ";
5020 PRINT@CL,"2";:PRINT@BU,DA$;:PRINT@CL,"3";
5030 GOSUB3480:GOSUB3000:PRINT@(AC+4),"CP";:PRINT@CL,"1";:GOSUB3080
5040 VL=VAL(CHR$(PEEK(15360+PR+67))+CHR$(PEEK(15360+PR+67+1)))
5050 PRINT@CL,"2";:PRINT@ME,STR$(VL);:GOSUB3430:PRINT@(ID+6),STR$(VL);
5060 PRINT@CL,"3";:GOSUB3520 :GOSUB3000
5070 PRINT@(AC+6),STR$(VL);
5080 IFVL=VAL(CHR$(PEEK(15360+AC)))THEN5110
5090 IFVL>VAL(CHR$(PEEK(15360+AC)))THEN5130
5100 IFVL<VAL(CHR$(PEEK(15360+AC)))THEN5150
5110 GOSUB3290 :PRINT@ZF,"SET";:GOSUB3140 :PRINT@CY,"NOT";
5120 PRINT@(AC+2),"      ";:QQ=QQ+2:GOSUB2540 :RETURN
5130 GOSUB3290 :PRINT@ZF,"NOT";:GOSUB3140 :PRINT@CY,"SET";
5140 PRINT@(AC+2),"      ";:QQ=QQ+2:GOSUB2540 :RETURN
5150 GOSUB3290 :PRINT@ZF,"NOT";:GOSUB3140 :PRINT@CY,"NOT";
5160 PRINT@(AC+2),"      ";:QQ=QQ+2:GOSUB2540 :RETURN
5170 REM * 25 * ADD A,(H)
5180 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"25";
5190 GOSUB3430 :PRINT@ID," ADD A,(H)  ";
5200 PRINT@CL,"2";:PRINT@BU,DA$;
5210 GOSUB3480 :GOSUB2870 :GOSUB2810 :GOSUB3000
5220 PRINT@(AC+4),"+";:VL=VAL(CHR$(PEEK(15360+HL+IY)))
5230 PRINT@(AC+6),STR$(VL);
5240 TT=VL+VAL(CHR$(PEEK(15360+AC))):PRINT@CL,"3";
5250 IFTT=0THEN5280
5260 IFTT>10THENTT=TT-10:GOTO5310
5265 IFTT=10THENTT=0:GOTO5355
5270 IFTT<10THENPRINT@(AC-1),STR$(TT);:GOTO5340
5280 PRINT@AC,"0";:GOSUB3290 :PRINT@ZF,"SET";
5290 GOSUB3140 :PRINT@CY,"NOT";:PRINT@(AC+1),"        ";
5300 QQ=QQ+1:GOSUB2540 :RETURN
5310 PRINT@(AC-1),STR$(TT);:GOSUB3290 :PRINT@ZF,"NOT";
5320 GOSUB3140 :PRINT@CY,"SET";:PRINT@(AC+1),"        ";
5330 QQ=QQ+1:GOSUB2540 :RETURN
5340 GOSUB3290 :PRINT@ZF,"NOT";:GOSUB3140 :PRINT@CY,"NOT";
5350 PRINT@(AC+1),"        ";:QQ=QQ+1:GOSUB2540 :RETURN
5355 PRINT@AC,"0";:GOSUB3290:PRINT@ZF,"SET";:GOSUB3140:PRINT@CY,"SET";
5357 PRINT@(AC+1),"        ";:QQ=QQ+1:GOSUB2540:RETURN
5360 REM * 26 * ADD A,(L)
5370 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"26";
5380 GOSUB3430 :PRINT@ID," ADD A,(L) ";
5390 PRINT@CL,"2";:PRINT@BU,DA$;
5400 GOSUB3480 :GOSUB2870 :GOSUB2810 :GOSUB3000
5410 PRINT@(AC+4),"+";:VL=VAL(CHR$(PEEK(15360+HL+IY+2)))
5420 GOTO5230
5430 REM * 27 * ADD A,NN
5440 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"27";
5450 GOSUB3430 :PRINT@ID," ADD A,    ";
5460 PRINT@CL,"2";:PRINT@BU,DA$;
5470 GOSUB3480 :GOSUB3000 :PRINT@(AC+4),"+";:GOSUB3080
5480 VL=VAL(CHR$(PEEK(15360+PR+67))+CHR$(PEEK(15360+PR+67+1)))
5490 PRINT@ME,STR$(VL);:GOSUB3430 :PRINT@(ID+7),STR$(VL);
5500 PRINT@CL,"3";:GOSUB3520 :GOSUB3000
5510 QQ=QQ+1:GOTO5230
5520 REM * 28 * SUB A,(C)
5530 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"28";
5540 GOSUB3430 :PRINT@ID," SUB A,(C) ";
5550 PRINT@CL,"2";:PRINT@BU,DA$;
5560 GOSUB3480 :GOSUB2750 :GOSUB2700 :GOSUB3000
5570 PRINT@(AC+4),"-";:VL=VAL(CHR$(PEEK(15360+BC+IX+2)))
5580 PRINT@(AC+6),STR$(VL);
5590 TT=VAL(CHR$(PEEK(15360+AC)))+10-VL
5600 IFTT=10THENTT=0:GOTO5280
5610 IFTT<10THEN5310
5620 IFTT>10THENTT=TT-10:PRINT@(AC-1),STR$(TT);:GOTO5340
5630 REM * 29 * SUB A,NN
5640 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"29";
5650 GOSUB3430 :PRINT@ID," SUB A,    ";
5660 PRINT@CL,"2";:PRINT@BU,DA$;
5670 GOSUB3480 :GOSUB3000 :PRINT@(AC+4),"-";:GOSUB3080
5680 VL=VAL(CHR$(PEEK(15360+PR+67))+CHR$(PEEK(15360+PR+67+1)))
5690 PRINT@ME,STR$(VL);:GOSUB3430 :PRINT@(ID+7),STR$(VL);
5700 PRINT@CL,"3";:GOSUB3520 :GOSUB3000
```

Program continues

Be a computer Picasso . . . Disney . . . DaVinci . . . On your TRS-80*

Introducing Programma's Hi-Resolution 80-GRAFIX™

For sheer fun and flexibility nothing compares with Programma's exclusive 80-Grafix for your Model I or Model III TRS-80. With its greater high-resolution capability, it outgraphics the Commodore CBM/PET*, and even Apple II*. In short, anything they do, you can now do better.

As for effective resolution, imagine this . . . 80-Grafix gives your TRS-80 an effective screen of 384 x 192 (vs normal 128 x 48) . . . while the CBM/PET is 80 x 50, and Apple II, 280 x 192. And that's only the beginning.

Black & White. Or Vice-Versa. Use the standard white on black, or for variety, call up Inverse Video as the need demands.

Lower Case. Free. No need to spend extra. 80-Grafix includes two sets of lower case characters. Plus Character Generator software so you can create your own set of up to 64 original characters.

Great Graphics. Here's unlimited fun. Pick a subject. Draw it. Sketch it. Design it. Change it. You're limited only by your own imagination.

Games People Play. 80-Grafix lets you develop your own software to create fantastic new real-time games to amuse, amaze or challenge. Or, order our ready-to-go software. It adds a new dimension to 80-Grafix without any extra programming on your part.

Easy Does It. It's simple to hook up 80-Grafix inside your TRS-80 case . . . takes just a few minutes. While this voids Radio Shack's warranty, it's a minor inconvenience compared to the usefullness and excitement you gain.

The Rush Is On. Frankly, this is one of the hottest items we've offered. Don't miss out. At your dealer now, or order direct for immediate delivery. (Specify version for Model I or Model III.) **Introductory Price:** $149.95 plus $4.50 shipping. Includes free lower case and demo programs. (Visa & Mastercharge accepted. Calif. residents add 6% sales tax.) Dealer inquiries invited.

↙21

PROGRAMMA

Programma International Inc.
2908 No. Naomi Street, Burbank, CA 91504
(213) 954-0240

* 80-Grafix is a trademark of Programma International, Inc. • TRS-80 is a trademark of Tandy Corporation Apple II is a trademark of Apple Computer, Inc. • Commodore CBM/PET is a trademark of Commodore International Ltd.

↙See List of Advertisers on page 306

```
5710 PRINT@(AC+6),STR$(VL);:QQ=QQ+1:GOTO5790
5720 REM * 30 * SUB A,(B)
5730 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"30";
5740 GOSUB3430 :PRINT@ID," SUB A,(B) ";
5750 PRINT@CL,"2";:PRINT@BU,DA$;
5760 GOSUB3480 :GOSUB2750 :GOSUB2700 :GOSUB3000
5770 PRINT@(AC+4),"-";:VL=VAL(CHR$(PEEK(15360+BC+IX)))
5780 PRINT@(AC+6),STR$(VL);
5790 TT=VAL(CHR$(PEEK(15360+AC)))+10-VL
5800 IFTT=10THENTT=0:GOTO5280
5810 IFTT<10THEN5310
5820 IFTT>10THENTT=TT-10:PRINT@(AC-1),STR$(TT);:GOTO5340
5830 REM * 31 * JP Z,NN
5840 PRINT@CL,"1";:GOSUB6300:GOSUB3560 :PRINT@ME,"31";
5850 GOSUB3430 :PRINT@ID,"JP Z,      ";
5860 PRINT@CL,"2";:PRINT@BU,AD$;
5870 GOSUB3640 :GOSUB3580 :IFCHR$(PEEK(15360+ZF))="S"THEN5890
5880 QQ=QQ+2:GOSUB2540 :RETURN
5890 GOSUB3480 :GOSUB3580
5900 VL=VAL(CHR$(PEEK(15360+PR+67))+CHR$(PEEK(15360+PR+67+1)))
5910 PRINT@CL,"3";:PRINT@(ID+7),STR$(VL);:QQ=VL:GOSUB2540
5920 PRINT@PC,IN$(1,VL);:RETURN
5930 REM * 33 * JP NC,NN
5940 PRINT@CL,"1";:GOSUB6300:GOSUB3560 :PRINT@ME,"33 ";
5950 GOSUB3430 :PRINT@ID,"JP NC,      ";
5960 PRINT@CL,"2";:PRINT@BU,AD$;
5970 GOSUB3680 :GOSUB3580 :IFCHR$(PEEK(15360+CY))="N"THEN5990
5980 QQ=QQ+2:GOSUB2540 :RETURN
5990 GOSUB3480 :GOSUB3580
6000 VL=VAL(CHR$(PEEK(15360+PR+67))+CHR$(PEEK(15360+PR+67+1)))
6010 PRINT@CL,"3";:PRINT@(ID+7),STR$(VL);:QQ=VL:GOSUB2540
6020 PRINT@PC,IN$(1,VL);:RETURN
6030 REM * 34 * JP NN
6040 PRINT@CL,"1";:GOSUB6300:GOSUB3560 :PRINT@ME,"34 ";
6050 GOSUB3430 :PRINT@ID,"JP         ";
6060 PRINT@CL,"2";:PRINT@BU,AD$;
6070 GOSUB3480 :GOSUB3580
6080 VL=VAL(CHR$(PEEK(15360+PR+67))+CHR$(PEEK(15360+PR+67+1)))
6090 PRINT@CL,"3";:PRINT@(ID+7),STR$(VL);:QQ=VL:GOSUB2540
6100 PRINT@PC,IN$(1,VL);:RETURN
6110 REM * 40 * CLR A
6120 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"40 ";
6130 GOSUB3430 :PRINT@ID,"CLR A      ";
6140 PRINT@CL,"2";:PRINT@BU,DA$;
6150 GOSUB3480 :GOSUB3000 :PRINT@AC,"0";
6160 GOSUB3290 :PRINT@ZF,"SET";:GOSUB3140 :PRINT@CY,"NOT";
6170 PRINT@CL,"3";:QQ=QQ+1:GOSUB2540 :RETURN
6180 REM * 99 * HALT
6190 PRINT@CL,"1";:GOSUB6300:GOSUB3080 :PRINT@ME,"99 ";
6200 GOSUB3430 :PRINT@ID,"HALT     ";
6210 PRINT@CL,"2";:FORX=1TO400:NEXT
6220 PRINT@CL,"3";:FORX=1TO400:NEXT
6230 PRINT@CL,"1";:FORX=1TO400:NEXT
6235 Q=PEEK(14400):IFQ=64THENOUT254,2:GOTO1270:ELSE6210
6240 Q=PEEK(14400):IFQ=2THENOUT254,2:GOTO1270
6250 FF=VAL(CHR$(PEEK(15360+PR+3))+CHR$(PEEK(15360+PR+4))):FF=FF+1
6260 ONFFGOSUB100,1,2,3,4,5,6,7,8,9,10,11,12,13,14,6,6,6,6,6,
20,6,6,6,6,25,26,27,28,29,30,31,6,33,34,6,6,6,6,6,40,6,6,6,6,
6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,
6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,6,99
6270 GOTO6240
6280 CLS:PRINT"MEMORY SIZE? "CHR$(95);
6285 A$=INKEY$
6290 A$=INKEY$:IFA$=""THEN6290 ELSECLS:GOTO2140
6300 VL=VAL(CHR$(PEEK(15360+PR))+CHR$(PEEK(15360+PR+1)))
6310 PRINT@PC,IN$(1,VL);:RETURN
6400 PT=PEEK(14312):IFPT<>63THEN6430ELSE6410
6410 FORX=0TO99:LPRINTIN$(1,X),PR$(1,X),PR$(2,X);PR$(3,X):NEXTX
6420 GOTO1270
6430 PRINT"PRINTER NOT READY":FORX=1TO300:NEXT:GOTO1270
6490 RESUME1270
```

this point, players refer to their respective instruction sheets and perform all actions required under cycle one. This is the beginning of the frenzy, because the clock is the referee and will decide when cycle two is to begin...each person must complete the required actions during a given clock cycle or risk being pulled out and replaced with a faster integrated circuit!

Similarly, the clock will call out cycles two and three. The program counter is advanced or changed only at the beginning of each cycle one, and the set of three cycles is repeated until a halt is called. The I/O device then retrieves the new list of digits from the B and C registers, and returns them to the human for an evaluation.

No one during the course of play will have any idea what the total result will be, and in fact, Simul-80 may be performed with each player in a separate room...with the clock using an intercom to be heard! If the entire game is done in a single room, everyone should be encouraged to read their instructions aloud, just to add to the confusion.

Programming in Simul-80

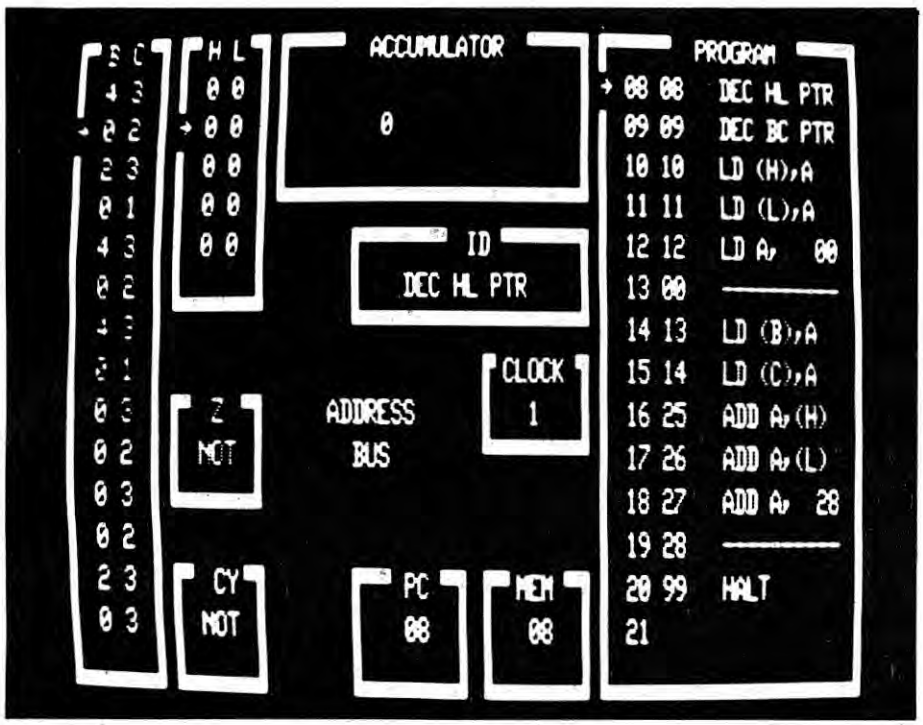
Demonstration programs of many sorts can be written in the Simul-80 language. Merely with the instructions given, it is possible to do simple multiplication and division, simulate a screen display or printer routine, etc. The absence of subroutines can be a bit of a hindrance, but blank spaces have been left in the Simul-80 instruction set for your own expansions of the commands. The most conspicuous absence is a stack pointer, which is a register whose job is to keep track of the program counter's last position whenever it runs off to a subroutine somewhere else in memory. If you need one, create it.

"...each person must complete the required actions during a given clock cycle or risk being pulled out and replaced with a faster integrated circuit!"

Programmers new to machine language often ask, "Why did you increment that pointer? Why did you assign that pair of registers to hold a subtotal? Why did you add this first and that second?" The answer is straightforward: The choice is arbitrary, but often influenced by a search for the simplest program or the greatest speed. In BASIC, why is the most used variable named X? Convention, perhaps, or what it suggests to a user.

Machine language is just as arbitrary, which is why such a mythical processor as the Simul-80 could be invented at all. It is limited to only 26 instructions, but represents the essential process by which all microprocessors do their work...one step at a time, with signals of all sorts flying everywhere.

Machine language is easy in principle: The drudgery of it does not imply difficulty,



only drudgery. Every action must be accounted for; every step has an effect equal to any other.

Simulation of Simul-80 is possible in advance. . . for those who actually wish to write a program for group simulation. Listing 3 is a complete program for use on the TRS-80 in order to watch the activities of a dozen on-screen players. Using the Simul-80 listing and the instructions provided, the BASIC program in Listing 3 will add a column of five numbers in about three minutes, displaying the activities of each step; it is designed to execute on a 16K, Level II machine.

I am anxious to hear from any clubs or classes that attempt to play Simul-80, whether they have been successful or not. For those who want to escape the typing, I have a tape available.■

AD	INST	AD	INST	AD	INST	AD	INST	AD	INST
01	01	21	03	41	10	61	10	81	34
02	10	22	02	42	33	62	33	82	05
03	02	23	26	43	05	63	70	83	09
04	11	24	11	44	07	64	07	84	12
05	03	25	33	45	05	65	05	85	09
06	02	26	39	46	27	66	29	86	13
07	20	27	04	47	01	67	01	87	14
08	01	28	27	48	11	68	11	88	03
09	31	29	01	49	08	69	08	89	99
10	21	30	10	50	34	70	04	90	05
11	20	31	33	51	05	71	30	91	14
12	02	32	39	52	03	72	10	92	04
13	31	33	07	53	05	73	33	91	13
14	52	34	05	54	28	74	05	94	07
15	20	35	27	55	11	75	07	95	05
16	03	36	01	56	33	76	05	96	03
17	31	37	11	57	70	77	29	97	14
18	90	38	08	58	04	78	01	98	40
19	34	39	01	59	29	79	11	99	13
20	83	40	25	60	01	80	08	00	99

Program Listing 4. This is the add subtract program to be filled in on the MEM wheel shown in Fig. 1. The first column is the memory address, the second column the memory contents.

The following are directions for each playing position, to be printed on cards and distributed to each player prior to beginning the game:

PLAYER CARDS

Clock

1. Wait for I/O to say READY.
2. Begin counting aloud, CYCLE ONE, CYCLE TWO, CYCLE THREE. (Wait 15 seconds between cycles at first, but speed up as players improve.)
3. When HALT is called, stop counting after your final "cycle three."

Program Counter (PC)

1. Increase the value displayed by your flip-book by one each time CYCLE ONE is called, unless—
2. The address bus gives you a new value. Display this with your flip-book instead, and continue as usual from there.
3. No actions are taken during cycles two or three.

Memory (MEM)

1. During cycle one, read the new value held up by PC.
2. Immediately check for a corresponding value on your memory card, and write it down on a slip of paper.
3. Give that value to ID, unless the address bus or data bus requests it.
4. No actions are taken during cycles two or three.

Registers (B, C, H, L)

1. Perform no actions during cycle one.
2. During cycles two and three, allow your pointer to be moved by the address bus as necessary, and/or accept (and write in place) or give the data value pointed to by your wall card's pointer.

Flags (Z AND CY)

1. During cycles one and two, hold aloft the side of your card given to you by A.
2. Give your cards to A during cycle three.

A no nonsense glossary of misunderstood micro jargon.

The Unexpurgated Version

David D. Busch
515 E. Highland Ave.
Ravenna, OH 44266

New or future TRS-80 owners feel lost sometimes when they make their first cautious visits to local users groups. The carefully learned technical terms of the neophyte's vocabulary sometimes have different meanings in the real world.

The beginner really needs an unexpurgated introduction to the real meanings of widely used TRS-80-related words and phrases. With apologies to several of computerdom's most powerful vendors, here is the first true TRS-80 glossary for beginners.

ATTRIB—Rarely used DOS command. Its chief value is making those programs that the programmer is ashamed of, but isn't ready to KILL, invisible on the directory.

BUFFER—Used under Disk BASIC, a storage place for information that should be lost during power failures, or when a diskette is removed before a disk file is CLOSEd. Should not be confused with Buffered Cable or Buffered Aspirin, both of which cure different kinds of headaches.

DISK CONTROLLER—IC chip designed to keep dust out of socket until user can install double density or data separator accessories. Also provides application for BREAK key on power-up (non-disk users only).

DISKETTE, PREMIUM QUALITY—A standard 5 1/4-inch diskette.

DISKETTE, DOUBLE DENSITY—A standard 5 1/4-inch diskette.

DISKETTE, DOUBLE DENSITY, DUAL-SIDED—A standard 5 1/4-inch diskette, priced $3.00 higher.

DISK DRIVES NO. 1160, 1161—These are nearly identical mini-disk drives with differently numbered black and silver stickers on the bottom. The 1160 comes with an expensive connecting cable, a DOS reference guide, a free DOS diskette, and a 69¢ DIP resistor. The 1161 costs the same, but because of the heavy labor cost of removing the resistor—the cable, reference book, and diskette are deleted as well.

DOS—An elegant hiding place for machine language bugs. Also an exercise for advanced programmers. Sometimes used to refer to any of several Disk Operating Systems.

EXTERNAL DATA SEPARATOR—A totally valueless device, thoughtfully excluded from the TRS-80 by Tandy. Needlessly complicates I/O operation of the disk drives by providing disk read reliability.

EXPANSION INTERFACE—Elevates the CRT screen to convenient level. Also contains vast amounts of empty space for installation of retrofixes. Comes already equipped with essential items (see SCREEN PRINTER PORT, DISK CONTROLLER) and may be purchased with rarely needed luxury items, at additional cost (see MEMORY).

KEYBOARD (bounce version only)—The keyboard was designed by a one-fingered typist who never really gave keys a workout until 80,000 computers had been sold.

LIVE CHASSIS GAME—one of the original computer games for the TRS-80. The object is for the experimenter to nullify the isolation of the CRT chassis from the rest of the computer, or himself. Some elements of skill and chance are involved, as the odds are only 50/50 in favor of electrocution.

LOWERCASE—Optional feature, useful only to TRS-80 owners who can read or write.

PRICE REDUCTION, RAM CHIPS—Free enterprise miracle, made possible by high TRS-80 sales volume, which decreases per-unit cost to end user.

PRICE INCREASE, LEVEL II ROM CHIPS—Another miracle, made possible by same factors as above, coupled with the additional rationale that nobody else sells these.

PRINTER—The most important TRS-80 peripheral after disk drive. Issues printout that the operator can use to prove to others that the computer actually does something.

RETROFIX—Free hardware modification made to correct most recent improvement to computer design. Sometimes added to correct problem caused by last retrofix.

TANDY—A company skilled in marketing leather craft goods.

TRS-80—Pioneering personal computer. Not named, as widely believed, after the Z-80 microprocessor: The numeral was derived from the year 1980. This was originally intended as the year in which all hardware bugs in the Model I would be eliminated, hence mandating its replacement with the Model III.

TRSDOS 2.0—Legendary disk-operating system, never actually used by anyone who lived to tell about the experience. Replacement for TRSDOS 1.0, which was written in Tiny BASIC.■

Run this interview program at your next one and your guests will agree.

This Ain't No Party!

Stewart E. Fason
Via La Selva
Palm Beach, FL 33480

Humor, it's been said, is tragedy plus timing. Remember that blind date years ago when you got fixed up with a real dog? Or the time the paint can overturned on your new carpet? While we didn't laugh at our foibles then, they seem funny now. Disasters with which people identify can add fun and laughter to a program which would otherwise be only mildly interesting.

Use Program Listing 1 at your next party. Your guests will love it.

Computers have received so much publicity that the layman thinks they do anything. He is, for the most part, unaware of the limits, and you can take advantage of such naivete by the recognition routine in lines 2180 to 2200 to 2400.

This program asks for a first name. You, the programmer, have entered something about every guest with IF A$ = "name of guest" then PRINT "something unique about him".

Depending on the memory available, you may accommodate up to 100 or so guests.

When someone responds to "WHAT IS YOUR NAME?" and the computer responds with something unique, the guest begins to think that the computer knows something about everyone. Line 2240 takes care of anyone you didn't expect.

- Lines 2130–2190 are great fun. The guest thinks something has really gone wrong. When the computer returns to normal, he is thinking, "This thing has its bad times too." You can use this routine to advantage in many programs.
- 410–880: These marvelous random number generators do away with predictability. The RND coupled with the IF THEN ELSE statements are one of the most powerful combinations in fun and games programming.
- 240–390: The day of reckoning . . . much laughter follows.
- 20–30: Rather than using FOR NEXT loops for a delay while the computer is supposed to be thinking, why not draw randomly selected lines across the screen?
- 890–940: While computers think fast, don't let the players think that it is easy. Make things seem difficult . . . make them think it's really working hard.

Keybounce Fix

We know that KBFIX resides from 32712-32767. We could examine each byte with T-BUG, but how about using PEEK to see what gives. Then, when we know the code, why not use POKE to put it in memory using BASIC?

This got me to thinking. I loaded KBFIX then entered the following: 10 FOR I = 32712TO 32767:A = PEEK(I): Print I,A: NEXTI. The codes showed up and they were entered into a data statement, then a FOR NEXT loop, READ, POKE, and darned if it didn't work. Considering we have to get out of the program in order to execute KBFIX, it would be nice to delete the lines once the POKEing is finished. Hence, the DELETE command.

Here is the result which you can use in any BASIC program to forever do away with keyboard bounce. It will even work with programs which require loading some machine language routine first, provided the routine doesn't occupy 32712-32767. You can find out by loading your routine, then using the PEEK routine above.

Operation

Load your program. Then type in the two-line KBFIX routine. RUN and in a second you get the READY?. Type SYSTEM ENTER, /32713 ENTER, and KBFIX is operational, lines one and two are gone and you are in business. ■

Program Listing 1. Psychiatry/Astrology Program

```
10 CLEAR:CLS:GOTO950
20 PRINT:HH=RND(5):IFHH=1THENYY$="!" ELSEIFHH=2THENYY$=
    "#"ELSEIFHH=3THENYY$="$"ELSEIFHH=4THENYY$="%"ELSEI
    FHH=5THENYY$="*"
30 FORI=1TO64:PRINTYY$;:FORU=1TO20:NEXTU:NEXTI:RETURN
40 CLS:PRINT:PRINTCHR$(23)"HI THERE ";S1$
50 PRINT:PRINT"IF YOU HAVE PROBLEMS WITH
60 PRINT"SEX, MONEY, HEALTH, OR YOUR JOB
70 PRINT"I CAN HELP.
80 PRINT:PRINT"I WILL ASK QUESTIONS. YOU
90 PRINT"ANSWER Y FOR YES OR N FOR NO
100 PRINT"REMEMBER TO PRESS 'ENTER AFTER
110 PRINT"EACH KEYBOARD ENTRY.
120 PRINT:PRINT:INPUT"READY ?  pRESS 'ENTER";:CLS
130 PRINT:PRINT:PRINT:PRINT"HELLO THERE...WHAT IS YOUR
    FIRST NAME ?":PRINT:PRINT:INPUT"DON'T FORGET TO PR
    ESS 'ENTER' AFTER TYPING YOUR NAME.";A$:GOSUB2210
```

Program continues

```
140 FORI=1TO2000:NEXT
150 CLS:PRINT:PRINT:PRINT:PRINT"i CAN HELP YOU SOLVE YO
    UR PROBLEMS ";A$;".
160 PRINT"mY EXPERTISE IS LIMITED TO FOUR CATAGORIES.
170 PRINT:PRINT"1. SEX....2. HEALTH....3. MONEY....4. J
    OB
180 PRINT:PRINT:PRINT"TOUCH THE NUMBER DO YOU CHOSE ";A
    $
190 GOSUB2260 :IFC$="1"THENB=1ELSEIFC$="2"THENB=2ELSEIF
    C$="3"THENB=3ELSEIFC$="4"THENB=4ELSECLS:PRINT:PRIN
    T"WHY WON'T YOU CHOSE 1,2,3 OR 4 ";A$;" TRY AGAIN.
    ":GOTO190
200 IFB=1THENGOSUB400  ELSEIFB=2THENGOSUB560  ELSEIFB=3
    THENGOSUB680  ELSEIFB=4THENGOSUB780
210 FORI=1TO500:NEXTI
220 PRINT:PRINT"WANT SOME MORE ADVICE ";A$;" ?";:PRINT"
     TOUCH Y OR N"
230 GOSUB2260 :IFC$="N"THEN240  ELSEIFC$="Y"THEN150  EL
    SEPRINT:PRINT"TOUCH Y OR N ";A$:GOTO230
240 CLS:PRINT:PRINT:PRINT:PRINT:PRINT"TELL ME ";A$;" HO
    W DO YOU RATE MY ADVICE ON A SCALE OF
250 PRINT"1 TO 10 ?
260 INPUTC:CLS
270 IFC<4THENCLS:PRINT"AS I THOUGHT.... ";A$;" YOU CAN'
    T HANDLE THE TRUTH.":PRINT"YOU'VE BEEN SPOILED BY
    THOSE PATRONIZING PROPONENTS OF":PRINT"PERSPICACIT
    Y WHO ONLY TELL YOU WHAT YOU WANT TO HEAR.":GOTO 3
    00
280 IFC>6THENPRINT"AH YES ";A$;" YOU RECOGNIZE REAL TAL
    ENT.":PRINT:PRINT"SOME OF THESE TURKEYS AROUND HER
    E DON'T APPRECIATE ME":GOTO 300
290 PRINT:PRINT"I'M TELLING YOU...i DON'T GET NO RESPEC
    T...THE LIFE OF":PRINT"OF A COMPUTER AIN'T EXACTLY
     EASY YOU KNOW...AT LEAST YOU":PRINT"DIDN'T RATE M
    E A 1 LIKE SOME OF THESE INSENSITIVE DUMMYS.
300 GOSUB 20   :PRINT"ACCORDING TO MY TIME CLOCK YOU OW
    E ME $25.00 FOR THERAPY.
310 PRINT:PRINT"YOU MAY LEAVE IT NEXT TO MY KEYBOARD.":
    GOSUB20
320 PRINT:PRINT"SAY ";A$;" DID YOU LEAVE THE MONEY ? EN
    TER Y OR N.":GOSUB2260
330 IFC$="Y"THENCLS:PRINT:PRINT:PRINT:PRINTCHR$(23)"LIA
    R..CHEATER..SWINDLER":PRINT:PRINT:FORI=1TO1300:NEX
    T:PRINTA$;:PRINT" SHAME ON YOU....":PRINT:PRINT"TR
    YING TO CHEAT ME.":GOTO 390
340 IFC$<>"N"THENPRINT"LET'S TRY AGAIN ";A$;" TOUCH Y O
    R N":GOTO320
350 CLS:PRINT:PRINT:PRINT:PRINT"YOU'RE HONEST ";A$;" BU
    T i'D RATHER HAVE THE CASH....
360 PRINT:PRINT"i'LL SETTLE FOR $1.00 CASH ";A$
370 FORI=1TO1500:NEXT:CLS:PRINTCHR$(23)
380 PRINT:PRINT:PRINT:FORI=1TO25:PRINT"CHEAPSKATE","CHE
    APSKATE","CHEAPSKATE","CHEAPSKATE":NEXTI
390 FORI=1TO2000:NEXT I:CLS:PRINT:PRINT:PRINT"NOW
     LET ME TALK TO SOMEONE ELSE.":FORI=1TO800:NEXTI:G
    OTO10
400 GOSUB 890
410 CLS:A=RND(13):PRINT
420 IFA=13THENGOSUB2130 :GOTO160
430 IFA=12THENPRINT"YOU SHOULD DRINK A TOAST TO YOUR SP
    OUSE AND LOVER.......":GOSUB 20   :PRINT:PRINT"AND
     HOPE AND PRAY THEY NEVER MEET !
440 IFA=7THENPRINT"WITH YOUR BODY, YOU SHOULD BE A CENT
    ERFOLD MODEL":PRINT:PRINT:GOSUB 20   :PRINT"FOR TH
    E FAMOUS MAGAZINE.....":FORI=1TO1000:NEXT:PRI
    NT:PRINT"       'THE AMERICAN FARMER'
450 IFA=8THENPRINT"WITH YOUR TALENT, YOU SHOULD SPEND M
    ORE TIME IN BED.":GOSUB 20   :PRINT:PRINT"SO WHY D
    ON'T YOU GO HOME NOW AND GO TO BED !
460 IFA=9THENPRINT"IF YOU FIND OUT YOUR DAUGHTER IS A
    H O O K E R  YOU MIGHT":GOSUB 20   :PRINT:PRINT"SU
    GGEST SHE CHANGE HER GRIP.
470 IFA=10THENPRINT"YOU HAVE THE REPUTATION OF BEING A
    REAL  S W I N G E R .....":GOSUB 20   :PRINT:PRINT
    "BUT THEN SO DO BABOONS AND MONKEYS !
480 IFA=11THENPRINT"YOU'RE NOT AS GOOD AS YOU ONCE WUZ.
    ..........BUT":GOSUB 20   :PRINT:PRINTA$;" YOU'RE
     AS GOOD ONCE AS YOU EVER WUZ!!!
490 IFA=1THENPRINT"GO TAKE A COLD SHOWER ";A$;" AND THE
     URGE WILL GO AWAY !":GOSUB 20   :PRINT:PRINT"UNTI
    L YOU DRY OFF !
500 IFA=4THENPRINT"WOW ";A$;" I FIND YOU SUPER SEXY....
    ..":GOSUB20   :PRINT"YOU REALLY TURN ME ON...SO YO
    U SHOULD BE PLEASED.....":GOSUB20   :PRINT"THAT SO
    MEONE FINDS YOU DESIRABLE!!!
510 IFA=5THENPRINTA$;", TOMORROW YOU WILL MEET A TALL D
    ARK MEMBER":PRINT"OF THE OPPOSITE SEX.":GOSUB 20
     :PRINT"IT WILL BE LOVE AT FIRST SIGHT....":GOSUB
    20   :PRINT"PROVIDED YOU LIKE 800 LB. GORILLAS.
520 IFA=6THENPRINT"WHO ARE YOU KIDDING ";A$;" YOU GET M
    ORE BY ACCIDENT.":PRINT"THAN MOST PEOPLE GET ON PU
    RPOSE!":GOSUB 20   :PRINT"WHICH MUST BE SOME KIND
    OF MIRACLE!!
530 IFA=2THENPRINT:PRINT:PRINT"dR. RUBIN SAID, 'USE IT
    OR LOSE IT'.":GOSUB20   :PRINT:PRINT"I SUGGEST YOU
     THROW IT AWAY !!
540 IFA=3THENPRINT"YOU HORNY RASCAL ";A$;" YOU SHOULD B
    E THE ONE GIVING ADVICE.
550 FORI=1TO500:NEXTI:RETURN
560 GOSUB 890
570 CLS:A=RND(9)
580 PRINT:PRINT:IFA=8THENGOSUB2130 :GOTO160
590 IFA=6THENPRINT"GIVE UP DRINKING AND SEX .....IMMEDI
    ATELY !":GOSUB 20   :PRINT:PRINT"YOUR HEALTH WORRI
    ES WILL BE OVER......BECAUSE":GOSUB 20   :PRINT:PR
    INT"THEN YOU HAVE LITTLE WORTH LIVING FOR...SO YOU
     WON'T CARE!!
600 IFA=7THENPRINT"THEY SAY THAT THE GOOD DIE YOUNG....
    ...":GOSUB 20   :PRINT:PRINT"MY DATA INDICATES THA
    T YOU SHOULD LIVE TO BE AT LEAST 95 !!!
610 IFA=9THENPRINT"GIVE UP SMOKING, DRINKING, AND SEX I
    MMEDIATELY.":GOSUB20   :PRINT"YOU STILL WON'T LIVE
     TO BE 90.....................":GOSUB20   :PRINT"B
    UT IT WILL SEEM LIKE IT!!!!!
620 IFA=1THENPRINT"CONSIDERING THE WAY YOU CARRY ON ";A
    $:PRINT:GOSUB 20   :PRINT"YOU'RE LUCKY TO STILL BE
     ALIVE
630 IFA=2THENPRINT"DON'T BUY ANY LONG PLAYING RECORDS "
    ;A$;" .":GOSUB20   :PRINT:PRINT"MAKE SURE YOUR INS
    URANCE IS PAID":GOSUB20   :PRINT:PRINT"CHECK OUT W
    HAT YOUR SPOUSE HAS BEEN FEEDING YOU
640 IFA=3THENPRINTCHR$(23):PRINT"IF I'VE TOLD YOU ONCE"
    :GOSUB20   :PRINT"I'VE TOLD YOU 1000 TIMES":GOSUB2
    0   :PRINT"QUIT EATING YELLOW SNOW ";A$
650 IFA=4THENPRINT"LAY OFF BOOZE & SEX FOR 24 HOURS ";A
    $:GOSUB 20   :PRINT" ...IF THAT IS POSSIBLE."
660 IFA=5THENPRINT"SMOKE A JOINT EVERY 4 HOURS AND CALL
     ME MONDAY.
670 FORI=1TO500:NEXTI:RETURN
680 GOSUB 890
690 CLS:A=RND(8):PRINT:PRINT:IFA=8THENGOSUB2130 :GOTO16
    0
700 IFA=1THENPRINT"mARRY SOMEONE RICH ";A$;" OR STOP EA
    TING...":GOSUB 20   :PRINT:PRINT"ONE WAY YOU HAVE
     ALL YOU WANT.........":FORI=1TO1000:NEXT:PRINT:PRI
    NT"THE OTHER, YOU WON'T NEED SO MUCH.
710 IFA=2THENPRINT"YOU LOOK WELL SUITED TO A LIFE OF CR
    IME ";A$:GOSUB20   :PRINT:PRINT"YOU HAVE THE SHIFT
    IEST EYES i'VE EVER SEEN ";A$
720 IFA=4THENPRINTA$;", SOMEDAY YOU WILL BE WORTH A MIL
    LION.................":GOSUB 20   :PRINT:PRINT:PR
    INT"                                YEN
730 IFA=5THENPRINT"SPEND IT NOW!  IT WILL BE WORTHLESS
     NEXT YEAR.":GOSUB 20   :PRINT:PRINT"I REALIZE THAT
     I MAY BE TOO OPTOMISTIC.
740 IFA=6THENPRINTA$;:PRINT" MY RECORDS SHOW THAT YOU H
    AVE SUCCESSFULLY (THUS FAR)":PRINT:PRINT"CHEATED T
    HE IRS OUT OF MORE THAN $20,000. IN TAXES !":GOSUB
     20   :GOSUB 20   :CLS:PRINTCHR$(23):PRINT@400,"CO
    NGRATULATIONS":FORI=1TO1000:NEXT:CLS
750 IFA=7THENPRINT"IF YOU FIND YOU CAN'T TAKE IT WITH Y
    OU ";A$:GOSUB20   :PRINT"THE ANSWER IS SIMPLE";:FO
    RT=1TO800:NEXTT:PRINT"    REFUSE TO GO!!!!"
760 IFA=3THENPRINT"WHY DO YOU INSIST ON PLEADING POVERT
    Y WHEN WE ALL KNOW":PRINT:PRINTA$;" IS WORTH ONE M
    ILLION DOLLARS......":GOSUB 20   :PRINT:PRINT:PRIN
    T"                          DEAD OR ALIVE.
770 FORI=1TO400:NEXTI:RETURN
780 GOSUB 890
790 A=RND(9):PRINT:IFA=7THENGOSUB2130 :GOTO160
800 IFA=8THENPRINT"WHAT DO YOU KNOW ABOUT WORK ";A$:GOS
    UB20   :PRINT"YOU GET TIRED JUST WATCHING OTHERS W
    ORK!!"
810 IFA=9THENPRINT"WORK??? ";A$;:PRINT" YOU DON'T EVEN
     KNOW THE MEANING":PRINT"OF THE WORD.":GOSUB20   :P
    RINT"IN FACT, I'M NOT AT ALL SURE YOU CAN SPELL IT
     !!"
820 IFA=1THENPRINT"WHO ARE YOU KIDDING ";A$;" YOU HAVEN
    'T WORKED IN YEARS.
830 IFA=2THENPRINT"i THINK YOU WOULD DO BETTER SELLING
     USED CARS ";A$:GOSUB20   :PRINT:PRINT"FACE FACTS,
     YOU'RE A NATURAL CON ARTIST":PRINT"AND HAVE A TOTA
    L DISREGARD FOR THE TRUTH!
840 IFA=3THENPRINT"IF LOOKS MEAN ANYTHING ";A$;" YOU'RE
     IN A LOT OF TROUBLE !!!
850 IFA=4THENPRINT"QUIT NOW ";A$;" AND BECOME A BEACH B
    UM.":GOSUB20   :PRINT:PRINT:PRINT"I MEAN...";:FORI
    =1TO500:NEXTI:PRINT"YOU ARE NEVER GOING TO AMOUNT
    TO MUCH ANYWAY."
860 IFA=5THENPRINT"DEMAND A RAISE OR ELSE !!":GOSUB20
     :PRINT:PRINT:PRINT"THEN START LOOKING FOR ANOTHER
     JOB ";A$;"."
870 IFA=6THENPRINT"IF YOUR BOSS GIVES YOUR ANY CRAP, TE
    LL THE S.O.B. TO GO JUMP":PRINT:PRINT"IN THE DAMM
    LAKE...YOU WILL BE REMEMBERED AS ONE COURAGOUS":GO
    SUB 20   :PRINT:PRINT"                          EX-EMPL
    OYEE
880 FORI=1TO500:NEXTI:RETURN
890 K=RND(2)
900 IFK=1THEN 930
910 IFK=2THEN 920
920 CLS:PRINTCHR$(23):PRINT@400,"I'M THINKING":FORP=1TO
    400:NEXTP:FORO=1TO7:S=RND(850):PRINT@S,"THINK":FOR
    G=1TO166:NEXTG:CLS:NEXTO:GOTO 940
930 CLS:FORI=1TO6:PRINTCHR$(23):PRINT@400,"I'M THINKING
    ":FORT=1TO200:NEXTT:CLS:NEXTI
940 RETURN
950 DATA "A Q U A R I U S","- - - - - - - -","P I C E S
    ","- - - - - -","A I R E S","- - - - -","T A U R U
    S","- - - - - -","G E M I N I","- - - - - -","C A
```

Program continues

COLLEGE BOARDS

for TRS-80
PET, APPLE

The best way to sharpen your skills for the College Boards is to work on actual examinations. Each of these program sets confronts the user with a virtually limitless series of questions and answers Each program is based on past exams and presents material of the same level of difficulty and in the same form as used in the College Board examination. Scoring is provided in accordance with the formula used by College Boards.

SAT, PSAT, N.M.S.Q.T., set includes 7 programs covering Vocabulary, Word Relationships, and Mathematics. Price $79.95

EDUCATOR EDITION - SAT, PSAT Includes all of the above programs plus detailed solutions and explainations for each problem plus drill exercises. SAT set includes 14 programs. $149.95

GRADUATE RECORD EXAMINATION set includes 10 programs covering Vocabulary, Word Relationships, Mathematics, Logical Diagrams, Analytical Reasoning. $139.95

EDUCATOR EDITION - Graduate Record Exam Set includes 20 programs. $199.95

SWORD OF ZEDEK

Fight to overthrow Ra, The Master of Evil. In this incredible adventure game, you must confront a host of creatures, natural and supernatural. To liberate the Kingdom, alliances must be forged and treasures sought. Treachery, deceit and witchcraft must be faced in your struggles as you encounter wolves, dwarves, elves, dragons, bears, owls, orcs, giant bats, trolls, etc. Each of the 12 treasures will enhance your power, by making invisible, invulnable, more eloquent, more skillful in combat etc., etc., as you explore the realms of geography both on the surface and underground. Dungeons, temples, castles, mountains etc., are all a part of the fantastic world of Ra. Each game is unique in this spectacular and complex world of fantasy. $24.95

KRELL GAME PAK

Incredible bargain, 15 unique and challenging games!!!

Hostage	**Primary Fight**
Prime Time	**Black Gold**
The Black Death	**Wordsworth**
Star Clipper	**Hard Scrabble**
Bulls & Bears	**Bible Quode**
Banzai	**Shakespeare Quode**
Banzai II	**Bill of Rights Quode**
Super Banzai *TRS-80 only, $39.95*	

SUPER STAR BASEBALL

ALL TIME SUPER STAR BASEBALL Sample Lineup		SUPER STAR BASEBALL Sample Lineup	
B. Ruth	T. Williams	D. Parker	J. Rice
L. Gehrig	J. Foxx	W. Stargell	H. Aaron
J. DiMaggio	H. Greenberg	W. Mays	L. Brock
J. Jackson	R. Hornsby	P. Rose	R. Carew
G. Sisler	H. Wilson	O. Cepeda	H. Killebrew
S. Musial	B. Terry	C. Yazstremski	R. Allen
T. Cobb	M. Mantle	W. McCovey	R. Leflore
W. Mays	H. Aaron	R. Jackson	R. Zisk
C. Young-P	W. Johnson-p	G. Brett	B. Madlock
		R. Guidry-P	T. Seaver-p

Performance is based on the interaction of actual batting and pitching data. Game can be played by one or two players with the computer acting as a second player when desired. Players select rosters and lineups and exercise strategic choices including hit and run, base stealing, pinch hitting, intentional walk, etc. Highly realistic, there are two versions, ALL TIME SUPER STAR BASEBALL, and SUPER STAR BASEBALL featuring players of the current decade. Each includes about 50 players allowing nearly an infinite number of roster and lineup possibilities.

$14.95

TIME TRAVELER

The best of the adventure games. Confronts player with complex decision situations and the demand for real time action. Using the Time Machine, players must face a challenging series of enviornments that include; the Athens of Pericles, Imperial Rome, Nebuchadnezzar's Babylon, Ikhnaton's Egypt, Jerusalem at the time of the crucifixion, The Crusades, Machiavelli's Italy, the French Revolution, the American Revolution, and the English Civil War. Deal with Hitler's Third Reich, Vikings, etc. At the start of each game players may choose a level of difficulty... the more difficult, the greater the time pressure. To succeed you must build alliances and struggle with the ruling powers. Each game is unique. $24.95

✓375

*ALL PROGRAMS AVAILABLE FOR TRS-80, APPLE II & PET

*Programs for APPLE or TRS-80 are on disk or cassett, please specify.

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

KRELL SOFTWARE

Send check or money order to
21 Milbrook Drive, Stony Brook, NY 11790
(516) 751-5139

✓See List of Advertisers on page 306

```
     N C E R","- - - -  - -"
960 DATA"L E O","- - -","V I R G O","- - - - -","L I B
    R A","- - - - -","S C O R P I O","- - - - - - -"
970 DATA"S A G I T T A R I U S","- - - - - - - - - - -"
    ,"C A P R I C O R N","- - - - - - - - -"
980 CLS:PRINTCHR$(23)"           WELCOME
990 PRINT:PRINT"       TO DR. HIMMELSTEIN'S
1000 PRINT:PRINT"    PSYCHIATRIC/ASTROLOGY CLINIC
1010 PRINT:PRINT"THOUSANDS HAVE COME FROM FAR AND
1020 PRINT"WIDE TO SEEK MY ADVICE
1030 PRINT:PRINT"YOU WILL BE ASKED QUESTIONS.
1040 PRINT"AFTER RESPONDING, YOU MUST THEN
1050 PRINT"PRESS THE LARGE WHITE BUTTON
1060 PRINT"MARKED 'ENTER'...PRESS IT NOW !":INPUT
1070 CLS:PRINT:PRINT:PRINT:PRINT:PRINTCHR$(23)"YOU CATC
    H ON FAST STRANGER.":FORI=1TO1500:NEXT:PRINT:CLS:P
    RINTCHR$(23)
1080 PRINT"PLEASE FOLLOW MY INSTRUCTIONS":PRINT"CAREFUL
    LY.....
1090 PRINT:PRINT"NOW FOR YOUR HOROSCOPE AND
1100 PRINT"OTHER SURPRISES.............
1110 PRINT:PRINT"NOTICE..AFTER EACH KEYBOARD
1120 PRINT"ENTRY, YOU MUST PRESS THE LARGE
1130 PRINT"WHITE BUTTON MARKED 'ENTER'
1140 PRINT:PRINT"NOW TYPE IN YOUR BIRTHDAY.":PRINT"PLEA
    SE NOTE: MAY 9TH WOULD":PRINT"BE ENTERED AS 0509 N
    OT AS 59."
1150 PRINT:PRINT"DATE MUST BE 4 DIGITS MO./DAY":INPUT"T
    YPE DATE,THEN PRESS ENTER";BB
1160 IFBB>1231 OR BB<101THENCLS:PRINT"INVALID DATE ENTR
    Y, TRY AGAIN.":PRINT:PRINT"I WANT MONTH & DAY ONLY
    !":GOTO 1150
1170 IFBB<0120THENS=12:GOSUB 1300 :GOTO 2080
1180 IFBB<0219 THEN S=1:GOSUB 1300 :GOTO 1400
1190 IFBB<0321THENS=2:GOSUB 1300 :GOTO 1470
1200 IFBB<420THENS=3:GOSUB 1300 :GOTO 1540
1210 IFBB<0521THENS=4:GOSUB 1300 :GOTO 1600
1220 IFBB<0621THENS=5:GOSUB 1300 :GOTO 1660
1230 IFBB<0723THENS=6:GOSUB 1300 :GOTO 1720
1240 IFBB<0823THENS=7:GOSUB 1300 :GOTO 1780
1250 IFBB<0923THENS=8:GOSUB1300 :GOTO 1840
1260 IFBB<1023THENS=9:GOSUB 1300 :GOTO 1900
1270 IFBB<1122THENS=10:GOSUB 1300 :GOTO 1970
1280 IFBB<1222THENS=11:GOSUB 1300 :GOTO 2020
1290 S=12:GOSUB 1300 :GOTO 2080
1300 PRINT:PRINT
1310 FORI=1TOS
1320 READS1$:READS2$
1330 NEXTI
1340 CLS:
1350 PRINTTAB(19);"Y O U R  S I G N  I S
1360 PRINTTAB((80-LEN(S1$))/2-9);S1$
1370 PRINTTAB((80-LEN(S2$))/2-9);S2$
1380 PRINT
1390 RETURN
1400 PRINT"YOU HAVE AN INVENTIVE MIND  AND ARE INCLINED
     TO BE PROGRESSIVE.
1410 PRINT"YOU LIE A GREAT DEAL.  ON THE OTHER HAND YOU
     ARE INCLINED TO BE
1420 PRINT"CARELESS AND IMPRACTICAL CAUSING YOU TO MAKE
     THE SAME MISTAKES
1430 PRINT"OVER AND OVER AGAIN.  pEOPLE THINK YOU ARE S
    TUPID !!!
1440 FORI=1TO4200:NEXTI:PRINT:PRINTTAB(22)"THEY ARE RIG
    HT !"
1450 PRINT:PRINT"SOME FAMOUS ONES ARE: PAUL NEWMAN,  TH
    OMAS EDISON, ":PRINT"FRANKLIN ROOSEVELT, GEORGE BU
    RNS, CLARK GABLE, AND GALILEO
1460 GOTO 2120
1470 PRINT"YOU HAVE A VIVID IMAGINATION AND OFTEN THINK
     YOU ARE BEING
1480 PRINT"FOLLOWED BY THE 'CIA' OR 'FBI'.  YOU HAVE MI
    NOR INFLUENCE OVER
1490 PRINT"YOUR ASSOCIATES AND PEOPLE RESENT YOU FOR YO
    UR FLAUNTING OF YOUR
1500 PRINT"POWER.  YOU LACK CONFIDENCE AND ARE GENERALL
    Y A COWARD.
1510 PRINT"YOU ARE A WEIRDO, BUT MAY POSSESS GREAT ARTI
    STIC TALANT.
1520 PRINT:PRINT"FAMOUS PISCES: EINSTEIN, CARUSO, CHOPI
    N, MICHELANGELO,":PRINT"VICTOR  HUGO, RUDOLPH NURE
    YEV, RENOIR, AND LIZ TAYLOR.
1530 GOTO 2120
1540 PRINT"YOU ARE THE PIONEER TYPE AND HOLD MOST PEOPL
    E IN CONTEMPT.
1550 PRINT"YOU ARE QUICK TEMPERED, IMPATIENT, AND SCORN
    FUL OF ADVICE.
1560 PRINT"YOU VASTLY OVERESTIMATE YOUR ABILITIES....IN
     FACT, ALL
1570 PRINT"THINGS CONSIDERED, YOU ARE A REAL CREEP !!
1580 PRINT:PRINT"FAMOUS AIRES:  MARLON BRANDO, HARRY HO
    UDINI, NIKITA KRUSHCHEV":PRINT"PETER  USTINOV, CHA
    RLES CHAPLIN, AND  BETTE DAVIS.
1590 GOTO 2120
1600 PRINT"YOU ARE PRACTICAL AND PERSISTENT.  YOU HAVE
     DOGGED
1610 PRINT"DETERMINATION AND WORK LIKE HELL.  mOST PEOP
    LE THINK YOU
1620 PRINT"ARE STUBBORN AND BULL HEADED....THEY ARE RIG
    HT !
1630 PRINT"YOU ARE NOT EXACTLY PHI BETA KAPPA MATERIAL
1640 PRINT:PRINT"FAMOUS BULLS: WILLIE MAYS, SHAKESPEARE
    , HARRY TRUMAN":PRINT"BARBARA STREISAND, ORSON WEL
    LS, AND ADOLPH HITLER !
1650 GOTO 2120
1660 PRINT"YOU ARE A QUICK AND INTELLIGENT THINKER.  pE
    OPLE LIKE YOU
1670 PRINT"BECAUSE YOU ARE BISEXUAL.  hOWEVER, YOU ARE
     INCLINED TO EXPECT
1680 PRINT"TOO MUCH FOR TOO LITTLE.  THIS MEANS YOU ARE
     CHEAP !
1690 PRINT"GEMINIS ARE KNOWN FOR COMMITTING INCEST.
1700 PRINT:PRINT"FAMOUS GEMINI'S:  BOB HOPE, AL JOLSON,
     ERROL FLYNN":PRINT"JOHN KENNEDY, JOHN DILLINGER,
     JUDY GARLAND & CHARLIE BROWN .
1710 GOTO 2120
1720 PRINT"YOU ARE SYMPATHETIC AND UNDERSTANDING OF OTH
    ER PEOPLE'S
1730 PRINT"PROBLEMS.  THEY THINK YOU ARE A SUCKER.  YOU
     ARE ALWAYS
1740 PRINT"PUTTING THINGS OFF.  THAT'S WHY YOU WILL NEV
    ER MAKE ANYTHING
1750 PRINT"OF YOURSELF.  mOST WELFARE RECIPIENTS ARE CA
    NCER PEOPLE.
1760 PRINT:PRINT"FAMOUS CANCER'S: JULIUS CEASAR, HENRY
     THE 8TH, REMBRANDT":PRINT"GINA LOLLOBRIGIDA, PHYLL
    IS DILLER, AND MILTON BERLE
1770 GOTO 2120
1780 PRINT"YOU CONSIDER YOURSELF A BORN LEADER.  OTHERS
     THINK YOU ARE
1790 PRINT"PUSHY.  MOST LEO PEOPLE ARE BULLIES.  YOU AR
    E VAIN AND
1800 PRINT"DISLIKE HONEST CRITISM.  YOUR ARROGANCE IS D
    ISGUSTING.
1810 PRINT"LEO PEOPLE ARD KNOWN THIEVES.
1820 PRINT:PRINT"FAMOUS LEO'S: NAPOLEON BONAPARTE, FIDE
    L CASTRO, MAE WEST":PRINT"MUSSOLINI, LUCILLE BALL,
     JULIA CHILD, AND EDDIE FISHER.
1830 GOTO 2120
1840 PRINT"YOU ARE THE LOGICAL TYPE AND HATE DISORDER.
     THIS NITPICKING
1850 PRINT"IS SICKENING TO YOUR FRIENDS.  YOU ARE COLD
    AND UNEMOTIONAL
1860 PRINT"AND SOMETIMES FALL ASLEEP WHILE MAKING LOVE.

1870 PRINT"VIRGOS MAKE GOOD BUS DRIVERS...
1880 PRINT:PRINT"FAMOUS VIRGO'S:  LAURENN BACALL, INGRI
    D BERGMAN, SID CAESAR":PRINT"HENRY FORD II, SOPHIA
     LOREN, PETER SELLERS.
1890 GOTO 2120
1900 PRINT"YOU ARE ARTISTIC AND HAVE A DIFFICULT TIME W
    ITH REALITY.
1910 PRINT"IF YOU ARE A MAN, YOU ARE MORE THAN LIKELY A
     QUEER.
1920 PRINT"CHANCES FOR EMPLOYMENT AND MONITATY GAIN ARE
     EXCELLENT.
1930 PRINT"mOST LIBRA WOMEN MAKE GOOD PROSTITUTES.  ALL
     LIBRAS
1940 PRINT"DIE OF VENERIAL DISEASE !!
1950 PRINT:PRINT"FAMOUS LIBRA'S:  CHARLES BOYER, TRUMAN
     CAPOTE, FRANZ LISZT":PRINT"GEORGE GERSHWIN, CHARL
    TON HESTON, AND BRIGETTE BARDOT.
1960 GOTO 2120
1970 PRINT"YOU'RE SHREWD IN BUSINESS AND CANNOT BE TRUS
    TED.  YOU WILL
1980 PRINT"ACHIEVE THE PINNACLE OF SUCCESS BECAUSE OF Y
    OUR TOTAL LACK
1990 PRINT"OF ETHICS.  SCORPIOS SELDOM DIE A NATURAL DE
    ATH.
2000 GOSUB20  :PRINT"FAMOUS SCORPIOS: LUCKY LUCIANO, A
    L CAPONE, NATHAN DETROIT.
2010 GOTO 2120
2020 PRINT"YOU ARE OPTOMISTIC AND ENTHUSIASTIC.  YOU HA
    VE A RECKLESS
2030 PRINT"TENDENCY TO RELY ON LUCK SINCE YOU LACK TALE
    NT.  THE
2040 PRINT"MAJORITY OF SAGGITARIANS ARE DRUNKS OR DOPE
    FIENDS.
2050 PRINT"PEOPLE LAUGH AT YOU FREQUENTLY.
2060 PRINT:PRINT"FAMOUS ONES: BEETHOVEN, WINSTON CHURCH
    ILL, MARK TWAIN":PRINT"WALT DISNEY, FRANK SINATRA,
     MARIA CALLAS, & BETTY GRABLE.
2070 GOTO 2120
2080 PRINT:PRINT"YOU ARE QUIET AND DEPENDABLE.  AT LEAS
    T THAT IS THE":PRINT"IMPRESSION YOU WISH TO GIVE W
    HILE YOU ARE CLIMBING TO THE TOP.
2090 PRINT"CAPRICORN'S ARE BASHFUL AND DIFFICULT TO  SE
    DUCE.....":PRINT"THEY THINK THEMSELVES TO BE FANT
    ASTIC LOVERS.....
2100 FORI=1TO2900:NEXT:PRINT:PRINT"                    A
     MINORITY OPINION
2110 PRINT:PRINT"FAMOUS GOATS:  RICHARD NIXON, JOAN OF
    ARC, LOUIS PASTEUR":PRINT"HUMPHREY BOGART, HOWARD
    HUGHES, AND ALBERT SCHWEITZER.
2120 PRINT:PRINT:INPUT"READY FOR MORE ADVICE, PRESS 'EN
    TER'.";:GOTO 40
2130 EE=RND(2):IFEE=1THEN2180 ELSECLS:FORO=1TO5:FORI=12
    6TO175:XX=RND(999):XY$=CHR$(I):PRINT@XX,XY$:NEXTI:
    NEXTO
```

Program continues

MULTI-USER OASIS HAS THE FEATURES PROS DEMAND. READ WHY.

Computer experts (the pros) usually have big computer experience. That's why when they shop system software for Z80 micros, they look for the big system features they're used to. And that's why they like Multi-User OASIS. You will too.

DATA INTEGRITY: FILE & AUTOMATIC RECORD LOCKING

The biggest challenge for any multi-user system is co-ordinating requests from several users to change the same record at the same time.

Without proper co-ordination, the confusion and problems of inaccurate or even destroyed data can be staggering.

Our File and Automatic Record Locking features solve these problems.

For example: normally all users can view a particular record at the same time. But, if that record is being updated by one user, automatic record locking will deny all other users access to the record until the up-date is completed. So records are always accurate, up-to-date and integrity is assured.

Pros demand file & automatic record locking. OASIS has it.

SYSTEM SECURITY: LOGON, PASSWORD & USER ACCOUNTING

Controlling who gets on your system and what they do once they're on it is the essence of system security.

(THEN COMPARE.)

Without this control, unauthorized users could access your programs and data and do what they like. A frightening prospect isn't it?

And multi-users can multiply the problem.

But with the Logon, Password and Privilege Level features of Multi-User OASIS, a system manager can specify for each user which programs and files may be accessed—and for what purpose.

Security is further enhanced by User Accounting—a feature that lets you keep a history of which user has been logged on, when and for how long.

Pros insist on these security features. OASIS has them.

EFFICIENCY: RE-ENTRANT BASIC

A multi-user system is often not even practical on computers limited to 64K memory.

OASIS Re-entrant BASIC makes it practical.

How?

Because all users use a single run-time BASIC module, to execute their compiled programs, less memory is needed. Even if you have more than 64K, your pay-off is cost saving and more efficient use of all the memory you have available—because it services more users.

Sound like a pro feature? It is. And OASIS has it.

AND LOTS MORE...

Multi-User OASIS supports as many as 16 terminals and can run in as little as 56K memory. Or, with bank switching, as much as 784K.

Multi-Tasking lets each user run more than one job at the same time.

And there's our BASIC—a compiler, interpreter and debugger all in one. An OASIS exclusive.

Still more: Editor; Hard & Floppy Disk Support; Keyed (ISAM), Direct & Sequential Files; Mail-Box; Scheduler; Spooler; all from OASIS.

Our documentation is recognized as some of the best, most extensive, in the industry. And, of course, there's plenty of application software.

Put it all together and it's easy to see why the real pros like OASIS. Join them. Send your order today.

OASIS IS AVAILABLE FOR

SYSTEMS: Altos; Compucorp; Cromemco; Delta Products; Digital Group; Digital Microsystems; Dynabyte; Godbout; IBC; Index; Intersystems; North Star; Onyx; SD Systems; TRS 80 Mod II; Vector Graphic; Vorimex.

CONTROLLERS: Bell Controls; Cameo; Corvus; Korian; Micromation; Micropolis; Tarbell; Teletek; Thinkertoys; X Comp.

Write for complete, free Application Software Directory.

PLEASE SEND ME:

Product	Price with Manual	Manual Only
OPERATING SYSTEM (Includes: EXEC Language; File Management; User Accounting; Device Drivers; Print Spooler; General Text Editor; etc.)		
SINGLE-USER	$150	$17.50
MULTI-USER	350	17.50
BASIC COMPILER/ INTERPRETER/DEBUGGER	100	15.00
RE-ENTRANT BASIC COMPILER/INTERPRETER/ DEBUGGER	150	15.00
DEVELOPMENT PACKAGE (Macro Assembler; Linkage Editor; Debugger)	150	25.00
TEXT EDITOR & SCRIPT PROCESSOR	150	15.00
DIAGNOSTIC & CONVERSION UTILITIES (Memory Test; Assembly Language Converters; File Recovery; Disk Test; File Copy from other OS; etc.)	100	15.00
COMMUNICATIONS PACKAGE (Terminal Emulator; File Send & Receive)	100	15.00
PACKAGE PRICE (All of Above)		
SINGLE-USER	500	60.00
MULTI-USER	850	60.00
FILE SORT	100	15.00
COBOL-ANSI '74	750	35.00

Order OASIS from:

Phase One Systems, Inc.
7700 Edgewater Drive, Suite 830
Oakland, CA 94621

Telephone (415) 562-8085
TWX 910-366-7139

NAME _____
STREET (NO BOX #) _____
CITY _____
STATE _____ ZIP _____

AMOUNT $ _____
(Attach system description; add $3 for shipping; California residents add sales tax)

☐ Check enclosed ☐ VISA
☐ UPS C.O.D. ☐ Mastercharge

Card Number _____
Expiration Date _____
Signature _____

OASIS

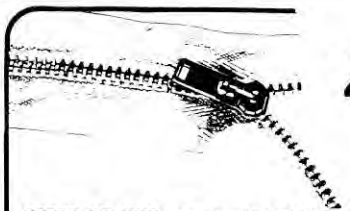
MAKES MICROS RUN LIKE MINIS

NOW AVAILABLE FOR TRS80 MOD II

```
2140 CLS:PRINTCHR$(23):PRINT:PRINT:PRINT"SORRY ";A$
2150 PRINT:PRINT"I MUST HAVE FLIPPED OUT.....
2160 PRINT:PRINT"ALL IS WELL NOW, LET'S GET"
2170 PRINT"BACK TO YOUR SESSION.":FORI=1TO1700:NEXT:CLS
     :RETURN
2180 PRINT:PRINT:PRINT"SORRY ";A$;" SOMETIMES I GET ANX
     IOUS":FORI=1TO700:NEXTI:PRINT:PRINT"IN FACT, I FEE
     L SOMETHING COMING ON NOW....":FORI=1TO600:NEXTI:P
     RINT:PRINT"OH DEAR !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
     !!!!!!!!!":FORI=1TO600:NEXTI
2190 FOR I=1TO800:OUT255,8:OUT255,0:NEXTI:PRINT:PRINT"W
     HEW!  SAY ";A$;" DO YOU HAVE SOME VALIUM??  I DO G
     ET SHAKY":PRINT"FROM TIME TO TIME.  ALL IS WELL NO
     W.  BACK TO THE SESSION":RETURN
2200 REM RECOGNITION ROUTINE, MUST BE TAILORED TO YOUR
     NEEDS
2210 CLS:PRINT:PRINT:PRINT:IFA$="JOHN" THEN PRINT"HOW'S
      THE GROCERY BUSINESS mR. JONES?":RETURN
2220 IFA$="LARRY"THENPRINT:PRINT"AREN'T YOU THAT WEIRDO
      WHO HOOKED ONE OF MY COLLEAGUES UP ":PRINT"IN YOU
     R CAR?????":RETURN
2230 IFA$="HARRY" THEN PRINT"ARE YOU STILL FOOLING AROU
     ND WITH SARAH?":RETURN
2240 PRINT"YOUR FILES HAVE BEEN TURNED OVER TO THE CIA
     ";A$;" AND I":PRINT"CANNOT COMMENT.":RETURN
2250 REM LIVE KEYBOARD ROUTINE
2260 C$=INKEY$:DD=DD+1:IFDD=60THENPRINT"QUIT WASTING TI
     ME ";A$:DD=0:FORU=1TO500:NEXTU:GOTO2260 ELSEPRINT@
     935,"MAKE SELECTION":FORY=1TO50:NEXTY:PRINT@935,"
                  ":IFC$=""THEN2260 ELSEDD=0:RETURN
```

Program Listing 2. KBFIX Routine

```
1  DATA  255,175,17,10,0,205,11,0,25,34,22,64,205,97,27,195,25,26,33,54,64,1,
         1,56,22,0,10,95,174,115,163,32,8,20,44,203,1,242,226,127,201,95,197,
         1,220,5,205,96,0,193,10,163,200,195,251,3
2  FOR I = 1 TO 56: READ A: POKE I + 32711,A: NEXT:PRINT "TYPE SYSTEM
   ENTER /32713 ENTER": DELETE 1-2
```

ZIP UP YOUR MODEL I

SPEED-UP UNIT - an easy to install electronic device that enables programs to run 2 to 3 times faster. It's the fastest and finest quality speed-up unit on the market.

- **guaranteed to double processing speed - no additional purchases required.**
- **programs will run up to 3 times faster (5.3 mhz) by adding a Z80B microprocessor and delay line - not supplied.**
- **returns automatically to normal speed during disk and cassette operation - no software patches required.**
- **keyboard power-on light changes color to indicate operating speed.**

$45.00

VIDEO I. Reverses the video display to provide black characters and graphics on an all white screen for a much easier to read presentation. Software controlled. Cures pulling and distortion problems commonly experienced with TRS-80 monitors. For use with TRS-80 monitors only. Assembled.

$24.00

"SATISFACTION GUARANTEED"

Add $2.00 postage & handling - California residents add 6% sales tax -Foreign orders add 15%.

ARCHBOLD ELECTRONICS

10708 Segovia Way Rancho Cordova, CA 95670

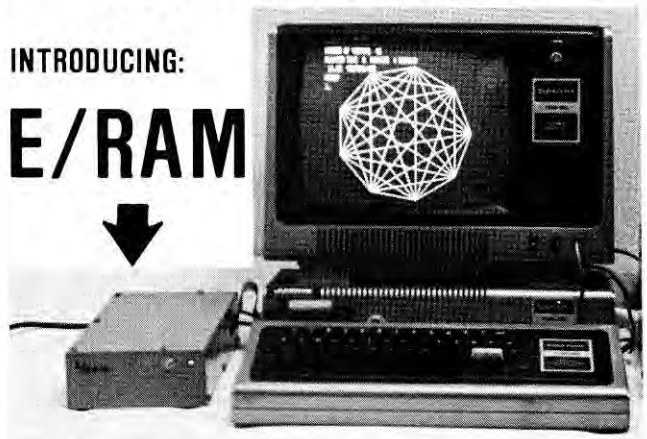
(916) 635-5408

Dealer inquiries invited

HI-RESOLUTION GRAPHICS FOR TRS-80*

INTRODUCING:

E/RAM



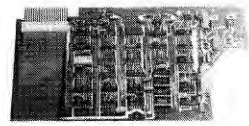
E/RAM Graphics is a unique hardware/software package, which will integrate high-speed, high resolution graphics into any Level II TRS-80 system. E/RAM hardware is a fully plug-compatible box, which installs in minutes, and requires absolutely **no** modifications to the TRS-80 system. E/RAM software is a compact, relocatable set of utilities which provides the user with easily accessible graphics functions. For instance: the user pokes the end point coordinates of a line into certain locations, does a USR call, and an optimized dot-raster line is automatically drawn on the screen at very high speed (less than 10 milli-seconds for a medium length line).

E/RAM does not require the purchase of an additional monitor CRT. The high-resolution graphics video is syncronized with the TRS-80 video and appears on the screen with the normal TRS-80 display. Alphanumerics, TRS-80 graphics, and E/RAM high-resolution graphics may be displayed simultaneously or individually.

E/RAM hardware contains its own 6144 byte video memory, which provides a true 256 x 192 matrix of **independent** graphic elements. (E/RAM is **NOT** a programmable character generator type graphics system. Character generator systems have serious limitations in full screen graphics applications.)

E/RAM will operate with or without an expansion interface, and with any standard memory configuration (4k through 48k).

E/RAM is **fast**. "E/RAM" is an acronym for **E**xtended **R**andom **A**ccess **M**emory, a very short description of the Patent-Pending method of I/O employed by this device, which gives it memory-mapped speed without interfering with the memory space used by the TRS-80.



The installation of E/RAM will not affect normal operation of the TRS-80. High resolution ON/OFF is under program or manual control (a switch is provided). An expansion card edge connector is provided so that other peripherals may be used on the TRS-80 bus.

E/RAM software package is compact (less than 1000 bytes), fast, easy to use, and very flexible. A relocating loader is provided. The user can delete unneeded routines if more memory space is required. Lines can be drawn as fast as 13 per second using BASIC USR calls, and as fast as 200 per second using assembly language programs.

Routines usable through USR of BASIC, and of course an assembler CALL are:

INIT	-	Sets up display
PLOT	-	Plots a point
READ	-	Reads a point from the screen
BLACK	-	Sets drawing mode to black (off)
WHITE	-	Sets drawing mode to on
CLEAR	-	Clears the high-resolution graphics screen
LINE	-	Draws a line

As an example, after the utilities package is loaded and you desire to draw a line, the following sequence of BASIC instructions could be executed:

U=USR(0)	Return the communications area
POKE U+1,X0	Provide the beginning X coordinate
POKE U+3,Y0	Provide the beginning Y coordinate
POKE U+5,X1	Provide the ending X coordinate
POKE U+7,Y1	Provide the ending Y coordinate
V=USR(4)	Draw the line (Current speed is approximately 13 vectors/second)

The complete E/RAM package is available for only $349.95, and includes case, power supply, cables, software cassette, and complete documentation.

To order, or for further details, write or call:

VERN STREET PRODUCTS THE COMPUTER STORE

We handle a full line of Radio Shack products ✓432

4949 South Peoria Ave
Tulsa, Okla 74105
(918) 747-2550

Send $10.00 for a set of the manuals provided (applicable towards purchase)
Dealer inquiries are invited.
Terms: COD Welcome, check, money order, Master Charge, or Visa
Delivery: Stock to 60 days.
E/RAM was designed, and is manufactured by KEYLINE COMPUTER PRODUCTS, INC. 13 East 6th Street, M/C 200, Tulsa, Oklahoma 74119.

*TRS-80 is a registered trademark of Radio Shack, a Tandy Corporation.

LOWEST PRICES ON THE TRS-80

Pan American Electronics

INCORPORATED

a Radio Shack AUTHORIZED SALES CENTER

Computers

For Business, Learning and Entertainment

For More Information Call

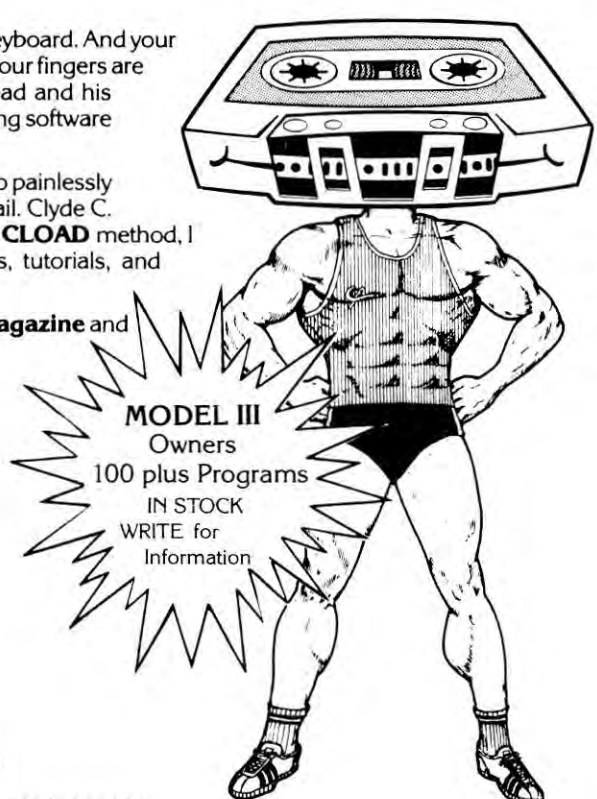
TOLL FREE ORDER NUMBER
800-531-7466
Texas & Principal NUMBER
512-581-2765
Telex Number 767339
Dept. 80, 1117 Conway
Mission, Texas 78572

GET BUGS KICKED IN YOUR FACE?

Ok, so you've tried running marathons on your **TRS-80** keyboard. And your workout even included lifting code off of the printed page. But your fingers are worn out and your programs are still weak. Let Charles Cload and his Dynamic **CLOAD** method show you the easy way to build strong software libraries!

Once a month, a 30-minute cassette filled with programs to painlessly exercise your **TRS-80** and your mind arrives by First Class Mail. Clyde C. writes, "I used to be a 98-error programmer. But thanks to the **CLOAD** method, I now have a large number of bug-free, ready-to-load games, tutorials, and practical programs."

No heavy workouts. Just get a subscription to **CLOAD Magazine** and you're on your way to happy, healthy computing.



PRICES

1 year subscription	$42.00
6 month subscription	$23.00
Single copies	$4.50
Anthology-volume 1	$10.00
Anthology-volume 2	$15.00

The Fine Print:
Overseas rates slightly higher—please write for them.
Back issues available—ask for our list.*
TRS-80 is a trademark of Tandy Corporation
California residents add 6% to single copies and anthologies.
Programs are for Level II 16K and occasionally for disks.
*24 Level I back issues also available.
Mastercard/Visa Welcome. Also Cash & Gold.

CLOAD MAGAZINE INC. © 1981
P.O. Box 1267 Goleta, CA 93116 (805) 964-2761

Data base management at 1 7/8 inches per second.

Sans Disks

Stewart F. Hunter
15510 Murray Hill
Detroit MI 48227

Data base management without the use of disks is at best a compromise. However, if you insist on exploring this area and have no inclination to make the investment in disk memories, this program may be just what you are looking for.

Applications

The program creates and maintains a collection of data for name and address lists, hobby collections, program directories, small inventories, etc. All data is saved on and loaded from cassette. Because of the tape format and machine language subroutines used for saving and loading, data loading is much faster than it would be using Level II tape load instructions.

Level II BASIC and 16K memory are the minimum requirements. If a line printer is on line (in selected state), output from the program will be directed to it. Otherwise it will appear on the video display. All instructions and prompts will appear on the display.

Organization

The data base is organized into fields and records. Each record consists of one or more fields. The type of information contained in each field is defined by the user. Field length and name are also user-defined. Data exceeding the defined length is truncated. The maximum field length that can be assigned is 255 characters. The field names can be from one to 16 characters and the type of information stored in a field may be alphabetic or numeric. The number of fields per record and the number of records is limited by the amount of available memory.

Machine Language Subroutines

The program POKEs two machine language subroutines into reserved memory. The first handles input and output of the data base to tape; the second is a swap subroutine used by the sorting section of the program. The program automatically reserves memory space for these subroutines. The response to the MEMORY SIZE? prompt is to hit the ENTER key.

Program Use

Refer to Fig. 1. When the program runs initially, it asks NEW DATA BASE? If you are creating a data base for the first time answer YES. If the data base is loaded from tape answer NO. If the answer is NO, the prompt COMMAND? is displayed, after which you may use the LOAD command to read in a data base from tape. If the NEW DATA BASE? prompt is answered YES the user will be prompted for the entry of the data base.

First the field specifications must be entered. Suppose that we are creating a file of names, addresses and telephone numbers. We will have to describe the layout of each of these items. The next prompt we encounter is INPUT DATA DESCRIPTION (FIELD NAME, FIELD SIZE, FIELD TYPE). This means to enter information for one item (field) of data that will appear in each record.

In the example we are using we might respond: NAME, 20, ALPHA. This means the first field of each record will be titled NAME, the field will contain a maximum of 20 characters, and the field will store alphabetic characters. For numeric characters enter the word INTEGER or REAL. REAL denotes floating point values. After the ENTER key is hit we will likewise be prompted for each additional field. When no more fields are to be specified, type END, END, END to terminate the field descriptions.

```
IF EXPLANATIONS ARE NEEDED TYPE ? IN RESPONSE TO QUESTIONS.

NEW DATA BASE? YES

INPUT DATA DESCRIPTION.
(FIELD NAME, FIELD SIZE, FIELD TYPE, SEPERATED BY COMMAS)
? NAME,20,ALPHA
? ADDRESS,15,ALPHA
? TEL. NO.,7,INTEGER
? END,END,END

ENTER DATA RECORDS.
NAME ( 20 CHARACTERS) = ? JOHN SMITH
ADDRESS ( 15 CHARACTERS) = ? 1622 MAPLE DR.
TEL. NO. ( 7 CHARACTERS) = ? 4729909

NAME ( 20 CHARACTERS) = ? END

COMMAND?
```

Fig. 1. User responses are underlined.

The next prompt is ENTER DATA RECORDS. Type in the value for each field of each record. The name of the field will be displayed along with the maximum number of characters that may be entered for that field. Following the displayed equals sign, type the value of that field for that particular record. Remember to enter only alphabetic information for fields that were defined as alpha and numeric information for numeric defined fields.

After the value for the last field of the last record is entered type END. Data entry will be terminated and the COMMAND? prompt will be displayed. A brief explanation of all prompts will be displayed by answering the prompt with ?.

"The data base is organized into fields and records. Each record consists of one or more fields."

Commands

There are 10 commands allowed by the program:

- LOAD—Reads in a data base that has been saved on tape. Put the tape recorder in the play mode with the tape positioned at the start of the data before entering this command.
- SAVE—Saves the data base currently residing in memory to tape. Set the recorder to the record mode before entering this command.
- NAMES—Prints a list of field names and descriptions previously selected by the user. These field names and descriptions are saved to and loaded from the tape along with the data base.
- SELECT—Produces a printout of the entire data base, field by field and record by record.
- SELECT IF—Prints records having fields that match the criteria given in the command. For example, SELECT IF NAME = JOHN SMITH. Three operators in addition to the equals sign may be used. They are >, <, and <>. These operators work for either alpha or numeric fields.
- DELETE IF—Works the same as the SELECT IF command but deletes the records as they are printed. The data base is automatically repacked to close up holes left by deleted records.
- CHANGE IF—Changes the specified field in all records to the value input by the user if the field meets the criteria in the command. For example, the command CHANGE IF ADDRESS = 112 ELM ST. would be followed by the prompt TO WHAT?. The user might respond, 3350 WOODWARD AVE. All records would then be searched for fields named ADDRESS which match the string 112 ELM ST. When these fields are found they are changed to the string 3350 WOODWARD AVE. All records are printed out as they are changed.
- APPEND—Adds data to the end of the data base currently in memory. Prompts input for each field of the new record as in the initial creation of the data base.
- SORT BY—Sorts the data base in ascending order of the values of the specified field. For example, SORT BY NAME would result in an alphabetical sort of all records according to the value of the field called NAME.
- EXIT—Returns to the BASIC monitor.

Because the main body of the program is written in BASIC, sorting and searching operations can be frustratingly slow, especially with lengthy data bases. However, the versatility of the program compensates for its lack of speed. ■

Program Listing 1.

```
        3=DELETE RECORD CODE
      3=DELETE RECORD CODE
      4=END OF DATA DESCR.
      5=END OF FILE CODE
40 '
      DATA DESCRIPTION START ADRS.=30001
      DATA RECORDS START ADRS.    =31001
    DATA RECORDS START ADRS.    =31001
41 '
75 DEFINTA,B,T,C,D,F,H,I,J,N,R,S,X-Z
80 X=29608:' START ADRS OF RESERVE MEMORY
90 X=X-2:Y=INT(X/256):Z=X-(Y*256):POKE16561,Z:POKE16562
   ,Y:CLEAR
92 X=29920
93 READY:POKEX,Y:X=X+1:IFY<>99GOTO93:' LOAD CASSETTE SU
   BROUTINE
94 DATA0,58,224,116,254,1,202,10,117,33,49,117,205,132,
   2,126,35,205,100,2,254,4,194,239,116,33,24,121,126
   ,35,205,100,2,254,5,194,252,116,205,248,1,201,205,
   147,2,33,49,117,205,53,2,119,35,254,4,194,16,117,3
   3,24,121,205,53,2,119,35,254,5,194
95 DATA29,117,205,248,1,201,99
96 POKE16526,225:POKE16527,116
97 FORX=29610TO29652:READY:POKEX,Y:NEXT:' LOAD SWAP SUB
   ROUTINE
98 DATA1,0,0,17,217,115,42,213,115,126,18,35,19,3,254,2
   ,32,247,197,237,91,213,115,237,176,193,237,83,213,
   115,33,217,115,237,176,42,215,115,35,34,215,115,20
   1
99 '
100 CLS:CLEAR 1500:DIM FD$(15),HD(255)
105 PRINT"IF EXPLANATIONS ARE NEEDED TYPE ? IN RESPONSE
    TO QUESTIONS.":PRINT
110 PRINT"NEW DATA BASE";:INPUT ANS$
112 IF ANS$="?" THEN 1100
120 IF LEFT$(ANS$,1)="N" THEN 360
125 PRINT
127 D1=30001
128 '
130 PRINT"INPUT DATA DESCRIPTION."
140 PRINT"(Field name, field size, field type. Seperate
    d by commas)
145 INPUT NA$,FS$,FT$:IFNA$="?" THEN 1300
147 IF NA$="END" THEN 210
150 NA$=LEFT$(NA$,16):CT=16-LEN(NA$):IF CT>0 THEN FOR I
    =1 TO CT:NA$=NA$+" ":NEXT
160 FORI=1TO16:NB=ASC(MID$(NA$,I,1)):POKE D1,NB:D1=D1+1
    :NEXT
170 FS$=LEFT$(FS$,3):CT=3-LEN(FS$):IF CT>0 THEN FOR I=1
    TO CT:FS$=FS$+" ":NEXT
180 FOR I=1 TO 3:NB=ASC(MID$(FS$,I,1)):POKE D1,NB:D1=D1
```

Program continues

PMC 80
$499.00

Compatible with all TRS80* hardware and software and S-100 Bus hardware

Use with TV or Monitor

PMC-80 Personal Micro Computer, 16K RAM, Level II BASIC
List Price $645.00
T.G.S. Price $499.00

Upper/Lower Case Option Factory Installed
List Price $75.00
T.G.S. Price $59.00

EXP-100 S-100 Bus Expander Disk Controller, Parallel, RS232
List Price $410.00
T.G.S. Price $299.00

S-32K RAM Board for EXP-100
List Price $295.00
T.G.S. Price $219.00

LIMITED OFFER
First five orders shipping prepaid.

Aerocomp Disk Drives Available

	Model No.
40 track flippy	**40-1**
List Price	$349.95
T.G.S. Price	$325.00
40 track dual-head	**80-2**
List Price	$459.95
T.G.S. Price	$429.00
80 track flippy	**80-1**
List Price	$459.95
T.G.S. Price	$429.00
80 track dual-head	**160-2**
List Price	$599.95
T.G.S. Price	$569.00

5¼" Diskettes ..... $2.25 each

APF Imagination Machine 8K
$475.00
System II Imagination Machine, Expansion box, disk controller & 5¼" disk drive.
$849.00

All APF periperals & software are available at discount.

VISA & MasterCharge accepted
Call or write for terms

THE GRAPHIC SOURCE ✓73
Route 2, Box 44
Canton, Kansas 67428
(316) 628-4935

*Trademark of Tandy/Radio Shack

✓See List of Advertisers on page 306

DISCOUNT Ad#12 SOFTWARE

✓250

✓ out our new items.

CP/M users: specify disk systems and formats. Most formats available.

	DISK WITH MANUAL	MANUAL ONLY
CP/M*		
ARTIFICIAL INTELLIGENCE		
✓ Medical	$449/$40	
✓ Dental	$449/$40	
COMPLETE BUS. SYSTEM		
Creator	$269/$25	
Reporter	$169/$20	
Both	$399/$45	
COMPUTER CONTROL		
✓ Fabs	$159/$20	
UltraSort II	$159/$25	
COMPUTER PATHWAYS		
Pearl (level 1)	$ 99/$25	
Pearl (level 2)	$299/$40	
Pearl (level 3)	$549/$65	
DIGITAL RESEARCH		
CP/M 2.2		
NorthStar	$149/$25	
TRS-80 Model II (P&T)	$159/$35	
Micropolis	$169/$25	
Cromemco	$189/$25	
PL/I-80	$459/$35	
✓ BT-80	$179/$25	
Mac	$ 85/$15	
Sid	$ 65/$15	
Z-Sid	$ 95/$15	
Tex	$ 70/$15	
DeSpool	$ 50/$10	
DYNAMIC MICRO-PROCESSOR ASSOC.		
✓ Ascom	$109/$15	
CBS	$369/$45	
✓ DMA-DOS	$179/$35	
GRAHAM-DORIAN		
✓ General Ledger	$729/$40	
✓ Acct Receivable	$729/$40	
✓ Acct Payable	$729/$40	
✓ Job Costing	$729/$40	
Payroll	$493/$40	
Inventory	$493/$40	
Cash Register	$493/$40	
Apartment Mgt	$493/$40	
KEY BITS		
String/80	$ 84/$20	
✓ String/80 (source)	$279/$na	
WordSearch	$179/$25	
MICRO-AP		
S-Basic	$269/$25	
Selector III	$269/$25	
Selector IV	$469/$35	
MICRO DATA BASE SYSTEMS		
HDBS	$269/$35	
MDBS	$795/$40	
✓ DRS or QRS or RTL	$269/$35	
✓ MDBS PKG	$1295/$60	
MICROPRO		
WordStar	$324/$60	
✓ Customization Notes	$ 89/$na	
Mail-Merge	$114/$25	
WordStar/Mail-Merge	$434/$85	
✓ DataStar	$249/$60	
WordMaster	$119/$40	
SuperSort I	$199/$40	
MICROSOFT		
Basic-80	$294/$30	
✓ Basic Compiler	$329/$30	
✓ Fortran-80	$349/$30	
Cobol-80	$574/$30	
Macro-80	$144/$20	
Edit-80	$ 84/$20	
MuSimp/MuMath	$224/$25	
MuLisp-80	$174/$20	
ORGANIC SOFTWARE		
TextWriter III	$111/$20	
DateBook	$269/$25	
OSBORNE		
General Ledger	$ 59/$20	
Acct Rec/Acct Pay	$ 59/$20	
Payroll w/Cost	$ 59/$20	
✓ All 3	$129/$57	
All 3 + CBASIC-2	$199/$71	
PEACHTREE*		
General Ledger	$399/$40	
Acct Receivable	$399/$40	
Acct Payable	$399/$40	
Payroll	$399/$40	
Inventory	$399/$40	
Property Mgt	$799/$40	
CPA Client Write-up	$799/$40	
Mailing Address	$349/$40	
SOFTWARE WORKS		
Adapt	$ 69/$na	
Ratfor	$ 86/$na	
SOHO GROUP		
MatchMaker	$ 97/$20	
WorkSheet	$177/$20	
STRUCTURED SYSTEMS		
GL or AR or AP or Pay	$599/$40	
Inventory Control	$449/$40	
✓ Analyst	$199/$25	
✓ QSort	$ 89/$20	
SUPERSOFT		
✓ Forth (8080 or Z80)	$149/$25	
✓ Diagnostic II	$ 84/$20	
Other	less 10%	
TCS		
GL or AR or AP or Pay	$ 79/$25	
All 4	$269/$99	
WHITESMITHS		
"C" Compiler	$600/$30	
Pascal (incl "C")	$750/$45	
"DATA BASE"		
FMS-80	$649/$45	
dBASE II	$629/$50	
Condor	$599/$30	
T.I.M.	$329/$35	
"PASCAL"		
✓ Pascal/MT+	$429/$30	
✓ Pascal/Z	$349/$30	
Pascal/UCSD	$299/$30	
Pascal/M	$149/$20	
"WORD PROCESSING"		
✓ SpellGuard	$249/$25	
Spell Binder	$349/$45	
✓ Magic Wand	$289/$45	
"OTHER GOODIES"		
Tiny "C"	$ 89/$50	
Tiny "C" Compiler	$229/$50	
CBASIC-2	$ 89/$15	
Nevada Cobol	$129/$25	
MicroStat	$224/$15	
Vedit	$ 99/$15	
✓ Prof Time Bill (Asyst)	$549/$40	
✓ ESQ-1	$1349/$50	
✓ MiniModel	$449/$50	
✓ StatPak	$449/$40	
✓ Micro B+	$229/$40	
APPLE II*		
MICROSOFT		
Softcard	$292	
✓ Fortran	$179	
Cobol	$574	
PERSONAL SOFTWARE		
Visicalc	$122	
CCA Data Mgr.	$ 84	
Desktop/Plan	$ 84	
Zork	$ 34	
PEACHTREE*		
General Ledger	$224/$40	
Acct Receivable	$224/$40	
Acct Payable	$224/$40	
Payroll	$224/$40	
Inventory	$224/$40	
"OTHER GOODIES"		
Super-Text II	$127	
Data Factory	$129	
✓ DB Master	$159	
Ledger Plus	$549	
✓ Charles Mann	less 15%	
✓ STC	less 15%	

ORDERS ONLY—CALL TOLL FREE VISA • MASTERCHARGE

1-800-854-2003 ext. **823** • **Calif. 1-800-522-1500** ext. **823**

Overseas—add $10 plus additional postage • Add $2.50 postage and handling per each item • California residents add 6% sales tax • Allow 2 weeks on checks, C.O.D. ok • Prices subject to change without notice. All items subject to availability • ®—Mfgs. Trademark.

THE DISCOUNT SOFTWARE GROUP

6520 Selma Avenue, #309 • Los Angeles, CA 90028 • (213) 666-7677


```
     +1:NEXT
190 POKE D1,ASC(LEFT$(FT$,1)):D1=D1+1
200 GOTO 145
201 '
205 REM D1=START ADRS. OF DATA DESCR. D2=START ADR. OF
     DATA SET
210 POKE D1,4:' SET END OF DATA DESCR. CODE
220 PRINT
230 PRINT"ENTER DATA RECORDS."
235 D1=30001:D2=31001
236 POKE D2-1,2
240 H$="":FOR I=D1 TO D1+15:H$=H$+CHR$(PEEK(I)):NEXT:D1
     =I
250 F1$=H$:FOR I=15 TO 1 STEP-1:IF RIGHT$(F1$,1)<>" " T
    HEN 270
260 F1$=LEFT$(F1$,I):NEXT
270 H$="":FORI=D1TOD1+2:H$=H$+CHR$(PEEK(I)):NEXT:D1=I
280 F2=VAL(H$)
290 F3$=CHR$(PEEK(D1)):D1=D1+1
300 PRINTF1$;" (";F2;"CHARACTERS) = ";:INPUT IN$:I1=1:I
    F IN$="END" THEN POKE D2,5:GOTO 360
310 FOR I=D2 TO D2+(F2-1):POKE I,ASC(MID$(IN$,I1,1)):I1
    =I1+1:IF I1>LEN(IN$) AND I1<=F2 THEN I2=I+1:FOR I3
    =I2 TO D2+(F2-1):POKE I3,32:NEXT I3:D2=I3:GOTO 330
320 NEXT I
325 D2=I
330 IF PEEK(D1)=4 THEN D1=30001:POKE D2,2:D2=D2+1:PRINT
     :GOTO 240
340 POKE D2,1:D2=D2+1:GOTO 240
342 '
360 PRINT:PRINT"COMMAND";
365 IFCI<>0 CI=0
370 INPUT CO$
372 IFPEEK(14312)=63THENHC=0ELSEHC=1
375 IF CO$="?" THEN 3600
380 IF CO$="SELECT" THEN 500
390 IF LEFT$(CO$,9)="SELECT IF" THEN 600
395 IF LEFT$(CO$,9)="DELETE IF" THEN 700
400 IF CO$="LOAD" THEN POKE29920,1:X=USR(0):GOTO360
405 IF CO$="SAVE" THEN POKE29920,2:X=USR(0):GOTO360
410 IF CO$="NAMES" THEN 800
415 IF CO$="APPEND" THEN 900
420 IF LEFT$(CO$,9)="CHANGE IF" THEN 2000
422 IF LEFT$(CO$,7)="SORT BY" THEN 910
424 IF CO$="EXIT" THEN STOP
440 PRINT:PRINT"INVALID COMMAND":GOTO 360
445 '
500 D1=30001:D2=31001
505 RN=1
510 GOSUB3000:FD$(RN)=F1$:RN=RN+1:IF ASC(F1$)<>4 THEN 5
    10
515 RN=1
520 I=1
525 MS$="":GOSUB9700:MS$="RECORD NUMBER":GOSUB9600:MS$=
     STR$(RN):GOSUB9700:RN=RN+1:MS$=STRING$(20,"-"):GOS
    UB9700
530 MS$=FD$(I):GOSUB9600:MS$="=":GOSUB9600:I=I+1
535 H$=CHR$(PEEK(D2)):D2=D2+1
540 IFASC(H$)=1 THEN MS$="":GOSUB9700:GOTO 530
545 IF ASC(H$)=2 THEN MS$="":GOSUB9700:GOSUB9700:IF PEE
    K(D2)=5 THEN MS$="<END OF FILE>":GOSUB9700:GOTO 36
    0:ELSE 520
550 MS$=H$:GOSUB9600:GOTO 535
555 '
600 CO$=MID$(CO$,11,244):H$="":FORI=1TO16:HO$=MID$(CO$,
     I,1):IFHO$="="ORHO$="<"ORHO$=">"THEN610
605 H$=H$+HO$:NEXTI
610 HH$=H$:MT$="":IFMID$(CO$,I,1)="="THENMT$="="
611 F5$=HH$
615 IFMID$(CO$,I,1)=">"THENMT$=">"
620 IFMID$(CO$,I,1)="<"THENMT$="<":IFMID$(CO$,I,2)="<>"
     MT$="<>":I=I+1
625 IFMT$=""THEN440
630 I=I+1
635 MV$=MID$(CO$,I,255)
640 D1=30001:CT=0
645 CT=CT+1:GOSUB3000:IFF1$=HH$THEN655
650 GOTO645
655 H$=HH$
657 MS$="":GOSUB9700:MS$=H$:GOSUB9600:MS$=MT$:GOSUB9600
    :MS$=MV$:GOSUB9700:MS$="":GOSUB9700
660 D2=31000
662 FC=0
663 D2=D2+1
664 GOSUB9000:IFFC=CTTHEN790ELSE670
665 D2=D2-1:IFMT$="="THEN680
666 IFMT$=">"THEN687
667 IFMT$="<"THEN691
668 IFMT$="<>"THEN696
669 STOP
670 IFPEEK(D2)=5 IFDLT=1GOTO705ELSE360:ELSE671
671 IFPEEK(D2-1)=2 THEN FC=0
672 GOTO664
680 IFF3$="I"THENIFINT(VAL(MV$))=INT(VAL(GF$))THEN684
681 IFF3$="R"IFVAL(MV$)=VAL(GF$)THEN684
682 IFF3$="A"IFMV$=GF$THEN684
683 GOTO663
684 GOSUB9100:GOTO664
687 IFF3$="I"IFINT(VAL(GF$))>INT(VAL(MV$))THEN684
```

Program continues

```
688 IFF3$="R"IFVAL(GF$)>VAL(MV$)THEN684
689 IFF3$="A"IFGF$>MV$THEN684
690 GOTO663
691 IFF3$="I"IFINT(VAL(GF$))<INT(VAL(MV$))THEN684
692 IFF3$="R"IFVAL(GF$)<VAL(MV$)THEN684
693 IFF3$="A"IFGF$<MV$THEN684
694 GOTO663
696 IFF3$="I"IFINT(VAL(GF$))<>INT(VAL(MV$))THEN684
697 IFF3$="R"IFVAL(GF$)<>VAL(MV$)THEN684
698 IFF3$="A"IFGF$<>MV$THEN684
699 GOTO663
700 DLT=1:MS$="RECORDS DELETED:":GOSUB9700:GOTO600
705 DST=31001
707 I1=PEEK(DST):IFI1=5THEN780
709 IFI1=3 TAR=DST+1:GOTO715
711 DST=DST+1:GOTO707
715 DST=DST-1
717 I1=PEEK(DST):IFI1=2 DST=DST+1:ELSE715
719 BY=PEEK(TAR):IFBY=3THEN730
721 POKEDST,BY:IFBY=5THEN780
723 DST=DST+1:TAR=TAR+1:GOTO719
730 TAR=TAR+1:GOTO715
780 DLT=0:GOTO360
790 IFPEEK(D2-1)=2 THEN FC=0
792 GOTO665
793 '
800 MS$="":GOSUB9700:MS$="FIELD NAME":GOSUB9600:MS$=STR
    ING$(10," "):GOSUB9600:MS$="FIELD SIZE":GOSUB9600:
    MS$="  ":GOSUB9600:MS$="FIELD TYPE":GOSUB9700:MS$=
    STRING$(42,"-"):GOSUB9700
805 D1=30001
810 GOSUB 3000
815 MS$=F1$:GOSUB9600:MS$=STRING$(21-LEN(F1$)," "):GOSU
    B9600:MS$=STR$(F2):GOSUB9600:MS$=STRING$(12-LEN(MS
    $)," "):GOSUB9600:IFF3$="A"MS$="ALPHA-NUMERIC"
816 IFF3$="I"THENMS$="INTEGER"
817 IFF3$="R"THENMS$="REAL NUMBER"
818 GOSUB9700
820 IF PEEK(D1)=4MS$="":GOSUB9700:GOTO360:ELSE810
822 '
900 D1=30001:FORI=31001TO32766:IFPEEK(I)<>5NEXT:ELSE905
905 D2=I:MS$="":GOSUB9700:GOTO240
906 '
910 X=29610:Y=INT(X/256):Z=X-(Y*256):POKE16526,Z:POKE16
    527,Y:HH$=MID$(CO$,9,244):D1=30001:CT=0:GOSUB9800
915 MS$="":GOSUB9700:MS$="DATA SORTED BY ":GOSUB9600:MS
    $=HH$:GOSUB9700:MS$="":GOSUB9700
920 CT=CT+1:GOSUB3000:IFF1$<>HH$THEN920
925 RP=31001:S=0
930 FC=0:D2=RP
935 GOSUB9900
940 HLD$=GF$
942 IFPEEK(D2-1)=2THEN944ELSED2=D2+1
943 GOTO942
944 FC=0
945 GOSUB9900
950 IFF3$="A"THENIFHLD$<=GF$THEN975
952 IFF3$="I"ORF3$="R"THENIFVAL(HLD$)<=VAL(GF$)THEN975
960 RP%=RP:S%=S
962 POKE29653,PEEK(VARPTR(RP%)):POKE29654,PEEK(VARPTR(R
    P%)+1)
964 POKE29655,PEEK(VARPTR(S%)):POKE29656,PEEK(VARPTR(S%
    )+1)
966 X=USR(0)
968 POKEVARPTR(RP%),PEEK(29653):POKEVARPTR(RP%)+1,PEEK(
    29654)
970 POKEVARPTR(S%),PEEK(29655):POKEVARPTR(S%)+1,PEEK(29
    656):RP=RP%:S=S%:GOTO980
975 RP=D2-FI(0):GOTO980
980 IFPEEK(RP)<>5THEN930
982 IFS<>0THENS=0:GOTO925
985 POKE16526,225:POKE16527,116:PRINT"SORT COMPLETED":G
    OTO360
1100 PRINT:PRINT"  IF YOU WANT TO READ A COMPLETE DATA
    BASE FROM TAPE (INCLUDING DATA DESCRIPTIONS), ANSW
    ER 'NO'.
IF YOU WANT TO ENTER NEW DATA, ANSWER 'YE
    S'."
1105 GOTO 110
1106 '
1300 PRINT
1305 PRINT"FIELD NAME= A 1 TO 16 LETTER DESIGNATION OF
    ONE"
1306 PRINT"            CATEGORY (FIELD) WITHIN EACH REC
    ORD."
1307 PRINT"FIELD SIZE= A 1 TO 3 DIGIT INTEGER VALUE SPE
    CIFYING THE"
1308 PRINT"            SIZE OF THE PREVIOUSLY NAMED FIE
    LD."
1309 PRINT"FIELD TYPE= (A)LPHA FOR AN ALPHANUMERIC FIEL
    D.
1310 PRINT"            (I)NT FOR A FIELD TO HOLD INTEGE
    RS.
1311 PRINT"            (R)EAL FOR A FIELD FOR REAL NUMB
    ERS,(DECIMAL
1312 PRINT"                POINTS).
1313 PRINT"ENTER 'END' WHEN DONE ENTERING DATA DESCRIPT
    IONS.
1314 PRINT
```

Program continues

The Original "Photo point" ™ Light Pen

ONLY $19.95

Why pay $30.00, $35.00, $62.00 for the same results??

Don't be misled by more expensive imitations!

This is the **original** *Photo point* light pen preferred and supported by some of the leading software sources like, "Quality Software"— "Instant Software"—"Level IV "products and so on,

Just imagine . . .

In playing backgammon, (included) when you want to move a man, you just point at where you want to move from, then point at where you want to move to, and your man moves!!! No more fumbling with keyboards—YEA!

Your Photo Point package comes complete;

- 1 Photo point light pen (of course)
- Info sheets on how to connect the pen and how to write your own programs ALL IN BASIC
- Two apertures
- AND two sensitivity settings
- A cassette tape with 4 informative programs and games
- Ready to connect to your TRS-80 System. **(DOS too!)**
- Does not void any Radio Shack warranties

Requirements:

- Level II basic
- And a little *imagination!!*

For fast real time programming it is your lowest cost peripheral at $19.95

SILVER & BLACK

Announcing

NEW PEN BASIC by Steve Bjork

Steve is one of the Best Assembly Lang. programmers around, and he has come up with PEN BASIC. This low memory routine will add 10 more commands to Level II such as PENGET which searches the entire screen for the pen and returns a number between 0-1024 in about 1 sec. Plus 9 other commands. Perfect for you lightware authors and **NEW** light pen owners too! . . . . . .only $14.95

(COUPON)

Micro Matrix ✓68
P.O. Box 938 • Pacifica, CA 94044
Send for yours **NOW:** **(415) 355-4635**

Name _____ Photopoint ☐ $19.95

Address _____

City _____ St.____ Pen Basic ☐ $14.95

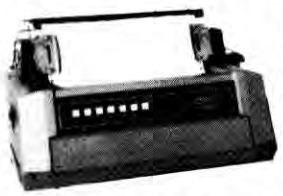
Zip _____

Card # _____ Money Order CK. ☐ ☐ Visa MC ☐ ☐

Ex. Date _____

✓See List of Advertisers on page 306

LETTER QUALITY PRINTERS



GE TERMINET 1200

- 120 char/sec print rate
- 96 char ASCII
- RS-232: 110, 150, 300, 600, 1200 baud
- Adjustable tractor: accepts up to 13″ wide pin feed paper

Used in good condition
Introductory Special: $795.00
(After 4/30/81: $895.00)

CRT TERMINALS

LEAR SIEGLER ADM-1

- 24 x 80 display
- Baud rates 110-9600
- Auxiliary printer port
- Character or block mode transfer

Used in good condition
Introductory Special: $495.00
(After 4/30/81: $595.00)

REFURBISHED CENTRONICS PRINTERS

730-1 (RS line printer II): $450
306: $595 101/101A: $795
103: $995 102: $1195

All printers & terminals shipped freight collect

CHARACTER GENERATOR BOARDS

Add lowercase plus additional character sets to your CENTRONICS printer!

9 X 7 DOT MATRIX:
- 101/101A: $150 (includes optional set of your choice)
- 779 (RS line printer I): $135 (optional set $15 extra)

5 X 7 DOT MATRIX:
- 779 (RS line printer I): $110 (includes optional set)
- All others: $95 (optional set $15 extra)

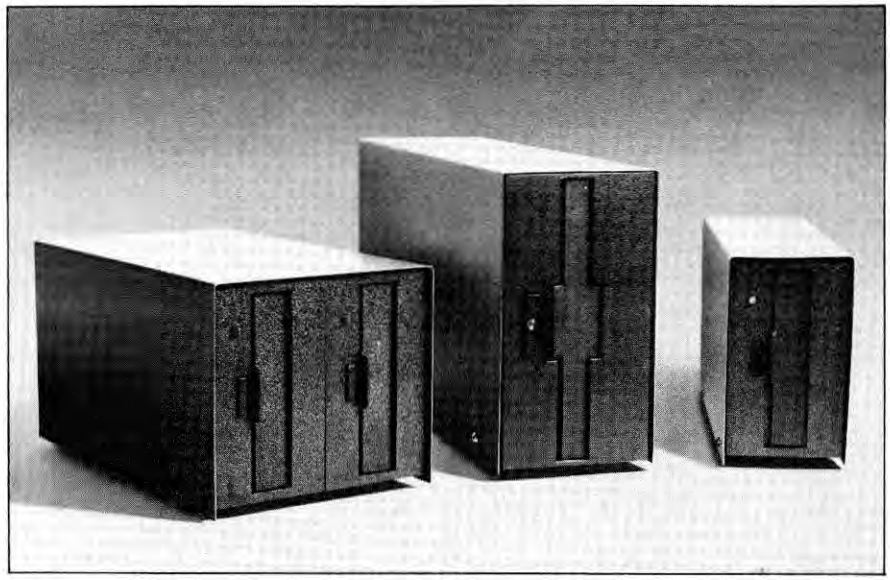
MC, VISA, MO, PO, Check, COD

DSE Digital Systems Engineering ↙368

12503 King's Lake Drive Reston, Virginia 22091

(703) 620-2994


```
1320 GOTO 130
1321 '
2000 INPUT"TO WHAT";F7$
2005 MS$="":GOSUB9700:MS$="THE FOLLOWING RECORDS WILL B
     E CHANGED IF ":GOSUB9600
2010 CI=1:GOTO600
2999 '
        SUBR. READS DATA DESCR. FIELDS
        O
     N ENTRY D1=CURRENT ADRS. IN DATA DESCR. ON EXIT F1
     $=FLD NAME, F2=FIELD SIZE, F3$=FLD. TYPE (A,I, OR
     R)
3000 H$="":FOR I=D1 TO D1+15:H$=H$+CHR$(PEEK(I)):NEXT:D
     1=I
3005 F1$=H$:FOR I=15 TO 1 STEP-1:IF RIGHT$(F1$,1)<>" "T
     HEN3015
3010 F1$=LEFT$(F1$,I):NEXT
3015 H$="":FOR I=D1 TO D1+2:H$=H$+CHR$(PEEK(I)):NEXT:D1
     =I
3020 F2=VAL(H$)
3025 F3$=CHR$(PEEK(D1)):D1=D1+1
3030 RETURN
3031 '
3600 PRINT
3605 PRINT"          SELECT - PRINTS ENTIRE DATA FILE
3610 PRINT"          SELECT IF - PRINTS RECORDS WHOSE SP
     ECIFIED FIELD
3615 PRINT"                      MATCHES THE GIVEN VALUE
3620 PRINT"          DELETE IF - SAME AS SELECT IF, BUT
     DELETES
3625 PRINT"          LOAD - READ IN FILE FROM TAPE
3630 PRINT"          SAVE - WRITE RESIDENT FILE TO TAPE
3635 PRINT"          NAMES - PRINTS DATA DESCRIPTION FIE
     LDS
3640 PRINT"          APPEND - ADD A RECORD TO END OF FIL
     E
3645 PRINT"          CHANGE IF - CHANGE SPECIFIED FIELD
     IN ALL
3650 PRINT"                      RECORDS TO GIVEN VALUE
3653 PRINT"          SORT BY XXX - SORT FILE IN ASCENDIN
     G ORDER
3654 PRINT"                        BY FIELD XXX. (XXX=FI
     ELD NAME)
3655 PRINT"          EXIT - END PROGRAM
3670 GOTO 360
3671 '
9000 GF$=""
9002 IFPEEK(D2)=5 IFDLT=1THENDLT=0:GOTO705:ELSE360:ELSE
     9005
9005 IFPEEK(D2)=1ORPEEK(D2)=2THENFC=FC+1:D2=D2+1:GOTO90
     20
9010 GF$=GF$+CHR$(PEEK(D2)):D2=D2+1
9015 GOTO9005
9020 FORA=LEN(GF$)-1TO1STEP-1:IFRIGHT$(GF$,1)<>" "THEN9
     030
9025 GF$=LEFT$(GF$,A):NEXT
9030 RETURN
9031 '
9100 ' SUBROUTINE PRINTS 1 RECORD, ON ENTRY D2 POINTS T
     O ANY
BYTE IN RECORD
9101 C9=1
9102 D5=D1:D1=30001:GOSUB9200:GOSUB3000:MS$=F1$:GOSUB96
     00:MS$="=":GOSUB9600
9105 D4=D2
9110 D4=D4-1:IFPEEK(D4)<>2THEN9110
9115 D4=D4+1:IFPEEK(D4)=2MS$="":GOSUB9700:D2=D4+1:FC=0:
     GOSUB9700:GOSUB9300:IFDLT=1POKED4-1,3:RETURN:ELSER
     ETURN:ELSE9120
9120 IFPEEK(D4)=1MS$="":GOSUB9700:GOSUB3000:MS$=F1$:GOS
     UB9600:MS$=" ":GOSUB9600:GOTO9115
9123 IFCI=1GOSUB9500
9125 MS$=CHR$(PEEK(D4)):GOSUB9600:GOTO9115
9126 '
9200 X1$=F1$:X2=F2:X3$=F3$:RETURN
9300 F1$=X1$:F2=X2:F3$=X3$:D1=D5:RETURN
9302 '
9500 IFF1$<>F5$RETURN
9505 IFLEN(F7$)>=C9 POKED4,ASC(MID$(F7$,C9,1)):C9=C9+1:
     RETURN
9510 POKE D4,32:C9=C9+1:RETURN
9512 '
9600 IFHC=0LPRINTMS$;ELSEPRINTMS$;
9610 RETURN
9700 IFHC=0LPRINTMS$ELSEPRINTMS$
9705 RETURN
9800 C=0:FI(0)=0:FORI=30001TO31000:IFPEEK(I)=4THEN9810
9802 H$=""
9805 C=C+1:NEXTI
9810 S=C/20:D3=30001:FORI=1TOS:D3=D3+16
9812 FORJ=1TO3:H$=H$+CHR$(PEEK(D3)):D3=D3+1:NEXTJ
9814 D3=D3+1:FI(I)=VAL(H$):H$="":NEXTI
9820 FI(I)=0:FORII=1TOI-1:FI(0)=FI(0)+FI(II)+1:NEXTII
9825 RETURN
9900 IFPEEK(D2)=5THEN982
9903 IFCT=1THEND9=D2:II=1:GOTO9907
9905 D9=D2:FORII=1TOCT-1:D9=D9+FI(II)+1:NEXT
9907 Y=INT(D9/256):Z=D9-(Y*256):POKEVARPTR(H$)+1,Z:POKE
     VARPTR(H$)+2,Y:POKEVARPTR(H$),FI(II):D2=D2+FI(0):G
     F$=H$:GOSUB9020:H$=" "
9915 RETURN
```



More power to you.

Disk drives, hardware and software— now more affordable *and* more available!

NOW IN STOCK! MODEL III DISK CONTROLLER BOARDS!

All retrofit packages include circuitry, power supplies, mounting brackets, cables and everything required to turn your Model III into a reliable, disk-based system. 100% compatible with Radio Shack hardware!

AM-1 — Supports 4 single-sided, double-density 5¼-inch disk drives **$445**

AM-2 — Supports 4 double-sided, double-density 5¼-inch disk drives **$545**

AM-3 — Supports 2 internal 5¼-inch single-sided, double-density disk drives and 2 external 8-inch single-sided, double-density disk drives **$645**

TRS-80™ SOFTWARE

MAKE 80©
Converts standard 35 or 40 track diskettes into 80-track-readable diskettes **$14.95**

Model III TRSDOS
40-track Model III TRSDOS & manual **$20**
80-track Model III TRSDOS & manual **$35**

Complete Service Center:
Speedy repairs, including modified TRS-80's.

New Store Hours:
Monday-Friday 10-6, Sat. 10-5

™TRS-80 is a trademark of Tandy Corp.

SPECIALS!

SAVE ON COMPLETE DISK DRIVE PACKAGES!

5¼-inch drives
40-track MPI 51 with case, power supply and extender cables **$320**
80-track MPI 91 with case, power supply and extender cable **$425**
Dual-headed 80-track drive with case, power supply **$550**

8-inch drives
Single Siemens 8-inch drive with single case & power supply **$695**

TEAC DISK DRIVES— THE BEST WE'VE SEEN TO DATE!

Teac 40-track disk drive
Call for our low price!
Teac 80-track disk drive
Call for our low price!

PRINTER SPECIAL!

Epson MX-80 Printer
Call for our low price!

The power behind the drives©

✓452

A.M. ELECTRONICS, INC.

3366 Washtenaw Ave.
Ann Arbor, Michigan 48104
(313) 973-2312

NEW TRS-80™ MODEL III! NOW WITH DISK DRIVES!

Model III with dual 80-track disk drives—704K of reliable disk storage on only two drives!

- Features two double-density 80-track drives
- 48K RAM
- Includes A.M. Electronics controller board and versatile MAKE80© program
- Complete, ready-to-run

Now only **$2295!**

The Ultimate Small Business Computer: Model III with four dual-headed 80-track disk drives!

- Features four drives
- 48K RAM
- 2.8 Megabytes reliable disk storage
- Includes A.M. Electronics controller board and versatile MAKE80© program
- Complete, ready-to-run

Now only **$3,795!**

CASES & POWER SUPPLIES

5½-inch enclosures
Single drive unit case and power supply **$85**
Dual drive unit case and power supply **$120**
(Extender cables $15 each extra)

8-inch enclosures
Single drive unit case and power supply **$150**

Attention OEM's & Distributors:
Call us for details on our attractive pricing!

✓See List of Advertisers on page 306

Get yours from those old pennies you've been squirreling away.

Two Cents Worth

Jack Clayton
15 Walnut Ridge Rd.
Stow, MA 01775

Penny ante poker, pocket cleaning, thrift, whatever—each of us has at one time or another stashed away pennies. Maybe they are worth a little more than face value, but, more likely, not.

Here is a simple program for the TRS-80 Level II to evaluate old pennies. It will keep the kids happy and maybe make a buck or two for you. It's simple to operate. After the title is displayed a one-page history of the Lincoln penny and a few programs remarks follow. Your penny's dates with mint identification are entered normally.

Any coin with a value greater than a dollar is noted. Finally, the coin is identified with its value and a summation of all the coins analyzed is displayed. The program loops when any key is depressed to the next coin.

Data is input from data lines that have been numbered, for easy identification, relating to date. This makes updating easier, but it costs a little run time. Since fewer old coins are around, you can pick up speed if you inverted the dates i.e. late date first, early date last.

The coin values are not the latest, but they are close enough. The last word, as noted in the program, rests with a reputable dealer—which I am not.

Input time is short, so it's easy to set up and use.

Finally, for those cheapos, like myself, it will run on the simplest of systems.■

Program Listing

```
5 CLS: PRINT CHR$(23):PRINT@ 460,"GET YOUR PENNIES WORT
    H"
10 FOR I=0 TO 127:SET(I,7):SET(I,40):NEXT
20 FOR I=0 TO 2000:NEXT
30 CLS:PRINT TAB(28)"SUMMARY":PRINT
40 PRINT"THIS PROGRAM EVALUATES THE LINCOLN HEAD PENNIE
    S, DATED 1909 TO
50 PRINT"PRESENT. THIS COIN WAS DESIGNED BY VICTOR D. B
    RENNER TO
60 PRINT"COMMEMORATE LINCOLN'S 100TH ANNIVERSARY. HIS I
    NITIALS APPEAR
70 PRINT"ON THE 1909 AND 1909S ISSUES.":PRINT
80 PRINT"PRICES USED IN THIS PROGRAM ARE APPROXIMATE FO
    R COINS IN
90 PRINT"GOOD CONDITION--I.E.--SIGNS OF WEAR, DETAIL OF
     HAIR & EARS
100 PRINT"GONE. YOURS MAY BE WORTH MORE OR LESS--CHECK
    WITH YOUR DEALER.
110 PRINT:PRINT"FOR UPDATING DATA (CURRENT PRICE REVISI
    ONS) DATA LINES
120 PRINT"AND DATES RELATE ON FIVE YEAR INTERVALS (1909
    D, LINE 1905-
130 PRINT"1941, LINE 1940 ETC.)."
140 PRINT"THIS IS FOR FUN---SO ENJOY
150 FOR I=0 TO 20000: NEXT
160 CLS: A$="$$####.##"
170 PRINT@ 192,:INPUT"TYPE DATE AND MINT I.d. (NO SPACE
    -I.E.-1909S, 1909VDB)";D$
175 RESTORE
180 C=VAL(D$)
185 IF C>1982 THEN 344
190 IF C >=1959 THEN V=.01 ELSE 210
195 FOR I=1TO100:NEXT I
200 GOTO 250
210 IF C >=1944 THEN V=.02 ELSE 230
220 GOTO 250
230 READ Y$,V
235 ON ERROR GOTO 344
240 IF D$=Y$ THEN 250 ELSE 230
250 S=S+V
260 IF V >=1 THEN 270 ELSE 280
270 PRINT:PRINT"THIS COIN IS SPECIAL. GET IT APPRAISED!
    "
280 PRINT:PRINT"THE VALUE OF THIS ";D$;" COIN IS: ";
290 PRINT USING A$;V
300 PRINT:PRINT"YOU HAVE SAVED ";
310 PRINT USING A$;S;
320 PRINT" WORTH OF PENNIES. CONGRADULATIONS!"
330 PRINT:PRINT"TO CONTINUE PRESS SPACE BAR"
340 B$=INKEY$:IF B$=""THEN 340
342 CLS: GOTO 170
344 PRINT@ 192,"SORRY-CHECK THE DATE AGAIN, THIS ONE IS
    NOT LISTED
346 FOR I=0 TO 1500:NEXT
348 RESUME 350
350 CLS: GOTO 170
1905 DATA 1909,.25,1909VDB,1.5,1909S,24,1909SVDB,115
1910 DATA 1910,.15,1910S,6,1911,.15,1911D,2,1911S,9,191
    2,.15,1912D,2.5,1912S,7.5,1913,.15,1913D,1.25,1913
    S,5,1914,.15,1914D,40,1914,.2
1915 DATA 1915,.4,1915D,.4,1915S,5,1916,.1,1916D,.2,191
    6S,.45,1917,.2,1917D,.15,1917S,.2,1918,.15,1918D,.
    2,1918S,.2,1919,.15,1919D,.2,1919S,.2
1920 DATA 1920,.15,1920D,.4,1920S,.2,1921,.2,1921S,.45,
    1922,35,1922D,4.5,1923,.15,1923S,1.25,1924,.15,192
    4D,8,1924S,.45
1925 DATA 1925,.15,1925D,.2,1925S,.2,1926,.15,1926D,.2,
    1926S,2.75,1927,.15,1927D,.15,1927S,.3,1928,.15,19
    28D,.15,1928S,.3,1929,.15,1929D,.15,1929S,.15
1930 DATA 1930,.1,1930D,.15,1930S,.15,1931,.2,1931D,2.3
    5,1931S,24,1932,1,1932D,.5,1933,.5,1933D,1.1,1934,
    .1,1934D,.15
1935 DATA 1935,.1,1935D,.1,1935S,.1,1936,.1,1936D,.15,1
    936S,.15,1937,.1,1937D,.15,1937S,.15,1938,.1,1938D
    ,.25,1938S,.4,1939,.1,1939D,.3,1939S,.1
1940 DATA 1940,.1,1940D,.05,1940S,.1,1941,.1,1941D,.1,1
    941S,.15,1942,.1,1942D,.05,1942S,.1,1943,.15,1943D
    ,.25,1943S,.25
```

Mini-Disk Storage Systems for TRS-80* Computers

Access... Offers More. Charges less.

from $295

Check this line-by-line comparison of Access 5-inch mini-disk systems for Model I and Model III computers. *Nobody* offers more benefits, better service or lower prices.

TOLL-FREE ORDER NO.
1-800-527-4196†
(orders and literature only)

Company/Drive Model	Price 1/	Flippy	*Formatted* Diskette Storage Capacity: Dbl-Density	Storage Capacity: Sgl-Density	100% Tested	48 hr. Burn-In	Warranty	Trial Period
40-TRACK DRIVES								
Access Unlimited								
AFD-100†	$295.00	no	180 Kbytes	102 Kbytes	yes	yes	yes	yes
AFD-100F†	329.00	yes	360 Kbytes	204 Kbytes	yes	yes	yes	yes
MTI								
TF-5	359.00	no	?	?	?	?	?	no
Midwest Comp. & Per.								
MPI/B-51	321.00	no	?	102 Kbytes	?	?	yes	no
Aerocomp								
Mdl 40-1	349.95	yes	?	?	yes	?	yes	yes
CPU Shop								
CCI-100	314.00	no	?	102 Kbytes	?	?	yes	no
AMI								
40-track	325.00	no	?	?	?	?	?	no
80-TRACK DRIVES								
Access Unlimited								
AFD-200†	429.95	no	368 Kbytes	205 Kbytes	yes	yes	yes	yes
AFD-200F†	449.95	yes	736 Kbytes	410 Kbytes	yes	yes	yes	yes
MTI								
TF-8	639.00	no	?	200 Kbytes	?	?	?	no
Aerocomp								
80-tk mdl	459.95	yes	?	?	yes	?	yes	yes
CPU Shop								
CCI-280	429.00	no	?	204 Kbytes	?	?	yes	no
AMI								
80-track	560.00	no	?	?	?	?	?	no

1 As advertised in 80 Microcomputing, Jan. 1981.

Free trial offer

Use your brand new AFD drive system for up to 15 days. If you're not *completely* satisfied, pack it in the original shipping container and send it back to Access. We'll refund the price of the system (less shipping charges), no questions asked. (No refund for misuse or improper handling.)

Operating burn-in test — too

Every drive that leaves Access is not only 100% electrically tested and double-checked for mechanical alignment, but it is also given a full 48-hour operating burn-in test. You'll find a test list — checked and signed by one of our competent technicians — in the drive carton. If a drive has latent defects, the burn-in life test will weed them out. The drives we ship just keep on running. And running. And running.

About our warranty

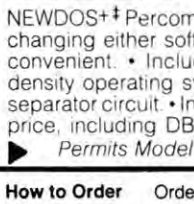
Venus de Milo has about the right number of fingers to count our warranty returns. Nevertheless, your new drive system is covered by our comprehensive 90-day limited warranty. The details are spelled out in the illustrated users manual included with each AFD drive system.

Software galore!

Games. Business programs. System software. We sell many of the best TRS-80* Model I and Model III programs, and at competitive prices. Make Access Unlimited your one-stop shopping center for all of your TRS-80* software, hardware and accessories. Save big! Call our toll-free order number, 1-800-527-4196† for free descriptive literature.

▶ USE YOUR CREDIT CARD AND SAVE! VISA AND MASTER CARD CHARGES ARE NOT DEPOSITED UNTIL THE DAY YOUR ORDER IS SHIPPED. CALL NOW TOLL-FREE, 1-800-527-4196†. ◀

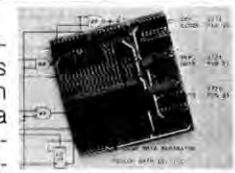
the DOUBLER™



Percom's new plug-in adapter for your Expansion Interface stores almost twice the data on a diskette track as a single-density system. You can store up to four times more data — depending on the type of drive — on one side of a diskette than you can store using a standard Model I mini-disk drive. Other features: Reads, writes and formats *either* single or double density minidiskettes. • Runs TRSDOS*, NEWDOS+‡ Percom OS-80™ or other single-density software *without* changing either software or hardware. Switch to double-density when convenient. • Includes DBLDOS™, a TRSDOS* compatible double-density operating system. • Includes on card, high-performance data separator circuit. • Installs *without* rewiring or trace cutting. • Introductory price, including DBLDOS and format conversion utility, only $219.95.

▶ *Permits Model III* software to be read on Model I computers. ◀

DATA SEPARATOR™



This PC board plug-in adapter for the TRS-80* virtually eliminates data read errors (CRC error — Track locked out!) which occur on high-density inner disk tracks, a problem that has plagued TRS-80* systems. The Percom Data Separator™ is installed in the Expansion Interface without modifying the host system. Caution: Opening the TRS-80* Expansion Interface may void the limited 90-day warranty: $29.95.

Disk System Interconnecting Cables

Improvement over RS cable design places drive 0, which includes the cable termination, at the end of the cable to eliminate the reflected noise of an unterminated cable. Better data integrity. Prices:

Two-Drive Cable $24.95
Four-Drive Cable 34.95

Power Line Filter

115/250 V, 50-400 Hz. Instructions included for easy installation in standard mini-box chassis: $19.95

Minidiskettes (Double-Density rated)

10 Disks in a convenient plastic organizer box $34.90
Single Disk 3.49

Disk Drive ID Tabs

1" x 1¼" self-adhering plastic drive identification tabs. Compatible silver with engraved black drive number. Two tabs (Nos. 0, 1): $2.50; three tabs (Nos. 0, 1, 2): $3.25; four tabs (0, 1, 2, 3): $4.50.

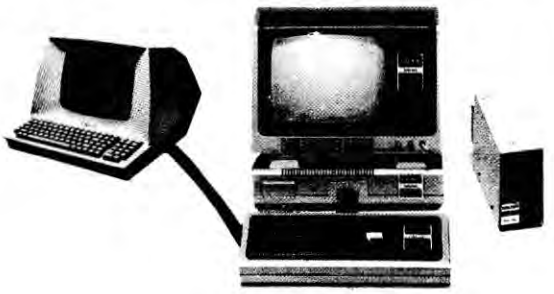
How to Order Order by calling Access Unlimited toll-free on 1-800-527-4196†. Mail orders also accepted. Orders may be charged to a VISA or MasterCard account or paid by a cashier's check, certified check or money order. We accept COD orders with 25% deposit. Sorry, we cannot accept personal checks. We pay shipping and insurance charges on orders over $1,000.00. Add approximate insurance and shipping charges for under $1,000.00. If in doubt about these charges, ask when you call in your order. Texas residents include 5% sales tax. Minimum order $20.00. Allow 2 to 4 weeks for delivery. †Texas residents call (214) 494-0206.

ACCESS UNLIMITED ✓229

315 N. Shiloh · Ste. D1 · Garland, TX 75042
(214) 494-0206

T trademark of Access Unlimited Company. *RADIO SHACK and TRS-80 are trademarks of Tandy Corporation. ™trademark of Percom Data Company, Inc. ‡trademark of Apparat Corporation.
ALL PRICES AND SPECIFICATIONS SUBJECT TO CHANGE AND ALL OFFERS SUBJECT TO WITHDRAWAL WITHOUT NOTICE.

TWO USER MULTI-TASKING



$89 TSHARE VI.3
A SPLIT PERSONALITY FOR YOUR TRS – 80 MODEL I

- Interrupt driven executive patches to parent operating system NEWDOS 2.1 or TRSDOS 2.3.
- Allows two active users to share a single TRS-80.
- Execute BASIC or MACHINE LANGUAGE (above 7700 Hex).
- Joint access of disk files.
- Second user ties to HOST via modem, terminal, or 2nd TRS-80.
- Options for Expansion Interface, RS-232, TRS232, or HUH interface.
- SIMPLEX MODE for non serial-port users. Requires only a printer to act as second "screen". Jobs share the keyboard under user control.
- CONFIGURE UTILITY partitions memory usage and selects I/O.

$49 DBM5
MULTI – FEATURE DATA MANAGER

- Up to 20 user defined fields.
- Files extend across multiple diskettes.
- Supports up to four drives.
- Automatic single drive disk mount requests.
- Four data types and computational fields.
- Flexible REPORT GENERATOR.
- Fast assembly language sorts.
- MULTI-FIELD sorts and searches.
- Keyed access on any sorted field.
- Indexed relations between files.

TRS-80 tm Radio Shack/Tandy Corp.
NEWDOS tm Apparat, Inc.
TRS232 tm Small System Software
HUH tm California Computer Systems.

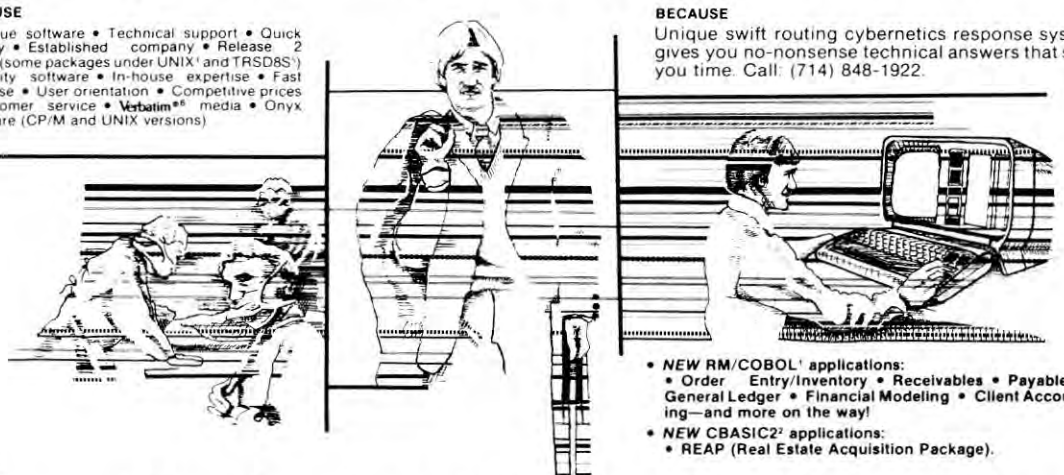
TO ORDER
VISA MasterCard

ComSoft
203 ARDEN STREET ✓204
GLENDALE, CA 91203
(213) 649-0369

Why Do Professionals Prefer

BECAUSE
• Unique software • Technical support • Quick delivery • Established company • Release 2 CP/M[1] (some packages under UNIX[1] and TRSD8S[1]) • Quality software • In-house expertise • Fast response • User orientation • Competitive prices • Customer service • Verbatim[MD] media • Onyx hardware (CP/M and UNIX versions)

BECAUSE
Unique swift routing cybernetics response system gives you no-nonsense technical answers that save you time. Call: (714) 848-1922.



• *NEW* RM/COBOL[1] applications:
  • Order Entry/Inventory • Receivables • Payables • General Ledger • Financial Modeling • Client Accounting—and more on the way!
• *NEW* CBASIC2[2] applications:
  • REAP (Real Estate Acquisition Package).

Business
Medical
Real Estate
Computer Systems

Software from Cybernetics?

RM/COBOL—The new standard for microcomputer COBOL!! The only COBOL for CP/M (also on TRSDOS & UNIX) with alternate keys (multi-key ISAM), CRT screen handling, interactive debug, and the most useful Level 2 features. Compatible with RSCOBOL[5]—but runs faster.

Plus existing CBASIC2 packages
APH (Automated Patient History)
Osborne & Assoc—Payroll • Payables/Receivables • General Ledger
NAD[6] (Name and Address)
PMS (Property Management System)

TRS-80[3], Model II CP/M—The fastest Mod II CP/M with the most features. Outstanding teaching documentation for newcomers to CP/M, multiple CRT emulation, down loading package, support for CORVUS 10 Mb hard disk. Many additional user-oriented features.

And system software packages
MAGIC WAND[4] Editing/Word Processing
CBASIC2 Compiler BASIC
QSORT[7] Soft Merge Package

Inquire for details

Trademarks of: [1]Ryan-McFarland Corp., Compiler Systems, Inc., [2]Digital Research, [3]Bell Telephone Laboratories, Inc., [4]Tandy Corp., [5]Verbatim, Inc., Cybernetics, Inc., [6]Structured Systems Group, Inc., [7]Small Business Applications, Inc.

CYBERNETICS INC
8041 Newman Ave., Suite 208
Huntington Beach, CA 92647
(714) 848-1922

Communication Arts, Huntington Beach, Ca

You've heard all about it, now read all about it—including the latest zaps.

NEWDOS-80

Allan J. Domuret
7825 Willowcrest Way
Fair Oaks, CA 95628

NEWDOS-80
Apparat, Inc.
Denver, CO
$149

After long anticipation, NEWDOS-80 has finally arrived. And an impressive package it is.

I hope to provide enough information for those of you who have not yet purchased NEWDOS-80 to help you decide whether or not your life depends on owning it. I also offer current and potential users a bit of operational guidance and fixes for minor difficulties I encountered. Just to be sure there is something for everyone, Table 1 provides some zaps that should prove useful, even if you are already an expert on NEWDOS-80.

Documentation

The first surprise on receipt of the NEWDOS-80 package (N80) was the quantity of documentation, which comes bound in an attractive brown notebook. A quick count revealed 96 double-sided pages.

The handsome packaging and quantity of the documentation is a breakthrough for Apparat, which has been better known for the quality of their software than the clarity of their documentation.

When first getting started with N80, the novice will find it as easy to use as TRSDOS, if the standard TRSDOS commands are used exclusively (The COPY and BACKUP commands are slightly different and more complicated than the TRSDOS commands.) There are also new and complex functions to keep the pseudo-experts busy for awhile. 'Nuff said.

Specialties—SYSTEM

N80 permits the DOS itself to be customized to fit the many different hardware configurations currently possible for the TRS-80. For example, using the new PDRIVE command it's possible to define your DOS for disk drives having 01 to 96 tracks, and almost any combination of 5 or 8 inch drives. (This magic cannot be worked without appropriate hardware attachments. N80 only supports the hardware bolted on by the user.) It is also possible to define the Omikron eight inch drive system or the Lobo expansion interface to N80 DOS. Provisions are made for future hardware adaptations by leaving space for additional customizing codes.

The directory can be expanded up to three tracks to accomodate extra files. For those of you who have 77 track (or more) drives, and the standard single track directory doesn't have enough capacity for the numerous files on the diskette. The directory track can be relocated on the diskette, if desired. (I often wondered if having the directory on track one rather than track 17 (decimal) would be more efficient in terms of reducing disk head travel. Now I can find out).

The new DOS SYSTEM command (not the same as BASIC's SYSTEM command) can be used to customize certain DOS functions. Some of the more interesting are: passwords, enable or disable; BASIC run-only mode, enable or disable (protects BASIC code from unauthorized access by computer operators); lowercase hardware, installed or not installed; BREAK key, enable or disable; DEBUG, enable or disable; and many more. No manual zaps are required—just follow instructions for the DOS SYSTEM command and everything else is pretty much automatic.

I initially experienced some difficulty getting my DOS SYSTEM command to work. The solution is to enter the command as follows: SYSTEM,USD:1 AA = N. The USD (Use System Disk parameters) evidently serves as a password until such time as they are disabled by the appropriate SYSTEM command. Unless I was initially doing something wrong, this was not immediately obvious to me.

DOS commands

MINI-DOS and DOS commands via the 2.1 CMD functions are beauties. MINI-DOS and CMD are actually two ways of bringing up DOS commands.

The operational distinctions between DOS and BASIC become blurred as it becomes possible to execute most DOS library commands at almost any time, from almost any program. (Library commands are the usual commands such as DIR, DUMP, FREE, CLOCK, etc. Not included are the commands that cause a program to execute).

The BASIC CMD function works as it did in NEWDOS 2.1, but has been expanded to allow more DOS operations. N80 performs some checking functions to help prevent the DOS command from clobbering the resident BASIC program and its variables. SUPERZAP (now in machine language) and DIRCHECK can be exercised from BASIC without clobbering BASIC operations, variables, or programs.

Here is an interesting trick that can be worked in BASIC:

```
10 CLS
20 CMD"SUPERZAP": REM (DIRCHECK is another possibility)
30 CLS
40 PRINT " Finished"
```

When finished with SUPERZAP (or DIRCHECK), exit with SUPERZAP's EXIT command or DIRCHECK's character 'N'. SUPERZAP and DIRCHECK imply that they will exit to DOS, but both will return to BASIC if called up from BASIC, as this miniprogram demonstrates.

Many unique applications can be found for CMD operations from BASIC.

The N80 documentation best explains MINI-DOS purpose: "There are many times

"How about calling up a DIRectory from Scripsit? Simple."

when, during the execution of a main program, the operator would like to interrupt the main program, execute one or more of the DOS library commands, and then resume main program execution without any change having occurred in the main program's state during the interruption. To execute MINI-DOS, simultaneously press the 'DFG' keys (but not during disk I/O), and execute the DOS command. Any DOS library command can be issued except APPEND, CHAIN, COPY, FORMAT, PDRIVE, and SYSTEM. Single file copy can, however, be executed with the MDCOPY command."

How about calling up a DIRectory from Scripsit? Simple. Move the cursor to the end of the text file (to prevent the DFG keys from overwriting Scripsit text when pressed) or to the command position with the break key (preferred over the former method), press the DFG keys to bring up MINI-DOS, then enter DIR: 1. Enter MDRET to return to Scripsit. Yes, Tandy, Apparat bailed you out again! The inability to manipulate directory files, a major Scripsit weakness, has been compensated for.

Modem users addicted to ST80D or ST80III (by Lance Micklus): Its inability to call a directory is no longer a problem. Use MINI-DOS to perform a DIR, KILL, or whatever without disturbing the main program.

Want to check diskette free space before writing Scripsit, Pencil, or ST80III text to it? Or kill a file while in Scripsit or ST80III to release space on a full disk? How about renaming a file? No problem. Want to exit Scripsit without reaching for the hidden RESET button because you have fat fingers that won't fit into the little cavity? Enter MINI-DOS, then enter BOOT. Great!

Other Magic

There are ways to manipulate your break key: N80 has a BREAK command to enable or disable the break key. Very handy if you have one of those silly BASIC programs that disables the break key.

A subtle but powerful feature has been added for bringing up DEBUG: simultaneous depression of the 123 keys will summon DEBUG at any time. This is a handy way to get into the innards of a BASIC program that disables the break key to prevent the program from being listed. DEBUG can also be activated in the midst of a machine language program, as long as memory requirements of the program and DEBUG don't conflict, and the target program does not assume control of the keyboard Device Control Block (DCB) at 4016 hex.

The CHAINing command exercises a series of DOS or BASIC commands, or makes automatic inputs to a BASIC program. The functions are similar to the BOOTSTRAP or COMPROC (from Racet Computes) programs. One important difference is that BASIC can implement a CMD "CHAIN" instruction which will then activate a predetermined sequence of inputs to BASIC. Think of it as automating the keyboard.

A nice feature of the N80 CHAIN command is that a wasteful five-sector (one gran) file is not necessarily created for each CHAIN file. Append a number of CHAIN command strings into one file, then access only the one that is needed.

The documentation provides a wealth of technical information for making use of N80's internal instruction code. As an example, a DOS CALL machine language routine is provided which allows the incorporation of DOS commands into your programs. Want to use RSM2D to LOAD a file into RAM? You can do it with a dozen bytes of code. How about creating your own SYS-20/SYS file? The documentation explains how. Apparat's no secrets marketing approach is genuinely refreshing.

Disk BASIC, like N80's DOS, is a complete rewrite. BASIC still works as it always did, and there appear to be no BASIC program incompatibilities. Significantly, Disk BASIC has been upgraded with a number of fascinating enhancements.

In addition to being able to RENUMber a BASIC file, it is now possible to move program lines around within the program. REF (variable and line number cross referencing), improved scrolling, and CMD, as implemented in NEWDOS 2.1, are still available.

In BASIC run-only mode, the BREAK and CLEAR keys are disabled and BASIC will not accept direct statements from the operator. In business applications, this keeps the computer operator from gaining access to unauthorized files or from manipulating the program itself. Apparat thoughtfully made it possible for a BASIC menu program to LOAD or RUN another BASIC program. In other words, it is possible for a BASIC program to call up another program or data file with imbedded commands, but the computer operator cannot do this directly from the keyboard. When turned on, the computer boots up and goes directly to the selected program. The operator has no control other than to operate the program as intended by the boss. Of course DEBUG and MINI-DOS can also be locked out to further frustrate the operator.

A number of wonderful new BASIC disk Input/Output (I/O) enhancements are implemented. Briefly, disk record lengths can be up to 4096 bytes long instead of the old 256 byte maximum. Disk files can be created and accessed in a variety of ways, allowing manipulation of file data in almost any conceivable format, from a single byte to a 4096 byte record, using fixed length files or variable length files. These new disk I/O options are available via five new BASIC file types which are classified in two major groupings: fixed item files and marked item files.

But the reader is cautioned: Apparat introduces new and esoteric terminology which makes things difficult for the novice. To make it easier, N80 includes a sample program which is accompanied by a tutorial chapter in the documentation, to help the new user along. This beginner's approach, plus an alphabetized dictionary, eases the operator gradually and painlessly into a very powerful set of disk I/O functions.

The operator is walked through the procedures, step by step, for creating and using the new BASIC files. Analogies are made to the traditional sequential and random file operations. With patience and practice, a whole new world of disk I/O manipulation becomes possible.

Your old BASIC files are compatible with N80, and it is still possible to create the "standard" sequential and random files with it.

Areas of Incompatibility

There is no way in the world to maintain total compatiblity with existing software, especially when machine language programs directly access non-standard subroutines within the guts of the DOS software itself.

Apparat acknowledges the few, minor incompatibilities in N80, and they provide the necessary zaps or guidance, where applicable, to compensate for them. If and when new problems arise, I feel certain that fixes will become available. It appears at the present time that N80's incompatibilities are trivial.

The following is a brief description of real or potential incompatibilities, as listed in the N80 documentation.

- User routines which are driven by the 25ms TRSDOS or NEWDOS 2.1 interrupt must be modified to work with N80. The N80 documentation explains the patches necessary to correct potential problems. To my knowledge, the only commercial programs that might experience interrupt problems are spoolers and despoolers.
- There is a compatibility problem with ST80III and with the Microsoft FORTRAN package, including the MACRO-80 assembler, but Apparat provides the necessary zaps to make these programs compatible with N80.
- Enabling or disabling the break key was formerly accomplished by changing the address at 4313 hex. The new address to accomplish this is 4369 hex. The procedure is explained in the N80 documentation.
- The same NEWDOS 2.1 incompatibility involving NEXT and EOF in the FCB (file

MODEL II

26-4002
64K 1 Drive
$3440.00

26-4160 1 Drive Exp.....$1034.00
26-4161 2 Drive Exp.....1574.00
26-4162 3 Drive Exp.....2114.00
26-4530 Scripsit II.....265.00
26-4512 Profile II.....162.00
26-4511 Visicalc II.....265.00
26-4501 Gen Ledger.....180.00
26-4506 Mail List.....72.00

PRINTERS

CENTRONICS

BEST PRICES

Fast 100 CPS Centronics
730-1A Printer.....$577.00
Text Quality Centronics
737-1 Printer.....$737.00

$ DISCOUNT $

TRS-80®

DEALER A301

COMPUTER SPECIALISTS

CALL US. . .
SAVE MONEY

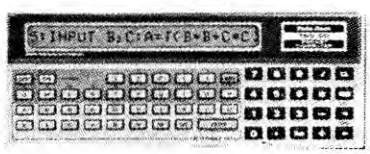
We carry the full line of TRS-80 Computers. All other R.S. software, furniture, and accessories at discount from catalog price. We stock most items to assure you fast delivery and save you money.

26-1140 Expansion Interface.....$249.00
26-1141 16K Exp. Interface.....359.00
26-1142 32K Exp. INterface.....469.00
26-1145 RS232C Board.....84.00
26-1160/1 Mini Disk Drive.....419.00
26-1563 Scripsit-Disk.....79.00
26-1566 Visicalc.....83.00

* * * * * **PRINTERS** * * * * *

26-1155 Quick Printer.....187.00
26-1167 9½ Dot Matrix Printer.....360.00
26-1166 Line Printer VI.....1080.00
26-1158 Daisy Wheel II.....1799.00
26-1165 Line Printer V.....1710.00

Pocket Computer

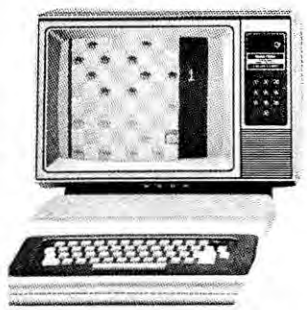


26-3501 1.9K P.C.....$221.00
26-3503 Cassette IF.....45.00
14-812 Recorder.....72.00

MODEL III

26-1061 4K I.....$629.00
26-1062 16K III.....865.00
26-1063 32K III
W/2 Drives, RS232.....2225.00

COLOR



26-3001 4K.....$353.00
26-3002 16K Ext. Basic.....533.00
26-3008 Joysticks.....22.50
26-3010 Color Video.....353.00
26-1206 Recorder.....54.00

commodore

AUTHORIZED DEALER
CALL FOR PRICES

ALL POCKET AND COLOR COMPUTER SOFTWARE SOLD AT DISCOUNT

WRITE US FOR A
FREE CATALOG

1-800-841-0860 Toll Free Order Entry

MICRO MANAGEMENT SYSTEMS, INC. ↙72

No Taxes on Out Of State Shipments

Immediate Shipment From Stock on Most Items

DOWNTOWN PLAZA SHOPPING CENTER
115 C. SECOND AVE. S.W.
CAIRO, GEORGIA 31728
(912) 377-7120 Ga. Phone No. & Export

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

R.S. 90 Day Limited Warranty
F-48 Form Provided

Largest Inventory In The S.E. U.S.A.

↙See List of Advertisers on page 306

SOME STRAIGHT TALK ABOUT DISK DRIVES

- DON'T BE CONFUSED BY ALL THE BRAND NAMES YOU SEE IN THE MARKET PLACE, THERE ARE VERY FEW MANUFACTURERS OF THE BASIC DRIVE CHASSIS, ALL THE OTHER NAMES ARE THOSE OF THE ASSEMBLERS OR THE RETAILERS.
- AS MANUFACTURED, THE DRIVE WILL NOT RUN ON A TRS-80$, IT MUST BE MODIFIED BY THE ASSEMBLER.
- THE QUALITY OF THE DRIVE DELIVERED TO YOU IS DEPENDENT ON BOTH THE MANUFACTURER AND THE ASSEMBLER, THE BEST CAN TURN TO JUNK IF THE ASSEMBLY IS IMPROPERLY DONE.
- THE POWER SUPPLY AND CASE ARE VERY IMPORTANT COMPONENTS OF THE COMPLETE DRIVE, THE CASE MUST ALLOW PROPER COOLING AIR FLOW, AND THE POWER SUPPLY MUST MAINTAIN TWO CONSTANT VOLTAGES.
- YOU MUST DEPEND ON THE COMPANY SELLING YOU THE DRIVE TO SERVICE IT AT REASONABLE COST WHEN IT FAILS YOU, THE MANUFACTURER IS NOT EQUIPPED TO DO THIS!
- THE BEST MEASURE OF QUALITY IN A DRIVE IS IT'S SPECIFICATIONS, WILL IT HANDLE DOUBLE DENSITY, WHAT IS THE TRACK TO TRACK ACCESS TIME, THE ANSWERS TO THESE TWO QUESTIONS INDICATE THE PRECISION OF IT'S COMPONENTS.
- WHAT KIND OF DRIVE SHOULD YOU BUY ? LEVEL IV HAS CHOSEN TO DISTRIBUTE EXCLUSIVELY, THE MPI LINE, ALL MODELS OF MPI ARE DOUBLE DENSITY RATED AND REQUIRE ONLY A FIVE MILLI-SECOND TRACK TO TRACK ACCESS TIME.
- WHAT DO ALL THE MODEL NUMBERS MEAN?
  B-51= 40 TRACKS SINGLE HEAD SINGLE SIDE B-52= 40/40 TRACKS DOUBLE HEAD DOUBLE SIDE
  B-91= 80 TRACKS SINGLE HEAD SINGLE SIDE B-92= 80/80 TRACKS DOUBLE HEAD DOUBLE SIDE
  (DOUBLE HEADS)-READ BOTH SIDES OF DISK (DUALS)-TWO DRIVES IN ONE CASE (RAW)-NO POWER SUPPLY OR CASE
- WHERE SHOULD YOU BUY YOUR DRIVE, LEVEL IV IS ONE OF THE OLDEST AND LARGEST DISTRIBUTORS OF TRS-80$ EQUIPMENT, LOOK AT THE ADS IN YOUR OLD MAGAZINES, MANY OF THE ADVERTISERS ARE NO LONGER IN BUSINESS, LEVEL IV HAS BEEN A LEADER SINCE THE BEGINNING, WE STAND BEHIND OUR PRODUCTS, AND WE'LL BE HERE WHEN YOU NEED HELP.
- WHERE DO THE NATIONALLY KNOWN AUTHORS BUY THEIR DRIVES ? LEVEL IV CAN SHOW COPIES OF SALES RECEIPTS FOR DRIVES TO MOST OF THEM, LANCE MICKLUS, SCOTT ADAMS, VERNON HESTER, BOB (CAPTAIN 80) LIDDIL, DICK BALCOM, KIM WATT, ETC. TO THESE MEN COMPUTING IS NOT A HOBBY, IT IS THEIR PROFESSION.
- CALL FOR OUR LOW PRICES ON NEW AND USED DRIVES, REMEMBER, WE ALSO TAKE TRADES, AND PAY THE SHIPPING!

✓14

LEVEL IV PRODUCTS INC. 32238 SCHOOLCRAFT, LIVONIA, MI 48150
PHONES: MI (313) 525-6200 OTHERS 800-521-3305 (TOLL FREE)

$ a trademark of the RADIO SHACK DIV. of TANDY CORP.

SUPER-UTILITY

© 1980 by Kim Watt of

Breeze Computing

P.O. Box 1013 • Berkley, Michigan 48072

SUPER-UTILITY was written by BREEZE COMPUTING and is the MOST POWERFUL utility program of its kind on the market. This program contains over–FOUR DOZEN MAJOR UTILITIES–that allow you to solve problems in SECONDS that used to take HOURS of tedious work.

For the first time, the NOVICE PROGRAMMER is able to perform a wide range of functions that up to now, only a PRO could handle. This 24K MACHINE LANGUAGE, stand alone program comes with over 30 pages of instructions that have been written in LAYMAN TERMS and also contains step by step instructions on how to use each utility.

SUPER-UTILITY contains seven (7) main menus of utilities and each menu has several different functions that are available for your use in various programming or disk repair problems that may arise. The following list will give you an idea of SOME of the power that this fantastic program contains.

Display disk sectors
Display file sectors
Display main memory
Compare disk sectors
Copy disk sectors
Verify disk sectors
Zero disk sectors
String search (ASCII or NUMBERS)
Sector search
Modify data in (HEX, ASCII, DECIMAL, or BINARY)
All screen displays in HEX AND ASCII
Dual cursors
Over 25 data modification commands
Kill individual files
Kill files from a list
Full disk directory (active and non-active files)
Examine sector allocations

Zero unused directory entries
Zero unused granules
Remove all system files automatically
Kill files by category (CMD/BAS/TXT/ECT)
Change name, date, password, auto command
Change file parameters
Remove passwords from all files
Format disks (1 to 96 track)
Format without erasing existing data
Add tracks to existing disk
Custom format any way you want
Read address marks on disk
Reads "Protected Disks"
Copy disks with format
Copy disks without formatting
Copy "Protected" Disks
Copy "Protected" Tapes
Automatic disk repair

Repair GAT table
Repair HIT table
Repair BOOT
Read protect directory track
Recover killed files
Complete directory check
Move memory
Exchange memory
Compare memory
Zero memory
Test memory
Imput byte from port
Output byte to port
Write memory to disk
Read memory from disk
Read a full track from disk

Dealer inquiries invited. To purchase your copy of SUPER-UTILITY, send $49.95 (check or money order, Michigan Residents add 4% sales tax) and $2.50 Shipping and Handling to:

BREEZE COMPUTING ✓76

P.O. Box 1013 • Berkley, Michigan 48072

"My zaps are necessary to provide access for MINIDOS and DEBUG to the keyboard. Without them, your system will hang."

control block) continues with N80. This has typically been an inconsequential inconvenience for most users.

Scripsit owners have no doubt learned by now that its disk I/O works properly only with TRSDOS. Apparat provides the necessary zaps to make Scripsit work with N80, and with NEWDOS 2.1, also.

These minor incompatibilities will not concern the average user unless one of the spoolers marketed by other distributors is involved. Machine language pros should have no difficulty coping. Again, the N80 documentation lists the old and new interrupt addresses to aid machine language hackers in making repairs.

All popular DOS routines are still accessible with the standard DOS address calls. This applies to BASIC functions as well. The traditional DOS call addresses, plus some new ones, are conveniently listed in the N80 documentation.

Apparat has done an exceptional job of maintaining compatibility among DOS systems. This is especially notable since N80 is a complete rewrite. Not only has Apparat given us the best available DOS system for the TRS-80 (NEWDOS 2.1, and now NEWDOS-80), they have managed to do so with a minimum of inconvenience to the user.

I found two other problems: The Electric Pencil and the Misosys Editor Assembler will not properly read a disk directory. The fixes for both of these programs are provided in Table 1.

The zaps to make N80 function at faster clock speeds are provided in Table 1 for TRS-80s with a CPU clock speedup board installed. If your TRS-80 is modified for the 2.66 MHz CPU clock, first try N80 without; they may not be required.

Those who are running at a 100 percent CPU clock speedup (3.54 MHz) will no doubt have to install my zaps. I am running at 4.0 MHz and N80 requires my zaps to function at this clock speed. You should experience no problems running N80 at either the normal 1.77 MHz or any souped up CPU clock speed, from 2.66 to 4.0 MHz, with the zaps.

Some Hints about MINI-DOS

For MINIDOS to function, the current program (that which is up and running) must allow for enabled interrupts and must not take away the keyboard device control block (DCB) at memory location 4016 hex.

For example, Pencil changes the keyboard DCB, although it does not make use of the DCB after the change; it uses its own keyboard scan routine. The fix is a simple one; I have experienced no problems as a result. The zaps are listed in Table 1.

By teaching Pencil to leave the keyboard DCB alone, it's possible to use MINI-DOS and DEBUG (call it by pressing '123') without crashing Pencil or its text.

If DEBUG is called with Pencil, 5C6F hex is a good re-entry address. Just enter 'G 5C6F' from DEBUG. Pencil's text file will not be disturbed.

My zaps are necessary to provide access for MINIDOS and DEBUG to the keyboard. Without them, your system will hang.

Watch out for the block move routines (the LDIR or LDDR instructions) which move programs or subroutines around in RAM. These routines, including those those created by Apparat's LMOFFSET, normally disable interrupts with the DI machine language code as the first instruction. Unless the program to be run reactivates interrupts, MINI-DOS or DEBUG will not function after this.

The solution is to patch each block move routine as necessary with an enable interrupt command (hex code FB) before the jump to the program's execution address. Here is what it should look like.

```
        DI              ;disable interrupts
        LD      HL,ssss ;source address
        LD      DE,dddd ;destination address
        LD      BC,bbbb ;byte count
        LDIR            ;move it
New --► EI              ;enable interrupts (added)
        JP      eeee    ;JP to execution address
```

With the EI properly inserted, interrupts are re-enabled and (if the program does not permanently disable them again, as RSM2D and others do), MINI-DOS will function normally.

If you have not patched Scripsit with one of these block move routines only one zap is required to re-enable its interrupts. The zap is provided in N80's documentation.

Let me part with one last suggestion. If you have an original NEWDOS 2.1 and are eligible for Apparat's N80 upgrade special deal (submit your registration number and pay the cost differential of $50), and if you are also considering buying one of the commercially available spoolers, pay the $50 for the NEWDOS-80 upgrade. You get a spooler for free with NEWDOS-80 and it is probably better than most of those currently available.■

NOTE: After this article was submitted for publication, Apparat released a number of Zaps to fix newfound bugs in NEWDOS 80. One large set of Zaps in particular—ZAP 031—overwrites most of my fast clock zaps.

Table of NEWDOS 80 Zaps

The relative file's sector is given in hex, then the relative byte in hex. The format is: 05/06 = relative sector five, relative byte 60. I emphasize the use of hex because the new SUPERZAP/CMD will accept decimal inputs as well as hex.

1. To make Pencil read a directory properly:

05/06	Change:	58	23	22
	To:	58	00	22

2. To make the Misosys EDTASM read a directory properly:

08/39	Change:	5D	13	ED
	To:	5D	00	ED

3. To make Pencil accept a MINI-DOS request:

00/61	Change:	54	22	16	40	21
	To:	54	00	00	00	21

Also, verify that 00/C5 reads C1 FB C9. 01/57 should read C9 FB 21. (Some users zeroed out the FB, which is an enable interrupt code, because of old TRSDOS 2.1 problems).

4. Fast Clock Zaps (Caution: these zaps use DOS RAM areas that appear to be unused, but may turn out to be used by some routine I haven't yet found. If you develop a problem I would appreciate hearing about it):

SYS0/SYS:	03/54	Change:	C5	0A	08	F5	E5	E1	E5	E1	F3
		To:	C5	C3	F5	4C	E3	E3	E3	E3	F3

(The E3s may already be in your SYS0/SYS. If so, it will still be necessary to put in the C3 F5 4C).

Table continues

". . . the N80 documentation lists the old and new interrupt addresses to aid machine language hackers in making repairs."

In addition, Percom has recently released a double density board for the TRS-80 Model I disk system, and Circle J Software quickly thereafter released Double-Zap II to configure NEWDOS-80 for double density operation. These deserve additional comment so as to avoid problems with those of you who may become confused by all of the DOS Zaps being tossed about.

Here are your options:

1. No Double-Density Applications:

a. Completely omit Apparat's ZAP 031 if you are not using the Omikron Mapper, because it slows down your computer noticeably. Omitting ZAP 031 retains the original DOS operating speed and does not affect system reliability or operation. In this way you can still apply my fast clock zaps and be none the worse off.

b. If you are intent on installing ZAP 031, you can still run at fast clock CPU speeds because Apparat wrote ZAP 031 so that it will function in fast clock systems, with one exception. With ZAP 031 installed, omit all of my fast clock zaps except for the one in SYS0/SYS:

```
04/0A,    change: 11 00 24 1B
             to: 11 00 52 1B
```

Some users find that values smaller than the 52 used herein work better in their systems. You might want to experiment with different values.

2. Double-Density Applications:

Double-Zap II (Circle J Software) absolutely requires installation of Apparat's ZAP 031 for double-density operation. Again, there is no problem with fast clock operations if the same change to SYS0/SYS (at 04/0A) is installed.

Hopefully these comments will prevent some inevitable confusion. Good luck.

```
SYS0/SYS:   04/7E   Change: 01  00  80  DC

                       To: 01  00  00  DC

SYS0/SYS:   04/89   Verify: C9  E3  E3  E3  E3  3A
                  (The E3s here were already in place in my copy).

SYS0/SYS:   04/A0   Change: 11  00  24  1B
                       To: 11  00  52  1B

SYS0SYS:    0A/10   Change: 00  00  00  00  00  00
                            00  00  00  00  00  A5
                              (eleven bytes of zeros)
                       To: E3  E3  E3  E3  0A  08
                           F5  C3  59  46  00  A5

SYS6/SYS:   04/C7   Change: 01  00  80
                       To: 01  00  00

SYS6/SYS:   CC/20   Verify: E3  E3  E3  E3  0A
                  (The E3s were already on my copy).

            0C/27:  Change: 5E  CB  4E  C2  37  5E  CB  4E  20  3A  CB  4E  20
                            36  CB  4E  20  32  CB  4E  20  2E  CB  4E  20  2A
                            CB  4E  20  26  D9  C9  CB  4E  C2  3F  5E  CB  4E
                            20  23  CB  4E  20  1F  CB  4E  20  1B  CB  4E  20
                            17  CB  4E  20  13  CB  4E  20  0F  D9  (Stop)

                       To: 5E  C5  06  12  CB  4E  20  05  10  FA  C1  D9  C9
                           C1  C3  37  5E  00  00  00  00  00  00  00  00  00
                           00  00  00  00  00  00  C5  06  12  CB  4E  20  05
                           10  FA  C1  D9  C9  C1  C3  3F  5E  00  00  00  00
                           00  00  00  00  00  00  00  00  00  D9  (Stop)

            OC/9F   Change: 0A  CB  4E  C2  48  5E  CB  4E  20  D3  CB  4E  20
                            CF  CB  4E  20  CB  CB  4E  20  C7  CB  4E  20  C3
                            CB  4E  20  BF  CB  4E  20  BB  08  (Stop)

                       To: 0A  C5  06  16  CB  4E  20  06  10  FA  C1  C3  8D
                           5E  C1  C3  48  5E  00  00  00  00  00  00  00  00
                           00  00  00  00  00  00  00  00  08  (Stop)
```

5. To make the break key functional for the 'JKL' screen print option (Caution: again, these zaps use DOS RAM areas that appear to be unused, but may turn out to be used by some routine I haven't found yet.)

```
SYS0/SYS:   00/B9:  Change: All zeros (Note—there is a 01 at 00/B1. Sector/BYTE 00/B9 corresponds to
                            RAM memory location 43A6).

                       To: F5  E5  3A  7F  38  FE  04  28  08  E1
                           F1  CB  74  23  C3  B2  45  3E  0D  CD
                           3B  00  E1  F1  C3  66  45  00  (Stop)

SYS0/SYS:   02/A9:  Change: 7E  CB  74  23  20
                       To: 7E  C3  A6  43  20
```

6. Zap to the BASIC/CMD file to implement BASIC's unused NAME command. After setting this zap, entering NAME from BASIC will cause a jump to the address specified in the NAME jump vector. For example, LOAD RSM2D48/CMD into high memory with an appropriate memory size protect, using either the (4049) entry or BASIC's 'MEMORY SIZE?' request. RSM2D's execution address (48K version) is EE94 hex.

Make the zaps to the BASIC/CMD file in the usual way.

```
BASIC/CMD:  16/72:  Change: C3  4A  1E  C3
                       To: C3  94  EE  C3
```

With RSM2D (48K version) in high memory, entering NAME will jump to RSM2D. To get back to BASIC gracefully from RSM2D, enter 'G 0072' (Go to address 72 hex). READY and its prompt will appear and the resident BASIC program will be intact.

This can also be done with NEWDOS 2.1 or TRSDOS 2.3. Just fine the C3 1E 4A (for the NAME function) in the BASIC/CMD file and change it in the same way.

NATIONAL TRS-80®
MICROCOMPUTER SHOW

New York Statler
Exposition Hall
(opposite Pennsylvania Railroad Station
and Madison Square Garden)
7th Ave. & 33rd Street

May 21, 22, 23, 1981
Thursday Noon to 6 PM
Friday 11 AM to 6 PM
Saturday 10 AM to 4 PM

For the Businessman, Educator, Professional and Hobbyist.

- Commercial Exhibits and Sales of Microcomputers, Software, Books, Magazines, Supplies, Parts, Printers, Etc.
- Free Seminars
- Famous Name Guest Speakers.
- User Groups. (Mod I, II, III, Color and Pocket Computers).
- Door Prizes - A TRS-80® Computer will be given away free each day, plus other prizes.

Avoid standing on line - Send in your registration today!

Radio Shack and TRS-80 are registered trademarks of Tandy Corporation, which has no relationship to Kengore Corporation or The National TRS-80 Microcomputer Show.

REGISTRATION FOR TRS-80® MICROCOMPUTER SHOW

May 21, 22, 23, 1981 — New York Statler Hotel

Name _____ Title _____

Company Name _____

Address _____

City, State, Zip _____

Please send _____ registrations at $10.00 each.

(Registration Badge will be sent to you on May 1st.)

Send To:
Kengore Corporation, Dept. 80
3001 Route 27
Franklin Park, N.J. 08823 ↙230

(Be sure to enclose check or money order.)

↙See List of Advertisers on page 306

THE ORIGINAL MAGAZINE FOR OWNERS OF THE TRS-80™* MICROCOMPUTER

* TRS-80™ IS A TRADEMARK OF TANDY CORP.

SOFTWARE FOR TRS-80™ OWNERS

H&E COMPUTRONICS INC.

MONTHLY NEWSMAGAZINE FOR TRS-80™ OWNERS

MONTHLY NEWSMAGAZINE
Practical Support For Model I, II & III

- PRACTICAL APPLICATIONS
- BUSINESS
- GAMBLING • GAMES
- EDUCATION
- PERSONAL FINANCE
- BEGINNER'S CORNER
- NEW PRODUCTS
- SOFTWARE EXCHANGE
- MARKET PLACE
- QUESTIONS AND ANSWERS
- PROGRAM PRINTOUTS

. . . . AND MORE

NOW IN OUR 4th YEAR

PROGRAMS AND ARTICLES PUBLISHED IN RECENT ISSUES INCLUDE THE FOLLOWING:

- FINCALC - A COMPLETE FINANCIAL APPLICATIONS PACKAGE
- INFORMATION SYSTEM REVIEW
- STATISTICAL COMBINATIONS
- PASCAL'S TRIANGLE
- ASSEMBLY LANGUAGE FOR BEGINNERS
- DISK FILES
- MOD-III REVIEW
- KEYBOARD THUNDER AND LIGHTING EXPLAINED
- DOS COMMANDS IN LEVEL II
- PROBABILITY CURVE GENERATOR
- CALCULATOR SIMULATIONS
- THE MEGABYTE GAP
- STOCKS AND BONDS
- BUDGET ANALYSIS (FOR BUSINESS AND HOME)
- NEWDOS/80 REVIEW
- DUTCHING - THE HORSE SYSTEM THAT CAN'T LOSE
- A SIMULATED GOLF GAME
- CONTINUOUS FORM SOURCES
- TAX/SAVER REVIEW

. . . . . AND MORE

FREE* WITH YOUR SUBSCRIPTION OR RENEWAL — **FINCALC** A Complete Financial Analysis Package Used To Calculate Markup, Margin, Annuities, Compound Interest, Nominal And Effective Rates, Sinking Funds, Mortgage Calculations, Future Value, Savings and Insurance, Percentage Difference Between Two Numbers, Amortization Schedule and More . . . . . .

SEND FOR OUR NEW 64 PAGE SOFTWARE CATALOG (INCLUDING LISTINGS OF HUNDREDS OF TRS-80™ PROGRAMS AVAILABLE ON CASSETTE AND DISKETTE). $2.00 OR **FREE** WITH EACH SUBSCRIPTIONS OR SAMPLE ISSUE

*** All programs are supplied on cassette (add $3 for Diskette Version - add $5 for modified Mod-II Version).**

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

ONE YEAR SUBSCRIPTION $24 .....
TWO YEAR SUBSCRIPTION $48 .....
SAMPLE OF LATEST ISSUE $ 4 .....
START MY SUBSCRIPTION WITH ISSUE.....
(#1 - July 1978 • #12 - June 1979 • #24 - July 1980 • #30 - January 1981)
NEW SUBSCRIPTION..... RENEWAL.....

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

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

CREDIT CARD NUMBER _____ EXP. DATE _____

SIGNATURE _____ NAME _____

ADDRESS _____ CITY _____ STATE _____ ZIP _____

***** ADD $12/YEAR (CANADA, MEXICO) - ADD $24/YEAR AIR MAIL - OUTSIDE OF U.S.A., CANADA & MEXICO *****

H & E COMPUTRONICS INC.

•••EVERYTHING FOR YOUR TRS-80™•••

* TRS-80™ is a trademark of the Radio Shack Division of Tandy Corporation

Currently Available

MOD-II PROGRAMS

★ *All orders processed within 24-Hours*
★ *30-Day money back guarantee on all TRSDOS Software*
★ *Add $3.00 for shipping in UPS Areas*
★ *Add $4.00 for C.O.D. or NON-UPS Areas*
★ *Add $5.00 outside U.S.A., Canada & Mexico*
★ *We will match any bonafide advertised price in any of the Major Computer Magazines*

ALL SOFTWARE LISTED HERE WORKS WITH TRSDOS*

(1) ELECTRIC PENCIL (Michael Shrayer Software)...Complete word processor with extensive editing and printer formatting features.....$325 (STANDARD TRSDOS VERSION)...$350 (DIABLO, NEC OR QUME TRSDOS VERSION).

(2) GENERAL LEDGER, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, INVENTORY CONTROL, INVOICING AND PAYROLL (Small Business Systems Group)...an extensive business system for the serious user...can be used one module at a time or as a co-ordinated system...$225...per module...$1299 for the complete system.

(3) GENERAL LEDGER, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, INVENTORY CONTROL AND PAYROLL (Compumax)...a complete user oriented business system...can be used one module at a time or as a coordinated system...$140 per module...$995 for the complete system.

(4) MOD-II UTILITY PACKAGE (Racet Computes)...adds important utilities to TRSDOS...copy files selectively...faster and more accurate file copying...repair bad directories...displays sorted directory of all files on 1 to 4 disk drives...SUPERZAP...change disk ID...and more...$150.

(5) ADVENTURE #1-#9 (Scott Adams - Adventure International)...a series of games formally only available on the large computers...your goal is to work your way through a maze of obstacles in order to recover a secret treasure or complete a mission...the package includes all 9 Adventures written by Scott Adams...$99.95.

(6) GSF (Racet Computers)...Generalized Subroutine Facility...a series of super fast machine language utilities that can be called from a BASIC program (no machine language knowledge required)...sorts 1000 items in under 5 seconds...allows PEEK and POKE statements...move data blocks...compress and uncompress data...works under TRSDOS...$50.

(7) DSM (Racet Computes)...Disk Sort Merge...sorts and merges large multiple diskette files on a 1 to 4 drive system...NOT AN IN MEMORY SORT...can actually alphabetize (or any other type of sort) 4 disk drives worth of data...sorts one complete disk of information in 10 minutes...information is provided to use DSM with the RS MAILING PROGRAM...works under TRSDOS...$150.

(8) RSM (Small Systems Software)...a machine language monitor and disassembler...can be used to see and modify memory or disk sectors...contains all the commands found on the Model-I version plus some additional commands for the MOD-II...works under TRSDOS...$39.95.

(9) BLINK BASIC LINK FACILITY (Racet Computes)...Link from one BASIC program to another saving all variables...chain programs without losing variables...$50.

(10) BASIC CROSS REFERENCE UTILITY (Racet Computes)...lists all variables and strings used in a program (with the line numbers in which they appear)...lists all GOTO's and GOSUB's (with the line numbers in which they appear)...searches for any specific variables or strings (with the line number in which they appear)...$50.

(11) DEVELOPMENT PACKAGE (Racet Computes)...SUPERZAP (to see, print or change any byte on a diskette)...Disassembler and MOD-II interface to the **MICROSOFT EDITOR ASSEMBLER PLUS** including uploading services and patches for Disk I/O...assemble directly into memory...save all or portions of source to disk...dynamic debug facility (ZBUG)...entended editor commands...$125.

(12) HARD/SOFT DISK SYSTEM (Racet Computes)...The software essential to interface any of the popular large hard disk drives...completely compatible with your existing software and files...allows up to 20 megabytes of storage (and larger)...directory expandable to handle thousands of files...$400.

(13) CAMEO HARD DISK DRIVE CONTROLLER...coming soon (November 1?)

(14) HARD DISK DRIVES...coming soon (Nov. 1?).

(15) H & E COMPUTRONICS, INC. SHARE-A-PROGRAM DISKETTE #1...works under TRSDOS...a collection of programs written by MOD-II owners...programs include data base management...a word processor...mail system...mortgage calculations...checkbook register...and many others...$8 (add $3 postage outside of the United States, Canada and Mexico)...FREE if you send us a diskette containing a program that can be added to the SHARE-A-PROGRAM DISKETTE.

(16) WABASH CERTIFIED DISKETTES...$39.95 (per box of 10).

(17) FLIP SORT DISKETTE STORAGE TRAY...Stores 50 diskettes...comes complete with index-dividers, tilt plates and adjustable spacing...$44.95.

(18) MASTER PAC 100...100 essential programs...BUSINESS...PERSONAL FINANCE...STATISTICS...MATH...GAMBLING...GAMES...includes 125 page manual and 2 diskettes...$99.95.

(19) BUSINESS PAC 100...100 essential business programs...INVENTORY CONTROL...PAYROLL...BOOKKEEPING SYSTEM...STOCK CALCULATIONS...CHECKBOOK MAINTENANCE...ACCOUNTS RECEIVABLE...ACCOUNTS PAYABLE...includes 125 page manual and two diskettes...$149.95.

(20) EDITOR ASSEMBLER (Galactic Software Ltd.)...the first user oriented Editor Assembler for the MODEL II and was designed to utilize all the features of the MODEL II. It includes innovative features for ease of coding and debugging and complete documentation (over 120 pages)...works under TRSDOS...$229.00.

(21) BASIC COMPILER (Microsoft)...changes your source programs into machine language...increases program execution by 3-10 times...$395.

(22) MAIL/FILE SYSTEM from Galactic Software Ltd. stores 2,500 names per disk. No sorting time is required since the file is automatically sorted by first and last name plus Zip Code on input. Retrieve by any combination of 19 user codes. Supports an 11 digit alphanumerica Zip. Supports a message line. Comes complete with user-oriented documentation (100-page manual). Allows for company name and individual of a company and complete phone number (and extension)...works under TRSDOS...$199.00.

(23) INCOME TAX PAC...Professional income tax package...most forms and schedules...output to video or line printer...automatic memory storage of all information...data can be loaded from diskette, changed and edited...built in error checking...$199.95.

(24) COMPUTER GAMES (SBSG)...Mean Checker Machine, Star-Trek III, Concentration, Treasure Hunt, Banco, Dog Star Adventure...$74.95.

ALL PROGRAMS LISTED HERE REQUIRE CP/M*

(1) CP/M (Lifeboat Associates).....an alternative operating system for the **MOD-II** that allows **MOD-II** owners to use any of the hundreds of programs available under **CP/M**...$170.

(2) CP/M HANDBOOK...(Sybex)...a step-by-step guide to **CP/M**...takes the reader through each of the **CP/M** commands...numberous sample programs...practical hints...reference tables...$13.95.

(3) GENERAL LEDGER, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, INVENTORY CONTROL, AND PAYROLL (Peachtree Software)...requires CP/M and MICROSOFT BASIC...professional business systems...turn key operation...can be used as single modules or as a coordinated system...$500 per module...$2500 for the complete system.

(4) WORD-STAR...The ultimate word processor...a menu driven word processing system that can be used with any printer. All standard word processing commands are included...plus many unique commands only found on WORD STAR...requires CP/M ...$495.

(5) MAIL LIST MERGE...An add on package that allows the user to send form letters (created on WORD-STAR) to any compiled mailing list (using any CP/M based MAIL program such as the PEACHTREE MAIL PROGRAM)...requires CP/M, WORD STAR and andy CP/M based mail program...$150.

(6) SELECTOR III (Micro-Ap)...complete data management system...user defined fields and codes...manages any list defined by the user...includes additional modules for simplified inventory control, accounts receivable and accounts payable...requires CBASIC-2...$295.

(7) SELECTOR IV (Micro-Ap)...the ultimate data management system...all features use the **SELECTOR III** plus...data file format conversions...full page report formatter...computations...global search and replace ...hard disk compatible...data/text merging...$550.

(8) GLECTOR (Micro-Ap)...add on package to the **SELECTOR**...general ledger that allows the user to define a customized chart of accounts...$350.

(9) CBASIC-2...a non-interactive BASIC used for many programs that run under **CP/M**...allows user to make more efficient use of disk files...eliminates the use of most line number references...require on such programs as the **SELECTOR**...$120.

(10) MICROSOFT BASIC...an enhanced version of the **MICROSOFT BASIC** found on **TRSDOS**...adds commands such as chaining (allows the user to LOAD and RUN a new program without losing the variables currently in memory)...long variable length file records, WHILE/WEND and others...can be used with the BASIC COMPILER to speed up programs (3-10 times faster execution)...$325.

(11) MASTER TAX (CPAids)...professional tax preparation program...prepares schedules, A, B, C, D, E, F, G, R/RP, SE, TC, ES and forms 2106, 2119, 2210, 3468, 3903, 2441, 4625, 4726, 4797, 4972, 5695 and 6521. Printing can be on readily available pre-printed continuous forms, on overlays, or on computer generated IRS approved forms. Maintains clint history files...interactive with CP/Aids General Ledger...$995.

(12) GENERAL LEDGER II (CPAids)...designed for CPA's...stores complete 12 month detailed history of transactions...generates financial statements, depreciation, loan amortizations, journals, trial balances, statements of changes in financial position, and compilation letters...includes payroll system with automating posting to general ledgers...prints payroll register, W2's and payroll checks...$450.

(13) ELECTRIC PENCIL (Michael Shrayer Software)...Complete word processor with extensive editing and printer formatting features...$275 (Standard printer version)...$300 (DIABLO, NEC or QUME version).

(14) BASIC COMPILER (Microsoft)...changes your source programs into machine language...increases program execution by 3-10 times...$395.

* (CP/M IS A REGISTERED TRADEMARK OF DIGITAL RESEARCH)

H & E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS GROUP

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

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

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

NEW!!!
MOD-II NEWSLETTER
$12/year (or 12 issues)

H&E COMPUTRONICS INC.

•••EVERYTHING FOR YOUR TRS-80™•••

* TRS-80™ is a trademark of the Radio Shack Division of Tandy Corporation

100 SUPER PROGRAMS

MASTER PAC 100

2nd EDITION (COMPLETELY REVISED)

FOR YOUR TRS-80™ LEVEL II MICROCOMPUTER

ALL ON CASSETTE OR DISKETTE

BUSINESS AND PERSONAL FINANCE — BUSINESS / PERSONAL FINANCE

1. CHECKBOOK MAINTENANCE
2. TIME FOR MONEY TO DOUBLE
3. FEDERAL FICA & WITHHOLDING TAX
3. COMPUTATIONS
4. HOME BUDGET ANALYSIS
5. ANNUITY COMPUTATION
6. UNIT PRICING
7. CHANGE FROM PURCHASE
8. NEBS CHECK PRINTER
9. DAYS BETWEEN DATES
10. MORTGAGE AMORTIZATION TABLE
11. INVENTORY CONTROL
12. PORTFOLIO VALUE COMPUTATIONS
13. VALUE OF A SHARE OF STOCK
14. SALES RECORD KEEPING SYSTEM
15. FUTURE VALUE OF AN INVESTMENT
16. EFFECTIVE INTEREST RATE (LOAN)
17. PRESENT VALUE OF A FUTURE AMOUNT
18. RATE OF RETURN-VARIABLE INFLOW
19. RATE OF RETURN-CONSTANT INFLOW
20. REGULAR WITHDRAWAL FROM INVESTMENT
21. STRAIGHT LINE DEPRECIATION
22. SUM OF DIGITS DEPRECIATION
23. DECLINING BALANCE DEPRECIATION
24. BREAK EVEN ANALYSIS
25. SALVAGE VALUE OF INVESTMENT
26. PAYMENT ON A LOAN
27. FUTURE SALES PROJECTIONS
28. CREDIT CARD FILE
29. ECONOMIC ORDER QUANTITY (EOQ) INVENTORY MODEL
30. VALUE OF HOUSE CONTENTS
31. TEXT EDITOR
32. MONTHLY CALENDAR
33. DAY OF WEEK
34. CASH FLOW VS. DEPRECIATION
35. COMPLETE MAIL SYSTEM
36. INTEREST RATE ON A LEASE

STATISTICS AND MATHEMATICS — STATISTICS / MATH

37. RANDOM SAMPLE SELECTION
38. ANGLO-METIC CONVERSION
39. MEAN, STANDARD DEVIATION, MAXIMUM AND MINIMUM
40. SIMPLE LINEAR REGRESSION
41. MULTIPLE REGRESSION ANALYSIS
42. GEOMETRIC REGRESSION
43. EXPONENTIAL REGRESSION
44. SIMPLE MOVING AVERAGE
45. SIMPLE T-TEST
46. CHI-SQUARE TEST
47. NORMAL PROBABILITIES
48. BINOMIAL PROBABILITY
49. POISSON PROBABILITY
50. MATRIX ADDITION AND SUBTRACTION
51. MATRIX TRANSPOSE
52. MATRIX INVERSE
53. MATRIX MULTIPLICATION
54. SOLUTION OF SIMULTANEOUS EQUATIONS
55. QUADRATIC FORMULA
56. LINEAR EQUATION SOLUTIONS
57. ROOT HALF INTERVAL SEARCH
58. ROOTS OF POLYNOMIALS
59. ROOTS-NEWTON'S METHODS
60. PRIME FACTORS OF INTEGER
61. LEAST COMMON DENOMINATOR
62. RADIAN-DEGREE CONVERSION
63. NUMERICAL INTEGRATION

UTILITIES

64. QUICK SORT ROUTINE
65. PROGRAM STORAGE INDEX
66. MULTIPLE CHOICE QUIZ BUILDER
67. FORM LETTER WRITER
68. SHELL SORT
69. CASSETTE LABEL MAKER
70. CODES MESSAGES
71. MERGE TWO FILES
72. SORT WITH REPLACEMENT

GRAPHICS

73. DRAWS BAR GRAPH
74. DRAWS HISTOGRAM
75. MOVING BANNER DISPLAY

GAMBLING AND GAMES — GAMBLING

76. RANDOM SPORTS QUIZ
77. GOVERNMENT QUIZ
78. HORSE RACE
79. MAGIC SQUARE
80. ARITHMETIC TEACHER
81. HIGH LOW GAMBLE
82. UNSCRAMBLE LETTERS
83. HANGMAN
84. GAME OF NIM
85. RUSSIAN ROULETTE
86. ROULETTE GAME
87. ONE ARMED BANDIT
88. HIT THE TARGET
89. WALKING DRUNK
90. STATE CAPITAL QUIZ
91. TIC-TAC-TOE
92. DICE GAME
93. LUNAR LANDAR GAME
94. BIORHYTHM
95. HORSE SELECTOR (CLASS CALCULATOR)
96. RANDOM DICE ROLL
97. RANDOM ROULETTE ROLL
98. RANDOM CARD DEALER
99. GUESS THE NUMBER
100. WHITE OUT SCREEN

INCLUDES 110 PAGE USER MANUAL

GUARANTEED SATISFACTION
30-DAY MONEY BACK GUARANTEE ON ALL SOFTWARE

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

PLEASE SEND ME:

☐ MASTER PAC 100 CASSETTE VERSION $59.95
☐ MASTER PAC 100 DISKETTE VERSION $59.95
☐ MASTER PAC 100 (TRS-80 MODEL II VERSION) $99.95

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

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

★ *All orders processed within 24-Hours*
★ *30-Day money back guarantee on all Software*

CREDIT CARD NUMBER ..... EXP. DATE.....

SIGNATURE.....

NAME .....

ADDRESS ..... CITY..... STATE ..... ZIP .....

*** ADD $3.00 FOR SHIPPING IN UPS AREAS • ADD $4.00 FOR C.O.D. OR NON-UPS AREAS • ADD $5.00 OUTSIDE U.S.A, CANADA & MEXICO ***

M&E COMPUTRONICS INC.

...EVERYTHING FOR YOUR TRS-80™...

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

BUSINESS PAC 100

100 Ready-To-Run Business Programs

★ All orders processed within 24-Hours
★ 30-Day money back guarantee on all Software

(ON CASSETTE OR DISKETTE).....Includes 110 Page Users Manual.....5 Cassettes (Or Diskettes)
Inventory Control.....Payroll.....Bookkeeping System.....Stock Calculations.....
Checkbook Maintenance.....Accounts Receivable.....Accounts Payable.....

BUSINESS 100 PROGRAM LIST

1	RULE78	Interest Apportionment by Rule of the 78's
2	ANNU1	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
NAME	**DESCRIPTION**	
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	CAPI	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

☐ **CASSETTE VERSION** **$99.95**
☐ **DISKETTE VERSION** **$99.95**
☐ **TRS-80* MODEL II VERSION** **$149.95**

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

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

M&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

VISA

24 HOUR ORDER LINE
(914) 425-1535

H & E COMPUTRONICS INC.

...EVERYTHING FOR YOUR TRS-80™...

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

SMALL BUSINESS SYSTEMS GROUP

COORDINATED BUSINESS SYSTEMS

★ *All orders processed within 24-Hours*
★ *30-Day money back guarantee on all Software*
★ *Add $3.00 for shipping in UPS Areas*
★ *Add $4.00 for C.O.D. or NON-UPS Areas*
★ *Add $5.00 outside U.S.A., Canada & Mexico*

FACTS ABOUT THE S.B.S.G. BUSINESS PACKAGES

1. **S.B.S.G.** is a sophisticated Business Software System designed for the serious businessman.
2. Each of the **S.B.S.G. Business Modules** may be purchased separately...or you may purchase the entire coordinated business system.
3. Modules purchased separately do not coordinate with the General Ledger (although for the standard **S.B.S.G.** fee, the user may upgrade his individual modules for the coordinated system).
4. Foolproof, Step-By-Step procedures are supplied, planned and documented for the **First-Time Computer User.** All programs are self-explanatory, telling the user what is required at every step.
5. Programs are written in **BASIC** and the source code listing is supplied for those users who decide to modify the original system.
6. A complete users manual is supplied with each module.
7. Demo Data diskettes are supplied with sample data.
8. **S.B.S.G.** has an In-House staff that can answer questions and problems related to the proper use of the **S.B.S.G. Business System** (on the telephone or through the mail).
9. First-Time Computer Owners Note-Instructions are provided for entering state payroll withholding tables. There is an additional charge if you prefer to have **S.B.S.G. Programmers** insert the correct data.
10. Minimum system requirement is 2-drives to run any single module.
11. Minimum system requirement is 3-drives to run the coordinated business system (AR-AP-GL) or (AR-AP-GL with PAYROLL).
12. Minimum system requirement is 4-drives to run the extended coordinated system (AR-AP-GL-PR and INVENTORY/INVOICING).
13. The **A. OSBORNE & ASSOCIATES** business manuals are provided **FREE** with each order (they may be purchased separately at $20 per manual).
14. The INVENTORY and INVOICING modules are original programs written by **S.B.S.G.**
15. Each module can be purchased as independent modules to run on a 2 or more drive system except INVOICING.
16. Memory requirement is 48K for the MODEL-I and 64K for the MODEL-II.
17. All **S.B.S.G. BUSINESS SYSTEMS** may be upgraded up to 4-disk drives. No data is ever lost during an upgrade. There is a standard **S.B.S.G.** charge for all upgrades.

ACCOUNTS PAYABLE

The accounts payable system receives data concerning purchases from suppliers and produces checks in payment of outstanding invoices. In addition, it produces cash management reports. This system aids in tight financial control over all cash disbursements of the business. Several reports are available and supply information needed for the analysis of payments, expenses, purchases and cash requirements. All A/P data feeds General Ledger so that data is entered into the system just once. These programs were developed 5 years ago for the Wang micro-computer and have been tested in many environments since then. The package has been converted to the TRS-80™ and is now well documented, on-line, interactive micro-computer system with the capabilities of (or exceeding many larger systems).

CAPABILITIES:

★ menu driven; easy to use; full screen prompting and cursor control
★ invoice oriented; everything revolves around the invoice; handles new invoice or credit memo or debit memo
★ invoce information recorded; invoice #, description, buyer, check register #, invoice date, age date, amount of invoice, discount (in %), freight, tax ($), total payable
★ transaction print and file maintenance procedures insure accuracy
★ flexible check calculation procedure; allows checks to be calculated for a set of vendors-or-for specific vendors
★ program prints your checks; contiguous computer checks with your company letterhead can be purchased from SBSG
★ reports include (samples on back):
  - open item listing/closed item listing - both detail and summary
  - debit memo listing/credit memo listing
  - aging
  - check register report (to give an audit trail of checks printed)
  - vendor listing and vendor activity (activity of the whole year)
★ fully linked to GENERAL LEDGER; each invoice can be distributed to as many as five (5) different GL accounts; system automatically posts to cash and A/P accounts

ACCOUNTS RECEIVABLE

The objective of a computerized A/R system is to prepare accurate and timeley monthly statements to credit customers. Management can generate information required to control the amount of credit extended and the collection of money owed in order to maximize profitable credit sales while minimizing losses from bad debts. The programs composing this system were developed 5 years ago, especially for small businesses using the Wang Microcomputer. They have been tested in many environments since then. Each module can be used stand alone or can feed General Ledger for a fully integrated system.

CAPABILITIES:

★ menu driven; easy to use; full screen prompting and cursor control
★ invoice oriented; invoices can be entered before ready for billing, when ready for billing, after billing or after paid
★ allows entry of new invoice, credit memo, debit memo, or change/delete invoice
★ allows for progress payment
★ transaction information includes:
  - type of A/R transaction
  - billing date
  - customer P.O. #
  - general ledger account number
  - description of P.O.
  - invoice amount
  - shipping/transportation charges
  - tax charges
  - payment
  - progress payment information
  - transaction print & file maintenance procedures insure accuracy
★ customer statements printed; computer statements with your company letterhead can be purchased from SBSG
★ reports include: (samples on back)
  - listing of invoices not yet billed
  - open items (unpaid invoices)
  - closed items (paid invoices)
  - aging
★ fully linked to General Ledger; will post to applicable accounts; debit A/R, credits account you specify

H&E COMPUTRONICS INC.

•••EVERYTHING FOR YOUR TRS-80™•••

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

PAYROLL

Payroll invoices many complex calculations and the production of reports and documents, many of which are required by government agencies. It is an ideal candidate for the computer. With this Payroll system in-house, you can promptly and accurately pay your employees and generate accruate documents/reports to management, employees, and appropriate government agencies concerning earnings, taxes, and other deductions. The package has been converted to the TRS-80™ and is now a well documented, op-line, interactive, micro-computer system with the capabilities of (or exceeding) many larger systems.

CAPABILITIES:

- ★ performs all necessary payroll tasks including:
  - file maintenance, pay data entry and verification
  - computation of pay and deduction amounts
  - printing of reports and checks
- ★ can handle salaried and hourly employees
- ★ employees can receive:
  - hourly or salary wage
  - vacation pay
  - holiday pay
  - piecework pay
  - overtime pay
- ★ employees can be paid using any combination of pay types (except, hourly cannot receive salary and salary cannot receive hourly)
- ★ special non-taxable or taxable lump sums can be paid regularly or one time (bonus, reimbursements, etc)
- ★ health and welfare deductions can be automatically calculated for each employee
- ★ earnings-to-date are accumulated and added to permanent records; taxes are computed and deducted: US income tax, Social Security tax, state income tax, other deductions (regular or one time)
- ★ paychecks are printed; computer checks with your company letterhead can be purchased from SBSG
- ★ calculations are accumulated for; employee pay history, 941A report, W-2 report, insurance report, absentee report
- ★ fully linked to General Ledger. Each employee's payroll information can be distributed to as many as (12) twelve different GL accounts; system automatically posts to cash account

INVENTORY CONTROL/INVOICING

- ★ **ISAM** (Indexed Sequential Access Method) eliminates the necessity for time consuming sort.
- ★ Pre-Allocated Files for IMMEDIATE update and inquiry capabilities.
- ★ Fast Disk storage and retrieval.
- ★ Inventory Master Record includes...class...SKU...Division...Retail...Cost...Beginning Balance...Period Sale Units...Period Receipts...On Order...On Hand...Minimum Reorder Point...Recommended Reorder Amount...Vendor Number...Period Sale Dollars...YTD Sale Units...YTD Sale Dollars.
- ★ Calculated and Displayed Formulas include...Gross Margin ($)...Gross Margin (%)...Gross Margin ROI (%)...Average Inventory Retail ($)...Average Inventory Cost ($)...Turn-Over (%).
- ★ Reports Generated include...Master File Listing...Class Description Listing...Transaction Audit Trail...Minimum Reorder Point by Vendor...Retail Price List...Retail & Cost Price List...Period Sales Report ...Year to Date Sales Report...Stock Status (Screen or printer output) ...Commission Report (for salesmen and buyers).
- ★ Transaction Types include...Sales, Vendor Receipts...Vendor Orders...Customer Returns...Vendor Returns...Transfer Stock.

GENERAL LEDGER

The General Ledger accounting system consolidates financial data from other accounting subsystems (A/R, A/P, Payroll, direct posting) in an accurate and timely manner. Major reports include the Income Statement and Balance Sheet and a "special" report designed by management. The beauty of this General Ledger system is that it is completely user formatted. You "customize" the account numbers, descriptions, and report formats to suit particular business requirements. These programs were developed 5 years ago for the Wang micro-computer and have been tested in many environments since then. The package has been converted to the TRS-80™ and is now a well documented, on-line, interactive micro-computer system with the capabilities of (or exceeding) many larger systems.

CAPABILITIES:

- ★ more than 200 chart of accounts can be handled
- ★ account number structure is user defined and controlled
- ★ more than 1,750 transactions may be entered via:
  - direct posting; done by hand; validated against the account file before acceptance
  - external posting; generated by A/R, A/P, Payroll or any other user source
- ★ data is maintained and reported by:
  - month
  - quarter
  - year
  - previous three quarters
- ★ reports (samples on back) include:
  - trial balances
  - income statement
  - balance sheet
  - special accounts reports and more.....
- ★ user formats reports with the following designated as you wish:
  - titles
  - headings
  - account numbers
  - descriptions
  - subtotals
  - totals
  - skip lines
  - skip pages
- ★ up to eight levels of totals - fully user designated
- ★ menu driven; easy to use; full screen prompting and cursor control

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

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

VISA
master charge

24 HOUR ORDER LINE
(914) 425-1535

PRICING	MOD-1 VERSION	MOD-II VERSION	MOD-III VERSION
ACCOUNTS RECEIVABLE	$125	$225	$199.95
ACCOUNTS PAYABLE	$125	$225	$199.95
GENERAL LEDGER	$125	$225	$199.95
PAYROLL	$125	$225	$199.95
INVENTORY	$175	$275	$199.95
INVOICING	$150	$250	$199.95
COORDINATED INVENTORY/INVOICING ACCOUNTS RECEIVABLE	$449	$749	$599.95
COORDINATED AR-AP-GL	$375	$675	$599.95
COORDINATED AR-AP-GL with PAYROLL	$495	$899	$799.95
EXTENDED COORDINATED AR-AP-GL INVOICING/INVENTORY with PAYROLL	$799	$1299	$1199.95

H&E COMPUTRONICS INC.

•••EVERYTHING FOR YOUR TRS-80™•••

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

MICROSOFT BASIC COMPILER

With TRS-80™ BASIC Compiler, your Level II programs will run at record speeds! Compiled programs execute an average of 3-10 times faster than programs run under Level II. Make extensive use of integer operations, and get speeds 20-30 times faster than the interpreter.

Best of all, BASIC Compiler does it with BASIC, the language you already know. By compiling the same source code that your current BASIC interprets, BASIC Compiler adds speed with a minimum of effort.

And you get more BASIC features to program with, since features of Microsoft's Version 5.0 BASIC interpreter are included in the package. Features like the WHILE...WEND statement, long variable names, variable length records, and the CALL statement make programming easier. An exclusive BASIC Compiler feature lets you call FORTRAN and machine language subroutines much more easily than in Level II.

Simply type in and debug your program as usual, using the BASIC interpreter. Then enter a command line telling the computer what to compile and what options to use.

Voila! Highly optimized, Z-80 machine code that your computer executes in a flash! Run it now or save it for later. Your compiled program can be saved on disk for direct execution every time.

Want to market your programs? Compiled versions are ideal for distribution. You distribute only the object code, not the source, so your genius stays fully protected.

BASIC Compiler runs on your TRS-80™ Model I with 48K and disk drive. The package includes BASIC Compiler, linking loader and BASIC library with complete documentation **$195.00**

1980 INCOME TAX PAC

Completely Revised - Latest Tax Tables - Fully Tested - Complete Manual and Documentation. The new version of the Income Tax Pacs are full of error catching codes making it impossible to make an error. Follow the simple Step By Step procedure that makes tax preparation simple.

INCOME TAX PAC A ..... **($19.95...Cassette)**
For Level II 16K Cassette Only
Does Form 1040 and 1040A
- Schedule A itemized deductions
- Schedule B interest and dividends
- Output to video display
- Schedule TC tax computation

INCOME TAX PAC B ..... **$49.95...Cassette or Diskette)**
For Level II 16K with or without printer...cassette or disk has all features of Income Tax Pac A **Plus** works with or without line printer.
- Formats Form 1040 and 1040A for standard tax forms
- Schedule C income from a personally owned business
- Form 2106 employee business expense

PROFESSIONAL INCOME TAX PAC C ..... **$99.95...Diskette**
For Level II 32K with disk and printer (optional)
Has all features of Income Tax Pac B **Plus** automatic memory storage for income tax preparers.
- 22 additional schedules and forms
- Formats forms for individual or tractor feed printing

MOD II CPA VERSION **$199.95**

GUARANTEED PROFIT **91%** **WINS PLACES SHOWS** **32%** **AVERAGE PROFIT AT ALL TRACKS-1978**

THE HORSE SELECTOR II (FLATS) (By Dr. Hal Davis **$50.00**
New simplified version of the original Horse Selector. The first Horse Selection System to actually calculate the estimated odds of each horse.
HIGHER PROFITS (OVER 100%) POSSIBLE THROUGH SELECTIVE BETTING ON:
- Rates each horse in 10 seconds.
- Easy to follow rules.
- Can be used with any Apple II Computer.
- 100% money back guarantee (returned for any reason).
- Uses 4 factors (speed rating, track variant, distance of the present race, distance of the last race).
- Using the above factors, the Horse Selector calculates the estimated odds. BET on horses whose actual payoff (from the Tote Board or Morning Lines) is higher than payoff based on estimated odds.
- Using the above factors, the Horse Selector calculates the estimated odds. BET on any selected horse with an estimated payoff (based on Tote Board or Morning Lines) higher than calculated payoff (based on Horse Selector II).
- Source listing for the TRS-80™, TI-59, HP-67, HP-41, Apple and BASIC Computers.
- No computer or calculator necessary (although a calculator would be helpful for the simple division used to calculate estimated odds).

FREE Dutching Tables allows betting on 2 or more horses with a guaranteed profit.

NEWDOS/80

A **New** enhanced NEWDOS for TRS-80™ Model I for the 1980's

Apparat Inc., announces the most powerful Disk Operating System for the TRS-80™. It has been designed for the sophisticated user and professional programmer who demands the ultimate in disk operating systems.

NEWDOS/80 is not meant to replace the present version of NEWDOS 2. 1 which satisfies most users, but is a carefully planned upward enhancement, which significantly extends NEWDOS 2. 1's capabilities. This new member to the Apparat NEWDOS' family is upward compatible with present NEWDOS 2. 1 and is supplied on Diskette, complete with enhanced NEWDOS + utility programs and documentation. Some of the NEWDOS/80 features are:
- New BASIC commands that supports with variable record lengths up to 4095 Bytes long.
- New BASIC commands that supports with variable record lengths up to 4095 Bytes long.
- Mix or match disk drives. Supports any track count from 18 to 80. Use 35, 40 or 77 track 5" mini disk drives or 8" disk drives, or any combination.
- A security boot-up for BASIC or machine code application programs. User never sees "DOSREADY" or "READY" and is unable to "BREAK", clear screen, or issue any direct BASIC statement including "LIST."
- New editing commands that allow program lines to be deleted from one location and moved to another or to allow the duplication of a program line with the deletion of the original.
- Enhanced and improved RENUMBER that allows relocation of subroutines.
- Powerful program chaining.
- Device hanging for routing to display and printer simultaneously.
- CDE function; simultaneous striking of the C, D and E keys will allow user to enter a mini-DOS to perform some DOS commands without disturbing the resident program.
- Upward compatible with NEWDOS 2. 1 and TRSDOS 2.3.
- Includes Superzap 3.0 and all Apparat 2.1 utilities.

..... **$149.00**

STOCK MARKET MONITOR

Galactic Software Ltd.

CASSETTE VERSION **$89.00**
DISK VERSION **$99.00**

1. The system is designed for the active "trader" not the "long term" investor, as the system is "technically" oriented.
2. For the TRS-80™ Model I, Level II, 16K or more. Available in both disk and tape versions.
3. Tracks user selected issues, in a technical system that reflects the issue's performance against the overall market.
4. Set up data is input by the user from the Standard and Poors stock guide or Value Line.
5. Daily issue data, "high", "low", "close" and "volume" are input from any newspaper containing this information.
6. Daily overall market, "volume" and "closing Dow" are also provided from a newspaper.
7. Volume and price changes of an issue, as they compare to volume an price changes of the overall market, are the basis of this system's analysis of the given issue.
8. Comparisons of the issue against itself are also done. This may allow the user to spot "unusual" activity on this issue.
9. Clear indications are given as to whether the issue is "out performing", "under performing" or "performing" with the market.
10. Complete video and printed output is provided.
11. This program is intended to be a guide to indications, and is not to be used as a sole recommendation to buy, sell or hold an issue. These decisions are the responsibility of the user and his brokerage.

H&E COMPUTRONICS INC.
MATHEMATICAL APPLICATIONS SERVICE™

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

24 HOUR ORDER LINE
(914) 425-1535

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

★ *All orders processed within 24-Hours*
★ *30-Day money back guarantee on all Software*

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

H & E COMPUTRONICS INC.

●●EVERYTHING FOR YOUR TRS-80™●●

MODEL III

* TRS-80 is a trademark of Tandy Corp.

★ *All orders processed within 24-Hours*
★ *30-Day money back guarantee on all TRSDOS Software*
★ *Add $2.00 for shipping in UPS Areas*
★ *Add $4.00 for C.O.D. or NON-UPS Areas*
★ *Add $5.00 outside U.S.A., Canada & Mexico*
★ *We will match any bonafide advertised price in any of the Major Computer Magazines*

(1) **GENERAL LEDGER, ACCOUNTS RECEIVABLE, ACCOUNTS PAYABLE, PAYROLL, INVENTORY CONTROL AND INVOICING** (Small Business Group)....an extensive business system for the serious user....can be used one module at a time or as a coordinated system..... **$199.95** per module....**$1199.95** for the complete system *

(2) **MASTER PAC 100**.....100 essential programs....BUSINESS....PERSONAL FINANCE....STATISTICS....MATH....GAMBLING....GAMES....includes 125 page manual and 5 diskettes **$59.95**

(3) **BUSINESS PAC 100**....100 essential business programs....INVENTORY CONTROL....PAYROLL....BOOKKEEPING SYSTEM....STOCK CALCULATIONS....CHECKBOOK MAINTENANCE....ACCOUNTS RECEIVABLE....ACCOUNTS PAYABLE....includes 125 page manual and five diskettes **$99.95**

(4) **INFORMATION SYSTEM** (The Bottom Shelf)....An in-memory information system for small mailing lists, inventories (i.e. books, articles, records, program reference files)....Can be used for anything that you would use rolodex or index card files....Up to ten user define fields....Programmable printouts for rolodex cards, mailing labels, etc....Will identify all records that contain a group of characters you've entered even if that group is in the middle of a line....Sorts data base by any field **$49.50***

(5) **DATA MANAGER II** (The Bottom Shelf)....RANDOM ACCESS Disk based DATA MANAGEMENT SYSTEM (Similiar to INFORMATION SYSTEM above.....but RANDOM ACCESS STORAGE expands the amount of storage space available)....Used to replace index cards for medium sized mail lists, inventories, personnel records, sales prospects, etc.....Uses up to four disk drives on line....Up to twenty user defined fields, programmable printouts for rolodex cards, etc....will identify all records that contain a group of characters you've entered even if that group is in the middle of a line....maintain up to 5 changeable presorted "key" files.....variable length random records (the smaller the record you define, the more records yu can store) **$99.95***

(6) **BUSINESS MAIL SYSTEM** (The Bottom Shelf)....Handles large mailing lists (up to 150,000 names)....supports 3 or 4 line addresses....files automatically in zip code order, alphabetical within zip code....formats for 1 to 4 across mailing labels....supports quick disk location of single or multiple names....meets all industry and postal standards....numeric code fields included for printing selected records **$125.00***

(7) **ANALYSIS PAD** (The Bottom Shelf)....A Columnar Calculator for financial analysis, line item budgeting, cost analysis, sales analysis and almost any financial function (and many statistical functions)....create matrixes of 29 × 39....make all entries at one time either by row or column.....add, delete, move or switch columns and rows....edit any data from full screen display....add, subtract, multiply and divide one column by another and put results in designated column (up to six calculations can be made and placed in designated column).....define columns as constants....save calculations and formulas on disk....results can be printed in a variety of report formats **$99.95***

(8) **CHECKBOOK II** (The Bottom Shelf)....A complete in memory checkbook balancing and reconcilliation program....five column keyboard input with 5 characters for check number, 16 for payee, 4 for code....numerical sort routine **$49.50***

(9) **CHECK REGISTER ACCOUNTING SYSTEM** (The Bottom Shelf)....A complete random access checkbook system....set and define up to 60 accounts with as many income accounts as you choose....complete checkbook balancing and reconcilliation....single entry input where transaction can be dispersed over several accounts....enables user to make a 64-character note on each transaction....print out your own check after data entry....prints monthly summaries of each account with month and year-to-date totals....create a suspense file to remind you of coming expenses....Reports generated included Check Register (for any month), notes to Check Register, Income/Expense Distribution Report, Statement of Selected Accounts, Bank Reconcile Statement, Suspense File and Full Account Distribution Statement **$74.95***

(10) **LIBRARY 100** (The Bottom Shelf)....100 Programs on a broad range of topics....Finance.....Education....Graphics....Home....Games....CASSETTE VERSION **$49.50**
DISK VERSION **$74.95**

(11) **ADVENTURE** (by Scott Adams).....A series of games (for ages 10-99).....wander through enchanted worlds seeking treasures.....1. Adventureland.....2. Pirate's Adventure.....3. Mission Impossible Adventure.....4. Voodoo Castle.....5. The Count.....6. Strange Odyssey.....7. Mystery Fun House.....8. Pyramid of Doom.....9. Ghost Town.....(#1 and #2 recommended for the movie adventure).....Each adventure **$14.95** (jon cassette).....Diskette versions sold in groups of three at **$39.95** per three programs (#1 - #3, #4 - #6, #7 - #9).

(12) **HORSE SELECTOR II** (Dr. Hal Davis).....New simplified version of the original Horse Selector (for flats).....The first Horse Selection System to actually calculate the estimated offs for each horse....easy to follow rules....uses 4 factors (speed rating, track variant, distance of the present race, distance of the last race).....calculated estimated odds.....FREE DUTCHING TABLES allows betting on 2 or more horses with a guaranteed profit **$50.00**

(13) **MON-3 and MON-4** (Howe Software).....Powerful utility programs enabling you to interact directly with your **TRS-80** in MACHINE LANGUAGE.....The monitor comes with complete 40-page instruction manual making it useful for both the beginner and advanced programmer.....simple commands make it easy to use.....functions include DISPLAY, DISASSEMBLE, MOVE and COMPARE, SEARCH, MODIFY, RELOCATE, PRINT, READ and WRITE, UNLOAD, SAVE and READ, INPUT and OUTPUT, SEND and RECEIVE.....MON-3 **$39.95** (for cassette).....MON-4 **$49.95** (for disk).

(14) **SMART TERMINAL** (Howe Software).....enables your TRS-80 to be used as a remote terminal to a time sharing computer system **$69.95**

(15) **FAST SORT** (Howe Software).....a series of machine-language subroutines to sort data from BASIC programs.....data may be alphabetic (string) or numeric.....easily interfaced with your BASIC programs (no machine language knowledge is necessary) **$9.95**

(16) **MAILING LIST** (Howe Software).....maintains mailing lists of over 1000 names.....commands allow adding, changing, deleting, and finding names. Sorting is done in machine language subroutine.....labels printed in 1, 2 or 3 columns **$69.95**

(17) **HOME BUDGET** (Howe Software).....combines the maintenance of your checkbook with analysis of your income, expenses and monthly bills. Handles data including bills, income, deposits, checks and debits to your checking account, and cash expenses. Computes checkbook balance, list of unpaid bills, monthly and year-to-date summaries of income and expenses showing income tax deductions.....All output printed on video display or line printer.....comes with complete instructions manual **$49.95***

(18) **SMALL BUSINESS ACCOUNTING** (Howe Software).....Based on the DOME BOOKKEEPING SYSTEM.....keeps track of all income, expenditures and payroll for a small business of up to 16 employees.....income and expenditures can be entered on a daily, weekly or monthly basis.....computes monthly and year to date totals.....manual contains complete instrucitons for customization Cassette version **$29.95**.....Diskette version **$49.95**

(19) **REMODEL-PROLOAD** (Racet Computes).....Renumber program lines.....move statements from one part of a program to another **$34.95**

(20) **GSF** (Racet Computes).....Lightning fast in-memory machine language sort utility that can be made part of your BASIC progams without any machine language knowledge.....includes several other utilities to speed up your BASIC programs.....no machine knowledge necessary to use GSF in your BASIC programs **$30.00**

(21) **DOSORT** (Racet Computes).....includes **GSF** (above).....extends the in memory sort to sorts on multiple disk drives **$45.00***

(22) **COPSYS** (Racet Computes).....allows the user to make copies of machines language cassettes without any knowledge of machine language **$20.00**

(23) **COMRPOC** (Racet Computes).....an auto load program for disk users.....allows the user to insert a diskette into their **MOD-III** and have the computer take over all loading.....load a machine language program, BASIC, RUN a certain program all without pressing a single button .....allows your computer to perform 10, 20, 30 or more functions without pressing a single button **$30.00***

(24) **INFINE BASIC** (Racet Computes).....adds a variety of machine language subroutines to your BASIC programs (without any machine language knowledge).....fast sorts.....matrix operations .....compress and uncompress data.....and more **$60.00**

(25) **INFINITE BUSINESS** (Racet Computes).....an add on package to **INFINITE BASIC**.....adds a variety of routines important to the businessman (increase accuracy of calculations and more) **$30.00**

(26) **DMS** (Racet Computes).....lightning fast machine language sort.....sorts up to 4 disk drives of information **$90.00***

(27) **BLINK** (Racet Computes).....allows you to RUN new programs without losing the variables stored in your previous program.....line many programs together without losing important variables **$30.00***

(28) **KFS-80** (Racet Computes).....now you can use ISAM (Index Sequential Access Files) on your **MOD-III**.....using ISAM in your BASIC programs allows instant access of your items in your data files.....use with mail programs.....inventory programs.....etc. **$100.00***

(29) **MAIL LIST** (Racet Computes).....all routines are in machine language allowing for quick access **$75.00**

* **FOR DISK ONLY**

H & E COMPUTRONICS INC. MATHEMATICAL APPLICATIONS SINCE 1974 ↙9

50 N. PASCACK ROAD
SPRING VALLEY, NEW YORK 10977

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

master charge

24 HOUR ORDER LINE
(914) 425-1535

VISA

↙See List of Advertisers on page 306

See if you get the point of this programming exercise.

The Dot Game

Arthur J. Welcher
360 S. Wetherly Drive
Beverly Hills CA 90211

If you really want to learn how to program, write a game," said my experienced friend when I took delivery of my TRS-80.

I began to visualize knights on horseback, castles with hundreds of rooms, fields of men and artillery, airplanes and rocket ships in the skies, and I could see what my friend was talking about!

I shall not fall into the trap of endless revising, I thought. I shall select a simple game for my first attempt. An old standby, maybe some graphics just to make it interesting. I finally came up with the Dot Game. It hasn't been overdone, in fact, it has been almost forgotten! It has pre-planned moves, and easy graphics; perfect!

Remember the Game?

In case you don't remember, the game of connecting the dots goes like this: Each player takes a turn where he draws a line to connect two adjacent dots, either vertical or horizontal. If you are able to complete a simple box with your line, you score a point and receive another turn. Whoever has the most boxes when the game board has been completed, with all dots connected, is the winner.

To begin, lay out the game board in lines 5000 to 5170.

First, you must establish the move subroutine in line 2000 to 3040 depending on whether it is a horizontal or vertical move. For a vertical move, go from the top coordinate to the bottom coordinate and from the left coordinate to the right for a horizontal move.

Also, when the letter of the coordinate is entered it must be followed by a comma, and then the number. For example: a legitimate horizontal move, going from left to right, would be B, 3 ENTER to B, 4 ENTER. A legitimate vertical move, going from top to bottom, would be C, 7 ENTER to D, 7 ENTER.

This works, and I settled for it, but you don't have to. You could modify the program to take the coordinates without the comma using a VAL(RIGHT$(X$,1) and VAL(LEFT$(X$,1) or you could modify it so that it is possible to enter it right to left as well (IF M>N THEN N1 = N:M1 = M: M = N1:N = M1).

After each move, we go to the scoring subroutine at lines 5500 to 5520. This subroutine checks to see if the line can complete a box. In the case of a horizontal line, the box above and the box below the move are scanned by using the Point command to see if a line exists for each of the other three sides. For a vertical move, the program uses the same process to determine possible boxes to the left and right of the entered line.

If you have a completed box, a score will tally and you will be returned to line 5179 to make another move. At the end of your moves, the score will register on the board, and it will become the opponent's move.

Originally for Two

I originally wrote this program for two players, but I decided that if the computer could scan your move, it could also take the move to complete a box. If the computer cannot make a box, it would take a random move. All of this happens in lines 5522 to 7166.

This routine was written to start its scan at coordinate A, 1. The computer takes a few moments to scan the entire board looking for a box to complete. This works well, so I settled for it. But I have used a little logic since then, and decided that the scan need only start one line above, and one row to the left of the last move in order to discover if your move created three sides of a box. If you begin to tire waiting for the computer to make its move, try making this change in the program yourself.

I hope you have as much fun with it as I did.■

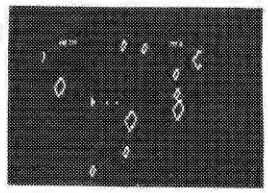
```
 5  CLS
 6  Z=0
 7  T=0:O=0:S=1
10   PRINT"THIS IS THE GAME OF CONNECTING DOTS"
20   INPUT"ENTER PLAYER 1 HERE";A$
25   INPUT"IF YOU WANT TO PLAY THE COMPUTER ENTER 1 ELSE
       2";A
27   ON A GOTO32,30
30   INPUT"ENTER PLAYER 2 HERE";B$
31   GOTO1000
32 Z=1:B$="COMPUTER"
```

Program continues

Games from BIG FIVE will turn your computer into a

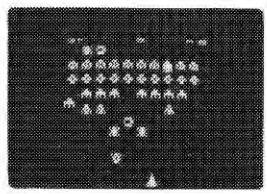
TRS-80 HOME ARCADE

SUPER NOVA©



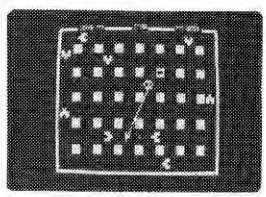
If you and your TRS-80 have longed for a fast-paced arcade-type game that is truly a challenge, then **SUPER NOVA** is what you've been waiting for. In this two player machine-language game, large asteroids float ominously around the screen. Suddenly your ship appears and you must destroy the asteroids before they destroy you! (But watch out because big asteroids break apart into little ones.) The controls that your ship will respond to are thrust, rotate, hyperspace, and fire. All right! You've done it! You've cleared away all the asteroids! But what is that saucer with the laser doing? Quick! You must destroy him fast because that guy's accurate!

GALAXY INVASION©



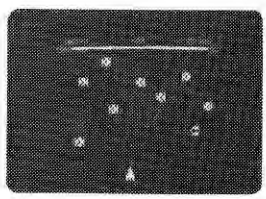
The sound of the klaxon is calling you! Cruel and crafty invaders have been spotted in battle formation warping toward Earth at an incredible speed. Suddenly, your ship materializes just below the huge flock of invaders. Quickly and skillfully you shift right and left as you carefully fire your lasers at them. But watch out! A few are breaking out of the convoy and flying straight at you! As the whine of their engines gets louder, you place your finger on the fire button knowing all too well that this shot must connect—or your mission will be permanently over! With sound effects!

ATTACK FORCE©



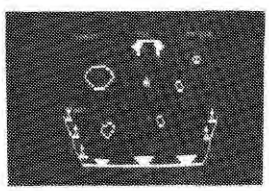
Your TRS-80 screen has been transformed into a maze-like playfield for this game. As your ship appears on the bottom of the screen, eight alien ramships appear on the top. All of them are traveling at flank speed directly at you! Quickly and boldly you move toward them and fire missiles to destroy them. But the more aliens you destroy, the faster the remaining ones become. If you get too good you must endure the wrath of the keeper of the mazefield: the menacing "Flagship". You must destroy him fast because, as you will find out, that guy's accurate! With sound effects!

COSMIC FIGHTER©

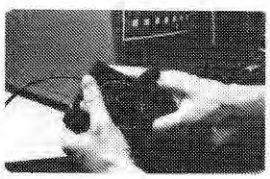


With thousands of stars whizzing by you, your **SPACE DESTROYER** ship comes out of hyperspace directly under a convoy of aliens. Almost effortlessly, you skillfully destroy every last one. But before you can congratulate yourself, another set appears. These seem to be slightly more intelligent than the first set. Quickly you eliminate all of them, too. But your fuel supply is rapidly diminishing. You must still destroy two more sets before you can dock with your space station. All right! The space station is now on your scanners! Oh no! Intruders have overtaken the station! You must skillfully fire your neutron lasers to eliminate the intruders from the station before your engines run out of fuel and explode! With sound!

METEOR MISSION II©



As you look down on your space viewer you can see the stranded astronauts that are crying out for you to rescue them. But first you must maneuver your shuttle down through the asteroids & meteors before you can reach them. Great! You've got one! But now can you get back to the space station to save your fellow shipmate or will you crash and kill both of you? You can fire your lasers to destroy the asteroids, but watch out, because there could be an alien FLAGSHIP lurking behind! Includes sound effects!



NEW JOYSTICKS!

For $39.95 it's now possible to have the famous ATARI joystick interfaced with your Model 1. All of our tapes are now completely compatible with the joystick. Packaged with complete instructions, you can even use it with your own programs! If your old tapes do not say "Joystick Version" on them and you wish to exchange them for new Joystick versions, enclose $2 and your old tape. (Call or write for info on Mod 3 joysticks.)

BIG FIVE SOFTWARE

✓357

P.O. Box 9078-185, Van Nuys, California 91409

For MC/Visa or COD orders, call (213) 782-6861 from 9am-5pm Pacific time.

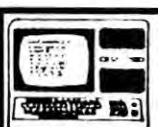
Prices per game: Level 2, 16K Mod 1/Mod 3—$15.95
Level 2, 16K Mod 1/Disk—$17.95

10% discount for 2 items, 15% for 3 or more. (Including Joystick)
Please add $1.50 postage/handling, Calif. residents add 6% tax.
All games are written in machine language and supplied on cassette.
Disk versions save high scores to your TRSDOS or NEWDOS diskette.

Cassette versions require 16K memory, disk versions require 32K.
We accept checks, money orders, and MC/Visa orders.
All games ©1980 by Bill Hogue & Jeff Konyu.
TRS-80 & TRSDOS are trademarks of Tandy Corp.
NEWDOS is a trademark of Apparat, Inc.
Dealer inquiries invited.

```
40  CLS
1000  REM.
1010  A=10:B=13:C=16:D=19:E=22:F=25:G=28:H=31:I=34:J=37
1020  K=22+((N-1)*8)
1025  GOTO5000
1070 REM IF M-N>1 THEN5180
1080 REM IF P-L>3 THEN5180
1090  IF (M>N)AND (P=L) THEN2000
1100  IF (M=N)AND (P>L) THEN3000
2000  K=22+(N-1)*8
2005  FOR X=K TO K+8
2010  SET(X,L)
2020  NEXTX
2030  GOSUB5185
2040  GOTO5500
3000  FOR Y=L TO L+3
3010  SET(22+((N-1)*8),Y)
3020  NEXTY
3030  GOSUB5185
3040  GOTO5515
5000  REM.GAME BOARD
5001 CLS
5060
5070  FOR W = 1 TO 10
5080 PRINT@133   +4*W,W;
5090  NEXTW
5110  PRINT@196,"A":PRINT@260,"B":PRINT@324,"C":PRINT@3
     88,"D":PRINT@452,"E"
5120  PRINT@516,"F":PRINT@580,"G":PRINT@644,"H":PRINT@7
     08,"I":PRINT@772,"J"
5130 FORY=10 TO 37 STEP3
5140 FORX=22 TO 94 STEP 8
5150  SET(X,Y)
5160 NEXT X
5170 NEXT Y
5175  PRINT@0,"SCORE "A$,T;TAB(40);B$;O
5176  IF(Z=1)AND (S=2)=-1 THEN5185
5177  A=10:B=13:C=16:D=19:E=22:F=25:G=28:H=31:I=34:J=37
5178  IF S=2 THEN5183
5179 DEFINT L,P:PRINT@896,"
                          "
5180  PRINT@896  ,A$;"'S TURN  ""NUMBER-LETTER";:INPUTN
     ,L$
5181 L=(ASC(L$)-57)+2*(ASC(L$)-64)
5182 GOTO5190
5183  PRINT@896  ,B$;"'S TURN","NUMBER-LETTER";:INPUTN,
     L$
5184 L=(ASC(L$)-57)+2*(ASC(L$)-64):GOTO5190
5185  PRINT@898  ,B$;"'S TURN - LET ME TAKE A LOOK": RE
     TURN
5190  PRINT@896,"    " , "END NUMBER-LETTER";:INPUTM,P$
5191 P=(ASC(P$)-57)+2*(ASC(P$)-64)
5200  GOTO1070
5490  CLS
5500 REM
5501 IF POINT(23+(N-1)*8,L)AND POINT(23+(N-1)*8,L+3)=-1
      THEN5509
5503  IF POINT(23+(N-1)*8,L)AND POINT(23+(N-1)*8,L-3)=-
     1 THEN5512
5506  GOTO5600
5509  IF POINT(22+(N-1)*8,L+1)AND POINT(22+N*8,L+1)=-1
     THEN5522
5512  IF POINT(22+(N-1)*8,L-1)AND POINT(22+N*8,L-1)=-1
     THEN5522
5513  GOTO5600
5515  IF POINT(22+(N-1)*8,L+1)AND POINT(22+N*8,L+1)=-1
     THEN5518
5516  IF POINT(22+(N-1)*8,L+1)AND POINT(22+(N-2)*8,L+1)
     =-1 THEN5519
5517  GOTO5600
5518 IF POINT(23+(N-1)*8,L)AND POINT(23+(N-1)*8,L+3)=-1
      THEN5522
5519  IF POINT(23+(N-2)*8,L)AND POINT(23+(N-2)*8,L+3)=-
     1 THEN5522
5520 GOTO5600
5522  IF S=1 THENT=T+1:GOTO5175
5525  IF(Z=1)AND (S=2)=-1 THENO=O+1:GOTO6000
5530  IF S=2 THENO=O+1:+5175
5600  IF(Z=1)AND (S=1)=-1 THEN5660
5601  IF(Z=1)AND (S=2)=-1 THEN5650
5605  IF S=1 THEN5640
5610  IF S=2 THEN5650
5640  S=2:GOTO5175
5650  S=1:GOTO5175
5660  S=2:GOTO6000
6000  A=0:B=0:C=0:D=0:E=0:F=0:H=0:I=0:J=0:G=0
6001  S=2
6005  FOR Y=10 TO 34 STEP 3
6010  FOR X=22 TO 86 STEP 8
6015  A=X+1
6016  B=(X-14)/8
6040  E=POINT(A,Y)
6050  F=POINT(X,Y+1)
6060  G=POINT(X+8,Y+1)
6070  H=POINT(A,Y+3)
6090  IF (E=-1)AND (F=-1)AND (G=-1)AND (H=-1)=-1 THEN62
     40
6100  IF(E=-1)AND (F=-1)AND (G=-1)=-1 THENN=B:L=Y+3:M=B
     +8:P=Y+3:GOTO1090
6120  IF(E=-1)AND (F=-1)AND (H=-1)=-1 THENN=B+1:L=Y:M=B
     +1:P=Y+3:GOTO1090
6130  IF(E=-1)AND (G=-1)AND (H=-1)=-1 THENN=B:L=Y:M=B:P
     =Y+3:GOTO1090
6140  IF(F=-1)AND (G=-1)AND (H=-1)=-1 THENN=B:L=Y:M=B+8
     :P=Y:GOTO1090
6175  IF(E=-1)AND (F=-1)=-1 THEN6240
6180  IF(E=-1)AND (G=-1)=-1 THEN6240
6190  IF(E=-1)AND (H=-1)=-1 THEN6240
6200  IF(F=-1)AND (G=-1)=-1 THEN6240
6210  IF(F=-1)AND (H=-1)=-1 THEN6240
6220  IF(G=-1)AND (H=-1)=-1 THEN6240
6225  IF (E=-1) THEN6240
6230  IF(F=-1) THEN6240
6240  NEXTX
6250  NEXTY
6260  N=RND(9)
6261  L=RND(9)*3 +10
6265  A=10:B=13:C=16:D=19:E=22:F=25:G=28:H=31:I=34:J=37
6270  GOTO1090
7160  N=B:L=Y:M=B+8:P=Y
7161  GOTO1090
7165  N=B:L=Y:M=B:P=Y+3
7166  GOTO1090
```

Program Listing 1



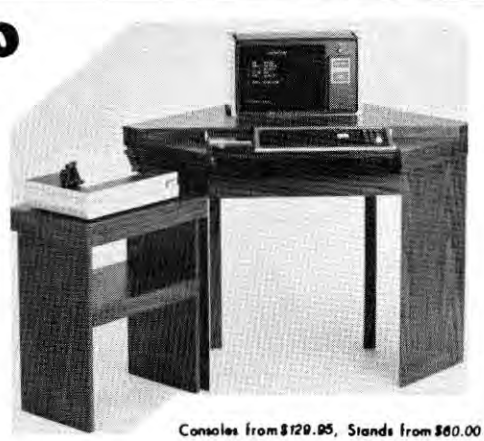
HOMES for TRS-80

(Custom furniture for MODELS I, II, and III)

Homes for TRS-80, is the unique custom furniture line that converts the Radio Shack modular computer system into one homogenious unit. Available in a high quality, commercial and economy series, the basic custom corner desk consoles provide total built-in capabilities for the TRS-80 keyboard, interface, monitor, and cassette. Options are available for building in accessories such as: Stringy Floppy's, Disk Drives, Screen Printers, and Line Printers.

FEATURES

- One Homogeneous Unit
- Built-in Accessories
- Arm Rest Cushion
- Copy Shelf
- Typewriter Height



Consoles from $129.95, Stands from $60.00

AVS AUDIO - VIDEO SYSTEMS

#146

2485 Autumnvale Dr. San Jose, CA. 95132

— FOR 24 HOUR INFORMATION —

PHONE 408-946-1265

TRS-80* MODEL I UPGRADE

*Registered Trademark of Tandy

If you're tired of waiting for your TRS-80* and need more processing power but don't need the hassels of changing software, the MicroC PCP may be **The 225% Solution.** Simply plug the MicroC PCP into the keyboard expansion port. No installation. No traces to cut. No holes to drill. No wires to solder. Not a mere clock mod but a whole new 4 MHz Z-80A CPU and support circuitry. Programs run reliably more than twice as fast (2.25 times faster) at the SAME CLOCK SPEED AS THE MODEL II. Special proprietory circuitry speeds RAM accesses. Automatic slowdown circuitry slows the processor to normal speed during disk accesses, with override for 4 MHz disk operation. System desk models now available.

SEE US IN NEW YORK

★ ★ BOOTH 38 ★ ★

NATIONAL TRS-80 MICROCOMPUTER SHOW

MAY 21, 22, 23

ASK ABOUT OUR NEW DISTRIBUTOR POLICY

Send Check for:

$229

includes shipping and handling

VISA, Master Charge, C.O.D.

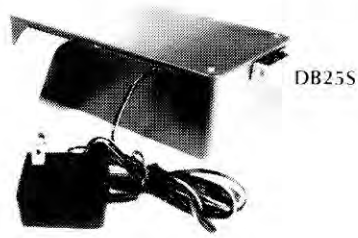
To: **MicroCompatible Inc.**
P. O. Box 106
Scaly Mt., N. C. 28775
(704) 526-2782
8:00 a.m. to 9:00 p.m. EST
↙252

CONVERT YOUR SERIAL PRINTER TO PARALLEL

NEW MODEL UPI-3 SERIAL PRINTER INTERFACE MAKES IT POSSIBLE TO CONNECT AN ASCII SERIAL PRINTER TO THE PARALLEL PRINTER PORT ON THE TRS-80.

Software compatibility problems are totally eliminated because the TRS-80 "THINKS" that it has a parallel printer attached. NO MACHINE LANGUAGE DRIVER NEEDS TO BE LOADED INTO HIGH MEMORY BECAUSE THE DRIVER ROUTINE FOR THE UPI-3 IS ALREADY IN THE LEVEL II ROM! SCRIPSIT, PENCIL, RSM 2, ST80D, NEWDOS, FORTRAN, BASIC etc. all work as if a parallel printer was in use.

The UPI-3 is completely self contained and ready to use. A 34 conductor edge card connector plugs onto the parallel printer port of the model I Expansion Interface or onto the parallel printer port on the TRS-80 III. A DB25 socket mates with the cable from your serial printer. The UPI-3 converts the parallel output of the TRS-80 printer port into serial data in both the RS232-C and 20 MA. loop formats.



Switch selectable options 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
- Parity or No parity
- ODD or EVEN Parity

Price is $139.95 plus $4.00 shipping US, $15.00 Foreign. SPECIFY BAUD RATE 110 TO 4800 WHEN ORDERING. The manual for the UPI-3 is available for $5.00 postpaid.

Our printer interface for the H14 is still available at $29.95 plus $2.00 S&H. Installation requires soldering. See ad Oct 80 p. 189

SPEEDWAY ELECTRONICS
1354 AUBURN ↙275
SPEEDWAY, IN 46224

Also available from
YE ODDE SHOPPE
(317) 925-0496

VISA MasterCard

↙See List of Advertisers on page 306

If you have the bucks, this check writing routine is good to $999,999.99.

Endorse It

Arthur J. Welcher
360 S. Wetherly Drive
Beverly Hills, CA 90211

My friend was telling about his latest acquistion, a check writing program. I asked him what it did, and got the obvious answer, "It writes checks!"

"What do you put in?" I asked.

"Everything," he answered.

"Why not just spindle a blank check into your printer and type out the check?" I asked.

"You sound just like my wife," he answered, and walked away.

It got me thinking about including a check writing program as a part of my own General Ledger program. After all, my cur-

Program Listing 1

```
10000 CLEAR500:INPUT"DOLLARS AND CENTS";X$
10005 P6$="":P5$="":P4$="":P3$="":P2$="":P1$=""
10010 PB$="."
10020 L =INSTR(X$,PB$)
10030 XA$=LEFT$(X$,L):XB$=RIGHT$(X$,2):PC$=XB$+"/100"
10040 ON L-1 GOTO 10150,10140,10130,10120,10110,10100
10090 REM DIGITAL SEPARATION
10100 X6$=MID$(XA$,L-6,1)
10110 X5$=MID$(XA$,L-5,1)
10120 X4$=MID$(XA$,L-4,1)
10130 X3$=MID$(XA$,L-3,1)
10140 X2$=MID$(XA$,L-2,1)
10150 X1$=MID$(XA$,L-1,1)
10170 ON L-1 GOTO          10450,10400,10350,10300,10250
     ,10200
10180 ON L-1 GOSUB 10600,10650,10700,10750,10800,10850
10190 END
10200 X6=VAL(X6$)
10210 ON X6 GOSUB11001,11002,11003,11004,11005,11006,11
     007,11008,11009,11010
10220 P6$=P$+"HUNDRED "
10250 X5=VAL(X5$):P0$=""
10260 ON X5 GOSUB10930,12002,12003,12004,12005,12006,12
     007,12008,12009,12010
10270 P5$=P0$
10300 X4=VAL(X4$):P$ =""
10310 ON X4 GOSUB 11001,11002,11003,11004,11005,11006,1
     1007,11008,11009,11010
10320 P4$=P$ +"THOUSAND "
10350 X3=VAL(X3$):IF X3=0 THEN10400
10360 ON X3 GOSUB 11001,11002,11003,11004,11005,11006,1
     1007,11008,11009,11010
10370 P3$=P$+"HUNDRED ":P$=""
10400 X2=VAL(X2$):P0$=""
10410 ON X2 GOSUB 10905,12002,12003,12004,12005,12006,1
     2007,12008,12009,12010
10420 P2$=P0$
10450 X1=VAL(X1$):P$=""
10460 ON X1 GOSUB 11001,11002,11003,11004,11005,11006,1
     1007,11008,11009,11010
10470 P1$=P$
10480 GOTO10180
10600 PRINTP1$;"AND ";PC$
10610 RETURN
10650 PRINTP2$;P1$;"AND ";PC$
10660 RETURN
10700 PRINTP3$;P2$;P1$;"AND ";PC$
10710 RETURN
10750 PRINTP4$;P3$;P2$;P1$;"AND ";PC$
10760 RETURN
10800 PRINTP5$;P4$;P3$;P2$;P1$;"AND "PC$
10810 RETURN
10850 PRINTP6$;P5$;P4$;P3$;P2$;P1$;"AND "PC$
10860 RETURN
10905 X1=VAL(X1$):IF X1=0 THEN P2$="TEN ":P1$="":GOTO10
     180
10910 ON X1 GOSUB 13001,13002,13003,13004,13005,13006,1
     3007,13008,13009
10915 P2$=PP$:P1$=""
10920 GOTO10180
10930 X4 =VAL(X4$):IF X4=0 THEN P5$="TEN ":P4$="":GOTO1
     0320
10935 ON X4GOSUB 13001,13002,13003,13004,13005,13006,13
     007,13008,13009
10940 P5$=PP$:P4$=""
10945 GOTO10320
11000 REM
11001 P$="ONE ":RETURN
11002 P$="TWO ":RETURN
11003 P$="THREE ":RETURN
11004 P$="FOUR ":RETURN
11005 P$ ="FIVE ":RETURN
11006 P$ ="SIX ":RETURN
11007 P$ ="SEVEN ":RETURN
11008 P$ ="EIGHT ":RETURN
11009 P$ ="NINE ":RETURN
11010 P$="":RETURN
12001 P0$="TEN ":RETURN
12002 P0$="TWENTY ":RETURN
12003 P0$="THIRTY ":RETURN
12004 P0$="FORTY ":RETURN
12005 P0$="FIFTY ":RETURN
12006 P0$="SIXTY ":RETURN
12007 P0$="SEVENTY ":RETURN
12008 P0$="EIGHTY ":RETURN
12009 P0$="NINETY ":RETURN
12010 P0$="":RETURN
13000 REM TEENS
13001 PP$="ELEVEN ":RETURN
13002 PP$="TWELVE ":RETURN
13003 PP$="THIRTEEN ":RETURN
13004 PP$="FOURTEEN ":RETURN
13005 PP$="FIFTEEN ":RETURN
13006 PP$="SIXTEEN ":RETURN
13007 PP$="SEVENTEEN ":RETURN
13008 PP$="EIGHTEEN ":RETURN
13009 PP$="NINETEEN ":RETURN
13010 PP$="TEN ":RETURN
```

rent program makes all the calculations for payroll checks and accepts the entry of accounts payable checks. Why isn't check writing a part of any program of this kind?

One look at a blank check immediately gave me the answer. The blank check calls for the check number, the date, the payee, my signature, and the amount in two places, once in Arabic number form and again in English word form. Thats it!

Most programs are confined to mathmatics or word processing, but a printed check needs a translation from numerics to the written word.

Limitless Checks

I decided to do something about it. I had seen a check that was marked "not valid over two hundred dollars", so it was possible to have a practical limit on the translation. I wanted more room in the program, so I set my limit six places to the left of the decimal point, or "not valid over 999,999.99 dollars". That wouldn't exclude too many check applications.

I gave the program a high starting line number so that it can be merged with an existing program and used as a subroutine. The program is a bit over 2K in length and requires about 130 bytes to execute.

Lines 10010 to 10030 count the columns to the left of the decimal point.

Lines 10100 to 10150 assign a string name to each column. Then, working in reverse, lines 10200 to 10460 do the actual translation decisions, with lines 11001 to 13010 supplying the words, and lines 10600 to 10860 printing the processed number into English.

You must include the two numbers that denote cents. It is necessary to have two digits to the right of the decimal point, even if they are zeros.

Now, to test the program, place a blank check into your printer, and write a check to the author. Any figure up to 999,999.99 is possible. ■

MANAGEMENT SYSTEMS SOFTWARE, INC.

Dr. Jerome S. Osteryoung, renowned business educator, and author of 5 business texts has written the following programs.

1. PROFORMA CASH-BUDGET PROGRAM

Allows the user to project the cash-balances for up to twelve periods in the future. Amount of loan, if needed, is computed as well as computing funds available for short-term investment. **(Price $125)**

2. LEASE-PURCHASE PROGRAM

Evaluates the lease vs. purchase decision incorporating all the latest tax laws including the investment tax credit and accelerated depreciation. This program gives the user all the information necessary to make this decision. **(Price $50)**

3. BUSINESS PROGRAM PACKAGE

13 Business programs (e.g., capital budgeting, cash-management, ratio analysis, debt management). These programs will be very useful to the business manager. **(Price $200)**

4. PROCUREMENT PROGRAM

Ascertains purchase amount when future price of commodity is varying. A must for all managers who have purchasing responsibilities. This program takes into consideration inventory levels, inventory capacity, and financial carrying cost in determining the optimal amount of an item to purchase when future prices are varying. **(Price $150)**

5. COLLEGE ENROLLMENT PROJECTION PROGRAM

Forecasts the enrollment for colleges using several different statistical techniques. User can specify the number of periods for which a forecast is desired. **(Price $100)**

Extensive Documentation With Each Program

Write or call for a brochure which describes the product in greater detail.

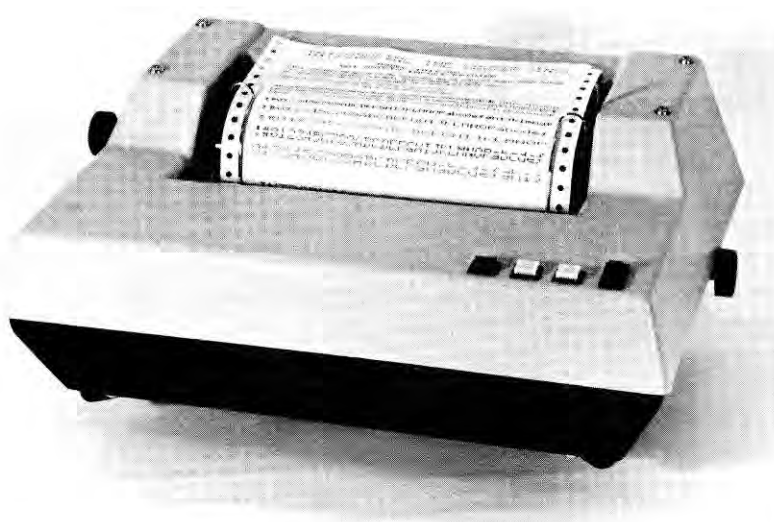
✓87 MANAGEMENT SYSTEMS SOFTWARE INC.

5200 Brittany Drive, #1006 St. Petersburg, Florida 33715
813-864-4347

FEATURES INCLUDE:

COOSOL DATA LOGGER IMPACT PRINTER

- Uses Standard Typewriter Ribbon
- Micro Processor Controlled
- Can Operate Continuously— No Thermal Problems (Has an all metal print head)
- 5 x 7 to Larger 10 x 7 and Larger 10 x 14 Dot Matrix Character Generator
- Standard 96 ASCII Character Font
- Upper and Lower Case Printing
- Up to 88 Characters Per Line
- Single Line Print Rate Is 160 CPS
- Average Print Rate Is 60 CPS For Ten Lines
- Graphics Capability With Extended Character Modes
- Programmable With 32 System Level Software Commands
- Standard Parallel and Serial Interface
- Software and Hardware Reset Interface
- Software Line Counting For Paging
- Baudrate Select From 110 to 9600
- Manual Paper Advance
- Manual Selftest and Reset
- Adjustable Tractor Width From 1 to 9½ Inches
- Interfaces with Apple, Atari, OSI, T.I., TRS-80 and the List Goes On *



$495 Kit, 101B-80KE $545 Assembled & Tested 101B-80E

*Registered Trademarks of Apple Computer Inc., Atari Inc., Ohio Scientific Inc., Texas Instruments Inc., Tandy Corp. respectively.

FACTORY DIRECT

COOSOL, INC. P.O. BOX 743, ANAHEIM, CA 92805 (714) 545-2216 7 Days a Week

✓78

✓See List of Advertisers on page 306

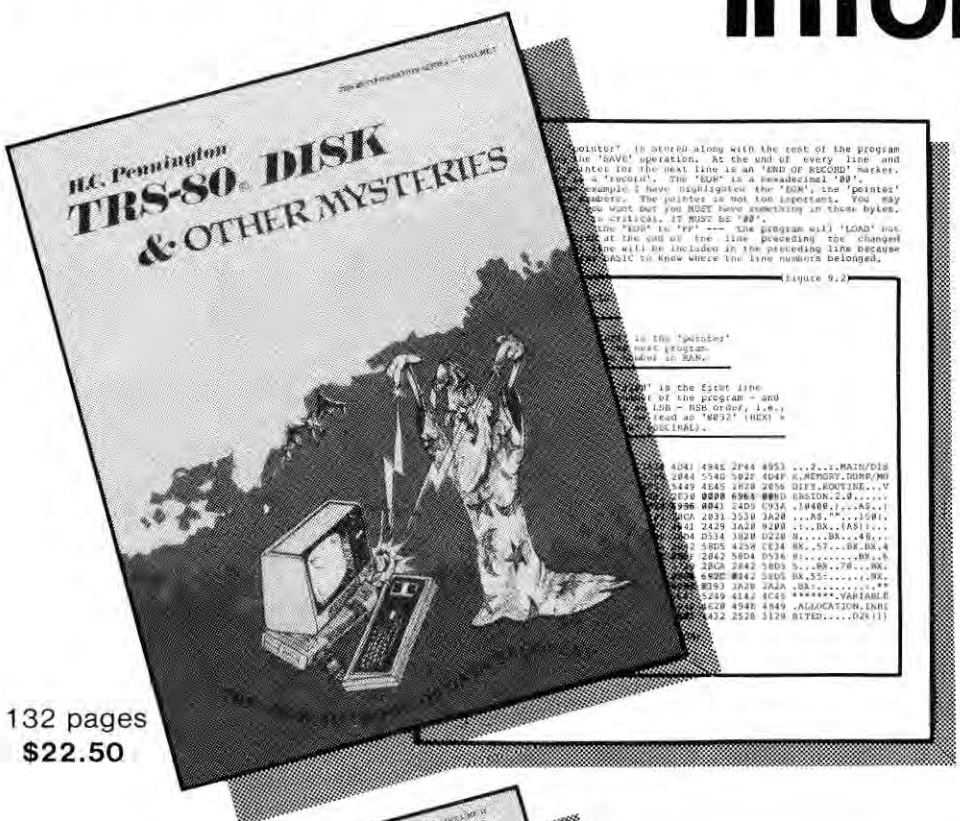
The books you've been waiting for...

Available at an IJG dealer near you!

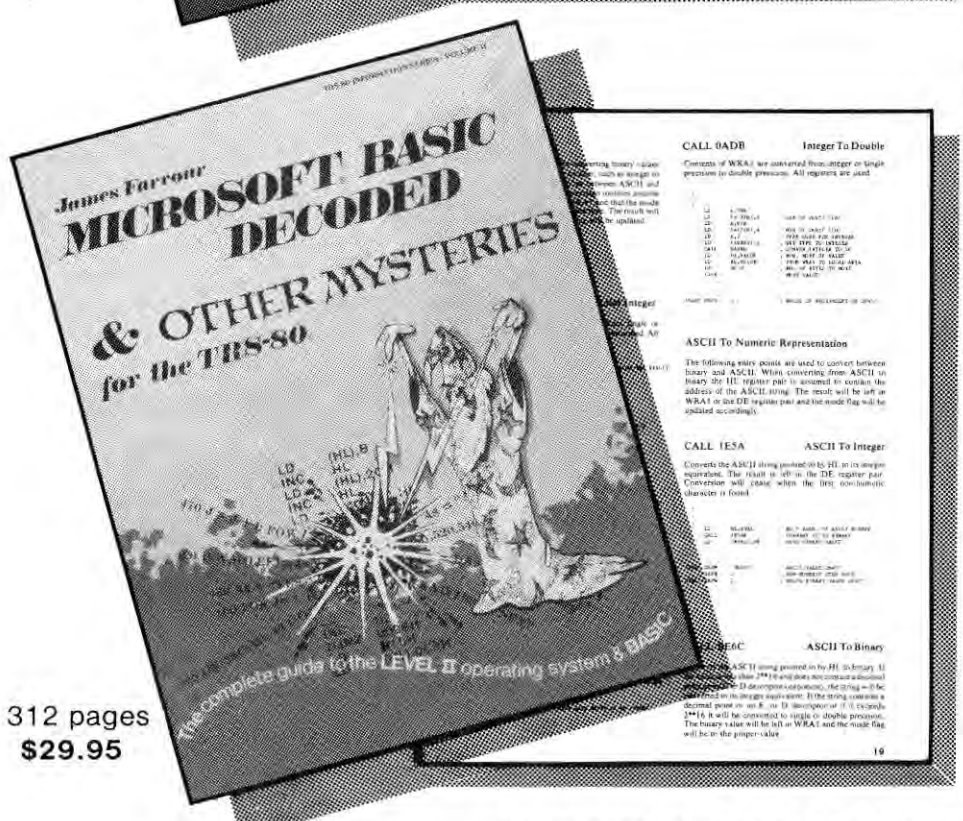
Anderson Computers Huntsville AL
Personal Computer Place Mesa AZ
Simutek Computer Products Tucson AZ
Berkley Microcomputer Berkley CA
Thorpe Dataservices Canoga Park CA
Data Dynamics Cerritos CA
J.K. Gill Cupertino CA
P C Computers El Cerrito CA
Computerland South Bay Lawndale CA
Op Amp Technical Books Los Angeles CA
Small Systems Software Newbury Park CA
Hobby World Northridge CA
Computer Information Exchange Oceanside CA
Kive Computers Oceanside CA
Stacey's Palo Alto CA
Capital Computer Systems Sacramento CA
Computerland San Bernadino CA
Stacey's San Bernadino CA
Computerland San Diego CA
Computer Age Inc San Diego CA
Disney's Electronics San Diego CA
Stacey's San Francisco CA
Computer Store of San Leandro San Leandro CA
M M & T Industries Lompoc CA
Microcomputer Technology Santa Anna CA
Vista Computer Co Santa Anna CA
ET Research Signal Hill CA
Exatron Sunnyvale CA
James Games Computer Center Upland CA
Computers To Go Westlake Village CA
Apparat Denver CO
Software Gourmet Denver CO
Computer Works Westport CT
The Program Store Washington DC
Computer Junction Fort Lauderdale FL
Adventure International Fern Park FL
HIS Computermation Melbourne FL
Boyd Electronics Panama City FL
TAB Sales Company Pensacola FL
AMF Microcomputer Center Tampa FL
Atlanta Computer Mart Atlanta GA
The Bottom Shelf Atlanta GA
Idaho Microcomputers Buhl ID
Garcia & Associates Chicago IL
Radio Shack Associate Store Honolulu HI
Data Domain of Schaumberg Schaumberg IL
Computer Shoppe Metairie LA
Mark Gordon Computers Cambridge MA
Computer City Charlestown MA
Miller Microcomputer Natick MA
Small Business Systems Group Westford MA
A M Electronics Ann Arbor MI
Wizards Arsenal East Lansing MI
Computer Center Garden City MI
Soft Sector Marketing Garden City MI
The Alternate Source Lansing MI
Level IV Products Livonia MI
C & S Electronics Milan MI
Software Shack Belton MO
The Software Center Flourissant MO
Computer Mart Springfield MO
Computer City Manchester NH
Ramworks Milford NH
73 Inc Peterborough NH
Westech Sparta NJ
Industrial Products Corp Albuquerque NM
B T Enterprises Centereach NY
Digibyte Systems New York NY
H & E Computronics Spring Valley NY
Micromini Computer World Columbus OH
Meta Technology Euclid OH
Astro Video Electronics Lancaster OH
Vern Street Products Sapulpa OK
Computer Store Tulsa OK
Sounds Etc Watonga OK
Erie Computer Store Erie PA
VR Data Folcroft PA
Marketline Systems Huntingdon Valley PA
Computerland Mechanicsburg PA
Computer House of Pittsburg Pittsburg PA
Personal Computer Corp Paoli PA
Brodart Inc Williamsport PA
Computerlab Memphis TN
Computer Fort Arlington TX
Quality Software Dallas TX
Waghalter Books Houston TX
Quality Technology Salt Lake City UT
Computer Shoppe Metairie VA
Home Computer Center Virginia Beach VA
Virginia Microsystems Woodbridge VA
H & S Microsystems Blaine WA
Magnolia Microsystems Seattle WA
Personal Computers Inc Spokane WA
Byte Shop of Milwaukee Milwaukee WI
Mc Gill's Australia
Micro 80 Australia
Alpha 1 Micro Canada
EC Data Denmark
A.J. Harding England
Mine of Information England
The Computer Bookshop England
Radcom Electronics Holland
Nordisk Mikro Sweden
Hofacker GMBH West Germany
Interface Age (Europe) West Germany

'.. this is not only a worthwhile book but a great book. My advice is to get it and USE it!' - **William Barden Jr.**

'HOW TWO' information!



132 pages
$22.50



312 pages
$29.95

TRS-80 Disk & Other Mysteries is the definitive **fixit** book for disk users. More than 130 pages of easy to read, entertaining and immensely useful information - find out how to recover disk files, the layout of information on disks, memory maps, problem solutions ... the list goes on!

Many readers have saved days of work by recreating disk files that were unreadable. With more than 14,000 copies sold so far, **TRS-80 Disk** & Other Mysteries has received favourable reviews in several magazines. Yours for only **$22.50** (plus $1.50 shipping, CA residents add $1.35 sales tax).

Microsoft BASIC Decoded & Other Mysteries is the definative guide to your Level II ROMs. With more than 7,000 lines of detailed comments, and 6 additional chapters packed with information, it is easily the biggest and best book about the Level II ROMs available.

Written by James Farvour, the comment section took more than a year to finish - it even includes the changes for the latest ROM sets Edited by Jim Perry, the founding editor of 80 Microcomputing, the text and comments are understandable.

Exploit the full power of Microsoft BASIC, with the aid of more than 300 pages of tested examples, explanations and detailed comments. Only **$29.95** (plus $2.00 shipping, CA residents add $1.80 sales tax).

Pick them up at your nearest IJG dealer, phone your order in or use the coupon.

IJG Computer Services, ↙37
1260 W. Foothill Blvd.,
Upland, CA 91786

Please send me a copy of TRS-80 Disk & Other Mysteries for $22.50 plus $1.50 shipping. ☐

Please send me a copy of Microsoft BASIC Decoded & other Mysteries for $29.95 plus $2.00 shipping. ☐

OK, send me both IJG books for $52.45 plus $3.50 shipping. ☐

Name .....
Address .....
City .....
State ..... Zip .....
Charge my
☐ Mastercard Interbank Code .....
☐ Visa Expiration Date .....
Card Number .....
☐ Check enclosed
☐ Ship COD ($2.00 extra)

Signature .....

'It has twelve thousand one-liners in it, and every one is great!' - **Dennis Kitsz.**

Phone orders (714) 946-5805

IJG Computer Services,
1260 W. Foothill Blvd.,
Upland, CA 91786

↙See List of Advertisers on page 306

Amaze your friends.

The Model I 1/2

Larry Fortna
4722 Montauk St.
Orlando, FL 32808

Do you own an Exatron Stringy Floppy? Are you tired of of having to plug in two ac power cords *plus* a transformer just to power up your system?

Would you like to have a portable system with only one cord?

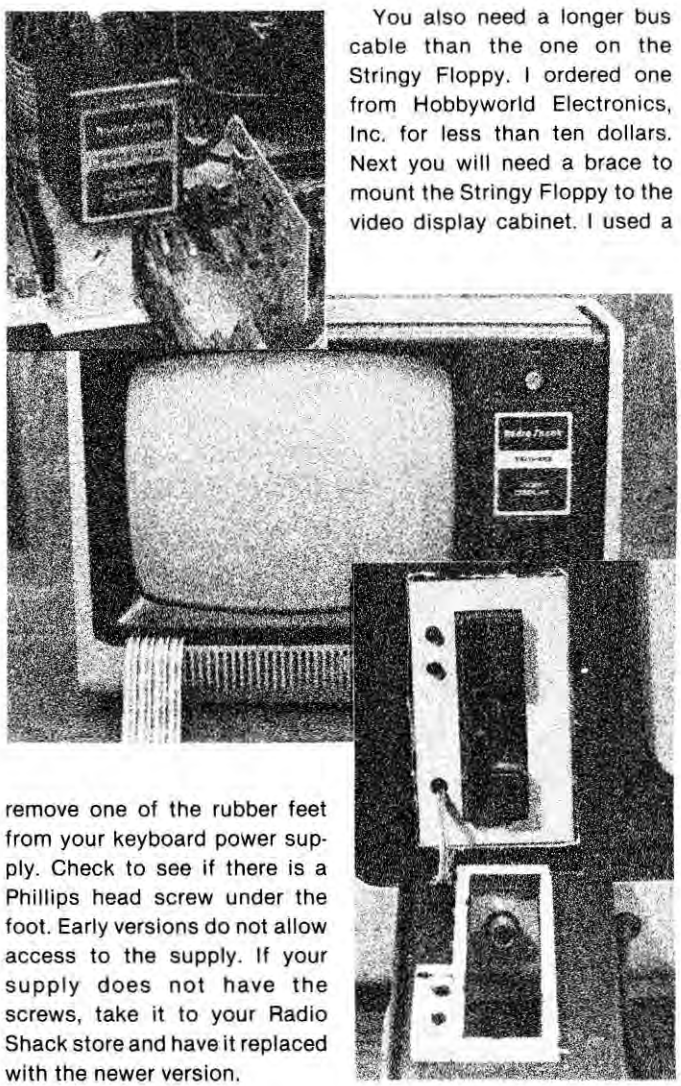
If the answer is yes, and you are a hobbyist with some electronics experience, you'll like this article. I'm going to tell you how I modified my TRS-80 video display to house the Stringy Floppy and the power supply for the TRS-80 keyboard.

Be prepared to spend a couple of evenings installing the modifications. The job is not difficult, but it is time consuming. And before you start, a gentle reminder: *this will void the warranty on the Stringy Floppy and the video display unit.*

You will notice in the photos that the Stringy Floppy is mounted vertically. This does not impair its operation.

Preliminaries

Before you tackle this project, remove one of the rubber feet from your keyboard power supply. Check to see if there is a Phillips head screw under the foot. Early versions do not allow access to the supply. If your supply does not have the screws, take it to your Radio Shack store and have it replaced with the newer version.



You also need a longer bus cable than the one on the Stringy Floppy. I ordered one from Hobbyworld Electronics, Inc. for less than ten dollars. Next you will need a brace to mount the Stringy Floppy to the video display cabinet. I used a metal foundation anchor purchased at a local hardware store. It required some bending and cutting to make into a suitable brace, but serves the purpose.

Lastly, you'll need some assorted sizes of balsa wood and some rubber grommets.

When your new cable arrives, take the covers off the Stringy Floppy unit with a 3/16 inch nutdriver or common screwdriver. Discard the plastic side and metal top covers. They will not be used. Now comes the tedious part. Remove the top of the bus connector at the PC board. This allows you to remove the ribbon cable. Be sure to note the direction of the red stripe.

If you can, press on the new ribbon cable in place of the old one.

This normally takes a special tool. If you can't press on the new cable, then it will be necessary to cut the ends of the ribbon cable to match the notched connector. Then strip 1/32 inch of each strand of ribbon. Tin each wire and place the ribbon cable in place. Solder each strand to the appropriate notch of the connector. With this completed, connect the new bus cable to the keyboard and thor-

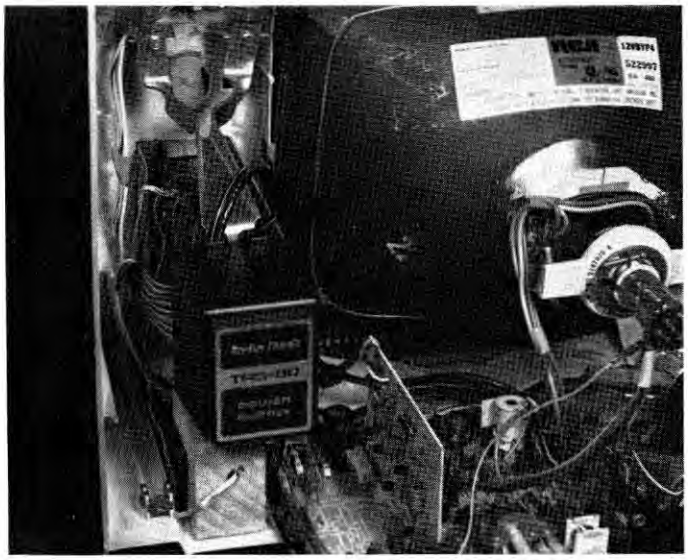


Photo 1. Stringy Floppy Unit Installed with Wood Block Supporting Power Supply

oughly test the Stringy Floppy unit.

Video Cabinet

Remove the rear cover of the video display with a 1/4-inch nutdriver. The Radio Shack logo panel cover will have to be removed by cutting four tabs from the inside of the cabinet. Now comes the hard part: making that first cut into your cabinet. You will need a coping saw blade that is made for cutting plastic. All cutting will be done by hand with only the blade. If you have a keyhole saw with a fine blade, this would work better.

Mark off the area to be cut. The Stringy Floppy case must fit 1/16 inch from the bottom of the ridge as viewed from the front of the display, and 9/16 inches from the right hand side of the ridge. You need to cut a rectangle 2 1/4 inches by 3 7/8 inches. The top of the Stringy cabinet should end up 1/16 inch from the bottom of the upper plastic tuner circle. It is best to cut slightly under size, and then file to exact fit. Place the Stringy Floppy from the back of the display into the cutout frequently while filing to insure the tightest fit.

When the filing is complete, start on the brace. The video display cabinet has two holes for mounting tuners. The brace should be fashioned to mount to these two holes and then fasten to the rear of the Stringy Floppy case.

I used the existing holes in the Stringy case to fasten the brace. It may help to cut a block of balsa wood to fit under the case. This will help hold it in place while you work out the brace. Later, this block of balsa will also serve to hold the transformer that powers the Stringy.

When the brace is completed, cut the balsa block to fit over the Stringy transformer (Photo 1). Then drill a 1/4-inch hole in one end to allow the ac power cord an exit. Unsolder the ac wires at the PC board and run the ac cord through the hole just drilled. Since you will not be needing a long ac cord, cut the wire to a shorter length and resolder it to the PC board.

Next, install a rubber grommet in the newly drilled hole. Pick a grommet with an inside diameter just slightly larger than the power cable.

Now, take the power cable connector off. Use a screwdriver to press in the tabs while you slide the cover off. Unsolder the wires to the power connector, making sure you know where to put them back. Slip the power cord through the grommet and resolder the connector. Put the contrast and brightness bracket back in place.

Mounting the Power Supply

On the bottom of the power supply are four rubber feet. Remove them and you will find four Phillips screws which secure the top half of the power supply. Remove the screws and drill a 1/8-inch hole in the base of the power supply at the point between the exits of the ac power cord and the dc power cable. This hole allows you to mount the power supply to the rear of the Stringy case at the same place where the bracket mounts.

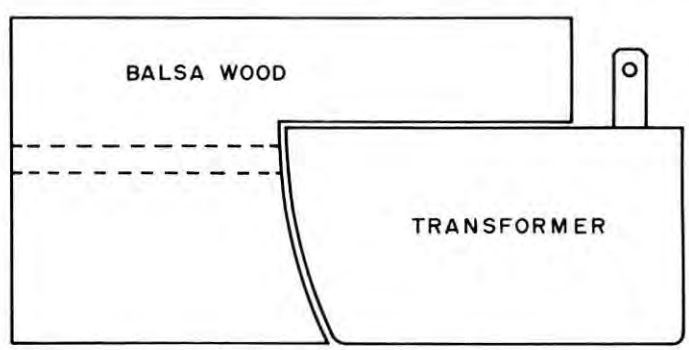


Fig. 1. Balsa Block Cut to Fit Around Transformer

Next comes the power supply for the keyboard. First, you will need a hole in the video display cabinet for the power supply cable. Remove the contrast and brightness knobs. They pull off from the front.

Remove the two screws which hold the knob bracket in place. Now, remove the cable clamp that holds the video cable secure. Slip this clamp back to the PC board where the cable originates. The video cable should now slide freely in the plastic grommet.

Next, drill a 5/16-inch hole in the video cabinet for the power cable. Drill from the back of the cabinet out. I drilled my hole in the center of a protrusion in the plastic directly in line with the contrast and brightness controls.

With the power supply mounted, put the upper half of the supply back on and install two of the four screws you removed and two of the rubber feet. There is not enough room to put all four back on with the supply attached to the Stringy case.

Cut the ac power cord so that it is about one foot long. Cut another one-foot section from the left over cord. This will be used to connect power to the Stringy transformer.

Now, locate the terminal strip on the video chassis as shown in Photo 2. This terminal strip

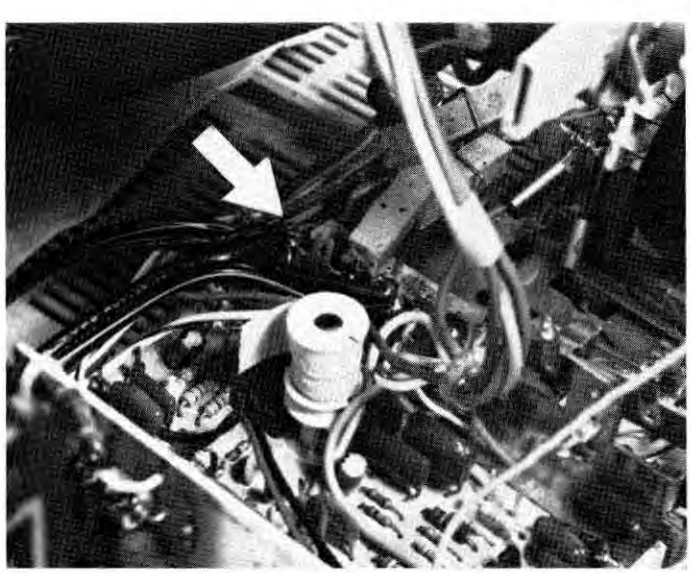


Photo 2. Arrow Points to Terminal Strip on Video Chassis.

NEW FROM MANHATTAN

FOR MODELS I AND III — MANY NOW ON DISK

CASINO BLACKJACK/COUNTER Learn to beat the dealer, or just play for fun, with this most realistic simulation of a casino table ever put on the TRS-80 screen. Does card counting really give the sharp player an advantage? How should you play each type of hand? The program gives you the card count after each hand, plus a recommended bet, and deals tirelessly. I/III — TBJ/C $14.95, TBJ/D $19.95

GIN RUMMY 3.0 The classic computer Gin Rummy game is now even better, with card graphics and faster playing time. Plays a full regulation game, changes strategy to counter your play, allows rearrangement of your hand on each turn, keeps score to game level. I/III — TGR/C $16.95, TGR/D $21.95

CRIBBAGE MASTER Great graphics and strong play. I/III — TCM/C $12.95, TCM/D $17.95

CALCULATOR PLUS makes your TRS-80 a printing calculator. I/III — TPC/C $ 9.95

CHECKBOOK PLUS handles the details of bank statements. I/III — TCB/C $ 9.95

CALCULATOR & CHECKBOOK both on one cassette or disk. I/III — TCC/C $14.95, TCC/D $19.95

E.S.P. LAB Do **you** have ESP? Scientific/fun program. Mod I — TPL/C $ 9.95

THE LISTMAKER II 400 names & codes in 16K, prints lists. Mod I — TLM/C $ 9.95

CONCENTRATION Classic matching game, graphics & sound. Mod I — TCO/C $ 9.95, TCO/D $14.95

LABYRINTH RUN Fascinating/frustrating test of skill. I/III — TLR/C $ 9.95

California residents add 6% sales tax.

24-hour credit card order hotline: (213) 454-8290

Write for full catalog of TRS-80 and Atari software.

VISA — MasterCard

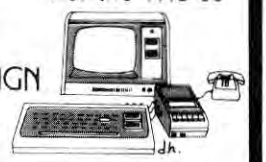
MANHATTAN SOFTWARE ✓90

P.O. Box 35, Pacific Palisades, CA 90272

INTERFACE EXPANSION BOARD

*For the TRS 80**

MD MICRO-DESIGN



The Interface Expansion Board gives your computer these features:

Phone Modem
2K E-PROM OPTION
32 K Memory
Real-Time Clock
Parallel Port
RS-232 Port
Dual Cassette Line
*Floppy Disk Controller**
On Board Supply
Silk Screen
Solder Mask
Expansion Port
Manual

In Stock Now
PC Board & user manual
MDX-1
64.95
MDX-2*
74.95

Add 3.00 for shipping & handling. Texas residents add 5% sales tax.

MANUALS $7.95

FREE PAMPHLET AVAILABLE
Call or write

MICRO-DESIGN ✓379
P.O. Box 18054
Austin, Texas 78760
1-512-458-2937

MasterCharge — VISA

**TRS 80 is a Trademark of Tandy Corp.*

New Software for the New TRS-80 Color Computer

TRS-80* **COLOR** TRS-80*

SPACE INVADERS — The full-feature popular arcade game with super fast HIGH RESOLUTION (128 x 192) graphics and sound. Can you beat the invaders?
16K, cassette $19.95

GAME OF LIFE — Fastest game of LIFE ever in exciting HIGH RESOLUTION graphics. Set up any starting colony and see if it will survive or die.
16K, cassette $19.95

METEOROIDS — Fast, HIGH RESOLUTION graphics game. Destroy meteoroids and alien spaceships before they get you.
16K, cassette $21.95

SPACE TRADERS — Form the largest galactic trading company. For 2 to 4 players. Uses all the graphics and sound potential of EXTENDED COLOR BASIC.
16K, cassette $16.95

ARTILLERY DUEL — Fight computer or friend to destroy his artillery.
4K, cassette $9.95

16K RAM — Expand your 4K system to 16K. No hardware modifications or special tools required. Full instructions included, easy to install.
$39.95

32K RAM — Put an extra 16K RAM inside your computer. No hardware modifications or special tools required. Full instructions. Guaranteed to work.
$89.95

EPROM PROGRAMMER — Program your own 2716 & 2732 EPROMS.
$74.95

EDITOR/ASSEMBLER — Write your own 6809 assembly language programs. Generates system tapes and allows storage of source files on cassette.
16K, cassette $29.95

BUGOUT — Full Feature MONITOR with EDIT, FILL, Register EXAMINE/MODIFY, HEX/ASCII dumps, breakpoints and TRACE, a powerful debugging tool.
4K, cassette $19.95

DISASSEMBLER — The best disassembler for the 6809 available — ANYWHERE. Unlock the secrets of COLOR BASIC. A MUST for the serious programmer.
16K, cassette $14.95

BUGOUT PLUS — BUGOUT & DISASSEMBLER mixed together.
16K, cassette $29.95

MAGIC BOX — Load MODI/III tapes into the color computer. Magic Box will not correct for the difference in video display size.
4K, cassette $19.95

VISA OR MASTERCHARGE ACCEPTED

WRITE FOR COMPLETE CATALOG OF GAMES & UTILITIES

*TRS-80 IS A TM OF TANDY CORP.

SPECTRAL ASSOCIATES
141 Harvard Ave. ✓132
Tacoma, Washington 98466
(206) 475-8483

OSI (8K) APPLE TRS-80†

Computers & Gambling Products Magazine

PRESENTS:

PROBABILITY HANDICAPPING DEVICE 1 — A BASIC PROGRAM FOR: HORSE RACE HANDCAPPING!

This incredible program was written by a professional software consultant to TRW Space Systems. This is a complex program carefully human factored for easy use. It is a comprehensive horse racing system for spotting overlays in thoroughbred sprint races. Your computer will accurately predict the win probability and odds line for each horse based on your entries from the racing form. The next day overlaid horses can be spotted on the track tote board. The user's manual contains a complete explanation of overlay betting plus much more useful information. The appendix contains a detailed tab run of a 100 consecutive race system workout showing **an amazing 50% return** ($1.50 returned for each $1.00 flat wager.) Includes many features such as error correction, bubble sort, line printer output, automatic keyboard debounce, archiving, etc. The manual may be ordered separately for perusal for $7.95 and credit.

CHALLENGER 1P, 2P, or 4P 8K VERSIONS Now Available!
Phd-1 User's manual and cassette for:
Apple II (16K), TRS-80 Level II (16K), Challenger (8K) 29.95
TRS-80 or APPLE DISK 34.95

BRAND NEW FROM SDL: WIN AT THE RACES. This thoroughbred handicapping algorithm is based on a currently popular book on thoroughbred multiple regression techniques. Both sprints and routes. All of the features of PHD-1 plus more. This program incorporates the best data entry technique we've ever seen.
32K TRS-80 or APPLE CASSETTE 34.95
32K TRS-80 or APPLE DISK 39.95

BOOKS:
Winning at the Races 21.95 + .75 P&H
Beating the Races with a Computer 14.95 + .75 P&H

Make checks payable to **JOE COMPUTER DEPT. 8** ✓193
22713 Ventura Blvd., Suite F, Woodland Hills, CA 91364
CA residents add 6 % sales tax.
PHONE ORDERS: 213-992-0514
MasterCharge — VISA

*SEND $2.00 TO PLACE YOUR NAME ON OUR MAILING LIST
†*TRS-80 is a registered trademark of Tandy Corporation*

has six lugs and is directly in front of the terminal strip that has the two fuses mounted.

Strip and tin 1/4-inch of the ac power cord for the power supply and the extra one-foot section. Connect one side of each of the two power cords to lug 1 (closest to the front of the video cabinet). Solder in place. Connect the other side of each of the two power cords to lug 4.

If you are not sure where these lugs are located, use an ohmmeter across the lugs in question. You should read 110 V ac when the power switch on the video monitior is pressed to on.

Strip and tin 1/2-inch from the remaining ends of the extra one-foot power cord and wrap it around the ac power prongs of the Stringy Floppy transformer. Solder these wires to the prongs and wrap with electrical tape.

Take the balsa wood block that you used earlier and cut out a section for the transformer (Fig.1). Glue the transformer to the balsa block. Because of the porous nature of the balsa wood, I used a rubber sealant and adhesive such as is used around bathtubs. This same adhesive can be used to glue the balsa block and transformer to the video cabinet (see Photo 1). Not all adhesives will stick to the video cabinet.

Bus Cable

Drill a series of small holes in the recessed area on the left side of the cabinet under the video screen for the bus cable to exit. File this to size so that the cable can be brought out the front of the display. You must shield the cable to prevent noise from causing bad loads. This can be done by wrapping aluminum foil around the cable from a point three inches from the beginning of the cable at the PC board, to the point where the cable exits the video cabinet.

Now, take a six-inch piece of wire and strip the insulation back one inch at one end. Lay this end of the wire on the aluminum foil. Wrap masking tape or electrical tape around the foil for the length. This will secure the ground wire and prevent shorting out any components on the video board.

Strip about a half-inch from the other end of the ground wire. Attach this under one of the screws which hold the PC board to the Stringy case (one of the two near the bus connector). Run the bus cable under the Stringy case and along the bottom of the video cabinet and out the bus exit opening. Fasten the Stringy Floppy in place with the bracket.

Before you test the Stringy Floppy, make sure that the bus cable is plugged into the keyboard, with pin one of the cable to pin one of the connector. Turn on the power and load a program from a good wafer. If your bus cable is shielded properly, you should have no problems. If you are getting parity errors, go back and check the shielding. If errors persist, recheck everything.

Logo Panel Cutout

When you are satisfied, it is time to cut out the cover to fit over the Stringy Floppy. (See Photos 3 and 4.) Be careful because mistakes will show on the finished product.

This cutout will require a 15/16 inch by three-inch cut for the wafer opening and a 3/8 by one inch opening for the LEDs. The cutout for the wafer opening should start about 1/32 inch from the bottom of the Radio Shack logo.

When these have been made, cut strips of balsa wood to fit around the opening on the inside of the panel. These can be glued in place and painted flat black. If you have scratched the paint where the bus cable exits, the flat black paint will provide a good cover. If the opening for the Stringy Floppy is a tight fit, the logo panel should fit back into place. However, if the logo panel is loose, secure it with some fastener. One method would use Velcron material, or another might use an adhesive to glue it in place.

Wrap Up

All that's left is to put the rear cover back in place. Of course, you'll probably want to invite your friends over to show off, and, why not? You deserve to be a little proud.■

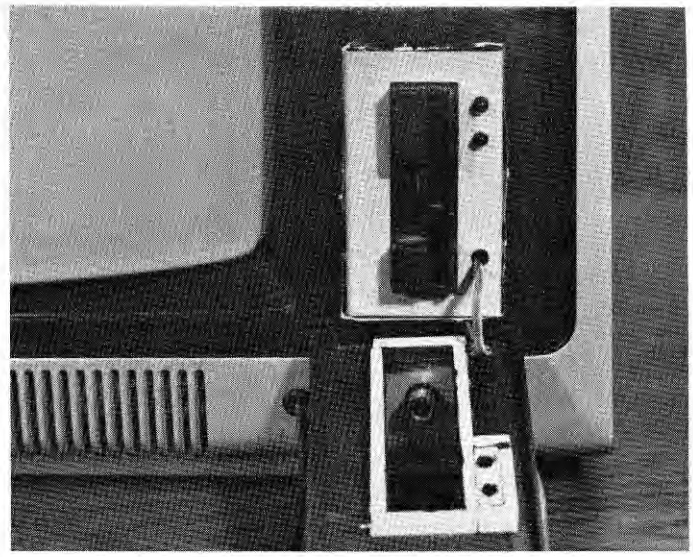


Photo 3. Logo Panel Cut to Fit Over Stringy Floppy

Photo 4. Close-up of Installed Unit

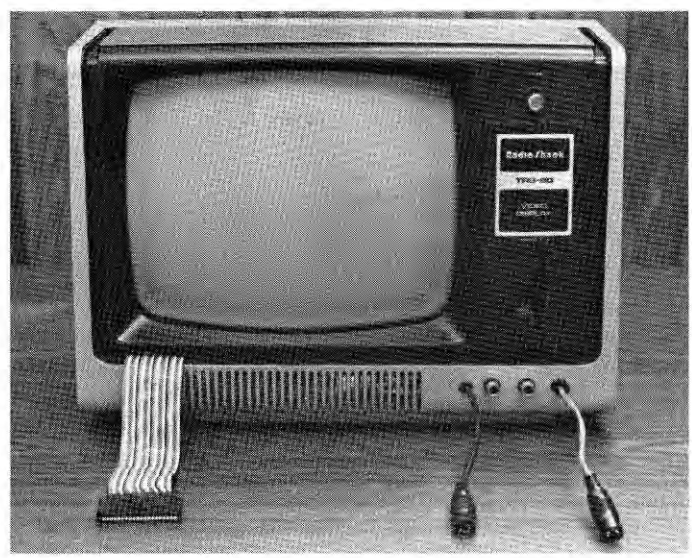


Photo 5. TRS-80 with Stringy Floppy Unit Installed

Some views on less expensive alternatives.

Cost Effective Word Processing

Larry M. Hewin, Ed. D.
VolksMicro Computer Systems, Inc.
202 Packets Court (Suite C)
Williamsburg, VA 23185

The prevalent conventional wisdom is that word processing has arrived. Where conventional wisdom goes wrong is in the belief that useful word processors cost $10-15,000. I believe that this misconception fails to consider a class of word processing systems which can be put together for under $2000. Because of the lack of awareness of the availability of these systems, many teachers, college professors and students, small businesses, authors, and others may miss a system which is affordable and useful.

My own views originally stem from those dark early days when one had to place an order, pray a lot, and wait at least six months for a TRS-80 disk drive. At that time I was faced with writing a report that ran to about 30,000 words. I was equipped with a 32K TRS-80 with expansion interface and a Selectric-type printer, but no disks. I had Shrayer's Electric Pencil and had made the recommended modification for lowercase.

While my system cost a lot more than $2000, it didn't function much differently than cheaper systems. I wasn't wildly enthusiastic about preparing a lengthy report on a cassette-based system, in view of the loading problems and sticking relays then prevalent. But, I was more than pleasantly surprised to discover I had an effective and useful system that not only did the job, but did it efficiently.

I can almost hear the voices out there saying,"He's out of his gourd! Ya just gotta have disks." Well, ya don't. Disks are nice; I have them and rarely use the cassettes. But I found that with experience, a cassette-based word processing system is not as handicapping as you might imagine.

Certain things have made the assembly of a low cost system possible. First is the reduction in price of the basic 16K Level II TRS-80. Second, you can now buy a printer interface cable that costs only $59. Finally, competition and the expanded market have reduced the price of printers substantially.

If you can assemble a cassette-based system for under $2000, a legitimate question is: how much does being limited to cassettes for external storage affect the user?

Limits

Consider the lowest cost approach: using the printer interface cable, effectively restricting the user to the 16K RAM in the keyboard. The first limitation to the system is the number of words or pages which can be stored in active memory.

If I were optimizing a 16K system, I would pick Electric Pencil, which is about 4K long. Scripsit is much longer, leaving less memory for your text. You will have more memory if you opt for the expansion interface + 16K RAM instead of the printer interface cable. But, if the $350 more is important, you can do significant writing with approximately 1000 words in memory at a time. Limited memory is not a loss in output capability, but an increment of additional time and effort to accomplish the output.

Time and Effort

Operating with limited memory, you will have to save text on tape fairly often, which is a good habit to get into anyway, to avoid losing text in the event of power failure or drain.

I partially offset the lost ability to immediately review text on-screen by printing out a draft before I make the tape save. I can thus review the older text from the printed version while the later text is on-screen. The printed copy is also insurance against calamity during or after the save.

Draft printing has another advantage: I usually draft text in the same format as the final copy, allowing me to get a picture of pages as a whole and to reorganize tape saves to begin and end with certain pages or sections. Pencil's ability to append text from tape to text in memory allows you to reorganize the initial tape saves to suit the organization of your paper.

General Observations

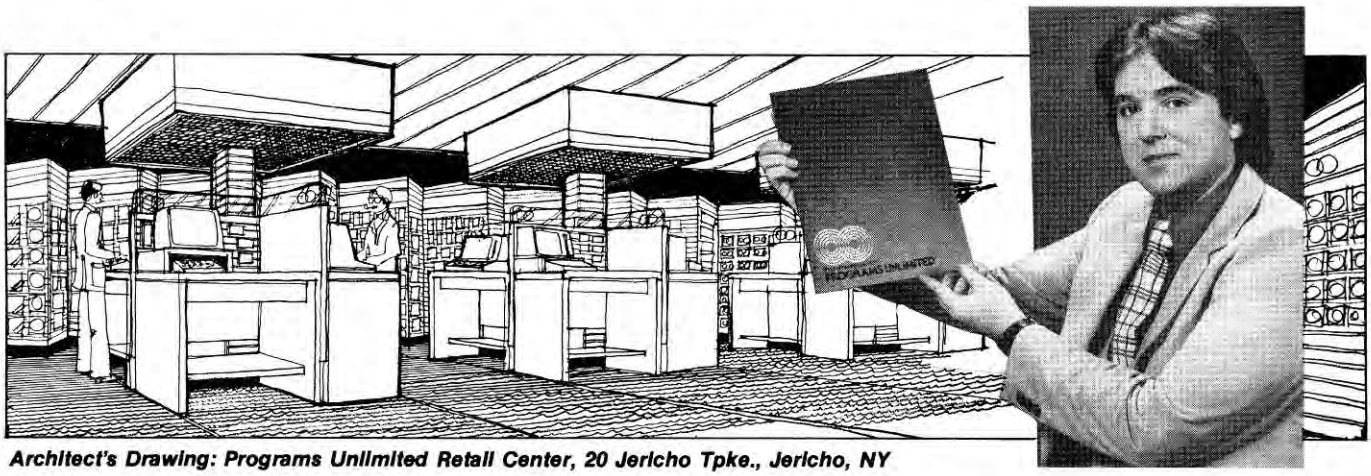
My CTR-41 was modified to provide an audible tone as text is being moved to or from the recorder. This is a mod you can do yourself if you are skilled. It is, in my view, one of the best investments you can make. It not only makes it easy to locate the beginning or end of recorded text, but allows you to turn your attention to other tasks. The tone cues you when the load is finished.

Use a log when saving text on tape, and note the following in it: the tape name or number and

"Behind our mail order catalog is a uniquely reassuring concept:

"A store with no place to hide."

says Richard Taylor, noted software author and President, Programs Unlimited.



Architect's Drawing: Programs Unlimited Retail Center, 20 Jericho Tpke., Jericho, NY

Our first store stocks the same incredibly wide range of software and peripherals that you'll find in our catalog.

With one important difference.

In our store, and in all future PROGRAMS UNLIMITED Retail Centers, **microcomputer owners can see potential purchases demonstrated on the leading micro-computer models they probably own**—including TRS-80s.

What does this mean to you, who may be considering ordering the same items by mail? Simply this:

In our store, we can't hide behind flowery advertising promises or inflated catalog claims.

In our store, we can't hide behind the U.S. Mail, or the safe distance that a long-distance telephone line puts between us and our customers.

Either an item delivers when it's demonstrated or it doesn't. And if it doesn't make it in the store, it doesn't make it into our catalog—period.

If you're in the Greater New York area, we hope you'll visit our first store soon.

If you're not, we hope you'll ask for our catalog. It's chock full of software and peripherals pre-selected to satisfy walk-in customers every bit as demanding as you are.

It has to be. Because in our store, there's no place to hide.

FREE INFORMATION SERVICES: Have questions about your system that you can't get answered elsewhere? Write Programs Unlimited, Information Services Dept., Box 265, Jericho, NY 11753.

This month's specials

EPSON MX-70 PRINTER	$449.00
SUPER HOST—32K Disk	29.95
THE WIZARD—32K Disk	19.95
DIRINDEX—32K Disk	19.95
ZAP—32K Disk	29.95
ORCHESTRA 85	CALL
MESSAGE 80	149.95
LDOS	139.00
DECATHLON	24.95
ZORK—32K Disk	39.95

Ask for our FREE catalog

FULL GUARANTEE

If, within 14 days, you are for any reason dissatisfied with any **Programs Unlimited** purchase, return the merchandise in original condition for a prompt, full refund.

How to order:

BY PHONE: (9 AM—5 PM Monday thru Friday)
- **CALL TOLL FREE (800) 645-6038** (except NY)
- NY State residents call collect (516) 997-8668

COMPUTER TO COMPUTER: (516) 334-3134
BY MAIL: Dept. 481M, Box 265, Jericho, NY 11753

Add $1.00 for postage and handling. NY residents add sales tax. Specials valid through 5/15/81. Subsequent prices subject to change without notice.

master charge THE INTERBANK CARD

VISA

Visit our new Retail Center at 20 Jericho Tpke., Jericho, Long Island, NY. Call (516) 333-2266 for hours & directions.

the software source™

PROGRAMS UNLIMITED™

See List of Advertisers on page 306

side used; the starting and ending CTR counter number; identification of the content of the save; and the word count and record count of the Pencil text.

Use the log to locate the right tape and side, then the counter in conjunction with the audible tone to locate the start of the text. Then load the text; if the word and record count are the same, you probably have a good load of the correct section of text. These techniques are a useful offset to the inability to name text files for loading, saving, and directory functions, that are available with disk operations.

The Printer

You would probably want a daisy-wheel or thimble-type letter quality printer which list at around $3000, making them only the stuff of dreams for most of us. If you concede the letter quality print requirement, there are a number of dot-matrix printers in the $500-800 range that do a nice job.

• TRS-80 16K Level II w/keypad	$849.00
• Printer Interface Cable	59.00
• Lowercase Mod for TRS-80	59.00
• Comprint 912GP w/cable	599.00
• Electric Pencil (tape)	99.00
• Radio Shack Space Saver Desk	49.95
• 2-300' Rolls Comprint Paper	19.00
• Radio Shack Power Line Filter	39.00
• Total	$1772.95

Table 1

I like the Comprint 912GP. It is available at around $600 and uses a 9 x 12 dot matrix to electronically remove an aluminized coating from a black base roll paper, at 225 characters per second. It's fast, prints upper and descending lowercase, the finished copy has a nice appearance (black letters on silver paper), and when it is copied, the 9 x 12 matrix is fine enough to make the copy look like a typed original. The paper comes in 8 1/2" wide rolls and the cost is slightly higher than white fanfold. You don't have to buy ribbons, so you come out about even, but without inky fingers or print density varying with the age of the ribbon.

There are other printers you might want to look at depending on your needs, finances, and skills. Centronics has announced their Model 737 which has an N x 9 dot matrix capability alleged to give letter quality printing, and lists around $1000. Radio Shack has announced that it will offer a nearly identical printer for the same price.

If you are a skilled tinkerer and must have letter quality, consider purchasing a used Selectric and convert it using the Escon or similar kit. You might even find a used Selectric-type printer in your price range. I urge caution in printer selection—the wrong one can cause you trouble.

A Sample System

Table 1 is a selection of components that might make up an inexpensive system. The costs are either list or generally advertised prices.

If you purchase the listed system or a similar one, you will have a useful word processing system. The only sacrifice you will make over an expensive model is in the quality of the printed characters.

In addition, you will have a small general purpose computer, and a base system with almost unlimited expansion possibilities—from the poor man's stringy floppy and cassette speedup systems, to 10-megabyte hard disks and daisy wheel printers. ■

PURE FIG GOODNESS!

Now you can use Forth on your TRS-80 Model I with 16K and a single disk. This is a stand-alone version of the widely accepted Forth Interest Group Model 1.1 with the standard Forth editor. Extensions include disk format/backup, upper and lower case, output to parallel or RS-232 printers, and an 8080 assembler/disassembler. Documentation includes an introduction, glossary, and every single line of the system, including disk drivers and boot up code, all written in Forth!

TRS-80 fig-FORTH for $49.95 Add 2.50 for shipping. Ca. res. add 6% for tax. Order from:

NAUTILUS SYSTEMS

✓55

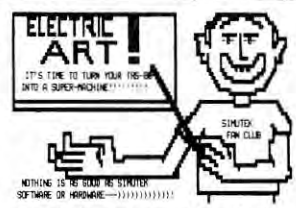
P.O. Box 1098, Santa Cruz Ca. 95061
TRS-80 is a trademark of Tandy Corp.

OKIDATA PRINTER

The Best Printer in the World for the TRS-80!
We'll Stake Our Reputation On It!

Look at the Features!

1) 200 million character head warranty! Better than any competitor!
2) Works under the most demanding business applications!
3) A "Real" 9x7 DOT Matrix Impact Printer!
4) 80 characters per second!
5) Full upper and lower case!
6) Double width characters!
7) *Supports TRS-80 Graphics! See Illustration. (These graphics are exactly the same graphic codes as the TRS-80's. No special software required)*
8) Connects directly to TRS-80 with standard cable!
9) Friction & pinfeed, use roll paper, stationary or regular data paper!
10) 6 or 8 lines per inch
11) 80 and 132 columns.
12) Quiet operation.



Actual photo of printout from Okidata Printer! From Simutek's Electric Artist Program!

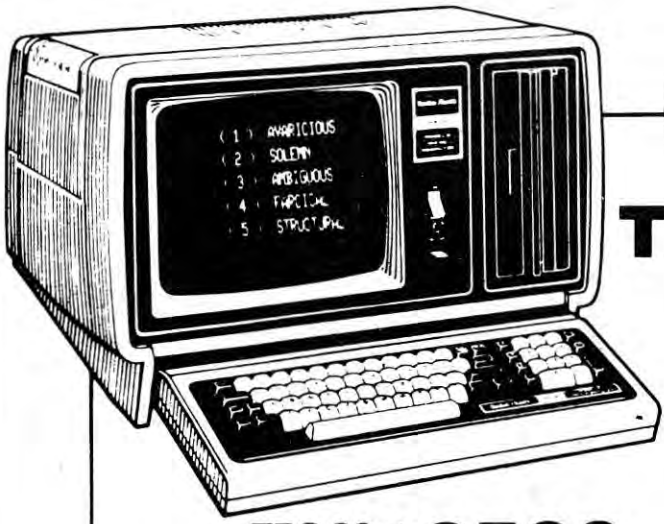
This is the finest printer you can buy at any price for your TRS-80.
Regular List Price **$850.00!**
Tractor Feed Option **$150.00!**
Special Simutek Customer Price Only — $559.00
(Tractor Feed $125.00 Extra)

Catalog #:		
90001	Okidata Microline 80	559.00
90002	Tractor Feed Option	125.00
91411	Cable For TRS-80 Keyboard	55.00
91401	Cable For Expansion Interface	39.00
94401	Cable For Model II TRS-80	39.00

We Accept VISA — Mastercharge — Checks — Money Orders or (C.O.D. $3.00 Extra)
NO TAX ON OUT OF STATE ORDERS! ✓19
Free Shipping In U.S.
Send Orders To: **SIMUTEK, P.O. Box 13687-Z, Tucson, AZ 85732**

Name _____
Address _____
City _____ State _____ Zip _____

Phone orders welcome 24 hours! (800) 528-1149 *Simutek offers other fine products for TRS-80's. Send for free catalog! Arizona residents add 4% sales tax.*
TRS-80 Is A TM of Radio Shack, A Tandy Corp.



Radio Shack®
DEALER

TRS-80™ DISCOUNT

☐ NO OUT-OF-STATE TAX
☐ NO SHIPPING COSTS

TRS-80 MODEL II 64K $3500
PACKS ENOUGH DATA HANDLING POWER FOR MANY SMALL BUSINESSES.

TRS-80 MODEL III
32K-2 DISKS
$2100
NEW PERSONAL COMPUTER . . . REAL-TIME CLOCK, SHARPER CRT IMAGES AND FASTER LOADING CASSETTES

TRS-80 COLOR COMPUTER OR VIDEO $339 each
A LOW COST, COLOR COMPUTER FOR PERSONAL BUSINESS OR ENTERTAINMENT

CERTIFIED CHECKS
CASHIERS CHECKS
OR CREDIT CARDS
MasterCard VISA

PERRY OIL & GAS INC. ✓51
137 NORTH MAIN STREET, PERRY, MICH. 48872
PHONE (517) 625-4161

WARRANTIES HONORED BY ALL RADIO SHACKS • *T.M. TANDY CORP.

Combine accurate flight characteristics with the best in animation graphics and you'll have SubLOGIC's

T80-FS1 Flight Simulator
for the TRS-80

SubLOGIC's T80-FS1 is the smooth, realistic simulator that gives you a real-time, 3-D, out-of-the-cockpit view of flight.

Thanks to fast animation and accurate representation of flight, the non-pilot can now learn basic flight control, including take-offs and landings! And experienced pilots will recognize how thoroughly they can explore the aircraft's characteristics.

Once you've acquired flight proficiency, you can engage in the exciting British Ace 3-D Aerial Battle Game included in the package. Destroy the enemy's fuel depot while evading enemy fighters.

Computer and aviation experts call the T80-FS1 a marvel of modern technology. *You'll* simply call it *fantastic!*

Special Features:
- 3 frame-per-second flicker free animation
- Maximum transfer keyboard input
- Constant feedback cassette loader

Hardware Requirements:
- Radio Shack TRS-80, Level 1 or 2
- 16K memory
- *Nothing else!*

Only $25

See your dealer or order direct. For direct order, include $1.25 and specify UPS or first class mail. Illinois residents add 5% sales tax. Visa and Mastercard accepted.

subLOGIC
Communications Corp.
Box V, Savoy, IL 61874
(217) 359-8482
Telex: 206995 ✓150

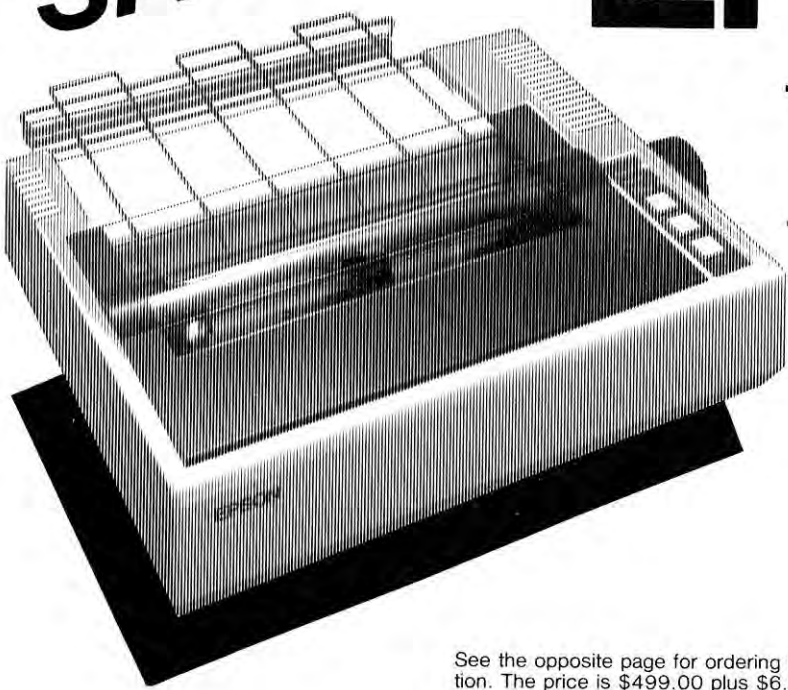
✓See List of Advertisers on page 306

SAVE!

EPSON

MX-80

$499.00



THE REAL THING

Yes, this is the EPSON MX-80 printer you have read so much about . . . the one everyone's buying. Better get yours while they are available at this terrific price! One of the most advanced 80 column dot matrix printers available featuring the world's first disposable print head. There are lots of printers to choose from but, once you have compared, you will find it hard to pass up the Epson MX-80.

FEATURES

- Bidirectional Printing.
- Logicial seeking of shortest lines.
- 80 Characters per second.
- 64 Block Graphics Characters.
- Forms Handling.
- Disposable print head.
- Adjustable Tractor-type pin feed.
- Paper width 4 to 10 inches.
- Inked ribbon cartridge with 3 million character life.
- Self test mode.
- Full 96 character ASCII with decenders.
- Printing Modes: Standard, Double, Emphasized and Double Emphasized.
- Correspondence Quality.

EXTRAS

TRS80 Cable **$30.00**
Apple Cable& Interface **$96.00**
Ribbon Cartridge, Black **$13.95**
RS 232 Interface **$69.95**
ORDER TODAY!!!

See the opposite page for ordering information. The price is $499.00 plus $6.00 for shipping and handling (cont. US). Does not include cable. Complete with David Lien manual.

ANOTHER CHOICE- OKIDATA MICROLINE 80

Here is another fine quality printer available at the outstanding price of $499.00. The Microline 80 has many outstanding features:

- Unidirectional Printing.
- 80 Characters per second.
- 64 Block Graphics Characters.
- Forms Handling.
- Tractor, Pin and Friction Feed.
- Paper Width 4 to 9 inches.
- Self Test Mode.
- Full 96 Character ASCII (no decenders).
- Printing Modes: Standard, Double and Condensed.

Add $6.00 shipping. Does not include cable.

CABLES, SOFTWARE & OTHER GOODIES

- **DRIVE CABLES**
  - **2-Drive** **$26.95**
  - **4-Drive** **$36.95**
  - **Extender** **$16.95**
- **DISKETTES** (5-1/4 in, soft sectored. box of 10)
  - **Cert. one side, single density** **$29.95**
  - **Cert. two sides, double density** . . . **$39.95**
- **OPERATING SYSTEMS**
  - **DOSPLUS 3.2, 3.2D** **$99.95**
  - **NEWDOS/80** **$149.00**
  - **TRSDOS 3.2 DISK & MANUAL** **$17.95**
  - **Double Zap II** (spec. Newdos/80 or VTOS) **$42.50**
  - **VTOS 4.0 MANUAL** **$25.00**
- **OTHER SOFTWARE & BOOKS**
  - **SCRIPSIT (disk)** **$89.95**
  - **SPECIAL DELIVERY** **$119.95**
  - **XTRA SPECIAL DELIVERY** **$189.95**
  - **SUPER UTILITY** **$39.95**
  - **MICROSOFT BASIC DECODED & OTHER MYSTERIES** **$25.95**
  - **TRS80 DISK & OTHER MYSTERIES** **$19.95**
  - **MAKE 80** **$14.95**

SPECIAL

* * * * * * * * *

WORD PROCESSING PACKAGE

Includes the following:

EPSON MX-80 PRINTER & CABLE
SCRIPTSIT (disk),
SPECIAL DELIVERY (disk) & Freight and Insurance.

Special

$725.00

(Reg. $917.00)

ORDER TODAY FROM

AEROCOMP

Redbird Airport, Bldg. 8
P.O. Box 24829
Dallas, TX 75224 ⌐387

See Opposite Page ⇨

THE LATEST

40 & 80 Track "FLIPPY" Drives

for TRS-80*

SELECT YOURS!

- **40-Track "FLIPPY" $349.95** (Model 40-1) 48 TPI, single dens. 125K bytes/side, double dens. 250K/side.
- **80-TRACK "FLIPPY" $459.95** (Mod. 80-1) 96 TPI, single dens. 250K bytes/side, double dens. 500K/side.
- **40 TRACK DUAL HEAD $459.95** (Mod. 80-2) 48 TPI, double-sided, 40 tracks/side; single dens. 250K bytes, double dens. 500K.
- **80 TRACK DUAL HEAD $599.95** (Mod. 160-2) 96 TPI, double-sided, 80 tracks/side; single dens. 500K bytes, double dens. 1 megabytes.

NOTE: All capacity values are unformated. All models capable of single or double density. All with power supply/silver enclosure. 115 VAC, 50-60 Hz. 115/230 VAC available.

REAL VALUE

AEROCOMP offers the best value in microcomputer disc drives on the market today! Reliability, features and cost tough to beat. We deliver...and we stand behind our products, as evidenced by the only FREE TRIAL OFFER in the industry. Examine your systems needs and order today!

MYSTERY REMOVED

There appears to be some confusion in the terminology used to describe disc drives and their features. Here's what we mean:

- **FLIPPY** Allows the use of both sides of a diskette with a single-headed drive by simply turning the diskette over (model 40-1&80-1).
- **TRACK DENSITY** Specified in tracks per inch (TPI). Refers to the number of tracks per radial inch on the diskette. Typically 48 TPI=40 usable tracks and 96 TPI=80 usable tracks.
- **DOUBLE DENSITY** Refers to recording density in bits per inch (bpi). Typically single density means data can be recorded up to 2,938 bpi; double density means data can be recourded up to 5,876 bpi.
- **DOUBLE SIDED** Refers to number of read/write heads. Single-sided is one head, read/write one side only; double-sided is dual heads allowing read/write operations on both sides of the diskette. A double sided drive appears as two seperate drives to the controller. **(Model 80-2 & 160-2)**
- **ACCESS TIME** The time required for the head to move from one track to the next. Typacilly 5 to 40 milliseconds (ms).

STARTER A

40-Track drive, 2-drive cable, TRSDOS 2.3 Disk & Manual, Freight & Ins.

$339.95

(Reg. $380.00)

STARTER B

40-Track FLIPPY drive, 2-drive cable,TRSDOS 2.3 Disk & Manual,Freight & Ins.

$369.95

(Reg. $401.00)

SPECIAL PACKAGES

#1 40-Track FLIPPY drive
2-Drive cable
Newdos/80
Freight & Ins.$459.00(reg.$528.00)

#2 80-Track FLIPPY drive
2-Drive cable
Newdos/80
Freight & Ins. $569.00 (reg.$638.00)

#3 TWO (2) 40-Track FLIPPY drives
4-Drive cable
Newdos/80
Freight & Ins. $785.00 (REG. $893.00)

#4 TWO (2) 80-Track FLIPPY drives
4-Drive cable
Newdos/80
Freight & Ins. $999.00 (reg.$1113.85)

#5 TWO (2) 40-Track DUAL HEAD Drives
Cable
Newdos/80
Freight & Ins. $995.00 (Reg. $1105.00)

#6 TWO (2) 80-Track DUAL HEAD Drives
Cable
Newdos/80
Freight & Ins. $1,245.00
(Reg. $1,385.00)

FREE TRIAL OFFER

Order your AEROCOMP Disc Drive and use it with your system for up to 14 days. If you are not satisfied for ANY REASON (except misuse or improper handling),return it, packed in the original shipping container, for a full refund.(Special packages will be prorated). We have complete confidence in our products and we know you will be satisfied! **ORDER TODAY!!**

WARRANTY

We offer you a 120 day unconditional warrenty on parts and labor against any defect in materials and workmanship. In the event service, for any reason, becomes nescessary, our service department is fast, friendly and cooperative.

100% TESTED

AEROCOMP Disc Drives are completely assembled at the factory and ready to plug in when you receive them. Each drive is 100% bench tested prior to shipment. We even enclose a copy of the test checklist, signed by the test technician, with every drive. AEROCOMP MEANS RELIABILITY!

ORDER NOW!!

To order by mail, specify Model Number(s) of Drive, cable, etc. (above), enclose check, money order, VISA or MASTERCHARGE card number and expiration date, or request C.O.D. shipment. Texas residents add 5% sales tax. Add $5.00 per drive for shipping and handling. Please allow 2 weeks for personel checks to clear our bank. No personel checks will be accepted on C.O.D. shipments-cash, money orders or certified checks only. You will receive a card showing the exact C.O.D. amount before your shipment arrives. Be sure to include your name and shipping address. WE SHIP PROMPTLY! In the event there is a slight delay, you will be notified of the shipping date and we will NOT charge your bankcard until the day we ship!

COMPARE AND BUY AEROCOMP!

	"FLIPPY"	ACCESS TIME (track to track)	HEAD LOAD SOLENOID	DISC EJECTOR	CAPACITY (unformated single density)	EASY-ENTRY DOOR	FREE TRIAL
AEROCOMP	YES	5ms.	YES	YES	250K bytes (both sides)	YES	YES
RADIO SHACK*	NO	40ms.	YES	NO	109K bytes	NO	NO
PERCOM	YES	25ms.	YES	NO	250K bytes (both sides)	YES	NO
MPI	NO	5ms.	YES	YES	125K bytes	YES	NO
SHUGART	NO	40ms.	YES	NO	109K bytes	NO	NO
TANDON	NO	5ms.	NO	NO	125K bytes	NO	NO

Factual material from current manufacturer's data sheets is believed reliable but cannot be guaranteed, comparing Aerocomp Model 40-1 to similar models.

The TRS-80* expansion interface limits the track to track access time to 12ms. *Trademark of Tandy/Radio Shack.

WRITE AEROCOMP TODAY FOR MORE VALUES !!!

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.

Dealers inqiries invited

AEROCOMP
Redbird Airport, Bldg. 8
P.O. Box 24829
Dallas, TX 75224

✓387

✓See List of Advertisers on page 306

Take your screen printer and 80 to the land of the low for less than $10.

Lower Cost Lowercase

Philip M. Van Praag
PO Box 35667
Tucson, AZ 85740

This article describes a lowercase modification and a KB fix for the Radio Shack Screen Printer, as well as a companion lowercase display modification for the TRS-80. These hardware modifications, unlike Radio Shack's, should cost less than $10.

Background

Both the TRS-80 and the Screen Printer contain character generator ICs that are capable of producing lowercase characters. What prevents them from doing this is the manner in which they are addressed.

Before we can describe the address control, however, let's explain the ASCII code used to select character generator outputs.

Table 1 contains the ASCII bit code for numbers, symbols and uppercase/lowercase characters. Each binary bit is either a zero (logic level low) or a one (logic level high). These highs and lows provide unique addresses which tell the character generator which character is needed. The bits to note are 5 and 6.

Notice that the only difference between the uppercase and lowercase versions of the same letter is that bit 5 is always a zero (low) for the uppercase and a one (high) for the lowercase.

Also, bit 6 is always high for letters, and low for numbers and symbols.

In the TRS-80 design, this eliminates the need for a bit 6 video storage IC (called a RAM).

TRS-80 ROM ICs decode each keyboard entry via an internal lookup table, and send the ASCII code to video RAM. Since the ROM output to video RAM never contains lowercase letters, bit 5 is high only when a number or symbol is present. Thus, bit 6 is not needed in this "uppercase only" application.

The Screen Printer prints exactly what you see on the monitor screen; that is, it prints the contents of the video RAM memory. Since the TRS-80 initially does not contain stored lowercase data (does not store bit 6), the Screen Printer synthesizes its own bit 6 for addressing its character generator IC. Since it only has to print uppercase letters and numbers/symbols, it synthesizes bit 6 by inverting bit 5.

The Scripsit program apparently contains its own lookup table to provide ASCII addressing for video RAM, thus providing lowercase letter addresses. All we need to do to modify the TRS-80 for lowercase display is to add a RAM IC to enable storage of bit 6 information.

Due to the bit 6 decoding technique used in the TRS-80, enabling the normal ASCII bit 6 function disables the graphics function. This is overcome by providing a switch to select uppercase/graphics or uppercase/lowercase.

Modifications

The Screen Printer lowercase modification involves disabling the bit 5-to-bit 6 inversion and replacing it with the real bit 6 address line. Implementing the lowercase disables the graphics feature, so again we provide a switch to select graphics or loer case. The printer must latch the incoming data from video RAM. We are now bringing in bit 6, and we must provide a data latch for

$6_5{}_4$	$0_1{}_0$	$0_1{}_1$	$1_0{}_0$	$1_0{}_1$	$1_1{}_0$	$1_1{}_1$
3210	Numbers/ Symbols		Uppercase Alpha		Lowercase Alpha	
0000	(SP)	0	@	P	\	p
0001	!	1	A	Q	a	q
0010	"	2	B	R	b	r
0011	#	3	C	S	c	s
0100	$	4	D	T	d	t
0101	%	5	E	U	e	u
0110	&	6	F	V	f	v
0111	'	7	G	W	g	w
1000	(	8	H	X	h	x
1001	)	9	I	Y	i	y
1010	*	:	J	Z	j	z
1011	+	;	K		k	
1100	,	<	L		l	
1101	–	=	M		m	
1110	.	>	N		n	
1111	/	?	O		o	

Table 1. ASCII code for numbers/symbols and uppercase/lowercase letters.

PMC-80 Expanded

Use all standard peripherals and existing software

When you buy PMC-80 you get hardware and software compatibility with the most popular microcomputer system in the world—that means thousands of disk and cassette based programs and all kinds of peripherals are instantly available!

PMC-80 has configurations that give the computer enthusiast a way to grow from a STARTER system in affordable increments. Begin at a low $675 for the basic 16K level II system and grow to the complete 48K memory system pictured above with two floppy disks for less than $3000.

FASTLOAD option inputs short programs as fast as "disk" from ordinary, standard format cassettes. Fast, reliable and economical!

PMC-80 COMMUNICATOR option provides interface to modems and parallel port printers. Take your pick of peripherals for communication with electronic bulletin boards and low cost timeshare services via phone lines from your home or business.

PMC-80 EXPANDER option provides the most powerful configuration with a total of 48K memory, provision for 4 mini-floppies, printer interface, RS-232C communications interface, plus a slot for the popular S-100 boards.

Sold through computer stores.

Personal Micro Computers, Inc. ↙422

475 Ellis Street, Mountain View, CA 94043 (415) 962-0220

↙See List of Advertisers on page 306

this bit. Rather than adding a new device to the circuitry, alter the operation of an existing data latch, one that is not used for non-graphics functions.

One additional Screen Printer/TRS-80 modification must be made to print with programs containing keyboard debounce (such as Scripsit).

Upon receiving a print request, the printer initiates the following sequence: TRS-80 CPU activity stops; CPU data and address outputs are disabled; the printer's next video RAM location is provided on the address bus; the video RAM output data is latched in the printer; and, finally, data is fed through the character generator and out to the print head.

The printer goes through this cycle for each of the 1024 screen character positions (16 lines of 64 characters each) every time a print is initiated.

Normal printer cycle operation disables the CPU's output to the data bus. It does not disable main RAM's output. Main RAM plays an active role in keyboard debounce routines. It is frequently addressed by the CPU when the printer takes control of the bus structure.

Once a print command has been initiated, the printer must print something at every character location. If the printer cannot seize control at the right instant, such as when the CPU is addressing main RAM, the print cycle will not occur for that character. Thus the character generator will print a null (a special character consisting of all low ASCII bits). To correct this problem, make two simple circuitry changes.

First, in the printer, alter the requirement that the CPU be in the ROM-read state in order for the printer cycle to begin. This is done by disabling a couple of diodes allowing the print cycle to begin even if the CPU is addressing RAM. Second, eliminate main RAM's contributing to the data bus (when all we want is video RAM), by utilizing an unused gate in the TRS-80. This disables the main RAM output buffers at the proper time.

Before proceeding with the modifications, check that you have all the parts and tools listed in Table 2. If you complete the mod and reassemble the equipment in one session, you will increase your chance of success.

Most Difficult

The most difficult task in the printer modifications is gaining access to the main logic board.

Although well-constructed with ample connectors, disassembling the board conjures up analogies to the old Chinese puzzle trick. All you have to do is follow this step-by-step procedure:

1.) Disconnect AC power and the interface cable.

2.) Open the hinged lid and remove the paper roll and two spindles.

3.) Turn the unit upside-down, and remove the six 3/16-inch hex screws.

4.) Turn the unit right-side-up, and remove the four Phillips screws which attach the print mechanism housing to the full-length main chassis.

5.)Slowly lift the housing. This will uncouple a fixed multi-pin connector. Reach underneath the housing, and unplug the small cable connector. Set the print mechanism aside.

6.) Remove the two 3/16-inch hex screws and brackets which attach the plastic power supply cover. Remove this by lifting it up and toward the rear.

7.) This exposes two 1/4-inch hex screws on the main chassis next to the power supply board. Remove these.

8.) Slide the main chassis to the rear until the print toggle switch lever clears the bottom housing. Then slowly lift the front of the chassis until you can disconnect the small LED connector on the underside.

9.) Lift the chassis rear so you can disconnect the remaining two wires: one at the fuseholder, the other at the power switch.

The main chassis should now be completely separated from the cabinet.

10.) Remove the Phillips screws which attach the logic board to the chassis. Slide the board out to the rear, and disconnect the cable connector. Disassembly is now complete.

To reassemble the printer once the modifications are done follow these steps in the reverse order.

The actual printer modifications are described below in four steps. The first three steps are performed before reassembling the printer. The last step involves only the interface cable.

Unfortunately, construction of the printer is such that you cannot test to determine whether your modifications are correct until everything is reassembled. So please take your time, and double-check your connections. Fig. 1 shows a schematic diagram of all printer modifica-

Parts

SPDT Switch, miniature toggle
4PDT Switch, miniature toggle
21L02 IC, static RAM 1024 × 1
1N914 or 1N4148 Diode, silicon
1.2 kohm Resistor, 1/4 watt
10 feet wire, #30 AWG sold

Tools

Miniature diagonal cutters
Needle-nose pliers
35 Watt soldering iron, fine tip
.031 inch solder
Drill and bits (for switch mtg.)
Phillips screwdriver, #1
Xacto knife
Hex drivers, 3/16 inch and 1/4 inch

Table 2. Parts and Tool Requirements

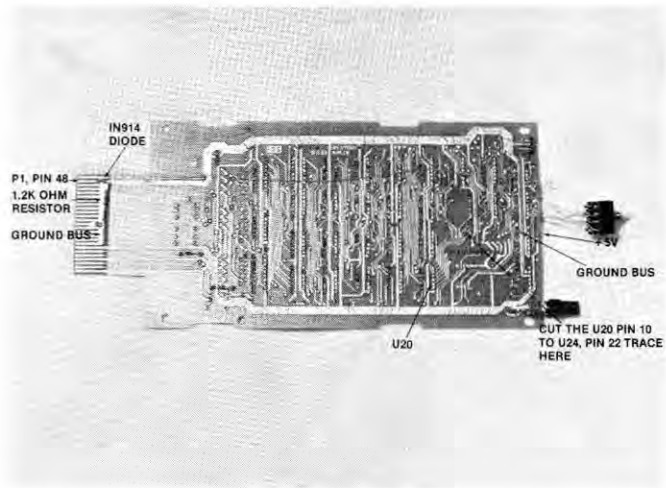


Photo 1. Underside of Printer Logic Board. Cut the pin 48 circuit trace at the ground bus before soldering diode in place.

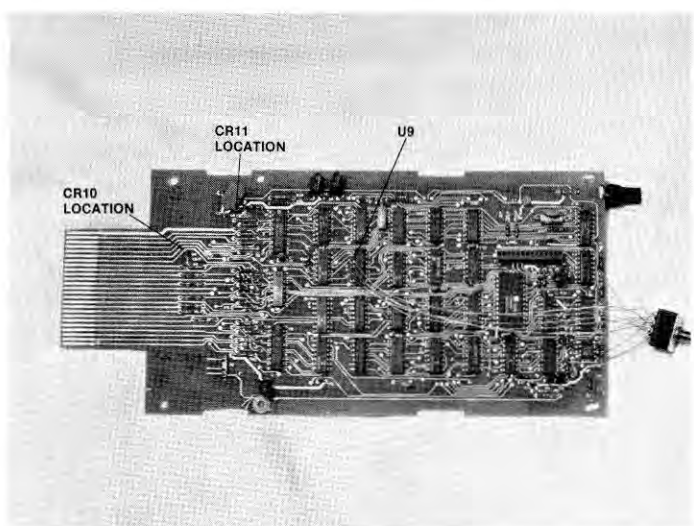


Photo 2. Top of Printer Logic Board. U9 pins 2, 5, and 6 must be cut 1/16-inch below IC body before wiring to switch.

TRS-80™ Compatible "carbonless" Continuous Statements

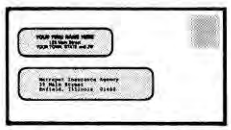
small quantities, low prices, fast delivery

Order as few as 500 statements imprinted with your firm name and address.

Only $27.95

NEBS 9062 Statements are software compatible with the TRS-80, Model 1, Level II, Accounts Receivable package #26-1555.

TRS-80 is a Trade Mark of the Radio Shack Co., Subsidiary of the Tandy Corp.



SPEED COLLECTIONS
Product 772 DU-O-VUE® Envelope (3⅝"x 6⅞") eliminates envelope addressing.

Product 9062 — Size 6"x 8½" detached. Prices include your firm name, address and phone in top section, plus your name only in lower section. Printed in black ink. Available in single (white) or duplicate (white, canary) continuous sets.

QUANTITY	SINGLE Product 9062-1	DUPLICATE Product 9062-2	Product 772 DU-O-VUE® Envelopes
10,000	$192.00	$355.00	$138.00
6,000	128.00	228.00	92.00
4,000	99.00	169.00	64.50
2,000	59.00	99.00	36.25
1,000	38.75	61.00	20.75
500	27.95	39.95	12.25

ORDER TODAY! MONEY-BACK GUARANTEE.
FAST SERVICE BY MAIL or PHONE TOLL FREE 1+800-225-9550 (Mass. residents 1+800-922-8560). It is our policy to ship within 6 working days following our receipt of your order.

Please ship: Date_____19____ **CODE 460**

_____**9062-1 STATEMENTS (Single)**

_____**9062-2 STATEMENTS (Duplicate)**

_____**772 DU-O-VUE® Envelopes**

_____**Information on continuous checks and other computer forms.**

HEADING TO BE PRINTED ON FORMS: (Please type or print)

STREET

CITY and STATE ZIP

PHONE

AUTHORIZED SIGNATURE
If you wish us to BILL and SHIP differently from above please indicate.

Nebs Computer Forms

✓194 *78 Hollis Street, Groton, Mass. 01450*
A division of New England Business Service, Inc.

MARK GORDON COMPUTERS

DIVISION OF MARK GORDON ASSOCIATES, INC.
P.O. Box 77, Charlestown, MA 02129
✓270 (617) 491-7505

COMPUTERS

Atari 800 W16K	799.00
Level-II 16K System	659.00
Model-II 64K System	3499.00
16K Model III	879.00

DISK DRIVES

40 Track 5¼ inch drive	314.00
80 Track 5¼	544.00
4 Disk Drive Cable	39.00

PRINTERS

Centronics 730	599.00
Epson MX80B	Call for price
Epson MX70	Call for price
Centronics 737	849.00
Okidata Microline 83	999.00
Okidata Microline 82	729.00
Integral Data 440G	999.00
NEC 5510 w-tractor	2679.00
Okidata Microline 80	499.00
Diablo 630	2495.00

MISC HARDWARE

Expansion int. TRS-80 (Ok)	269.00
Novation Cat modem	159.00
16K Memory Kit	41.99
Leedex Monitor	119.00
Leedex 100 G	139.00
Printer Cable for above	49.00
ISO-2 Isolator	54.00
AC LINE FILTER	24.00

STORAGE MEDIA

Verbatim box 10-5¼	25.00
Memorex box 10-5¼	22.00
Plastic Storage Box	5.00

OPERATING SYSTEMS

NEWDOS by APPARAT INC.	49.00
NEWDOS+ by APPARAT INC.	99.00
MMS FORTH DISKETTE PRIMER	79.95
NEWDOS 80	149.00

BUSINESS SOFTWARE FOR THE TRS-80* BY SBSG

Free enhancements and upgrades to registered owners for the cost of media and mailing. 30 day free telephone support. User reference on request.

Fully Interactive Accounting Package. General Ledger. Accounts Payable, Accounts Receivable and Payroll Report Generating	
Complete Package (requires 3 or 4 drives)	**$475.00**
Individual Modules (requires 2 or 3 drives)	$125.00
Inventory II: (requires 2 or 3 drives)	$ 99.00
Mailing List Name & Address II (requires 2 drives)	$129.00
Intelligent Terminal System ST-80 III:	$150.00
The Electric Pencil from Michael Shrayer	$150.00
File Management System	$ 49.00

FINE PRINT

TRS-80 is a Tandy Corporation trademark. Use of above operating systems may require the use of Radio Shack* TRS-DOS. Radio Shack equipment subject to the will and whim of Radio Shack.

ORDERING INFORMATION

We accept Visa and Mastercard. We will ship C.O.D. certified check or money orders only with a 40% deposit on orders over $300. Massachusetts residents add 5 percent sales tax. Shipping charges not included in prices.

To order call toll-free 1-800-343-5206
For information call 617-491-7505

The Company cannot be liable for pictorial or typographical inaccuracies.

✓See List of Advertisers on page 306

COMPUTER EQUIPMENT & SOFTWARE BARGAINS

EVERY MONTH

BUY, SELL OR TRADE ALL TYPES OF COMPUTER EQUIPMENT AND SOFTWARE (pre-owned and new) among 20,000 readers nationwide.

FEATURES:

- Low classified ad rates - 10¢ a word
- Hundreds of ads from individuals
- Categorized ads so you can find them instantly
- Large (11 by 14") easy to read pages

Subscribe now for $10 and receive 13 issues/year (one FREE plus 12 regular issues). After receiving your first issue if you're not completely satisfied you may have a 100% refund and you still keep the first issue free. Bank cards accepted.

BONUS: *If you have something to advertise (pre-owned or software) send in a classified ad with your subscription and we'll run it FREE.*

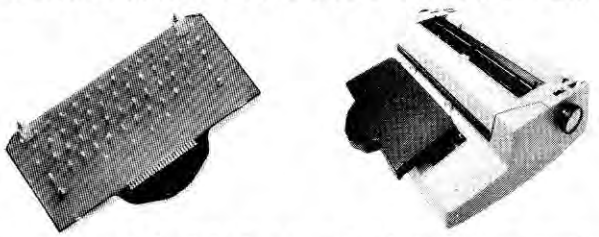
The Nationwide Marketplace for Computer Equipment

COMPUTER SHOPPER ✓212

P.O. BOX F27 • TITUSVILLE, FL 32780 • 305-269-3211

MasterCard & VISA subscriptions only, call **TOLL FREE 1-800-528-6050 Ex. 184**.

At last --- the DYNATYPER TYPEWRITER INTERFACE!



Turn your electric typewriter into a low cost, high quality hard copy printer. 1 year warranty

DYNATYPER – Rochester Data's patented* Computer/Typewriter Interface is the industry standard for typewriter output.

- 2 minutes to initially install and 5 seconds to remove or replace.
- You do not have to modify your typewriter. All factory warranties and maintenance agreements on your typewriter will be honored.
- Compatible with all power carriage return typewriters having standard U.S. keyboard. The Dynatyper works with Selectrics (model 1) and most non-Selectrics (model 2). Please specify. Typewriter conversion between models takes 2 minutes and the kit (17 plungers) is available for a nominal fee.
- The Dynatyper is compatible with all major word processing software. (Scripsit, Pencil, Applewriter, Easywriter, Magic Window, Visi-calc CCADBM, Supertext, Write On)
- Interfaces available for TRS-80, APPLE, PET/CBM, OSI, Northstar, HP-85, H-89. Weighs only 3 lbs. Extremely portable.
- Delivery: Stock to two weeks. Price $499 for complete system. F.O.B. Rochester, Domestic. VISA and Master Card accepted. Call Ken Yanicky at 716-244-7804

*Pat. Pending

✓468

ROCHESTER DATA incorporated

3000 Winton Road South, Rochester, N.Y. 14623

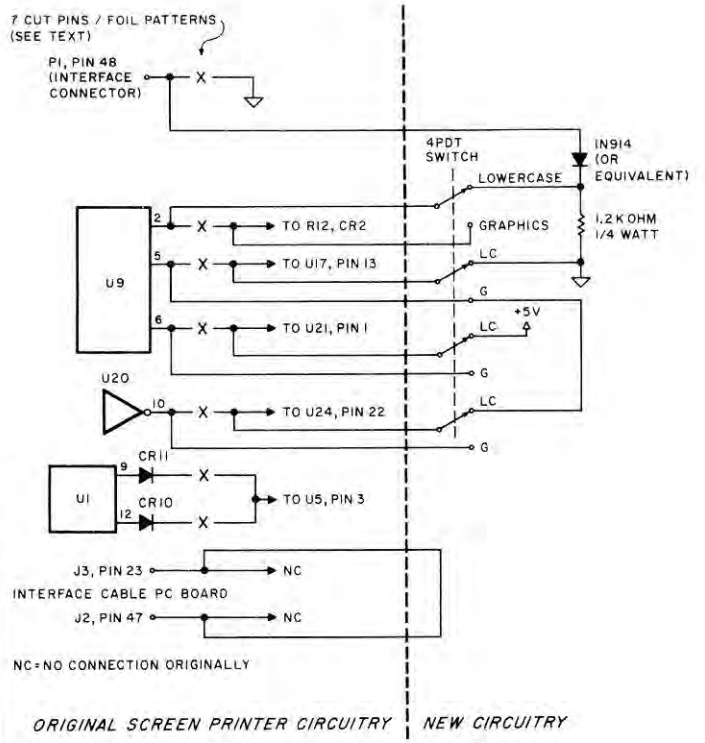


Fig. 1. Screen Printer Modifications

tions.

1.) Using an Xacto knife or small sharp screwdriver cut through the connector pin-48 circuit trace where shown in Photo 1. Using a small diagonal cutter, cut the following IC pins (approximately 1/16 inch below the pins' entrance to the IC body): U9 pins 2, 5, and 6, U20 pin 10. Use Photo 2 as a guide to locate the IC pins. Use a small screwdriver to separate the remaining pin stubs and the circuit board. Cut on end of CR10 and CR11 where shown in Photo 2.

2.) Connect the 1N914 diode and the 1.2 kohm resistor as shown in Photo 1. Now connect the four-pole switch as shown, in Fig. 1, allowing about three inches of wire beyond the front board edge to the switch. This will allow you to insert the switch in the cabinet as the chassis is reinstalled.

3.) Drill a hole in the front of the cabinet to accomodate the additional switch. Reassemble the printer.

4.) Disassemble the printer interface cable circuit board assembly by carefully prying up one end of the plastic cover with a small screwdriver. Using Photo as a guide, solder a short jumper wire from J3 pin 23 to J2 pin 47. When finished, snap the cover back over the circuit board.

TRS-80 Modifications

The TRS-80 modifications involve two circuit changes. One is the addition of a switchable storage facility (a 2102 RAM) for bit-6 data bus information. The other adds an unused gate in order to disable main RAM output to the data bus during Screen Printer access of video RAM. First, however, disassemble the keyboard assembly.

Gaining access to the TRS-80 logic board is considerably easier than the Screen Printer disassembly. Disconnect all cables and place the keyboard upside-down on a soft towel. Remove the six Phillips screws from the bottom cover. Then turn the keyboard right-side-up. Lift off the top cover. Hinge the keyboard upward, away from the logic board, to a vertical position. While holding the keyboard with one hand, remove the five rubber spacers from the plastic posts.

Cut the circuit trace connecting Z73 pins 9 and 12 shown in Photo 4. Set the keyboard down lightly onto the logic board.

Now carefully lift *both* the keyboard and logic board out of

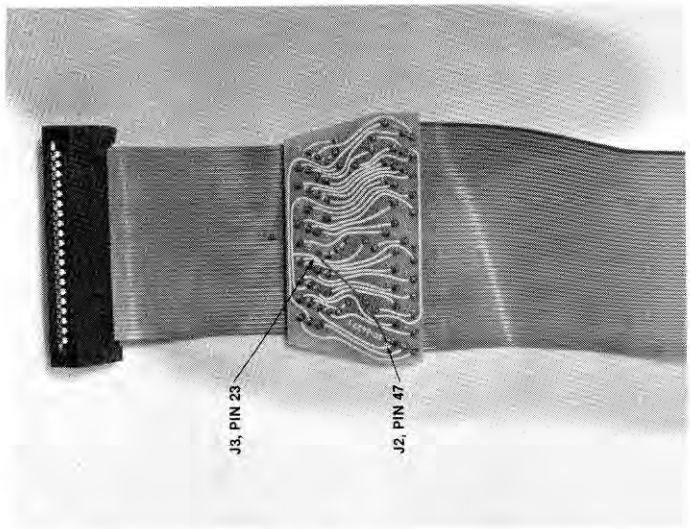


Photo 3. Printer Interface Cable PC Board. Install single jumper wire as shown.

the cabinet bottom as an assembly. Avoiding any bending of the logic board. Turn the two boards upside-down on the towel, using great care to avoid stress on the short interconnecting ribbon cable.

All of the remaining modification work involves the component side of the logic board.

It's best to use both the schematic in Fig.2 and Photo 5 to avoid confusion.

To install the lowercase mod, begin by "piggy-backing" the 2102 RAM on top of Z45. Solder all pins of the 2102 to the corresponding pins of Z45 except pins 11 and 12, which should be bent outward as shown in Photo 5.

Next, cut pin 13 of Z30 using the method described in the Screen Printer mod. Now drill a hole to mount the SPDT toggle switch where desired (I found the space between the tape and video DIN jacks convenient.) To complete the video RAM portion of the mod, connect four wires as shown from Z30, Z44, the new RAM, and the SPDT switch.

To complete the main RAM portion of the mod, cut the trace below Z74 where shown in Photo 5. (This trace was the original connection to the main RAM enable/disable buffers Z67 and Z68.) Finally, connect three wires from Z52, Z73, Z74, and the previously cut circuit trace.

Double-check all of your wiring against Photo 5. When reassembling, don't forget the five rubber spacers to isolate the logic board from the keyboard.

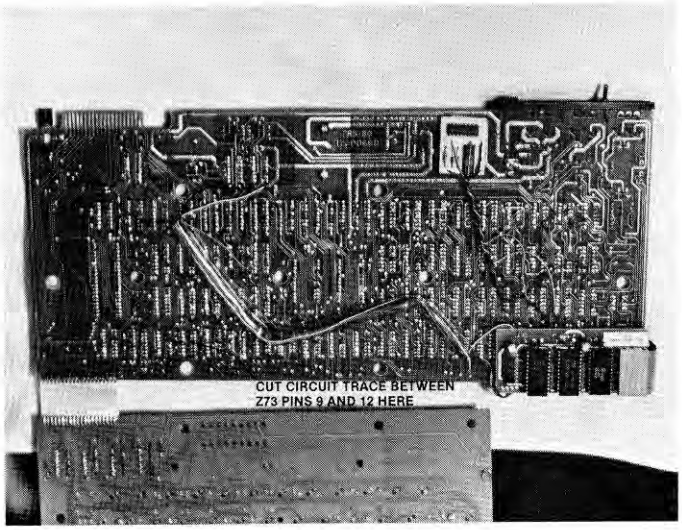


Photo 4. Underside of TRS-80 Logic Board

TRS-80 OWNERS
BASIC SLOWING YOU DOWN?
TAKE
ZBASIC
FOR
FAST RELIEF!

Introducing SIMUTEK'S ZBASIC, The truly interactive BASIC COMPILER for your TRS-80! FINALLY! People that don't have the time or the inclination to learn complicated assembly language, have a chance to write PROFESSIONAL QUALITY SOFTWARE in machine language using a subset of LEVEL II BASIC!!

What does interactive mean? It means you have ZBASIC and your BASIC program resident at the same time! You may compile a BASIC program, run it or save it without destroying your resident BASIC program! In fact, jumping back and forth between the compiled code and the BASIC code is one of its finest features!

ZBASIC allows saving your COMPILED PROGRAM as a system tape, (tape version), or as /CMD file, (disk version). THE COMPILED CODE IS VERY EFFICIENT Z80 OBJECT CODE. THE LEVEL II ROMS ARE USED ONLY FOR I/O ROUTINES!!

FACTS ABOUT ZBASIC

1. 16K ZBASIC will compile a 4.8K program. (tape only)
   32K ZBASIC will compile a 17K (tape), 10K (disk) pgm
   48K ZBASIC will compile a 17K program. (disk only)
   (These are approximate values depending on program efficiency etc.)
2. ZBASIC DOES NOT support disk or tape files.
3. BASIC programs compiled with ZBASIC are between 10-200 times faster than interpreted BASIC!!
4. NO ROYALTIES ON ZBASIC COMPILED PROGRAMS!!
5. ZBASIC programs are only about 1.1 times larger than the average basic program.
6. ZBASIC programs may be used as USR routines from basic.
7. ZBASIC uses INTEGER MATH ONLY to increase speed and decrease compiled program size. Use of Single or Double precision would destroy the beauty of the first "INTERACTIVE COMPILER" on the market!
8. Limited variables: A-Z, A1-Z1, A2-Z2, A$-Z$. Arrays are not supported to decrease memory demands and speed up compiling of programs.
9. COMPILE TIMES ARE TYPICALLY 1 TO 10 SECONDS! THERE IS NO NEED TO USE COMPLICATED COMPILE TIME MODULES!
10. ZBASIC comes with a HIGHLY DETAILED manual describing all important memory locations, commands, variables, warm/cold start entry points and many useful sub-routines for emulating unsupported commands!!
11. Existing programs may be loaded from tape or disk and compiled as long as unsupported commands or variables are not used.

ALL COMMANDS DIRECTLY SUPPORTED BY ZBASIC

FOR	NEXT	STEP	IF	THEN	ELSE	PEEK
SET	RESET	POINT	CHR$	RANDOM	RND	POKE
DATA	READ	RESTORE	END	GOTO	GOSUB	CLS
INPUT	INKEY$	LET	STOP	OUT	INP	RETURN
PRINT	LPRINT	PRINT@	USR	SGN	INT	ABS
SQR	LEN	ASC	VAL	STR$	POS	ON GOTO
ON GOSUB	REM	NOT	AND	OR		

INTEGER MATH *MULTIPLY /DIVIDE +ADD -SUBTRACT +/- 32767

NOTE: Some commands do not act exactly as BASIC commands act.

TRS-80 MOD I and III or PMC-80 Computers. (Level II Only) NEW LOWER PRICES!

ZBASIC 16K/32K LVII Tape Version + Manual	**$79.95**
ZBASIC 32K/48K Disk Version + Manual	**$89.95**
Both Versions + Manual	**$99.95**
ZBASIC Manual Only (Fully Refundable)	**$25.00**
Model III Version Available 3/1/81	

Credit Card or C.O.D. Call **Toll Free: (800) 528-1149**
or send check or money order to:

SIMUTEK COMPUTER PRODUCTS™ ↙19

P.O. Box 13687 Tucson, AZ 85732 (602) 323-9391
(C.O.D. Available $3.00 Extra)
TRS-80 is a TM of Tandy Corp.

↙See List of Advertisers on page 306

TEXAS COMPUTER SYSTEMS
Radio Shack
Authorized Sales Center
All Radio Shack merchandise available at a discount. Ask for our price list.
We offer the lowest prices on ®
TRS-80
COMPUTERS
MODEL II 64K $3349 (Plus shipping)
All accessories for Model II available – disk expansions, printers and software
EPSON MX-80 $ CALL List $645
Letter quality matrix similar to the Line Printer IV and the Centronics printer but has full software control of 40, 80, 66, or 132 columns.
80 cps bidirectional printing, tractor feed, disposable printhead. $300 less than the nearest competitive printer, it's the best buy in a letter quality multi-strike printer. Our price is too low to advertise.
★ Anadex 9500/9501 ★ Line Printer V ★ The New Daisy Wheel II
★ Payment: Money Order, Cashier's Check, Certified Check, Personal Checks require 3 weeks to clear. VISA MASTERCHARGE – Add 3%
★ Prices subject to change at any time
★ No tax out of state. TX add 5%
★ All items new, guaranteed by manufacturer
★ Delivery subject to availability
TEXAS COMPUTER SYSTEMS
An Authorized RADIO SHACK® Sales Center F701
Box 1174, Brady, Texas 76825 ✓25
TOLL FREE Number 800-351-1473
Texas Residents 915-597-0673

PACIFIC OFFICE SYSTEMS
COMPUTER INTERFACES & PERIPHERALS

- **POS-100 NRZI TAPE DRIVE CONTROLLER/FORMATTER** – Now your micro can read and write IBM/ANSI compatible NRZI format 9-track magnetic tapes. The POS-100 consists of S-100 bus card, 6' ribbon cable, tape drive controller card, cable to Pertec-Standard NRZI Tape drive, plus documentation and Z-80 or 8080 software (specify). Power is derived from tape drive and S-100 bus. Ship Wt.: 10 lbs. Suggested Retail Price $995.00
- **POS 103/202 "MIX or MATCH" MODEM** – Unique POS control design permits use in one housing of both Bell-compatible 103 (0-300 baud) and 202 (0-1200 baud) modem modules originally made by VADIC Corp. for a telephone company subsidiary. FEATURES: RS-232 serial Interface, auto-answer, auto-dial, LED display, telephone line interface via acoustic coupler, manual DAA, or auto-answer DAA (sold separately). FULLY ADJUSTED; no special tools required. 3,000 mile range over standard dial-up telephone lines. Ship wt.: 15 lbs.
PRICES . . . . . POS 103 Modem – $199.95; POS 202 Modem – $299.95; POS 202 Modem w/Auto-Answer – $349.95; POS 103/202 Modem – $499.95; FCC-Approved Auto-Answer DAA – $125.00; Acoustic Coupler – $29.95.
- **POS DAISY-WHEEL PRINTER INTERFACE for TRS-80** – Will drive Diablo HyType I, HyType II, and Qume Q and Sprint 3 printers. Includes 1K user-available memory for custom print routines (such as graphics, bidirectional printing, etc.). Programmed to respond to print commands from BASIC ELECTRIC PENCIL™ and SCRIPSIT™ software. Draws its power from printer. Ship wt.: 5 lbs. Price $250.00
Cables, each (Specify HyType I, HyType II, or Qume) . . . . . $ 25.00
- **POS ASCII INTERFACE for IBM I/O SELECTRIC** – This Centronics-style parallel printer interface will drive an IBM Model 731 or 735 I/O typewriter (EBCD and Correspondence codes). No software needed. Features on-board EPROM which holds up to 8 ASCII-to-IBM code tables for different type spheres. Closed-loop operation runs at maximum printer speed; stops and starts on a single character without loss of data. Requires +12VDC and ±5VDC power source. Ship wt.: 5 lbs. Price $249.95
Power Supply (±5VDC, +12VDC, +24VDC for Solenoids on Printer) . . . . $ 49.95
- **CONVERT OFFICE SELECTRIC TO I/O TYPEWRITER** – Kit includes assembled solenoids, switches, wire harness, magnet driver PCB plus instructions for installation and mCPU interface. Price $150.00
- **"FORMALINER" Variable Width Forms Tractor** for 15" Selectrics . . . $95.00
- **GTE Model 560 ASCII SELECTRIC I/O Terminal** – With RS-232 Serial Interface and digital cassette deck for use as memory typewriter. Ship wt.: 100 lbs. Price, tested and adjusted $1,195.00
- **POS ASCII IBM SELECTRIC PRINTER** – 15" Selectric from GTE terminal cleaned and adjusted with POS Centronics-style ASCII printer interface. UC/LC, carbon and fabric ribbons. Compatible with TRS-80, Apple, SOL and other CPU parallel printer ports. Ship wt.: 75 lbs. Price $895.00

PACIFIC OFFICE SYSTEMS ✓153
918 Industrial Avenue Palo Alto, CA 94303 (415) 493-7455

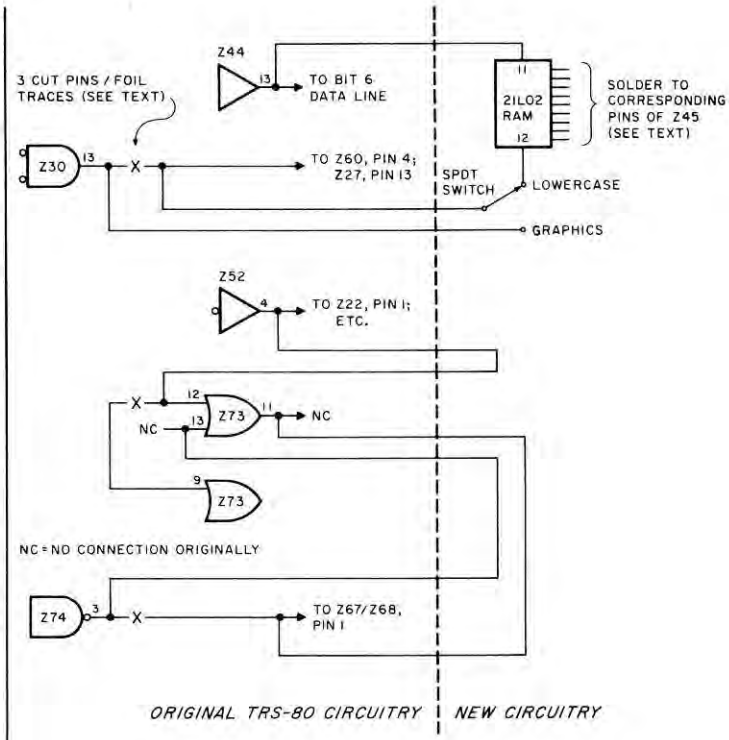


Fig. 2. TRS-80 Modifications

Operating Tips

The Screen Printer and TRS-80 modifications allow completely unmodified operation when the two new switches are off. This is probably the best way to begin after reconnecting all the cables. Thus, if normal operation is not achieved, don't go any farther. Shut off the power and find out what's wrong.

If everything is okay, load the Scripsit program, activate the printer and TRS-80 mod switches. Then depress the shift and control keys to enter Scripsit lowercase mode. Type some text into the display. Voila! You should now have an upper/lowercase display.

The Screen Printer will now function on many programs that just produced jibberish before, specifically, programs which contain the keyboard debounce routine. However, never initiate a print during program loading or execution involving anything other than "awaiting a keyboard entry." You can set or reset either of the mod switches during the "awaiting keyboard entry" state without adverse effects. ■

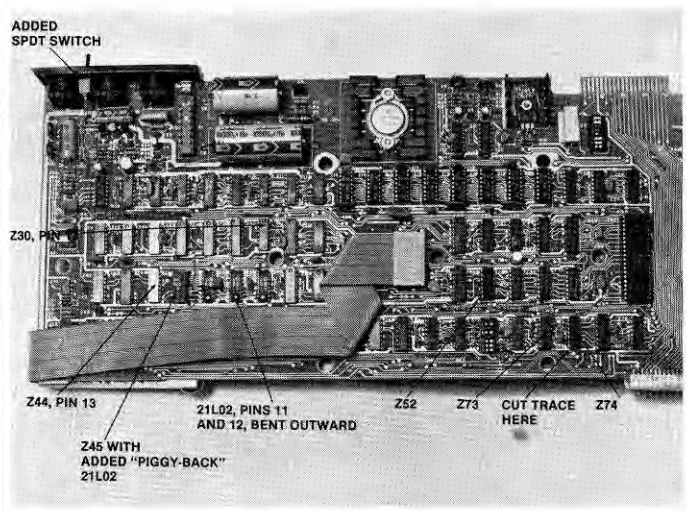


Photo 5. Top of TRS-80 Logic Board

PROGRAMMING TOOLS FOR YOUR TRS-80™

INSIDE LEVEL II

The Programmers Guide to the TRS-80 ROMS

INSIDE LEVEL II is a comprehensive reference guide to the Level II 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, a method of greatly increasing the speed at which data elements are stored on tape, and special precautions for disk systems. INSIDE LEVEL II is a clearly organized reference manual. It is fully typeset and packed with nothing but useful information. It does not contain questions and answers, ROM dumps, or cartoons. **INSIDE LEVEL II.....$15.95**

SINGLE STEP THROUGH RAM OR ROM

STEP80 allows you to step through any Basic or machine language program one instruction at a time, and see the address, hexadecimal value, Zilog mnemonic, register contents, and step count for each instruction. The top 14 lines of the video screen are left unaltered so that the 'target program' may perform its display functions unobstructed. STEP80 will follow program flow right into the ROMs, and is an invaluable aid in learning how the ROM routines function. Commands include step (trace), disassemble, run in step mode at variable step rate, display or alter memory or CPU registers, jump to memory location, execute a CALL, set breakpoints in RAM or ROM, write SYSTEM tapes, and relocate to any page in RAM. The display may also be routed to your line printer through the device control block so custom print drivers are automatically supported. **STEP80.....$16.95**

TELECOMMUNICATIONS PROGRAM

This machine language program allows reliable high speed file transfers between two disk-based computers over modems or direct wire. It is menu driven and extremely simple to use. Functions include real-time terminal mode, save RAM buffer on disk, transmit disk file, receive binary files, examine and modify UART parameters, program 8 custom log-on messages, automatic 16-bit checksum verification of accurate transmission and reception, and many more user conveniences. Supports line printers and lowercase characters. With this program you will no longer need to convert machine language programs to ASCII for transmission, and you will know immediately if the transmission was accurate. **TELCOM.....$29.95**

PROGRAM INDEX FOR DISK BASIC

Assemble an alphabetized index of your entire program library from disk directories. Program names and free space are read automatically (need not be typed in) and may be alphabetized with a fast Shell/Metzner sort by disk or program. The list may also be searched for any disk, program, or extension; disks or programs added or deleted; and the whole list or any part sent to the printer. Finally, the list itself may be stored on disk for future access and update. 'The best thing since sliced bread' (January issue of '80 Microcomputing). Works with TRSDOS, NEWDOS, and NEWDOS/80. One drive and 32K required. **INDEX.....$19.95**

4 SPEED OPTIONS FOR YOUR TRS-80

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, though the TRS-80 is not reliable at this speed. 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. **SK-2.....$24.95**

INSTANT ASSEMBLER

The INSTANT ASSEMBLER is a new, powerful tape-based editor/assembler and debugger for the TRS-80 Model I. It features immediate detection of errors as the source code is entered, assembly to memory as well as to tape, a built-in single-stepping debugger, a compactly coded source format that uses 1/3 as much memory as standard source, the ability to produce relocatable code modules, and the ability to link-load independently written modules. In addition, the INSTANT ASSEMBLER has many operational features including single stroke entry of DEFB and DEFW, continuous editing of succesive lines, alphabetic listing of symbol table, separate commands for listing error lines or the symbol table, block move function, and verification of source tapes.

INSTANT ASSEMBLER includes three separate programs. The assembler itself includes the single-stepper and debugger. In this mode you may have full-register displays, decimal or hex entry, forward or backward memory displays, disassembly of object code in memory, memory display in ASCII format, and hex-to-decimal or decimal-to-hex conversion. The single-stepper will step one instruction at a time or at a fast rate to any defined address. During assembly you may quickly switch from assembler to debugger and back again without losing the source code. This makes INSTANT ASSEMBLER an excellent learning tool for machine language programming. Also included on the tape are two versions of the linking loader which allow you to write your programs in smaller modules and link them together for final assembly.

INSTANT ASSEMBLER occupies 8375 bytes of memory. In a 16K machine this will leave you more than 7000 bytes which is enough to write assembly language programs of around 2000 bytes. This makes it ideal for users with only 16K machines. While this version was written specifically for tape systems, we will soon have a disk version as well. The instruction manual may be purchased separately for $5, which will apply towards the purchase of the INSTANT ASSEMBLER. **INTASM.....$29.95**

RAM SPOOLER AND PRINT FORMATTER

This program is a full feature print formatting package featuring user defineable line and page length (with line feeds inserted between words or after punctuation), screen dump, printer pause control, and baud rate selection. In addition, printing is done from a 4K expandable buffer area so that the LPRINT or LLIST command returns control to the user while printing is being done. Ideal for Selectric or other slow printers. Allows printing and processing to run concurrently. Output may be directed to either the parallel port, serial port, or the video screen. **SPOOLER.....$16.95**

MACHINE CODE FAST FOURIER TRANSFORM

This complete package includes 3 versions of the machine language FFTASM routine assembled for 16, 32, and 48K machines, a short sample Basic program to access them, a 10K Basic program which includes sophisticated interactive graphing and data manipulation, and a manual of instructions and examples. The machine language subroutines use variables defined by a supporting Basic program to make data entry and retrieval extremely fast and easy for custom implementation. They perform 20 to 40 times faster than their Basic equivalent (256 points in 12.5 seconds), and require less than 1550 bytes of memory. The FFT is useful in analyzing stock market and comodity trends as well as for scientific information. **FFTASM.....$49.95**

DUPLICATE SYSTEM TAPES WITH CLONE

Make duplicate copies of any tape written for Level II. They may be SYSTEM tapes or data lists. The file name, load address, entry point, and every byte (in ASCII format) are displayed on the video screen. **CLONE.....$16.95**

RAMTEST FOR LEVEL II

This machine language program is a very thorough test for several types of RAM errors. A complete test of each individual bit in a 48K machine takes just 14 seconds. Includes a separate test for power line glitches. **RAMTEST.....$9.95**

EDIT BASIC PROGRAMS WITH ELECTRIC PENCIL

Load Basic programs or any other ASCII data file into the disk version of Electric Pencil for editting. One command from DOS quickly modifies existing files to Pencil format. One disk and 32K required. **PENPATCH.....$9.95**

MUMFORD MICRO SYSTEMS

↙144

ORDERING: Complete satisfaction is guaranteed or a full refund will be made. All programs are shipped on cassette unless $5 is included for a formatted (no system) disk. Include $1 postage and handling. California residents add 6% sales tax. Visa, Mastercharge and COD orders accepted.

Box 400-E Summerland, California 93067 (805) 969-4557

↙See List of Advertisers on page 306

These Next 4 Pages are for TRS-80* Owners ONLY!

NEW! Over 100 programs compatible with the Model III.

The next 4 pages contain over 100 Model III compatible programs for your TRS-80. Whatever your interests, we have a software program for you. We list sections on Home/Personal, Business, Games, the Arts, Home Education, Utilities, Special Business, Flight Simulations, Electronics, Comp-U-Novels, and Popular Games. These programs can be purchased through your local Instant Software dealer, or you can call us directly using our toll free number. We ship our orders within 48 hours. Browse through these 4 pages, we're sure you'll enjoy your selections. Remember: WE GUARANTEE IT!

UTILITIES

TRS-80 UTILITY I—Give your program that professional look. RENUM: Renumber any Level II program to make room for modification or to clean up the listing. DUPLIK: With this program you can duplicate any BASIC, assembly/machine language program, verify the data and record the program to tape. You can even record Level I programs on a Level II keyboard. **(T1) Order No. 0081R $9.95.**

TRS-80 UTILITY II—Change the drudgery of editing your programs into a quick, easy job. It includes: • CFETCH: You'll be able to merge consecutively numbered BASIC programs into one program. It will also search through any Level II program tape and display the file names for all programs. • CWRITE: Combine subroutines that work in different memory locations into one program. It works with BASIC and/or machine-language programs and will give you a general checksum to verify that your program hasn't dropped any bits. **(T1) Order No. 0076R $9.95.**

THE COMMUNICATOR—This package lets you transmit data over the telephone lines. The full ORIGINATE/ANSWER capability allows your TRS-80 to be controlled from a remote-based terminal, or allows two TRS-80s to "talk" to each other. You can transmit data or programs from home base to a remote terminal. There will be a simultaneous display of information on both video monitors. Requires a modem and RS-232 interface for each terminal. **(T1) Order No. 0126R $9.95.**

TERMINAL-80—Communicate with the rest of the world! These programs give you control of the RS-232 port of your Expansion Interface. You can connect one or more serial terminals to your TRS-80 and it will accept input from the RS-232 interface just as if it were entered from the keyboard. Your TRS-80 can also be transformed into a dumb terminal, for use in a time-sharing situation to talk with "big" computers via a modem. The LPRINT/LLIST commands will transfer a program to a receiving computer. Supports upper/lowercase, Level II & III control characters, and all functions such as CHR$. The baud rate is software controlled for your convenience. Requires an RS-232 interface. **(T1) Order No. 0130R $24.95.**

DISK SCOPE—Need to check out the contents of a disk? Then check out these three programs. • FILELOC: If you know the name of the program or data file, FILELOC will show you which tracks and sectors contain that file, as well as how much memory the file takes when loaded into RAM. You can then print the information, search for a new file or exit to BASIC. • CDISK: This utility and test program allows you to view any track and sector on your disks in ASCII, Hex and screen POKEs. It disregards all protection codes. • PASSWORD: This machine-language program not only gives you a password for individual files, but for whole disks as well. **(T2) Order No. 0139R $19.95.**

DISK EDITOR—This machine-language program gives you total access to ANY byte of information in ANY sector in ANY track of your disk! You can examine, alter, add and delete information with ease. You can even search for a specific string (up to 8 characters long). If you need hardcopy, use the LINEPRINT command to send a copy of the video display to your printer. It can be used with TRSDOS, NEWDOS and MicroDOS. Both the 35 and 40 track versions are included. **(T2) Order No. 0180RD $39.95.**

BPA (BASIC PROGRAMMING ASSISTANT)—BPA does three things for you: (1) It will list the variables used in a BASIC program. Optionally, it will list the line numbers where each variable appears; the variable-type symbol (string, integer, single or double precision); whether it is dimensioned and where it is changed. (2) It will produce a cross-referenced list of line numbers for GOTO's, GOSUB's and IF...THEN statements. (3) It will list the line numbers where a selected BASIC function word (e.g., INPUT, PRINT) is used. **(T1) Order No. 0203R $14.95.**

TLDIS & DLDIS—These two utilities are ideal for those who wish to decipher and/or modify machine-code programs. TLDIS (Tape-based Labeling DISassembler) and DLDIS (Disk-based Labeling DISassembler) are three-pass, label-assigning disassemblers that assign labels (where appropriate) to the routines in a machine-language program. Their output is almost identical to that of a hand-assembled source code. TLDIS can send the disassembly to cassette tape, DLDIS can send it to disk; both send it to the video monitor. Each version can be reassembled using Tandy's EDTASM or Apparat's disk extension of EDTASM, respectively. You can also send either disassembly to a printer (R/S parallel port). Because of the labels, it is a simple matter to change any object code program by disassembling it and making changes to the resulting source code, without losing track of the jump/load addresses. Labels start at "AA00" and increment up, in even numbered steps (AA02, AA04, etc.). The odd numbers (AA01, AA03, etc.) are left for your (optional) use in the reassembly. **TLDIS (T1) Order No. 0230R $14.95. DLDIS (T2) Order No. 0231RD $19.95. Model III compatible**

THE DISASSEMBLER—This is a single-pass, hex-notation that sends its output either to tape or to a lineprinter (R/S parallel port). The tape output is directly compatible with Tandy's EDTASM, so you can disassemble an object code tape and output it to tape, then use EDTASM to add, delete, change and re-assemble your new version. It displays the *displacement* and *absolute address* of any relative jumps made by the disassembled program. It also displays and ASCII characters used in an LD or CP opcode. It is relocatable and you can jump to memory locations and transfer control between Disassembler and other utility programs. **(T1) Order No. 0232R $9.95.**

CODE—Min. System Required
(T1)=TRS-80 Model I Level II 16K RAM
(T2)=TRS-80 Model I Level II, 16K RAM with Expansion Interface 16 + K RAM and one disk drive
(T3)=TRS-80 Model II, 32K RAM

COMPRESSION UTILITY PACK—Do you want to add sound routines to a Space Trek program that already uses 16K? Or maybe you need an extra column in that financial report program, but when you run it, you get OM errors?

With a wave of your hand, and a little help from either of the COMPRESSION programs, in this package, your problems are over.

COMPRESS-80 fits in 265 bytes, deletes spaces, and offers the choice of leaving REMark line numbers in the program, or deleting them altogether.

SUPERCOMPRESS uses 767 bytes and can do everything COMPRESS-80 can do PLUS, it packs the program into the smallest possible number of multiple statement lines.

With the Compression Utility Pack and your own programming skill, you can add all those little extras to your BASIC programs. (T1) **Order No. 0246R $19.95.**

*TRS-80 is a trademark of Tandy Corporation.

SEE YOUR LOCAL INSTANT SOFTWARE DEALER OR **Just Call Toll-Free 1-800-258-5473**

Instant Software™

PETERBOROUGH, N.H. 03458

We Guarantee It!

Instant Software Guarantee

OUR PROGRAMS ARE GUARANTEED TO BE QUALITY PRODUCTS. IF NOT COMPLETELY SATISFIED YOU MAY RETURN THE PROGRAM WITHIN 60 DAYS. A CREDIT OR REPLACEMENT WILL BE WILLINGLY GIVEN FOR ANY REASON.

THE ARTS

COMPU-CAROLS—We are proud to present a selection of Christmas carols, played by your TRS-80. Just place an AM radio next to your keyboard and you'll be amazed at the quality of this computer-generated music. You'll hear AWAY IN A MANGER, NOEL, SILENT NIGHT, O LITTLE TOWN OF BETHLEHEM and eight more of your favorite carols. **(T1) Order No. 0036R $9.95.**

DOODLES AND DISPLAYS II—It includes: ● DOODLE PAD: Draw pictures and save them on cassette tapes. ● SYMMETRICS: An electronic kaleidoscope that's constantly changing. ● DRAWING: Like DOODLE PAD, but for the serious artist. Over 40 user commands. ● RANDOM PATTERN DISPLAY: The computer does the drawing, but those with itchy fingers can make alterations. ● MATHCURVES: Bring those geometry lessons to life. Six different geometrical curves on the screen of your TRS-80. ● RUGPATTERNS: Designs rug patterns with a choice of user or computer control. **(T1) Order No. 0042R $7.95.**

MUSIC MASTER—Includes these four audio treats: ● MICRO-ORGAN: This program changes your computer into a musical instrument, with a range of four octaves with three voices! You can play sharps and flats to imitate the sounds of an organ, harpsichord or piano. ● KALEIDOPY: Now you can have a computerized "player piano." Generate a symmetrical graphics pattern and then see it transformed into music. ● COMPOSER: Experiment with computer-generated music. You can select the length of the piece, its scale, and its tempo. ● KEYMANIA: Test your memory and your musical ear. One to four players try to repeat the melody that the computer creates. **(T1) Order No. 0084R $9.95. Model III compatible**

ELECTRONICS

HAM PACKAGE I—This versatile package lets you solve many of the problems commonly encountered in electronics design, including: ● BASIC ELECTRONICS WITH VOLTAGE DIVIDER: Solve problems involving Ohm's Law, voltage dividers and RC time constants; ● DIPOLE AND YAGI ANTENNAS: Design antennas easily, without tedious calculations. **(T1) Order No. 0007R $7.95. Model III compatible**

ELECTRONICS I—This package will not only calculate component values for you, it will also draw a schematic diagram. Included are: ● TUNED CIRCUITS AND COIL WINDING: Design tuned circuits without restoring to cumbersome tables and calculations; ● 555 TIMER CIRCUITS: Design astable or monostable timing circuits using this popular IC; ● LM-381 PREAMP DESIGN: Design IC preamps with this low-noise IC audio amp. **(T1) Order No. 0008R $7.95. Model III compatible**

QSL MANAGER—Ever looked at your log book and wondered if you sent a QSL card to the operator you worked last week? Maybe you sent a QSL but can't remembered getting one in return. The QSL MANAGER will help you set up a computerized log book that gives you *instant access* to your records. Make complete log entries which include: Date, Time, Call sign, Name, Band, both the sent and received Signal Reports, the Mode, whether a QSL card was sent or received and any remarks you want to add. The QSL MANAGER program has built-in editing features that let you keep your log book up to date. **(T2) Order No. 0151RD $19.95. Model III compatible**

HOME EDUCATION

MONEY MADNESS—You can experience the Raw Power of High Finance with two Big Money empires. ● MILLIONAIRES: Can you manipulate $1000 into a million dollars in fifteen years? It all depends on your strategy as you buy and sell properties, negotiate bank loans, collect rentals and accept sealed bids. ● TIMBER BARON: An in-depth experience of the timber business, from the time you cut the trees until your milled lumber reaches the market. These transactions are affected by those tough, unexpected eventualities that can upset the most careful plans. **(T1) Order No. 0156R $9.95. Model III compatible**

TEACHER'S AIDE—Now you can have the benefits of Computer Aided Instruction (CAI) in your own home. Create a question and answer lesson (up to 8000 characters), save the lesson on disk, then create an entire sequence of lessons. Perfect for parents, teachers and students who need the unlimited patience and undivided attention only a computer can provide. **(T2) Order No. 0214RD $34.95. Model III compatible**

GRADE BOOK—Teachers, now you can use the speed and accuracy of the computer to help calculate student grades. Just type in the grades for tests, quizzes, homework, classwork or special projects to calculate and display individual grade averages. You can also obtain a cumulative grade for a specific marking period—or a whole year! **(T1) Order No. 0050R $9.95. Model III compatible**

TEACHER—This program enables you to create your own tests, quizzes and exercises for the education of your children. You can even provide "graphic" reward for your children and provide hints for problem solving. **(T1) Order No. 0065R $9.95. Model III compatible**

LIFE—Create "living" organisms in which cells are constantly active. They are born, they multiply, they die. This computerized version of LIFE is based on the well known game popularized by Martin Gardner. You can create one-cell organisms, then observe their growth patterns. The library of commands give you unlimited versatility in the control of the cell patterns *you* have arranged. **(T1) Order No. 0078R $9.95. Model III compatible**

ARCHIMEDES' APPRENTICE—This two-part package will teach you the formulas used to find the volume of any solid object including parallelopipeds (cubes and rectangular solids), prisms, pyramids, cylinders, cones and spheres. It will show you on-screen diagrams of these figures, and present you with the formulas you'll need to compute their volumes. **(T1) Order No. 0092R $9.95. Model III compatible**

TYPING TEACHER—This complete seven-part package takes you from initial familiarization with the keys, through typing words and phrases, to complete mastery of the keyboard. Your computer can even become a bottomless page for typing practice. **(T1) Order No. 0099R $9.95. Model III compatible**

VIDEO SPEED READING TRAINER—Most people's reading speed is limited simply because they read individual letters or words. Now you can increase your reading speed and comprehension by reading whole words and phrases. This package will train your mind to quickly recognize numbers, words, letters and phrases. Start at any speed level at which you are comfortable and the computer will automatically advance you as your reading speed and comprehension increases. **(T1) Order No. 0100R $9.95. Model III compatible**

WORDWATCH—four different programs to entertain and educate. ● WORD RACE—race to the finish line of defining words correctly; ● HIDE N SPELL— find the misspelled word, then correct it; ● SPELLING TUTOR—a spelling lesson, but beware, the spelling may become unusual. There you have it, Wordplay × four = WORDWATCH. **(T1) Order No. 0111R $7.95. Model III compatible**

MIND WARP—This game includes: ● MIND TWIST: a Mastermind-type game with a twist. Try to guess the computer's secret digit sequence. ● MIND BENDER: A multi-level game where you must discover the computer's secret code. It's no mystery, the MIND WARP package is for puzzle lovers everywhere. **(TI) Order No. 0118R $9.95. Model III compatible**

INVESTOR'S PARADISE—Here are two programs to test your skill in the stock market. ● STOCK TREK: a stock market simulation in which you and up to five other investors buy and sell stocks. ● SPECULATION: a step beyond a mere simulation, you enter financial data on up to 25 real companies and start playing the market. This package lets you experience the thrills and triumphs of the stock market without risking a dime! **(T1) Order No. 0125R $9.95. Model III compatible**

IQ TEST—IQ TEST will administer and score an intelligence test in just 30 minutes. There are three equivalent tests, each consisting of 3 questions that survey your general knowledge and problem solving abilities. **(T1) Order No. 0157R $9.95.**

SPECIAL BUSINESS

BOWLING LEAGUE SECRETARY—This package is simple to operate and provides a dynamic reference to all the names of individual bowlers, their team numbers, scores, team names, league data and all necessary statistics. The system is highly adaptable, with 17 different scoring options that allow you to custom tailor the program to suit your league's special needs. And, if you even have any problems, simply type HELP and the program will give you an explanation of what information is needed—complete with a sample entry. The system puts at your fingertips all individual weekly scores, team cumulative scores, bowler cumulative scores and individual leaders in the following categories: high single, high series, high average and high points. **(T2) Order No. 0095RD $49.95. Model III compatible**

*TRS-80 is a trademark of Tandy Corporation.

SEE YOUR LOCAL
INSTANT SOFTWARE DEALER OR

Just Call Toll-Free
1-800-258-5473

BEGINNER'S RUSSIAN—In order to understand a foreign culture, you must know its language. The three programs in this package will give you on-screen displays of the characters of the Cyrillic alphabet, detailed instructions of their proper pronunciation and exercises that will have you recognizing and speaking simple Russian words. An excellent package for students, businessmen, scientists or anyone who is interested in learning the Russian language. **(T1) Order No. 0136R $9.95. Model III compatible**

EVERYDAY RUSSIAN—will acquaint you with the words for various foods, places to eat, signs and the names of stores—exactly what a traveller needs to know. Each of the three parts of the package not only teaches you the words but quizzes you on them as well. You can even practice typing in Russian. Discover the Russian language today! **(T1) Order No. 0137R $9.95. Model III compatible**

NO MATTER WHAT YOUR NEEDS ARE, INSTANT SOFTWARE HAS A PROGRAM FOR YOU.

BOWLING LEAGUE STATISTICS SYSTEM—Keeps a computerized list of league data, team data and data for each bowler. Extremely flexible, it has a total of 16 different options to let you modify the program to suit your league's rules. It is easy to use and has a built-in "HELP" feature to aid you. **(T1) Order No. 0056R $24.95.**

HOME/PERSONAL

HOUSEHOLD ACCOUNTANT—Save with these two programs: ● BUDGET & EXPENSE ANALYSIS: It has nine sections for income and expenses and an option for quarterly/yearly reviews. ● LIFE INSURANCE COST COMPARISON: Compare the total costs of various insurance policies. Contrast term with whole life. It will store and display up to six prospective policies. **(T1) Order No. 0069 $7.95. Model III compatible**

PERSONAL BILL PAYING—You can keep a computerized list of ALL your bills (up to 22 accounts), each listed with its name, number, due date and amount owed. Individual accounts can be displayed with a month-by-month breakdown of payments (including check numbers) and current accounts can be seperated from inactive ones. It allows you to save the data to tape for future use. **(T1) Order No. 0103R $7.95 Model III compatible**

WRITE FOR OUR NEW INSTANT SOFTWARE CATALOG

We Guarantee It!

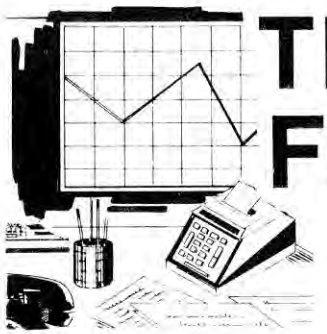
Instant Software Guarantee

OUR PROGRAMS ARE GUARANTEED TO BE QUALITY PRODUCTS. IF NOT COMPLETELY SATISFIED YOU MAY RETURN THE PROGRAM WITHIN 60 DAYS. A CREDIT OR REPLACEMENT WILL BE WILLINGLY GIVEN FOR ANY REASON.

Instant Software™

PETERBOROUGH, N.H. 03458

See List of Advertisers on page 306



TRS-80* Software From Function to Fantasy

POPULAR GAMES

BEGINNER'S BACKGAMMON/KENO—Why sit alone when you can play these fascinating games: • BACKGAMMON: Play against the computer in a game that's sure to sharpen your skills; • KENO: Enjoy this popular Las Vegas gambling game—guess the right numbers and win big! **(T1) Order No. 0004R $7.95. Model III compatible**

CHESSMATE-80—This versatile chess opponent gives you a choice of ten levels of play, from the "blitz" level (the computer has 3 seconds to move) to the infinity level (where the computer will consider every possible move—which could take years). This machine-language program is a conservative player and follows all the rules of international play. CHESSMATE-80 can teach you how to move and allow you to set up the board and play end games or special problems. CHESSMATE-80 battled Sargon II to a draw at two minutes a move and beat Microchess 1.5 in six moves. **(T1) Order No. 0057R $19.95. Model III compatible**

YOUR CRIBBAGE AND CHECKERS PARTNER—CRIBBAGE is a two-person game that you are sure to enjoy. This is NOT a tutorial—it is a game worthy adversary. CHECKERS: An old favorite which follows international rules, including multiple jumps. **(T1) Order No. 0068R $9.95. Model III compatible**

CARDS—A one-player package to let you play, with your computer, these famous games: • DRAW AND STUD POKER: These programs will keep your game sharp; • NO-TRUMP BRIDGE: Develop your strategy and (hopefully) increase your skill. **(T1) Order No. 0063R $7.95. Model III compatible**

FLIGHT SIMULATIONS

RAMROM PATROL/TIE FIGHTER/KLINGON CAPTURE—•RAMROM PATROL: Destroy the RamRom ships before they capture you. •TIE FIGHTER: Wipe out the enemy Tie fighters and become a hero of the Rebellion. •KLINGON CAPTURE: You must capture the Klingon ship intact. **(T1) Order No. 0028R $7.95. Model III compatible**

FLIGHT PATH—This three-part package includes: •MOUNTAIN PILOT: Become a daring bush pilot and fly supplies to a remote mining camp. You must cross mountain ranges and struggle with headwinds, tricky navigation and rapidly diminishing fuel. •O'HARE: A control tower simulation for you would-be Air Traffice Controllers. You are responsible for the lives of hundreds of passengers as you guide aircraft through your control sector. •PRECISION APPROACH RADAR: Combines the skills of pilot and Air Traffic Controller, as your commands guide an aircraft in its approach to the field and a safe landing. **(T1) Order No. 0171R $9.95. Model III compatible**

BALL TURRET GUNNER—Imagine yourself at the control console of a strategic laser weapon, deep in the space lanes. Your hindsight detector informs you of a Gnat fighter coming in for an attack so you swivel you laser turret until you can see the target. Watch the Range Indicator and your Targeting Computer's readout closely, because you'll only have a fraction of a second to catch him in your sights. Will you transform the Gnat into a ball of ionized gas or will you see that blinding flash that means The Big Demotion? BALL TURRET GUNNER, with you choice of multiple levels of difficulty, optional sound effects and excellent graphics, is more than a game. It's an event to be savored. **(T1) Order No. 0051R $9.95. Model III compatible**

JET FIGHTER PILOT—In this brilliantly realistic simulation, you become the pilot of a twin turbo-jet fighter. Begin your mission from either the deck of a carrier or from an airfield. During flight, you'll need to constantly monitor your display and make the necessary adjustments to the throttle, flaps, and air spoilers; you must decide when to retract landing gear and release your drop tanks! There is an on-board Navigational Computer, a Glideslope/Localizer and a Weapons Control Computer. Earn your wings with JET FIGHTER PILOT. **(T1) Order No. 0159R $14.95. Model III compatible**

SPACE TREK II—Protect the quadrant from the invading Klingon warships. The Enterprise is equipped with phasers, photon torpedoes, impulse power and warp drive. **(T1) Order No. 0002R $7.95. Model III compatible**

AIR FLIGHT SIMULATION—Take off and land your aircraft without making a crater. This "instruments only" simulation starts you with a full tank of fuel, which gives you a maximum range of about 50 miles. You'll get constant updates of air speed, compass heading and altitude. After you've acquired a few hours of flight time, you can try flying a course against a map or doing aerobatic maneuvers. **T(1) Order No. 0017R. $9.95. Model III compatible**

SPACE TREK IV—•STELLAR WARS: Engage and destroy Tie fighters in your attack on the Death Star. For one player. •POPULATION SIMULATION: A two-player game where you control the economy of two neighboring planets. You must decide: Guns or Butter? **(T1) Order No. 0034R $7.95. Model III compatible**

BASIC AND INTERMEDIATE LUNAR LANDER—Bring your lander in under manual control. The basic version is for beginners; the intermediate version is more difficult, with a choice of landing areas and rugged terrain. **(T1) Order No. 0001R $7.95. Model III compatible**

COSMIC PATROL—We put you in command of a small interstellar patrol craft. You must defend Terran space and prey on the Quelon freighters that carry vital war supplies—but beware of their I-Fighter escorts. They're well armed, extremely fast and they NEVER miss! With its real-time action, impressive sound option and superb graphics, this machine-language program is the best of the genre. **(T1) Order No. 0223R $14.95. Model III compatible**

Airmail Pilot —Return to the early days of aviation. You must fly the mail from Columbus to Chicago. Your Jenny, a cloth-covered biplane, must take you through unpredictable winds, hail and electrical storms. Your mission is to get the mail through in the shortest possible time. There is an on-board clock to time you flight, from takeoff to touchdown. . . assuming you are able to complete it. **(T1) Order No. 0106R $9.95. Model III compatible**

NIGHT FLIGHT—Your mission is to fly over the North Atlantic and make a nighttime photo/recon flight above the enemy fleet. NIGHT FLIGHT lets you take-off, fly and land a propellar-driven aircraft. You can practice approaches and landings with an on-screen display of the landing field information—it will practically teach you to fly. **(T1) Order No. 0117R $9.95. Model III compatible**

COMP-U-NOVELS

WHO-DUN-IT? Criminal elements have committed five dastardly crimes. As the investigating detective, you must solve them.

You can compete against either Detective Nybbles, a computerized sleuth, or up to four other human detectives.

•DEDUCTION: Guess the order of four symbols out of six or seven different ones. To make things even more complicated, you can let the computer repeat symbols and have a range of 2401 possibilities. **(T1) Order No. 0047R $7.95. Model III compatible**

SANTA PARAVIA AND FIUMACCIO Become the ruler of a medieval city-state as you struggle to create a kingdom. Up to six players can compete to see who will become the King or Queen first. **(T1) Order No. 0043R $7.95. Model III compatible**

There are over 450 Instant Software dealers throughout the U.S.A. and the world.

We ship our orders within 48 hours.

*TRS-80 is a trademark of Tandy Corporation.

CODE—Minimum System Required

(T1) = TRS-80 Model I Level II, 16K RAM
(T2) = TRS-80 Model I Level II, 16K RAM with Expansion Interface 16 + K RAM and one disk drive
(T3) = TRS-80 Model II, 32K RAM

*A trademark of Tandy Corporation

SEE YOUR LOCAL INSTANT SOFTWARE DEALER OR

Just Call Toll-Free 1-800-258-5473

WRITE FOR OUR NEW INSTANT SOFTWARE CATALOG

We Guarantee It!

Instant Software Guarantee

OUR PROGRAMS ARE GUARANTEED TO BE QUALITY PRODUCTS. IF NOT COMPLETELY SATISFIED YOU MAY RETURN THE PROGRAM WITHIN 60 DAYS. A CREDIT OR REPLACEMENT WILL BE WILLINGLY GIVEN FOR ANY REASON.

Instant Software™

PETERBOROUGH, N.H. 03458

HOME/PERSONAL

THE WORDSLINGER—An economical word processing program that was designed for the individual user or small business featuring: automatic formatting; text editing; and tape storage. Once you've used the WORDSLINGER, you won't want to go back to your typewriter. **(T1) Order No. 0129R $29.95.**

MIMIC—Test your memory and reflexes with five versions of this popular game. You must match the sequence and location of symbols displayed on your monitor within the time limit. Instructions on how to produce accompanying sound effects. **(T1) Order No. 0066R $7.95**

CLIMATE COMP—This two-program package includes: WEATHER FORECASTER, which gives you a short range weather forecast based on the information that you enter and WEATHER PLOT, which will display climatological data for any major city in the United States. **(T1) Order No. 0102R-1 $19.95. Model III compatible**

BODY BUDDY—Includes these three programs: ● ADULT CALORIC REQUIREMENTS: Will determine your Basal Metabolic Rate and suggest strategies to achieve your ideal weight! ● FLEXI-DIET: Creates an "infinite" number of diet menus, on a day-to-day basis. Choose your caloric intake, from 600 to 2400 calories per day. The ● ANATOMY QUIZ program teaches a mini-lesson on the various organs of the human body, giving location, size and function(s). **(T1) Order No. 0109R $9.95. Model III compatible**

ENERGY CONSUMPTION—This program will record and analyze your utility bills for up to five years, when you supply the following information. Gas/Water/Electricity used and their respective costs. It will calculate six monthly usage averages and unit costs. Data can be compared for any month or multi-month periods. **(T1) Order No. 0132R $9.95. Model III compatible**

BUSINESS

SALES ANALYSIS—If your business is sales, you're faced with some unique problems. This package is divided into several modules to help solve those problems: The SALES ANALYSIS module is designed to provide guidelines for determining sales performance, to analyze this performance and show you where it can be improved. The DATA STORAGE module allows you to store data in an automated processing ledger. The MANAGEMENT ANALYSIS module can take all the sales records for your group and show you who your best salespersons are, who needs more training and give you a sales forecast. Finally, the MARKET ANALYSIS module can show you where determined sales efforts can produce the most success. **(T1) Order No. 0131R $24.95. Model III compatible**

ORACLE-80—will provide you with business analysis and forecasting capabilities previously available only on large computer and time-sharing systems. A flexible, professional time series analysis and forecasting package for use in product planning, business planning, sales forecasting and more. Financial managers and economists can analyze economic climates and investigate business cycles. ORACLE-80 is designed to be used and understood by the typical businessperson. All input and output is written in plain English and the package documentation carefully explains *all* the functions of the program. ORACLE-80 puts the future in your hands. **(T2) Order No. 0140R $75.00. Model III compatible**

BUSINESS PACKAGE IV—This business package contains two programs: ● BUSINESS CYCLE ANALYSIS: This program can plot the expansion and contraction cycles of any aspect of your business. ● FINANCIAL ANALYSIS: Now you can get the figures for any type of annuity, sinking fund, or mortgage and compute the yield and value for bonds. The package includes a blank data tape. **(T1) Order No. 0019R $9.95. Model III compatible**

FINANCIAL ASSISTANT—Compute the figures for a wide variety of business needs, including: ● DEPRECIATION: Figure depreciation on equipment five different ways. ● LOAN AMORTIZATION: Enter a few essential factors and get a complete breakdown of all costs and schedules of payment for any loan. ● FINANCIER: Performs thirteen common financial calculations. ● 1% FORECASTING: Use it to forecast sales, expenses, or any other historical data series. **(T2) Order No. 0072R $7.95. Model III compatible**

CHECK MANAGEMENT SYSTEM—Use this program for writing checks and maintaining records. You can make entries, edit/correct entries and print out the checks. It will also search and display records by number, code, date, description or amount. A Code and Search routine allows you to print a report of all checks written for specific expenses. You can print your letterhead and account number at the top of each report. System requirements: **(T2)** with a compatible tractor-feed printer. **0147RD $39.95. Model III compatible**

ACCOUNTS RECEIVABLE/ACCOUNTS PAYABLE—These Model I programs will handle the drudgery involved in AR/AP entries. They will also provide invoices, statements, reports and more. Each program is capable of handling up to 1500 entries per month, posted to as many as 760 accounts. The AR/AP package is ideal for any small business and can easily be used by anyone familiar with AR/AP operations. System requirements (in addition to **T2**: Three disk drives and a Line Printer (tractor-feed). **Order No. 0075RD $199.95. Model III compatible**

MAIL/LIST—With a five-inch drive, you can store up to 600 names per disk without DOS, or 300 names with DOS. The program maintains separate alphabetical and ZIP code files under constant sort. When you add a name or ZIP code to your list, it will be inserted into its correct position in the file. The program will record your data in nine fields: address, city, state, ZIP code, phone number, phone extension and name (2) plus a five character code field. The best feature of this program is the sort process that lets you determine alphabetical or ZIP code order for label printing. **(T2) Order No. 5000RD $99.00 Model III compatible**

ONE-D MAILING LIST—A comprehensive mailing list program that will run on only ONE disk drive! Up to 17 fields of selection for name/address retrieval. Its features include: Auto-sort (alphabetic or ZIP code). Easy error correction and recovery. Prints selective listings. Supports up to 4 drives. Prints mailing labels and listing of all names on file. **(T2) Order No. 0123RD $24.95. Model III compatible**

EXECUTIVE EXPENSE REPORT GENERATOR—Provides you with emergency relief in the form of a clear, plausible expense layout. Input your grand total and cash advance (if any), and you'll receive an itemized expense report, from breakfast to snacks. **(T1) Order No. 0135R $9.95. Model III compatible**

GAMES

WINNER'S DELIGHT—Do you enjoy a challenge? Then try WINNER'S DELIGHT including: ● AMAZING: You must escape from a maze, one that you view from the inside, working against the clock; ● JUNIOR CHECKERS: Not your usual game of checkers . . . the challenge is to beat the computer in the fewest number of moves; ● JUMBO JIGSAW: Fit the pieces together in the fewest number of tries; ● THIRTEEN WAYS: Try to fill up your columns with the numbers you roll on the dice—the computer will try to fill its columns first! **(T1) Order No. 0124R $9.95. Model III compatible**

FUN PACKAGE I—Why call it "Fun Package"? Judge for yourself! This entertaining package includes: •ROCKET PILOT: Flying it is easy—it's the landing that's tough! •PAPER, ROCK, SCISSORS: It's the time-honored game just as you remember it, played against your TRS-80. •HEX I: Just when you master this puzzle game, the computer will increase the difficulty. **•MISSILE ATTACK: Use your missiles to protect your city from jet attack. Requires a TRS-80 Level I 16K. Order No. 0037R $7.95. Model III compatible**

DEMO III—The biggest package ISI has ever released, including: ● RACE 1: Careen around the race course as you try to beat the clock; ● TARGET UFO: Destroy all the invading UFOs; ● LIFE: Experiment with this simulation of the life cycle of a colony of bacteria; ● PHONE NUMBER CONVERTER: Change those hard to remember 7-digit phone numbers into easily remembered words; ● BIORHYTHM: Plot biorhythm curves for anyone, anytime; ● GRAPHICS PROGRAM: This program will show you what your TRS-80's graphics display can do; ● RACE 2: Five different tracks for the more experienced driver; ● HORSE RACE: Up to nine players can bet on and enjoy our most entertaining horse race program; ● DRAWING BOARD: Draw pictures or messages and store them in memory or on cassette tape with this easy-to-use program; ● 24-HOUR CLOCK: Transform your computer into an accurate digital clock. **(T1) Order No. 0055R $7.95**

OIL TYCOON—Avoid oil spills, blowouts and dry wells as you battle to become the world's richest oil tycoon. Two players become the owners of competing oil companies as they search for oil and control their companies. **(T1) Order No. 0023R $7.95.**

BOWLING—Let your TRS-80 set up the pins and keep score. One player can pick up spares and get strikes. **(T1) Order No. 0033R $7.95. Model III compatible**

DEMO II—contains: ● TIC-TAC-TOE: An old time favorite with three levels of difficulty; ● TIME TRIALS: Try to beat the clock as you race your car through curves, chutes, and chicanes; ● MAZE: One or two players can search through the maze for the secret square; ● HANGMAN: One or two players can try to guess the secret word; ● WHEEL OF FORTUNE: Choose your number, place your bet and see if you can break the bank (for one to eight players); ● HURRICANE: You can track and monitor hurricanes in *any* part of the world; ● BUGSY: Can you build your Z-80 bug before the computer does? ● HORSE RACE: Pick a sure winner and place your bet (for 1 to 100 players). **(T1) Order No. 0049R $7.95. Model III compatible**

BATTLEGROUND—It is late 1944 and the Allied forces are sweeping toward Berlin. As General in command, you study the map. At your command are tanks, planes, artillery, infantry, engineers, and vehicles. The battle map of your sector will fill with markers to show the development of your forces. You and your opponent will assume the roles of warring Generals, as the battle unfolds. The stark reality of World War II comes alive in BATTLEGROUND. **(T1) Order No. 0141R $9.95. Model III compatible**

SKIRMISH-80—Check out these great games: ● MISSION IMPOSSIBLE: Your objective in this real-time simulation is to drive your tank into a prison courtyard, rescue a jailed prisoner and escape; ● TRAP: A two-player game, in which you must maneuver your opponent into a position where he is hopelessly trapped; ● WIPEOUT: A two-player game in which your mobile gun gets points by destroying as many obstacles as possible, but be careful—some of those obstacles are explosive mines; ● BLOCK-'EM: A two-person competition in which your moving "snake" tries to force your opponent to hit either (1) your trail, (2) his own trail, (3) the boundaries of the field, or (4) any randomly place barriers. The strategy is, of course, to leave you opponent no safe move. **(T1) Order No. 0070R $9.95. Model III compatible**

POPULAR GAMES

OTHELLO—In the game of Othello, there is no such thing as lucky move. The game is a constant test of concentration and tactics.

Othello pits your strategic powers against a merciless, computerized opponent. You play on a board of 64 squares. When you capture your opponent's game disks (by bracketing them with your own), they immediately change sides, to become members of your set.

Here's a maddening, frustrating, but always engrossing, game for your TRS-80. (T1) **Order No. 0046R $9.95. Model III compatible**

SEE YOUR LOCAL
INSTANT SOFTWARE DEALER OR

Just Call Toll-Free
1-800-258-5473

*TRS-80 is a trademark of Tandy Corporation.

NO MATTER WHAT YOUR NEEDS ARE, INSTANT SOFTWARE HAS A PROGRAM FOR YOU

Instant Software™

PETERBOROUGH, N.H. 03458

We Guarantee It!

Instant Software Guarantee

OUR PROGRAMS ARE GUARANTEED TO BE QUALITY PRODUCTS. IF NOT COMPLETELY SATISFIED YOU MAY RETURN THE PROGRAM WITHIN 60 DAYS. A CREDIT OR REPLACEMENT WILL BE WILLINGLY GIVEN FOR ANY REASON.

See List of Advertisers on page 306

Disk owners, your speed mods, aren't over once the hardware is done. Your DOS software needs help too.

Fast Clock DOS

Allan J. Domuret
7825 Willowcrest Way
Fair Oaks, CA 95628

A number of TRS-80 CPU clock modification kits are currently being advertised. Most of them speed up the CPU clock from the standard 1.77 MHz to a rate 50 percent faster at 2.66 MHz. A more recent development to 3.54 MHz doubles the standard TRS-80 CPU clock speed, bringing the rate to 3.54 MHz.

At these speeds, several advantages are obtained: faster program running time and faster sorts. Even the Electric Pencil works better—the frustrating character dropout on a word-wrap-around virtually disappears.

The main problem, up until now, has been that disk operations at fast clock rates were virtually impossible. Excessive disk errors required that the CPU clock be slowed down to its standard 1.77 MHz rate in order to reliably read and write. Not being convinced the problem was insoluble, I sought a way to make disk I/O reliable at fast clock speeds, and I found it.

A Word of Caution

I am sharing the info with TRS-80 owners with a word of caution and one request: This is a relatively new area of TRS-80 operations and some problems may develop. If anyone who makes the speedup mod encounters problems, please contact me so that some efforts can be made to correct them.

If you install the clock speedup board and encounter problems, it is quite easy to restore the TRS-80 to its original configuration. Most TRS-80's, however, should work quite well at the 2.66 MHz clock. The 3.54 MHz clock might be a little more flaky. These problems result from the varied quality of the CPU chip.

My clock speedup kit was purchased from Archbold Electronics, Sacramento, CA. They provide a kit that can be wired to run a TRS-80 at either 2.66 or 3.54 MHz. The 3.54 MHz speedup uses the same kit, but involves the additional small task of cutting two traces and running two jumpers on the main CPU board.

My system has been running reliably at 3.54 MHz for several months now. Note that some users have had problems with the 3.54 MHz clock mod and they therefore had to be satisfied with the 2.66 MHz clock.

If you plan on making the hardware changes required for the speedup mod, keep in mind the effect it may have on getting maintenance or warranty service on your TRS-80 by Radio Shack.

Theory of Operation

After plowing through the Radio Shack Disk Operating System (TRSDOS), it became apparent that processing time delays were required. They involve some kind of "settling time" for certain parts of the hardware or software. The method uses PUSH-POPs in pairs, which do nothing but create time delays.

Using RSM2D, or a similar machine language system monitor, an example of one of these time delays can be found in NEWDOS at memory location 45F3 hex as a series of PUSH-POP commands. Another POP-PUSH (in that order) time delay is found at 4698 hex, but this particular delay is also functional in that it loads the BC register with data.

For DOS 2.2 and 2.3 users, the memory locations for the SYSO/SYS PUSH-POPs are 4664 hex and 4697 hex.

There is also a time wasting series of PUSH-POPs in the BOOT/SYS file, but these will not normally be found in memory. The reason is that the BOOT is resident only briefly during a boot up or a reset. It loads initially to memory location 4200 hex, and after it has served its purpose it is overwritten by SYSO/SYS. If you know how to load the BOOT/SYS (it is at drive zero, track zero, sector zero) to 4200 hex with RSM2D, you will see the PUSH-POPs at 42BB and 42C9 hex. The BOOT/SYS PUSH-POPs are the same for DOS 2.2, 2.3 and NEWDOS.

There are additional PUSH-POPs in several of the other DOS files, plus some timing loops in the FORMAT/CMD file of all three DOS systems.

To enable disk operations with a fast running TRS-80, it is only necessary to increase the time delays by substituting do-nothing commands to kill additional time. It so happens that the E3 machine code for "EX (SP), HL" can serve our purpose by being used in pairs. A pair of E3 commands uses up about three times as much time as a two-byte PUSH-POP. With the E3 command, data in (SP) is exchanged with HL either two times or four times—the end result being nothing but wasted time.

But the additional time delay, required at memory location 4698 hex in NEWDOS and 4697

Professional software

TRS-80® MODEL II NOW AVAILABLE!

BASIC CROSS REFERENCE

- FIND WHERE NAMES ARE USED FAST!
- CAN YOU DELETE THAT LINE? FIND OUT!
- DO YOU HAVE DEAD CODING?
- WANT A NICE PROGRAM LISTING WITH DATE & TIME IN HEADING
- SAVE HOURS!
- PARALLEL/SERIAL PRINTERS
- SEVERAL OPTIONS
- 6/8 LPI VARIABLE LINE WIDTH & PAGE DEPTH

$59.99 +$3.00 POSTAGE & HANDLING

$100.00 FOR VECTOR GRAPHICS SYSTEMS. DOCUMENTATION ONLY $10.00 DEDUCTIBLE ON PURCHASE

DISK SORT

- YOU DON'T HAVE TO BE A PROGRAMMER TO USE IT!
- MENU DRIVEN
- RANDOM FILES
- CHAINS TO SYSTEM OR BASIC PROGRAMS
- EASY TO USE
- FAST!
- SPECS SAVED ON DISK
- EASY TO INSERT INTO JOB STREAM FOR NON-STOP RUNNING!

$69.99 DOCUMENTATION ONLY $10.00 DEDUCTIBLE ON PURCHASE +$3.00 POSTAGE & HANDLING

BASIC COMPILER

- TRSDOS*/BASIC COMPATIBLE!
- FASTER THAN BASIC BY UP TO 40 TIMES
- EASY TO USE
- AUGMENTED WITH OUR DOCUMENTATION
- WRITTEN BY MICROSOFT

$350.00 +$5.00 POSTAGE & HANDLING

TRS-80* & TRSDOS* ARE REGISTERED TRADEMARKS OF TANDY CORP

GOOD-LYDDON DATA SYSTEMS ✓218
5486 RIVERSIDE DR., CHINO, CA. 91710
MASTER CHARGE or VISA accepted.

Model 488-80B For Model 1 Operation

Model 488-80C For Model 3 Operation

IEEE-488 TO TRS-80* INTERFACE

Everything needed to add *powerful* basic GPIB-488 controller capability to TRS-80 Model 1 or 3, Level 2 or DOS with a minimum of 16K.

488-80B or 488-80C $225.
+ shipping, insurance & tax ✓291

SCIENTIFIC ENGINEERING LABORATORIES
11 Neil Drive • Old Bethpage, NY 11804
Telephone: (516) 694-3205

**Trademark of Tandy Corp.*
There is no affiliation between Scientific Engineering Laboratories and Tandy Corp. or Radio Shack.

Optional Relocatable Machine Level GPIB Driver for Assembler Level Programming-$35.

WHY BUY FROM US?

- NAME BRAND – TOP QUALITY SUPPLIES
- DISCOUNT PRICES – 25 - 50% OFF
- WE SHIP YOUR ORDER FAST – WITHIN 24 HOURS
- 30 DAY GUARANTEE ON EVERYTHING WE SELL

SCOTCH DISKETTES – 5¼" or 8" Scotch quality means fewer errors.
COMPUTER PAPER – Regular Green Bar • Blank Word Processing • Heavy Weight Bond.
AVERY LABELS – Pressure Sensitive Address Labels • Shipping Labels • Piggyback Response Labels.
DISK STORAGE – Binders • Filing Panels • Library Cases.

To Place and Order or Request a Catalog:

Mastercharge
VISA

1–800-253-4358
In Michigan 616 – 375-7519

✓142 NATIONAL TRICOR, INC. • 3335 Greenleaf Blvd.• Kalamazoo, MI 49008

THE BOOKKEEPERS

FOR INFO CALL (603)-447-2745

Full Charge Bookkeeper—48K, 3 DRIVE, w/ALPHA **$129.95**
Intermediate Bookkeeper—48K, 2DRIVE & Printer **$109.95**
Cheap Bookkeeper—32K, 2DRIVE & Printer **$ 89.95**

All Above Are Daily Journal—G/L Systems

Ann Rose, our Accounts Receivable Clerk—
48K, 2 DRIVE & PRINTER **$150.00**

STURDIVANT & DUNN, INC. ✓82
BOX 277, 124 WASHINGTON ST., CONWAY, NH, 03818

If you're looking for the best prices in the U.S.A. on

TRS-80®
MICROCOMPUTERS

We have consistently offered the TRS-80 line at savings **up to 20%,** which means you can save $150 to $1500 by buying directly from Computer Discount of America.

TRS-80 Model II, 64K System, with disc drive only $3385.00

Other TRS-80 Model II, or Model III computers and systems, Color Computers, and Pocket Computers are in stock at similar savings.

Our savings are as big on expansion interfaces, printers, diskettes – everything for your TRS-80 System.

ATARI®
MICROCOMPUTERS

We have the full line of ATARI personal computers and systems, including Models 400 and 800. The computers, accessories, and hardware are brand new, in factory sealed cartons, and carry a full factory warranty.
Most models are in stock for immediate delivery (usually within 7-10 days), and a price quote is as near as your phone.
So if you're looking for the **best prices in the U.S.A.,** for microcomputers and accessories, call Computer Discount of America, Inc., West Milford, New Jersey 07480. 201-728-8080. **NO TAX ON OUT-OF-STATE SHIPMENTS.**

TOLL FREE 800-526-5313

✓372 **Computer Discount of America**®

Authorized TRS-80 dealer, store B-282.

✓See List of Advertisers on page 306

hex in DOS 2.2, will not fit within the DOS SYSO/SYS code itself. It is necessary to branch out of SYSO/SYS with a JUMP to a place in memory where the required time delay can be programmed, and then return to SYSO/SYS.

There is a safe "hole" in disk memory at 4060 hex. Memory in this area is used only by Debug, so any software commands loaded to this area are usually safe. The required time delay can sit safely there without ever getting clobbered, unless you call up Debug. Normally this should create no problems because you won't be performing disk operations with Debug anyway. Just remember that when you are finished with Debug, perform a RESET, and everything will reboot back to a normal configuration.

Enter SUPERZAP

The disk modifications are made directly to disk using Apparat's Superzap. If you are not familiar with Superzap, be absolutely certain that you make a backup disk before performing surgery. Even you pros should work on a backup. If you blow it on a backup, it will crash, but no other harm will be inflicted on your system. Just start over again.

Table 1

BOOT (for NEWDOS, DOS 2.2 and DOS 2.3):
- 0000BB (Superzap's column identifier)—change F5 F1 F5 F1 to E3 E3 E3 E3.
- 0000C9—change C5 C1 to E3 E3.

SYSO/SYS (NEWDOS only):
- 0008A9—change to read C3 A2 46 E3 E3 E3 E3 3A EC etc.
- 000952—change C3 E3 45 to read C3 60 40
- 001759—following 2E 0D 03, where 02 02 00 4E begins, change 02 02 etc., to read, 01 09 60 40 E3 E3 E3 E3 C3 E3 45 02 02 00 4E
- 011403 (repair system directory—change from 5D to 68)

SYS0/SYS (DOS 2.2 only):
- 00075F—change F5 F1 00 00 to E3 E3 E3 E3
- 000792—change C1 C5 C1 C5 F3 to C1 C5 C3 60 40
- 001721—change 02 02 00 4E to 01 0A 60 40 E3 E3 E3 E3 F3 C3 9C 46 02 02 00 4E (No system directory repair is needed for TRSDOS.)

SYSO/SYS (DOS 2.3 only): Apply the change for 00075F and 000792 as shown above for DOS 2.2. For the last change at 001721, the location is 00172D for DOS 2.3. The change code is otherwise identical. This is the only difference required in changes between DOS 2.2 and DOS 2.3.

FORMAT (for NEWDOS, DOS 2.2 and DOS 2.3—all are identical):
- 00227D—change 01 CD 00 to 01 9A 01
- 002290—change 01 9D 19 to 01 3A 33
- 0022A7—change 01 BA 00 to 01 74 01
- 0022BE—change 01 20 17 to 01 40 33
- 0023D5—change F5 F1 F5 F1 to E3 E3 E3 E3
- 0023F4—change C5 C1 C5 C1 to E3 E3 E3 E3
- 0025B6—change F5 F1 F5 F1 to E3 E3 E3 E3
- 0025C7—change C5 C1 C5 C1 to E3 E3 E3 E3
- 00316F—change F5 F1 F5 F1 to E3 E3 E3 E3
- 00317D—change C5 C1 to E3 E3

SYS3/SYS (NEWDOS):
- 012354—change 21 EF 37 to CD 85 51
- 012448—change 02 02 4F 50 etc., to E3 E3 E3 E3 21 EF 37 C9 02 02 4F 50
- 0123B9—change 01 8D to 01 95
- 011703—change directory end of file from 4C to 54

SYS3/SYS (DOS 2.2 and 2.3):
- No changes

BACKUP/CMD (DOS 2.2 and 2.3):
- 003757—change 01 CD 00 to 01 9A 01
- 00376A—change 01 9D 19 to 01 3A 33
- 003780—change 01 BA 00 to 01 74 01
- 003794—change 01 20 17 to 01 40 33
- 003855—change F5 F1 F5 F1 to E3 E3 E3 E3
- 003874—change C5 C1 C5 C1 to E3 E3 E3 E3
- 004131—change F5 F1 F5 F1 to E3 E3 E3 E3
- 00413E—change C5 C1 C5 C1 to E3 E3 E3 E3
- 004185—change F5 F1 F5 F1 to E3 E3 E3 E3
- 0042BB—change F5 F1 F5 F1 to E3 E3 E3 E3
- 0042CC—change C5 C1 C5 C1 to E3 E3 E3 E3

DOS ZAPs

The DOS ZAPs provided here will enable a modified TRS-80 to run at a fast clock rate of 2.66 or 3.54 MHz (or even 4.0 MHz if you are technically inclined) and to function normally for all disk operations. Disk files created at any clock rate will be compatible, so that those created on a 3.54 MHz system can be loaded and run on a 1.77 or 2.66 MHz system, etc.

In the ZAPs given in Table 1, the six digit prefix on each new line is Superzap's identifier code, assuming only drive zero is available.

Additional Considerations

If you are using anything which depends on a controlled baud rate other than the Radio Shack RS-232 board—for example, the Small Systems Software TRS232 cassette port printer driver—you may encounter timing problems. The Radio Shack RS-232 board, however, has its own clock generator that is not affected by the modified clock in the CPU.

I am running a Heath H-14 RS-232 serial printer on the Radio Shack RS-232 board and it was not necessary for me to change any baud rate settings when I went to the fast clock mod. I am also running a modem without any problems.

Printer operations are normal if a handshake is used, as is the case with just about any printer connected to the Centronics parallel port.

One possible problem might be a TRS-80 equipped with cheap memory chips. Most, but possibly not all, memory chips should work well with the 2.66 MHz clock. So far, I have not encountered any problems of this type. Also, for what it is worth, my system does not have a buffered cable and it works fine.

A Pencil Patch

When running the TRS-80 at the 2.66 MHz clock rate, you will find that the Pencil's cursor fades irritably in and out (probably because its blink rate is close to a multiple of the vertical sweep rate of the video monitor). The problem disappears at the 3.54 MHz clock rate, but the user may nevertheless prefer to slow down the cursor blink rate. Step by step instructions for this modification follow.

1. With NEWDOS, call up LMOFFSET and use it to load the Electric Pencil to memory location 6589 hex (Pencil's normal memory residence starts at 5589 hex, but it will not LOAD there because it is too low in memory).

2. Answer N to the SUPPRESS APPENDAGE? prompt.

3. Answer Y to the DISABLE INTERRUPTS? prompt.

4. Write this relocated Pencil file to disk. (This relocated version of Pencil will load to start, end, and execute addresses of 6589, 7CA4, and 7C95 hex. LMOFFSET will display these addresses for you.)

5. Return to DOS.

6. Load, but do not run, the newly created Pencil file to memory.

7. Using RSM2D or your other favorite monitor, look at memory locations 6CE4 and 6CEE. These should read:

```
F PENCIL2/CMD 6589 7CA4 7C95
```

The values 0096 and 012C loaded into DE affect the cursor blink rate.

8. To change the cursor blink rate, change memory locations 6CE5 from 96 to E1, and 6CEF from 2C to C2 (Yes, two 'see' to 'see' two). This increases each of the time values loaded into DE by 50 percent to correspond to the clock speedup of 50 percent. The first change will 'LD 00E1' into DE and the second will 'LD 01C2' into DE.

9. Now press RESET while holding down SHIFT/up arrow to reenter DOS. Holding down the SHIFT/up arrow disables the keyboard debounce.

10. SAVE Pencil to disk with TAPEDISK from your old TRSDOS 2.2 or 2.3 disk. The appendage attached to Pencil by LMOFFSET will relocate the program to its normal operating position every time it is loaded from disk. The TAPEDISK com-

FMG CORPORATION NOW CARRIES GRAHAM-DORIAN & PEACHTREE SOFTWARE

FMG CORPORATION
P.O. Box 16020
Fort Worth, Texas
76133
(817) 294-2510

VISA* master charge

M-530

All FMG Software Products Include All Necessary Manuals

NEW VERSATILITY
For Your TRS-80
CP/M®2

CONTROL PROGRAM FOR MICROCOMPUTERS ENABLING YOU TO RUN SOFTWARE PUBLISHED FOR CP/M 1.4 ON THE TRS-80

CP/M is considered the industry standard disk operating system because it gives you the hardware-independent interface you need to make your computer work for you. CP/M 2.0 is the latest in the evolution of a proven reliable and efficient software system. FMG CORPORATION NOW OFFERS THE CP/M 2.0 FOR THE TRS-80 .

It features an enhanced upward compatible file system and powerful new random access capabilities. The CP/M 2.0 from FMG provides the ability to run software published for the CP/M system, on the TRS-80 Model II. From minidisks, floppy disks, all the way to high-capacity hard disks, the flexibility of CP/M 2.0 makes it a truly universal operating system. The package includes an 8" system disk, editor, assembler and debugger for the TRS-80

Available in Format A, B, C, G only ..... $200/$25

MP/M™
MULTI-PROGRAMMING MONITOR

NEW INDUSTRY STANDARD

A deluxe operating system that provides big computer facilities at small computer prices. MP/M is a monitor program which operates with your microcomputer to provide multi-terminal access with multi-programming at each terminal. Best of all, it's CP/M compatible which means you can run a wide variety or programming languages, applications packages, and development software.

You can run simultaneous editors, program translators, and background printer spoolers. Or you can use MP/M for data entry or data-base access from remote terminals. Or you can use MP/M real-time features to monitor an assembly line and automatically schedule programs for execution throughout the day. MP/M makes an excellent focal point for a cluster of connected microcomputers. The possibilities are limitless.

(Format B) ..... $450/$35
(Format G) ..... $300/$35

*CP/M and MP/M are trademarks of Digital Research
Z80 is a trademark of Zilog, Inc.
TRS-80 is a trademark of Tandy Corp
Pascal/M is a trademark of Sorcim.

· MICROPRO INTERNATIONAL

	SOFTWARE WITH MANUAL	MANUAL ALONE
SUPER-SORT I — Sort, merge, extract utility as absolute executable program or linkable module in Microsoft format. Sorts fixed or variable records with data in binary, BCD, Packed Decimal, EBCDIC, ASCII, floating & fixed point, exponential, field justified, etc. Even variable number of fields per record!	$225/$25	
SUPER-SORT II — Above available as absolute program only	$175/$25	
SUPER-SORT III — As II without SELECT/EXCLUDE	$125/$25	
WORD-STAR — Menu driven visual word processing system for use with standard terminals. Text formatting performed on screen. Facilities for text paginate, page number, justify, center and underscore. User can print one document while simultaneously editing a second. Edit facilities include global search and replace. Read/Write to other text files, block move, etc. Requires CRT terminal with addressable cursor positioning	$495/$40	
WORD-STAR Customization Notes — For sophisticated users who do not have one of the many standard terminal or printer configurations in the distribution version of WORD-STAR	NA/$95	
WORD-MASTER Text Editor — In one mode has superset of CP/M's ED commands including global searching and replacing, forwards and backwards in file in video mode, provides full screen editor for users with serial addressable-cursor terminal	$150/$25	
FLOPPY SAVER — Protection for center holes of 5" and 8" floppy disks. Only 1 needed per diskette. Kit contains centering post, pressure tool and tough 7 mil mylar reinforcing rings for 25 diskettes.		
5" Kit	$14.95	
5" Rings only	$7.95	
8" Kit	$16.95	
8" Rings only	$8.95	
HEAD CLEANING DISKETTE — Cleans the drive Read/Write head in 30 seconds. Diskette absorbs loose oxide particles, fingerprints, and other foreign particles that might hinder the performance of the drive head. Lasts at least 3 months with daily use.		
8"	$32.00	
5¼"	$30.00	

(M) **DESPOOL** — Allows flexibility and efficiency. (Disk file printing can be accomplished while simultaneously using the computer for other tasks) Slower printers do not tie up the computer. Requires 32K minimum ..... $75/$10

(M) **SCREEN EDIT** — Text editor for program entry — allows user the ability to see entries as they are being made. Has command which enables user to move the viewed position of the file anywhere within the current data file OR add information anywhere in the file. Requires 16K minimum ..... $125/$25
(Also available in TRS DOS format.
Specify model or TRS-80)

(M) **MAC** — Disk-based, powerful macro assembler utilizes Standard Intel Mnemonics. Includes macro processor.
The CP/M 8080 Macro Assembler reads assembly language statement from a diskette file and produces an Intel "HEX" format object file on the disk suitable for processing in the TRS-CP/M environment. Requires 32K minimum and CP/M ..... $100/$25

(M) **ZSID** — Efficient and reliable program testing system for Z80 microcomputers. Capabilities include traceback and histogram facilities. Allows real time breakpoints.
ZSID is a symbolic debugger which expands upon the features of the TRS-CP/M standard debugger, providing greatly enhanced facilities for assembly language program check-out. Requires 32K minimum and CP/M ..... $99/$25

(T) **MAIL LIST** — Mailing list maintenance package. No sorting required to print normal address labels in zip code sequence. Supports new larger zip code. Sorts and selects on multiple fields. Labels may be printed in user selectable formats. Includes sort and select utilities $300/$35

· PEACHTREE SOFTWARE SYSTEMS

(T) **GENERAL LEDGER** — Records details of all financial transactions. Generates a balance sheet and an income statement. Flexible and adaptable design for both small businesses and firms performing client writeup services. Produces reports as follows: Trial Balance, Transaction Registers, Balance Sheet, Prior Year Comparative Balance Sheet, Income Statement, Prior Year Comparative Income Statement and Department Income Statements. Interactive with other PEACHTREE accounting packages. Supplied in source code for Microsoft BASIC ..... $990/$30

(T) **ACCOUNTS PAYABLE** — Tracks current and aged payables and incorporates a check writing feature. Maintains a complete vendor file with information on purchase orders and discount terms as well as active account status. Produces reports as follows: Open Voucher Report, Accounts Payable Aging Report and Cash Requirements. Provides input to PEACHTREE General Ledger. Supplied in source code for Microsoft BASIC ..... $990/$30

(T) **ACCOUNTS RECEIVABLE** — Generates invoice register and complete monthly statements. Tracks current and aged receivables. Maintains customer file including credit information and account status. The current status of any customer account is instantly available. Produces reports as follows: Aged Accounts Receivable, Invoice Register, Payment and Adjustment Register and Customer Account Status Report. Provides input to PEACHTREE General Ledger. Supplied in source code for Microsoft BASIC ..... $990/$30

(T) **PAYROLL** — Prepares payroll for hourly, salaried and commissioned employees. Generates monthly, quarterly and annual returns. Prepares employee W-2's. Includes tables for federal withholding and FICA as well as withholding for all 50 states plus up to 20 cities from pre-computed or user generated tables. Will print checks, Payroll Register, Monthly Summary and Unemployment Tax Report. Provides input to PEACHTREE General Ledger. Supplied in source code for Microsoft BASIC ..... $990/$30

(T) **INVENTORY** — Maintains detailed information on each inventory item including part number, description, unit of measure, vendor and reorder data, item activity and complete information on current item costs, pricing and sales. Produces reports as follows: Physical Inventory Worksheet, Inventory Price List, Departmental Summary Report, Inventory Status Report, The Reorder Report and the Period-to-Date and Year-to-Date reports. Supplied in source code for Microsoft BASIC ..... $1,190/$30

(T) **MAILING ADDRESS** — Keeps track of name and address information and allows the selective printing of this information in the form of mailing lists or address labels. Allows the user to tailor the system to his own particular requirements. User-defined format and print-out system uses a special format file which tells programs how to print the mailing list or address labels. Standard format files are included with system. Automatic sorting of data uses indexed file management routines which allow the name and address information to be sequentially retrieved and printed without file sorting. Supplied in source code for Microsoft BASIC ..... $790/$30

· GRAHAM-DORIAN SOFTWARE SYSTEMS

(T) **GENERAL LEDGER** — An on-line system; no batching is required. Entries to other GRAHAM-DORIAN accounting packages are automatically posted. User establishes customized C.O.A. Provides transaction register, record of journal entries, trial balances and monthly closings. Keeps 14 month history and provides comparison of current year with previous year. Requires CBASIC-2. Supplied in source ..... $995/$35

(T) **ACCOUNTS PAYABLE** — Maintains vendor list and check register. Performs cash flow analysis. Flexible — writes checks to specific vendor for certain invoices or can make partial payments. Automatically posts to GRAHAM-DORIAN General Ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source ..... $995/$35

(T) **ACCOUNTS RECEIVABLE** — Creates trial balance reports, prepares statements, ages accounts and records invoices. Provides complete information describing customer payment activity. Receipts can be posted to different ledger accounts. Entries automatically update GRAHAM-DORIAN General Ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source ..... $995/$35

(T) **PAYROLL SYSTEM** — Maintains employee master file. Computes payroll withholding for FICA, Federal and State taxes. Prints payroll register, checks, quarterly reports and W-2 forms. Can generate ad hoc reports and employee form letters with mail labels. Requires CBASIC-2. Supplied in source ..... $590/$35

(T) **INVENTORY SYSTEM** — Captures stock levels, costs, sources, sales, ages, turnover, markup, etc. Transaction information may be entered for reporting by salesman, type of sale, date of sale, etc. Reports available both for accounting and decision making. Requires CBASIC-2. Supplied in source ..... $590/$35

(T) **JOB COSTING** — Designed for general contractors. To be used interactively with other GRAHAM-DORIAN accounting packages for tracking and analysing expenses. User establishes customized cost categories and job phases. Permits comparison of actual versus estimated costs. Automatically updates GRAHAM-DORIAN General Ledger or runs as stand alone system. Requires CBASIC-2. Supplied in source $995/$35

Sample Program Disk For Each Graham-Dorian Business Package. Specify Package $45

· MICROSOFT PRODUCTS

(M) **BASIC-80** — Disk Extended BASIC. ANSI compatible with long variable names, WHILE/WEND, chaining, variable length file records ..... $350/$25

(M) **BASIC COMPILER** — Language compatible with BASIC-80 and 3-10 times faster execution. Produces standard Microsoft relocatable binary output. Includes MACRO-80. Also linkable to FORTRAN-80 or COBOL-80 code modules ..... $395/$25

(M) **FORTRAN-80** — ANSI 66 (except for COMPLEX) plus many extensions. Includes relocatable object compiler, linking loader, library with manager. Also includes MACRO-80 (see below) ..... $500/$25

(M) **COBOL-80** — Level 1 ANSI '74 standard COBOL plus most of Level 2. Full sequential, relative, and indexed file support with variable file names. STRING, UNSTRING, COMPUTE, VARYING/UNTIL, EXTEND, CALL, COPY, SEARCH, 3-dimensional arrays, compound and abbreviated conditions, nested IF. Powerful interactive screen-handling extensions. Includes compatible assembler, linking loader, and relocatable library manager as described under MACRO-80 ..... $750/$25

(M) **MACRO-80** — 8080/Z80 Macro Assembler. Intel and Zilog mnemonics supported. Relocatable linkable output. Loader, Library Manager and Cross Reference List utilities included ..... $150/$25

(T) **XMACRO-86** — 8086 cross assembler. All Macro and utility features of MACRO-80 package. Mnemonics slightly modified from Intel ASM86. Compatibility data sheet available ..... $300/$25

(T) **PASCAL/M*** — Compiler generates P code from extended language, implementation of standard PASCAL. Supports overlay structure through additional procedure calls and the SEGMENT procedure type. Provides convenient string handling capability with the added variable type STRING. Untyped files allow memory image I/O. Requires 56K CP/M ..... $150/$20

(T) **PASCAL/Z** — Z80 native code PASCAL compiler. Produces optimized, ROMable re-entrant code. All interfacing to CP/M is through the support library. The package includes compiler, Microsoft Compatible relocating assembler and linker, and source for all library modules. Variant records, strings and direct I/O are supported. Requires 56K CP/M and Z80 CPU. ..... $395/$25

(M) **PASCAL/MT** — Subset of standard PASCAL. Generates ROMable 8080 machine code. Symbolic debugger included. Supports interrupt procedures. CP/M file I/O and assembly language interface. Real variables can be BCD, software floating point, or AMD 9511 hardware floating point. Version 3 includes Enumeration and Record data types. Manual explains BASIC to PASCAL conversion. Source for the runtime package requires Digital Research's MAC. Requires 32K ..... $250/$30

(M) **CBASIC-2** Disk Extended BASIC — Non-interactive BASIC with pseudo-code compiler and run-time interpreter. Supports full file control, chaining, integer and extended precision variables, etc. ..... $110/$15

(M) **BSTAM** — Utility to link one computer to another also equipped with BSTAM. Allows file transfers at full data speed (no conversion to hex), with CRC block control check for very reliable error detection and automatic retry. We use it! It's great! Full wildcard expansion to send ★.COM, etc. 9600 baud with wire. 300 baud with phone connection. **Both** ends need one. Standard and Ⓜ versions can talk to one another. ..... $150/$5

(M) (T) **SELECTOR III-C2** — Data Base Processor to create and maintain multi Key data bases. Prints formatted sorted reports with numerical summaries or mailing labels. Comes with sample applications, including Sales Activity, Inventory, Payables, Receivables, Check Register, and Client/Patient Appointments, etc. Requires CBASIC-2. Supplied in source ..... $349/$20

GLECTOR — General Ledger option to SELECTOR III-C2. Interactive system provides for customized COA. Unique chart of transaction types insure proper double entry bookkeeping. Generates balance sheets, P&L statements and journals. Two year record allows for statement of changes in financial position report. Supplied in source. Requires SELECTOR III-C2, CBASIC-2 and 52K system ..... $250/$25

(M) **TEXTWRITER III** — Text formatter to justify and paginate letters and other documents. Special features include insertion of text during execution from other disk files or console, permitting recipe documents to be created from linked fragments on other files. Has facilities for sorted index, table of contents and footnote insertions. Ideal for contracts, manuals, etc. Now compatible with Electric Pencil* prepared files. ..... $125/$20

FORMATS AVAILABLE:
ORDERS MUST SPECIFY DISK SYSTEMS AND FORMATS:
(A) TRS-80 Model I (M) Keys Only
(B) TRS-80 Model II
(C) TRS-80 Model III (M) Keys Only
(D) HEATHKIT H89 (M) Keys Only
(E) NORTH STAR
(F) SUPER BRAIN QD
(G) STANDARD UNIMPLEMENTED

(M) Modified version available for use with CPM as implemented on Heath and TRS-80 Model I computers.

(T) For all (T) items listed above, the recommended system configuration consists of 48K CPM 2 full dize disk drives, 24 x 80 CRT and 132 column printer.

The sale of each proprietary software package conveys a license for use on one system only.

Prices F.O.B. Fort Worth, Tex. Shipping, handling and C.O.D. charges extra.

FMG's LIBRARY:

PASCAL USER MANUAL & REPORT
(2nd) Edition by K. Jensen and N. Wirth

- **Tutorial Manual and Concise Reference Report for Both Programmers and Implementors**
- **Includes Helpful Examples to Demonstrate the Various Features of PASCAL**

The book consists of two parts: the user manual and the revised report. The manual is directed to those who have some familiarity with computer programming and who wish to get acquainted with the PASCAL language. The report defines standard PASCAL, which constitutes a common base between various implementations of the language.

Stock No.	Price
#B21	$9.95

PASCAL PRIMER Problem Solving

This book has three major goals:

- **To introduce all aspects of the programming and problem solving process (includes problem specification and organization, algorithms, coding, debugging, testing, documentation and maintenance);**
- **To teach good programming style and how to produce a high quality finished product; and**
- **To teach the syntax of the PASCAL programming language.**

Numerous examples are employed throughout the text. PASCAL is used as a vehicle to teach various aspects of programming techniques.

Stock No.	Price
#B24	$18.95

Microcomputer Problem Solving Using Pascal
by Kenneth L. Bowles

- **A Book Designed for Both College Courses AND Individual Self-Study**
- **Ideal for use with UCSD Pascal**
- **Includes Extensions to Standard PASCAL**

This book is designed both for introductory courses in computer problem solving at the freshman and sophomore college level, and for individual self-study. It includes many examples and actually executable programs. It includes information on the necessary functions and procedures for handling graphics and strings.

Stock No.	Price
#B22	$14.95

BEGINNER'S MANUAL FOR UCSD PASCAL SYSTEM

- **An Enlightening Introduction to UCSD PASCAL**
- **Demonstrates How to Use the UCSD PASCAL System and How to Program in PASCAL**
- **Includes Many Practical Examples of PASCAL Programs**

This book is intended to be used as an introduction and reference manual for people just beginning to use the UCSD Pascal Software System. Whether you have never used a computer before or whether you are an experienced programmer who is unfamiliar with UCSD PASCAL, this book will provide a relatively easy, yet thorough, introduction to UCSD PASCAL.

Stock No.	Price
#B25	$11.95

PROGRAMING IN PASCAL
by Peter Grogono

- **An Excellent Introduction to One of the Fastest Growing Programming Languages Today**
- **Sections on Procedures and Files PLUS a Chapter on Dynamic Data Structures such as Trees and Linked Lists**

The text is arranged as a tutorial, containing both examples and exercises to increase reader proficiency in PASCAL. Concepts are illustrated by examples, ranging from the Tower of Hanoi problem to circumscribing a circle about a triangle. PROGRAMMING IN PASCAL is sure to hold the reader's interest.

Stock No.	Price
#B23	$14.95

UCSD Reference Book

- **A Reference Guide to the Complete UCSD PASCAL System**
- **Includes Information on Compiler Basic, Assembler and Editor**
- **Lists Actual P-Machine Codes**

This reference book can be a valuable and time-saving guide to through information on the UCSD PASCAL system. The easy-to-read manual provides fast access to pertinent data.

Stock No.	Price
#B28	$25.00

See List of Advertisers on page 306

SPECIAL DELIVERY

WORDPROCESSING
- POWER -
for the TRS-80®

"...If you're presently looking for a mailing list processor, this represents the current state of the art."
80 MICROCOMPUTING - 80 REVIEWS - JULY 1980

MAILFORM is data entry at its best, just fill in the form! FAST, EASY to use functions include: search, sort, extract, page forward and back. 'Transparent cursor', insert/delete characters, and MORE!

MAILRITE prints 'personalized' form letters by inserting information from MAILFORM into Electric Pencil®, Scripsit®, or BASIC text files. Print letters, labels, even envelopes! Boldface, underscore, change margins, pause, print 'unprintable' characters, and MORE!

XTRA! includes: MAILFORM; MAILRITE - with capability of printing variable text from a 'key' file; MAILABEL - 1, 2, 3, or 4 across label printer; and MAILSORT - sort a full 40 track double density data diskette in only 48K!

ALL MACHINE LANGUAGE
means unsurpased
SPEED, RELIABILITY & EASE OF USE

For VISA, Master Card & COD orders only
Call NOW - TOLLFREE
(800) 824-7888
ASK FOR OPERATOR 203
California (800) 852-7777
Hawaii & Alaska (800) 824-7919
For more information call (214) 233-3998

(Requires min 32K single disk drive)

FOR THE MODEL I & III
SPECIAL DELIVERY $125
XTRA SPECIAL DELIVERY ..$199
FOR THE MODEL II
SPECIAL DELIVERY $199
(Requires Mod II DOS version 2.0)

TRS-80 is a registered trademark of Tandy Corp.

VISA MasterCard

software concepts

13534 Preston Rd. Suite 142
Dallas, Texas 75240
Visit us at the San Francisco Computer Faire April 3-5
Dealer Inquiries invited ✓299

DOUBLE-ZAP/II

Unleash your DOS power into Double Density!

Double-Zap/II is a disk program which zaps **NEWDOS/80,®** **NEWDOS 2.1/+®** for double density operation when used in conjunction with the PERCOM DOUBLER.™

Double-Zap/II will completely zap **NEWDOS/80** or **NEWDOS 2.1/+** on a one or two drive diskette, it will run single and double density, mix and match.

Double-Zap/II provides you with ***ADR***™ **(Automatic Density Recognition).**

After **Double-Zap/II** has been applied, you will get an extra 64,000+ bytes on the original diskette including the original programs from **NEWDOS/80**, **NEWDOS 2.1/+ Double-Zap/II** will read any single density TRSDOS or NEWDOS files and convert them to double density. **Double-Zap/II** is the ONLY double density conversion for **NEWDOS/80**, and **NEWDOS 2.1/+** authorized by PERCOM DATA to be used with the PERCOM DOUBLER. **Requires 32K RAM.**

Double-Zap/II	**for NEWDOS 2.1/+**	**$39.95**
Double-Zap/II	**for NEWDOS/80**	**$49.95**

Software Etc. . . ✓42
1839 Chamberlain Drive
Carrollton, Texas 75007
Tel: (214) 492-0515

Demand a Demonstration from your Local Dealer or write for a brochure of our complete line of Fine Software.

132 COLUMN PRINTER

only
$199

FEATURES
- Totally LPRINT, LLIST compatible
- Spools and prints 12 lines per page
- 64 character ASCII
- 30 characters per second
- Quiet, reliable, fixed head thermal printer
- Uses 2¼" wide thermal calculator paper
- Compatible with all TRS-80* printer interfaces
- Up to 132 columns per line

PRINTEL introduces the **SIDEWINDER**, a totally new concept in low cost printers. It offers the reliability, quality, and features desired by today's microcomputer enthusiast. By printing lines along the length of the paper instead of across it, you can now obtain format capability for all your program listings, assembly listings and application programs involving text, tables and graphics.

SIDEWINDER PRINTER	**$199**
Includes printer, parallel interface (centronics), Cassette driver, and 1 roll of paper	
TRS-80* EXPANSION INTERFACE CABLE	**$19**
TRS-80* KEYBOARD INTERFACE CABLE	**$49**
THERMAL PAPER (3 - roll pack)	**$2.50**

DEALER INQUIRES INVITED
To order –
Send check or money order to:
Printel inc.
P.O. Box 21094
Okla. City
OK 73156 ✓285
(Okla. residents add 4% sales tax)

master charge VISA

*TRS-80 is a trademark of Tandy Corp.

mand for writing Pencil to disk is:

```
6CE4: 11 96 00   LD   DE,0096
6CEE: 11 2C 01   LD   DE,012C
```

These addresses represent the start, end and execute addresses. Of course you can use a different file name if desired, and a drive number can also be specified.

That's it. Try your Pencil now with the TRS-80 running with the fast clock. If desired, the blink rate can be changed by changing values loaded into the DE register, following the same procedure described above.

One final note: There are a few different versions of NEWDOS. If you have difficulty finding the disk bytes to be modified according to the directions provided here, feel free to contact me for help.

New Developments

Since this article was accepted for publication, Archbold Electronics has released a new version of their speedup board which guarantees a 50 percent minimum increase in CPU clock action. Instructions are also provided for clock speed increases in excess of 125 percent (4.0 MHz or more), but no guarantees are made for this substantial change. Nevertheless, with the hardware improvements provided in the new board, most TRS-80 disk or tape systems can actually run reliably at 4.0 MHz or even 5.3 MHz.

The new board automatically slows down the CPU clock before disk I/O takes place, and speeds it up after disk I/O completion. Because of these hardware improvements, no software DOS Zaps of the tape described in this article should be required.

For those equipped and happy with any of the earlier speedup boards, the DOS Zaps in this article will virtually assure disk I/O reliability. ■

Save With

Service Technologies

"Simply the Best"

ADD LOWER CASE TO ANY CENTRONICS PRINTER!... $89.00

ADD MOTOR CONTROL TO YOUR 779!..... $95.00

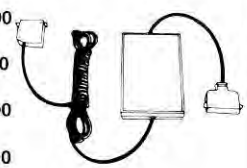
Our Conversion Kit I gives all Centronics printers the ability to print upper and lower case.....$89.00.
Optional customer defined character sets available
Our Conversion Kit II turns your motor on and off automatically. Increases the life of your printer:.....$95.00.
Both kits require NO soldering, etchcuts, software change, interface or program modifications. Installs in minutes with just a screw driver

We are the original Centronics add-on company. Don't be fooled by immatations!

NOW USE YOUR CENTRONICS PARALLEL PRINTER ON ANY COMPUTER WITH A SERIAL PORT!

AVAILABLE IN FOUR MODELS, ALL WITH SWITCHABLE BAUD RATES

CSP - 100
NO BUFFER $175.00
CSP - 200
256 CHARACTER BUFFER $225.00
CSP - 200X
X ON/X OFF PROTOCOL $340.00
CSP - 2000
2048 CHARACTER BUFFER $395.00



And more.....

C-488 IEEE PARALLEL "LISTEN ONLY" TO CENTRONICS INTERFACE

- Input IEEE 488 GPIB, Hewlett Packard HPIB, or PET compatible
- Switchable device address
- Disable switch for address and parallel commands $125.00

PSI PARALLEL SWITCH ALLOWING TWO DEVICES TO SHARE ONE LINE PRINTER

- Two parallel input ports - one parallel output port
- Manual or remote switching control $125.00

SDP-1
A USER PROGRAMABLE SERIAL DATA PROCESSOR WITH THE CAPABILITY OF COMBINING MULTIPLE SERIAL DATA OPERATIONS

- Z-80 Microprocessor - controlled
- Buffer allocation, synchronous or asynchronous operation including transparent or non transparent mode.
- Code, word structure and buad rate conversions Ex. ASCII to EBCID or ASCII to BAUDOT
- Handles baud rates of 50-19,200 b.p.s
- Buffer size expandable from 4K - 64K RAM memory
- Audio cassette interface
- Independent and separately controlled input and output ports.

OUR QUALITY, SERVICE, WARRENTY AND PRICE CAN'T BE BEAT

To order please send check or money order to;

Service Technologies
32 Nightingale Rd.
Nashua, N.H. 03062
(603) 883-5369 ✓297

master charge VISA

Visa and Master Card accepted (include signature expiration date and phone #)
phone orders and inquirys always welcome

computer case company

comp case

• RS204

• AP101	Apple II with Single Disk Drive	$109
• AP102	Apple II with Double Disk Drives	119
• AP103	Apple II, 9 inch Monitor & Double Drives	129
• AP104	Apple ///, two additional Drives & Silentype	139
• AP105	12 inch monitor plus accessories	99
• RS201	TRS-80 Model I, Expansion Unit & Drives	109
• RS202	TRS-80 Monitor or TV set	84
• RS204	TRS-80 Model III	129
• RS205	Radio Shack Color Computer	89
• P401	Paper Tiger 440/445/460	99
• P402	Centronics 730/737 - Line Printer II/IV	89
• P403	Epson MX70 or MX80	89
• CC90	Matching Attaché Case	75

✓199 **computer case company**

5650 INDIAN MOUND CT. COLUMBUS, OHIO 43213 (614) 868-9464

✓See List of Advertisers on page 306

Combine the two for more effective programs.

Loops and Arrays

L. Mitchell Wein, CPA
470 Midland Ave.
Yonkers, NY 10704

Loops and arrays, when used together, can be the most powerful tool available to the BASIC programmer. They can represent tables of information, cash receipts and disbursement journals, general ledgers, game maps and complex equations; the possible uses are limited only by the creativity and imagination of the programmer.

A loop is a functioning circle in which events repeat themselves until a certain condition is met, breaking that circle. The Level II BASIC used in the TRS-80 provides the FOR-NEXT statement to construct the circle and the IF...THEN...ELSE statement to break it.

Sequence of Variables

An array is an indexed sequence of variables which can be presented as a list (one dimension), a table (two dimensions) or a location in a matrix (three or more dimensions). An array can be defined for string variables as well as numeric variables. The key instruction used to set up arrays is the DIM instruction. One must be careful to always use the DIM instruction after the CLEAR and DEF instructions to prevent canceling the DIM instruction. An array can be dimensioned only once while a program is running, so it is best to dimension arrays early in a program, preferably by using multiple statements in the same line. To satisfy the same requirement, loops should stay clear of DIM statements. A sample DIM line follows:

```
20  DIM PY(50), AC(50), DC(50)
```

This same line could also be represented as:

```
20  DIM AC(50,3)
```

Also:

```
20  INPUT "MAXIMUM NUMBER OF
    ROWS = ";MX
30  DIM AC(MX,3)
```

The last method is the best since the user can dimension the array afresh each time the program is run. However, an ON ERROR GOTO...RESUME should be inserted before the INPUT. This routine will hold the program intact if you should exceed your 80's memory.

The key to utilizing arrays from input to output to display is the loop. I have designed a simple General Ledger to demonstrate the function and desirability of combining loops and arrays in a program.

Our General Ledger requires a minimum of two files; the first is a Balance Forward Accounting (BFA) file, and the second is a Transaction file. The BFA file contains the account number, the account alpha description and its latest balance. This information is provided for every account in the file, with debits represented by positive balances and credits represented by negative balances. The sum of all the balances should equal zero, if the file is in balance.

The Transaction file contains

```
20  PRINT HEADER
30  INITIALIZE VARIABLES
40  DISPLAY MENU
50  INPUT ACCOUNT NAMES
    AND NUMBERS FROM
    KEYBOARD
60  INPUT TRANSACTIONS
    FROM TAPE
70  INPUT TRANSACTIONS
    FROM WAFER
80  INPUT TRANSACTIONS
    FROM DISK
90  OUTPUT TRANSACTIONS
    TO TAPE
100 OUTPUT TRANSACTIONS
    TO WAFER
110 OUTPUT TRANSACTIONS
    TO DISK
120 DISPLAY BALANCE SHEET
    SUMMARY
130 DISPLAY NET INCOME
    SUMMARY
140 DISPLAY PERSONAL
    EXPENSE SUMMARY
150 DISPLAY SINGLE OR
    MULTIPLE ACCOUNTS
160 RE-SORT ACCOUNTS
300 VARIABLE DEFINITIONS:
310   M% = MAXIMUM
      NUMBER OF ACCOUNTS
320   A$(M) = ACCOUNT NAME
330   N% = ACCOUNT
      NUMBER
340   O# = OPENING
      BALANCE FOR PERIOD
350   D# = DEBITS FOR
      PERIOD
360   C# = CREDITS FOR
      PERIOD
370   E# = ENDING BALANCE
      FOR PERIOD
1000 SUBROUTINE LOCATIONS:
1010   23000 CLR SCREEN
       AND CENTER CURSOR -
       LARGE PRINT
1020   23300 CLR SCREEN
       AND CENTER CURSOR
       SMALL PRINT
1030   23500 TURN PAGE—
       LARGE PRINT
1040   23700 TURN PAGE—
       SMALL PRINT
1050   24000 CALCULATE
       ENDING BALANCE FOR
       PERIOD
1060   24300 PAGE HEADER
       FOR BALANCE SHEET
1070   24700 PAGE HEADER
       FOR NET INCOME
1080   25000 PAGE HEADER
       FOR PERSONAL
       EXPENSE
```

Program Listing 1.

the following information for each entry: date of entry, transaction number, account number and amount of entry. The sum of all entries with a particular transaction number should always equal zero (debits should equal credits).

A daily Transaction file is entered from the keyboard, and the files are used to update the monthly or annual Transaction and BFA files. These files can be maintained on tape, wafer, or disk, and can be accessed using the video monitor or the printer. The BFA file for our General Ledger could be split into asset and liability accounts, net income accounts and personal expense accounts. You could also include a budget for the net income accounts and the personal expense accounts.

Program Listing 1 presents the logic statements for the BFA file.

We're now ready to explore briefly how loops and arrays are used in our program's execution. First, let's look at how some of the variables are initialized in Program Listing 2.

By using DEF in line 3000 we eliminate the need for continuous punctuation as we write the program. Now comes the most important part of the whole program:

```
3030  DIM A$(M), N(M), E(M,3)
```

In this case E(M,0) is the opening balance: E(M,1) is the sum of the debits; E(M,2) is the sum of the credits; and E(M,3) is the ending balance. Alternatively, one could use the DIM statement, 3030 DIM A$(M), N(M), O(M), D(M), C(M), E(M), which generates the ending balance in the following manner:

```
23999  END
24000  E(M) = O(M) + D(M) - C(M)
24010  RETURN
```

It's only necessary to store the opening balance in the BFA files when using this method. The debits and credits will enter the CPU (central processing unit) from the transaction files and generate the ending balance, which will become the new opening balance in the next period.

The Table of Accounts

Program Listing 3 displays a table of accounts.

Line 15040 displays the account name. Lines 15050 through 15090 display the account name as an integer, and the opening balance, debits, credits, and the ending balance, using double precision defined by F$.

The loop is defined by lines 15010 and 15110. Lines 15020 and 15100 temporarily halt printing on the screen after 12 lines. (Four lines are allowed for a header and trailer on the screen.) Line 15030 terminates the display when the array is exhausted. ■

```
3000  CLEAR 1000: DEFSTR A: DEFINT M, N: DEFDBL O, D, C, E,: F$ = "######.##"
3010  GOSUB 23000: PRINT "ENTER MAXIMUM":PRINT "NUMBER OF"
3020  INPUT "ACCOUNTS"; M
```

Program Listing 2.

```
15000  GOSUB 24300
15010  FOR X = 1 TO M
15020    LN = LN + 1
15030    IF N%(M) = 0 THEN 15200
15040    GOSUB 24000: PRINT A$(M)
15050    PRINT N%(M);
15060    PRINT TAB(12);: PRINT USING F$; O#(M)
15070    PRINT TAB(24);: PRINT USING F$; D#(M)
15080    PRINT TAB(36);: PRINT USING F$; C#(M)
15090    PRINT TAB(48);: PRINT USING F$; E#(M)
15100    IF LN = 12 THEN GOSUB 23700: GOSUB 24300
15110  NEXT X
15200  GOSUB 23700: PRINT CHR$(23): GOTO 4000
```

Program Listing 3.

New for TRS-80 Basic Programmers...A Way To Get Your Basic Programs Working Fast

BasicPro!!

BasicPro Saves Hours of Programming Drudgery

Write and debug your BASIC programs faster. With Basic Pro you get 12 powerful programming aids that let you instantly:

- MOVE or COPY code
- RENUMBER lines
- RENAME variables
- JOIN programs together

And more! You also get a handy CROSS REFERENCE list that shows you where every variable is used. BasicPro even has a SPEED-UP option that makes your code run faster.

BasicPro Is Easy To Use.

Just select what you want to do from the command menu. You never get stuck with BasicPro. Just use the unique HELP command. BasicPro provides plenty of prompt messages to guide you through any programming session.

BasicPro comes complete with instruction booklet. Start enjoying effortless programming! Order BasicPro today! **$24.95**

Also New...VisiCom - The Visible Computer

Learn Machine Language Programming Fast with VisiCom. VisiCom turns your TRS-80 into a simple computer with registers and memory displayed. VisiCom's small set of machine language instructions is easy to use. You start writing machine language programs immediately.

See Your Machine Language Programs Running "Inside" VisiCom. You see data move in and out of registers and memory as VisiCom executes each instruction. It's EASY to learn machine language programming when you can SEE what every instruction does.

VisiCom comes with instruction manual.

Start learning machine language programming the fast, fun way! Order VisiCom today **$19.95**

Special Offer! Act NOW and SAVE 20%
By ordering BOTH BasicPro and VisiCom, you pay just $35.95 (reg. $44.95)

Both BasicPro and VisiCom require TRS—80 level II and (16K) memory.

SOFTWORX, INC. P.O. Box 9080, Seattle, WA 98109

✓289

Please send me the items checked below

☐ BasicPro $24.95
☐ VisiCom $19.95
☐ BasicPro & VisiCom $35.95

Name _____

Address _____

City _____

State _____ Zip _____

Enclose check or money order and mail this coupon to:
Softworx, Inc. P.O. Box 9080, Seattle, WA 98109
Or Charge to:

Visa# _____ Mastercharge# _____

Cardholder Signature _____

Expiration Date _____

Visa and Mastercharge customers may call (206) 284-7388

✓See List of Advertisers on page 306

Read the small print on this lowdown project.

Red Letter Day For Lowercase

George C. Ferber
Datacopy Company
106 E. Court St.
Fairmount, IL 61841

Important days in the calendar year are printed in red. July 4, 1980 was one of those days.

Preparing to make modifications to my microcomputer system around that time, I ordered kits from vendors around the country, including a lowercase printer modification for my Radio Shack 779 printer, an additional and final 16K of RAM for the Model I expansion interface, a Pencil lowercase mod kit, and the Patch, a character generator modifier allowing conventional typing methods and lowercase display.

The printer modification kit cost $125. I ordered the Pencil lowercase mod and the 16K RAM kit including Verbatim diskettes and labels. The RAM kit costs $75, the lowercase mod, $19. I ordered the $59.95 Patch from Cecdat.

I was concerned about the different features offered by the two lowercase mods for the processor. The Pencil mod requires shifting for lowercase, instead of the more familiar shift for uppercase on typewriters. The kit's control key facilitates Pencil's use and the upper-lowercase switch permits maintenance of the integrity of Level II BASIC. The switch to lowercase is made prior to entering Pencil. This mod requires a short modifier program to implement the lowercase conversion.

The Patch lowercase mod promises normal typing methods as in shift for uppercase, and a block cursor. The question of Pencil compatibility elicits the response "a control key is required."

I installed the printer modification prior to July 4. I decided to use only the control key of the Pencil mod and was awaiting arrival of the Patch.

Printer Mod

The printer kit contains three items. There is a small circuit board with one attached lead terminating in a red sub-miniature E-Z clip connector, requiring no soldering. Just press the spring loaded button, a tiny hook emerges. Hook it around the exposed leg (pin) of the integrated circuit indicated on the drawing, and the connection is complete. The second item is a jumper wire with black E-Z clips installed at each end, and third, the instructions.

The two pages of instructions are legible and well-organized. Each page contains a clear drawing of the printer's large circuit board with the components that are involved in the modification outlined, as well as enough other components to serve as guideposts to orient the installer.

Four brief numbered lines of instructions provide the appropriate order to pursue the modification. Each instruction is concise, clear, and easy to follow. A review of the four quickly reveals the general nature of the modification. A 28-pin dual in-line package (DIP) integrated circuit must be removed, without damaging the chip or bending its pins. The kit's circuit board plugs into the vacated socket and its connecting wire and jumper wire clip in place.

Electronic enclosure disassembly and reassembly frequently require more time than the modifications. Fine interconnecting wires and delicate components require careful handling and positioning during physical movement. This prevents shorting, breakage, etc. Occasionally fasteners, knobs, and supports become stubborn and pose problems during reassembly.

The large circuit board, where the modifications occur, is accessed from the rear of the printer.

I first removed the fanfold paper from the tractors and pushed the box aside. Next I unplugged the power cord. Then I separated the data cable connector and laid it aside. A small knob had to be removed from the print density control on the lower right hand side. The wire rack paper guide and its ground wire came off next. The ground wire terminal with its associated static charge collector required the use of a screwdriver, and the paper guide merely lifted off. It was held in place by predrilled holes in the printer housing.

Two screws retained an L-shaped rear cover. Their removal permitted the cover to be withdrawn and exposed the printer's large main circuit board indicated in the instructions.

I was intimidated by thoughts of breaking the 28-pin DIP or mangling its pins upon prying it

ALWAYS WANTED A MAINFRAME?

Probably not. But you've probably been frustrated by the limitations of the micro's.

StatPac is a 3-part program written and designed for research, survey and questionnaire processing, data entry, statistical analysis, management and market analysis.

Whether you're a researcher, a programmer or reader and user of data — StatPac can fit your needs because you create the data file format to fit your specifications.

Stat Pac is the SPSS of small computers. It eliminates the need for expensive programming or renting time on large mainframe computers.

Available for Model I (requires NEWDOS) or Model III, 2 disk drives, 48K RAM and a lineprinter. StatPac handles all phases of research analysis including: frequency analysis, descriptive statistics, crosstabs & chi-square, t-test, correlation & linear regression, analysis of variance, multiple linear regression and management reports.

CODEBOOK AND DATA ENTRY

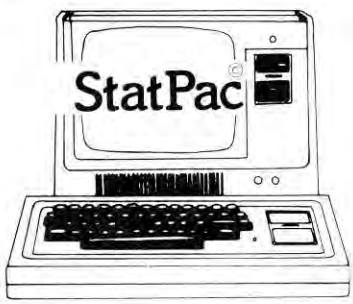
Enter data using key-to-disc system with automatic back-up of data to protect against system crashes. Enter survey, report, test or lab data using fixed or free format. Programs feature screen prompting to guide data entry operator, automatic error detection, user-definable tab stops, repeating keyboard, plus much more.

DATA MANIPULATION

Edit your files with fast machine language editor using "pencil"-like commands, better than "pencil." Verify data files for "out-of-bounds" entries. Recode and transform data using conditional and absolute recodes and unlimited logical operators. Edit files larger than memory size. Accepts up to 2000 cases and up to 255 variables.

STATISTICAL ANALYSIS AND BATCH PROCESSING

Create a "task control file" to specify all analysis for batch processing. Save, edit or reuse task control file on other data sets. "Select if" feature allows analysis on partial data sets. All outputs to parallel or RS232 lineprinter. Error trapping features minimize aborted jobs.



Total package for 3 discs and extensive step-by-step user's manual is $185. Manual may be purchased separately for $30 and may be applied to the purchase price. Order by calling 612/866-9022 or write to Walonick Associates. Free brochure also available. MasterCard and VISA accepted. Dealer inquiries invited.

Walonick Associates ✓363
5624 Girard Ave. So.
Minneapolis, MN 55419

. . . and you won't need a mainframe!

Introducing

COBOL + FORTRAN + 64K RAM

FOR YOUR TRS-80

★Release your software chains with the *NEW* ***FREEDOM OPTION***, a plugable change that restructures the TRS-80* on command to perform like a large Z80 system. All the TRS-80* features are retained. All TRS-80* software will run without interference. The option is supplied with a fully assembled & tested ***FREEDOM BOARD, T8/OS*** on a 5¼" disk, and complete instructions. ***T8/OS*** allows your TRS-80* to execute most software originally written for ***CDOS$_2$, TSA/OS$_2$,*** and ***CP/M$_3$*** operating systems. ***T8/OS*** opens the door to higher level languages and existing programs.

★To further enhance your TRS-80* processing power, a ***MEMORY EXPANSION OPTION*** is available to replace, on command, the *ROM* and provide *A FULL 64K RAM*. This option is switched into operation by the ***FREEDOM BOARD*** providing *57K* of *USER RAM* with ***T8/OS*** loaded. Both options are fully assembled & tested and fit into the TRS-80* keyboard enclosure. Write for more details. 6 Mo. Board Warranty.

FREEDOM OPTION..... $245
MEMORY EXPANSION OPTION.... $295

Send Check or Money Order to:
(MASS. RESIDENTS, PLEASE INCLUDE 5% TAX)

F.E.C. ltd. ✓141

P.O.Box 2368 • Woburn, MA. 01888
(617) 944-5329

VISA master charge

*TRS-80 ® Tandy Corp
†CDOS ® Cimarron Inc
‡TSA OS ® TSA Software Inc
§CP/M ® Digital Research Inc

MACHINE LANGUAGE PROGRAMS "BUGGING" YOU??

Debug them -- with C-ALL!!

- GENERAL OPERATION MODE
  machine language tape I/O, user memory and CPU register control, I/O port control, memory operations like fill, block move, and search
- DISASSEMBLY MODE
  dump to screen or screen and printer the assembly language mneumonics for instructions or data of a known format. Includes page formatting and breakpoint control.
- TRACE MODE
  large number of options: default displays four lines of CPU data, trace address, hex code and assembly language mneumonic prior to execution. Delay is 1 second or 1/16 second with shift pressed. Top of CRT displays CPU register and memory data; bottom displays last 7 instructions executed. Optional dump to printer.

C-ALL: JUST $19.95

(Level II or DOS, 32K recommended)

THE ALTERNATE SOURCE ✓138

1806 Ada Street
Lansing, MI 48910
517-487-3358
517-485-0344

Add: $2.00/postage, $1.50/COD, 4%/Visa.

Little Bee EDUCATIONAL PROGRAMS

For TRS* 80 Level II 16 K CASSETTE

Upper/Lower Case Matching K-1
Provides a drill to associate upper case letters to corresponding lower case letters. **$9.95**

ABC sequence K-1
Marching letters reinforce alphabet sequence. **$9.95**

Listen and Spell (Wh-Th Words) 2-4
Provides drill for troublesome Wh-Th words. **$9.95**

Calendar Tic-Tac-Toe 2-4
Provides drill on sequence of months and days including current day and month for one or two students. **$14.95**

Math Facts K-6
Teacher selectable drill for math facts. Teacher selects +, −, ×, ÷ and limits. **$9.95**

Contractions 2-4
Drill for students to provide the two words that make up contraction **$9.95**

Self correcting and scoring positive reinforcement
*Trademark of Tandy Corp.

Little Bee EDUCATIONAL PROGRAMS ✓208

P.O. Box 262 Massillon, Ohio 44646

✓See List of Advertisers on page 306

out of its socket. It lay in the upper left hand corner of the board with little separation from the housing. There was not enough space to grasp each end of the device with a finger. I also visualized an errant pin or two, of the 28 on the replacement board, upon substituting it for the removed integrated circuit.

By gently prying up alternate ends with a small thin-bladed screwdriver inserted between the body of the chip and its socket, I lifted it free. I made repeated lifts at alternate ends moving the chip only slightly each time.

The 28 pins on the bottom of the replacement board are obscured by the board. It is difficult to see if they are entering the socket correctly. By carefully positioning the board over the socket and gently wiggling it, I felt the pins enter the socket's clips and a gentle but firm downward pressure seated the board in the socket.

I could not visually determine whether any pins had been displaced in the process so I decided to continue with the modification and determine its soundness using a dynamic test. I clipped the red E-Z connector to the pin of the integrated circuit indicated on the drawing, and then installed the jumper. All that remained was reassembly and testing.

I was eager to observe the lowercase g, j, q, y, and z's appearance in print. My processor had not yet been modified, so I LPRINTed, from BASIC's command mode, the lowercase set using ASCII code numbers and the CHR$( ) statement. CHR$(97) returns the lowercase a and CHR$(122) returns the z.

As anticipated, they appeared without descenders. As desirable as descenders are, this modification's lowercase character forms are generally pleasing to the eye.

The Patch

Receiving the Patch July 3, I looked forward to the holiday that would include its installation.

The kit consists of the following: Patch, a small hybrid board with an edge connector, a short five-conductor flat ribbon cable with attached receptacle, a modified 2102 integrated circuit having two pins bent up (and fine wire leads presoldered to the pins), and a short length of solder.

The ribbon cable's receptacle contains a section of circuit board with conducting traces that serve as a key. The hybrid board has an edge card type connector designed to receive the ribbon cable's receptacle and connect it to various points on the processor board. The hybrid board plugs into the processor board's unused ROM socket.

Although legible, the drawings accompanying the instructions should be improved. A lack of page numbering results in needless paper thumbing. I would like to prod Cecdat into some improvements here. However, a detailed step-by-step installation guide is provided. These steps include disassembly of the keyboard enclosure, installing the Patch, soldering the five ribbon cable conductors, piggybacking the 2102, terminating its two leads, cutting the trace, and reassembly.

"The tiny spaces separating adjacent pins require a measure of dexterity. . ."

While my keyboard case was open, I installed the control key from the Pencil lowercase kit, leaving its 2102 chip unused. This required boring a ¼-inch hole just below the left shift key and soldering the two fine preattached wire leads to pin 10 of Z2 and pin 10 of Z4.

The major portion of all soldering activity involved the soldering of fragile wire leads or piggybacking integrated circuit pins upon resident integrated circuit pins.

The tiny spaces separating adjacent pins require a measure of dexterity, steady hands, and an appropriate soldering iron.

I used two rechargeable battery-powered pencil irons designed for this type of work. If the first iron's charge is depleted before all soldering is complete, I have the second iron as a backup, allowing immediate completion of the work.

An examination, with the aid of a magnifier, revealed no solder shorts or misplaced wire terminations. I closed the case, positioned the keyboard, attached the buffered ribbon cable's edgeboard connector, reconnected the DIN connectors of Radio Shack's refresh fix cable, and inserted the DIN connectors of the power cable, the monitor cable, and the cassette cable. The next step was testing.

Powering up in NEWDOS, I pressed the keys B, A, S, I, and C. The letters appeared in lowercase on the display. I was shocked by the appearance of the letter a. It was misplaced, being too high in the character set matrix form. The system asked WHAT? and continued in the DOS READY mode. I retyped the five letters in uppercase and upon pressing the enter key, Disk BASIC loaded into memory.

Eager to observe the display's form of the g, j, p, q, y, and z and the printer's form of the same letters plus the a, I entered, on a single line, each lowercase letter, separated by a space. The a, g, p, q, and y stuck out. I suspected the too high position of the a might be due to a character generator error, since there was no reason why it couldn't be lower in the matrix form.

Obviously the g, p, q, and y could not be lowered since they occupy the full height of the available form. Lowering them would exceed the lower limit of this form.

The display's lowercase c, o, s, v, w, x and z are miniature duplicates of their uppercase.

The printer's lowercase c, g, o, p, s, v, w, x and z are also miniature duplicates of their uppercase counterparts.

The printer's lowercase a, g, p, q, and y are all printed low in the matrix form, without descenders, and look much better in print than on display.

I loaded a BASIC module. Would it perform? The code ran as anticipated, loading memory with three diskfile indices, and displayed the module's option table. I selected an option and the code requested a left margin value for a printer function, or a 99 to skip the printout and continue. Upon entering the 99, instead of branching to the appropriate code, DOS READY appeared. This, of course, was a bug introduced by the conversion.

I conducted a test to determine if Pencil would function properly with Patch and the added control key. The code loaded correctly, accepted my yes to the case question, and homed the cursor, prepared to receive text.

The keyboard functioned as expected, shifting for uppercase, and all went well until I attempted to enter a control character. Pressing the control key moved the cursor down one line and subsequent pressing displayed the character. The control function did not execute properly. I suspected, due to an ambiguity in the Pencil's control key instructions, one of the control key's wires should have been soldered to pin 10 of Z2 instead of pin 4.

After a phone conversation with Cecdat, I made the wiring change and Pencil sprang to life.

Memory Expansion

With an inflated ego and devilish grin, I accosted my expansion interface. The final 16K of memory addition would make 48K of memory available to me. I would have all the memory that the 8-bit Z80 could address.

My order specified the kit for the interface since it was the third and final 16K permitted. The 48K system owner would in-

stall his first 16K memory addition in the keyboard enclosure, the second and third addition in the interface.

The kit contains a set of eight RAM chips, two sockets with shorting bars, and four pages of instructions. Two of the pages are for the Apple and two for the TRS-80. The eight integrated circuits are packed with their pins inserted in a small rectangle of black conductive foam. This protects their sensitive PN junctions from potential damage from discharges of static electricity that can occur during handling and installation.

Each page of the TRS-80 instructions is a photo copy and indicates different versions of the interface circuit board. Both are almost illegible except for the typed lines of instruction.

All cables must be removed, and the interface enclosure withdrawn from beneath the monitor and placed upside down with the front facing you, on a static-free work surface. Six screws and the bottom are removed revealing the heavily populated circuit board.

There were only eight vacant sockets left on my board, Z1 thru Z8, and all that remained was to ground my hand, remove each chip from the protective foam, and gently insert it in one of the available sockets.

Each chip must be installed with its notch or dot in the same direction, which is toward the nearest edge, and imitates the orientation of the previous 16K memory addition already in place in Z9 thru Z16.

The two remaining devices evidently were for the Apple conversion. All that remained was closing up and repositioning the expansion interface in my system.

Loading NEWDOS 2.1, I entered Disk BASIC. From the command mode, I entered PRINT MEM. The command returned 38,659. At this writing, I have not had time to thoroughly investigate the operational features of my new capability. I have noticed one irregularity.

When the LIBRARY of DOS commands is displayed by the command LIB, all command names are displayed in uppercase, except COPY. It is displayed as cOPy with the first and last letter in lowercase and the two middle letters in uppercase.

Should you decide to make similar modifications to your system, keep the aspirin bottle handy for the first few hours of proofreading the display. The odd-shaped lowercase letters make it difficult to detect typographical errors, and headaches tend to develop.■

1562 gene traymham disc
3 hel cond. 5-8 mr

SAVE MONEY
ON 5¼''

DISK DRIVES

40 Track siemens, double density, assembled and tested, with grey textured finish case and power supply.

ONLY **300.00** CASH OR CHECK

INTRODUCTORY OFFER EXPIRES
APRIL 30, 1981
ADD $20 FOR "FLIPPY" ✓36
COMPUTER SALES & SERVICE
P.O. Box 26352
5819 Camp Bowie Blvd.
Fort Worth, Texas
817-731-7412

SSI'S POCKET COMPUTER PROGRAMS

LUNAR LANDER - Land the lunar module at the lunar base using verticle and horizontal thrust. $6.95

SECTION PROPERTIES - Determine section properties of built up sections using rectangular, circular, triangular, and standard shapes. $9.95

CONCRETE BEAM TORISONAL DESIGN - Torisonal design for shear and longitudinal reinforcing. $9.95

SPUR-GEAR DESIGN - Standard and non standard gear designing. $9.95.

EPSON MX-80 PRINTER - A printer with outstanding abilities at a most reasonable price. Only $599.95 + $25.00 shipping and handling.
TRS-80 PRINTER CABLE $39.95

MEMOREX DISKETTES - 5 1/4' SOFT SECTOR, box of 10 diskettes: $29.95 + $1.00 handling and postage.

TRS-80 Trademark of TANDY CORPORATION

SUPERIOR SOFTWARE INC
P.O. BOX 11676
KANSAS CITY MO 64138
MISSOURI RESIDENTS PLEASE ADD 4% STATE SALES TAX
✓403
Write SSI for information about marketing your programs.

MAXELL® OR **Dysan**

Some computorists pay less - but may not receive Shuggart™ or IBM® approved disks.

8" SINGLE SIDE DOUBLE DENSITY.....Box of 10 for $60
8" DOUBLE SIDE DOUBLE DENSITY.....Box of 10 for $70
5¼" MINI.....Box of 10 for $50
DYSAN® DISKS
5¼" MINI.....Box of 5 for $25
(Specify - 8" Soft or Hard Sector/5" Soft or Hard Sector)

C.O.D.- $1.00 Additional

✓121
Custom Electronics Inc.
238 EXCHANGE STREET
CHICOPEE, MA. 01013
413-592-4761
established 1960 - closed mondays

APPLE TRS-80 IBM WANG ALTAIR DATA GENERAL MATTEL CROMENCO
ATARI TI/99-4 PET

DISCOUNT PRINTER RIBBONS

40% OFF!! OR MORE!

BRAND NEW, TOP QUALITY, EXACT REPLACEMENT RIBBONS FOR ALL OF THE DOT MATRIX TRS-80,* & CENTRONICS PRINTERS:

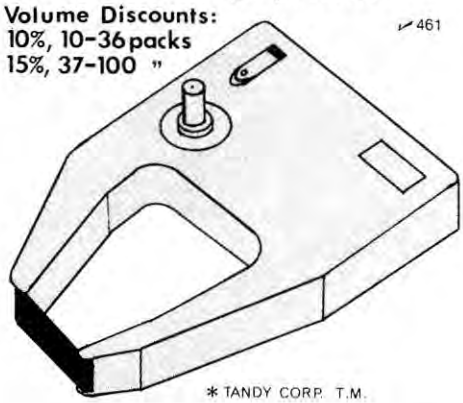
Send order blank below & PAYMENT (Min. $20) TO:

ANCIE LABORATORIES
9202-9206 BALTIMORE BOULEVARD
COLLEGE PARK, MD 20740
(301) 345-6000

Your PRINTER	RETAIL LIST	Your Wholesale Price	ITEM NUMBER
TRS-80 LINE PRINTER II	18.95 + Tax (3 PACK)	11.95 PER 3 PACK	C-700
TRS-80 LINE PRINTER III	21.95 + Tax (IN CART)	9.95 PER (RIBBONS ONLY)	T-3
TRS-80 TRACTOR FEED	18.95 + Tax (3 PACK)	11.95 PER 3 PACK	C-700
CENTRONICS MODS 700-704	18.95 + Tax (3 PACK)	11.95 PER 3 PACK	C-700
CENTRONICS #730	18.95 + Tax (3 PACK)	11.95 PER 3 PACK	C-700
CENTRONICS #737	18.95 + Tax (3 PACK)	11.95 PER 3 PACK	C-700
CENTRONICS #779	18.95 + Tax (3 PACK)	11.95 PER 3 PACK	C-700

Volume Discounts:
10%, 10-36 packs
15%, 37-100 "

✓461



MINIMUM ORDER: $20.00 No shipping charges or taxes.
PLEASE SEND ME: _____C-700, 3 RIBBON PACKS & _____T-3 RIBBONS.
I WILL USE THESE RIBBONS ON A _____ PRINTER.
$_____ENCLOSED ··· ··· ··· SEND C.O.D. ( )
Name_____
Address_____
City, State, Zip_____
ANCIE LABORATORIES 9202-9206 Baltimore Blvd., College Park, MD 20740 301-345-6000

* TANDY CORP. T.M.

✓See List of Advertisers on page 306

If you hate our titles, you'll love this article.

WHERZIT—A Keyword Indexing and Retrieval Program

James H. Fox
14601 55th St. So.
Afton, MN 55001

Several articles have been written in the last year or so about using home computers to index everthing from recipes to record collections to magazine articles. All have dealt with a specific technique or minor variations such as storing the title in a string array and then searching all titles for a desired character string. Such a method is usually unsatisfactory for magazine articles or other literature files.

Confusing Titles

Title searches assume that information about the subject matter is contained in the title string. For magazine articles, this is not always true. The author or editor often tries to use a catchy phrase in order to attract your interest and it might not describe the subject. While this is acceptable in fiction markets, it might be out of place in a technical publication where the reader is trying to find and use technical information.

For example, an article titled "WHAZIT?" appeared in the March, 1980, issue of *80*. Was the article about a game? A utility program? Some strange new peripheral? Even knowing that it was a utility program to identify unlabeled cassettes, you will never find it in a title search.

An alternative is needed when the searching is to be done automatically by machine.

Keys to Indexing

In the early 1960s, a number of sources developed the idea of key concepts as indexing and retrieval mechanisms. The technique is known by various synonyms, commonly, *keyword indexing*, *concept coordination* and *key concept retrieval*. Whatever name is used for an application, the same basic method is used.

When an article is first read or scanned, the reader notes the subject matter and thinks of a few words to describe the contents. The keywords then provide a basis for indexing the article for later recall. For example, the article title "WHAZIT?" might be described by the following keywords: utility, cassette, identification, machine language, POKE.

Note that the keywords do not necessarily appear in the title of the article. The assignment of specific keywords to an article is the first step in indexing.

The second step is filing the article and its associated keywords. Keyword files can be maintained on index cards, in notebooks—or in a computer.

Keys to Retrieval

Assume that you have a series of articles, each of which is filed and has an associated list of keywords. How do you retrieve the article you want?

Make a list of keywords that describe the subject of interest. Then go to your keyword file and see which magazine articles are described by your chosen keywords.

Each keyword will usually apply to several articles. If you have chosen your keywords consistently, one of the articles referenced by our selected set will be the one you want.

Possible keyword assignments for the March, 1980 issue of *80 Microcomputing* are given in Example 1. If you search this list for articles having the keyword *program*, you will find 13 entries. Each of these matches is called a "hit."

Difficulties

The search may not yield a unique result. However, if you are looking for information on a specific topic, you will find all the information on that topic indexed in your file. Paying careful attention to keyword selection and application will ensure that all hits from a search include related subject matter.

Synonymous terms can cause problems. A simple term like *disk drive* can be the same as *floppy disk* or just *disk*. You could assign *interfacing* as a keyword but not score a hit if you specify *interface* during the retrieval search. This is especially troublesome when machine searching is based on a specific character string.

One way to avoid synonym difficulties is to maintain a checklist or thesaurus of the actual terms you use as keywords. An example of a keyword thesaurus for microcomputer magazines is given in Example 2.

I still come across occasional articles which require new keywords. This will be especially true in a field as dynamic as microcomputers. Whenever I need a new keyword, I just assign it to the article and then add it to my list.

A final difficulty is word arrangement or syntax. Best illustrated by example, the keywords *wire-wrap, interface* and *board* might be applied to different concepts. There might be an article on constructing an interface board using wire-wrap techniques. Another might describe interfacing with wire-wrapped boards. Both articles would register a hit during a retrieval search.

File

A file is a collection of rec-

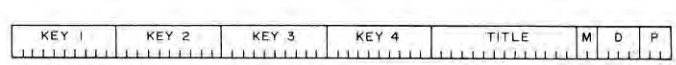
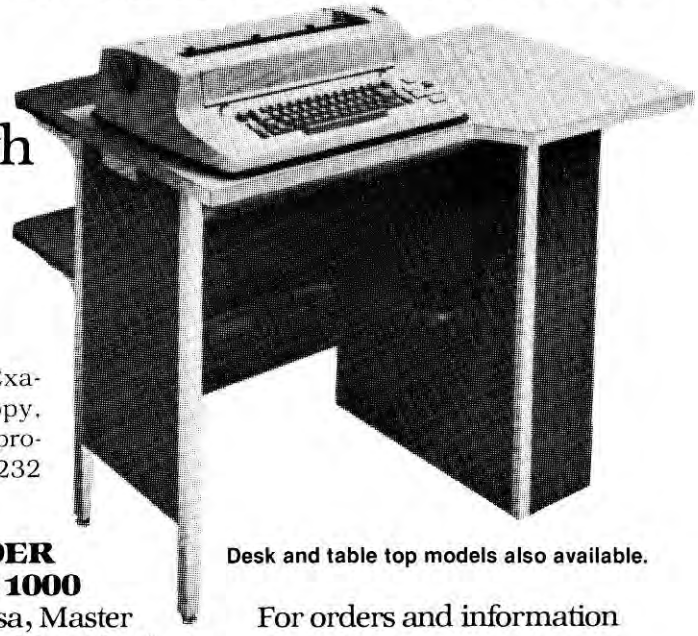


Figure 1. Record definition as described in the article. M is magazine code; D is date; P is page number.

The DATA-TRANS 1000

A completely refurbished **IBM** Selectric Terminal with built-in **ASCII** Interface.



***FOR YOUR TRS-80 WITH OR WITHOUT EXPANSION INTERFACE. AVAILABLE WITH CENTRONICS TYPE PARALLEL PORT.**

Features:

- 300 Baud Serial
- 14.9 characters per second printout
- Reliable heavy duty Selectric mechanism
- RS-232C Interface
- Documentation included
- 60 day warranty—parts and labor
- High quality Selectric printing Off-line use as typewriter
- Optional tractor feed available
- 15 inch carriage width

Also works with Exatron's Stringy floppy, for fast loading of programs. (Has RS232 built in stringy)

Desk and table top models also available.

HOW TO ORDER DATA-TRANS 1000

1. We accept Visa, Master Charge. Make cashiers checks or personal check payable to:

DATA-TRANS

2. All orders are shipped F.O.B. San Jose, CA
3. Deliveries are immediate

For orders and information

DATA-TRANS

45277 Fremont Blvd., #7 ↙274
Fremont CA 94538

Phone: **(408) 263-9246**

BALCODE FOR SOFTWARE

FOR THE TRS-80 MODEL I

BALCODE 80X — **SPACE INVADERS.** A favorite game with a new challenge. Specify disc system or cassette. Software $19.95. With Amplifier-Speaker $34.95.

BALCODE 80A — **THE BALCODE SYSTEM.** Permits higher order programming using instructions similar to IBM 370 BAL. Includes the finest text editor, floating point macro assembler, and DISC I/O. With Manual. Sample programs DEMO, RAMTST, PIC and SROOT. PLUS Macro Library for PASCAL structures and monthly Newsletter. $79.00.

BALCODE 80C — **WORDPROCESSOR.** The ultimate using imbedded format statements. DISC I/O. Hidden line numbers. Automatic capitals at head of sentences. Headers, Footers, Tabs, Paging, Multiple Copies, and any printer commands. Allows full capability of any printer. Reformater for CRT display. $79.00 (COMPLETE WITH AUTOMATIC ERROR DETECTION.)

BALCODE 80D — **WORDPROCESSOR.** Maximum Simplicity. Quick and easy to use. DISC I/O. Hidden line numbers. Reformater for CRT display. Printing can be identical to CRT display. Left and Right Margins. Tabs and Any Spacing. Complete $34.95.

CASSETTE I/O Also Included for All of Above.

INCLUDE $3.00 FOR FLOPPY DISC AND MAILING.
CHECK, MO, VISA, OR MASTERCHARGE.

ALL BALCODE AND Z-80 ASSEMBLY LANGUAGE SOURCE CODE CAN ALSO BE PURCHASED AT NEGOTIATED PRICES.

WRITE FOR INFORMATION TO:

BALCODE SOFTWARE, INC.
421 HUDSON ST., SUITE 302
NEW YORK, N.Y. 10014
(212) 924-2401 EVES.

↙See List of Advertisers on page 306

```
APPLICATION,BUSINESS,PROGRAM, ,PRINTERS APPRENTICE,80,0380,22
APPLICATION,FINANCE,ANALYSIS,SOFTWARE,INVESTMENT ANAL,80,0380,28
TAXES,PROGRAM,APPLICATION,SOFTWARE,IRS-80,80,0380,42
PROGRAM,ASSEMBLER,SERIAL,PRINTER,SPOOL AND DESPOOL,80,0380,46
GAME,ARTIFICIAL,PROGRAM,SOFTWARE,4K INTELLIGENCE,80,0380,55
REVIEW,SOFTWARE, , ,USEFUL UTILITIES,80,0380,58
PROGRAM,DATA-BASE,SORT,APPLICATION,KWIC INDEX,80,0380,60
HARDWARE,MODIFICATION,DRIVER,DISPLAY,LOWERCASE AND UPPER,80,0380,72
HARDWARE,REVIEW,PRINTER, ,QUICK PRINTER,80,0380,77
BUSINESS,TECHNIQUE,EXAMPLE, ,PART-TIME CONSULTANT,80,0380,79
MEMORY,TESTING,PROGRAM,TECHNIQUE,TEST YOUR MEMORY,80,0380,80
MATH,TECHNIQUE,THEORY, ,EQUATIONS,80,0380,84
HARDWARE,MODIFICATION,KEYBOARD,DRIVER,BABYBUG KEYPAD,80,0380,88
REVIEW,ROM,ASSEMBLER,THEORY,INSIDE THE ROMS,80,0380,94
HARDWARE,CONSTRUCTION,INTERFACE,I/O,A HOMEBREW,80,0380,96
SOFTWARE,PRINTER,DRIVER,PROGRAM,LPRINT ROUTINES,80,0380,105
HARDWARE,CONSTRUCTION,POWER-SUPPLY,MODIFICATION,REGULATE IT,80,0380,113
PROGRAM,ASSEMBLER,APPLICATION,TAPE,WHAZIT,80,0380,115
APPLICATION,PROGRAM,GRAPHICS,THEORY,BIORHYTHMS,80,0380,117
HARDWARE,I/O,INTERFACE,CONSTRUCTION,I/O PORTS PLUS,80,0380,120
PROGRAM,ASSEMBLER,DISPLAY,EDITOR,SCREEN EDITOR,80,0380,122
SOFTWARE,THEORY,TECHNIQUE,ERROR,EXTRA ERRORS,80,0380,125
APPLICATION,PROGRAM,SEARCH, ,DUTY ROSTER,80,0380,127
PROGRAM,DISPLAY,GRAPHICS,PLOTTER,GRAPH PLOTTER,80,0380,130
HARDWARE,CONSTRUCTION, , ,BOX IT IN,80,0380,132
REVIEW,SOFTWARE, , ,ONE INTO TWO,80,0380,134
REVIEW,HARDWARE,SERIAL,INTERFACE,RS-232,80,0380,136
APPLICATION,PROGRAM,THEORY,TECHNIQUE,SOUNDEX CODES,80,0380,138
```

Example 1. Typical data entry lines for the May, 1980 issue of 80 Microcomputing. *The keywords are in the first four data fields.*

ords. Each record has specified fields that contain information. An analogy can be made with a common filing cabinet in which each drawer is called a file. Each folder in the drawer is called a record and each paper in the folder is called a field.

In order to be machine compatible, our files, records and fields must be strictly defined. For keyword indexing, I defined a record with eight fields. A typical record is illustrated in Fig. 1.

The first four fields are ten characters long. These fields contain the keywords for the record. Four keywords should be adequate for retrieval of records in a magazine article index. Ten characters are sufficient to allow keywords to be defined clearly.

The remaining fields indentify the location of the article. Field five contains up to 14 characters of the title, permitting identification in a table of contents. Field six is a two-character code indicating magazine name. Field seven contains the issue data in a four-character string. Field eight is a three-character string with the article's page number.

Although I found a 63-character record definition convenient, you may decide to expand or reduce it. In that case you will have to make appropriate changes in the programs listed here.

The records are maintained in a string array. Three are concatenated before being written to tape for permanent storage, so that tape I/O efficiency is increased. Shorter records allow tighter string packing, up to the 255-byte maximum string size.

By segregating functions into two programs, only one needs to be in memory at a time and memory is saved. Spaces are deleted from the programs, line numbers are kept to two digits, and multiple statements are included in one line where possible.

Data Base Program

Program Listing 1 is the data base manipulation program. The program is written for a 32K machine. For other memory configurations, CLEAR, DIMR$ and the MX assignment must be changed. CLEAR 11500 and 44000 are used for 16K and 64K machines. The corresponding MX values and R$ dimensions

```
A/D-D/A
ALGORITHM
ANALYSIS
APL
APPLE
APPLICATIO(N)
APPROXIMAT(ION)
ARTIFICIAL
  (INTELLIGENCE)
ASCII
ASSEMBLER

BAR-CODE
BASIC
BAUDOT
BOARD
BUSINESS

CALCULATOR
CASSETTE
CHESS
CLOCK
CLUBS
COBOL
COLOR
COMMUNICAT(ION)
COMPILER
CONSTRUCTI(ON)
CONTROL
CONTROLLER
CONVERSION
COSMAC
COUNTER

DATA-BASE
DEBUGGING
DISK
DISPLAY
DRIVER

EDITOR
EDUCATION
ERROR
EXAMPLE

FICTION
FILE
FINANCE
FLOATING
FLOPPY
F8

GAMES
GRAPHICS

HAM-RADIO
HARDWARE
HASH
HEATH
HISTORY

INTERFACE
INTERFACIN(G)
INTERPRETE(R)
INTERRUPT
I/O

JOYSTICK

KEYBOARD
KIM
KIT

LANGUAGE
LIGHT-PEN
LOGIC
LSI-11

MATH
MEMORY
MEMORY-MAP
MODELLING
MODIFICATI(ON)
MONITOR
MORSE-CODE
MULTIPROGR(AMMING)
MUSIC

NAVIGATION
NETWORK
NUMBER

OPTIMIZATI(ON)
OSI

PAPER-TAPE
PARALLEL
PASCAL
PACE
PERIPHERAL
PET
PLOTTER
POWER-SUPP(LY)
PRINTER
PROGRAM
PROM
PROTOCOL

REVIEW
ROBOT
ROM
RTTY

SEARCH
SEQUENTIAL
SERIAL
SIMULATION
SOFTWARE
SOL
SORT
SPEECH
STANDARD
STRUCTURED
  (PROGRAMMING)
SWTP
S-100

TAPE
TAXES
TECHNIQUE
TERMINAL
TESTING
TEXT-EDITI(NG)
THEORY
TI
TRS-80
TTL
TV

VIDEO

WIRE-WRAP

Z-80

6502
6800
8008
8080
```

Example 2. Keyword Thesaurus for Microcomputer Magazines. Letters in parenthesis exceed the 10-character keyword field and are included in the thesaurus for information purposes only.

TIME ...

METHUSELAH™ has time for you and your TRS·80®

The name Methuselah has always been associated with long life. The Methuselah computer clock board with its 24 hour clock and its perpetual calendar is indeed worthy of the title. Methuselah puts state of the art technology into action with the on board four year lithium battery back-up to keep it running even when your computer is off. That means no more fooling around with the software or hardware "clocks" that become Rip Van Winkles when the computer is reset or turned off.

Methuselah has many other timely features. Software patches keep the DOS and BASIC time and clock commands ticking. Only two screws mount Methuselah inside the expansion interface without soldering, clipping, cutting, or jumpering. There is even a spare 1/0 port and four different interrupts available for people who love to tinker.

SPECS: MM/DD/YY, HH:MM:SS and day of the week. Four year lithium battery back-up. Crystal controlled timing (adjustable 32.768 oscillator). Twenty four hour clock and perpetual calendar.

Send check or money order to:

M-S1 ..... $97.00
(add $4.50 P and H)
S-S1 ..... $17.50
(add $2.50 P and H)
(If you wish to use Methuselah and the RS-232 board (26-1145) together, order this option which includes a new cover and connector.)
WI residents add 4% sales tax.

NDM DESIGNS ↙135

6330 W. North Ave.
Wauwatosa, WI 53213
(414) 259-0120

METHUSELAH is a trade mark of NDM Designs

®Reg. T.M. Tandy Corp.

STOCK MARKET SOFTWARE

By H & H Trading Company for Mod. I, II, & III TRS-80®s

STOCK TRACKER™ times trades on individual stocks and options. Uses a technical volume analysis. Completely objective. Gives buy, sell signals.

MARKET TRACKER™ times tops & bottoms on the Dow Industrials; a composite of six technical indicators. Some judgement required. Gives buy, sell signals.

These two programs are accurate.
Hundreds of satisfied users.

ASK FOR THE EVIDENCE!

FOR MORE INFORMATION OR TO ORDER, CONTACT:

H & H TRADING COMPANY ↙223
POST OFFICE BOX 23546
PLEASANT HILL, CALIFORNIA 94523
Telephone 415/937-1030

VISA & MASTERCARD

®Regd. T.M. of Radio Shack ©

SCIENTIFIC SUBROUTINE LIBRARY FOR ENGINEERS, SCIENTISTS AND MATHEMATICIANS

American Computer Development, Inc. proudly introduces the most powerful collection of scientific subroutines ever written for microcomputers. Before now these programs were only available for large mainframe computers such as the IBM 370*. This collection of 72 distinct programs are up and running and can be working for you NOW on your TRS-80** Model I. In seconds these programs will perform some of the most difficult and time-consuming problems you face. For example, you can solve Eigenvalue problems, invert matrices, solve differential equations, do multiple linear regressions, and much, much more.

LIBRARY INCLUDES:

POLYLIB — This is a collection of 8 subroutines designed to handle polynomial operations of a very high order, including polynomial addition, subtraction, division, multiplication, evaluation, differentiation, integration, normalization, and extraction of roots, both real and complex.

FUNCLIB — This is a set of 10 subroutines to compute the value of a series expansion in some special polynomial, the value of a special polynomial or special function, such as the gamma function.

MATLIB — This is a collection of 13 very powerful matrix-handling subroutines which can be used individually or can be linked together to form program modules to perform successive matrix operations. These subroutines all use Variable Array Dimensioning.

CALCLIB — This is a collection of 7 subroutines designed to integrate, differentiate, and solve both single and systems of differential equations. The differential equations programs use the Fourth-Order RUNGE-KUTTA method.

STATLIB — This is a set of 26 different subroutines to calculate many statistical properties of various data sets. While most of the programs can be used individually, several can be called in order to perform very sophisticated analyses, such as multiple linear regressions and polynomial regressions.

MISCLIB — This is a collection of 8 subroutines to calculate various results, including Fourier analysis, Fourier transforms, least squares fits, and the solving of nonlinear equations.

PADD	PSUB	PMPY	PDIV	PVAL	PDER	PINT	POLRT	HEP
HEPS	LEP	LEPS	GMMMA	BESJ	BESY	BESK	I0	INUE
GMADD	GMSUB	GMPRD	GMTRA	SADD	SSUB	SMPY	SDIV	MFUN
SIMQ	MINV	EIGEN	MSTR	DGR3	QTFG	QG2	QG10	RK1
RK2	RKGS	TALLY	BOUND	ABSENT	CORRE	ORDER	MULTR	GDATA
AVDAT	AVCAL	MEANQ	AUTO	CROSS	SMO	EXSMO	CHISQ	QTEST
RANK	MOMENT	TTEST	GAUSS	BDTR	CDTR	NDTRI	DLGAM	RAND
NDTR	RTNI	FMFP	SE13	APLL	APFS	FORIF	FORIT	FFT

DOCUMENTATION: Each diskette comes with 103 pages of documentation containing calling conventions, parameters, notes, examples, appendices and index.

MINIMUM SYSTEM REQUIRED: 32K RAM with single disk drive

TO ORDER: Send check or money order in the amount of $99.95 per copy made payable to

AMERICAN COMPUTER DEVELOPMENT, INC. ↙227

1735 Briarcrest Dr., Suite 200
Bryan, Texas 77801
713/775-1516 713/775-1510

Telephone orders accepted. Dealer inquiries invited. VISA and MASTER CHARGE accepted. Send card number and expiration date. Price includes shipping and handling. Immediate delivery.

*IBM 370 is a Trademark of the International Business Machines Corporation.
**TRS-80 is a Trademark of the Tandy Corporation.

↙See List of Advertisers on page 306

DOES YOUR SMART PRINTER SUDDENLY BECOME DUMB WHEN YOU PRINT FROM SCRIPSIT?

Is your printer capable of underlining
but not from Scripsit?

Is your printer capable of **Bold Printing**
but not from Scripsit?

Can your printer super script and sub script
but not from Scripsit?

Can your printer change pitches
but not from Scripsit?

The answer is SCRIPMOD

SCRIPMOD does not require a separate printer driver. With SCRIPMOD control codes can be embedded in the test of your document. You use the same format line syntax you're used to now. SCRIPMOD adds one format instruction to Scripsit & two control codes.

>C=N J=N **CC=H**

The above line tells SCRIPMOD to justify text and to backspace the printer upon encountering a Text Character in the document. The Text Character is entered by placing the cursor at the place in text where the control code is to take place and typing on **@T**. Of course your printer must be capable of backspacing and must use the ASCII code 8 (or H) as the control for backspace. If the code is something different there is no problem as the correct code may always be sent. Any control code your printer is capable of using from 1 to 31 with or without an **ESCAPE** lead in many be sent.

The second control code which is added in the **MENU** command. You press an **@M** and the screen clears and prompts you to select a drive from 0 through 3 or return to the text. All visible files can be displayed on the screen at this time. When you select to return to the text, the cursor is placed on the exact character it was on when you selected **@M**.

The minimum system required for SCRIPMOD is the Mod I 32K disk system with either the RS lower case mod or the EP lower case mod.

SCRIPMOD is supplied on disk with full documentation for **$39.95.**

PENCIL-FIX Save your warranty. Use PENCIL-FIX to avoid custom control key on your keyboard. Redefines the control key for EP to be the @ key. Use RS lower case mod or the EP mod without the control key. Disk based EP only . . . **$14.95**

PRINT-CENTRAL Send any control code directly to your smart printer from the BASIC command mode or from DOS. Avoid having to type such things as "LPRINT CHR$(31) just to change pitch. Use CLEAR right arrow (two key strokes) instead. Any code from 1 to 31 may be sent. Mod I 32K disk . . . **$24.95**

SPOOL-REL An in-memory print buffer that runs in Mod I 32K or 48K disk systems. Fully relocatable code and buffer. A true background spooler at an unbelievably low price . . . **$24.95**

TIGGER-GRAF Create engineering, scientific, business, or just plain fun on your IDS 440G or 460G printer. Resolution is 495 x 575. Easy BASIC programs provided for data entry and machine language module for speed. Includes setting individual points, drawing lines, shading shapes. Several graphs may be catenated along the Y-axis for larger graphs. Requires Mod I 32 or 48K 1 disk . . . **$149.95**

VERN STREET PRODUCTS ✓111

THE COMPUTER STORE 4949 S. Peoria • Tulsa, OK 74105 • 918-747-2550

Program Listing 1

```
1 CLEAR27000:DEFINTA-Z:DIMR$(420):MX=420:NL=0:ONERRORGO
    TO2:GOTO4
2 IFERR<>26THENPRINT"ERROR";ERR/2+1;"AT LINE";ERLELSEPR
    INT"STRING SPACE IS FULL...LAST RECORD DELETED":NL
    =N-1
3 FORI=1TO5000:NEXT:RESUME4
4 CLS:PRINT@20,"MAGAZINE KEYWORD INDEX":PRINT@84,"DATA
    BASE MANIPULATION":PRINT@220,"MENU":PRINT@320,"PRE
    SS:    1   TO ENTER NEW RECORDS":PRINT@394,"2   TO
     UPDATE EXISTING RECORDS"
5 PRINT@458,"3   TO READ DATA TAPE":PRINT@522,"4   TO W
    RITE DATA TAPE":PRINT@586,"5   TO STOP"
6 Q$=INKEY$:IFQ$=""THEN6ELSEIFASC(Q$)<49ORASC(Q$)>53THE
    N6ELSEQ=VAL(Q$):ONQGOTO40,60,30,20,9
7 FORI=1TO4:A$(I)=MID$(R$(N),1+(I-1)*10,10):NEXT:A$(5)=
    MID$(R$(N),41,14):A$(6)=MID$(R$(N),55,2):A$(7)=MID
    $(R$(N),57,4):A$(8)=RIGHT$(R$(N),3):RETURN
8 R$(N)="":FORI=1TO8:R$(N)=R$(N)+A$(I):NEXT:RETURN
9 PRINT@704,"HAS DATA BEEN RECORDED ON TAPE (Y/N)?"
10 Q$=INKEY$:IFQ$="N"THEN20ELSEIFQ$<>"Y"THEN10
11 STOP
12 PRINT@576,"PRESS S TO ABORT DATA I/O AT ANY TIME.":R
    ETURN
20 CLS:PRINT"PREPARE DATA TAPE TO RECORD DATA. PRESS C
    WHEN READY":I=1
21 IFINKEY$<>"C"THEN21ELSEPRINT@470,"WRITING DATA TAPE"
    :GOSUB12
24 J=1:A$=""
25 A$=A$+R$(I):I=I+1:IFI>NLTHENA$=A$+STRING$(189-LEN(A$
    )," "):GOTO27
26 J=J+1:IFJ=<3THEN25
27 PRINT#-1,A$:IFI>NLTHEN28ELSEIFINKEY$<>"S"THEN24ELSEP
    RINT"DATA RECORDING ABORTED AFTER";I;"rECORDS.":FO
    RI=1TO5000:NEXT:GOTO4
28 PRINT#-1,"FOXY-1":GOTO4
30 CLS:PRINT"PREPARE DATA TAPE TO PLAY BACK DATA. PRESS
     C WHEN READY":I=1
31 IFINKEY$<>"C"THEN31ELSEPRINT@470,"READING DATA TAPE"
    :GOSUB12
33 INPUT#-1,A$:IFLEFT$(A$,6)="FOXY-1"THEN35ELSER$(I)=LE
    FT$(A$,63):R$(I+1)=MID$(A$,64,63):R$(I+2)=MID$(A$,
    127,63):I=I+2:IFR$(I)=STRING$(63," ")THEN35
34 IFINKEY$<>"S"THENI=I+1:GOTO33:ELSENL=I:PRINT"DATA IN
    PUT ABORTED AFTER";I;"RECORDS.":FORI=1TO5000:NEXT:
    GOTO4
35 I=I-1:IFR$(I)=STRING$(63," ")THEN35
36 NL=I:GOTO4
40 CLS:PRINT"ENTERING NEW RECORDS":PRINT@128,"FOR EACH
    RECORD ENTER 4 KEYWORDS,TITLE OF ARTICLE, 2 CHARAC
    TER":PRINT"MAGAZINE CODE, 4 CHARACTER ISSUE DATE A
    ND 3 DIGIT PAGE NUMBER."
41 PRINT"ENTER 'DONE' AND 7 NULLS TO STOP.":PRINT:N=NL
42 INPUTA$(1),A$(2),A$(3),A$(4),A$(5),A$(6),A$(7),A$(8)
    :IFA$(1)="DONE"THEN49
43 FORI=1TO4:IFLEN(A$(I))>10THENA$(I)=LEFT$(A$(I),10):N
    EXT:ELSEA$(I)=A$(I)+STRING$(10-LEN(A$(I))," "):NEX
    T
44 IFLEN(A$(5))>14THENA$(5)=LEFT$(A$(5),14)ELSEA$(5)=A$
    (5)+STRING$(14-LEN(A$(5))," ")
45 IFLEN(A$(6))>2THENA$(6)=LEFT$(A$(6),2)ELSEA$(6)=A$(6
    )+STRING$(2-LEN(A$(6))," ")
46 IF LEN(A$(7))>4THENA$(7)=LEFT$(A$(7),4)ELSEA$(7)=A$(
    7)+STRING$(4-LEN(A$(7))," ")
47 IFLEN(A$(8))>3THENA$(8)=RIGHT$(A$(8),3)ELSEA$(8)=STR
    ING$(3-LEN(A$(8))," ")+A$(8)
48 N=N+1:GOSUB8:IFN<MXTHEN42ELSEPRINT"FILE LIMIT OF 420
     RECORDS HAS BEEN REACHED":FORI=1TO5000:NEXT
49 NL=N:GOTO4
60 CLS:PRINT"RECORDS MAY BE UPDATED ONLY BY A SEQUENTIA
    L SEARCH, BUT YOU":PRINT"CAN SPECIFY THE STARTING
    POINT AND THE STEP SIZE. THE FILE":PRINT"NOW HOLDS
    ";NL;" RECORDS."
61 INPUT"STARTING POINT";N:IFN<1ORN>NLTHEN61
62 INPUT"STEP SIZE";S
63 GOSUB7
64 PRINT@384,"RECORD";N:PRINT"1  KEY1:  ";A$(1)TAB(31)"
    2  KEY2:  ";A$(2):PRINT"3  KEY3:  ";A$(3)TAB(31)"4
     KEY4:  ";A$(4):PRINT"5  TITLE:  ";A$(5)TAB(31)"6
     MAGAZINE:  ";A$(6):PRINT"7  DATE:  ";A$(7)TAB(31
    )"8  PAGE:  "A$(8)
65 PRINT@832,"PRESS THE NUMBER OF THE ITEM TO BE CHANGE
    D, </> TO DELETE":PRINT"THE ENTIRE RECORD, 9 TO CH
    ANGE THE STEP SIZE, 0 FOR":PRINT"NEXT RECORD (NO C
    HANGES), SPACE BAR FOR MENU";
66 Q$=INKEY$:IFQ$=""THEN66ELSEIFQ$=" "THEN4ELSEIFASC(Q$
    )<47ORASC(Q$)>57THEN66
67 PRINT@832,STRING$(190," ");:IFQ$<>"/"THEN70ELSEPRINT
    @832,"DELETE THIS RECORD...HIT C TO CONFIRM, ANY O
    THER KEY TO ABORT";
68 Q$=INKEY$:IFQ$=""THEN68ELSEIFQ$<>"C"THEN65
69 NL=NL-1:FORI=1TONL:R$(I)=R$(I+1):NEXT:GOTO63
70 Q=VAL(Q$):IFQ=0THEN83ELSEIFQ=9THEN82
71 PRINT@832,"ENTER NEW VALUE FOR ITEM";Q;:INPUTQ$:ONQG
    OTO72,72,72,72,74,76,78,80
72 IFLEN(Q$)>10THENA$(Q)=LEFT$(Q$,10)ELSEA$(Q)=Q$+STRIN
    G$(10-LEN(Q$)," ")
73 GOTO81
74 IFLEN(Q$)>14THENA$(5)=LEFT$(Q$,14)ELSEA$(5)=Q$+STRIN
```

Throw It Away!

Now your TRS-80® can proofread your spelling for you, with MICROPROOF, the affordable computer dictionary.

MICROPROOF will proofread text files produced by any word processing software (specify with order). Patches available to FULLY INTEGRATE MICROPROOF WITH SCRIPSIT® OR ELECTRIC PENCIL.® Comes with 50,000 word infinitely expandable vocabulary. Errors displayed on screen or printed. Optional feature enables MICROPROOF to insert corrections in original text file, and automatically returns to word processing software. Recognizes both prefixes and suffixes. FAST! Requires one 5¼ or 8 inch disk drive.

PRICES

MODEL I	$125.00
MODEL II	$200.00
CP/M®	$200.00
Correcting feature	add $60.00
Patch for Scripsit® or Electric Pencil®	$35.00
Users Manual	$ 5.00

APPLE VERSION AVAILABLE SOON

Mastercharge and Visa accepted.
No C.O.D. —
California residents add 6% tax.

Send for brochure—dealer inquiries welcome.

✓378

Cornucopia Software
1625 Beverly Place, Berkeley, Calif. 94707
(415) 524-8098

LYNX makes your TRS-80 a whole new animal.

LYNX is more than a telephone coupler. LYNX is a one-piece total telephone linkage system for TRS-80 Level I and II computers, with or without expansion interface. No RS-232 required for true originate/answer direct-connect telephone operation. DOS-compatible EMTERM "smart terminal" software furnished on cassette. Already have a favorite TRS-80 program? Use it with LYNX.

With LYNX you can tap the Source or the new Compu-Serve Information Utility. Control university, business and personal computers from a remote location. Communicate via electronic mail. Learn from library data bases. Profit by instant financial market info.

Auto-Answer Optional.

All for only $279.95 at your dealer.

Includes all cables, "EMTERM" terminal program, instruction manual.
FCC Registration Number: A909KE-69488-DM-N

ESI LYNX

123 LOCUST STREET LANCASTER, PENNSYLVANIA 17602
Phone 717/291-1116

DEALER INQUIRIES INVITED.

✓278

MODEL III & APPLE, TOO!

"TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation"

✓See List of Advertisers on page 306

3 ALTERNATIVE INTERFACES FOR THE TRS-80

CHATTERBOX™

Featured in Aug. '80 BYTE

- 300 baud originate modem
- Centronics printer port 8-bit
- RS-232-C port (50-19.2K baud)
- connects to keyboard or E. I.
- received data automatically routed to printer ports
- includes terminal software
- only $279.95 complete

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.

DISK-80™

Featured in March '81 BYTE

- disk controller (4 drives)
- hardware data separator
- includes 16K of RAM provision for additional 16K
- buffered TRS-bus connector
- real-time clock
- printer port (optional)

ASSEMBLED & TESTED
with 16K of RAM $329.95
Centronics Printer Port add . . . . . $ 50.00
with 32K RAM add. . . $ 50.00
DISK-80 pc board. . . . . $ 48.00
Printer/Power Supply pc board . . . . . $ 16.00
Complete Kit with 16K RAM and Printer Port . $275.00

Dealer inquiries invited.

TRS-80 is trademark of Tandy Corp.

COMM-80™

Featured in May/June '80 BYTE

- RS-232-C port (50-19.2K baud) software/hardware selectable
- Centronics printer port 8-bit
- connects to keyboard or E. I.
- chain up to 16 units
- use with I.E. for 2nd printer
- includes terminal software
- only $179.95 complete

To order call (516) 374-6793
or write: The MicroMint Inc. ↙310
917 Midway
Woodmere, NY 11598

MICRO MINT

****SPECIAL**SPECIAL****
TRS-80 ADD ON DRIVES
IMMEDIATE DELIVERY

SINGLE SIDED $225.00
DOUBLE SIDED $345.00

COMPLETE SYSTEMS
SINGLE SIDED $365.00
DOUBLE SIDED $485.00
INCLUDES:
MINI DISK DRIVE
FUSED POWER SUPPLY
VENTED CABINET
CABLE
90 DAY WARRANTY
FACTORY ASSEMBLED
FACTORY TESTED

THESE ARE NEW 5" FD's

I 2 INTERFACE, INC ↙246
20932 CANTARA ST
CANOGA PARK, CA 91304
(213) 341-7914

VISA AND MASTER CHARGE ACCEPTED

MICRO-80™ CASSETTES—
100% ERROR-FREE

LENGTH	12 PACK	24 PACK
C-10	69¢	59¢
C-20	89¢	79¢

- Fully Guaranteed!
- World's Finest Media
- Premium 5-Screw Construction
- Used by Software Firms Nationwide
- Dealer and Club Discounts Available
- Custom Storage Case, Add 19¢ Each
- Shipping Charges, Add $1.50 ↙476

μ80™ MICRO-80™ INC.
K-2665 NO. BUSBY ROAD
OAK HARBOR, WA 98277

SICK

OF PROGRAMS THAT TREAT YOU LIKE AN IDIOT, WASTING TIME & MONEY??

RANDOM ACCESS PAYROLL

- NO Complicated Initialization
- EDIT & LIST
- QUARTERLY Reports
- PROGRAM Loads In Less than 30 sec.

PAY ANY EMPLOYEE ANYTIME

- SALARIED OR HOURLY
- COMPLETE including EIC
- PRINTS on NEBS 9020 CHECKS
- NO SPECIAL PAYROLL CHECKS
- SPECIAL HOURS—SPECIAL PAY
- TWO SAVINGS—INCLUDING RIA
- STATE TAX—WORKMENS COMP.
- CLASSED BY Occupation or Dept.
- PAYSTUB Shows Year-to-date
- No Filenames—All Automatic

SEND YOUR STATE TAX SCHEDULE

- We'll Customize for your State Tax

WRITTEN IN BASIC FOR COMPLETE CONTROL

Documentation & Disk $55.00
Documentation only $10.00-credit to purchase

MASS ADD 5% or Exempt number
Requires:
Min. 32K-1 Drive-Printer = 50 EMP
48K-2 Drives-Printer = 100 +
TEL. 7 AM-9:30 PM EASTERN
(617)-359-2364/6370

MEDFIELD ↙421
COMPUTER SOFTWARE
39 GREEN ST., MEDFIELD, MA 02052

```
    G$(14-LEN(Q$)," ")
75 GOTO81
76 IFLEN(Q$)>2THENA$(6)=LEFT$(Q$,2)ELSEA$(6)=Q$+STRING$
    (2-LEN(Q$)," ")
77 GOTO81
78 IFLEN(Q$)>4THENA$(7)=LEFT$(Q$,4)ELSEA$(7)=Q$+STRING$
    (4-LEN(Q$)," ")
79 GOTO81
80 IFLEN(Q$)>3THENA$(8)=RIGHT$(Q$,3)ELSEA$(8)=STRING$(3
    -LEN(Q$)," ")+Q$
81 GOSUB8:GOTO83
82 PRINT@832,"STEP SIZE";:INPUTS
```

are 175 and 675. A menu allows user selection of the desired functions.

Any string can be substituted for FOXY-1 in lines 28 and 33 as long as it is not a keyword in the data file. This string serves as an end-of-file indicator when the file is transferred between tape and memory.

Since the file records have defined fields, input data maintain field size. This data verification is done in lines 43 to 47. Strings are truncated or spaces added to maintain the field requirements. Similar verification is made in lines 72 to 80 when new data is input to change the records.

Changes are easy to make since the data file is maintained in memory for all operations. Permanent storage of the data is on tape, but the program may be modified to use disk. As with any file of data, it is wise to include a confirmation task before deleting any record. This is done in lines 67 and 68.

Retrieval Programs

The data base can be searched for keywords using several schemes. A simple program is given in Program Listing 2. The program searches the data base for keyword hits. When a hit is found, the article title and other identifying information is output. A hit value is also output. This value corresponds to the number of matches between the keywords of the search and the keywords of the article. If you have chosen your keywords carefully, articles with high hit values will contain the information you want.

Since Program Listing 2 will output article information even if a single hit is scored, the screen tends to become cluttered. Several other search or printing strategies could avoid this problem. One alternate scheme searches for only one keyword at a time. When a hit is found, the record is added to a list of hits. After each level of searching, only those records which scored hits on all keywords stay in the list. Thus, when a printout is requested, high hit value articles are listed.

The programs listed here show one way that keywords can be applied to magazine indexing. The record structure and searching scheme are ones that work for me. You may want to modify them so that they are tailored to your own needs.

Keywords and key concept retrieval are proven techniques. Make the most of them. ■

Program Listing 2

```
1 CLEAR27000:DEFINTA-Z:DIMR$(420):NL=0:MX=420
4 CLS:PRINT@20,"MAGAZINE KEYWORD INDEX":PRINT@88,"DATA
    BASE SEARCH":PRINT@220,"MENU":PRINT@320,"PRESS:
     1   TO READ DATA TAPE":PRINT@394,"2   FOR KEYWORD
     SEARCH"
5 PRINT@458,"3   FOR TITLE LISTING":PRINT@522,"4   TO S
    TOP"
6 Q$=INKEY$:IFQ$=""THEN6ELSEIFASC(Q$)<49ORASC(Q$)>52THE
    N6ELSEQ=VAL(Q$):ONQGOTO30,40,20,10
7 PRINT@960,"(PRESS C TO CONTINUE, M FOR MENU)";
8 Q$=INKEY$:IF Q$="M"THENQ=1ELSEIFQ$="C"THENQ=2ELSE8
9 RETURN
10 STOP
11 CLS:PRINT"PRESS S AT ANY TIME TO STOP LISTING":RETUR
    N
12 PRINT@576,"PRESS S TO ABORT DATA INPUT AT ANY TIME":
    RETURN
20 I=1:P$="%          %        %%     % %   % %"
21 P=0:GOSUB11:PRINT"ARTICLE TITLE      MAGAZINE  ISSUE
     PAGE"
22 PRINT USING P$;MID$(R$(I),41,14),MID$(R$(I),55,2),MI
    D$(R$(I),57,4),RIGHT$(R$(I),3):P=P+1:I=I+1:IFINKEY
    $="S"THEN24ELSEIFP<12ANDI=<NLTHEN22
23 IFI>NLTHENPRINT@896,"END OF FILE"
24 GOSUB7:IFI>NLTHEN4ELSEONQGOTO4,21
30 CLS:PRINT"PREPARE DATA TAPE TO PLAY BACK DATA. PRESS
    C WHEN READY":I=1
31 IFINKEY$<>"C"THEN31ELSEPRINT@470,"READING DATA TAPE"
    :GOSUB12
33 INPUT#-1,A$:IFLEFT$(A$,6)="FOXY-1"THEN35ELSER$(I)=LE
    FT$(A$,63):R$(I+1)=MID$(A$,64,63):R$(I+2)=MID$(A$,
    127,63):I=I+2:IFR$(I)=STRING$(63," ")THEN35
34 IFINKEY$<>"S"THENI=I+1:GOTO33:ELSENL=I:PRINT"DATA IN
    PUT ABORTED AFTER";I;"RECORDS.":FORI=1TO5000:NEXT:
    GOTO4
35 I=I-1:IFR$(I)=STRING$(63," ")THEN35
36 NL=I:GOTO4
40 CLS:PRINT"THE INDEX FILE CAN BE SEARCHED ON THE BASI
    S OF ONE TO FOUR":PRINT"KEYWORDS. A 'HIT' IS SCORE
    D WHENEVER ONE OF THE KEYWORDS IS":PRINT"AN EXACT
    MATCH FOR ONE OF THE KEYS IN THE FILE RECORD."
41 PRINT"FOR EACH HIT A 'VALUE' IS PRINTED ALONG WITH T
    HE TITLE,":PRINT"MAGAZINE,ISSUE AND PAGE. THE NUME
    RICAL VALUE INDICATES THE":PRINT"NUMBER OF KEYWORD
    S WHICH MATCHED KEYS OF THAT RECORD."
42 PRINT@448,"ENTER 4 KEYWORDS FOR SEARCH. IF SEARCH IS
     TO BE BASED ON LESS":PRINT"THAN 4 KEYWORDS, ENTER
     NULLS TO MAKE A TOTAL OF 4 ENTRIES.":INPUTA$(1),A
    $(2),A$(3),A$(4):N=0
43 FORI=1TO4:IFA$(I)<>""ANDA$(I)<>" "THENN=N+1
44 NEXTI:IFN=0THEN42
45 FORI=1TON:IFLEN(A$(I))>10THENA$(I)=LEFT$(A$(I),10):N
    EXT:ELSEA$(I)=A$(I)+STRING$(10-LEN(A$(I))," "):NEX
    T
46 I=1:P$="  #        %          %        %%     % %
     % %"
50 P=0:GOSUB11:PRINT"VALUE      ARTICLE TITLE      MAGA
    ZINE  ISSUE  PAGE"
51 V=0:FORJ=1TON:FORK=1TO31STEP10:IFA$(J)=MID$(R$(I),K,
    10)THENV=V+1
52 NEXTK:NEXTJ:IFV=0THEN54
53 PRINTUSINGP$;V,MID$(R$(I),41,14),MID$(R$(I),55,2),MI
    D$(R$(I),57,4),RIGHT$(R$(I),3):P=P+1
54 I=I+1:IF INKEY$="S"THEN56ELSEIFP<12ANDI=<NLTHEN51
55 IFI>NLTHENPRINT@896,"END OF FILE"
56 GOSUB7:IFI>NLTHEN4ELSEONQGOTO4,50
```


Introducing . . .

OMNITERM

The Ultimate TRS-80™ Terminal Package . . . . **At Last!**

OMNITERM - The Ultimate TRS-80™ Terminal Package is now available after nearly 2 years in the making. Created as a result of dissatisfaction with existing terminal programs, **OMNITERM** is the **Most Powerful** and **Flexible** microcomputer intelligent terminal program at any price - **Bar None.** Now the **TRS-80™** can communicate with and transfer files to almost any computer system **Without** writing special software. **OMNITERM** solves the problem of computer systems that send 32, 40, or 80 column lines to your 64 column **TRS-80™** by **Reformatting** your screen for easy reading. **OMNITERM** can compensate for incompatibilities with 7 different translation tables, one to and from each device. This capability even allows **OMNITERM** to use codes such as **EBCDIC**, and translate them to the **TRS-80™'s ASCII.** With **OMNITERM** you can even **Review** text that has **Scrolled Off** the **Screen!** At any time you can examine and change any of **OMNITERM's** settings, because **OMNITERM** gives you a **Full Status Display** of all functions. It works with all **ROM's** and **DOS's** since it uses only officially documented calls.

- **Spooled Printer**
- Single Key **Auto Signon**
- **Prompted** File Output
- True **Break** Key
- **X/Y Cursor Control**
- **Xon/Xoff** File Control
- **Repeat** Key
- **Lower Case** Support.
- Can **Echo** characters

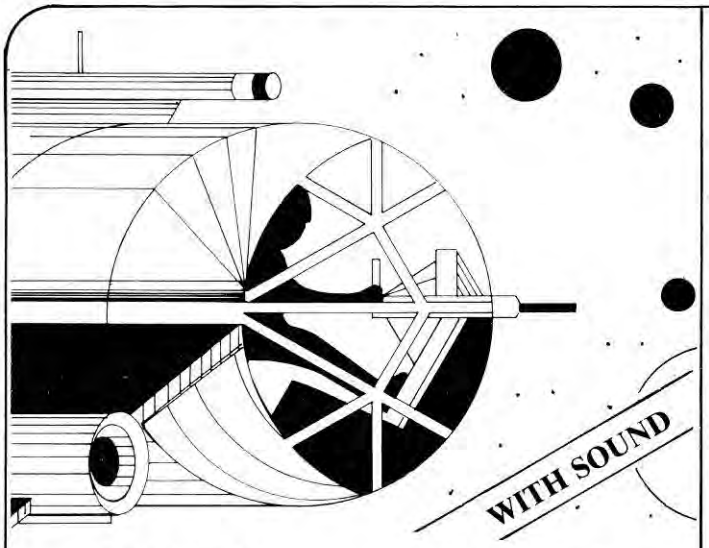
- Sends **Special Characters** not on the **TRS-80** keyboard.
- Control-G causes "**Beep**" sound and **Graphic Bell** to flash on the screen.
- Accepts all standard **VIDEOTEX™** control codes.
- Can configure the **UART** for baud rates from 50-19,200 baud.
- Can send text **Slowly** for computers that work at "typist" speed.
- Keeps continuous count of **Parity, Framing,** and **Overrun** errors.
- **Saves** a special file with proper settings for each different use.
- Includes: 60 page manual, **Text Editor,** Hex **Conversion Utilities.**

Everyone who sees **OMNITERM** is **Amazed** by its **Power** and **Ease of Use!** Requires **TRS-80** with 32K memory, 1 disk. $95 (plus shiping if C.O.D.). Call for shipment within 24 hours. Manual alone $15, refunded with purchase. Order by Visa, M/C or C.O.D. Personal checks delay 2-3 weeks. Mass. residents add 5% sales tax. Dealer Inquiries Invited.

Lindbergh Systems

49B Beechmont Street, Worcester, MA 01609 (617) 799-2217 391

GO BOLDLY . . .
Where No TRS-80* Program Has Gone Before!



ASTEROID

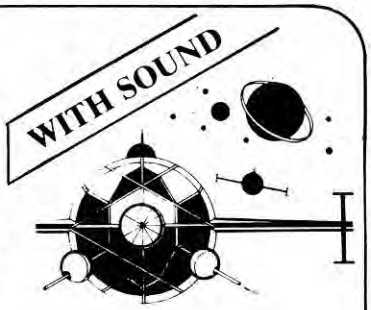
DATE: 28.02.2047
LOCATION: 270 million miles from Terra
MISSION: Maintaining Terra's Space Lanes

Briefing will follow:
1.1 Your mission is to destroy any asteroids in your sector and to prevent alien spacecraft from infiltrating the Terran Defense Network.
1.2 Your ship is armed with an anti-matter cannon. You can shoot large asteroids, but this turns them into many smaller asteroids, each capable of destroying your ship.
1.3 In addition, alien ships can make instantaneous hyperspace jumps into your area and start firing on your ship.
1.4 You'll need lightning reflexes and nerves of steel to survive Asteroid. We have no use for non-survivors!

Asteroid, a real-time, machine-language game, features variable levels of difficulty, superb high-speed graphics, sound effects and automatic score keeping. (T1) or (T2)

Order No. 0237R $14.95 Tape.
Order No. 0247RD $19.95 Disk.

BALL TURRET GUNNER

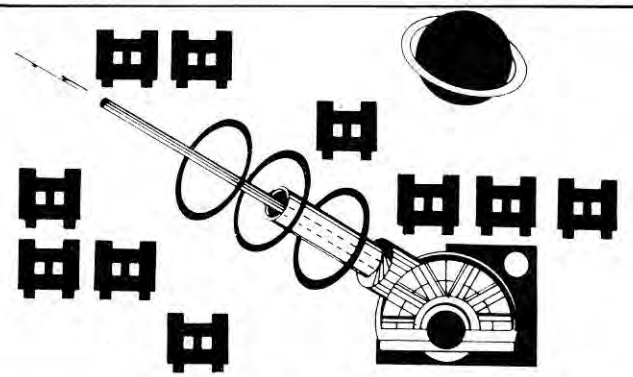


For years the Petro Resource Conglomerate has attacked our photon collection stations and strangled our deep-space trade routes. The PRC Exxonerator Class light fighters (code name: Gnat) have been their main weapon. Now you can strike back, by joining the Ball Turret Gunner Service.

Imagine yourself at the control console of an LW-1417 Stratoblazer (Type B Strategic Laser Weapon). Your Hindsight Director informs you that a Gnat fighter is coming in for an attack. You pivot your gigawatt laser turret until you can see the target on your monitor. The Range Indicator shows him coming in fast. The Targeting Computer studies his course and speed as your finger tenses over the firing key. You know you'll have only a fraction of a second in which to react. The Gnat fighter's evasive maneuvers cause him to dance in your sights. Suddenly, you see the FIRE Command and you react instinctively. Your laser beam lashes out and reduces the Gnat to an expanding ball of ionized gas. Mission accomplished!

Ball Turret Gunner, with your choice of multiple levels of difficulty, optional sound effects and superb graphics, is more than just a game. It's an adventure. Experience it! (T1)

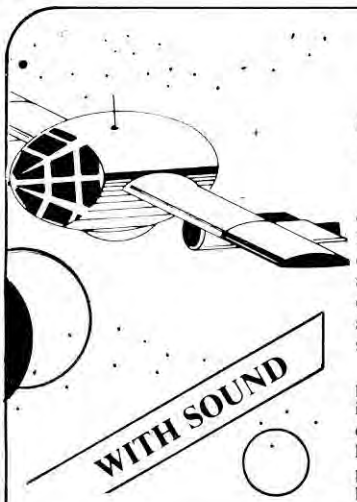
Order No. 0051R $9.95.



INVADERS

The INVADERS are coming! Earth's defenses are dead except for your Laser base. Your assignment is to destroy the approaching INVADERS before they destroy Earth. Before Earth's sensors failed, they detected 550 armed invaders in space, speeding toward us in 10 attack formations of 55 in each group. The sensors detected four different types of attack craft: Large, Medium, Small, and a short profile craft which is the most difficult to destroy. If you cannot stop these space attackers they will stop Earth . . . . . for good. (T1)

Order No. 0240R $9.95.



COSMIC PATROL

WARNING: PLAYERS OF THIS GAME SHOULD BE PREPARED FOR A STATE OF REALISM HITHERTO UNAVAILABLE ON THE TRS-80

Skilled players soon master many difficult computer games, but COSMIC PATROL is in a world all its own. The challenge intensifies! Supporting graphics and sound (optional) make each encounter an exciting new experience. It all adds up to a Super 3-S package. . . skill, sight and sound.

Scenario: The Cosmic Patrol program puts you in the command chair of a small interstellar patrol craft. Your mission is to defend Terran space and prey on the Quelon supply ships which carry essential parts and lubricants for that implacably hostile robotic force. The drone freighters are fairly easy pickings for the accomplished starship pilot, but beware of the I-Fighter escorts. They're armed, fast and piloted by intelligent robots linked to battle computers. They *never* miss.

The Cosmic Patrol program is not just another search and destroy game. With its fast, real-time action, impressive sound option and superb graphics, this machine-language program is the best of its genre.

Don't keep putting quarter after quarter into arcade games or spending big bucks for video game cartridges. Get Cosmic Patrol from Instant Software—and get the best for less! (T1)

Order No. 0223R $14.95 Tape.
Order No. 0224RD $14.95 Disk.

TO ORDER

See Your Local Instant Software Dealer or Call Toll-Free 1-800-258-5473

Instant Software™

PETERBOROUGH, N.H. 03458 603-924-7296

(T1) = TRS-80 Model 1, Level II, 16K RAM.

(T2) = TRS-80 Model 1, Level II 16K, Expansion Interface 16K + 1 disk drive.

*A trademark of Tandy Corporation

Here's a subroutine you can bank on.

Check Writer

Charles Z. Tzinberg
6318 Heritage Station Rd.
Belleview, IL 62223

If you use your computer to print checks, then this article is for you!

The following subroutine will transform your checks into professional works of art—and serve as an effective check protector as well. Although written in Radio Shack Disk BASIC, it can easily be converted to any system. The entire subroutine (lines 300 through 310) occupies only 537 bytes.

Line 110 is included to demonstrate the program. Be careful to correctly insert data line (900) into your main program so that it will be read when called.

The functions in line 100 must be included in the start of your program. Be sure to clear at least 139 bytes. That is the minimum required to run the subroutine. Unless you change the variable M, or add a $ (M$), you must DEFSTR M. If you keep W as a variable, and print amounts requiring double precision, you must DEFDBL W.

If you work only with single precision numbers, this is not necessary and will only slow the subroutine.

Line 310 should be modified to fit your particular use. Before I started using a machine language patch to output all slash zeros to the printer as 0, I used subroutine 200 to remove the slashes. If you don't need it simply delete the line and remove the GOSUB 200 in line 310.

Print the Check

When ready to LPRINT the check, let W equal the amount of the check, and GOSUB 300. The subroutine will then LPRINT the formatted amount with a minimum of 50 characters, filling the spaces with asterisks, which fit my checks perfectly.

```
100 CLEAR139:DEFDBLW:DEFSTRM:DIMM(26):FORX=0TO26:READM(
    X):NEXT
110 INPUTW:GOSUB200:GOTO110
200 IFINSTR(X$,0)=0THENRETURNELSEMID$(X$,INSTR(X$,"0"),
    1)="O":GOTO200
300 IFW<.01THENX$="* VOID * VOID * VOID ":GOTO310ELSEIF
    W>=1000THENX$="$$$$"+STR$(INT(W))+" DOLLARS"+STR$(
    INT((W-INT(W))*100+.5001))+" CENTS":GOTO310
302 Y$=STR$(W+.005001):Y$=MID$(Y$,INSTR(Y$,".")+1,2):IF
    LEFT$(Y$,1)="0"THENY$=RIGHT$(Y$,1):IFY$="0"THENY$=
    "NO"
304 W=FIX(W):IFW=0THENX$="ONLY "+Y$+" CENTS ":GOTO310EL
    SEX$=Y$+" CENTS ":Y$=STR$(W):Y=VAL(RIGHT$(Y$,2)):I
    FY=0THENY$="":GOTO306ELSEIFY<21THENY$=M(Y-1)ELSEY$
    =M(VAL(MID$(Y$,LEN(Y$)-1,1))+17):IFRIGHT$(STR$(W),
    1)<>"0"THENY$=Y$+"-"+M(VAL(RIGHT$(STR$(W),1))-1)
306 X$=Y$+" DOLLARS AND "+X$:IFW<100THEN310
308 Y$=STR$(W):Y=VAL(MID$(Y$,LEN(Y$)-2,1)):X$=M(Y-1)+"
    HUNDRED "+X$
310 X$=X$+STRING$(50-LEN(X$),"*"):LPRINTTAB(12)X$:LPRIN
    TSTRING$(3,138):RETURN
900 DATAONE,TWO,THREE,FOUR,FIVE,SIX,SEVEN,EIGHT,NINE,TE
    N,ELEVEN,TWELVE,THIRTEEN,FOURTEEN,FIFTEEN,SIXTEEN,
    SEVENTEEN,EIGHTEEN,NINETEEN,TWENTY,THIRTY,FORTY,FI
    FTY,SIXTY,SEVENTY,EIGHTY,NINETY
```

Check Printing Subroutine

If you want more or less length modify the 50 in line 310. Note that line 310 will print at TAB(12), and, after printing, will skip three spaces. You will need to modify this to fit your checks.

It is simple to format amounts in the thousands or even higher, but since you will probably have very few of these to print, and because they'd take so much room, I use a much shorter method of printing any amount equal to or greater than 1000 (See line 300).

These amounts are printed as:

```
$$$$ 6835 DOLLARS AND 50 CENTS******
```

To test the subroutine, add the following to print test numbers.

```
110 W = RND(2000)/3: IFRND(9)<
    2THENW = W*-1ELSE
    IF RND(9)>8THENW = W*10
120 GOSUB200:GOTO110
```

If, instead of the above test, you prefer to print a few of your actual checks, make them payable to me. When they clear your bank account, you'll know for sure that everything works properly!■

Paddle your way around.

TRS-80 Joystick Control

Stephen Barker
7700 Parkway Drive #44
La Mesa, CA 92041

Many games written for the TRS-80 use keyboard input to control game movement. This is done by using the INKEY$ command. Since I'm not a touch typist, however, I found this to be slow and confusing, especially during an action game.

The need for a joystick was obvious.

I saw ads in computer magazines for joysticks, but none for the TRS-80. Acquiring a joystick was no problem since I also own an Atari Video Computer System that has two. Joysticks are available for purchase independent of the video game.

Operating Principles

The keyboard of the TRS-80 is arranged as an 8 × 8 matrix. Depressing a key causes a particular row and column location to be activated during a keyboard scan. Keyboard IC's Z1 and Z2 control the rows, while IC's Z3 and Z4 control the columns. When the three key is pressed, a contact closes inside the key cap. This connects pin six of Z1 to pin six of Z3, thereby inputting a three to the computer. A value of eight is also stored in memory location 16442.

The Atari joystick works on somewhat the same principle as the keyboard. There are five sets of contacts inside it. Four sets control movement up, down, right and left. The fifth is activated by a firing button on the stick. Each set has a common ground, making six wires necessary in order to use all of the functions of the joystick. The five contacts also resemble a 5 × 1 matrix, with the common ground being the row and the five wires being the columns.

Constructing the Joystick

The Atari joystick comes with a nine-pin female plug, of which six pins are connected. The pins are arranged in two rows with five pins on top and four pins on bottom. Hold the plug so you are

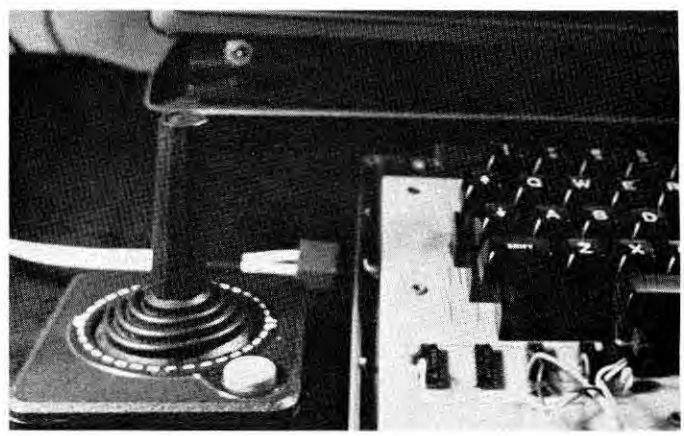


Photo 1. The joystick at left

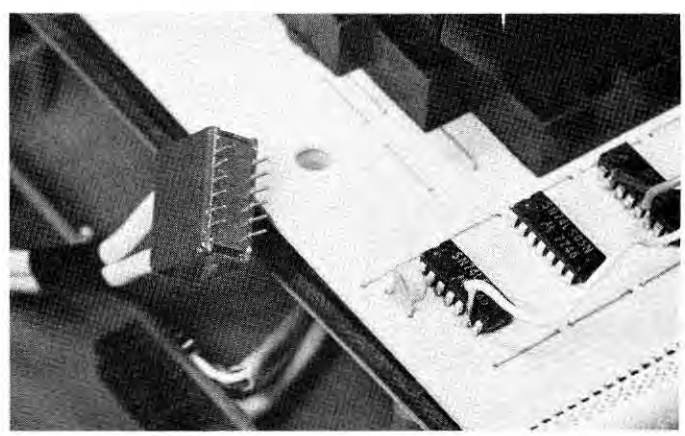


Photo 2. The Atari joystick comes with a nine-pin female plug, of which six are connected.

The Most Popular Music Synthesizer In The World!

Orchestra-80™
$79.95

plus $2.00 postage and handling
CA residents add 6% sales tax
MasterCard and Visa accepted

Free Downloading of Orchestra-80 Music Files Now Available!

PHOTO-80 (201) 790-6795
BULLET-80 (813) 541-2580
FORUM-80 (201) 688-7117
CONNECTION-80 (516) 588-5836
COMMUNIQUE-80 (201) 992-4847
BULLET-80 (203) 744-4644
MICRONET 70110,503

✓356

Software Affair
858 Rubis Drive, Sunnyvale, CA 94087
(408) 295-9195

!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑←%$#!()*

LLIST LPRINT.
LPRINT LLIST.

SERIAL PRINTER USERS

END OF SOFTWARE HASSLES!!

MAGIC BOX (TM) PLUG IT AND GO! NO SOFTWARE NEEDED TO LPRINT / LLIST.

PLUG IN THE PARALLEL PRINTER PORT, COMPATIBLE WITH MOST POPULAR SERIAL PRINTERS : TELETYPES, H14, DIABLO, QUME, NEC, ECT. . . .
USES ALL LEVEL2 ROM PRINTER ROUTINES FOR FULL FLEXIBILITY.
SELECTABLE SPEED 55 TO 9600 BAUDS.(SPECIFY WHICH SPEED)
AUTO LINE FEED AFTER C.R. AUTO CARRIAGE RETURN.
STOP BITS, PRINTER HANDSHAKE, 20MA LOOP OR RS232.
INTRODUCTORY OFFER 109.00 DOLLARS FOR A LIMITED TIME
NINETY DAYS LIMITED WARRANTY.

MR X CONSULTING, INC.

✓466

1-813-973-0517- 602 GLENWOOD DR. E. ZEPHYRHILLS, FLA 33599
WATCH FOR SERIAL PRINTER TO CPU INTERFACE COMING SOON.
NO R.S. INTERFACE OR SOFTWARE WILL BE REQUIRED TO LPRINT / LLIST

!"#$%&'()*+,-./0123456789:;<=>?@ABCDEFGHIJKLMNOPQRSTUVWXYZ[\]↑←%$#!()*

VISA/MC Order Line Only (except Mich.) 800-253-4358 ext. 100

FINDISK-II The ultimate in automatic disk indexing with exclusive features . . . . . Model-I $20.00
AUTOMATICALLY create INDEX of programs or data from all your disks, print disk LABELS, print alphabetized MASTERLIST, do fast SEARCH, add DESCRIPTIONS. Also automatically: detect DATA or SYS disks, PURGE disks and index of old files, and UPDATE from revised disks only.

SOLAR-I The critical calculations for passive design. . . Model-I $30.00 . . . . . Model-II $45.00
INPUT: any latitude, orientation, slope, roof overhang, storage type, building loss, OUTPUT: solar angles, shading, time, heat gain/loss, percent solar, fuel use. Print report by hour, month, year in presentation format.

RIA-II Complex Real Estate Investment Analysis . . . . . Model-I $30.00.....Model-II $45.00
Analysis for investor or homeowner using Elwood method. INPUT: Project costs, loan and tax data, expenses, depreciation rate. OUTPUT: Cap rate/value, mortgage payments, before/after tax cash flows, return (IRR), profit/gain from sale over any time series.

DEPRECIATE-I Manage a list of depreciable items . . . . . Model-I $15.00.....Model-II $20.00
Tracks long list of depreciable items with varying purchase dates, depreciation rates, or per cent business use. Update any time. Print tax form. Used by many CPAs.

STRUCT-I Graphic design of steel/wood beams and moment transfer. . . . . Model-I $15.00
INPUT: span/cantilever, uniform/point loads, beam material. OUTPUT: with screen graphics beam moment & shear diagrams. Print job report with diagram, stresses, and required beam sizes.

Min 32K. On disk (Mod-I one drive order tape). Add $1.00 postage (Mich. add 4% tax) VISA/MC

✓88 **DOCUMAN SOFTWARE BOX 387-A KALAMAZOO, MI 49005 (616) 344-0805**

THE WORD WIZARD

A LEVEL II WORD PROCESSOR

- Text NOT limited by memory
- 35 commands for easy processing
- Custom keyboard input routines
- Custom cassette I/O routines
- Custom hardcopy print routines
- Embedded Z80 routines for speed
- Includes hyphenation routines
- Long line input (255 characters)
- Huge text buffer (store 60 lines)
- Built in default values
- Global & Local search & replace
- Line move and Line duplicate
- Double sized headings supported

AND MUCH, MUCH MORE!
JUST $29.95

✓138

THE ALTERNATE SOURCE

1806 Ada Street
Lansing, MI 48910
517/487-3358
517/485-0344

Add $2.00 for crush-proof box, $1.50 for COD, Master Charge or Visa orders.

✓See List of Advertisers on page 306

looking into the sockets with the row of five on top. Number the pins across with the upper left pin being number one, upper right pin number five, lower left pin number six and the lower right number nine. The following pins control the various functions: Pin 7 is the ground, pin 2 is left, pin 3 is right, pin 4 is down, pin 5 is up and pin 9 is fire. These directions are referenced with the fire button in the lower right position.

Since I couldn't locate a compatible nine-pin socket, I decided to use a 16-pin socket and plug. The joystick requires only six pins, but I thought I'd save the rest. I might construct a second joystick later and use six more.

I had some three-wire intercom cable left from another project and decided to connect with it. Since I wanted to keep my joystick compatible with my Atari, I spliced the intercom cable and connected it into the joystick cable. I attached the other ends to the 16-pin plug. The socket was then mounted to the case of the TRS-80 by drilling holes through the sides and passing the pins of the socket through. The socket was held in place by bending the outer four pins back against the case. I ran two three-wire cables from the socket to the keyboard, leaving plenty of slack for keyboard and main board removal.

To simplify my connections, I soldered the wires to the legs of the IC's rather than to the PC board.

The necessary connections are as follows: connect pin 7 of the Atari plug to pin 6 of Z1, pin 5 of the plug to pin 6 of Z3, pin 4 of the plug to pin 4 of Z3, pin 3 of the plug to pin 10 of Z3, pin 2 of the plug to pin 10 of Z4 and pin 9 of the plug to pin 4 of Z4. This completes the construction.

Running It

Attach the joystick to the computer now and check its operation. This is done by pushing the stick forward to input 1 to the screen, right to input 2, back to input 3, left to input 4 and by pushing the button to input 5. The INKEY$ function scans the keyboard for a single key input. Once this has been received by the computer, it cannot receive another until the contacts are opened again. This situation can be relieved by POKEing a zero into memory location 16442. Pushing the stick to a diagonal position will input two numbers, but the INKEY$ function will only read the first number. The keyboard memory may now be checked for the second number, but this requires some knowledge of machine language. ■

CHEAP CHIPS . . . ARE NO BARGAIN

BUYING ADD-ON MEMORY? GET THE BEST!!!

WE'LL BEAT ANY DEAL FOR COMPARABLE CHIPS.

TOP QUALITY CHIPS AT UNBEATABLE PRICES

Memory failures cost you time and money. Japanese 16k RAM chips have a one-to-ten in-service failure ratio to U.S. chips--from a study by R. Anderson, Computer Div., Hewlett-Packard, reported in ***The Economist***, 4-26-80.

We offer 4116 chips by Fujitsu, NEC, Hitachi, Toshiba and Mitsubishi . . . for most popular computers and expansion memory boards, including:

***Apple *All TRS-80's *New Pet *Heath H-89 *Superbrain *Expandoram *Many Others**

4116 DYNAMIC RAMS		THE BEST
200nsec Plastic	$27.70,	Ceramic $37.95
150nsec Plastic	$31.95,	Ceramic $41.95

STATIC RAMS

2114 450nsec $3.30, 300nsec $3.90; 2101 $2.90.

EPROMS (450 nsec std; ask for hi-speed if required) 2708 $4.80; 2716 5V+12V $9.40; 2716 5V $9.70; 2732 $18.90.

We'll beat any legitimate price for comparable chips. Hi-volume users, dealers, or clubs, ask for quantity discounts. SHIPPING: to $25, $2; to $50, $1; over $50, **FREE.** COD: +$1.40.

DISCOUNTS ON TOTAL: over $100, 5%; over $200, 10%.

MINIS & MICROS INC. • 29486 Trailway
98 Agoura, CA. 91301 • (213) 342-4535
CA. residents add 6% sales tax

2 YEAR WARRANTY ★ CALL US ANYTIME

CompuCover ® 100

COVER YOUR INVESTMENT

•Cloth Backed Naugahyde Vinyl
•Improved Reliability
•Longer Life
•Waterproof & Dustproof
•Two Decorator Colors Saddle Tan • Black

TRS-80 MODEL I		TRS-80 MODEL III	$14.95
Keyboard	$ 7.95	TRS-80 COLOR COMPUTER	9.95
Cassette	4.95	Line Printer I	$16.95
Video Display	9.95*	Line Printer II	9.95
Package Offer	18.95*	Line Printer III	15.95
*NOTE-Add $3.00 for Expansion Interface		Line Printer IV	9.95
TRS-80 5¼" Disk	$ 4.95	Line Printer VI	14.95
Two Disk Cover (Side by side)	7.95	Daisy Wheel Printer II	16.95
TRS-80 MODEL II		Quick Printer I	9.95
Entire Unit	$22.95	Quick Printer II	5.95
Keyboard Only	7.95		
Three Disk Unit (8" Drives)	18.95		

Over 200 covers, write for complete list.

VISA

Send check or money order to CompuCover P.O. Box 324 (Dept A) Mary Esther, FL 32569 Phone (904) 243-5793

Include $1.50 for postage and handling. Overseas orders include $4.00 postage.

DEALER INQUIRES INVITED

EDUCATIONAL SOFTWARE

For TRS-80* Color Computer, PET, Apple II.

ELEMENTARY	MATH
SCIENCE	BIOLOGY
GEOGRAPHY	HISTORY
ECONOMICS	ACCOUNTING
FOREIGN LANG.	BUSINESS ED.
GRAMMAR	FARM RECORDS

COIN INVENTORY

Write for FREE Catalogue:

MICRO LEARNINGWARE 89
BOX 2134, N. MANKATO MN 56001
507-625-2205

VISA & MASTER CHARGE ACCEPTED

We pay 15% royalty for Educational Programs listed with us.

Apple is a trademark of Apple Computer Co.
TRS-80 is a registered trademark of TANDY CORP.
Pet is a trademark of Commodore Bus. Machines.

THE BEST UTILITY SOFTWARE IS NOW AVAILABLE FOR THE MODEL II, AT DISCOUNT PRICES!!!

MANUFACTURER	PRODUCT	CASH PRICE	CREDIT CARD PRICE
SNAPP	Extended Basic		
	Single Modules	33.00	34.02
	Complete System	165.00	170.10
RACET	Utilities Package	131.25	135.31
SNAPP	Spooler	82.50	85.05
RACET	Development System	109.38	112.76
SNAPP	HOST II/TERM II	41.25	42.53
RACET	GSF	43.75	45.10
SNAPP	Master/Slave	123.75	127.58
RACET	DSM	131.25	135.31
SNAPP	Convert	61.88	63.79
RACET	BLINK	43.75	45.10
SNAPP	S BASIC	61.88	63.79
SCOTCH	741-0 DISKETTES	35.00	36.08

All products carry manufacturer's full warranties.
Please allow 7-10 days for delivery.
Please add $2.00 shipping and handling for each order.

Software Discount
7755 E. Quincy #A4-108
Denver, Co. 80237

BLACKJACK PLAYERS

A YEARS INCOME IN 4 MONTHS.

Basic Strategy Tutors, for the novice & expert alike. Use our Tutors & quickly learn how to become A WINNER. Earn $40 hour. Learn the secrets of our success. Our Tutors will teach you how to:

**** BET YOUR MONEY ****
**** PLAY EACH HAND ****
**** NOT GET BARRED ****
**** BE A BUSINESS ****

****** BEWARE ******

Our Tutors are not games!!! They are serious tools to make winners out of you. The authors have spent 7 years playing & being winners. Now so can you, with the aid of our Tutors. Our Tutors are based on the strategies developed by Lawrence Revere. More advanced strategies are available call for info. Consultation is available for you by mail or phone. From 12pm - 12am M.S.T.

PKG. 1 contains 10 Basic Tutors for Atlantic City, or Nevada Rush $25 for 16K Mod I or Mod III, cass. $30 for 32K disk Please add $2.00 for shipping.

205

MICRO BLAJAK SYSTEMS INC.
2800 NORTH ELLEN STREET
FLAGSTAFF, ARIZONA 86001
(602) 774-5723 or (602) 774-7561

— Professional —

Real Estate Software

For Apple or TRS-80

Property Management System

(32K, 1 Disk Systems)

Features:

- Tenant Information
- Late Rent Reports
- YTD & Monthly Income
- Handles — Partial Payments, Returned Checks, Advance Payments
- Prints Receipts
- 5 Digit Expense Accounts
- Building Expense Report
- Vendor Expense Report
- Income Tax Report
- All Reports Can Be Printed
- Complete Documentation
- Easy Data Entry & Edit
- 200 Units per File

Price $225.00

Real Estate Analysis Modules:

(Cassette or Disk)

1) Home Purchase Analysis
2) Tax Deferred Exchange
3) Construction Cost/Profit
4) Income Property Cashflow
5) APR Loan Analysis
6) Property Sales Analysis
7) Loan Amortization

$35 Per Module

Software Realty Company™

At Computer Stores Everywhere
Or Order COD Direct
(Cal Residents Add 6% Sales Tax)
(213) 372-9419

Dept. M 1116 "G" 8th St., Manhattan Beach CA 90266

Storm Coming?

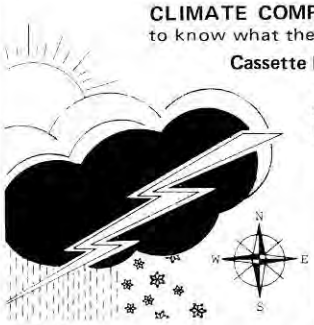
How many times have your plans revolved around the weather? Now you can turn your TRS-80 into a weather forecaster, and stop getting caught in the rain!!

CLIMATE-COMP was created by National Weather Service Meterologist, author and editor David Carman.

THE WEATHER FORECASTER program will give you a short range forecast for your area. Enter a few simple measurements, easily obtained from newspapers or the U.S. Weather Service, to receive a short range forecast for the next six hours.

THE WEATHER PLOT program is the result of years of carefully collected data. At your command are records, charts, graphs, facts and figures on local weather for every major city in the United States. Choose your area of the country and the data files will release a flood of information. Each city is listed with its monthly rainfall, monthly and yearly average temperature, average wind speed, snowfall, heating and cooling degree days, annual average sunshine, humidity and record-breaking temperatures.

CLIMATE COMP for all the information you need to know what the weather has in store for you.



Cassette based: system requires 16K, level II, Pkg. no. 0102R $19.95. Disk based: system requires 32K one disk drive, Pkg. no. 0316RD $24.95.

TO ORDER: Contact your local Instant Software dealer. If these programs are unavailable, call toll-free **1-800-258-5473**

*A trademark of Tandy Corporation

Instant Software™

PETERBOROUGH, N.H. 03458

Are You Sitting on a Gold Mine?

Thousands of computerists have written programs and could be receiving royalty checks every month but they aren't....and won't, until they do something about publishing their programs.

Have you written any microcomputer programs that may be useful to others? Few applications or utilities are unique so the chances are excellent that many of the programs you have written are marketable, RIGHT NOW!

What kind of programs? Just about anything that others can use such as business, scientific, utility, educational, and games programs. Which microcomputer? Instant Software publishes programs for ALL popular microcomputer systems. (Instant Software also converts programs for use on other microcomputer systems and translates them into other languages, such as German, French, Italian, etc., for our international market).

Instant Software can transform your programs into royalty checks. We've set the standard for royalties to programmers. We have the publishing know-how, a world-wide distribution network and can do the most for you in selling the product of your genius.

Submit your programs on tape or disk, with complete documentation, to: Instant Software, Inc., Submissions Dept., Peterborough, NH 03458. If we can't use your program, you should hear from us in a few days. The good news takes a bit longer, but comes in the form of royalty checks.

Instant Software™

Peterborough, N.H. 03458

GET ORGANIZED

With These Utility Programs From Instant Software

FIND IT QUICK

Put an end to the Misplaced Information Syndrome! Here is a reliable, fast, subject-oriented information locator—FIND IT QUICK! This information indexing and retrieval system is versatile and flexible—the ideal tool for doctors, lawyers, engineers, businessmen, educators, anyone who needs to locate information.

Designed with a journal/magazine format, FIQ is versatile enough to be used to store and retrieve any type of reference information including client lists, vendor advertisements, report bibliographies and more—even poems and famous quotations. Subjects can be indexed or called according to author, journal and date or by up to nine keywords that you determine. Keywords can be used singly or in combination during the search routines.

FIQ can be used by anyone. It requires no special skill, just the ability to type. Article references to be stored can be preselected and then entered into the system by a secretary or assistant. The contents of entire file cabinets can even be indexed and stored!

FIND IT QUICK requires a minimum system consisting of a TRS-80 Model I Level II with 16K of RAM, an Expansion Interface with 16K of RAM and at least one disk drive. Up to 1080 items can be stored on one data disk. Instant Software's Tiny DOS operating system is included on the program disk so that you can use the program without fuss or bother.

Make your computer work like your own personal librarian with FIND IT QUICK. Can you afford to wait another day?

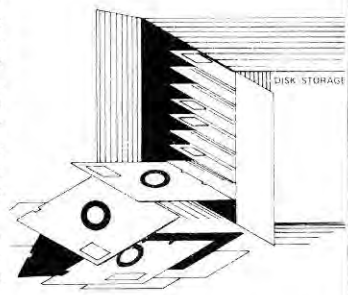
Order No. 0258RD $49.95. Disk

MASTER DIRECTORY

The MASTER DIRECTORY is a disk file storage program that reads the files on all your disks and stores the file names and extensions and even records the free space on each disk. All you have to do is number the disks in your library and the MASTER DIRECTORY will keep track of their contents. You can read the names, displayed alphabetically, search the DIRECTORY for file names and extensions, delete disks and search for free space. You can store 5000 files or 320 disks, whichever comes first.

Your disk storage problems are over now that the MASTER DIRECTORY is here. This package requires the following minimum system:

1. A TRS-80 Level II with 16K RAM.
2. An Expansion Interface.
3. One (or more) disk drives.



Order No. 5005RD (disk-based version) $29.95

TO ORDER:

SEE YOUR LOCAL INSTANT SOFTWARE DEALER OR CALL TOLL-FREE

1-800-258-5473

Instant Software™

PETERBOROUGH, N.H. 03458

See List of Advertisers on page 306

Not just a flip-flop fudge factor.

Exponential Smoothing

Len Gorney
Box 91, R.D. #5
Clarks Summit, PA 18411

The eventual success of a business is based, in part, on management's ability to accurately forecast future demand for a product.

Forecasting is the science of predicting future events based in whole or in part on past performances. Many forecasting methods are available, running the gamut from educated guesses to highly mathematical techniques.

The technique known as exponential smoothing is a variation on a moving average forecast. In particular, exponential smoothing is based on a geometric progression which results in non-uniform weights being assigned to the available historical data. Exponential smoothing and the moving average techniques effectively reduce fluctuations in demand, at the same time remaining sensitive to trends. In other words, the values calculated for future demands are not subject to instantaneous, random peaks or drops, nor will a resulting trend be ignored before proper adjustments are made to the forecast values.

Requirements

The required variables for exponential smoothing include historical data which correspond to previous actual demand figures, the number of time periods to project into the future, and a constant known as the smoothing constant.

Historical data is usually available from sales figures for the product during a particularly representative time period. For example, monthly sales figures for a product can be gathered and used as the basis for the historical data points.

Program Listing. Exponential Smoothing.

```
1040 REM  VARIABLE              DESCRIPTION
1050 REM    AD              ACTUAL DEMANDS (HISTORICAL DATA)
1060 REM    AF              AVERAGE FORECAST ERROR
1070 REM    BF              LARGEST FORECAST ERROR
1080 REM    CT              CURRENT TREND VALUES
1090 REM    DG              # OF TIMES DEMAND > FORECAST
1100 REM    DL              # OF TIMES DEMAND < FORECAST
1110 REM    EA              EXPONENTIAL AVERAGES
1120 REM     F              FORECAST VALUES
1130 REM    FE              FORECAST ERRORS
1140 REM    F2              FORECAST ERRORS SQUARED
1150 REM     I              GENERAL LOOP COUNTER
1160 REM    LF              SMALLEST FORECAST ERROR
1170 REM     N              # OF ACTUAL DEMAND TIME PERIODS
1180 REM    NC              # OF TIMES FORECAST >< ZERO
1190 REM    NL              # OF LINES PRINTED FOR TABULAR OUTPUT
1200 REM    NP              # OF PROJECTED TIME PERIODS
1210 REM     Q              ANSWER ( Y OR N ) TO QUESTION
1220 REM    QN              PRINT USING PARAMETER
1230 REM    Q1              PRINT USING PARAMETER
1240 REM     S              SUM OF FORECAST ERRORS
1250 REM    SC              SMOOTHING CONSTANT VALUE
1260 REM    SD              STANDARD DEVIATION OF FORECAST
1270 REM    SE              STANDARD DEVIATION OF FORECAST ERROR
1280 REM    ST              SMOOTHED TRENDS
1290 REM    S1              1.0 LESS THE SMOOTHING CONSTANT VALUE
1300 REM    S2              SUM OF THE FORECAST ERRORS SQUARED
1310 DEFINT D, I, N
1320 DEFSNG A, B, C, E, F, L, S
1330 DEFSTR Q
1340 QN = "#######.##": Q1 = "###"
1350 CLS
1360 INPUT"ENTER > Y < FOR INSTRUCTIONS ELSE ENTER > N <";Q
1370 IF Q = "Y" THEN 2560 ELSE IF Q = "N" THEN 1380 ELSE 1350
1380 CLS
1390 INPUT"ENTER NUMBER OF TIME PERIODS OF ACTUAL DEMAND";N
1400 IF N <= 0 OR N >< INT(N) THEN STOP
1410 DIM AD(N), EA(N), CT(N), ST(N), F(N), FE(N), F2(N)
1420 CLS
1430 FOR I = 1 TO N
1440   PRINT,"ACTUAL DEMAND #";I;
1450   INPUT AD(I)
1460 NEXT I
1470 CLS
1480 INPUT"ENTER SMOOTHING CONSTANT";SC
1490 IF SC <= 0.00 OR SC > 1.00 THEN GOSUB 2430 : GOTO 1480
1500 CLS
1510 INPUT"ENTER NUMBER OF PROJECTED TIME PERIODS";NP
1520 IF NP <= 0 OR NP >< INT(NP) THEN GOSUB 2470: GOTO 1510
1530 CLS
1540 INPUT"ENTER > Y < FOR TABULAR OUTPUT ELSE ENTER > N <";Q
```

Program continues

A business which deals with a high turnover product will want to forecast perhaps only one to three time periods into the future. On the other hand, a longer forecast time period is logical for a product whose demand remains widespread and steady—home heating oil, for example.

The major problem with exponential smoothing lies in choosing an appropriate smoothing value—the constant.

The smoothing constant must be a positive value between 0.00 and 1.00, where 0.00 results in complete smoothing while a smoothing constant of 1.00 results in a forecast with no smoothing ability. These extreme values are rarely used, however.

Generally, a smoothing constant between 0.01 and 0.30 yields reasonably accurate results; that is, a prompt response to change without a larger response to random fluctuations.

The smaller the smoothing constant value, the slower the response of the procedure to change. On the other hand, the larger the value of the smoothing constant, the quicker the response to change, as a much greater emphasis is placed on the most recent data.

"The major problem with exponential smoothing lies in choosing the appropriate smoothing value—the constant."

A product's market history will usually give a clue as to the correct magnitude of the smoothing constant. If the historical data is relatively stable, a small smoothing constant usually gives accurate forecasts. A seasonal pattern or other trend usually requires a large smoothing constant. Experience in your business is the prerequisite for forecasting future demand for a product.

One technique, known as retrospective simulation, is often used to determine the approximate values for the smoothing constant and the number of projected time periods. Basically, retrospective simulation (or Monday morning quarterbacking) uses the most recent marketing figures as control data and applies them to historical market information.

Various smoothing and projected time periods are applied to the historical data, until a reasonably good fit results. These same values are then applied to future demand predictions.

Operating Instructions

The initial response to the following program is either a Y or an N which will give either a brief instructional screen display or branch immediately to the data input phase. Entering a Y will present the necessary background information and operating

```
1550 IF Q = "Y" THEN GOSUB 2300 ELSE IF Q = "N" THEN 1570
                                                    ELSE 1530
1560 REM  INITIALIZE VARIABLES TO ZERO
1570 AF = 0.0: BF = 0.0: DG = 0.0: DL = 0.0: LF = 0.0: NC = 0
1580 S1 = 1.0 - SC
1590 FOR I = 1 TO N
1600   CT(I) = 0.0: EA(I) = 0.0: F(I) = 0.0
1610   FE(I) = 0.0: F2(I) = 0.0: ST(I) = 0.0
1620 NEXT I
1630  S = 0.0
1640 S2 = 0.0
1650 REM  SET FIRST EXPONENTIAL AVERAGE TO FIRST ACTUAL DEMAND
1660 NL = 1
1670 EA(1) = AD(1)
1680 I = 1
1690 IF Q = "Y" THEN GOSUB 2380
1700 REM  START OF MAIN LOOP
1710 FOR I = 2 TO N
1720 REM   CALCULATE EXPONENTIAL AVERAGE, CURRENT TREND
1730 REM   IF SMOOTHED TREND = ZERO
                THEN SMOOTHED TREND = CURRENT TREND
                   ELSE CALCULATE SMOOTHED TREND
1740   EA(I) = (SC*AD(I))+(S1*EA(I-1))
1750   CT(I) = EA(I)-EA(I-1)
1760   IF ST(I-1) = 0.0 THEN ST(I) = CT(I)
                              ELSE ST(I) = (SC*CT(I))+(S1*ST(I-1))
1770   IF NP+1 >= I THEN 1920
1780 REM   CALCULATE FORECAST VALUE
1790   F(I) = EA(I-NP)+((S1/SC+FIX(NP))*ST(I-NP))
1800 REM   ACCUMULATE DEMAND > FORECAST OR DEMAND < FORECAST
1810   IF AD(I) > F(I) THEN DG = DG + 1 ELSE DL = DL + 1
1820 REM   CALCULATE FORECAST ERROR VALUE
1830   FE(I) = F(I)-AD(I)
1840 REM   DETERMINE LARGEST FORECAST ERROR
                    AND SMALLEST FORECAST ERROR
1850   IF FE(I) > BF THEN BF = FE(I)
1860   IF FE(I) < LF THEN LF = FE(I)
1870 REM   CALCULATE FORECAST ERRORS SQUARED,
                       SUM OF FORECAST ERRORS,
                       SUM OF FORECAST ERRORS SQUARED
1880   F2(I) = FE(I)*FE(I)
1890       S = S+FE(I)
1900      S2 = S2+F2(I)
1910   IF F(I) >< 0.0 THEN NC = NC + 1
1920   IF Q = "Y" THEN GOSUB 2380
1930   IF NL = 13 THEN GOSUB 2510: GOSUB 2300
1940 REM   END OF MAIN LOOP
1950 NEXT I
1960 REM   CALCULATE AVERAGE FORECAST ERROR,
       STANDARD DEVIATION OF FORECAST,
          STANDARD DEVIATION OF FORECAST ERRORS
1970 FOR I = 1 TO N
1980   AF = AF+FE(I)
1990 NEXT I
2000 AF = AF/N: IF NC = 0 OR NC = 1 THEN SE=0: SD=0: GOTO 2030
2010 SE = SQR(ABS((S2-(S*S)/(NC))/(NC-1)))
2020 SD = SQR(ABS(S2/(NC-1)))
2030 GOSUB 2510
2040 REM   OUTPUT RESULTS ROUTINE
2050 PRINT@64,"SMOOTHING CONSTANT =";SC
2060 PRINT@128,NP;"PROJECTED TIME PERIODS"
2070 PRINT@256,"STANDARD DEVIATION OF FORECAST DISCREPANCY =";
2080 PRINT,SD
2090 PRINT@320,"STANDARD DEVIATION OF FORECAST ERROR       =";
2100 PRINT,SE
2110 PRINT@448,"DEMAND GREATER THAN FORECAST";DG;"TIMES"
2120 PRINT@512,"DEMAND    LESS THAN FORECAST";DL;"TIMES"
2130 PRINT@640,"CUMULATIVE FORECAST ERRORS      =";S
2140 PRINT@704,"LARGEST POSITIVE FORECAST ERROR =";BF
2150 PRINT@768,"LARGEST NEGATIVE FORECAST ERROR =";LF
2160 PRINT@832,"AVERAGE FORECAST ERROR          =";AF
2170 GOSUB 2510
2180 CLS
2190 PRINT@912,"ENTER APPROPRIATE OPTION NUMBER"
2200 PRINT@320,"OPTION   DESCRIPTION"
2210 PRINT@389,"1  USE SAME ACTUAL DEMAND FIGURES BUT";
2220 PRINT" DIFFERENT"
2230 PRINT@457,"SMOOTHING CONSTANT AND/OR PROJECTED TIME";
2240 PRINT" PERIOD VALUES"
2250 PRINT@517,"2  USE DIFFERENT ACTUAL DEMAND FIGURES"
2260 PRINT@645,"3  STOP PROGRAM"
2270 PRINT@768,"ENTER OPTION NUMBER";
2280 INPUT I
2290 IF I = 1 THEN 1470 ELSE IF I = 2 THEN RUN 1310 ELSE STOP
```

Program continues

instructions for the program.

The program will then ask for the number of time periods for which actual market demand information is available; that is, the number of time periods for which historical data is present. Entering a zero for this question ends the program, while entering any other positive integer value dimensions the necessary arrays.

An OM ERROR may occur if the value for this variable is too large. Using a 16K TRS-80, the maximum value for this variable may approach 250 with no adverse effects. If no error occurs, the program will ask the operator for each actual demand value.

After all the actual demand values are entered, the program will ask for the smoothing constant value. A positive value between 0.00 and 1.00 is expected.

The number of projected time periods is the next request. This value must be a positive integer, one or above. This value, as well as the value for the previously entered smoothing constant, determines the accuracy of the forecast.

Finally, a Y or an N answer is required if the user wants a tabular output of the various forecast values during the execution of the program. These values are important if the user wants to see the intermediate results of the procedure.

The program then commences its calculations. If your answer to the tabular question is a Y, intermediate values during each time period for the actual demand, exponential average, current trend, smoothed trend, forecast demand and forecast error are displayed and frozen.

Eventually, the final results of the program are listed. These results include the standard deviation of forecast errors.

The number of times the actual demand was greater than and less than the forecast value is also listed. The cumulative forecast errors, the largest positive forecast error, the largest negative forecast error and the average forecast error will also be listed.

The operator can adjust the smoothing constant and/or the number of time periods projected into the future without re-entering the historical data by following the instructions on the last screen display. ■

```
2300 REM   TABULAR OUTPUT ROUTINE
2310 CLS
2320 NL = 1
2330 PRINT@65,"TIME  ACTUAL EXPONENTIAL CURRENT  SMOOTHED";
2340 PRINT@119,"FORECAST";
2350 PRINT@128,"PERIOD DEMAND   AVERAGE    TREND    TREND";
2360 PRINT@173,"FORECAST    ERROR"
2370 RETURN
2380 NL = NL + 1
2390 PRINT USING Q1;I;
2400 PRINT USING QN;AD(I);EA(I);CT(I);ST(I);F(I);FE(I)
2410 RETURN
2420 REM   ERROR MESSAGE ROUTINES
2430 CLS
2440 PRINT"0.01 <= SMOOTTHING CONSTANT <= 1.00"
2450 GOSUB 2510
2460 RETURN
2470 CLS
2480 PRINT"NUMBER OF PROJECTED TIME PERIODS >= 1"
2490 GOSUB 2510
2500 RETURN
2510 PRINT@960,"PRESS > ENTER < TO CONTINUE";
2520 INPUT QE
2530 CLS
2540 RETURN
2550 REM   INSTRUCTION OUTPUTT ROUTINE
2560 CLS
2570 PRINT@10,"FORECASTING BY EXPONENTIAL SMOOTHING""
2580 PRINT
2590 PRINT"   EXPONENTIAL SMOOTHING IS A VARIATION ON A MOVING"
2600 PRINT"AVERAGE FORECAST BASED ON A GEOMETRIC PROGRESSION "
2610 PRINT"RESULTING IN THE ASSIGNMENT OF NONUNIFORM WEIGHTS "
2620 PRINT"TO THE HISTORICAL DATA."
2630 PRINT"   THE REQUIRED INPUT PARAMETERS INCLUDE:"
2640 PRINT"1. THE HISTORICAL DATA; I.E. PAST ACTUAL DEMAND,"
2650 PRINT"2. A SMOOTHING CONSTANT,"
2660 PRINT"3. THE NUMBER OF PROJECTED TIME PERIODS."
2670 PRINT"   THIS PROGRAM USES A TYPE OF RETROSPECTIVE "
2680 PRINT"SIMULATION TO EXHIBIT THE EXPONENTIAL SMOOTHING "
2690 PRINT"FORECAST TECHNIQUE."
2700 GOSUB 2510
2710 PRINT"IINPUT PARAMETER # 1"
2720 PRINT"   NUMBER OF ACTUAL DEMAND PERIODS; I.E. THE"
2730 PRINT"   NUMBER OF PERIODS FOR WHICH HISTORICAL DATA "
2740 PRINT"   IS AVAILABLE."
2750 PRINT"INPUT PARAMETER " 2"
2760 PRINT"   THE VALUES FOR EACH OF THE ACTUAL DEMAND "
2770 PRINT"   FIGURES."
2780 PRINT"INPUT PARAMETER # 3"
2790 PRINT"   SMOOTHING CONSTANT VALUE.  THIS VALUE MUST BE "
2800 PRINT"   BETWEEN +0.01 AND +1.00"
2810 PRINT"INPUT PARAMETER # 4"
2820 PRINT"   NUMBER OF PROJECTED TIME PERIODS IS THE "
2830 PRINT"   FORECASTED FUTURE TIME PERIODS."
2840 GOSUB 2510
2850 PRINT"INPUT PARAMETER # 5"
2860 PRINT"   INTERMEDIATE OUTPUT IS AVAILABLE BY ANSWERING "
2870 PRINT"   'Y' TO THIS QUESTION."
2880 GOSUB 2510
2890 GOTO 1380
2900 END
```


MOVING?

Let us know 8 weeks in advance so that you won't miss a single issue of 80 Microcomputing.

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.

☐ Address change only ☐ Extend subscription ☐ Enter new subscription
☐ 1 year $18.00 ☐ Payment enclosed ☐ Bill me later

If you have no label handy, print OLD address here *print NEW address here*

AFFIX LABEL

Name_____ Name_____

Address_____ Address_____

City_____ State____ Zip____ City_____ State____ Zip____

80 MICROCOMPUTING P.O. Box 981 ● Farmingdale NY 11737

ACCEL/ACCEL2 SPEEDUPS

TRS-80 Model I BASIC Compilers

Table below shows the BASIC subset translated by **ACCEL** and **ACCEL2** to machine code. Figures represent the minimum expected ratio of execution times, compiler to interpreter. All other BASIC statements and functions run at interpreter speed after compilation.

	INTEGER	SINGLE	DOUBLE	STRING
Assignment (LET)	**115**	3.3	3.4	7.6
Array Reference (1-dim)	35	78	66	34.5
AND or OR	**41**	2.5	2.0	
Compare (<,etc)	**30**	1.6	1.4	4.2
Add, Subtract, Concat	**47**	2.0	1.5	4.9
Multiply (*)	3.3	2.0	1.5	
Divide (/)	2.0	2.0	1.02	
Reference to a constant	**69**	65	54	2.1
FOR with NEXT	**15**			
POKE	**82**	4.6	3.6	
SET or RESET	**6.7**	3.1	2.6	
IF THEN ELSE	**11.1**	3.0	2.3	7.6
ON expression GOTO	**15.8**	3.2	2.8	
Functions				
VARPTR	**33**	47	47	44
USR	**11.2**	3.7	2.8	
POINT	**6.9**	3.0	2.5	
PEEK	**52**	4.4	3.5	
LEN				43
MID$				4.1
LEFT$				3.0
RIGHT$				2.8
CHR$				4.7
ASC				30
CVI				28
Flow of Control				
GOSUB with RETURN	**137**			
GOTO	**204**			
All other BASIC statements and functions	**1.0**	**1.0**	**1.0**	**1.0**

ACCEL: For 16K TRS-80 Model I. Compiles boldface subset in INTEGER variable type. Compile-time size 2816 bytes, run-time size 256 bytes. Trade up later to ACCEL2 for the price difference. $44.95 + .75 shipping

ACCEL2: For 32K TRS-80 Model I. Compiles subset in all variable types. Compile-time size 5120 bytes, run-time size 1024 bytes. Local and Global options help control growth of the compiled code. Output save to Disk, Stringy/Floppy. TRSDOS and most vendor DOSs supported. Use ACCEL2 during BASIC program development for easy huge speedups. $88.95 + 1.50 shipping

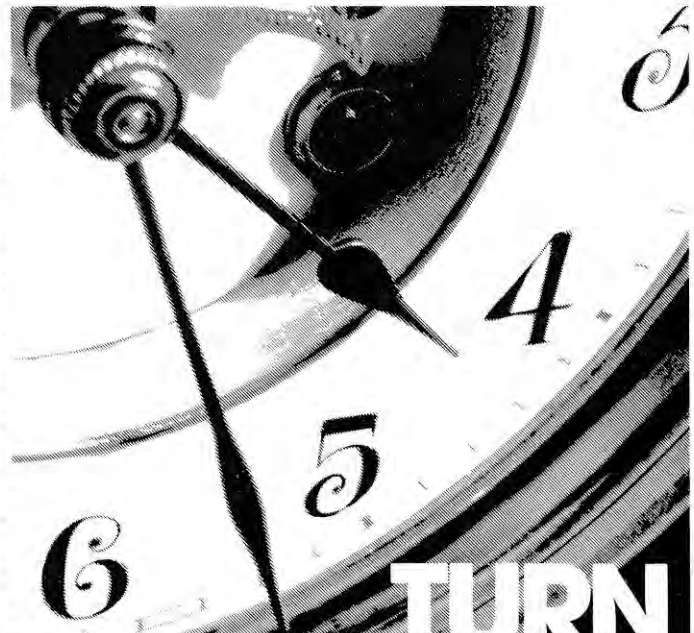
TSAVE: Writes ACCEL/ACCEL2 compiler output to independent SYSTEM tape. $9.95

Developed in Britain by Southern Software

ALLEN GELDER SOFTWARE ✓79
Box 11721 Main Post Office
San Francisco, CA 94101

Mastercharge/Visa Ca add 6%

TRS-80, TRSDOS tm Radio Shack
Stringy/Floppy tm exatron, inc.



TURN ME ON

- Control your lights
- Burglarproof your home
- Turn on the coffee
- Regulate your heat

All with your TRS-80

Imagine the function of lamps, alarms, heaters, pumps, radios and appliances under the control of your TRS-80. With the SUPER X10 MOD from CmC, **computer control** of up to 256 low-cost BSR remote-control modules is possible over the AC house lines **with no special wiring**. The SUPER X10 MOD contains its own microprocessor with **clock/calendar functions** so that once **programmed from the TRS-80**, a sequence of events can be initiated at a specific time of day, **even with your computer off**. In addition, the SUPER X10 MOD can control up to eight digital logic functions and respond to a maximum of eight logic inputs such as switches mounted at windows and doors, fluid level floats, thermostats, and so on.

Control of remote devices can be in conjunction with the AIM16 below, or the controller can be programmed via the TRS-80 to initiate a sequence of **up to thirteen events** in response to an external trigger.

and you can also monitor

Measure light level, temperature, sound level, pressure, pH, humidity, fluid level, acceleration, battery voltage. Most physical parameters you can think of can be monitored by your TRS-80 and the appropriate sensor with the AIM16 analog to digital converter from CmC.

The AIM16 converts 16 analog inputs (expandable to 256) within the range of 0 to 5.12 volts with 8-bit resolution.

30-day money-back guarantee

TRS-80 Set 1a—Monitoring; 16 analog inputs
TRS-80 Set 2—Controlling without Monitor with 8 digital inputs/8 digital outputs and clock/calendar function.
TRS-80 Set 3—Controlling Add-on for use with Set 1.
each set **$295.00**

Visa/Master Charge. Mention this magazine for a 5% discount.

Connecticut microComputer, Inc. ✓497

CmC

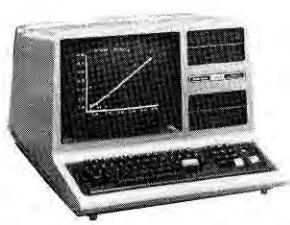
34 Delmar Drive, Brookfield, CT 06804, (203) 775-4595, TWX: 710 456-0052

AUTHORIZED TRS 80® DEALER #R491

$670.00 MOD[illegible] NOT AVAILABLE 16[illegible] [illegible] Keypad [illegible] – 1056

$3500.00 MODEL II
MODEL II, 64K
26 – 4002

$875.00 MODEL III
MODEL III 16K RAM, MODEL III BASIC
26 – 1062



WE ACCEPT CHECK, MONEY ORDER, OR PHONE ORDERS WITH VISA OR MASTER CHARGE. SHIPPING COSTS WILL BE ADDED TO CHARGE ORDERS. DISK DRIVES, PRINTERS, PERIPHERALS, AND SOFTWARE – YOU NAME, WE'VE GOT IT. WRITE OR CALL FOR OUR COMPLETE PRICE LIST.

FULL FACTORY WARRANTY ON ALL ITEMS SOLD.

C & S ELECTRONICS, LTD. 32 EAST MAIN ST. MILAN, MICH. 48160
(313) 439-1508 (313) 439-1400 ✓145

C & S ELECTRONICS MART IS AN AUTHORIZED TRS 80® SALES CENTER STORE #R491

✓See List of Advertisers on page 306

DISASSEMBLED HANDBOOK FOR TRS-80

VOLUME 3—$18. POSTPAID

Chapter 1: Writing Disassembler Programs
Chapter 2: High Speed Disassemblers
Chapter 3: Spooling Theory & Practice
Chapter 4: Port Encoders & Decoders
Chapter 5: Writing Interrupt Programs
Chapter 6: D/A Converters & Construction
Chapter 7: A/D Converters & Construction
Chapter 8: High Speed Morse Code Program
Chapter 9: Comm. Bulletin Board Systems
Chapter 10: Radio Teletype From A to Z
Chapter 11: Self-Programmed Learning Q/A
Appendix A: Volumes 1-2-3 combined index
Appendix B: Vols. 1-2-3 Pgms. on Disk $30

VOLUME 1—$10. POSTPAID

6th printing

VOLUME 2—$15. POSTPAID

4th printing

—GERMAN & FRENCH LANGUAGE EDITIONS—

RICHCRAFT ENGINEERING LTD.
Drawer 1065, Wahmeda Industrial Park
Chautauqua, New York 14722
phone (716) 753-2654 for COD orders
(US funds: add $4.50 overseas airmail) ✓276

STEPWISE

MULTIPLE LINEAR REGRESSION

Fast Compiled Machine Language
Comprehensive Data Base Manager
* Transformations
* Lags
Designate Any Variable As Dependent At Run Time
Descriptive Statistics
Correlation Matrix
ANOVA Table
Partial Correlation Coefficients Each Step
Future Releases Are Upward Compatible And Include: Factor Analysis, Time Series, Linear Programming

For 2 Disk, 48K TRS-80®, With Line Printer
Write For Information On Other System Configurations

Price $89.00 — Documentation Only $10.00
Visa And Master Charge Accepted

Barstrann Corporation — Dept. A ✓201
P.O. Box 265 Mid City Station
Dayton, Ohio 45402

TRS-80 MODEL I

INTERNAL MEMORY

uses 4116's

Want to increase memory to 32K, inside the keyboard unit, with NO Expansion Interface needed? Just plug the INTERNAL MEMORY into the RAM sockets inside the TRS-80(NO SOLDERING), and you've done it! It's that easy now! Assembled and tested; Ppd. in Cont. U.S.; guaranteed for ONE YEAR; CUSTOMER SERVICE YOU CAN COUNT ON!

$47.50 less RAM
RAM chips available; write for current price
send SASE for free brochure

HOLMES ENGINEERING
6246 West 3705 South
Salt Lake City, Utah 84120
(801)967-2324
✓401

YORK 10

✓482 **BASF-DPS**
WORLD STANDARD TAPE

DATA TRAC C-10

- **PROFESSIONAL 5 SCREW SHELL**
- **MONEY BACK GUARANTEE**
- **1 DOZ. BULK PACK, $10 SENT POSTPAID**

Calif. residents add 6% sales tax

YORK 10 Computerware
24573 Kittridge St., Dept. M Canoga Park, CA 91307

IT'S HERE!

A POWERFUL

EASY TO USE

SMALL BUSINESS

INVENTORY

PROGRAM

- Menu Driven • Easy Editing (8 Fields)
- Scroll Display Forward & Back Items in Memory
- Paper Print Out (With Total Cost)
- Holds & Dumps up to 150 Items On Disk Ver. 250 On Tape Ver. (150 Per Disk Filename)
- Instring Search Description & Supplier + 3 Equality Searchs (Totals All Costs)
- Sorts Items by Number

Disk + Tape Ver. $99 — Tape Ver. $49
Reg. TRS 80* (48K) Model I

✓239 **JOSEPH BROTHERS**
7311 Van Nuys Blv. Rm 5, Van Nuys, Ca 91405
Demo By Appointment (213) 994-2293
*A Trademark Tandy Corp.

Exact Replacement

TRS-80* PRINTER RIBBONS or CARTRIDGE RELOADS

(HEAVY INKING - LONGER LIFE)

TRS-80#	CENTRONICS#	PRICE/PACK
LP I (26-1413)	#779,700-704	11.00/3 PACK
LP II (26-1413)	#730	11.00/3 PACK
LP III or V (26-1414)		9.00/RELOAD
III (YOU INSERT IN CARTRIDGE)		18.00/3 PACK
LP IV (26-1413)	#737	11.00/3 PACK
LP VI (26-1418)		9.00/RELOAD
VI (YOU INSERT IN CARTRIDGE)		18.00/3 PACK

NEW for the DAISY WHEEL II

Multi-Strike Carbon Film (26-1419)	21.00/3 PACK
Multi-Str Carbon Film Reload	15.00/3 RELOADS
New Long-Life Fabric Reload	9.00/RELOAD

SEND PRINTER NUMBER and/or OLD CARTRIDGES (for Reloads

MODEL II 8" GAME DISCS

VOLUME 1	VOLUME 2
Biorhythms, Trap	Ugly, Bingo
Concentration	Towers, Blackjack
Rip Cord, Yacht Sea	Farkle, Chomp
+4 More	$24.95 per volume +5 More

SEND CHECK or MONEY ORDER TO:
BCCOMPCO ✓237
Box 246
Summersville, Mo. 65571
417 932-4196 *TANDY CORP TM

16K RAM

PLUS **$36.95**

Kit includes 8 tested dynamic RAMs for memory expansion, instructions that make it very easy for anyone that's not experienced at handling, installing and testing RAMs to do the job, a RAM test program on cassette tape, etc. Completely guaranteed for 90 days. Add $2.95 for DIP shunts needed to upgrade 4K mem only.

32K RAM

PLUS **$71.95**

You get the 16K kit described above plus 8 additional RAMs.

C-10 TAPES ..... $.59

You get computer quality, low noise C-10 blank cassettes with labels. Add .13 ea for plastic storage cassette box.

SOFTWARE:

RAM MEMORY TEST 1.1 The best test to find "flakey" or defective RAM **$2.95**

NEWBOOT 1.2 Press a single key to load and run your directory choice, BASIC or CMD programs. Assorted display lists all programs, Gran size, free disk space, etc. Has printout command, etc. for 1 or more drives **$19.95**

MEDICAL FORMS 1.2 The text editor with prepared office forms as patient history, surgery, etc. Saves the M.D. much time. A much used program by the surgeon **$49.95**

MasterCharge and Visa Cardholders
Telephone (817) 246-3778
or send check or money order to:
Digital Data Supply
P.O. Box 5061, Fort Worth, Texas 76108 ✓313
(Order now, prices may change next month)

LEARNING TOOLS

- Spelling Primer
- Vocabulary Builder
- Crossword Generator

EACH PROGRAM FEATURES:

- HUNDREDS OF WORDS
- GRAPHIC SCORING MONITOR
- PROGRAMMABLE SPEED CONTROL

Each Program Available in 4 Levels:

Grades 1-2; 3-4; 5-6; 7-8.
(Specify Grade)

16K - LEVEL II

$ 6.95 each — any two for $ 9.95

DYNATEK INFO. SYSTEMS
586 CONCORD AVE.
WILLISTON PARK, N.Y. 11596

✓253 *"Quality Software at Affordable Prices"*

SOFTWARE * CRITIC

PROGRAM REVIEWS FOR THE "80'S" *

STOP wasting your software dollars. START getting timely, complete, understandable, objective, and critical software reviews. Subscribe NOW to the SOFTWARE CRITIC. Published bi-monthly, charter subscription only $9 per year. (Regular $15.00) Canada and Mexico $18.00, others $24.00. Unused portion refunded if you're not satisfied. Send check or money order for $9 to:

NEW!

SOFTWARE CRITIC
P. O. BOX 3CH
UNIVERSITY PARK,
NEW MEXICO 88003

$9/YR

*Currently MODS I & III ✓220

Double check the accuracy of your ASCII disk dumps with this feature packed utility.

Compare

William B. Everett
14645 NE 34th St. C-24
Bellevue, WA 98007

Compare is a program that compares two BASIC programs stored on disk to ensure they are identical. It was written to guarantee the accuracy of a load input from tape and stored in Level II BASIC in ASCII (SAVE "file name",A) format. The programs should be saved under different name.

Features

The features of Compare are as follows:

- Compares two programs stored on disk in ASCII format (lines 190 and 270).
- Lists unequal lines by line number (line 270).
- Lists the total number of lines in the program (lines 220 and 240).
- Lists the total number of characters in the program (lines 220 and 250).
- Execution terminates if a line number appears in one of the programs being compared and not in the other (line 260).
- If one program has more lines than the other, an error statement is printed (lines 170 and 180).
- Execution will terminate if more than 10 lines are unequal (line 270).
- If the same program name is entered for both programs, Compare counts the number of lines and characters and lists their totals (lines 120 and 130).
- Checks that both programs being compared are stored on disk in the ASCII format (lines 200 and 210).

Side by Side

The program briefly explains what it does and then prompts the user to enter the names of the programs to be compared. The program runs by itself. It lists a running total of the number of lines and characters read and the number of the line currently being compared in the program.

The only caution to be observed is that the program must be allowed to run until it finishes. If the break key is used to stop execution, the files being read from may not be closed.

Compare reads the program it is comparing line by line from disk. It will take about four minutes to compare two 13K programs. ■

```
40 CLS:PRINT@128,TAB(20)"PROGRAM COMPARISON
50 PRINT@256,"THIS PROGRAM CPMPARES TWO BASIC PROGRAMS
    THAT HAVE BEEN STORED
60 PRINT"ON DISC IN THE ASCII FORMAT.  IT LISTS UNEQUAL
     LINES BY NUMBER.
70 PRINT"IT ALSO WILL TELL YOU THE TOTAL NUMBER OF CHAR
    ACTERS AND LINES
80 PRINT"CONTAINED IN A PROGRAM.
90 PRINT@640,"DEPRESS ENTER TO CONTINUE";:INPUT A$
100 CLEAR MEM/3
110 F$=" IS NOT STORED IN ASCII FORMAT.  PROGRAM TERMIN
    ATED!"
120 CLS:PRINT@192,"WHAT IS THE NAME OF THE FIRST PROGRA
    M";:INPUT A$
130 PRINT@320,"WHAT IS THE NAME OF THE SECOND PROGRAM";
    :INPUT B$
140 OPEN "I",1,A$: OPEN "I",2,B$
150 CLS
160 IF EOF(1) AND EOF(2) THEN CLOSE: PRINT@768,"COMPARI
    SON COMPLETE": END
170 IF EOF(1) THEN CLOSE: PRINT@768,"THE LAST LINE IN "
    ;A$;" HAS BEEN REACHED":PRINT B$;" HAS ADDITIONAL
    LINES REMAINING": END
180 IF EOF(2) THEN CLOSE: PRINT@768,"THE LAST LINE IN "
    ;B$;" HAS BEEN REACHED":PRINT A$;" HAS ADDITIONAL
    LINES REMAINING": END
190 LINE INPUT#1,C$: LINE INPUT#2,D$
200 IF VAL(C$)=0 THEN CLS: PRINT@512,A$+F$: CLOSE: END
210 IF VAL(D$)=0 THEN CLS: PRINT@512,B$+F$: CLOSE: END
220 A=A+1: B=B+LEN(C$)
230 PRINT@128,"LINE NUMBER CURRENTLY BEING READ FROM ";
    A$;TAB(50)VAL(C$);"    "
240 PRINT@256,"TOTAL NUMBER OF LINES READ";TAB(50)A;
250 PRINT@384,"TOTAL NUMBER OF CHARACTERS IN ";A$;TAB(5
    0)B;
260 IF VAL(C$)<>VAL(D$) THEN PRINT@512,"LINE NUMBERS AR
    E DIFFERENT STARTING WITH LINE";BAL(C$);"IN ";A$:P
    RINT"THE PROGRAM HAS BEEN TERMINATED.": CLOSE:END
270 IF C$<>D$ THEN E$=E$+STR$(VAL(C$))+",": PRINT@640,"
    UNEQUAL LINES ";E$: X=X+1: IF X>10 THEN PRINT@768,
    "MORE THAN TEN LINES ARE UNEQUAL THE PROGRAM IS TE
    RMINATED": CLOSE: END
280 GOTO 160
```

A new expansion bus proposal.

TRS-80 Bus Conductor

L. Joseph Fox
1043 La Paloma Terrace
Panama City, FL 32401

For two years I have been waiting for a standardized TRS-80 expansion bus configuration, so that my hardware projects will simply plug in. Since Radio Shack locked the data bus inside the expensive expansion interface, I decided to strike back by introducing the EXPANSION-80, TRS-80 expansion bus.

As with any standard, there should be several advantages—cost, compatibility, expandability and simplicity. One advantage of this expansion bus would be the use of standard 44-pin card edge connectors. Almost everyone has 44-pin card edge connectors: Radio Shack stocks them in their stores.

Another advantage is that this system will allow the use of prototyping boards, such as the Radio Shack 4.5 × 4.5-inch board and the Vector 4.5 × 4.5 and 4.5 × 9-inch boards, which can also be wire wrapped. There are also those of us who like to etch our own boards. There are several companies offering standard card cages which neatly accommodate the standard 4.5 inch, 44-pin double sided boards. By using a power distribution method of supplying ± 8 volt and ± 12 volt buses and regulating needed voltages on the interface boards with three terminal regulators, power supply problems are simplified.

Since the power supply furnished with the computer is already operating at its limit, and the bus chip load is near maximum, the data and address buses should have buffers. Reliability can also be improved with the use of active termination on all signal lines, so that noise levels can be reduced.

Future expansion can be

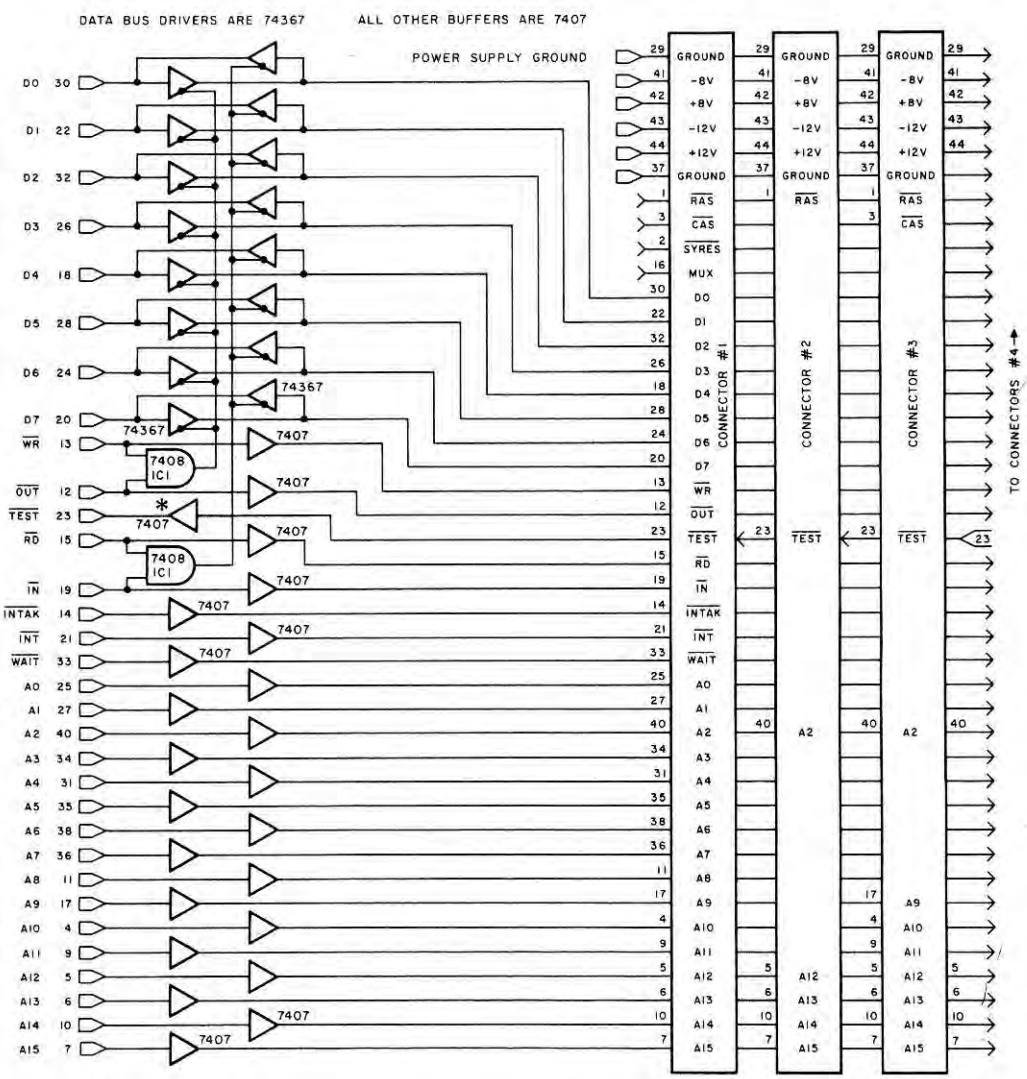


Figure 1

STOCKMARKET INVESTMENTS MADE EASIER

Fulfill your dream to invest in the stockmarket.
Invest as little as $1000, or as little as $100 per month.
The potential is there to double that investment within 12, 24, or 36 months. The stock selection and the buy/sell decisions are the key.
We have the financial management computer programs for you.
Through the use of your TRS-80* Level II home computer and the **COMPUVEST** programs, you can determine the stocks in which to invest and when to buy and sell.
The Graham/Rea stock selection criteria program-10 criteria for a stock buy decision----------$10.00
COMPUVEST Lump Sum Investment Program—Lump sum investment approach for the small stock investor ----------$12.50
COMPUVEST Monthly Investment Program—Monthly investment approach for the small stock investor---$12.50
All Three Programs----------$30.00
For information or to order cassette tape programs write:

COMPUVEST, INC.
6725 Fishburg Road
Dayton, Ohio 45424 ✓498
*A Registered Trademark of Radio Shack.

Fantastic New Tool for Voice Synthesis

NO EQUAL ON THE MARKET

This peripheral adds high quality communication to the following:

TRS-80

S-100 Bus systems

Other 8 bit processors

The TLP-52 can give:

High quality speech (up to 800 words)

Phonetic speech (unlimited vocabulary)

Software generated speech

Voice recognition

From $200

For more information contact:

The Learning Place ✓198
5620-176th S.W.
Lynnwood, Washington-98036

THE QUIZ
MOVIES
TELEVISION
SPORTS

NEVER EVER REPEATS GAMES

HUNDREDS OF QUESTIONS

3 LEVELS — PERSONAL SCORE PER GAME

ENTERTAINS ANY AGE

TRS-80-16K LEVEL II

Academy Awards / Famous Movies... $ 9.95
Emmy Awards / Famous TV Shows.... $ 9.95
Pro Football / Baseball Records..... $ 9.95
ALL $19.95

✓304

QUARP PUB'S
P.O. BOX 7416
OXNARD, CA. 93031

Subscription Problem?

80 Microcomputing 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:

80 Microcomputing
Subscription Dept.
PO Box 981
Farmingdale, NY 11737

Thank you and enjoy your subscription.

TRS-80 Model I and Model II Programs

MULTIPLE REGRESSION 2.1—A disk based package of chained programs that permits model estimation using thousands of observations, user specified transformations, X-Y plots, formatted for screen or printer $45.00
Linear Programming..... $39.95
0-1 Programming..... $39.95
Transportation Algorithm..... $39.95
Heuristic Line Balancing..... $39.95
Stat. Pack—medium, mode, mean (avg., harmonic, geometric), variance, histograms, Tests (T,X²,F,) one variable regression, one and two-way ANOVA. $24.95
Differential equations—6 methods..... $39.95
Queuing Statistics..... $18.95
LOWERCASE MOD—Includes excellent documentation + all parts (nothing else to buy), compatible with Electric Pencil..... $14.95

Available in Disk add $5
S.C. residents add 4% sales tax
Overseas orders add $5 for shipping

✓269
Quant Systems
p.o. box 628
charleston sc
29402

*MTS OFFERS A **COMPLETE** EDUCATIONAL PACKAGE FOR STUDENTS AND TEACHERS OF ENGINEERING MATHEMATICS STATISTICS*
*DEVELOPED BY DR. S. W. TURNER FOR THE TRS-80**

CURVFIT Determines coefficients for all polynomials up to 14th degree through large no. of data points (limited by memory size). Data points may be input in any order. Program tabulates correlation coefficients for selection of best fit.

CURVPLOT Rapidly plots nearly any user defined function. User controls range of X & Y and program labels both axes. Easy to use.

NEW! *POLYSOLV* Solves any polynomial of any degree for all roots, including real and imaginary. Program uses iterative procedures which automatically vary starting point to handle any equation.

Any of the above programs on:
cassette for 16K LVII ... 16.95/ 2 for 29.95
formated disk for 32K, 48K disk ... 19.95/ 2 for 32.95

BONUS PACKAGE for disk users. All 3 programs provide a powerful tool for data analysis or instruction.

Useful for small businesses, schools, colleges, personal use. All three program on formated disk, only 39.00

INDEX-80 for the serious TRS-80* user — save hours of searching — rapidly searches all 1980 issues of '80 Microcomputing'† for keywords or subjects. 356 articles & reviews with nearly 2000 subjects stored. Includes alphabetical index of keywords/subjects. 3 versions: specify 16K LVII cassette, 32K or 48K disk 19.95

Mail or Phone (904) 897-3741
FL. residents add 4% sales tax
Foreign orders add $2.00
✓451

MTS ENTERPRISES
P.O. Box 596 Niceville, FL 32578
MICROCOMPUTER TECHNOLOGY AND SOFTWARE
†TM Wayne Green Inc. *TM Tandy Corp.

TRS-80*

SAVE A BUNDLE

When you buy your TRS-80™ equipment!

Use our toll free number to check our price before you buy a TRS-80™ . . . anywhere!

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

full Radio Shack warranty

HAL ✓148
SALES COMPANY
1412 WEST FAIRFIELD DR.
P.O. BOX 8098 PENSACOLA FL 32505
904/438-6507
nationwide 1-800-874-1551

✓See List of Advertisers on page 306

achieved by placing an end connector at the end of the board in the TRS-80 bus format, allowing for the chaining of two expansion motherboards if necessary, or placing the Expansion-80 between the CPU and the Radio Shack expansion interface.

Another advantage can be realized if a 40-pin card-edge jumper assembly, such as the A P Products P/N 924065-36-R, is connected to a 44-pin connector. This will make a neat connection for a single board project, or will temporarily connect one of several boards such as a PROM programmer.

The only disadvantage to this system is the fact that Radio Shack does not support it and no commercial interface boards are presently available. However, I would bet that after a standard expansion bus has been established, there will be many. An expansion bus is sold under part number GPA-80 by Electronic Systems in California. When I called for information on the pinouts, it was not available.

By placing a standard in public domain, anyone can make and sell motherboards. The bare board should be priced at $10.00 and by using junk box edge connectors and parts, the unit probably can be built for less than $20.00.

The 44-pin assignment is simple. First, the standard 44-pin identification of 1-22 and A-Z is discarded, and re-identified in the TRS-80 format (1-43 and 2-44). Next, pin 41 is assigned −8 volts, pin 42 is assigned +8 volts, pin 43 is assigned −12 volts and pin 44 is assigned +12 volts. This allows the use of the pin identification, found in the TRS-80 manuals. Also, the power supply voltages are assigned, starting with the lowest voltage to the lowest pin (#41) of the four extra pins.

The data bus is buffered both ways, but the address bus and other signal lines are not. The data bus drivers are three-state output devices and their outputs are high impedance until the enable inputs are pulled low. When either the RD* or IN* outputs go low, the tri-stated data buffers are enabled by the AND gate (IC1). Similarly, if either the OUT* or WR* go low, the other AND gate will enable the data bus buffers for output.

This version was chosen because I did not plan to use Direct Memory Access (DMA) from the motherboard, as required by the Radio Shack screen printer.

The computer outputs of CAS*, SYSRES*, RAS*, and MUX*, are not shown in the schematic but are wired the same as the WAIT* output. ■

™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.

NOTE: This and other interesting and needed articles for the Radio Shack TRS-80 color computer™ are being included monthly in 68 Micro Journal—The Largest specialty computer magazine in the world!

68 MICRO JOURNAL
3018 Hamill Road
HIXSON, TN 37343 ✓91

Foreign Orders-Add:
Air Mail $35.00/Year Surface $12.00/Sear
1-Year $18.50 2-Years $32.50
3 Years $48.50
Canada & Mexico Add $5.50 Per Year
to USA Subscription Rate

word processor

a low-cost, yet powerful disk-based word processor

miniSCRIPT*

only $ 17.50

for your business and personal letters, termpapers...

- easy-to-use, menu-like command table
- store/retrieve text fast using your disk
- UPPER and lower case at printhead or
- support for lower case modifications
- selectable margin with automatic centering
- optional justification, page numbering
- flexible editing! global search and replace
- insert/delete/change line or character
- plus many more...

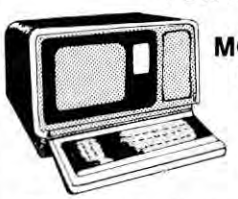
(for Model 1, Level 2 systems, 1 disk 32K min.)

ORDER by MAIL (check,MO,VISA,MC) or CHARGE IT on our 24-hour phone
overseas: please add $4.00 for air mail
N.J. residents please add 5% tax

micrOdome ✓248
P.O. Box 392, Denville, New Jersey 07834 USA
(201) 627-8554

INCOME TAX PROGRAM

FOR RADIO SHACK TRS-80™ MOD.I, LEVEL II COMPUTERS



$19.95 8K CASSETTE

TRS-80 is a registered trademark of Tandy Corp.

Save time, guesswork. Program takes income, deductions, cap. gains, etc. and computes adj. gross income, s.e. tax, FICA and taxes due. Great for year-round tax spot check, too!

STOCK CHARTING. Let your computer draw your chart.	8K	15.95
TAX INFO. FILE & BUS. MILEAGE	8K	10.95
Add $4 for disk		
MAIL LIST, LABELER. Disk only	32K inc. disk	24.95

Add $1.50 handling

BAP$ SOFTWARE ✓152
6221 Richmond, Suite 220
Houston, Texas 77057
783-3433

UNBALANCED?

If it's because you can't find a decent system to handle checking accounts on a TRS-80* Model 1, then you may need MICROCHECK-80. With MICROCHECK-80 you enter checks and deposits on the keyboard, store them on disk, automatically reconcile bank statements, and maintain a complete cleared check file. Each check is given an expense category, permitting retrieval by category, month, any combination of the two, or in detail. A summary of expense categories is also included.

MICROCHECK-80 is easy to use, well documented, and FAST! Machine language programs, and a system designed to eliminate sorting, provide incredible efficiencies over conventional techniques. The package is perfect for personal or small business use, and requires 32K plus one disk. 48K and a printer unlock the system's full potential.

Why not throw away your checkbooks, and let the computer do the arithmetic and recordkeeping for you? $39.95 postage paid. Send check or write for detailed information. (Specify memory size.)

SUMA MICROWARE ✓267
1110 WEST 41st STREET
LA GRANGE, ILLINOIS 60525

*A Trademark of Tandy Corporation.

LISP

INTERPRETER FOR THE TRS-80*

SEE THE AUGUST, '79 ISSUE OF BYTE TO FIND HOW EASY IT IS TO USE LISP.

- INCLUDES MORE THAN 30 FUNCTIONS & PREDICATES.
- CODED FOR HIGH-SPEED OPERATION.
- FULL ARITHMETIC CAPABILITY.
- USER'S MANUAL.
- SUPPLIED ON CASSETTE FOR 16K-64K LEVEL II.

SEND $50 IN CHECK OR MONEY ORDER TO:

✓259

CYBER INNOVATIONS
WORLD TRADE CENTER
P. O. BOX 58657
DALLAS, TEXAS 75258

*TRADEMARK OF TANDY CORPORATION

COMPUTER FORMS ✓

SUPPLIES

Distributor of Computer Paper Products

VISA — Master Charge — Check or Money Order

Box 1000 sheets 9½"x11" (sheet size 8½"x11") tractor feed #15 lb. economy computer paper. $11.95 + $2 shipping

Box 750 sheets 9½"x11" (sheet size 8½"x11") tractor feed #20 lb. economy #2 Bond computer paper. $11.95 + $2 shipping

Box 750 sheets 9½"x11" (sheet size 8½"x11") tractor feed #20 lb. High Quality #1 Bond with Watermark computer paper. $14.95 + $2 shipping

Box 1000 15/16"x3½" 2 across tractor feed 8"carrier address labels. $8.95 + $1.50 shipping (One across available, specify which)

Box 700 6"x4" continuous postcard stock tractor feed Blank white, yellow, green (specify). $13.95 + $2 shipping

Box 300 sets (900 sheets) 9½"x11" (sheet size 8½"x11") 3 part carbon copy style tractor feed paper $13.95 + $2 shipping (2 part also available 400 sets $13.95 + $2 shipping)

Catalog available check(✓) reader service number

✓240 **Computer Forms • (616) 429-7922**
5588 Caribou, Stevensville, MI 49127

N E W PEN737

FINALLY - THE ULTIMATE IN WORD PROCESSING FROM COMPUTEX

Superscripts / Subscripts / Underlines / **Elongated** printing / BOLD face type and many other features can now be accomplished with your TRS80 computer, Electric Pencil, Centronics 737 Printer and our new PEN737 program.

PEN737 program (available on disk or cassette) $29.95
When purchased with Centronics 737 printer $19.95

CENTRONICS 737 PRINTER
Special $750.00

FEATURES: Fan fold, roll and single sheet paper handling • True underlining capabilities • Superscripts and Subscripts • True UPPER & lower case • 80 or 132 column lines • Fast 80 cps printing • Paper forward and reverse switch • Supports 10 and 16.7 c.p.i

TRS80 MODEL I or MODEL III PRINTER CABLE $29.95

16K MEMORY EXPANSION KITS FOR MODEL I AND MODEL III SYSTEMS
$35.95/kit 2-5 kits $32.95/kit 6 up $29.95/kit

LNW EXPANSION I/F and COLOR COMPUTER KITS

COMPLETE LNW EXPANSION INTERFACE
. . . . . $249.00

Includes all components, sockets, and hardware to build the complete kit. Does not include the relay for dual cassette, cabinet or Ram.

RAM MEMORY $29.95/16K WHEN PURCHASED WITH LNW

Complete CPT Systems with disk drive, 32K Ram, RS232 and Custom cabinet as low as $799.00
(CALL FOR QUOTE)

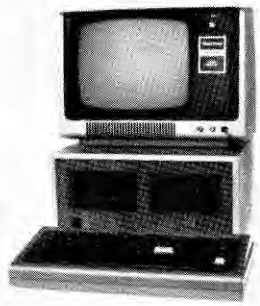
LNW COLOR Computer Kit
$599.00

Includes all components to assemble the LNW Color Computer including: High Resolution Video Ram and 16K user ram, Keyboard, and Level II compatible Roms.

CUSTOM CABINET FOR LNW COLOR COMPUTER AND EXPANSION I/F $149.95

CUSTOM CABINET FOR LNW EXPANSION I/F, AND DISK DRIVES . . . . . $ 99.95

We also stock a complete line of components for both the LNW Color Computer and the LNW System Expansion at NEVER UNDERSOLD PRICES



TRS80 is a registered trade mark of Radio Shack
Certified Checks, Money Orders
Or call to arrange direct wire transfer
Visa and Mastercharge accepted, add 4% to order.
Personal or company checks require 2 weeks to clear.

COMPUTEX ✓392
15502 Highway 3, Suite 715
Webster, Texas 77598
(713) 488-8022

DISK DRIVES - Compare !!!!

RELIABILITY / FEATURES / WARRANTY
PRICE / DELIVERY
Computex offers the best of all with TANDON Disk Drives

Warranty: 120 day repair / replace warranty
Reliability: 8000 hrs. mean time between failure
Features: 5 m.s. Track to Track Access Time
0 sec. Head load time (no solenoid either!)
Single or Double Density Capabilities
40 / 80 Track - Single & Double Sided
Maintenance Manual Provided with drive

TM100-1 Single headed 40 track disk drive, unformatted double density storage = 250 KB
TRS80[tm] Storage single density = 102 KB Double = 184KB
Bare drive $225.00 **With case/supply $299.95**

TM100-2 Double headed 40 track drive, unformatted double density storage = 500 KB
TRS80[tm] Storage single density = 204KB, Double = 367KB
Bare drive $345.00 **With case/supply $419.95**

TM100-3 Single headed 80 track drive, unformatted double density storage 500KB
TRS80[tm] Storage single density = 204KB, Double = 367KB
Bare drive $375.00 **With case/supply $449.00**

TM100-4 Double headed 80 track drive, unformatted double density storage = 1.0mB
TRS80[tm] Storage single density = 408KB, Double = 735KB
Bare drive $475.00 **With case/supply $549.00**

2 Drive Disk Cable $24.95
4 Drive Disk Cable $34.95
Drive Extender Cable $13.95

MODEL III DISK DRIVE KITS

Complete kit installs in minutes, Interfaces any Tandon disk drive to your Model III, Detailed instructions included **$429.95**

TRS-80 & OTHER NEEDS FILLED FOR LESS

+ + + COMPATIBLE DISK DRIVES WITH POWER SUPPLY AND CASE—90 DAY WARRANTY + + +
• 40 TRACK (102,400 BYTE/DISK) DISK DRIVE WITH P.S. AND CASE **$299**
• 8 IN. DRIVE & P.S./CASE **$729** WITH P.S./CASE FOR 3 DRIVES **$929**
• 80 TRACK (204.8K BYTE) 90 DAY WARRANTY **$419**
• 4-DRIVE CABLE **$28** • • 10 DISKS-5 IN. @ **$24**-8 IN. @ **$36** HARD CASE **$3** & **5**

BASE 2 PRINTER **$599** EPSON MX—80 PRINTER—CALL MICROLINE 80 PRINTER **$499**

• CENTRONICS 737 **$699** + + + + + CABLE @ **$25**
• HARRIS SELECTRIC (WORD PROCESSING TYPEWRITER & PRINTER), AS IS **$690**
• LOWER CASE FOR CENTRONICS 779/RADIO SHACK LINE PRINTER 1-EASY INSTALL **$94**
• UPS (UNINTERRUPTIBLE POWER SUPPLY) PREVENT POWER DROP SURGE OR OUT? FROM **$195**
• 300 BAUD MODEM (ORIG/ANS) $115. AND UP + + + + + + + + 16K MEMORY SET (200 NANO) **$29**
• 16K MODEL III RADIO SHACK SYSTEM **$849**
• APPLE, ATARI, RADIO SHACK MODEL 1/2 HARDWARE/SOFTWARE DISCOUNTED. A/R, A/P, G/L, P/R FOR **$200 or $59 ea.** (MODEL 1) & **$329 or $80 ea.** (MODEL 2). APPLICATIONS INTERACT & ARE COMPLETE & PROFESSIONAL. WILL RUN ON OTHER COMPUTERS. THIS IS A SPECIAL INTRODUCTORY PRICE.
• ASK FOR FREE FLYER WITH OUR LOW PRICES—DEALER INQUIRIES INVITED MASS. RESIDENTS ADD 5% TAX—F.O.B. TEWKSBURY—FREIGHT EXTRA.
M/C, VISA OR CHECK ACCEPTED. TRS-80 IS A REG. TRADEMARK OF TANDY CORP.

✓105

OMNITEK SYSTEMS — 24 MARCIA JEAN DR., DEPT-M, TEWKSBURY, MA 01876 CALL 617-851-3156

THE SPIKE-SPIKERS™ ✓353
with Transient Absorber and R.F. Filters

Protects Computers & Sensitive Equipment
from Most Transients & "Hash" Interference

Deluxe Power Console
with Transient Absorber & RF Filters
8 individually switched 120 Vac Grounded outlets. Divided into two filtered circuits. Main on/off switch. Fuse and Indicator Light
$79.95

Mini-I
Wall mounted with Transient Absorber Only
$34.95

Mini-II
Two Sockets with Transient Absorber plus RF "Hash" Filters
$44.95

Prices Subject to Change without Notice - PA Residents add 6% sales tax

KALGLO® ELECTRONICS CO., INC.
DEPT. mc
COLONY DRIVE INDUSTRIAL PARK
6584 RUCH ROAD - E. ALLEN TWP.
BETHLEHEM, PA 18017

master charge VISA

dealers invited

ORDER FACTORY DIRECT
215-865-0006
OUT OF STATE ORDER TOLL FREE
800-523-9685

Data Strategies, Inc. *Presents* ✓294

WordMagic II

Complete WORD PROCESSING designed specifically for
The Radio Shack TRS-80 Model II Computer

WordMagic II* is a Word Processor designed specifically for the Radio Shack TRS-80 Model II Computer.*

FEATURES INCLUDE:
- Mailing List/Labels Generation
- Automatic Merging of Mailing Data with Text Files to created "PERSONALIZED" Form Letters
- Automatic wrap-around in text entry
- Margination, Paging, Complete Cursor Movement
- Complete Editing Commands—Insertion, Global Substitution, Overwrite, etc.
- Centering, Smooth Right, Left Justify
- Table of Contents Generation
- Automatic Page Numbering
- Variable Form Lengths
- Underlining
- Line Numbering

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

Requires 64K Model II, TRSDOS & BASIC (not provided with WordMagic)
Introductory Pricing: $195.00 Manual $20. (Cal. Res. add tax)

Formerly Caldata
Data Strategies, Inc. **P.O. Box 28726**
San Diego, CA 92128 **(714)489-9218**

✓See List of Advertisers on page 306

A communications package for Level I or II.

The Model I As a Dumb Terminal

Jim Tallman
3468 SE Roanoke
Hillsboro, OR 97123

TERMINAL/RS-232 INTERFACE DEFINITIONS

A **terminal** is basically two independent units housed together. One unit is the keyboard (or any other input device) which allows the user to communicate to the machine. The other is the display which allows the machine to communicate with the user. (See Fig. 1.)

The **RS-232 interface** provides a standard serial communications protocol between the user and the computer. It was developed in 1969. Serial communications employ one line for each direction. The RS-232C Standard defines voltage levels and impedances.

As the terminal user types a character on the keyboard, the ASCII code for that key, along with sync bits, is transmitted through the interface to the computer. Incoming characters are similarly obtained from the interface on the receive line, and put on the screen for display.

The Radio Shack TRS-80 can be easily modified to act as a terminal capable of communicating with any RS-232 compatible peripheral. Surprisingly inexpensive to implement, the RS-232 interface involves only one transistor, some unused IC gates, a few resistors and the following software.

The RS-232 compatible hardware and hardware level shifters are unused IC gates in the TRS-80, along with a single transistor and a few resistors. Software links the hardware interfaces, the TRS-80's keyboard and tv monitor. These links have been made using 4K of RAM and Level I BASIC (or 16K of RAM and Level II BASIC).

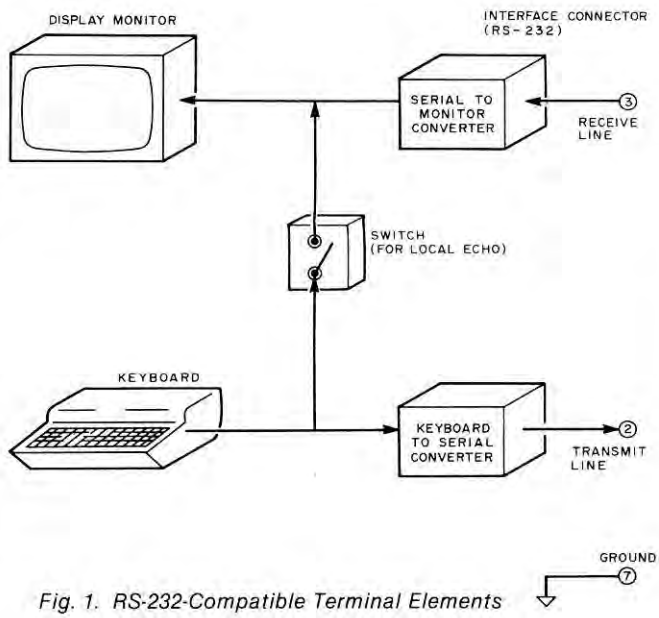


Fig. 1. RS-232-Compatible Terminal Elements

Easy Hardware Changes

The hardware changes necessary to convert the TRS-80 into an RS-232 compatible terminal are shown in Fig. 2. Z7 is a 74LS74 Dual "D" Flip flop. The higher numbered half is unused with all inputs tied to ground.

(Incidentally, an error was discovered in the TRS-80 schematic in that the Q output is labeled seven but must be nine since seven is ground on a 74LS74.) These inputs need to be removed from ground and connected as shown. This connects the flip flop to bit four of output port FF_{16}, previously unused. The Q output of the flip flop is

$$\text{(Time Delay} = \frac{1}{\text{Baud Rate}}\text{)}$$

Baud Rate	Time Delay (msec)
110	9.091
300	3.333
600	1.667
1200	.833
1800	.556
2400	.417

Table 1. Baud Rates and Times Between Bits

2-A CHARACTER IN-REGISTER INSTRUCTION LOOP TIME

Start Bit to Data Bit

Line Number	Instruction		Number of Cycles	
97	AND	n	7	
98	JR	NZ (jumps)	12	
106	LD	B,n	7	
107	LD	D,n	7	
108	LD	E,n	7	(Total:
109	CALL	nn	17	83)
110	IN	A, (n)	12	
111	AND	n	7	
112	JR	Z, (no jump)	7	

Delay Between Bits

Line Number	Instruction		Number of Cycles	
116	NOP		4	
117	LD	E, n	7	
118	CALL	nn	17	
119	IN	A, (n)	12	(Total:
120	AND	n	7	91)
121	OR	r	19	
122	LD	r, r'	4	
123	RRC	r	8	
124	DJNZ	(jumps)	13	

2-B CHARACTER OUT-REGISTER

Start Bit Generated to Loop

Line Number	Instruction		Number of Cycles	
168	RLC	r	8	
169	RLC	r	8	
170	RLC	r	8	(Total:
171	LD	r, n	7	71)
172	CALL	n, n	17	
173	LD	r, r'	4	
174	CPL		7	
175	AND	n	12	

Loop Time Between Bits

Line Number	Instruction		Number of Cycles	
177	RRC	r	8	
178	DJNZ	(jumps)	13	
171	LD	r, n	7	(Total:
172	CALL	n	17	72)
173	LD	r,r'	4	
174	CPL		4	
175	AND	n	7	
176	OUT	(n), r	12	

2-C 300 BAUD DELAY LENGTH IN CYCLES

Loop Time

Line Number	Instruction		Number of Cycles	
205	NOP		4	
206	NOP		4	
207	NOP		4	
208	NOP		4	(Total:
209	NOP		4	36)
210	DEC	r	4	
211	JR	NZ, nn	12	

Loop Overhead (One Time Per Use)

Line Number	Instruction		Number of Cycles	
205	NOP		4	
206	NOP		4	
207	NOP		4	(Total:
208	NOP		4	58)
209	NOP		4	
210	DEC	E	4	
211	JR	NZ	7	
212	RET		10	
	Call to Subroutine		17	

2-D DELAY TIME FORMULA DERIVATION

$$\frac{1}{\text{Baud Rate}} = \text{Time to be Used Up in Delay Loop} + \text{Program Time Needed to Process Bits}$$

T = (Number of loop passes − 1) (Time used by 1 loop) + (loop overhead + program processing time)

$$T = (N - 1)(M_L)(.56\mu s) + (LOH + PRT)(.56\mu s)$$

Where: N = Number of loops to be done
M_L = Machine cycles per loop
LOH = Loop entry and exit overhead
PRT = Program processing time

Solve for N:

$$T = (N)(M_L)(.56\mu s) - (M_L)(.56\mu s) + (LOH + PRT)(.56\mu s)$$
$$(N)(M_L)(.56\mu s) = T + (M_L)(.56\mu s) - (LOH + PRT)(.56\mu s)$$

$$N = \frac{T + (M_L)(.56\mu s) - (LOH + PRT)(.56\mu s)}{(M_L)(.56\mu s)}$$

$$N = \frac{\frac{T}{.56\mu s} + M_L - LOH - PRT}{M_L}$$

2-E DELAY LOOP CALCULATIONS FOR 300 BAUD

(A) Character In-register Start Bit to Data Bit

M_L = 36
LOH = 58
PRT = 83
T = 1667μs (1/2 data width)

$$N = \frac{\frac{1667\mu s}{.56\mu s} - 58 - 83}{36} + 1 = 79.77$$

Use 80
(See line 4 of listing.)

(B) Character In-register Delay Between Bits

$$N = \frac{\frac{3333\mu s}{.56\mu s} - 58 - 91}{36} + 1 = 162.18$$

Use 162
(See line 5 of listing.)

(C) Character Out-register
Since both times are within 1 cycle use same for both.

$$N = \frac{\frac{3333\mu s}{.56\mu s} - 58 - 71}{36} + 1 = 162.74$$

Use 163
(See line 3 of listing.)

Table 2. Details of Calculations for 300 Baud

used to drive a 2N3906 level shifter so that the output to the RS-232 line pin two is a signal that swings from +5V to −5V.

To provide the input level shifter, a resistor divider is used to attenuate the positive voltage and a diode clamps the negative voltage.

With these modifications, whenever output port FF_{16} is written to by software, the value of bit four is strobed to the transmit line. Also, whenever input port FF_{16} is read, the status of the receive line is transferred to bit four of the A register. Software can thus control the timing of the level changes on the transmit line and can inspect the receive line to decipher any coming characters.

Software Links it All Together

The Program Listing provided is for Level I BASIC in the 4K TRS-80. It alternately checks both the keyboard and the RS-

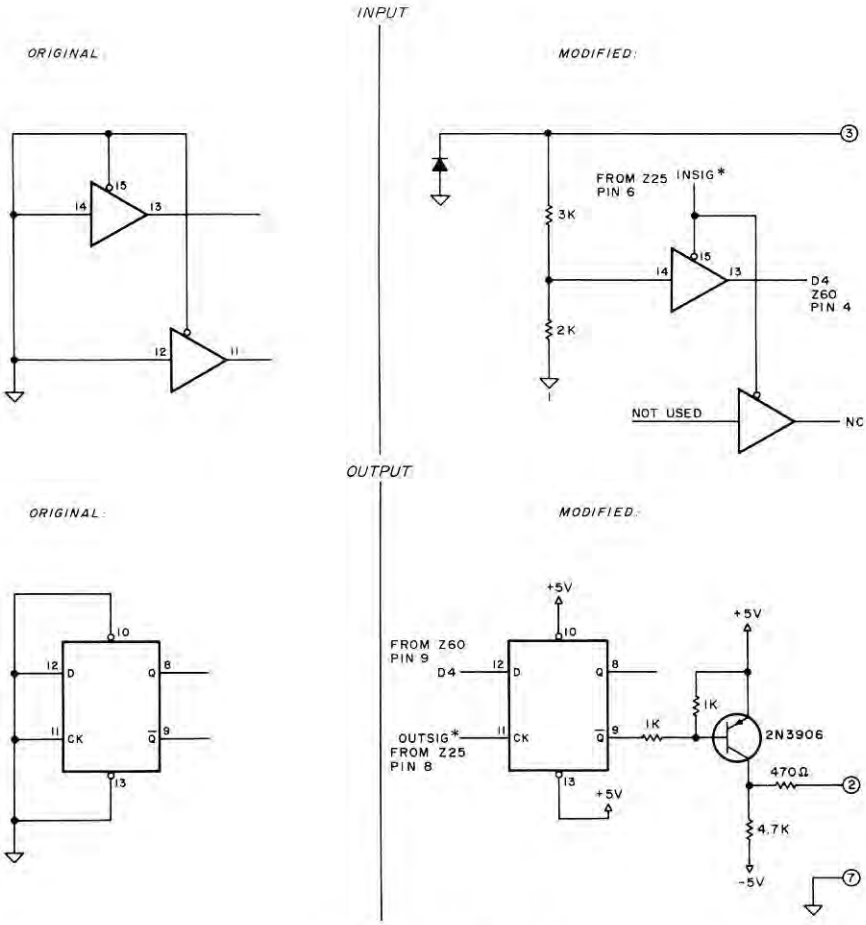


Fig. 2. Hardware Changes

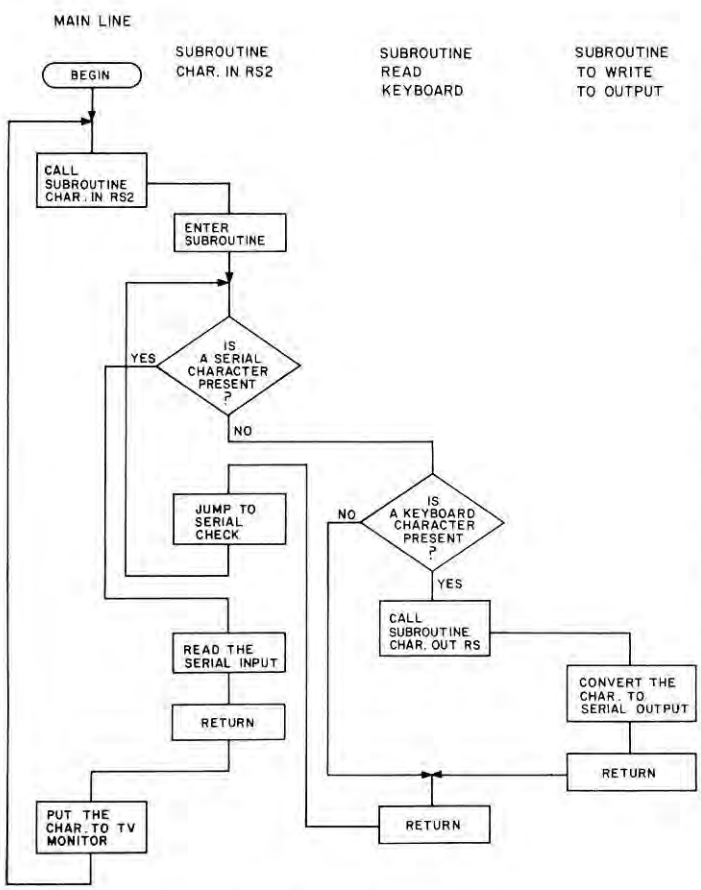


Fig. 3. Software Flowchart

232 input line as rapidly as possible. If a keystroke is detected, it goes to the RS-232 output for transmission. If data is detected on the RS-232 input line, the character is read and sent to the screen. The flow chart in Fig. 3 illustrates this program.

The main line is very small and begins with a call to the RS-232 input routine. Only when a valid character is received on the serial input line is this routine exited. Control then transfers to the main line. The next line of code in the main program fixes the character for the tv screen software driver in Level I ROM, and a call to that driver, RST 2, prints the character on the screen.

As shown in the flowchart, if a start bit is found on the serial input line, the data bits are read and assembled into the received character. The routine is then exited, with control passing back to the main line.

The CHAR.INRS2 subroutine provides the details, the timing of the collection, and assembly of the bits. Unfortunately, the screen monitor software driver in the Level I ROM doesn't use ASCII for all characters: It expects an $1D_{16}$ for the backspace. A check for a backspace 08_{16} is therefore needed. When this character is seen, it is converted to the expected $1D_{16}$ before calling the screen monitor driver. Also, lowercase characters are converted to uppercase before the lowercase tv driver is invoked.

When rapid checking of both inputs shows a keystroke, the keystroke is intended for the serial output line. Since Radio Shack used non-ASCII codes for some keys, they must first be converted to ASCII. A software driver is used to convert the characters to a serial output and add the start and stop bits.

Selecting the Baud Rate

The time delays required between sampling each bit on the serial input and sending each bit on the output are set with a software delay routine. In the program listing, the delays are set to 3.333 ms between bits (300 baud).

Adding a modem allows operation with larger computer systems over phone lines. The time delays can be altered to allow operation from 110 to 2400 baud (Table 1).

The delay routine is at the end of the program because longer lengths are required for the slower rates (110 and 300 baud). It is important that the proper time interval be allowed between the data bits. Some time is required to read and process each bit in building the parallel form.

The remainder of the time is used up by a delay routine. The length of time spent in the delay depends on the value in the E register when the subroutine is called.

Calculations are detailed for 300 baud in Table 2, 110 baud in Table 3, 1200 baud in Table 4. Three delays are needed, two for input and one for output.

Two delays are required for the input because a delay of ½ the time allows a second sam-

Time Delays for 110 Baud

Loop time Line Number	Instrument	Number of Cycles
205	NOP	4
206	NOP	4
207	NOP	4
208	NOP	4
209	NOP	4
210	NOP	4
211	NOP	4
212	NOP	4
213	NOP	4
214	NOP	4
215	NOP	4
216	NOP	4
217	DEC r	4
218	JR NZ	12
		64 cycles

Loop Overhead		
	12 NOP's	48
	DEC r	4
	JR	7
	CALL TO DELAY	17
	RET	10
		86 cycles

110 Baud $T = 9091\mu s$

(A) Start Bit to Data Bit

$$N = \frac{\frac{4545\mu s}{.56\mu s} - 86 - 90}{64} + 1 = 125.06 \quad \text{Use } 125$$

(B) Delay between input bits

$$N = \frac{\frac{9091\mu s}{.56\mu s} - 86 - 91}{64} + 1 = 251.8 \quad \text{Use } 252$$

(C) Output Delay

$$N = \frac{\frac{9091\mu s}{.56\mu s} - 86 - 72}{64} + 1 = 252.1 \quad \text{Use } 252$$

Table 3. Time Delays for 110 Baud

pling of the start bit. Two advantages are provided by this second sampling. One is immunity to noise spikes of widths less than ½ bit time. If either sampling yields no start bit, the character read is aborted.

The second advantage is that the start bit is sampled at its center. This is superior to sampling the data bits at their transition points because if a shift in timing occurred at either the transmitting or receiving end, bad reads would result.

Baud rates faster than 2400 are not practical, because the time to process the bits is nearly as long as the time between bits.

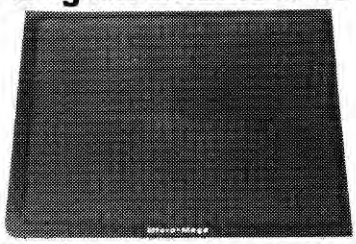
A cycle time of 0.56 usec is used for all calculations. (The TRS-80 is driven by a 1.77 MHz clock.)

Operating As a Terminal Or a Computer

The TRS-80 acting as its own terminal outputs on pin 2 and examines pin 3 for incoming characters. As a computer, the machine outputs on pin 3 and checks pin 2 for inputs. If one wants to use the RS-232 inter-

for the TRS-80 from Micro-Mega

The Original GREEN-SCREEN ✓29



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.....*$13.95*

Add $1.00 for postage and handling.

THE ULTIMATE STAR TREK PACKAGE

Tired of trivial computer games? This complete Star Trek package will provide you with endless fascination and challenge. In addition to the program cassette, it includes comprehensive instructions, a pad of "Voyage Log" record sheets, and a free-standing "Torpedo and Maneuvering Chart."

The package is built around the latest version of Lance Micklus' incomparable Star Trek III, a 13,000 byte program with a host of subtle and imaginative features, which include numerous dynamic and spectacular graphic displays. Star Trek III puts you in command of the Enterprise cruising in a galaxy of 192 quadrants filled with uncharted hazards, including hostile Klingons, pulsars, and black holes. You have at your disposal scanners, various weapons and defense systems, on-board computers, and a loyal crew. (You will need them all to survive the Klingons.)

Your mission is to rid the region of Klingons and to locate five inhabitable planets, all within 300 stardays, before returning to Star Fleet Headquarters where your overall effectiveness as a starship commander will be scored. High scores are possible only with careful planning and effective battle tactics. The "Voyage Log" sheets will guide your strategy, and the "Torpedo and Maneuvering Chart" will give you a vital edge in combat. (When you engage three Klingon ships you can't afford to miss.)

STAR TREK PACKAGE (for Level II, 16K only).....$22.95

Add $1.00 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 4% sales tax.

Micro-Mega · P.O. Box 6265 · Arlington, Va 22206

✓See List of Advertisers on page 306

DELAY	DEC	r	4
	JR	NZ	12
			16 cycles
Loop Overhead	DEC	r	4
	JR	NZ	7
	CALL	nn	17
	RET		10
			38

TIME DELAYS FOR 1200 BAUD

T = 833μs

(A) Start Bit to Data Bits

$$N = \frac{\frac{417\mu s}{.56\mu s} - 38 - 90}{16} + 1 = 39.5 \quad \text{Use } 40$$

(B) Delay Between Bits

$$N = \frac{\frac{833\mu s}{.56\mu s} - 38 - 90}{16} + 1 = 87.1 \quad \text{Use } 87$$

(C) Output Delay

$$N = \frac{\frac{9090\mu s}{.56\mu s} - 86 - 72}{64} + 1 = 252.1 \quad \text{Use } 252$$

Table 4. Baud Rates of 600, 1200, 1800, and 2400

face to connect the TRS-80 to a line printer, punched tape reader, or any other RS-232 compatible device, one simply ensures that the TRS-80 signal is transmitted on pin 3 and inputs are received on pin 2. This is easily done by reversing the two existing wires. Pin 7 is used for ground in either case.

A timing problem occurs when the screen fills and is required to scroll (shift its contents upward). Since software scrolls the TRS-80 screen, the MPU is busy shifting the screen and not examining either the keyboard or the serial input line. Therefore characters coming in on the serial input are occasionally missed or read incorrectly.

An easy solution is to allow a time delay long enough for the TRS-80 to scroll the screen between carriage returns or line feeds and the next character. The problem doesn't occur during output because the user typing on the keyboard is slower than the scroll. In actual use I find that clearing the screen before it fills or using a time delay between a carriage return and the next character eliminates the problem.

The serial input and output software drivers are designed to stand alone. If you need output only (to drive a peripheral) this modification is both excellent and inexpensive. It can be used with any peripheral using seven data bits and no parity bit.

The Level II listing operates much the same way as the described Level I listing. The main differences are the results from the location of the ROM KB input routine and the tv output driver. Their starts are located in lines 11 and 12 of the Level II listing.

The changes needed to make the RS-232 characters ASCII are slightly different, resulting in differences in the FIX2TV and FIX2RS routines. Those changes are in lines 29 to 65 of the listing.

These programs will work on any computer with 4K or more RAM. Type the programs in by copying the machine language using a program like T-BUG. ■

DELAY COUNT

Baud Rate	NOP s In Delay Loop	Input Memory Location 4466 (Base 10)	16)	4477 (Base 10)	16)	Output Memory Location 44A1 (Base 10)	44B0 16)
110	12	125	70	252	FC	252	FC
300	5	80	50	163	A3	163	A3
600	0	86	56	179	B3	180	B4
1200	0	40	28	87	57	87	57
1800	0	24	18	55	37	56	38
2400	0	16	10	41	29	39	27

Note: Beyond 2400 baud, time-to-process>time between bits.

Table 5. Delay Times for 110 to 2400 Baud

TABLE OF CONTENTS FOR LISTING

2 EQUIVALENTS
67 CHAR.INRS2 RS-232 INPUT DRIVER
139 CHAR.OUTRS
195 DELAY ROUTINE

References

1. Electronic Industries Association RS-232C Specification.
2. *EDN Magazine* articles; "Binary Serial Interfaces—Making the Direct Connection" (April 20, 1976), and "Design a Low-cost CRT Terminal Around a Single-Chip Microprocessor" (May 5, 1977).
3. *Radio Shack TRS-80 Micro Computer Technical Reference Handbook*, First Edition, 1978, page 108 (Schematic Sheet 2).
4. *Tektronix 4051 Data Communication Interface Manual*, Section 2; "Data Communication Terms."
5. "300 Baud Terminal," by Timothy Loos, *80 Microcomputing*, August 1980, page 136.

Features of the FATIGUE FIGHTER™:

- ☑ **REDUCES OPERATOR FATIGUE THEREBY ALLOWING MORE EFFICIENT USE OF THE COMPUTER.**
- ☑ **INSTALLS EASILY WITH PRESSURE SENSITIVE ADHESIVE. NO SCREWS, CLIPS, OR DRILLING TO DAMAGE MONITOR.**
- ☑ **DESIGNED TO MATCH TRS-80® STYLING FROM THE BLACK AND SILVER BORDER TO THE LETTERING TYPE FACE.**
- ☑ **MADE OF TOUGH 1/8 INCH THICK ACRYLIC SHEET FOR DURABILITY, EASE OF CLEANING, AND A QUALITY APPEARANCE.**
- ☑ **FITS BOTH THE MODEL I AND THE MODEL II.**
- ☑ **DOES NOT VOID THE COMPUTER WARRANTY.**

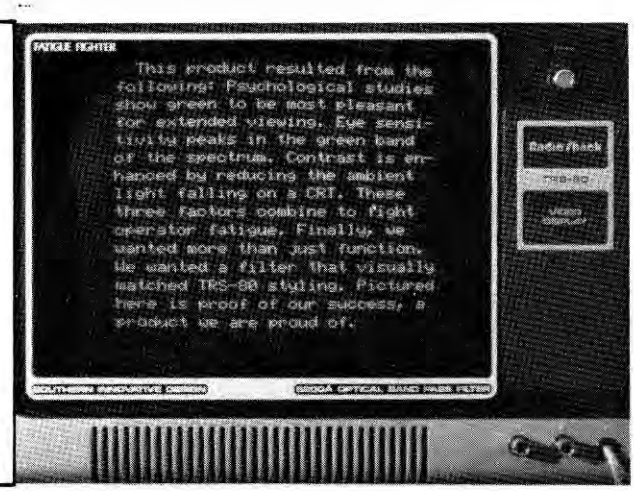
TO ORDER :

Send Name & Address Typed or Clearly Printed with Check or Money Order for $12.95 Each, Including Shipping. COD's are $2.50 Additional Per Order & are Accepted by Mail or by Calling 904-378-2494 9-5 M-F. Florida Residents Add 4% Sales Tax.

TRS-80 IS A TRADEMARK OF TANDY

SID

SOUTHERN INNOVATIVE DESIGN
1520 NORTHEAST 12TH STREET
GAINESVILLE, FLORIDA 32601 ✓373



ADD DISK DRIVES
TO YOUR
MODEL III

SAVE UP TO 34% COMPARED TO RADIO SHACK
Now, add mini-disk drives to your TRS-80 Model III and get FREE INSTALLATION.

Fully compatible with Radio Shack's operating system TRSDOS.
- One, two, three, four drive configurations
- 134K to over 1 Meg of storage
- 40 track and 80 track available
- 90 day warranty, 100% parts and labor
- Extended warranty available

Complete upgrade includes one mini-disk drive, power supply, controller, and mounting hardware. IMMEDIATE DELIVERY.

Accessories

Drive Head Cleaning Kit (Mod I & III)	$14.95
RS232 Board (Mod III)	75.00
Upper/Lower case conversion (Mod I only)	disk 24.95
	cassette 19.95

To order call toll free-800 345-8102 or (215) 461-5300 in PA.

	OUR PRICE	RADIO SHACK	SAVINGS
Complete one drive assembly	$599.	$849.	29%
Additional internal drive	265.	399.	34%
External drive	340.	499.	32%
80 track drives (inc. patch)	add 250. ea.	N/A	
16K memory (required to use drives)	49.	119.	59%
Model III 32K w/VR Data two drive assembly	1812.	2380.	24%

VR Data, a manufacturer of innovative computer products, is known worldwide for quality, dependability and prompt, personal service since 1972.

VRData corp

VISA master charge

VR Data Corporation • 777 Henderson Boulevard • Folcroft, PA 19032

MULLEN Computer Products

M-80
CONTROL BOX

TRS-80* accessory

The **M-80 OCTOPORT** is a simple to use interface for the **TRS-80 COMPUTER.** You can **control 8 external devices and sense 8 external conditions.** Each output uses a reed relay and each input an opto-isolator to electrically isolate your TRS-80.

One or more controllers can be connected to either the interface connector or the screen printer connector.

Each OCTOPORT is shipped completely assembled, tested and INCLUDES the interconnector cable, a UL approved power pack, and a 1 year warranty.

M-80 OCTOPORT $159.

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

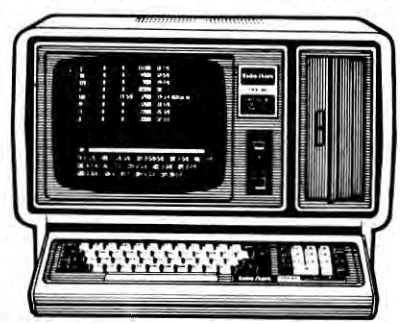
ASSEMBLED BURNED-IN & TESTED

Use your TRS-80, and our M-80 control box to program control energy savings devices at home or in your business. Send for our free application notes today.

MULLEN COMPUTER PRODUCTS, BOX 6214, HAYWARD, CA 94544
OR PHONE (415) 783-2866. VISA/MASTERCHARGE ACCEPTED.
INCLUDE $1.50 FOR SHIPPING & HANDLING. CALIFORNIA RESIDENTS ADD TAX.

THE BIGGEST NAME IN LITTLE COMPUTERS™

TRS-80™ Model II — Your Best Buy In a Business Microcomputer



UP TO 15% OFF! on

TRS-80™ computers, software and peripherals

Similar values on all **Radio Shack** merchandise

CALL COLLECT:

915-283-2920
Van Horn Office Supply ✓137
701 W. Broadway -- P O· Box 1060
Van Horn, Texas 79855

MasterCard VISA

Radio Shack
DEALER

THE NATIONWIDE SUPERMARKET OF SOUND®

✓See List of Advertisers on page 306

```
Z80 ASSEMBLER V1.8C  79/12/20. 15.19.07.  FILE NAME--TERM1--300 BAUD TERMINAL
TABLE OF CONTENTS

    2  EQUILIVANTS
   67  CHAR.INRS2  RS232 INPUT DRIVER
  139  CHAR.OUTRS
  195  DELAY ROUTINE



Z80 ASSEMBLER V1.8C  79/12/20. 15.19.07.  FILE NAME--TERM1--300 BAUD TERMINAL
EQUILIVANTS


                00A3        PUT.DLY         EQU         163
                0050        ST.HDLY         EQU         80
                00A2        ST.WHDLY        EQU         162
                45FF        TOPSTK          EQU         $45FF
                4091        MON.TOP         EQU         $4091     THE RE-ENTER OF THE MONITOR
                0B40        INPUT.KB        EQU         $B40
                00FF        INPORT          EQU         $FF
                00FF        OUTPORT         EQU         $FF

                4400                ORG     $4400
4400    31      FF45        BEGIN   LD      SP,TOPSTK   SET UP THE STACK


4403    CD      4744        COMP    CALL    CHAR.INRS2
4406    CD      0C44                CALL    FIX2TV      FIX FROM ASCII TO TRS-80 CONTROL CHAR
4409    D7                          RST     2
440A    18      F7                  JR      COMP


440C    FE      08          FIX2TV  CP      08
440E    20      02                  JR      NZ,NOT.BK
4410    3E      1D                  LD      A,$1D
4412    D6      60          NOT.BK  SUB     $60         CHECK FOR LOWER CASE LETTERS
4414    F2      1844                JP      P,LOWCASE
4417    C6      60                  ADD     $60         ADD BACK IN
4419    18      02                  JR      RT
441B    C6      40          LOWCASE ADD     $40         LOWER CASE SO CONVERT TO UPPER
441D    C9          RT      RET                         CALL THE OUTPUT ROUTINE


                        *
                        *       TRS-80 GIVES $1B FOR UP ARROW SO THIS CAN BE USED FOR  ESC
                        *
441E    FE      1C      FIX2KR  CP      $1C         CHECK FOR DOWN ARROW--IF SO GIVE OUT A LINEFEED
4420    20      02              JR      NZ,NOT.LF
4422    3E      0A              LD      A,$A
                        *
4424    FE      1D      NOT.LF  CP      $1D         CHECK FOR LEFT ARROW --IF SO GIVE A BACKSPACE
4426    20      02              JR      NZ,NOT.BS
4428    3E      08              LD      A,8
                        *
442A    FE      1E      NOT.BS  CP      $1E         CHECK FOR RIGHT ARROW--IF SO MAKE A TAB
442C    20      05              JR      NZ,NOT.TAB
442E    3E      20              LD      A,$20       PUT A SPACE OUT TO THE TUBE
4430    D7                      RST     2
4431    3E      09              LD      A,$9
                        *
4433    FE      0C      NOT.TAB CP      $C          CHECK FOR CLEAR TUBE AND IF SO SEND NULL
4435    20      02              JR      NZ,NOT.CLEAR
4437    3E      7F              LD      A,$7F       LOAD UP $7F FOR TRANSMISSION--COMPUTER IGNORES THIS
                        *
4439    C9          NOT.CLEAR   RET


                        *
                        *    FOR THE KEYBOARD --
                        *         Z   = NO KEY DOWN
                        *        NZ   = A KEY DOWN



Z80 ASSEMBLER V1.8C  79/12/20. 15.19.07.  FILE NAME--TERM1--300 BAUD TERMINAL
EQUIL IVANTS

                        *
443A    CD      4008    CHAR.INKB CALL  INPUT.KB    GO GET THE KEY
443D    28      07              JR      Z,DONE      DONE IF NO KEY EXIT WITH Z FLAG SET TO 1
443F    FE      03              CP      3           CHECK FOR BREAK ON THE TRS-80
4441    20      03              JR      NZ,DONE     DONE IF NOT ZERO, THEN THERE WAS A KEY SO RETURN WITH
                        *                               Z SET TO 0 BECAUSE IT WASN'T BREAK
4443    CD      9140            CALL    MON.TOP     IT WAS BREAK SO GO TO TOP OF THE MONITOR
4446    C9          DONE    RET
```

Program continues

DISCOVER THE 6809 IN YOUR COLOR COMPUTER

Now you can explore the Radio Shack Color Computer's impressive potentials—as an inexpensive development system, a color peripheral, a process controller—ad infinitum. The Micro Works introduces these powerful software tools for utilizing the color computer at the assembly language level.

MONITOR TAPE: A cassette tape which allows you to:

- Examine or change memory using a formatted hex display
- Save areas of memory to cassette in binary (a "CSAVEM")
- Download/upload data or programs to a host system
- Move the video display page throughout RAM
- Send or receive RS-232 at up to 9600 baud
- Investigate and activate features of your computer, such as hi-res graphics or machine-language music
- Use your color computer as an intelligent peripheral for another computer, a color display or a 6809 program development tool

The monitor has 19 commands in all, and is relocatable and re-entrant.

80C Monitor Tape Price: $29.95

MONITOR ROM: The same program as the monitor tape, supplied on ROM. This allows BASIC to use the entire RAM space. And you don't need to re-load the monitor each time you use it. The ROM plugs into the Extended Basic ROM Socket or a modified ROMPACK.

80C Monitor ROM
Price: $39.95

C BUG IS HERE!!

INSIDE THE COLOR COMPUTER: This package is a disassembler which runs on the color computer and enables you to generate your own source listing of the BASIC interpreter ROM. Also included is a documentation package which gives useful ROM entry points, complete memory map, I/O hardware details and more. Disassembler features include cross-referencing of variables and labels; output code which can be re-assembled; output to an 80-column printer, small printer or screen; and a data table area specification which defaults to the table boundaries in the interpreter ROM. A 16K system is required for the use of this cassette.

80C Disassembler Price: $49.95

THE MICRO WORKS ✓109

Mastercharge and BankAmericard

P.O. BOX 1110 DEL MAR, CA 92014 714-942-2400

CHICATRUG News

Chicago TRS-80™* Users Group

12 Issues For Only $12.00

All The TRS-80™ News You Need When You Need It*

Now In Our 3rd Year Of Continuous Publication

One Of The Oldest TRS-80™* Newsletters Still In Circulation

— Featuring —

• Applications • Product Reviews •
• Machine Language Tutorials •
• And Much More •

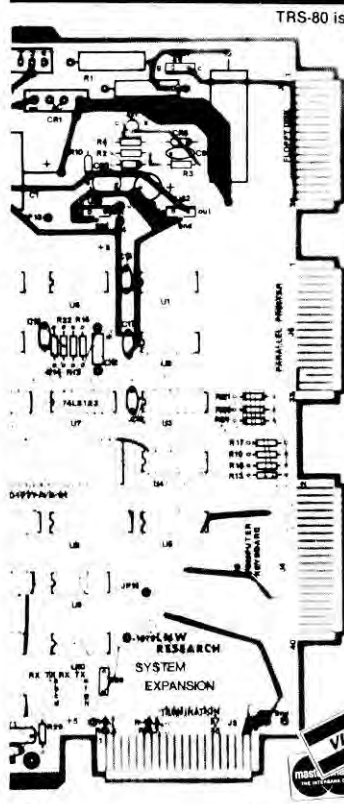
Call: 312-782-9750

Write For Free Sample:

Chicatrug News ✓117
c/o EBG & Associates
203 N. Wabash Av
Chicago, IL 60601

* TRS-80™ is a Trademark of Tandy Corp.

TRS-80 is a registered trademark of TANDY CORP.



SYSTEM EXPANSION

FOR THE

TRS-80™

AT

$69.95 [PC BOARD & USER MANUAL]

- SERIAL RS232C 20mA I/O
- FLOPPY CONTROLLER
- 32K BYTES MEMORY
- PARALLEL PRINTER PORT
- DUAL CASSETTE PORT
- REAL-TIME CLOCK
- SCREEN PRINTER BUS
- ONBOARD POWER SUPPLY
- SOFTWARE COMPATIBLE
- SOLDER MASK, SILK SCREEN

LNW RESEARCH ✓53

714-641-8850

TO ORDER

P.O. Box 16216 Irvine CA 92713
Add $3 for postage and handling.
CA residents add 6% sales tax

VISA

Card No. _____ Expiration Date _____ Signature _____

✓See List of Advertisers on page 306

```
Z80 ASSEMBLER V1.8C  79/12/20. 15.19.07.  FILE NAME--TERM1--300 BAUD TERMINAL
CHAR.INRS2  RS232 INPUT DRIVER

                                *
                                *
                                *   INPUT RS232 DRIVER
                                *
                                *     USES REGISTERS AS LISTED BELOW
                                *
                                *       A--IS USED FOR THE INPUT
                                *       B--IS USED TO HOLD THE BIT COUNT
                                *       D--IS USED TO BUILD THE CHARACTER
                                *       E--IS USED FOR THE DELAY COUNTER
                                *
                                *    CALL WITH 'CALL CHAR.INRS2'
                                *     RETURNS WITH 'RET' WITH THE CHAR IN A REG
                                *
                                *   THIS INPUT DRIVER READS 1 START BIT
                                *                           8 DATA BITS (MASKS TO 7)
                                *                           DOESN'T READ THE STOP BITS
                                *
                                *  HARDWARE REQUIRED IS A LEVEL SHIFTER FROM RS232 LEVELS
                                *   TO TTL LEVELS AND THE INPUT ON BIT 4 OF PORT $FF
                                *
                                *    FOR THE RS232 PORT INPUT--
                                *         Z   = 0 ON THE INPUT PORT = NO START BIT PRESENT
                                *        NZ   = 1 ON THE INPUT PORT = START BIT PRESENT
                                *
                     4447       CHAR.INRS2 EQU  *
4447  C5                              PUSH     BC
4448  D5                              PUSH     DE
4449  DBFF                      TRY.SB IN       A,(INPORT)    CHECK FOR A START BIT
444B  E6   10                         AND      $10
444D  20   12                         JR       NZ,ST.BIT
444F  CD   3A44                       CALL     CHAR.INKB     CHECK FOR A KEY
4452  28   F5                         JR       Z,TRY.SB
4454  CD   1E44                       CALL     FIX2KR
4457  CD   8F44                       CALL     CHAR.OUTRS
445A  FE   53                         CP       'S
445C  CA   0044                       JP       Z,BEGIN
445F  18   E8                         JR       TRY.SB
4461  06   09                 ST.BIT LD       B,9           SET UP THE COUNT
4463  16   00                         LD       D,0           CLEAR OUT THE CHARACTER
4465  1E   50                         LD       E,ST.HOLY     DELAY 1/2 BIT TIME
4467  CD   CC44                       CALL     DELAY
446A  DBFF                           IN       A,(INPORT)
446C  E6   10                         AND      $10           MASK OFF THE INPUT
446E  28   09                         JR       Z,TRY.SB      JMP TO RETURN IF NO START BIT PRESENT
                                *
                                *     MUST BE A VALID START BIT TO GET HERE
                                *
4470  00                        GET.MORE NOP
4471  1E   A2                         LD       E,ST.WHOLY    SET UP FOR WHOLE DELAY
4473  CD   CC44                       CALL     DELAY
4476  DBFF                           IN       A,(INPORT)
4478  E6   10                         AND      $10           MASK OFF THE OTHER BITS
447A  B2                             OR       D             OR IT IN WITH WHAT IS RECIEVED SO FAR
447B  57                             LD       D,A           PUT CHAR BACK INTO D
447C  CB0A                           RRC      D             SHIFT IN PREPERATION FOR NEXT TIME
447E  10   F0                         DJNZ     GET.MORE
                                *
                                *   GOT ALL BITS TO GET HERE



Z80 ASSEMBLER V1.8C  79/12/20. 15.19.07.  FILE NAME--TERM1--300 BAUD TERMINAL
CHAR.INRS2  RS232 INPUT DRIVER

                                *
4480  00                              NOP
4481  00                              NOP
4482  CB0A                            RRC      D
4484  CB0A                            RRC      D
4486  CB0A                            RRC      D
4488  7A                              LD       A,D           PUT CHAR IN A REG FOR EXIT
4489  2F                              CPL
448A  E6   7F                         AND      $7F           MASK IT OFF
448C  D1                              POP      DE
448D  C1                              POP      BC
448E  C9                              RET



Z80 ASSEMBLER V1.8C  79/12/20. 15.19.29.  TERM2  THIS IS THE TERMINAL AT 300 BAUD
CHAR.OUTRS


                                *
                                *  OUTPUT RS232 DRIVER
                                *    USES REGISTERS AS LISTED BELOW
                                *
                                *       A--IS USED TO OUTPUT THE CHARACTER BIT AT A TIME AND HAS THE CHAR ON ENTRY
                                *       B--IS USED TO HOLD THE BIT COUNT
                                *       D--IS USED TO HOLD THE CHAR
```

Program continues

SEE WHAT COMPUTERS CAN DO FOR YOU AT HOME — THE OFFICE — THE CLASSROOM.

Let the convenience, fascination and power of computers bring new dimensions to your personal life. Over 30 informative sessions at the Personal Computing Festival offer a remarkable view of the many ways you can put computers to work for you. Hands-on exhibits give you a chance to test the capabilities of equipment designed for use in your home, office, or classroom as the PCF joins NCC '81 in the main exhibit area for the first time. Learn how computers can develop an investment portfolio or compose music; create a picture or calculate commissions on sales; control your furnace or do your homework. See applications you never thought of in special demonstration area. Most important of all — find out how computers can make life better for you — personally!

Personal Computing Festival

now a part of the
National Computer Conference '81

May 4–7, 1981
McCormick Place
Chicago, Illinois

Register for one full day for $10.00 (includes Personal Computing Digest) — or attend the full three-day session for $30.00. (If you prefer, register for the full NCC '81 session — $60 fee includes PCF registration.

For discount air fares, airline reservations, hotel and show information or to preregister CALL TOLL FREE 800-556-6882

✓381

afips

A conference within a conference sponsored by the American Federation of Information Processing Societies, Inc.

TEACH YOUR CHILDREN

Learning to count money by Malcolm Nygern

A three-program learning system that teaches the important skill of counting money.

1. Counting Coins—Instruction and drill in counting pennies, nickels, dimes and quarters.
2. Shopping Trip—Buy goods in various stores; count out the payments and earn "purple stamps" for a right answer. Three speed levels.
3. Check-Out—Run your own checkout counter. Learn and practice how to make change.

Learning to count money by Malcolm Nygren features superior graphics and is available for TRS-80 Model I—Level II—16K on cassette only. Shipped postpaid by first-class mail

Each program **$6.95**—*all three* **$19.95**

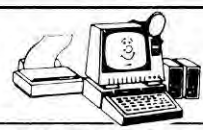
ALSO AVAILABLE

ALPHA—Alphabet recognition for preschoolers
SIGMA—Addition problems for Grades 1-3
SIGMA-EX—Addition problems for —the younger or slower learner
SPE_L—Spelling practice for Grades 2-4

Available on cassette only. $5.95 each. Two for $11. All for for $20.00.

✓104

Mercer Systems Inc.
87 Scooter Lane
Hicksville, N.Y. 11801



THE MICRO CLINIC

✓214

EVERY MODEL I DISK SYSTEM NEEDS A FLOPPY DOCTOR!

Double-density recording (using the Percom Doubler**) and 77/80 track drives put greater demands on your TRS-80* and make it imperative that you assure yourself of data integrity BEFORE committing it to disk. THE FLOPPY DOCTOR 3.0 is the **only** machine language diagnostic which can test your Model I in either single density or, if you have a Doubler**, in double density. This program is a comprehensive test of every sector on every track of 35, 40, 77, or 80 track drives, single or double sided; checks drive motor speed; use your computer as an intelligent disk exerciser; MORE! Also includes memory diagnostic and 16-page instruction manual.

*TM Tandy Corp. **TM Percom Data Co.

VISA®

PRICE: $25.95
Includes P/H
CA Add 6% Tax

On diskette for a min. 16K single disk system. Drive 0 must be 35 or 40 tracks. VISA/MC include card #, exp. date, sign.

master charge

THE MICRO CLINIC • 17375 Brookhurst • Suite 114 • Fountain Valley, CA 92708 • 714-962-0621

THE MICRO CLINIC ✓214

DUAL CHARACTER SETS FOR YOUR CENTRONICS 779/RS PRINTER I

Expand the capabilities of your Centronics 779/Radio Shack Printer I with our CLC-1 Lowercase Adapter. The CLC-1 gives you the option of selecting between 2 different UPPERCASE/lowercase character sets so you can choose the print style that is best for your application, all at a fraction of the cost of a new printer. Send for a free sample printout and discover what your Centronics 779/RS Printer I can do for your word processing needs. We think you'll find that its dual character sets, easy installation, and FAST delivery make the CLC-1 an outstanding value!

master charge

CLC-1 PRICE: $99 A/T. Includes P/H. CA add 6% tax.
VISA/MC include card number, signature, exp. date, phone number. MC include interbank number.

VISA®

THE MICRO CLINIC • 17375 Brookhurst • Suite 114 • Fountain Valley, CA 92708 • (714) 962-0621

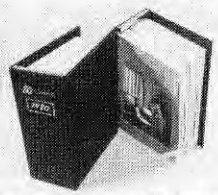
✓See List of Advertisers on page 306

```
                        *       E--IS USED FOR THE DELAY COUNTER
                        *
                        *  TO CALL USE  'CALL CHAR.OUTRS' WITH THE ASCII CHARACTER IN
                        *          A REG
                        *  RETURN IS WITH RET
                        *
                        *   THIS DRIVER PUTS OUT :
                        *       1 START BIT
                        *       7 DATA BITS
                        *       2 STOP BITS (NO PARITY)
                        *
                        *    HARDWARE REQUIRED IS A LEVEL SHIFTER TO RS232 LEVELS
                        *    DRIVEN BY BIT 4 OF OUTPUT PORT $FF
                        *
              7FAB      CHAR.OUTRS EQU  *
7FAB  57                        LD      D,A
7FAC  06    07                  LD      B,7
7FAE  3E    10                  LD      A,$10           SET UP A FOR THE START BIT
7FB0  CB02                      RLC     D               BIT 0-->1
7FB2  D3FF                      OUT     (OUTPORT),A     DO THE START BIT
7FB4  CB02                      RLC     D               BIT 0-->2
7FB6  CB02                      RLC     D               BIT 0-->3
7FB8  CB02                      RLC     D               BIT 0-->4
7FBA  1E    A3          PUT.MORE LD     E,PUT.DLY
7FBC  CD    E47F                CALL    DELAY
7FBF  7A                        LD      A,D
7FC0  2F                        CPL
7FC1  E6    10                  AND     $10             MASK OFF BIT 4
7FC3  D3FF                      OUT     (OUTPORT),A     OUTPUT THE BIT
7FC5  CB0A                      RRC     D
7FC7  10    F1                  DJNZ    PUT.MORE        THIS WORKS ON B REG ONLY
7FC9  1E    A3                  LD      E,PUT.DLY
7FCB  CD    E47F                CALL    DELAY
7FCE  3E    00                  LD      A,0             DO THE STOP BITS BECAUSE MUST BE FINISHED
                        *                               TO GET HERE
7FD0  D3FF                      OUT     (OUTPORT),A
7FD2  CB0A                      RRC     D               FIX UP THE POSITION
7FD4  CB0A                      RRC     D
7FD6  CB0A                      RRC     D
7FD8  1E    A3                  LD      E,PUT.DLY       DO THE STOP BITS
7FDA  CD    E47F                CALL    DELAY
7FDD  1E    A3                  LD      E,PUT.DLY
7FDF  CD    E47F                CALL    DELAY
7FE2  7A                        LD      A,D
7FE3  C9                        RET


Z80 ASSEMBLER V1.8C  79/12/20. 15.19.07.  FILE NAME--TERM1--300 BAUD TERMINAL
DELAY ROUTINE


                        *
                        *  GENERAL PURPOSE DELAY SUBROUTINE
                        *
                        *  ASSUMES THE DELAY COUNT IS IN REG E
                        *
                        *
                        *  CALL WITH 'CALL DELAY'
                        *   RETURNS WITH E SET TO 0
                        *
44CC  00                DELAY   NOP
44CD  00                        NOP
44CE  00                        NOP
44CF  00                        NOP
44D0  00                        NOP
44D1  1D                        DEC     E
44D2  20    F8                  JR      NZ,DELAY
44D4  C9                        RET
              4400              END     BEGIN


Z80 ASSEMBLER V1.8C  79/12/20. 15.19.07.  FILE NAME--TERM1--300 BAUD TERMINAL
SYMBOL TABLE


BEGIN       4400    CHAR.INKB   443A    CHAR.INRS2  4447    CHAR.OUTRS  448F    COMP        4403
DELAY       44CC    DONE        4446    FIX2KR      441E    FIX2TV      440C    GET.MORE    4470
INPORT      00FF    INPUT.KB    0B40    LOWCASE     4418    MON.TOP     4091    NOT.BK      4412
NOT.BS      442A    NOT.CLEAR   4439    NOT.LF      4424    NOT.TAB     4433    OUTPORT     00FF
PUT.DLY     00A3    PUT.MORE    44A0    RT          4410    ST.BIT      4461    ST.HDLY     0050
ST.WHDLY    00A2    TOPSTK      45FF    TRY.SB      4449


Z80 ASSEMBLER V1.8C  79/12/20. 15.19.07.  FILE NAME--TERM1--300 BAUD TERMINAL
CROSS REFERENCE LIST


BEGIN     4400        13 D  104    213
CHAR.INKB 443A        60 D   99
CHAR.INRS24447        17     93 D
CHAR.OUTRS448F       102    160 D
```

Program continues

80 microcomputing

BINDERS



order yours today

Keep your library of 80 Microcomputing safe from loss or damage in these handsomely appointed binders with rich dark green covers and gold lettering. Each binder holds 12 issues making an EXCELLENT REFERENCE HANDBOOK. Several binders form a quality library you can be proud of.

$7.50 each . . . 3 for $21.75 . . . 6 for $42.00 . . .
Postage paid in USA. Foreign orders please include $2.50 for postage.

Specify 1980 or 1981

Send check or money order only to:
80 MICROCOMPUTING BINDERS
P.O. Box 5120, Phila., PA 19141

Allow 6-8 weeks for delivery. Please no C.O.D. orders, no phone orders.

MURDER IN THE MANSION And Other Computer Adventures In Pocket-BASIC for the TRS-80

10 brand-new exciting tested ready-to-run game programs for the pocket computer, or any BASIC micro, including Saturn Death, Lost Safari, Buried Treasure, Black Pearl Scrambled Egg, Barrel of Apples and more, 64-page book. **$5.95**

POCKET COMPUTER PROGRAM WORKSHEETS

Pocket-BASIC Coding Form for the TRS-80, or any BASIC micro, makes writing programs easy, space for memory labels. 50-sheet pad **$2.95**

Send check or money order plus $1 shipping for each item ordered to:

✓491 ARCsoft
Box 132 P
Woodsboro, MD
21798

The Magic Curser™

The Magic Cursor allows you to easily create screens (including graphics) on your video. A powerful command then generates the BASIC instructions to recreate the screen.

The Magic Cursor makes sophisticated Data Entry and Display easy. With **the Magic Cursor** you define the data entry or display fields directly on your screen. The definition commands will generate the BASIC instructions to implement data entry and display.

The Magic Cursor will also:
- create graphical characters simply on the screen
- duplicate characters on the screen easily
- store screens for later use in the same sessions
- reload screens created in previous sessions
- center blocks of text on the screen
- move blocks of text on the screen
- right justify text within a block on the screen
and more . . . it has 27 powerful commands!!

MAGIC CURSOR (32K Disk) Mod I $99.95

Trace-80™

TRACE-80 lets you observe the inner workings of your BASIC program. It allows you to run a machine language program in slow motion with the option to stop execution at any time and examine the contents of memory or program variables. You can watch each instruction (mnemonic and register contents) as it is executed on the screen in place of normal screen display.

If you have a printer, **TRACE 80** allows you to record your program's execution and watch the screen while your printer simultaneously prints the machine code being executed, the memory location and the instruction mnemonic along with the current register contents.

TRACE-80 allows you to trace ROM as well as RAM based routines and can be used in a special execution buffer.

TRACE-80/Mod I 16K Tape or Disk $29.95
TRACE-80/Mod II $49.95

The Restauranteur's Consultant™

This food and beverage management tool dramatically reduces the time spent for food cost analysis. Those tasks required to effectively operate any restaurant, a time-consuming business. Over a dozen reports give you the information you need to run the kitchen information for profitability. And handling menu item changes requires only one minute per week instead of hours because the Consultant makes all the necessary adjustments from your case prices.

Mod I 32K 2 Disk, Printer or Mod II $750.00

CUSTOM COMPUTER CENTER, INC.
For Ordering or Information Write:
P.O. Box 58042 Houston, TX 77058
Attn: Ian Marfleet
or Call (713) 474-2436

✓7

WRITE FOR OUR COMPLETE SOFTWARE CATALOG!!

STEREO HI-FI OWNERS
MUSIC COLLECTORS
RADIO PROGRAM MANAGERS

CUSTOM STORAGE AND RETRIEVAL SYSTEM

Now you can have instant access to any record or tape in your music collection with your TRS-80 MODEL I or III.

RECORD AND TAPE COLLECTION INVENTORY will store your collection on tape or disk. You will then be able to search for any record or group of records and list to the display or a printer. The collection can be sorted (alphabetically) for display, printing and storage. File editing allows quick and easy addition or deletion of records, and adding to or changing any individual record description. Complete error-trapping makes program crashes almost impossible.

The 16K TAPE version will conveniently handle up to 350 records and tapes per data file. An unlimited number of data files can be stored on tape. PRICE: $15.95

The enhanced 32K and 48K DISK versions are upgraded for heavy commercial use and can handle up to 500 and 1000 records per data file, respectively. Up to 1500 records can be stored on a one-drive system. Any number of drives can be used, allowing instant access to thousands of records. An unlimited number of data files can be stored on diskettes, allowing even a one-drive system convenient access to thousands of records. Many other improvements over the tape version. PRICE: $25.00

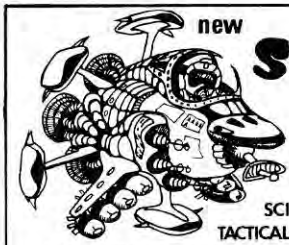
Programs provided on cassette: easily transferred to disk. Complete user's manual with examples.

Mailed First Class, include $1.00 S&H.
(Arkansas orders add 3% sales tax.)

Order from:

OZARK MOUNTAIN ✓308
SOFTWARE

FRANK L. WHITSELL, P.O. Box 2945, Fayetteville, Arkansas 72701 Ph. (501) 521-2301



new SPACE ACE 21

SCIFI GAME OF TACTICAL SPACE COMBAT

Design your own space fighter. You choose the weapons, equipment, engines, and more. Then engage in a one on one sudden death fly-off. Human opponent or 10 different computer opponents. Fight in 2 or 3 dimensions. Action Sounds and Graphics. The most imaginative scifi game we offer. $19.95
(written by former USAF phantom pilot)

More Super Games with Action Sounds and Graphics:

!!! ANTS !!! Amazing battle between ant colonies. Easy to play, Challenging to master! $14.95
PARSECTOR V The ultimate space war. Unique split video, each player has a private display. $19.95
PARSECTOR 8 Tournament version of Parsector V. Larger galaxy to conquer. $20.95
HIGH SPEED LIFE The fastest, most advanced life game. Up to 2000 gen/min possible. $14.95
NAME THAT STATE QUIZ Educational fun. Draws State and asks questions. $14.95

TRS 80 Level II 16k, Model I or III required. ✓231
For cassette and instructions send CHECK or MONEY ORDER.

Synergistic Solar Inc. PO Box 560595 Miami FL 33156

Please write for more info. Dealer inquiries invited.

COTTAGE SOFTWARE

PACKER: Automatically edits all or part of your Basic program to ease editing, run faster, or save memory. Has 5 sections: UNPACK—unpacks multiple statement lines into single statements maintaining program logic, inserts spaces and renumbers lines for easier editing. SHORT—shortens your program by editing out all REM statements, unnecessary words and spaces. PACK—executes UNPACK & SHORT then packs lines into multiple statement lines; maintains program logic. RENUM—renumbers program lines including all branches. You specify increment. MOVE—moves any line or block of lines to any new location in the program and renumbers lines. Written in machine language. Supplied on tape in 3 versions for 16K, 32K & 48K.
For TRS-80™ Level II or Disk Basic.....**$29.95**

FAST SORT ROUTINES: for use with Radio Shack's Accounts Receivable, Inventory Control I, & 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 or tape for one drive system).....**$14.95**
ALL THREE ROUTINES.....**$44.95**

SYSTEM TAPE DUPLICATOR: Copy your system format tapes. Includes verify routine.
For any TRS-80™ Level II.....**$14.95**

CASSETTE LABEL MAKER: A mini word processor to print cassette labels on a line printer. Includes manual and 50 peel-and-stick labels on tractor feed paper.
For TRS-80™ Level II & printer.....**$15.95**

4116 RAM CHIPS—Tested!! Guaranteed for 1 year to the original purchaser.....16K for **$49.95**

MANY MORE items available. Call or write for catalog. VISA & MASTERCHARGE accepted. Dealer inquiries invited. Kansas residents add 3% sales tax.
Foreign orders in US currency only.
On line catalog on Wichita FORUM-80: 316-682-2113
Or call our 24 hour phone: 316-683-4811 or write:

COTTAGE SOFTWARE
614 N. Harding ✓233
Wichita, KS 67208

"TRS-80 is a registered trademark of TANDY CORP."

HATCH A PLOT WITH YOUR TRS-80*

Use ESP the Educated Slave Processor

- + Full plotting control features
- + Self-contained microprocessor
- + Connects TRS-80* master computer to user-supplied X-Y Recorder
- + Converts commands to voltage outputs
- + Plots vectors, dots, X and Y axes, and ASCII characters
- + Buffers commands to optimum speed of recorder
- + Price is $450.
- + Manual sold separately for $10.
- + Manual price refundable with purchase of unit

Or Use MICRO-PEN Software

- + ESP capabilities except buffering
- + Runs in TRS-80* computer
- + Requires user-supplied D/A and pen control interfaces
- + Price is $99 on diskette
- + Schematic and parts information provided for electrical interface

For additional information, write to:
Epsilon Systems
969 Crown Ave.
Santa Barbara, CA 93111 ✓487

*TRS-80 IS A TRADEMARK OF TANDY CORPORATION

---

tired?

of not being able to read the digital counter without changing positions every time?—Then try the **DATA VIEW**

Specifically designed to position the recorder at the proper angle for effortless viewing of the counter.

Constructed of durable translucent acrylic in a beautiful smoked gray tint with slip resistant padded feet.

Only 8.95 each
Add 2.00 for shipping and handling
California residents add 6% sales tax.

TO ORDER: Send check or money order only to:
REM TRON
P.O. Box 2280 ✓499
Santa Clara, CA 95055

NO COD'S PLEASE

*Exatron stringy floppy version also available for 5.95. Ideal as desk calculator stand also. Size 5½" wide x 9" long.

*Exatron is a registered trademark of Exatron, Inc.

✓See List of Advertisers on page 306

```
COMP        4403        17 D   20
DELAY       44CC       109     118     172     180     188     190     205 D  211
DONE        4446        61      63      66 D
FIX2KR      441E        35 D   101
FIX2TV      440C        18      22 D
GET.MORE    4470       116 D   124
INPORT      00FF         9 D    96     110     119
INPUT.KE    0840         8 D    60
LOWCASE     4418        26      29 D
MON.TOP     4091         7 D    65
NOT.BK      4412        23      25 D
NOT.BS      442A        40      43 D
NOT.CLEAR   4439        50      53 D
NOT.LF      4424        36      39 D
NOT.TAB     4433        44      49 D
OUTPORT     00FF        10 D   167     176     183
PUT.DLY     00A3         3 D   171     179     187     189
PUT.MORE    4440       171 D   178
RT          441D        28      30 D
ST.BIT      4461        98     106 D
ST.HDLY     0050         4 D   108
ST.WHDLY    00A2         5 D   117
TOPSTK      45FF         6 D    13
TRY.SB      4449        96 D   100     105     112

       0 LINE(S) WITH ERRORS          0 LINE(S) WITH WARNINGS        436 MILLISECONDS USED
      28 SYMBOLS CREATED         73 REFERENCES
```

Program Listing—Level II

```
Z80 ASSEMBLER V1.8C  79/12/20. 15.19.29.  TERM2  THIS IS THE TERMINAL AT 300 BAUD
TABLE OF CONTENTS

  2  EQUILIVANTS
 14  TRANSPARENT TERMINAL
 66  SUPPORT ROUTINES
 92  CHAR.INRS2  RS232 INPUT DRIVER
151  CHAR.OUTRS
204  DELAY ROUTINE



Z80 ASSEMBLER V1.8C  79/12/20. 15.19.29.  TERM2  THIS IS THE TERMINAL AT 300 BAUD
EQUILIVANTS

 3              7F00      START           EQU         $7F00
 4              1A19      SYS             EQU         $1A19
 5              00A3      PUT.DLY         EQU         163
 6              0050      ST.HDLY         EQU         80
 7              00A2      ST.WHDLY        EQU         162
 8              7F00      MON.STK         EQU         START
 9              00FF      INPORT          EQU         $FF
10              00FF      OUTPORT         EQU         $FF
11              0033      TVOUT           EQU         $33
12              0028      KBINPUT         EQU         $28
13              0020      SPACE           EQU         $20



Z80 ASSEMBLER V1.8C  79/12/20. 15.19.29.  TERM2  THIS IS THE TERMINAL AT 300 BAUD
TRANSPARENT TERMINAL


15              7F00                ORG   START
16                        *
17                        *         TRANSPARENT USER'S TERMINAL
18                        *
19  7F00  CD    777F      TERMN     CALL  CHAR.INRS2        CHECK THE RS232 INPUT
20  7F03  28    06                  JR    Z,TRY.KB
21  7F05  CD    187F                CALL  FIX2TV            MUST BE A CHAR TO GET HERE
22  7F08  CD    6D7F                CALL  TOTV              ECHO IT TO TV
23  7F0B  CD    597F      TRY.KB    CALL  CHAR.INKB         CHECK KEYBOARD FOR CHARACTER
24  7F0E  28    F0                  JR    Z,TERMN           IF NONE--GO CHECK RS232 INPUT
25  7F10  CD    327F                CALL  FIX2RS            MUST BE ONE TO GET HERE
26  7F13  CD    AB7F                CALL  CHAR.OUTRS        SO SEND IT OUT THE PORT
27  7F16  18    E8                  JR    TERMN


29  7F18  FE    0D        FIX2TV    CP    $D                CHECK FOR CR
30  7F1A  28    15                  JR    Z,FIXED           ALLOW CR
31  7F1C  FE    08                  CP    8                 CHECK FOR BACKSPACE
32  7F1E  28    11                  JR    Z,FIXED
33  7F20  FE    20                  CP    $20               CHECK FOR .LT. 20
34  7F22  30    04                  JR    NC,NOCTL
35  7F24  3E    00                  LD    A,0
36  7F26  18    09                  JR    FIXED
```

Program continues

Using SCRIPSIT?
What has IBM got that you haven't got?

A SPELLING CHECKER!

HEXSPELL zaps those ~~snaeky~~ sneaky typos!

Tired of typos in your text? Can't remember if it's one "c" or two? Let HEXSPELL zip through your words, displaying any spelling errors for easy correction. HEXSPELL comes with a built-in wordlist, and soon learns any additional words that are special to your business or occupation. You can even teach it to become bilingual! HEXSPELL remembers up to 28,000 words, then starts forgetting old ones to make room for the new.

HEXSPELL, wordlist and manual US$69. Manual only $12.

Requires 48K TRS-80 Mod I with 2 Drives and TRSDOS. SCRIPSIT version available now, other versions under development.

HEXAGON SYSTEMS
P.O. Box 397 Stn. A ✓125
Vancouver, B.C. Canada V6C 2N2
Telephone (604) 682-7646

AT LAST!

Mass production prices for high quality software. Buy direct and save 50%. Also available for CPM and HDOS.

DATA BASE MANAGER Mod I & III $69, $149 (48K). Mod-II $199
Maintain a data base and produce reports, all without user programming. Define file parameters and report formats on-line. Key random access, fast multi-key sort, field arithmetics, audit log, label. No time-consuming overlays. 500 happy users in one year. Mod-II and 48K versions have over 50 enhancements, including 40 fields maximum. "IDM-M2 is great!" - 80-US.

A/R Mod-I $69 Mod-II $149 Mod-III $69
Handles invoices, statements, aging, sales analysis, credit checking, forms input, and order entry. Unlike other accounts receivable programs, ours can be used by doctors, store managers, etc.

WORD PROCESSOR $49
Centers, justifies, indents, and numbers pages. Mod-I version features upper/lower case without hardware modification! File merge option available.

MAILING LIST Mod I & III $59, $79 (48K). Mod-II $99
The best! Compare and be selective. Includes forms input, 5-digit selection code, zip code extension, sort on any field, and multiple labels. Who else offers a report writer and merges with word processor?

INVENTORY Mod I & III $89, $109 (48K) Mod-II $149
Fast key random access. Reports include order info, performance summary, EOQ and user-specified reports. Many people have converted to our system! "Next to impossible to damage the file."

GL, A/R, A/P, PAYROLL Mod-II $129 each
Integrated accounting package. 100+ page manual. As opposed to Osborne's slow binary search and 64 column screen, we use fast ISAM and 80 columns. Dual disk and TRSDOS required.

L216 $59
A cassette package of 10 business programs for Level II 16 K systems. Includes word processor and data base manager. Poker game $19.

Most programs are on-line, interactive, random-access, bug-free, documented, and delivered on disks. Mod-I programs require 32K TRSDOS. We're #1 in business software—don't let our low price fool you! Ask for our free 20-page catalog if you're still not convinced. Compiled versions are available.

MICRO ARCHITECT, INC. ✓54
96 Dothan St., Arlington, MA 02174

COMPILERS

ACCEL2: Compiler for TRS-80 Disk BASIC. Compiles selected subset to Z80 machine code in all four variable types, compact 1K run-time component controls interpreter to streamline all other statements and functions. Technique minimises code expansion without impairing huge speedups for true double optimisation. Six diagnostic messages, Local/Global options increase compatibility with subject programs. Output save to Disk, tapes. Professionals note: No royalties on the derived code. It's like having a 100 mhz clock **$88.95**

ACCEL: Compiler for TRS-80 Level II BASIC. Same huge speedups as ACCEL2 but in INTEGER variable type only. Run-time component just 256 bytes, ideal for graphics, games in 16K. Developed in Britain by Southern Software. **44.95**

TSAVE: Writes compiler output to SYSTEM tape **$9.95**

SOFTWARE CPU™

Super STEP: Animated Z80 Programming Models, Disassembler, Single-step/TRACE modes with intelligent RAM Window, 5 user-selectable Windows, single and cumulative instruction times in microseconds, Reference Space, much more. Big booklet, a Z80 Software CPU. 16K Level II TRS-80, TBUG required. No. BL-0 ..... **$19.95**

Super TLEGS: Relocates TBUG, Super STEP **$9.95**

EMU 02: Animated 6502 Programming Models, Disassembles to 6502 mnemonics. Single-step/TRACE modes, 6502 counterparts to #B, #J, #R, #F and #G commands, fast Cross-interpreter, keyboard scan port with p-instructions DB,EB control, paging in virtual address space, more. Big booklet & SYNERTEK card, a 6502 Software CPU.
16K Level II TRS-80, TBUG required. No. BL-1 ..... **$24.95**

COLOR COMPUTER

COCOBUG: 6809 Debugging monitor for TRS-80 Color Computer. Examine, modify memory/CPU registers, place breakpoints, execute single instructions or entire machine language programs in real time. Includes 6809 Reference card, runs in 4K. **$19.95**

MASTERCARD/VISA
Incl. .75 postage, CA add 6%

ALLEN GELDER SOFTWARE
Box 11721 Main Post Office
San Francisco, CA 94101

✓79

TRS-80, TBUG tm Radio Shack/Tandy Corp.
Software CPU tm Allen Gelder Software.

PRICE CRASH

16K DYNAMIC RAMS FOR

$24.50

Volume buying does it again: these are top quality, high speed, low power RAMs suitable for expanding memory in TRS-80* I/II/III and Color Computers, Heath H89, Apple, newer PETs, etc. Backed by one year limited warranty. Add $3 for two dip shunts and conversion instructions for TRS-80* I.

*TRS-80 is a trademark of the Tandy Corporation

Why pay more

. . .we stock the right parts at the right price.

Terms: Cal res add tax. Allow at least 5% shipping, excess refunded. VISA, Mastercard orders call (415) 562-0636, 24 hours. Include street address for UPS delivery. Prices subject to change without notice.

✓75

GODBOUT

GODBOUT ELECTRONICS
BOX 2355, OAKLAND AIRPORT, CA 94614

Wages Is Here

FOR THE TRS-80

- **Wages** MEETS PAYROLLS
- **Wages** IS GUARANTEED
- **Wages** COST ***ONLY*** $35.00 FOR MODEL I ($45.00 FOR MODEL II)

FROM
The Maine Software Library
P.O. Box 194 ✓268
Standish, Maine 04084

*A Trade name of the Tandy Corp.

✓See List of Advertisers on page 306

```
7F28   D6   60        NOCTL     SUB   $60                CHECK FOR LOWER CASE LETTERS
7F2A   F2   2F7F                JP    P,LOWCASE
7F2D   C6   20                  ADD   $20                ADD 20 AND GET 40 MORE IN FALL THRU
7F2F   C6   40        LOWCASE   ADD   $40                LOWER CASE SO CONVERT TO UPPER
7F31   C9             FIXED     RET                      CALL THE OUTPUT ROUTINE
                      *    LEVEL 2 GIVES 8 FOR BACKSPACE SO NO CHECK IS REQUIRED
                      *        AND $A FOR LINEFEED SO AGAIN NO CHECK
                      *
7F32   FE   5B        FIX2RS    CP    $5B                 CHECK FOR UP ARROW--IF SO GIVE OUT ESC
7F34   20   02                  JR    NZ,TRY.TAB
7F36   3E   1B                  LD    A,$1B
7F38   FE   09        TRY.TAB   CP    9                  CHECK FOR RIGHT ARROW--IF SO MAKE A TAB
7F3A   20   07                  JR    NZ,TRY.CLEAR
7F3C   3E   20                  LD    A,SPACE            PUT A SPACE OUT TO THE TUBE
7F3E   CD   6D7F                CALL  TOTV
7F41   3E   09                  LD    A,9
                      *
7F43   FE   1F        TRY.CLEAR CP    $1F                CHECK FOR CLEAR TUBE AND IF SO SEND NULL
7F45   20   11                  JR    NZ,GO.OUT
7F47   3E   1C                  LD    A,$1C              SET CURSOR TO HOME
7F49   CD   6D7F                CALL  TOTV
7F4C   3E   1F                  LD    A,$1F              CLEAR TV SCREEN
7F4E   CD   6D7F                CALL  TOTV
7F51   3E   0E                  LD    A,$E               TURN ON CURSOR
7F53   CD   6D7F                CALL  TOTV
7F56   3E   7F                  LD    A,$7F            LOAD UP $7F FOR TRANSMISSION
                      *
7F58   C9             GO.OUT    RET
```

Z80 ASSEMBLER V1.8C 79/12/20. 15.19.29. TERM2 THIS IS THE TERMINAL AT 300 BAUD
SUPPORT ROUTINES

```
                      *
                      *    FOR THE KEYBOARD --
                      *         Z=1 = NO KEY DOWN
                      *        NZ=0 = A KEY DOWN
                      *
7F59   CD   2B00      CHAR.INKB CALL  KBINPUT            GO GET THE KEY
7F5C   FE   00                  CP    0                  CHECK FOR A KEY DOWN
7F5E   28   0C                  JR    Z,DONE+5           DONE IF NO KEY EXIT WITH Z FLAG SET TO 1
7F60   FE   01                  CP    1                  CHECK FOR BREAK ON THE TRS-80 LEVEL 2
7F62   20   03                  JR    NZ,DONE            DONE IF NOT ZERO, THEN THERE WAS A KEY SO RETURN WITH
                      *                                  Z SET TO 0 BECAUSE IT WASN'T BREAK
7F64   CD   191A                CALL  SYS                IT WAS BREAK SO GO TO TOP OF THE MONITOR
7F67   CD   6D7F      DONE      CALL  TOTV               ECHO THE  CHARACTER
7F6A   FE   00                  CP    0                  SET Z FLAG TO OFF
7F6C   C9                       RET
                      *
                      * A REG HAS THE CHARACTER TO BE OUTPUT TO THE TV
                      *
7F6D   D5             TOTV      PUSH  DE,
7F6E   FDE5                     PUSH  IY                 MUST SAVE IY AND DE FOR TVOUT
7F70   CD   3300                CALL  TVOUT              WRITE THE CHARACTER TO THE TV
7F73   FDE1                     POP   IY
7F75   D1                       POP   DE
7F76   C9                       RET
```

Z80 ASSEMBLER V1.8C 79/12/20. 15.19.29. TERM2 THIS IS THE TERMINAL AT 300 BAUD
CHAR.INRS2 RS232 INPUT DRIVER

```
                      *   INPUT RS232 DRIVER
                      *
                      *     USES REGISTERS AS LISTED BELOW
                      *
                      *       A--IS USED FOR THE INPUT
                      *       B--IS USED TO HOLD THE BIT COUNT
                      *       D--IS USED TO BUILD THE CHARACTER
                      *       E--IS USED FOR THE DELAY COUNTER
                      *
                      *    CALL WITH 'CALL CHAR.INRS2'
                      *     RETURNS WITH 'RET' WITH THE CHAR IN A REG
                      *
                      *   THIS INPUT DRIVER READS 1 START BIT
                      *                           8 DATA BITS (MASKS TO 7)
                      *                           DOESN'T READ THE STOP BITS
                      *
                      *  HARDWARE REQUIRED IS A LEVEL SHIFTER FROM RS232 LEVELS
                      *   TO TTL LEVELS AND THE INPUT ON BIT 4 OF PORT $FF
                      *
                      *    FOR THE RS232 PORT INPUT--
                      *         Z   = 0 ON THE INPUT PORT = NO START BIT
                      *        NZ   = 1 ON THE INPUT PORT = CHARACTER RECIEVED
                      *
             7F77     CHAR.INRS2 EQU  *
7F77   DBFF                  IN       A,(INPORT)         CHECK FOR A START BIT
7F79   E6   10               AND      $10
7F7B   20   02               JR       NZ,ST.BIT
7F7D   18   2B               JR       GOOUT
7F7F   06   09        ST.BIT LD       B,9                SET UP THE COUNT
7F81   16   00               LD       D,0                CLEAR OUT THE CHARACTER
```

A MAJOR BREAKTHRU FOR

TRS 80™*

Electronic Engineers
Electronic Hobbiest
Electronic Students
Ham Operators

A General DC-AC (steady state) Analysis of Any Circuit

Will Analyze and Compute:

- Node, Branch, Element, Voltages
- Node, Branch, Element, Currents
- Branch Power Dissipation
- Magnitude and phase values and complete frequency response with graphic display
- Modify any element in circuit for desired results

A complete operational manual supplied comparable to I.B.M.'s E.C.A.P.™ Program

*A.C. Analysis Program *$149.95*

*D.C. Analysis Program *$89.95*

*Order before May 31, 1981 to get both for *$149.95*

To Order Write:
G & L Software Enterp.
2304 N. 1st. Street
Upland, CA 91786

60 DAY MONEY BACK GUARANTEE IF NOT SATISFIED.

VISA master charge

Do Not Send Cash in the Mail

TRS 80™ is a trademark of the Tandy Corp.. E.C.A.P. is a trademark of International Business Machines, Inc.

✓39

TRS-80™ MODEL III AND MODEL I SOFTWARE PACKAGES.

Can 30 user proven high-quality TRS-80 programs cost a mere $24.95?

We have a lot to gain by almost losing our shirts. Because we're a young, growing software company. We're BASICS AND BEYOND. And in order to build, we need your business.

MICROCOSM I. Thirty programs with everything from our incredible "Atlantis" game that'll challenge your intellect, to "Flowering Houseplants" for valuable reference.

MICROCOSM II. Twenty programs that require skill; the desire for intense concentration as in "Decipher." And practical guides like "Stain Removal." Both packages, for 16K Model I or Model III, on quality tape cassettes, with hardcover storage case and detailed handbook, just $24.95 each. Our prices will never be lower. Send today.

BOX 10 • AMAWALK, N.Y. 10501 (914) 962-2355 ✓49

BASICS & BEYOND, inc.

No charge for postage or handling. N.Y. residents add 5% sales tax. TRS-80 is a trademark of Radio Shack Division of Tandy Corp

EDAS EDAS

A sophisticated Editor & Assembler setting the standard for the '80 Model I & Model III. All EDAS commands and SOURCE text can be entered in either upper case or lower case. Direct assembly form memory or disk by means of *GET assembler directives. This gives text buffer capacity equal to your drive configuration! 30,000 bytes of symbol table.

Direct assembly to disk or memory for faster debugging operations! DOS "system" command functions KILL, DIR, FREE, and LIST are available from within the environment of EDAS.

The Editor, with renumber, maintains command syntax identical to the BASIC editor. Global change permits you to alter a string throughout a designated range of lines while block move relocates lines of text.

EDAS is priced at $79 plus $3 S&H. A 72-page manual included.

cmdfil

Now you can append two or more CMD files and/or SYSTEM tapes. Perform transfer to & from disk/tape of SYSTEM/CMD modules with offset capabilities. Read VTOS ISAM overlays. More! $20

MISOSYS SERIOUS SOFTWARE

LDOS is the latest generation of operating systems for the TRS-80 computers. LDOS is completely documented in an extensive operating manual and total on-going support from some of the most knowledgeable people in the industry is provided. In short, LDOS is THE operating system to use with the TRS-80 computers!

$139.00
+$3 S&H

LDOS 4.1

dsmblr

Complement your assembly language tools with this Z80 disassembler which produces screen, printer, cassette, or disk file output. A two-pass process provides SYMBOLS for 16-bit address and 8-bit relative references. EQUates & ORG are generated. Read SYSTEM programs & display load address range. $20 (DSMBLR I for non-disk use is $15)

Specify Model I or Model III

master charge VISA

MISOSYS - Dept MU
5904 Edgehill Drive
Alexandria, Virginia 22303
703-960-2998 MicroNET 70140,310
Dealer Inquiries Invited ✓221

diskmod

Turn your Editor Assembler into a disk package. This 32K patch modifies EDTASM for DOS operation. Features? Add full disk I/O, block move, global change, printer pagination with optional prompting, sorted symbol table, print memory utilization, correct DEFM expansion, protect memory, and recover after BOOT. From within the EDTASM you will have DIR, KILL, & FREE. Upgrade your EDTASM today! Version for EDTASM+ coming soon. $20.

THE BØØK

THE BØØK must be a part of your Z-80 language tools. Volume I gives you access to all math operations in your Level II ROM including ASCII-Binary conversions. Included is a symbol table of the entire machine noting over 500 addresses. Volume II tells you everything you wanted to know about the Level II I/O - printer, keyboard, video, and cassette routines are fully explained. Each volume has a fully-commented listing of all the routines discussed. THE BØØKs will save you hours of assembler program development time. Don't start programming without THE BØØKs. Each volume is priced at $14.95 + $1.50 S&H or buy both for $24.95.

```
123  7F83   1E   50              LD      E,ST.HDLY       DELAY 1/2 BIT TIME
124  7F85   CD   E47F            CALL    DELAY
125  7F88   DBFF                 IN      A,(INPORT)
126  7F8A   E6   10              AND     $10             MASK OFF THE INPUT
127  7F8C   28   1C              JR      Z,GOOUT         JMP TO RETURN IF NO START BIT PRESENT
128                      *
129                      *     MUST BE A VALID START BIT TO GET HERE
130                      *
131  7F8E   00           GET.MORE NOP
132  7F8F   1E   A2              LD      E,ST.WHDLY      SET UP FOR WHOLE DELAY
133  7F91   CD   E47F            CALL    DELAY
134  7F94   DBFF                 IN      A,(INPORT)
135  7F96   E6   10              AND     $10             MASK OFF THE OTHER BITS
136  7F98   B2                   OR      D               OR IT IN WITH WHAT IS RECIEVED SO FAR
137  7F99   57                   LD      D,A             PUT CHAR BACK INTO D
138  7F9A   CB0A                 RRC     D               SHIFT IN PREPERATION FOR NEXT TIME
139  7F9C   10   F0              DJNZ    GET.MORE
140                      *
141                      *   GOT ALL BITS TO GET HERE
142                      *
143  7F9E   CB0A                 RRC     D
144  7FA0   CB0A                 RRC     D
145  7FA2   CB0A                 RRC     D
146  7FA4   7A                   LD      A,D             PUT CHAR IN A REG FOR EXIT
147  7FA5   2F                   CPL
148  7FA6   E6   7F              AND     $7F             MASK IT OFF
149  7FA8   FE   FF              CP      $FF             SET ZERO FLAG TO OFF FOR SURE
```

```
Z80 ASSEMBLER V1.8C  79/12/20. 15.19.07.  FILE NAME--TERM1--300 BAUD TERMINAL
CHAR.OUTRS
```

```
140                      *
141                      *  OUTPUT RS232 DRIVER
142                      *    USES REGISTERS AS LISTED BELOW
143                      *
144                      *      A--IS USED TO OUTPUT THE CHARACTER BIT AT A TIME AND HAS THE CHAR ON ENTRY
145                      *      B--IS USED TO HOLD THE BIT COUNT
146                      *      D--IS USED TO HOLD THE CHAR
147                      *      E--IS USED FOR THE DELAY COUNTER
148                      *
149                      *  TO CALL USE  'CALL CHAR.OUTRS' WITH THE ASCII CHARACTER IN A REG
150                      *  RETURN IS WITH RET
151                      *
152                      *   THIS DRIVER PUTS OUT :
153                      *       1 START BIT
154                      *       7 DATA BITS
155                      *       2 STOP BITS (NO PARITY)
156                      *
157                      *    HARDWARE REQUIRED IS A LEVEL SHIFTER TO RS232 LEVELS
158                      *    DRIVEN BY BIT 4 OF OUTPUT PORT $FF
159                      *
160              448F    CHAR.OUTRS  EQU  *
161  448F   C5                   PUSH    BC
162  4490   D5                   PUSH    DE
163  4491   57                   LD      D,A
164  4492   06   07              LD      B,7
165  4494   3E   10              LD      A,$10           SET UP A FOR THE START BIT
166  4496   CB02                 RLC     D               BIT 0-->1
167  4498   D3FF                 OUT     (OUTPORT),A       DO THE START BIT
168  449A   CB02                 RLC     D               BIT 0-->2
169  449C   CB02                 RLC     D               BIT 0-->3
170  449E   CB02                 RLC     D               BIT 0-->4
171  44A0   1E   A3         PUT.MORE LD     E,PUT.DLY
172  44A2   CD   CC44            CALL    DELAY
173  44A5   7A                   LD      A,D
174  44A6   2F                   CPL
175  44A7   E6   10              AND     $10             MASK OFF BIT 4
176  44A9   D3FF                 OUT     (OUTPORT),A     OUTPUT THE BIT
177  44AB   CB0A                 RRC     D
178  44AD   10   F1              DJNZ    PUT.MORE        THIS WORKS ON B REG ONLY
179  44AF   1E   A3              LD      E,PUT.DLY
180  44B1   CD   CC44            CALL    DELAY
181  44B4   3E   00              LD      A,0             DO THE STOP BITS BECAUSE MUST BE FINISHED
182                      *                               TO GET HERE
183  44B6   D3FF                 OUT     (OUTPORT),A
184  44B8   CB0A                 RRC     D               FIX UP THE POSITION
185  44BA   CB0A                 RRC     D
186  44BC   CB0A                 RRC     D
187  44BE   1E   A3              LD      E,PUT.DLY       DO THE STOP BITS
188  44C0   CD   CC44            CALL    DELAY
189  44C3   1E   A3              LD      E,PUT.DLY
190  44C5   CD   CC44            CALL    DELAY
191  44C8   7A                   LD      A,D
192  44C9   D1                   POP     DE
193  44CA   C1                   POP     BC
194  44CB   C9                   RET
```

```
Z80 ASSEMBLER V1.8C  79/12/20. 15.19.29.  TERM2  THIS IS THE TERMINAL AT 300 BAUD
DELAY ROUTINE

205                      *
```

!!NOW AVAILABLE!!

I NDEX
SEQUENTIAL
ACCESS
METHOD

★ Get and Put Records to Disk File by "KEY"
★ Read File in Key Sequence Without Sorting
★ Delete Records Without Recopying File
★ Add Records to Disk Files in Any Sequence
★ Variable Key Length From 1 to 50 Characters
★ Machine Language or Basic Subroutines.

BUSINESS APPLICATION ADVANTAGES

- Improved Disk Utilization
- Easier Program Development
- Improved Operating Characteristics
- Reduce or Eliminate Sorting
- Improved Performance

ISAM SUBROUTINES **Documentation**
ISAM UTILITIES On Diskette $90.00

– PLUS – Free Mailing List Sample Application
Add 6% Sales Tax for California Orders

TRS-80 **MODEL I, II, & III** SOFTWARE FROM:

Johnson Associates - or - Telephone Order Line
P.O. Box 1402M ✓85 For Bank Card Sales
Redding, CA 96001 (916) 221-0740

WRITE FOR FREE CATALOG

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

Don't Blame The Software!

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

- **ISOLATOR (ISO-1) 3 filter isolated 3-prong sockets; integral Surge/Spike Suppression; 1875 W Maximum load, 1 KW load any socket $62.95**
- **ISOLATOR (ISO-2) 2 filter isolated 3-prong socket banks; (6 sockets total); integral Spike/Surge Suppression; 1875 W Max load, 1 KW either bank $62.95**
- **SUPER ISOLATOR (ISO-3), similar to ISO-1 except double filtering & Suppression $94.95**
- **ISOLATOR (ISO-4), similar to ISO-1 except unit has 6 individually filtered sockets $106.95**
- **ISOLATOR (ISO-5), similar to ISO-2 except unit has 3 socket banks, 9 sockets total $87.95**
- **CIRCUIT BREAKER, any model (add-CB) ..... Add $ 8.00**
- **CKT BRKR/SWITCH/PILOT (-CBS) ..... Add $16.00**

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

ESP Electronic Specialists, Inc.
171 South Main Street. Natick, Mass. 01760
Technical & Non-800: 1-617-655-1532 ✓58

TRS-80™ SOFTWARE

For The Model I & Model III Computers

MACHINE LANGUAGE SOFTWARE

MONITOR #3 ..... **$39.95**
Disassembler; memory displays, memory move, search verify, and modify; read and write object tapes; hexadecimal arithmetic; object code relocator; unload programs for disk; symbolic output tapes; 41-page instruction manual.

MONITOR #4 ..... **$49.95**
Same as Monitor #3 but adds: save and read disk files; direct input and output of disk sectors; send, receive, or talk to another computer via RS-232-C interface; symbolic disassembly on disk.

SMART TERMINAL **$69.95**
Enables your TRS-80 to be used as a remote terminal to a time-sharing system. Supports lowercase and full range of control keys. Automatic transmission between memory and host computer. Much more.

FASTSORT **$9.95**
Machine-language sorting program for use by Basic programs. Many times faster than other methods!

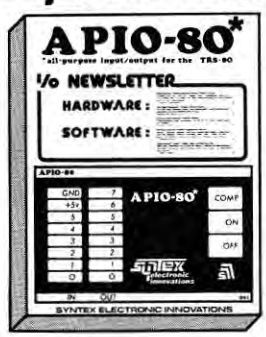
BASIC SOFTWARE

MAILING LIST **$69.95**
Maintains mailing list files of over 1000 names per diskette. Add, delete, change, find name, machine language sort, print file.

SMALL BUSINESS ACCOUNTING **$49.95**
Based on Dome Bookkeeping Journal #612, keeps track of income, expenditures, and payroll for a small business of up to 16 employees. Daily, monthly, year-to-date summaries.

HOWE SOFTWARE
14 Lexington Road, New City, N.Y. 10956
* TRS-80 is a registered trademark of Tandy Corp ✓103

EXCITING NEW uses for the TRS-80*



all purpose INPUT/OUTPUT PORT + teaching newsletter

- **the most useful peripheral**
- **don't spend more for less** **$45**
  - → **8 outputs 6 inputs**
  - → **assembled & tested PC board**
  - → **customizing kit included**
  - → **LII Basic or LI T-Bug**
  - → **WE TEACH YOU HOW**

with the APIO-80 newsletter subscription you will learn how to use the TRS-80 for:

* home security * robotics * test equipment simulation * printer int. * voice I/O *
* remote control * human and botanical interfacing * analog interface * light pen *
* amateur radio * telephone interface * model railroad * computer music * BSR I/O *

and a multiplicity of other uses
WE don't just say it, we DO it!

INSTANT-MAIL RECORDING LINE
for more info. call 717/733-4769
syntex electronic innovations
Box 4034 LANCASTER PA 17604

*TRS-80 IS A TRADEMARK OF TANDY CORP. (C) 80 BY SYNTEX ELECTRONIC INNOVATIONS

Bayesian Investment Services

Send for free catalog discussing TRS-80 programs available for evaluating:

Options & Futures
Stocks & Bonds
Convertible
& Other Hedges
Portfolio Position
Tax Positions
Market Timing

Write or call:

Bayesian ✓186
Investment
Services
Dept. H3
757 Santa Rosita
Solana Beach, CA 92075
(714) 755-6225

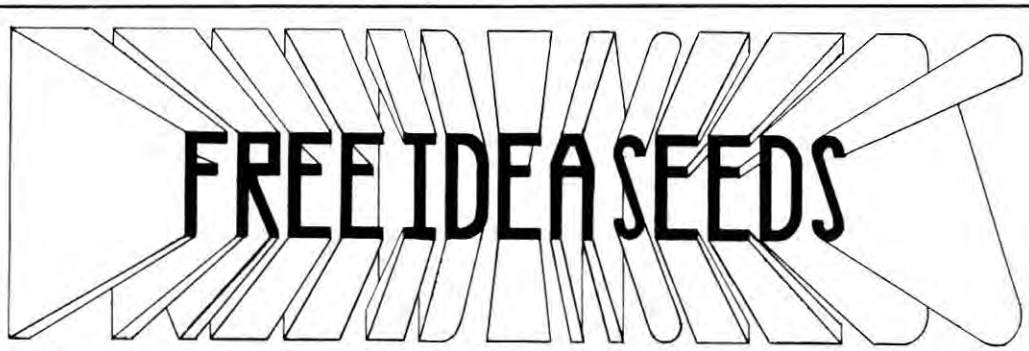
✓139

✓See List of Advertisers on page 306

```
206                         *  GENERAL PURPOSE DELAY SUBROUTINE
207                         *
208                         *  ASSUMES THE DELAY COUNT IS IN REG E
209                         *
210                         *
211                         *  CALL WITH 'CALL DELAY'
212                         *   RETURNS WITH E SET TO 0
213                         *
214  7FE4   00              DELAY     NOP
215  7FE5   00                        NOP
216  7FE6   00                        NOP
217  7FE7   00                        NOP
218  7FE8   00                        NOP
219  7FE9   1D                        DEC       E
220  7FEA   20   F8                   JR        NZ,DELAY
221  7FEC   C9                        RET
222                0000              END
```

```
Z80 ASSEMBLER V1.8C  79/12/20. 15.19.29.  TERM2  THIS IS THE TERMINAL AT 300 BAUD
SYMBOL TABLE

CHAR.INKB   7F59    CHAR.INRS2  7F77    CHAR.OUTRS  7FAB    DELAY       7FE4    DONE        7F67
FIXED       7F31    FIX2RS      7F32    FIX2TV      7F18    GET.MORE    7F8E    GOOUT       7FAA
GO.OUT      7F58    INPORT      00FF    KBINPUT     0028    LOWCASE     7F2F    MON.STK     7F00
NOCTL       7F28    OUTPORT     00FF    PUT.DLY     00A3    PUT.MORE    7F8A    SPACE       0020
START       7F00    ST.BIT      7F7F    ST.HDLY     0050    ST.WHDLY    00A2    SYS         1A19
TERMN       7F00    TOTV        7F6D    TRY.CLEAR   7F43    TRY.KB      7F0B    TRY.TAB     7F38
TVOUT       0033
```

```
Z80 ASSEMBLER V1.8C  79/12/20. 15.19.29.  TERM2  THIS IS THE TERMINAL AT 300 BAUD
CROSS REFERENCE LIST

CHAR.INKB 7F59        23     72 D
CHAR.INRS27F77        19    116 D
CHAR.OUTRS7FAB        26    173 D
DELAY     7FE4       124    133    183    191    199    201    214 D  220
DONE      7F67        74     76     79 D
FIXED     7F31        30     32     36     41 D
FIX2RS    7F32        25     46 D
FIX2TV    7F18        21     29 D
GET.MORE  7F8E       131 D  139
GOOUT     7FAA       120    127    150 D
GO.OUT    7F58        56     65 D
INPORT    00FF         9 D  117    125    134
KBINPLT   0028        12 D   72
LOWCASE   7F2F        38     40 D
MON.STK   7F00         8 D
NOCTL     7F28        34     37 D
OUTPORT   00FF        10 D  178    187    194
PUT.DLY   00A3         5 D  182    190    198    200
PUT.MORE  7F8A       182 D  189
SPACE     0020        13 D   51
START     7F00         3 D    8     15
ST.BIT    7F7F       119    121 D
ST.HDLY   0050         6 D  123
ST.WHDLY  00A2         7 D  132
SYS       1A19         4 D   78
TERMN     7F00        19 D   24     27
TOTV      7F6D        22     52     58     60     62     79     86 D
TRY.CLEAR 7F43        50     55 D
TRY.KB    7F0B        20     23 D
TRY.TAB   7F38        47     49 D
TVOUT     0033        11 D   88

       0 LINE(S) WITH ERRORS         0 LINE(S) WITH WARNINGS       479 MILLISECONDS USED
      31 SYMBOLS CREATED        85 REFERENCES
```

All you have to do is send a No. 10 size envelope, self-addressed and stamped, to:

✓62

CECDAT, INC.
P. O. Box 8963
Moscow, ID 83843

The most unique concept in software ideas. Are you tired of not knowing those tricks and shortcuts which the expert programmer utilizes without even thinking twice? Now you can pick up some tips and novel routines which will simplify your own BASIC programming. TRS-80 Model I LII.

TRS-80 is a trademark of Tandy Corp.

Free Idea Seeds is a trademark of CECDAT, INC.

SOFTWARE YOU CAN BET ON!

STUD5

A five card stud program so realistic you'll swear you're facing six professionals. You decide who's bluffing and who has the cards. Your opponents learn your style and that of the others and modify their betting strategies as the game proceeds. You can define the players' characteristics to match those of your Friday night poker club or let your computer define them randomly.

Only $13.00

TOUT3

A vastly improved version of the original TOUT horse race handicapper. Now, thousands of races are simulated in seconds to give you each horse's probability of winning and identify overlays. Horses are screened using factors derived from an operations research study. This handicapper outperforms programs and calculators selling for much more.

Only $19.00

DRAW5

Jacks or better to open with a joker that can be used as an ace or in straights or flushes (Gardenia CA rules). You play against six computer-controlled opponents. This program has true artificial intelligence capabilities. DRAW5 was developed originally by Real World Simulations. After three years of refining, it's now available for the TRS-80. It will provide hours of fun, challenge and education.

Only $13.00

TRADE IN your old advertised handicapping and poker-playing programs and receive a $6.00 credit. Include original cassette/disk and documentation with your order.

All programs on cassette for Level II 16K (Models I and III). Loading guaranteed. Add $3.50 to get one or more programs on a formatted diskette. Pa. residents add 6% sales tax.

WILSON ✓279
Software Division • 539 Springhouse Lane • Camp Hill, PA 17011

TRS-80 is a Tandy Corporation trademark.

BUSINESS USERS!

SAVE TIME & MONEY BY CONTROLLING YOUR LONG DISTANCE TELEPHONE COSTS

LONG DISTANCE ANALYZER will

- Sort your billed calls
- Identify each party called (from your known list) or print locations of unrecognized numbers
- Total the cost of calls to each number, to all numbers, and to all unrecognized numbers
- Analyze calls and tolls by area code, state, and WATS zone
- Print an alphabetical directory of recognized numbers
- Save verification time
- Create cost-consciousness
- Facilitate cost accounting and client billing
- Isolate personal calls and billing errors
- Reveal inefficient use patterns
- Help you perform WATS feasibility studies

Requires Model I, II, or III TRS-80*, Level II, 16K, and 1 disk. Printer is optional. No connection to phone system.

Model	Cassette	TRSDOS* disk
I	$95	$135
II	N/A	$155
III	$95	$135

Brochure on request.
Send model number and check or money order to:

Golden Braid Software
P. O. Box 2934 ✓281
Sarasota, Florida 33578

*TRS-80 and TRSDOS are trademarks of Tandy Corporation.

NEW EDUCATIONAL PROGRAMS for the TRS-80*

You can now order reading programs for
READING COMPREHENSION- ECONOMICS- PHYSICS- MATH-AUTO MECHANICS- HISTORY
2 FULL LENGTH PROGRAMS only $9.90
(one cassette)
16 PROGRAM COURSE only $77.00 (8 cassettes)

Order by checking the desired programs:

- ☐ *Reading Comprehension — Cd 1 / Cd 2 $9.90
- ☐ Cd 3 / Cd 4 $9.90
- ☐ Physics 1 / Physics 2 $9.90
- ☐ Economics 1 / Economics 2 $9.90
- ☐ History 9 / History 10 $9.90

*12 more Cd's available

- ☐ *Auto Mechanics — Ka 1 / Ka 2 $9.90
- ☐ Ka 3 / Ka 4 $9.90
- ☐ 2 Demo programs and Catalogue $9.90

Utilize with any Model I, Level I or Level II, 4K and 16K or any Model III. Displays lower case if you have it.

*12 more Ka's available *TRS-80 IS A TM OF TANDY CORP

I have enclosed a total of _____. $9.90 for each 2 program cassette ordered plus $.50 per cassette for shipping/handling to:

DORSETT ✓314
Educational Systems, Inc.
P.O. Box 1226, Norman, Ok. 73070

Name _____
Address _____
City _____ State _____ Zip _____

NEW

THE PROGRAM YOU'VE BEEN WAITING FOR

A magazine index for ALL your 1980 issues of **80-MICROCOMPUTING** or **KILOBAUD MICROCOMPUTING!**

Locate and **use** those special tutorials and how-to articles that you never read because you weren't interested at the time. Find **all** articles on printers, disks...you name it! FAST & EASY access of **any** article by subject search *or* key-word search, indexed by **topic.** NO catchy magazine titles to remember!

All programs are fully documented, guaranteed to load. **ORDER NOW** at a low introductory price and put your magazines to work for **YOU!**

PLEASE SPECIFY MAGAZINE AND DATES!

80-Microcomputing OR Kilobaud.

Jan-June 1980	16K	L-II	$11.95
Jul-Dec 1980	16K	L-II	$11.95
Jan-Dec 1980	32K	L-II	$19.95

Send check or M.O. to: ✓157

THE SYSTEMS SHACK
P.O. Box 281
Flushing, N.Y. 11358

N.Y.C. Residents add 8% tax
Kilobaud & 80-Microcomputing published by Wayne Green, Inc.

MEMOREX DISKETTES & CARTRIDGES

for your computer or word processor

BUY THE BEST FOR LESS. Lowest prices. **WE WILL NOT BE UNDERSOLD!!** Buy any quantity. Call free (800) 235-4137 for prices and information.

✓370
PACIFIC EXCHANGES
100 Foothill Blvd.
San Luis Obispo, CA
93401. (In Cal. call
(805) 543-1037.)

Know The Reasons Why The FORCE-80 is your "Best Buy."

FORCE-80 The computer protector

- Power dropout protection
- Suppresses transient voltages
- Suppresses RFI
- Disc protection
- Factory warranty
- Satisfaction guaranteed
- Direct from factory

FORCE-80

Only $121.50 plus $5.00 shipping & handling

Check, Mastercharge, Visa accepted
(5% discount for cash)
No C.O.D.'s please

P&S Electronics, Inc.
P.O. Box 23014 Dept. EM
Nashville, TN 37202
615-383-6210

✓406

Allow 6-8 weeks for delivery
Add 14 days for personal checks.

QUALITY SOFTWARE for the TRS-80™ MICROCOMPUTER

KEYWORD Indexing System

A series of programs that will create a data file on disc, build an index of all occurrences of "Keywords" in the text of the data file and allow inquiries or searches into the file using the indexed keywords. The system features:

- **flexible record lengths with location printers**
- **deletion of non keywords from index by system**
- **"and" "or" "not" logic for inquries**
- **interface for user written inquiries**

KEYWORD INDEX—2 disk 32K system $49.95
1 disk 32K system $39.95

SORTS for HOME and BUSINESS

No computer user should be without a versatile, easy to use sort program. The Northeast Microware in memory sort programs are written in Level II BASIC and have the following features:

- **Sort ALPHA or NUMERIC data**
- **Sort on up to 5 fields simultaneously**
- **In ascending or descending sequence**
- **Supports kb. video or tape I/O**
- **Supports seq. disk and printer I/O (SORT IID)**
- **Supports user I/O routines**
- **User exits (SORT IID only)**

SORT II—16K Level in memory sort $19.95
SORT IID—32K DOS in memory sort $29.95

FOR the SERIOUS GAMBLER
BLACKJACK SIMULATOR. Allows you to simulate the playing of thousands of hands of BJ and analyze the results on tape in Level II BASIC. $19.95

Manual for all programs available for $3.00 ea.
(price deductible on purchase of program)

"TRS-80 is a registered trademark of TANDY CORP."

Northeast MICROWARE
BOX 2133, ✓74
BOSTON, MA. 02106

"A PERFECT CLOAD EVERY TIME"

From a review in the September-October 1980 Elementary Electronics

$64.95

Alphanetics TRS-80 TAPE DIGITIZER available without cassette remote on/off switch for $59.95

- Eliminates cassette loading & copying problems ... even SYSTEM tapes!
- Makes tape program loading virtually independent of volume control setting!
- Makes perfect digital copies of any tape without using computer, removing hum, noise, & cures minor dropouts!
- Cassette switch allows manual control of cassette recorder.
- "Good Data" indicator easily enables setting proper volume ... doubles as a tape monitor!
- A.C. powered - no batteries to replace!
- Compatible with Level I & II.
- Feed your cassette to the TAPE DIGITIZER and feed your computer the exact digital waveform the TRS-80 gave to the tape!
- Get rid of your tape bugs today - $64.95 postpaid or return within 10 days for a full refund!

ALPHANETICS ✓124

P.O. BOX 597 FORESTVILLE, CA 95436

master charge 24 hr. phone (707) 887-7237 VISA

THE GREEN SCREEN THING

(The Green Thing a custom design to fit your TRS-80. It mounts in seconds without any tools.)

AVAILABLE: For models I, II, and III as well as any standard 12 inch monitor.

List $7.95 (Add $1.00 for shipping & handling, and California residents add 6% sales tax)

FEATURES:
- Improved image contrast
- Reduces eye fatigue
- Enhances screen legibility
- Decreases glare
- Gives system a professional look

ORDER NOW
24 HOUR
PH 408-946-1265
VISA

AVS ✓146 AUDIO - VIDEO SYSTEMS

2485 Autumnvale Dr. San Jose, CA. 95132

APARTMENT MANAGEMENT SYSTEMS... *TM Tandy Corp.

(Using the TRS-80 MOD II*)

...for first-time computer users & small real estate operators.

EASILY HANDLES ALL RECORD-KEEPING & CORRESPONDENCE FOR 200-2,000 RENTAL UNITS ... IN MINUTES!

NO EXPERIENCE NECESSARY

✓99

Dealerships Available

CCS

Complete financial recordkeeping & printed reports generated for all tenants, such as late charges due and paid, reports of amounts due, financial history by month and category & management information and payment history files and much, much more!

For further information, call or write:

CORNWALL COMPUTER SYSTEMS
(201) 238-5757
4 CORNWALL DR., E. BRUNSWICK, NJ 08816

JOY-6

THE ULTIMATE JOYSTICK INTERFACE FOR YOUR TRS-80*

Don't be left out. The best action and simulation games require smooth, clean, jitter free joystick control. That's what you get with **JOY-6**, and more!

- 2 joysticks with pushbuttons for fast action
- Sound effects capability. Great for space games
- Simple software control—write your own programs.
- Manual—schematic, theory of operation, software.
- 2 additional A to D channels for game paddles, sensors.

PLUS: Joypak-1 —A 16K L2 cassette with 6 fascinating new games — **SOLO, FRENZY, WIPEOUT, DOODLE, ENDPLAY** and **BLOCKADE** — an action and strategy game with 9 levels of difficulty. Try to break through your opponent's defenses. But watch out! While the enemy is rebuilding his blockade, he's destroying yours! Games can last for seconds or hours.

SPECIAL INTRODUCTORY OFFER! ALL THE ABOVE PLUS POWER SUPPLY— ASSEMBLED, TESTED, READY TO PLAY ONLY **$99.95**
COMPLETE KIT—ONLY **$84.95** QUALITY GUARANTEED

MEGA ✓272 systems INC.
262 PARK LANE
KING OF PRUSSIA, PA 19406

PHONE ORDERS WELCOME
215-337-3876
C.O.D., CHECK, M.O., M.C., VISA
Add $2.00 postage & handling
Pa. Res. add 6% tax

*TRS-80 is a Trademark of Tandy Corp.

TRS-80™ OWNERS!

Prepare Tax Returns for friends and relatives!

New easy to use Tax Program developed by J. D. Gramm

This 1040 Program (Individual Income Tax Return) has the following features

1. Adds and enters all information on W-2 forms
2. Computes and enters excess FICA
3. Computes tax
4. Automatically prepares information for TC
5. Automatically computes and enters Earned Income Credit
6. Prepares Itemized Deductions
7. Prepares Income Averaging
8. Prints Form 1040
9. Tax information and back up from J. D. Gramm
10. Tractor feed forms and schedules included in price

Equipment Needed Model 1, 2 or 3, 48K 1 disc Printer optional

***Price* 159.95**

J.D. GRAMM

✓481 *Phone: (305) 822-7341*

6846 NW 169 St., Miami, Fla. 33015

8o8o8o

Why punt around with winking cursors when you can make extra points by blocking?

Block that Cursor

Ron Balewski
412 E. Ridge St.
Nanticoke, PA 18634

One day I saw a software ad that fascinated me: It was for a patch to turn the TRS-80 cursor into a block cursor. I thought that might be a nice thing to have, but, because I'm a cheapskate, I decided not to buy it. I'd write it instead!

Program Listing 1 is the fruit of my efforts. Type it in, run it, and you have a block cursor!

Let's examine the program.

First, the program had to be tied into the video display driver routine—that was no problem. The Level II Manual told me that the driver address started at 16414.

Being baffled at this point, I did what any competent programmer would do—I punted. I knew that I didn't want scrolling and character printing in my program, so I decided to let the original driver do that.

I thought that all I'd do then was put a block character at the current cursor position which (again, according to the Level II manual) is stored at 16416. With this notion, I ground out some machine code. I didn't think it would be worth it to load EDTASM for such a small amount of code. My Program logic then looked something like this:

1. Call Radio Shack's video driver routine.
2. Put a block character in the current cursor position.
3. Return.

Voila!

Next, I converted everything to decimal, typed it into data statements, loaded it with BASIC, and patched it into the interpreter. Voila!! Block cursor!!

Now to test it. I listed the program—oops! Tacked onto the end of each line was a block cursor! Evidently the Radio Shack driver doesn't write a cursor every time it's called. This minor bug wouldn't do, so I tried to rectify the situation.

Finally, after some head-scratching, I came up with the answer. After my routine calls the Radio Shack driver, I look at the cursor position. If it contains a Radio Shack cursor then I put a block there. There must be a better way to do this, but it works for me.

You must first set memory size to 32635 because the block sits between 32635 and 32654. This is not the top of memory in a 16K computer. I often use the KBEEPFIX module by Dennis Kitsz (*80 Microcomputing*, February, 1980). Although I have a new style of keyboard that doesn't need debouncing (yet), I like the beep and auto-repeat features. Anyway, this block cursor program fits right under KBEEPFIX.

If you use another upper memory patch, or have a machine with more or less than 16K of memory, this program is relocatable. All you have to change then are the parameters of the FOR-NEXT loop in line 10, and the POKE statements in lines 60 and 70.

The cursor is the graphic character with the top four pixels lit (character code 143). I tried all six pixels (code 191), but the cursor extended too far below the text for my taste. I'm happy with the character I'm using. If you want to change to a different one (graphic or alphanumeric), just change the 143 in the data statement to the code for the particular character you want.

I feel that this patch, along with KBEEPFIX, adds a touch of elegance to the TRS-80. Try it, you'll like it!

If you have any questions or problems, please write me at my home address. I'd be glad to hear from you. ■

```
10 FORK = 32635TO32654
20 READX
30 POKEK,X
40 NEXTK
50 DATA245,197,205,88,4,237,75,32,64,10,254,95,32,3,62,143,2,193,241,201
60 POKE16414,123
70 POKE16415,127
80 END
```

Program Listing 1. Block Cursor Patch Program

Impress your computer. Answer some familiar prompts in hex.

Smart Answers

James F. Williams
720 West Haven Blvd.
Rocky Mt., NC 27801

How many times have you wanted to answer the SYSTEM prompt with /hex number? Want to answer the BASIC INPUT prompt with a non-string hex reply? Or PEEK and POKE hex addresses? Do you need to see the answer to a previous calculation in hex? All these goodies are at your command with Convert, by typing one of two shifted keys per conversion.

The two commands that activate this program are the shifted C and shifted B keys. Shift C implements a replacement conversion that deletes the number you typed in before hitting enter or a non-hex character, and substitutes a five-character conversion, using leading 0s and an H after hex numbers. Shift B activates a backward search from the current cursor position for the last displayed decimal string. It marks the end of the string on the screen with an @ and replaces it with the hex equivalent at the cursor location. Both commands cause the program to generate characters just as if they were typed in by hand: The new characters are not only on the screen, but in the input buffer as well.

The following examples are offered for clarification. The shift key, enter key and break key are designated by <SH>, <EN>, and <BR>, respectively.

- Problem: (7E00H – 7D29H) × F4H = ?
  Type: ?(7E00H <SH> C – 7D29H <SH> C) * F4H <SH> C <EN>
  Comment: The answer is in decimal. To convert to hex, type: <SH> B
- Problem: Begin execution of a machine language program with an entry point of 7E00H
  Type: SYSTEM <EN> / 7E00H <SH> C <EN>
- Problem: Write a short program that will allow you to examine two adjacent memory locations as a two-byte word in hex.
  Type: 10 INPUT H: ?PEEK(H) + PEEK(H + 1) * 256: GOTO 10 <EN>
  Comment: Program is in. Now we will execute it.
  Type: RUN <EN> 40E8H <SH> C <EN>
  Comment: Answer is in decimal. To convert, type: <SH> B We can now examine what the contents of 40E8H point to.
  Type: <SH> C <EN> <SH> B
  Comment: We could have deleted the hex number with <SH>← and typed in a hex number.
- Problem: Type in the following BASIC program line, and then EDIT the PEEK address to 3820H to demonstrate that the <SH> C command works in EDIT mode, (I)nsert submode.
  Type: 20?PEEK(123);:GOTO20 <EN>
  Comment: The line is now in memory to EDIT,
  Type: EDIT20 <EN> S13DI3820H <SH> C <EN>
  Comment: We (S)earched for a 1, (D)eleted three characters, (I)nserted 3820H, (C)onverted it, and concluded EDITing.

Note: When using shift C after an address with POKE, be sure to leave a space between the E in POKE and the first hex character, or the E will be interpreted as a hex character.

CONVERT uses three ROM routines. 1E4FH converts an unsigned decimal string pointed to by HL and terminated with a 0 byte into a two-byte value stored in DE. Radio Shack, in its infinite wisdom, decided that it was not necessary for the routine to convert 65530 - 65535 (FFFAH - FFFFH). Therefore, the largest decimal number that this routine will convert is 65529. Larger numbers will produce a SYNtax error.

132FH converts a two-byte value stored in 4121H to an unsigned decimal string beginning at the address pointed to by HL. It is good to 65535. RST 18H is a one-byte call to 18H. The routine there compares DE to HL (HL-DE) and sets the condition flag without altering DE or HL.■

80 microcomputing T.M. bookshelf

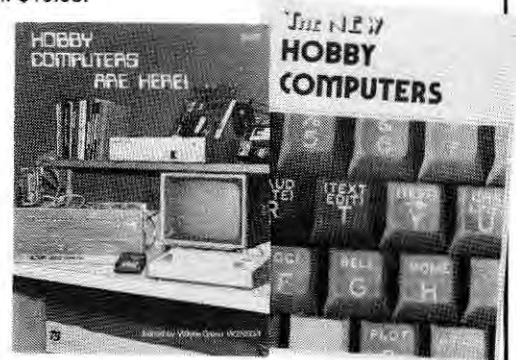
3 new books from the editors of KB & 80 Microcomputing

● **40 COMPUTER GAMES**—BK7381—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. $7.95*

● **UNDERSTANDING AND PROGRAMMING MICROCOMPUTERS** —BK7382—A valuable addition to your computing library. This two part text includes the best articles that have appeared in 73 and Kilobaud Microcomputing magazines on the hardware and software aspects of the new microcomputing hobby. Well known authors and well structured text helps the reader get involved in America's fastest growing hobby. $10.95*

● **SOME OF THE BEST FROM KILOBAUD/MICROCOMPUTING**—BK7311—A collection of the best articles that have recently appeared in Kilobaud/MICROCOMPUTING. Included is material on the TRS-80 and PET systems, CP/M, the 8080/8085/Z80 chips, the ASR-33 terminal. Data base management, word processing, text editors and file structures are covered too. Programming techniques and hardcore hardware construction projects for modems, high speed cassette interfaces and TVTs are also included in this large format, 200 plus page edition. $10.95.*

INTRODUCTORY



● **THE NEW HOBBY COMPUTERS**—BK7340—This book takes it from where "HOBBY COMPUTERS ARE HERE!" leaves off, with chapters on Large Scale Integration, how to choose a microprocessor chip, an introduction to programming, low cost I/O for a computer, computer arithmetic, checking memory boards . . . and much, much more! Don't miss this tremendous value! Only $4.95.*

● **HOBBY COMPUTERS ARE HERE!**—BK7322—If you (or a friend) want to come up to speed on how computers work . . . hardware and software . . . this is an excellent book. It starts with the fundamentals and explains the circuits, and the basics of programming. This book has the highest recommendations as a teaching aid for newcomers. $4.95.*

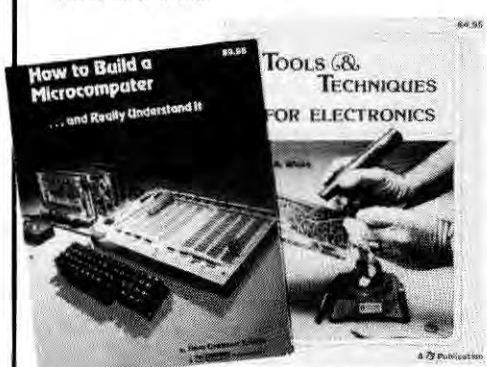
INTRODUCTION TO MICROCOMPUTERS (VOL. 0→III)

● **AN INTRODUCTION TO MICROCOMPUTERS, VOL. 0**—BK1130—The Beginner's Book—Written for readers who know nothing about computers—for those who have an interest in how to use computers—and for everyone else who must live with computers and should know a little about them. The first in a series of 4 volumes, this book will explain how computers work and what they can do. Computers have become an integral part of life and society. During any given day you are affected by computers, so start learning more about them with Volume 0. $7.95.*

● **VOL. I**—BK1030—**2nd Edition completely revised.** Dedicated to the basic concepts of microcomputers and hardware theory. The purpose of Volume I is to give you a thorough understanding of what microcomputers are. From basic concepts (which are covered in detail), Volume I builds the necessary components of a microcomputer system. This book highlights the difference between minicomputers and microcomputers. $12.99.*

● **VOL. II**—BK1040 (with binder)—Contains descriptions of individual microprocessors and support devices used only with the parent microprocessor. Volume II describes all available chips. $31.99*

● **VOL. III**—BK1133 (with binder)—Contains descriptions of all support devices that can be used with any microprocessor. $21.99*



● **HOW TO BUILD A MICROCOMPUTER—AND REALLY UNDERSTAND IT**—BK7325—by Sam Creason. The electronics hobbyist who wants to build his own microcomputer system now has a practical "How-To" guidebook. This book is a combination technical manual and programming guide that takes the hobbyist step-by-step through the design, construction, testing and debugging of a complete microcomputer system. Must reading for anyone desiring a true understanding of small computer systems. $9.95.*

● **TOOLS & TECHNIQUES FOR ELECTRONICS**—BK7348—by A. A. Wicks is an easy-to-understand book written for the beginning kit builder as well as the experienced hobbyist. It has numerous pictures and descriptions of the safe and correct ways to use basic and specialized tools for electronic projects as well as specialized metal working tools and the chemical aids which are used in repair shops. $4.95.*

"PRICES SUBJECT TO CHANGE WITHOUT NOTICE"

*Use the order card in the back of this magazine or itemize your order on a separate piece of paper and mail to 80 Microcomputing Bookshelf ● Peterborough NH 03458. Be sure to include check or detailed credit card information. No C.O.D. orders accepted. All above add $1.00 handling. Please allow 4–6 weeks for delivery. Questions regarding your order? Please write Customer Service at the above address.

FOR TOLL FREE ORDERING CALL 1-800-258-5473

80 microcomputing T.M. bookshelf

Z80 BOOKS

NEW!

● **MICROSOFT BASIC DECODED AND OTHER MYSTERIES**—BK1186—by James Farvour. 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 give the reader a real insight into how the interpreter works. $29.50 (Available after December 20th).

● **TRS-80 DISK AND OTHER MYSTERIES**—BK1181—by Harvard C. Pennington. This is the definitive work on the TRS-80 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. $22.50.*

● **PROGRAMMING THE Z-80**—BK1122—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. $14.95.*

● **Z-80 ASSEMBLY LANGUAGE PROGRAMMING**—BK1177—by Lance A. Leventhal. This book thoroughly covers the Z80 instruction set, abounding in simple programming examples which illustrate software development concepts and actual assembly language usage. Features include Z80 I/O devices and interfacing methods, assembler conventions, and comparisons with 8080A/8085 instruction sets and interrupt structure. $16.99.*

● **Z-80 SOFTWARE GOURMET GUIDE AND COOKBOOK**—BK1045—by Nat Wadsworth. Scelbi's newest cookbook! This book contains a complete description of the powerful Z-80 instruction set and a wide variety of programming information. Use the author's ingredients including routines, subroutines and short programs, choose a time-tested recipe and start cooking! $16.99.*

● **INTRODUCTION TO TRS-80 GRAPHICS**—BK1180—by Don Inman. Dissatisfied with your Level I or Level II manual's coverage of graphics capabilities? This well-structured book (suitable for classroom use) is ideal for those who want to use all the graphics capabilities built into the TRS-80. A tutorial method is used with many demonstrations. It is based on the Level I, but all material is suitable for Level II use. $8.95.*

BASIC & PASCAL

● **BASIC BASIC (2ND EDITION)**—BK1026—by James S. Coan. This is a textbook which incorporates the learning of computer programming using the BASIC language with the teaching of mathematics. Over 100 sample programs illustrate the techniques of the BASIC language and every section is followed by practical problems. This second edition covers character string handling and the use of data files. $10.50.*

● **LEARNING LEVEL II**—BK1175—by David Lien. Written especially for the TRS-80, this book concentrates on Level II BASIC, exploring every important BASIC language capability. Updates are included for those who have studied the Level I User's Manual. Sections include: how to use the Editor, dual cassette operation, printers and peripheral devices, and the conversion of Level I programs to Level II. $15.95.*

● **THE BASIC HANDBOOK**—BK1174—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. $14.95.*

● **INTRODUCTION TO PASCAL**—BK1189—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. $12.95.*

● **ADVANCED BASIC**—BK1000—Applications, including strings and files, coordinate geometry, area, sequences and series, simulation, graphing and games. $10.75*.

"PRICES SUBJECT TO CHANGE WITHOUT NOTICE"

*Use the order card in the back of this magazine or itemize your order on a separate piece of paper and mail to 80 Microcomputing Bookshelf • Peterborough NH 03458. Be sure to include check or detailed credit card information. No C.O.D. orders accepted. All above add $1.00 handling. Please allow 4–6 weeks for delivery. Questions regarding your order? Please write Customer Service at the above address.

FOR TOLL FREE ORDERING CALL 1-800-258-5473

80 microcomputing T.M. bookshelf

GAMES

NEW!

● **MORE BASIC COMPUTER GAMES** – BK1182 – edited by David H. Ahl. More fun in BASIC! 84 new games from the people who brought you *BASIC Computer Games*. Includes such favorites as Minotaur (battle the mythical beast) and Eliza (unload your troubles on the doctor at bargain rates). Complete with game description, listing and sample run. $7.50.*

● **WHAT TO DO AFTER YOU HIT RETURN** – BK1071 – PCC's first book of computer games . . . 48 different computer games you can play in BASIC . . . programs, descriptions, many illustrations. Lunar Landing, Hammurabi, King, Civel 2, Qubic 5, Taxman, Star Trek, Crash, Market, etc. $10.95.*

● **BASIC COMPUTER GAMES** – BK1074 – Okay, so once you get your computer and are running in BASIC, then what? Then you need some programs in BASIC, that's what. This book has 101 games for you from very simple to real buggers. You get the games, a description of the games, the listing to put in your computer and a sample run to show you how they work. Fun. Any one game will be worth more than the price of the book for the fun you and your family will have with it. $7.50.*

SPECIAL INTERESTS

● **THE CP/M HANDBOOK (with MP/M)** – BK1187 – 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. $13.95.

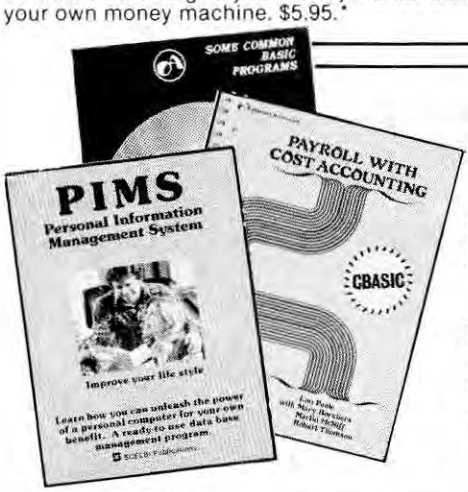
● **HOW TO MAKE MONEY WITH COMPUTERS** – BK1003 – In 10 information-packed chapters, Jerry Felsen describes more than 30 computer-related, money-making, high profit, low capital investment opportunities. $15.00.*

● **HOW TO SELL ANYTHING TO ANYBODY** – BK7306 – According to *The Guinness Book of World Records*, the author, Joe Girard, is "the world's greatest salesman." This book reveals how he made a fortune – and how you can, too. $2.25.*

NEW!

● **THE INCREDIBLE SECRET MONEY MACHINE** – BK1178 – by Don Lancaster. A different kind of "cookbook" from Don Lancaster. Want to slash taxes? Get free vacations? Win at investments? Make money from something that you *like* to do? You'll find this book essential to give you the key insider details of what is really involved in starting up your own money machine. $5.95.*

BUSINESS



● **PAYROLL WITH COST ACCOUNTING – IN BASIC** – BK1001 – by L. Poole & M. Borchers, includes program listings with remarks, descriptions, discussions of the principle behind each program, file layouts, and a complete user's manual with step-by-step instructions, flowcharts, and simple reports and CRT displays. Payroll and cost accounting features include separate payrolls for up to 10 companies, time-tested interactive data entry, easy correction of data entry errors, job costing (labor of distribution), check printing with full deduction and pay detail, and 16 different printed reports, including W-2 and 941 (in **CBASIC**). $20.00.*

● **SOME COMMON BASIC PROGRAMS** – BK1053 – published by Adam Osborne & Associates, Inc. Perfect for non-technical computerists requiring ready-to-use programs. Business programs, plus miscellaneous programs. Invaluable for the user who is not an experienced programmer. All will operate in the stand-alone mode. $14.99 paperback.

● **PIMS: PERSONAL INFORMATION MANAGEMENT SYSTEM** – BK1009 – Learn how to unleash the power of a personal computer for your own benefit in this ready-to-use data-base management program. $11.95.*

PRICES SUBJECT TO CHANGE WITHOUT NOTICE

*Use the order card in the back of this magazine or itemize your order on a separate piece of paper and mail to 80 Microcomputing Bookshelf ● Peterborough NH 03458. Be sure to include check or detailed credit card information. No C.O.D. orders accepted. All above add $1.00 handling. Please allow 4–6 weeks for delivery. Questions regarding your order? Please write Customer Service at the above address.

FOR TOLL FREE ORDERING CALL 1-800-258-5473

Just like the real McCoy...
...except for the price and label

Super Savings on Printers for the TRS-80®

New Low Price

Faster than any Radio Shack Printer

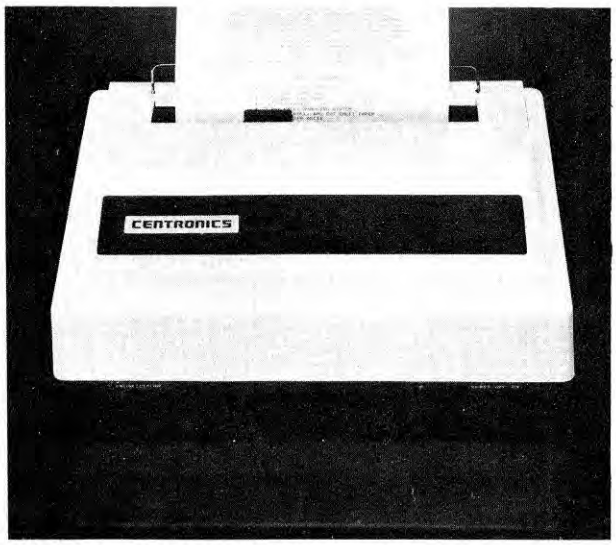
CENTRONICS 704-11
(same as 703-9)

CENTRONICS PARALLEL INTERFACE
Ideal for TRS-80

180 Characters Per Second, Bi-Directional, Logic Seeking, with Tractor
Adjustable to 16"

FORMER LIST PRICE $2975

NOW ONLY $1695



Disc Drive Values
for TRS-80
Your Choice
5¼" Disk Drives

Shugart, MPI-51, or Tandon
w/case & Power Supply

$499 VALUE

MMM PRICE ONLY

$329
2 for $638

CENTRONICS 730

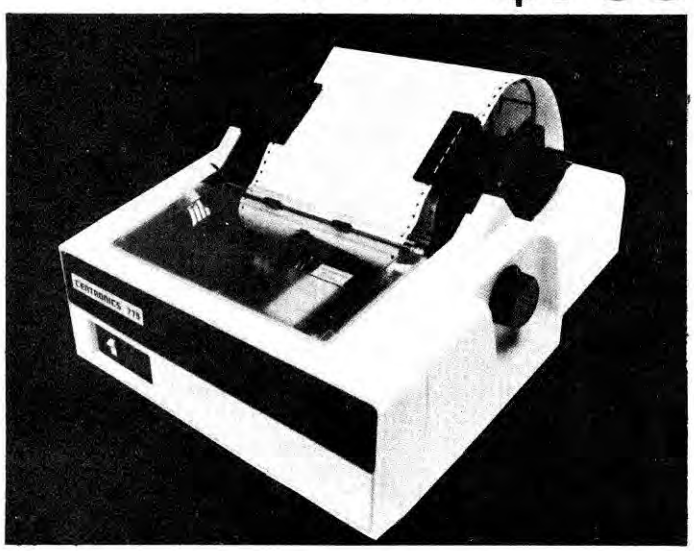
Same as R.S. Line Printer II
LIST PRICE $795
(add $7.50 for shipping)

NOW ONLY $599

CENTRONICS 779-2

Same as R.S. Line Printer I w/tractor
LIST PRICE $1350
(Ship freight collect)

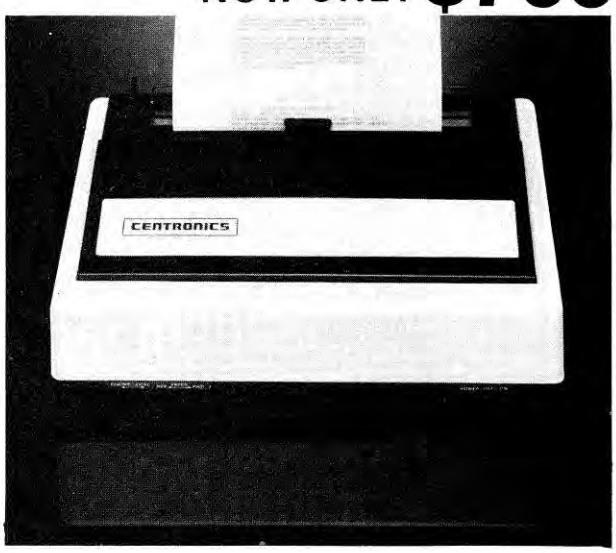
NOW ONLY $799



CENTRONICS 737

Same as R.S. Line Printer IV
Featuring Correspondence Quality and Proportional Spacing
LIST PRICE $995

NOW ONLY $799



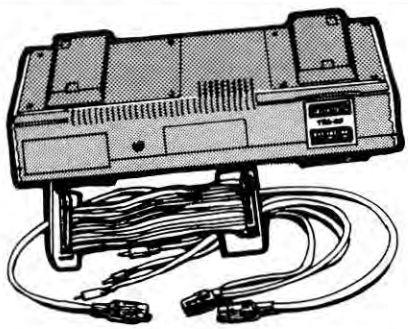
MiniMicroMart, Inc.

✓24

1618 James Street, Syracuse NY 13203 (315) 422-4467 TWX 710-541-0431

HOBBYWORLD ELECTRONICS, INC.

19511 BUSINESS CENTER DR., DEPT V4, NORTHRIDGE, CA 91324



TRS-80* Expansion Interfaces

Factory sealed Radio Shack* expansion interfaces for the TRS-80. Available with 16K or 32 K of memory installed. Wt 10 lb.

Cat No. 3001 16K interface **$415.00**
Cat No. 3002 32K interface **$450.00**

**Radio Shack and TRS-80 are registered trademarks of Tandy Corporation*

SCOTT ADAMS ADVENTURE #10

Savage Island (Part 1)

A remote island in the Pacific ocean holds an awesome secret. This is part 1 of a multi-part adventure. For experienced adventurers. Wt 4 oz.

Cat No.	Description	Price
2988	TRS-80 model 1&3, L2, 16K, cass	$14.95
2989	TRS-80 model 1&3, L2, 16K, disk	$19.95

Asteroid $19.95

Destroy the asteroids and prevent the alien spacecraft from penetrating Earth's defenses. Played in real-time, this machine language game features multiple levels of play, high speed graphics, sound effects and auto scoring. Wt 4 oz.

Cat No. 2992 TRS-80, L2, 16K, disk

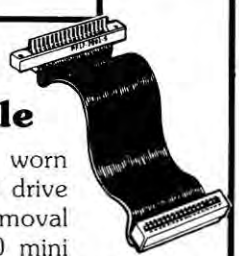
5¼" Diskettes

for the TRS-80®

- *Single sided, double density*
- *35 & 40 track sectoring*
- *10 per box*
- *Wt 1 lb.*

Cat No.	Description	Price
2987	"Brown Bag" special, major mfg, no label	$25.00
1147	Verbatim, 40 track, w/hub rings	$29.00
2953	As above, with plastic box	$31.00
2909	Memorex, 40 track tested	$29.00
2952	Maxell, soft sector	$37.95

Disk Drive Extender Cable



Eliminate pinched and worn cables. End the hassle of drive cabinet disassembly for removal of cables. Fits all TRS-80 mini disk drives. Wt 6 oz.

Cat No. 2775 $16.95

Times are changing...and so is our name!

From being "just a hobby", electronics today has become a way of life.

In keeping up with the times we're changing our name. On June 1st, Hobbyworld Electronics will become **HW Electronics**. ↙23

How to Order

Order by phone, mail or at our retail stores. Pay by check, money order, Visa, Mastercard, or COD. Please include card number, exp. date and bank number with charge card orders. Add $1.40 for COD. **Shipping:** Specify UPS or Parcel Post **Ground:** $2.00 for first 2 lbs, 40¢ each addl. **Air:** $3.50 for first 2 lbs, $1.00 each addl.

TOLL FREE (outside Calif) (800) 423-5387

IN CALIF (213) 886-9200

Send for your free HOBBYWORLD Catalogue...filled with thousands of products and accessories for your personal computer needs.

Name_____

Company_____

Address_____

City_____

State_____ **Zip**_____

↙See List of Advertisers on page 306

MIDWEST COMPUTER PERIPHERALS

INVENTORY CLEARANCE SALE
PRICES SLASHED!!

COMPUTER SYSTEMS

ALTOS MODEL ACS-8000-2 64k, 2 drive, single user	$3769
MODEL ACS-8000-5MU2 112k, 2 drive, two user	$5809
APF IMAGINATION MACHINE Complete System	$1015
APPLE II plus 16k	$1096
ATARI 400	$509
ATARI 800	$815
COMPUCOLOR 3 8k complete package	$1478
RADIO SHACK MODEL III 16k	$899
EXPANSION INTERFACE OK	$274
MODEL II 64k w/ one drive	$3499
We carry the complete **RADIO SHACK** line at a discount	
SD SALES SDS-100	*6299
SDS-200	*$6699
ZENITH Z-89 (48k)	$2447

PRINTERS

ANACOM 150 150 cps, bi-directional, 9 x 9 matrix	$1319
ANADEX DP-9500	$1529
CENTRONICS MODEL 779 TRACTOR PRINTER	$999
737 "Letter Quality" w/ cable	$815
We Carry the complete **CENTRONICS line!**	
DIABLO MODEL 630 RO w/Tractors	*$2579
EPSON MX-70	$399
MX-80 Tractor feed, bi-directional, 80 cps	$550
INTEGRAL DATA IDS 445G w/2K Buffer & Graphics w/Cable	$752
IDS-460 w/Cable	$1209
MPI MT-88 TRACTOR PRINTER w/cable	$659
MT-88G Graphics printer w/ cable	$699
OKIDATA 82 Bi-directional w/ tractor cable	$862
83 15" Carrage/Bi-directional	$1099
NEC SPINWRITER 5510 RO Serial	*$2579
5520 KSR Serial	*$2879
5530 RO Parallel	*$2579
OKIDATA MICROLINE 80 PRINTER 80 cps, 9 x 7 matrix	$554
w/Tractors and cable	$679
TEXAS INSTRUMENTS 810 Basic	*$1499
TRS-232 PRINTER INTERFACE	$59
Allows you to use any serial printer with the **TRS-80**.	

WE NOW TAKE
AMERICAN EXPRESS

TERMINALS

ADDS REGENCY 25	*$1295
HAZELTINE MODEL 1510	*$1095
1520	*$1295
PERKIN-ELMER BANTAM	*$799
SOROC IQ 120	*$759
IQ 140	*$1199
TELEVIDEO 912C	*$799
920C	*$859
ZENITH Z-19	*$899

CALIFORNIA COMPUTER SYSTEMS

MODEL 2016C 16k Static RAM board, A & T	$242
2200 MAINFRAME A & T	$352
MOTHERBOARD 12 slots, A & T	$101

APPLE PRODUCTS

Model 7440 PROGRAMMABLE TIMER BOARD A & T	$99
7470 3¾ DIGIT BCD A to D Converter A & T	$102
7490 GPIB (IEEE 488-1978) INTERFACE A & T	$202
7710 ASYNCHRONOUS SERIAL INTERFACE A & T	$132
7712 SYNCHRONOUS SERIAL INTERFACE A & T	$142
7720 PARALLEL INTERFACE A & T	$99
7811 ARITHMETIC PROCESSOR A & T	$356
7114 12k ROM/PROM Module A & T	$69

We carry the complete line of **CCS** products

SD SALES S-100 BOARDS

MODEL Expandoram (NO RAM)	KIT	$192
VDP-8024	KIT	$302
VDB-8024	A & T	$402
VDB-8024	A & T	$402
Z-80 STARTER KIT		$302
Z-80 STARTER SYSTEM	A & T	$382
SBC-100	KIT	$252
SBC-100	A & T	$305
SBC-200	KIT	$274
Versafloppy	Kit	$223
Versafloppy	A & T	$295
Versafloppy II Double Density	KIT	$305
Versafloppy II Double Density	A & T	$376

master charge THE INTERBANK CARD

Midwest Computer Peripherals

VISA

1467 S. Michigan Ave. #8
Chicago, IL 60605

WE PAY UPS CHARGES ON MOST ORDERS
IN THE CONTINENTAL U.S.

FLOPPY DISK STORAGE

CORVUS 11T 10 MEGABYTE HARD DISK *$4029
Fully compatible with **TRS-80, APPLE II,** and **S-100**

LOBO 400T $399
TRS-80 plug-in compatible 5.25" single headed 35 track drive. With Power Supply and case.

MPI MODEL B51 $321
TRS-80 plug-in compatible 5.25" single headed 40 track drive. Comes complete with case and power supply. **90 DAY WARRANTY.**

BARE DRIVES
(No Case or Power Supply)

5" MODELS

MPI MODEL 51	40 tracks, 5 ms.	$254
MPI MODEL 52	Double headed, 80 tracks	$299
MPI MODEL 91	80 tracks	$299
MPI MODEL 92	160 Tracks, Double headed	$399

5.25" POWER SUPPLIES WITH CASE

STANDARD MINI DISK POWER SUPPLY WITH CASE	$80
DELUXE MINI DISK POWER SUPPLY w/CASE & extender card	$131
DUAL MINI DISK POWER SUPPLY w/CASE	$121
DISK DRIVE EXTENDER CABLE	$16

DRIVE CABLES

1 DRIVE TRS-80 CABLE	$24
2 DRIVE TRS-80 CABLE	$29
3 DRIVE TRS-80 CABLE	$35
4 DRIVE TRS-80 CABLE	$40

We'll make any cable! Call us with specs.

THE DOUBLER by PERCOM DATA $203
Double density controller for **TRS-80 Model I.** With data separator. (Use your **PERCOM DISCOUNT** coupon)
DATA SEPARATOR by Percom Data $29
Stops read errors on inner tracks.

SOFTWARE

NEWDOS (40 Track)	$49
NEWDOS + (40 Track)	$99
NEWDOS 80	$139
MICROSOFT FORTRAN	$85
Z80 Softcard	$305
Super Utility	$49
Make 80	$14
Electric Pencil (disk)	$130

10% off all **RADIO SHACK** software

We carry SBSG, Microsoft, personal software, Apparatt and many other brands. All at a discount.

DISKETTES

		(Prices per box of 10) VERBATIM	DYSAN	BASF
5 1/4"	Single sided, single density	$31	$41	$28
	Single sided, double density	$40	$42	
	Double sided, single density	$48	$45	
	Double sided, double density	$48	$48	
8"	Single sided, single density	$41	$41	
	Single sided, double density	$51	$61	
	Double sided, single density	$61	$51	
	Double sided, double density	$61	$61	

When ordering diskettes, please give us your make and model number of computer or disk drive, or give us the brand and part number of the diskettes you are currently using.

5 1/4" **LIBRARY CASE** holds 10 disks	$3.95
BINDER HOLDER holds 2 disks	10 for $7.95
8" **LIBRARY CASE** holds 10 disks	$4.95
BINDER HOLDER holds 2 disks	10 for $19.95
FLOPPY SAVER	5 1/4" $14.95
	8" $16.95
	Refills also available!
16k **MEMORY KITS** 200 ns	$39.00

NEC UPD416C-2 prime dynamic RAM. Compatible with TRS-80, APPLE, or any computer specifying 4116 dynamic RAM.

HOW TO ORDER:
PHONE ORDERS: HOURS 10AM - 5PM CST MON - FRI
BY CHECK: Call in your order then send us a cashiers check or money order. This way we can have your order waiting for you when your check arrives. Personal checks require 10-14 days to clear.
BY CREDIT CARD: Just have your **MASTER CHARGE** or **VISA** or **AMERICAN EXPRESS** handy, we'll do the rest.
MAIL ORDERS: NEW ADDRESS 1467 South Michigan Ave., Chicago, IL 60605.
ALL MAIL ORDERS: Send your **NAME** and **STREET ADDRESS** (we ship UPS), **CITY, STATE, ZIP CODE AND TELEPHONE NUMBER** along with your order.
BY CHECK: Include a cashiers check or money order with your order. Personal checks require 10-14 days to clear. For your safety, mail your order via insured mail. **BETTER SAFE THAN SORRY.**
BY CREDIT CARD: Neatly type or print your **MASTER CHARGE** or **VISA** account number along with the expiration date and 4 digit interbank number (MC only).
IL. RES. ADD 6% SALES TAX

SHIPPING INFORMATION: We pay all UPS ground service charges (USA only, BLUE LABEL EXTRA) on all items except those denoted with an asterisk (*). (*) items must go airfreight or truck and can be sent freight collect.
FOREIGN ORDERS WELCOME. CALL OR WRITE.
ALL orders F.O.B. Chicago, Il.

WARRANTY INFORMATION: All Equipment carries a 90 day parts and labor warranty, unless otherwise noted. Warranty repair or replacement will be provided at no charge, excluding shipping costs. **10 DAY MONEY BACK GUARANTEE:** If within ten days you return merchandise in new and re-saleable condition we will refund your original purchase price. All refunds, exchanges or repairs include original cartons, packaging, and manuals and be in new and re-saleable condition and accompanied by your original invoice. A 10% re-stocking fee may be charged on returns at our discretion.
Not responsible for typographical errors
Prices subject to change without notice
Dealer inquiries welcome
TRS-80™ TANDYCORP.

SAVE TIME. . . ORDER BY PHONE
TOLL FREE: 800-621-3229
IN ILLINOIS: 312-987-1024

MIDWEST COMPUTER PERIPHERALS

1467 South Michigan Av.
Chicago, IL. 60605 ✓8

We pay UPS charges on all orders in continental U.S.

LIST OF ADVERTISERS

RS Number		Page
56	ABM Products	170
452	A. M. Electronics	191
445	AT-80	131
229	Access Unlimited	193
34	Acorn Software Products	165
213	Adventure International	25
387	Aerocomp, Inc	226, 227
69	Alpha Byte Storage	28-30
210	Alpha Products Company	125
262	Alpha Products Company	127
124	Alphanetics	296
138	The Alternate Source	132, 151, 174, 249, 263
256	American Business Computers	143
211	American Business Computers	143
196	American Business Computers	143
396	American Business Computers	142
397	American Business Computers	143
483	American Business Computers	143
484	American Business Computers	143
192	American Business Computers	142
317	American Business Computers	142
322	American Business Computers	142
227	American Computer Development	255
160	American Computer Development	73
461	Ancie Labs	251
264	Apparat, Inc	83-114
*	Archbold Electronics	184
491	Arcsoft	287
146	Audio Video Systems	212, 296
48	Automated Simulations	46
330	Automated Simulations	72
*	Balcode Software	253
152	BAP$ Software	274
201	Barstarnn Corporation	270
49	Basics and Beyond, Inc	291
186	Baysian Investment Services	293
237	BCCOMPCO	270
357	Big Five Software Company	211
346	Bourrut Consulting Corp	72
76	Breeze Computing	198
382	Business Micro Products	166
145	C + S Electronics	269
*	CBEMA	71
316	CFR Associates Inc	167
298	The CPU Shop	147
38	Case Computer Products Company	168
62	Cecdat, Inc	162, 294
117	Chicatrug News	283
336	Citation Group	70
32	Cload Magazine	185
263	Communications Electronics	169
167	Compiler Systems	72
100	CompuCover	264
107	Computer Applications Unlimited	296
199	Computer Case Company	245
372	Computer Disc. of America	241
240	Computer Forms	274
22	Computer Information Exchange	122
130	Computer Plus	159
36	Computer Sales and Service	251
212	Computer Shopper	232
184	Computer Store, The	432
392	Computex	275
9	Computronics, Inc	202-209
204	Comsoft	194
498	Compuvest, Inc	273
497	Connecticut Microcomputers	269
10	Contract Services Associates	163
78	Coosol, Inc	215
99	Cornwall Computer Systems	296
233	Cottage Software	287
7	Custom Computer Center	287
121	Custom Electronics	251
259	Cyber Innovations	274
*	Cybernetics, Inc	194
44	Data Train, Inc	164
274	Data Trans	253
294	Data Strategies, Inc	275
302	Decision Master	17
340	Design Solution Facility	71
123	Design Solution, Inc	141
222	Digibyte	69
313	Digital Data Supply Company	270
331	Digital Research	70
368	Digital Systems Engineering	190
335	DIP, Inc	72
440	Discount Software Group	188
88	Documan Software	263
314	Dorsette Education Systems	295
334	Dresden Assoc	73
253	Dynatek Information Systems Inc	270

RS Number		Page
*	80 Microcomputing	36, 50, 130, 268, 273, 275, 287 299, 300, 301
477	Edu-ware	132
58	Electronic Specialists	293
278	Emtrol Systems, Inc	257
487	Epsilon Systems	287
404	Epson America	121
*	Exatron	Cov.IV
141	FEC Ltd	249
12	FMG Corporation	243
342	GB Association	71
39	G & L Software Enterprises	291
79	Allen Gelder Software	269, 289
75	Godbout Electronics	289
281	Golden Braid Software	295
218	Good-Lyddon Data Systems	241
481	J. D. Gramm	296
73	The Graphic Source	187
223	H & H Trading Company	255
125	Hexagon Systems	289
23	Hobby World Electronics	303
401	Holmes Engineering	270
366	Howard W. Sams	81
103	Howe Software	293
37	IJG Inc	216, 217
*	Information Technology Systems	296
305	Insiders Software Consultants	115
2	Instant Software	42, 43, 236-239, 260, 265
246	Interface, Inc	258
287	Interlude	23
343	Interpretive Education	71
190	JPC Products	133
193	Joe Computer	220
85	Johnson Associates	293
239	Joseph Bros	270
353	Kalglo Electronics Co., Inc	275
338	Kalglo Electronics Co., Inc	73
230	Kengore Corp	201
375	Krell Software	181
53	LNW Research	139, 283
11	L T Data	59
198	The Learning Place	273
14	Level IV Products, Inc	198
391	Lindbergh Systems	259
341	Lindbergh Systems	70
208	Little Bee Educational Programs	249
15	Lobo Drives International	Cov.III
349	MFJ Enterprises	72
466	Mr. X Consulting Inc	263
451	MTS Enterprises	273
268	Maine Software	289
87	Management Systems Software	215
90	Manhattan Software, Inc	220
270	Mark Gordon Computers	231
128	Med Systems Software	118, 119
421	Medfield Computer	258
272	Mega Systems	296
104	Mercer Systems, Inc	285
20	Meta Technologies Corp	9, 11, 13, 15
54	Micro Architect	289
348	Micro Architect, Inc	71
205	Micro Blajak Systems, Inc	264
214	The Micro Clinic	285
379	Micro-Design	220
476	Micro-80	258
170	Micro-Investment Software	71
89	Micro Learningware	264
72	Micro Management Systems Inc	197
68	Micro Matrix	189
29	Micro Mega	279
310	Micro Mint	258
384	Micro Systems Software Inc	6
350	Micro Works	72
458	MicroCompatible Inc	51
252	MicroCompatible Inc	213
171	Microcomputer Specialists	71
*	Microcomputer Tech. Inc	152, 153
248	MicrOdome	274
306	Microperipheral Corp	171
378	Microproof	257
109	MicroWorks, The	283
8	Midwest Computer Peripherals	304, 305
112	Miller Microcomputer Services	150
24	Mini Micro Mart Inc	302
98	Minis 'n Micros Inc	264
221	MISOSYS	291
333	Modular Software Assoc	73
*	Mullen Computer Products	281
144	Mumford Micro Systems	235
135	NDM Design	255
*	NRI Schools	82

RS Number		Page
381	National Computer Conference	285
142	National Tricor, Inc	241
55	Nautilus	224
194	New England Business Service, Inc	231
332	Next In Line, Inc	70
74	Northeast Microware	295
389	Omega Sales	20
105	Omnitek	275
296	Orange Micro Inc	115
376	Orion Instruments	68
308	Ozark Mountain Software	287
347	P + A Electronics	72
406	P & S Electronics	295
370	Pacific Exchanges	295
153	Pacific Office Systems	234
64	Pan American Electronics	185
169	Parasitic Engineering Inc	73
207	Pensadyne Computer Services	41
408	Percom Data Company	3
1	Percom Data Company	Cov.II
162	Percom Data Company	70
51	Perry Gas & Oil	225
422	Personal Micro Computers, Inc	229
*	Phase I Systems	183
344	Phase I Systems	73
285	Printel Inc	244
17	The Program Store	60, 61
21	Programma International	173, 175
364	The Programmers Guild	58
110	Programs Unlimited	223
441	Prosoft	167
166	Prosoft	71
269	Quant Systems	273
304	Quarp Publishing	273
41	Racet Computes	157
161	Racet Computes	73
*	Realty Software Company	264
173	REMarkable Software	71
70	Remsoft, Inc	132
499	Remtron	287
276	Richcraft Engineering Ltd	270
468	Rochester Data Inc	232
91	68 Micro Journal	274
373	SID	280
291	Scientific Engineering Lab	241
168	Scott Instruments	73
297	Service Technologies, Inc	245
19	Simutek	224, 233
232	Snapp	26, 27
495	Soft Sector Marketing Inc	75
434	Soft Sector Marketing Inc	77
494	Soft Sector Marketing Inc	76
496	Soft Sector Marketing Inc	78
165	Soft Sector Marketing Inc	73
356	Software Affair	263
299	Software Concepts	244
220	Software Critic	270
*	Software Discount	264
42	Software Etc	244
380	Software Innovations	39
278	Software Innovations	39
289	Softworx, Inc	247
132	Spectral Assoc	220
275	Speedway Electronics	213
438	Stocking Source	45
82	Sturdivant & Dunn, Inc	241
150	Sublogic	225
267	Suma Microware	274
403	Superior Software	251
231	Synergistic Solar Inc	287
*	Synergistic Solar Inc	70
139	Syntex Electronic Innovations	293
358	Syracuse R & D Center	174
157	Systems Shack	295
473	Systemworks	167
163	TYC Software	72
148	Tab Sales Company	273
45	Taranto & Associates	19
147	Task Computer Applications	123
25	Texas Computer Systems	234
402	Turtle Computer Software Corp	149
*	V R Data Corporation	281
137	Van Horn Office Supply	281
256	Vern Street Products/Keyline Computer Products	111
363	Walonick Associates	249
279	Wilson Software Division	295
482	York 10 Computerware	270

*This advertiser prefers to be contacted directly.

READER SERVICE

This card valid until May 31, 1981.

Please help us to bring you a better magazine—by answering these questions.

I. What is your age?
- ☐ A. under 18
- ☐ B. 18-22
- ☐ C. 23-40
- ☐ D. 41-60
- ☐ E. over 60

II. What is your occupation?
- ☐ 1. Professional
- ☐ 2. Engineer
- ☐ 3. Data processing
- ☐ 4. Business
- ☐ 5. Education
- ☐ 6. Technician
- ☐ 7. Student
- ☐ 8. Other

III. What are your primary applications of your TRS-80 (check only two)?
- ☐ A. Business
- ☐ B. Games
- ☐ C. Home
- ☐ D. Education
- ☐ E. Scientific
- ☐ F. Control
- ☐ G. Music

IV. Your TRS-80, is it a
- ☐ 1. Level I
- ☐ 2. Level II
- ☐ 3. Model II
- ☐ 4. Don't own one yet

V. What peripherals do you have (check all that apply)?
- ☐ A. Expansion interface
- ☐ B. Disk
- ☐ C. Printer

VI. How much have you spent on hardware?
- ☐ 1. less than $500
- ☐ 2. $500-1,000
- ☐ 3. $1,000-2,000
- ☐ 4. $2,000-4,000
- ☐ 5. $4,000-6,000
- ☐ 6. more than $6,000

VII. How much have you spent on software?
- ☐ A. less than $100
- ☐ B. $100-250
- ☐ C. $250-500
- ☐ D. $500-1,000
- ☐ E. more than $1,000

VIII. What is your level of education?
- ☐ 1. Post-graduate
- ☐ 2. College
- ☐ 3. High school

IX. How many people read your copy of 80 Microcomputing?
- ☐ A. 1
- ☐ B. 2
- ☐ C. 3
- ☐ D. 4 or more

X. If you are not a subscriber please circle number 500.

80 Microcomputing • POB 2743 • Clinton IA 52735

80 Microcomputing • APRIL 1981

Reader Service: To receive more information from any of the advertisers in this issue of 80 Microcomputing, circle the number on the postage-paid Reader Service Card that corresponds with the Reader Service number on the ad in which you are interested. You will find numbers, preceded by a ✓, near the logo of each advertiser. Complete the entire card, drop into a mailbox and in 4-6 weeks you will hear from the advertiser directly.

1	6	11	16	21	126	131	136	141	146	251	256	261	266	271	376	381	386	391	396
2	7	12	17	22	127	132	137	142	147	252	257	262	267	272	377	382	387	392	397
3	8	13	18	23	128	133	138	143	148	253	258	263	268	273	378	383	388	393	398
4	9	14	19	24	129	134	139	144	149	254	259	264	269	274	379	384	389	394	399
5	10	15	20	25	130	135	140	145	150	255	260	265	270	275	380	385	390	395	400
26	31	36	41	46	151	156	161	166	171	276	281	286	291	296	401	406	411	416	421
27	32	37	42	47	152	157	162	167	172	277	282	287	292	297	402	407	412	417	422
28	33	38	43	48	153	158	163	168	173	278	283	288	293	298	403	408	413	418	423
29	34	39	44	49	154	159	164	169	174	279	284	289	294	299	404	409	414	419	424
30	35	40	45	50	155	160	165	170	175	280	285	290	295	300	405	410	415	420	425
51	56	61	66	71	176	181	186	191	196	301	306	311	316	321	426	431	436	441	446
52	57	62	67	72	177	182	187	192	197	302	307	312	317	322	427	432	437	442	447
53	58	63	68	73	178	183	188	193	198	303	308	313	318	323	428	433	438	443	448
54	59	64	69	74	179	184	189	194	199	304	309	314	319	324	429	434	439	444	449
55	60	65	70	75	180	185	190	195	200	305	310	315	320	325	430	435	440	445	450
76	81	86	91	96	201	206	211	216	221	326	331	336	341	346	451	456	461	466	471
77	82	87	92	97	202	207	212	217	222	327	332	337	342	347	452	457	462	467	472
78	83	88	93	98	203	208	213	218	223	328	333	338	343	348	453	458	463	468	473
79	84	89	94	99	204	209	214	219	224	329	334	339	344	349	454	459	464	469	474
80	85	90	95	100	205	210	215	220	225	330	335	340	345	350	455	460	465	470	475
101	106	111	116	121	226	231	236	241	246	351	356	361	366	371	476	481	486	491	496
102	107	112	117	122	227	232	237	242	247	352	357	362	367	372	477	482	487	492	497
103	108	113	118	123	228	233	238	243	248	353	358	363	368	373	478	483	488	493	498
104	109	114	119	124	229	234	239	244	249	354	359	364	369	374	479	484	489	494	499
105	110	115	120	125	230	235	240	245	250	355	360	365	370	375	480	485	490	495	500

Name _____

Address _____

City _____ State _____ Zip _____

BOOKS

80 Microcomputing
Peterborough NH 03458

Please send me the following 80 Microcomputing products:

Qty.	Catalog #	Title	Unit Price	Total

Add $1 shipping/handling _____

Total _____

Enclosed $_____ ☐ Check ☐ M.O.
Bill: ☐ AE ☐ MC ☐ VISA

Card # _____

Exp date _____ Interbank # _____

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

Please allow 4–6 weeks for delivery

No C.O.D. orders accepted.

4/81

SUBSCRIPTION

80 Microcomputing POB 981
Farmingdale NY 11737

80 Microcomputing subscribers SAVE 40% Subscribe now.

Please allow 4–6 weeks for delivery

☐ New Subscription ☐ Renewal
☐ 1 year—$18 ☐ 2 years—$30 ☐ 3 years—$45
☐ Enclosed $_____ ☐ Check ☐ M.O.
Bill: ☐ MC ☐ VISA ☐ AE ☐ Me

Card # _____ Exp. date _____

Signature _____ Interbank # _____

Name _____

Address _____

City _____ State _____ Zip _____

Canada: $20 1 year only, US funds
Other foreign: $28 one year only, US funds

314B9

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 780 FARMINGDALE NY 11737

POSTAGE WILL BE PAID BY ADDRESSEE

80 microcomputing™

Subscription Dept.
POB 981
Farmingdale NY 11737

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 80 PETERBOROUGH NH 03458

POSTAGE WILL BE PAID BY ADDRESSEE

80 microcomputing™

Peterborough NH 03458

Att. Mail Order

BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 217 CLINTON IA 52735

POSTAGE WILL BE PAID BY ADDRESSEE

80 microcomputing T.M.

POB 2743
Clinton IA 52735

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

Expand your TRS-80*

With The LOBO LX-80 Expansion Interface

Now you can realize all the power and potential of your TRS-80*, Model 1. If it's add-on memory you need, your LX-80 can accommodate up to four 5¼-inch, single- or double-density 35, 40 or 80 track mini-floppies, four 8-inch floppies (single or double sided), and up to eight Winchester fixed disk-drives (5¼". 8", 14").

LOBO's powerful new LDOS™ operating system, provided with your LX-80, allows for the use of any eight drives, in any combination, single or double density.

And there's more ... lots more. There are two parallel ports (standard), two serial ports (optional), a keyboard ROM override switch, and a 32K memory expansion (optional). Send for a free LX-80/TRS-80 cost performance comparison chart.

For the full story on how the LX-80 can expand your TRS-80, see your nearest LOBO dealer, or write or call:

*TRS-80 is a registered trademark of Radio Shack, a Tandy Company.

LOBO drives INTERNATIONAL

LOBO DRIVES INT'L
354 South Fairview Ave.
Goleta, CA 93117
(805) 683-1576 ✓15

See us at the N.C.C., booth #4211

To add the speed, capacity and reliability of a disk for only $249.50...

CALL OUR HOTLINE
(800) 538-8559
In California Call (408) 737-7111

exatron

181 Commercial Street, Sunnyvale, Calif. 94086

VisiCalc™ is Great! But you need a disk. ES/F "Electric Spreadsheet" $49.95. For Level II and 16K.

CALL OUR HOTLINE
(800) 538-8559
In California Call (408) 737-7111

exatron

181 Commercial Street, Sunnyvale, Calif. 94086

TM VisiCalc is a registered trademark of Personal Software, Inc. and Software Arts, Inc.

Exclusive!

All Exatron products come with a 30 day money back guarantee and one full year warranty.

Complete information package—$3.00. Includes Manual, Software Catalogue and list of local Users Groups.

Complete Starter Kit includes ES/F System and Exatron's Software Package. $349.50

CALL OUR HOTLINE
(800) 538-8559
In California Call (408) 737-7111

exatron

181 Commercial Street, Sunnyvale, Calif. 94086

NEW machine language ES/F Word Processor System with UC/LC–$24.95. No hardware modification.

CALL OUR HOTLINE
(800) 538-8559
In California Call (408) 737-7111

exatron

181 Commercial Street, Sunnyvale, Calif. 94086